atlanta testing
& engineering

8901 farrow road / suite 108a / columbia, south carolina 29203 / (803) 736-1700 / fax: (803) 736-5005

1969 Our 20th Year 1989

August 3, 1989

RECEIVED
GROUND-WATER

Mr. Howard Smith
Crown Central Petroleum Corporation
One North Charles
Baltimore, Maryland 21201

High OVA
Low TRPH
ND 6-N

Re: Tank Assessment Report
Crown Central Petroleum Facility
Store No.: SC-015
Location: 3800 Devine Street
Richland County
Columbia, South Carolina
Job No. C-1012
N-40-NO-07680

Dear Mr. Smith:

SUPERB REQ Paid in Full

Atlanta Testing & Engineering has completed the authorized underground storage tank assessment at the referenced site and presents its findings in this report.

INTRODUCTION

The Crown station site is located at 3800 Devine Street in Columbia, South Carolina. The assessment was performed to evaluate soil conditions and verify that no releases had occurred in the vicinity of the underground storage tank (UST) pit. The work was performed in accordance with our Proposal No. 89-069 and Crown Purchase Order Number 9-328, as authorized by R.S. Garvine on April 26, 1989.

UST
42T
DOCKETING

SCOPE OF WORK

The scope of work, as identified in the proposal, is as follows:

1. Install four monitoring/leak detection wells within the UST pit at locations marked by Crown. To avoid cross-contamination between wells, the augers and all other down hole equipment will be steam-cleaned prior to drilling each well.

2. Collect soil samples from each well bore at a depth of seven feet. These samples are to be forwarded to Harco Technologies, Decatur, Georgia for corrosion analysis.

SCOPE OF WORK (continued)

3. Collect composite soil samples from each well bore for Organic Vapor Analysis (OVA). Samples from dry holes are to be collected at a depth of fifteen to eighteen feet. Samples from wet holes are to be collected just above the water table.

4. If the OVA results exceed 10 parts per million (ppm) in the Coastal Plain or 100 ppm in the Piedmont, then submit the soil samples to an approved laboratory for Total Petroleum Hydrocarbon (TPH) analysis. In addition, if the hole is wet, develop and sample the well. The water sample is to be submitted to an approved laboratory for Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) analysis.

5. Clean site and dispose of "clean" soils.

6. Prepare a report documenting our findings, including a site map with well locations, well completion logs, soil and groundwater quality analyses, conclusions, and recommendations for additional action, as necessary.

SUMMARY OF FINDINGS

The following is a summary of our findings:

1. Four monitor/leak detection wells were installed on June 13 - 14, 1989 to a depth of eighteen feet. The well locations are shown on Plate 1. Well completion logs are presented in the Appendix.

2. Soil samples from a depth of seven feet were shipped to Harco Technologies on June 27, 1989 accompanied with a Chain of Custody Log.

3. The OVA testing results indicated organic vapor concentrations greater than 10 ppm in wells MW-1, MW-2, and MW-3. The OVA concentrations are included in Table 1.

4. The laboratory analysis of soil samples indicated detectable levels of TPH (petroleum hydrocarbon) constituents in wells MW-1 and MW-3. The laboratory analytical report is included in the Appendix.

5. Groundwater was not encountered in the four wells.

WELL INSTALLATION

The leak detection monitor wells were installed to a predetermined depth of eighteen feet. The wells were constructed with fifteen feet of four inch schedule 40 PVC slotted screen and three feet of riser. The wells were completed with locking caps and set in waterproof protective manholes. The wells were installed by a South Carolina Certified Well Driller, with approval granted by the South Carolina Department of Health and Environmental Control (SCDHEC), in accordance with R.61-71.

SAMPLING AND ANALYSIS PROGRAM

A soil sample from each well bore was collected from the hollow stem augers and tested for organic vapors (OVA) by the head space vapor extraction technique. The sample depths were typically fifteen to eighteen feet; however, if groundwater was encountered, the samples were collected just above the water table. The soil samples were stored in clean glass jars allowing approximately 25% head space. The jars were sealed with parafilm and a screw top lid, then transported to the Atlanta Testing & Engineering Columbia office where they were analyzed. The OVA testing was performed at room temperature, using a Photovac International, Inc. TIP II (Total Ionizable Present) Air Analyzer, to measure the total organic vapors present in the samples. The TIP II detects organic vapors with a photoionization potential less than 10.6 eV. Hydrocarbon constituents such as Benzene, Toluene, Ethylbenzene, and Xylenes are all amenable to this type of screening. The total organic vapor concentrations from the soil samples are recorded in parts per million, with a detection limit of 0.1 ppm.

GW not encountered

Appropriate soil samples were shipped in an iced container to Savannah Laboratories (Savannah, Georgia), accompanied with a Chain of Custody Log. The samples were analyzed for TPH in accordance with EPA Method 418.1.

A centrifugal pump or Teflon bailer was used for well development. Prior to sampling, a minimum of three well volumes were evacuated from each well. Well development and sampling were performed concurrently.

Clean Teflon bailers were used to collect groundwater samples. Prior to sampling each well, the bailers were washed with lab grade detergent, rinsed with de-ionized water, rinsed with methanol and rinsed again with de-ionized water. The samples were placed in laboratory prepared containers, packed in a cooler filled with ice, and shipped to Savannah Laboratories accompanied with a Chain of Custody Log. The samples were analyzed for BTEX in accordance with EPA Method 602.

CONCLUSIONS AND RECOMMENDATIONS

Based on the field and analytical data, a release of petroleum hydrocarbons has apparently occurred in the vicinity of the UST pit on this site. Additional assessment is recommended to evaluate the extent of hydrocarbon constituents in the soil.

LIMITATIONS

This report has been prepared for the exclusive use of Crown Central Petroleum Corporation. The information contained in this document is applicable only to Store Number SC-015, in Richland County, South Carolina. We cannot accept responsibility for damages or claims due to past or future contamination or subsequent remediation. Our findings have been developed in accordance with accepted standards of hydrogeology practice in the State of South Carolina, available information and our professional judgement. No other warranty is expressed or implied.

ACKNOWLEDGEMENT

Atlanta Testing & Engineering appreciates the opportunity to provide professional services to Crown Central Petroleum Corporation. If you have any questions regarding the report contents or if we may be of additional assistance, please contact us.

Very truly yours,

ATLANTA TESTING & ENGINEERING

James T. Spell, Jr.
Environmental Engineer

Charles R. Clymer, Jr., P.G.
Senior Hydrogeologist
Reg. SC 236

JTP/CRC:cbs

cc: Rodney Readling, Crown
Jim Woody, Crown
Jim Hess, SCDHEC

APPENDIX

PLATE 1 - SITE PLAT WITH WELL LOCATIONS

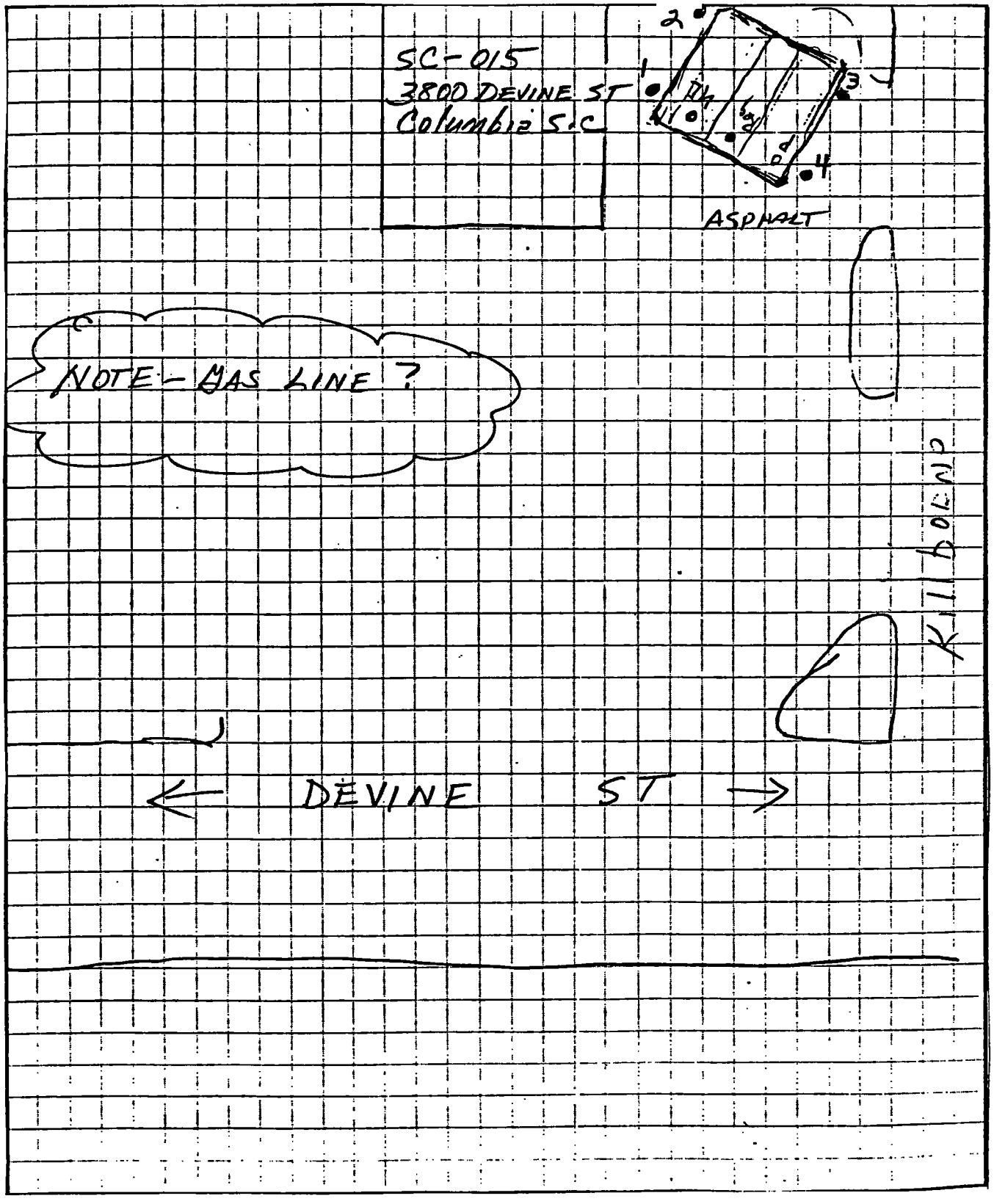
TABLE 1 - TOTAL ORGANIC VAPOR CONCENTRATIONS

WELL COMPLETION LOGS

LABORATORY ANALYTICAL REPORTS

CHAIN OF CUSTODY LOGS

AF 51093AB



PLAT PROVIDED BY CCPC PERSONNEL	DATE 8/1/89	DRAWN BY CCPC	CHECKED BY -	SCALE NOT TO SCALE	JOB NO. C-1012	PLATE NO. 1

atlanta testing & engineering
geotechnical and testing engineers
atlanta, greenville, charlotte,
tampa, jacksonville, lakeland, marco island

SITE PLAT WITH WELL LOCATIONS
CROWN CENTRAL PETROLEUM CORP.
TANK ASSESSMENT PROGRAM
SOUTH CAROLINA

ATE-108

TABLE 1

TOTAL ORGANIC VAPOR CONCENTRATIONS
CROWN CENTRAL PETROLEUM CORPORATION
STORE NO. - SC-015
LOCATION - 3800 DEVINE STREET
RICHLAND COUNTY
COLUMBIA, SOUTH CAROLINA
JOB NO. C-1012

Boring No.	Depth (feet)	Total Organic* Vapor Concentrations (ppm)
MW-1	15 - 18	620.0
MW-2	15 - 18	12.2
MW-3	15 - 18	65.5
MW-4	16 - 18	5.1

NOTE: Vapors measured are those with an Ionization Potential of 10.6 eV or less.

* *Isobutylene Equivalent*

atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-1

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/13/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

	SAND	BENTONITE	CEMENT
MATERIAL:			
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

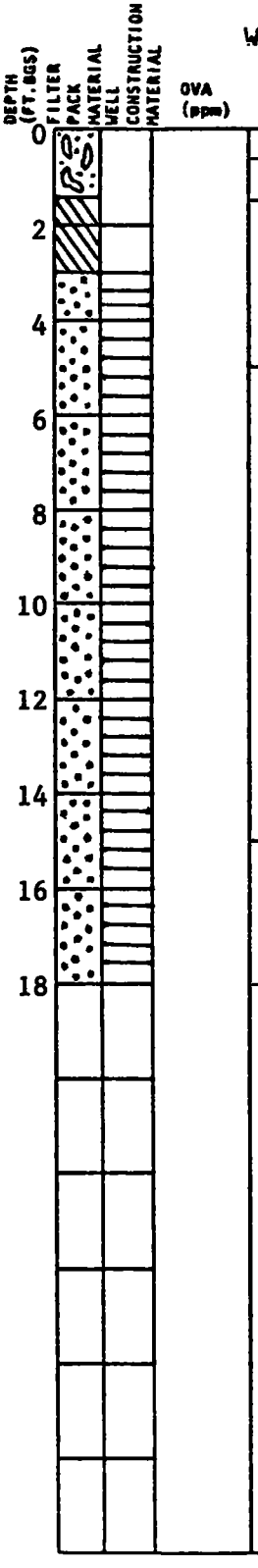
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-2

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/13/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

MATERIAL:	SAND	BENTONITE	CEMENT
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

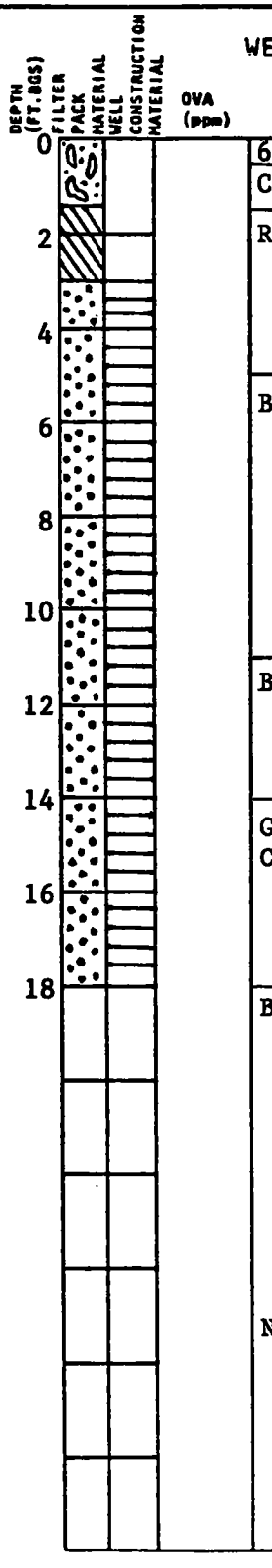
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-3

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/14/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

MATERIAL:	SAND	BENTONITE	CEMENT
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

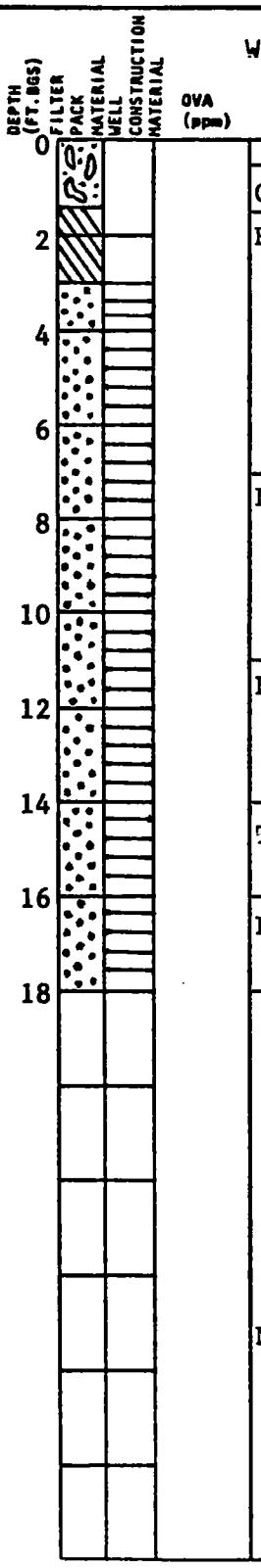
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-4

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/14/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

	SAND	BENTONITE	CEMENT
MATERIAL:			
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

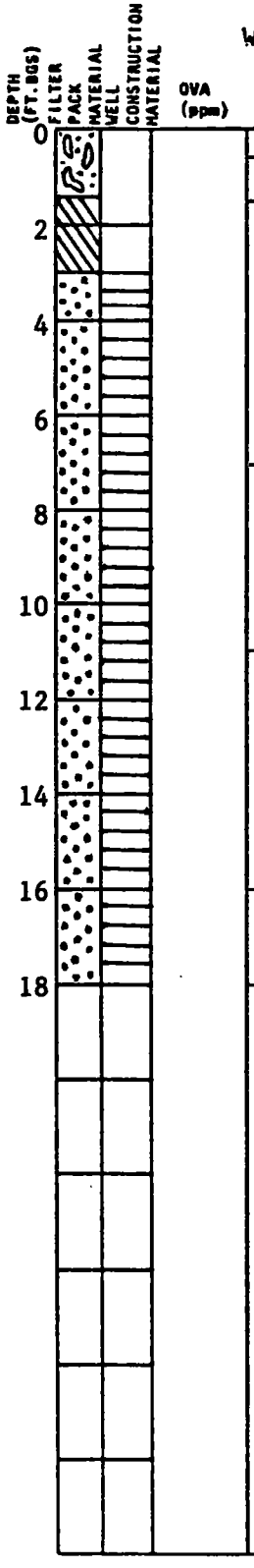
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



SOIL/ROCK DESCRIPTION

- 0 – 6" ASPHALT
- CRUSHED STONE
- 2 – REDDISH-BROWN CLAYEY SAND
- 6 – BROWN SILTY SAND WITH CLAY
- 8 – 10 –
- 12 – TAN SILTY SAND WITH GRAVEL
- 14 –
- 16 – RED-WHITE MOTTLED SILTY CLAY
- 18 – BORING TERMINATED AT 18 FEET

NO GROUNDWATER ENCOUNTERED

James W. Andrews, Ph.D.
President

Janette Davis Long
Vice-President

SAVANNAH LABORATORIES
AND ENVIRONMENTAL SERVICES, INC.
5102 LaRoche Avenue (31404)
P. O. Box 13548 • Savannah, GA 31416-0548
(912) 354-7858

RECEIVED
JUL 5 1989

LOG NO: 89-4864
Received: 19 JUN 89

Mr. Jamie Spell
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: C-1012/SC-015 3800 Devine St.

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , SOLID OR SEMISOLID SAMPLES	SAMPLED BY
4864-1	MW-1 15'-18'	Client
4864-2	MW-2 15'-18'	
4864-3	MW-3 15'-18'	

PARAMETER	4864-1	4864-2	4864-3
Petroleum Hydrocarbons (IR), mg/kg dw	37	<10	27
Percent Solids, %	91	91	82

Aug 15 '89
TPH

James W. Andrews, Ph.D.
President

Janette Davis Long
Vice-President

SAVANNAH LABORATORIES
AND ENVIRONMENTAL SERVICES, INC.
5102 LaRoche Avenue (31404)
P. O. Box 13548 • Savannah, GA 31416-0548
(912) 354-7858

RECEIVED
JUL 5
LOG NO: 89-4864
Received: 19 JUN 89

Mr. Jamie Spell
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: C-1012/SC-015 3800 Devine St.

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , QC SAMPLES	SAMPLED BY
4864-4	Detection Limits	Client
4864-5	Accuracy (Mean % Recovery)	
4864-6	Precision (% RPD)	

PARAMETER	4864-4	4864-5	4864-6
Petroleum Hydrocarbons (IR), mg/kg dw	10	100 %	8 %

Methods: EPA SW-846.

Janette D. Long

Janette D. Long

atlanta testin engineering

CHAIN OF CUSTODY LOG

CLIENT: CROWN

SAMPLE COLLECTED BY: T. COPPAGE

AT&E JOB NO.: C-101Z

DATE SAMPLED: 6/13-6/14-89 TIME: PM/AM

SITE LOCATION: COLUMBIA

SHEET NO.: 1 OF 1

PROJECT NAME: SC-015 / 3800 DEVINE ST

SAMPLE ID NUMBER	SAMPLE LOCATION	TOTAL NUMBER OF CONTAINERS PER LOCATION	DESCRIPTION (CONTAINERS) / QUANTITY EACH CONTAINER (TALL VOM JARS)	COMMENTS
MW-1	15'-18'	1	1	
MW-2	15'-18'	1	1	
MW-3	15'-18'	1	1	
4864				

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
James J. Dyer	6-16-89/1530	Sarita Samuel	6/17/89 1200PM

ANALYZE FOR: TPH (EPA 418.1)

DETECTION LIMITS: 10 ppm

SCHEDULE: 2 weeks

NOTIFICATION: PLEASE CALL JAMIE SPELL (803) 736-1700

NOTE TO LAB

PLEASE SEND A COPY OF THIS SHEET WITH YOUR SIGNATURE BACK TO ATLANTA TESTING & ENGINEERI

8901 Farrow Rd. Suite 108
Columbia, SC 29203

atlanta testing & engineering

CHAIN OF CUSTODY LOG

JUL 26 1989

CLIENT: CROWN PETROLEUM

SAMPLE COLLECTED BY:

AT&E JOB NO.: C-1012

DATE SAMPLED: TIME:

SITE LOCATION: COLUMBIA, S.C.

SHEET NO.: 1 OF 1

PROJECT NAME: CROWN

SAMPLE ID NUMBER	SAMPLE LOCATION	TOTAL NUMBER OF CONTAINERS PER LOCATION	DESCRIPTION (CONTAINERS) / QUANTITY EACH CONTAINER (Qt. Ziplock Bags)	COMMENTS
SC-639	7'	1	1	SAMPLES FOR
SC-637	7'	1	1	HARCO LABS
SC-634	7'	1	1	
SC-636	7'	1	1	
SC-635	7'	1	1	
SC-638	7'	1	1	
SC-016	7'	1	1	
SC-015	7'	1	1	
SC-640	7'	1	1	
SC-014	7'	1	1	

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
James L Spell Jr.	6-27-89/1700	C. J. [illegible]	7-5-89

ANALYZE FOR:

DETECTION LIMITS:

SCHEDULE:

NOTIFICATION: PLEASE CALL JAMIE SPELL (803) 736-1700

NOTE TO LAB
PLEASE SEND A COPY OF THIS SHEET WITH YOUR SIGNATURE BACK TO
ATLANTA TESTING & ENGINEERING
8901 Farrow Rd. Suite 108-A
Columbia, SC 29203

ACUTEST

November 2, 1989

Mr. Howard Smith
Crown Central Petroleum Corp.
One N. Charles St.
Baltimore, MD 21201

Test No. : 891022
Test Date : October 22, 1989
Location : Fast Fare #015
3800 Devine
Columbia, SC

Dear Mr. Smith:

A precision test was performed on tanks at the above location using the LEAK COMPUTER® System. We have reviewed the data produced in conjunction with this test for purposes of verifying the results and certifying the tank systems. The testing was performed in accordance with AcuTest protocol, and therefore satisfies all requirements for such testing as set forth by NFPA 329-87 and USEPA 40 CFR part 280.

The results of testing are shown on the following page, and indicate whether the full systems, including the tank and all nonpressurized piping, or just the individual tank passed or failed. Included with the report are computer printouts of the data compiled during the last hour of each test. Each printout shows leak rate, and the confidence level (three times standard deviation) of that leak rate. This information is stored in a permanent file if future verification of test results is needed.

QUALITY ASSURANCE BY:

Andrew R. Herdman
A/T #005

TEST CERTIFIED BY:

B. G. Van Delinder
A/T #049

DGV:smc\493



ACUTEST CORPORATION 1141 BRITTMOORE ROAD HOUSTON, TEXAS 77043
(713) ACUTEST (800) 992-8884 (713) 228-8378

Test No. : 891022
Test Date : October 22, 1989
Location : Crown #15
3800 Devine
Columbia, SC

TEST RESULTS

PRODUCT	VOLUME (GAL)	WATER IN TANK (INCHES)	HIGH LEVEL LEAK RATE (GPH)	LOW LEVEL LEAK RATE (GPH)	FULL SYSTEM	TANK ONLY
UNLEADED	10,000	0	0.04 @ 46″	0.02 @ 32″	PASS	PASS
REGULAR	8,000	0	-0.05 @ 33″	-	PASS	PASS
PREMIUM	6,000	0	0.01 @ 45″	-0.02 @ 28″	PASS	PASS

COMMENTS: The field technician could not run the product line tests because the lines could not be isolated. These lines need to be broken at the union and capped off. When this is achieved, AcuTest will schedule a line test of these systems.

Paul - RCAS 7105
(1) Superfund
(2) Technical directives

atlanta testing
& engineering
8901 farrow road / suite 108a / columbia, south carolina 29203 / (803) 736-1700 / fax: (803) 736-5005

June 8, 1990

RECEIVED
JUN 18 1990
GROUNDWATER
PROTECTION DIVISION

Mr. Howard Smith
Crown Central Petroleum Corporation
One North Charles
Baltimore, Maryland 21201

Re: Release Investigation and
Confirmation Report
Crown Station No. SC-015
3800 Devine Street
Columbia, South Carolina
Job No. C-1044

N-40-NO-01680

Dear Mr. Smith:

Atlanta Testing & Engineering has completed the release investigation and confirmation steps in compliance with the Federal Underground Storage Tank (UST) regulations, 40 CFR Section 280.52, at the referenced site and presents its findings in this report. The work was performed in accordance with Atlanta Testing & Engineering's Proposal No. 89-149 and Crown Central Petroleum Corporation Purchase Order Number 9-183, as authorized by Mr. R. S. Garvine on November 3, 1989.

INTRODUCTION

The Crown station is located at 3800 Devine Street in Columbia, South Carolina. In August 1989 Atlanta Testing & Engineering completed a preliminary tank assessment to evaluate soil conditions and verify that no releases had occurred in the vicinity of the UST pit. Four leak detection assessment wells were installed near the corners of the UST pit. Organic vapor analyses (OVA) of soil samples from each well indicated OVA concentrations greater than 10 parts per million (ppm) in wells MW-1, MW-2 and MW-3. Laboratory analysis of soil samples from MW-1, MW-2, and MW-3 indicated detectable levels of total petroleum hydrocarbon (TPH) constituents in wells MW-1 and MW-3. Based on the field and analytical data, a release of petroleum hydrocarbons had apparently occurred in the vicinity of the UST pit. Additional site assessment activities were recommended in Atlanta Testing & Engineering's Tank Assessment Report dated August 3, 1989.

UST
44.T
DOCKETING

SCOPE OF WORK

Our scope of work for the release investigation included the installation of one monitoring well to bracket the water table, and groundwater sampling and analysis to evaluate groundwater quality conditions. However, Atlanta Testing & Engineering personnel visited the site on December 6, 1989, and discovered that wells MW-3 and MW-4 contained groundwater. The assessment wells were previously dry, at the time of installation. Rather than install well MW-5, as proposed, the two existing wells were sampled for benzene, toluene, ethylbenzene, and xylenes (BTEX) analysis per EPA Method 602.

GROUNDWATER SAMPLING AND ANALYSIS

The depth to groundwater was measured at 16.00 feet to 16.68 feet in the four wells. Dedicated polyethylene bailers were used to purge the wells and collect groundwater samples. Prior to sampling, a minimum of three well volumes were evacuated from each well. Well development and sampling were performed concurrently. The samples were placed in laboratory prepared containers, packed in a cooler filled with ice, and shipped to Savannah Laboratories accompanied with a Chain of Custody Log. The samples were analyzed for BTEX in accordance with EPA Method 602.

Groundwater samples from the two wells were collected on December 19, 1989 and submitted to Savannah Laboratories and Environmental Services, Inc. for BTEX analysis. The laboratory analyses indicated detectable levels of BTEX constituents in wells MW-3 and MW-4. The total BTEX concentrations ranged from 29 parts per billion (ppb) at MW-3 to 1,690 ppb at MW-4. The laboratory analytical report is included in the Appendix.

CONCLUSIONS

The laboratory analytical results confirm a release of petroleum hydrocarbons in the vicinity of the UST's. The detected concentrations of volatile organic compounds exceed drinking water standards. The specific source of the hydrocarbon release is unknown.

ACKNOWLEDGEMENT

Atlanta Testing & Engineering appreciates the opportunity to provide professional services to Crown Central Petroleum Corporation. If you have any questions regarding the report contents or if we may be of additional assistance, please contact us.

Very truly yours,

ATLANTA TESTING & ENGINEERING

James T. Spell, Jr.
Environmental Engineer

Charles R. Clymer, Jr., P.G.
Senior Hydrogeologist
Reg. SC 236

APPENDIX

PLATE 1 - SITE PLAT WITH WELL LOCATIONS

LABORATORY ANALYTICAL REPORT

CHAIN OF CUSTODY LOG

James W. Andrews, Ph.D.
President

Janette Davis Long
Vice-President

SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue (31404)
P. O. Box 13548 • Savannah, GA 31416-0548
(912) 354-7858

LOG NO: 89-11167

Received: 20 DEC 89

Mr. Jamie Spell
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: C-1044/SC-015/3800 Devine Street

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
11167-1	MW-3 (12.19.89) 1330	Client
11167-2	MW-4 (12.19.89) 1330	

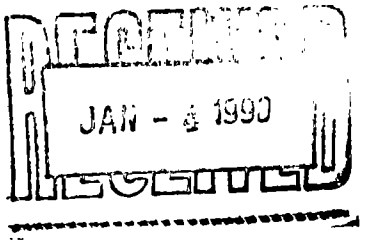
PARAMETER	11167-1	11167-2
Purgeable Aromatics (602/8020)		
Benzene, ug/l	13	490
Ethylbenzene, ug/l	<1.0	330
Toluene, ug/l	14	130
Xylenes, ug/l	1.9	740

James W. Andrews, Ph.D.
President

Janette Davis Long
Vice-President

SAVANNAH LABORATORIES AND ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue (31404)
P. O. Box 13548 • Savannah, GA 31416-0548
(912) 354-7858



LOG NO: 89-11167

Received: 20 DEC 89

Mr. Jamie Spell
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: C-1044/SC-015/3800 Devine Street

REPORT OF ANALYTICAL RESULTS

LOG NO	SAMPLE DESCRIPTION , QC SAMPLES	SAMPLED BY
11167-3	Method Blank-Liquid	Client
11167-4	Accuracy (Mean % Recovery)-Liquid	
11167-5	Precision (% RPD)-Liquid	
11167-6	Date Analyzed-Liquid	

PARAMETER	11167-3	11167-4	11167-5	11167-6
Purgeable Aromatics (602/8020)				
Benzene, ug/l	1.0	107 %	1.0 %	12.28.89
Ethylbenzene, ug/l	1.0	---	---	12.28.89
Toluene, ug/l	1.0	114 %	1.0 %	12.28.89
Xylenes, ug/l	1.0	---	---	12.28.89

Methods: EPA 40 CFR Part 136.

Janette D. Long

CHAIN OF CUSTODY LOG

atlanta testing & engineering

CLIENT: CROWN SAMPLE COLLECTED BY: M. Hudgins

AT&E JOB NO.: C-1044 DATE SAMPLED: 12-19-89 TIME: 1:30

SITE LOCATION: 3600 Devine St, Columbia SHEET NO.: 1 OF 1

PROJECT NAME: SC-015

SAMPLE ID NUMBER	SAMPLE LOCATION	TOTAL NUMBER OF CONTAINERS PER LOCATION	DESCRIPTION (CONTAINERS) 40 ml Glass QUANTITY EACH CONTAINER	COMMENTS
MW-3		3	3	
MW-4		3	3	
11167				

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
M. Hudgins	12-19-89/7:30pm	Rhona Bonds	12/20/89, 2:45pm

ANALYZE FOR: BTEX

DETECTION LIMITS:

SCHEDULE:

NOTIFICATION: PLEASE CALL J. Spell - (803)736-1700 (FAX)736-5005

NOTE TO LAB

PLEASE SEND A COPY OF THIS SHEET WITH YOUR SIGNATURE BACK TO

ATLANTA TESTING & ENGINEERING
8901 FARROW RD., SUITE 108-A
COLUMBIA, SC 29203

South Carolina Department of Health and Environmental Control

2600 Bull Street
Columbia, S.C. 29201

Commissioner
Michael D. Jarrett

Board
Henry S. Jordan, M.D., Chairman
John B. Pate, M.D., Vice-Chairman
William E. Applegate, III, Secretary
Toney Graham, Jr., M.D.
John H. Burriss
Richard E. Jabbour, D.D.S.
Currie B. Spivey, Jr.

September 25, 1989

Mr. J. Howard Smith
Crown Central Petroleum Corporation
One North Charles
Baltimore, Maryland 21201

Re: Crown Central Petroleum Facilities
Richland, Marlboro and Lexington Counties

Dear Mr. Smith:

The Ground-Water Protection Division (GWPD) of the S. C. Department of Health and Environmental Control (SCDHEC) has reviewed the submittals for the facilities listed below. These submittals are considered to be the report of a suspected release as described in the Federal Underground Storage Tank Regulations 40 CFR Section 280.50(c). The analytical results (OVA readings and/or total petroleum hydrocarbons) indicate the possibility that a release of regulated substances has occurred at the facilities. Therefore in accordance with 40 CFR Section 280.51, release investigation and confirmation must be undertaken and the procedures outlined in 40 CFR Section 280.52 followed.

The facilities affected are as follows:

ADDRESS	SCDHEC ID	CROWN ID
1057 South Lake Drive Lexington	N-32-NO-06011	SC-611
200 Knox Abbott Drive West Columbia	N-32-NO-06018	SC-014
6340 St. Andrews Road Columbia	N-32-NO-06045	SC-608
4403 Augusta Highway West Columbia	N-32-NO-06051	SC-618
209 Wattling Road West Columbia	N-32-NO-06052	SC-620

1542 North Lake Drive Lexington	N-32-NO-06107	SC-614
210 West Main Street Bennettsville	N-34-NO-06347	SC-666
3800 Devine Street Columbia	N-40-NO-07680	SC-015
441 Piney Grove Road Columbia	N-40-NO-07683	SC-615
6930 North Main Street Columbia	N-40-NO-07684	SC-643
538 St. Andrews Road Columbia	N-40-NO-07685	SC-011
10110 Two Notch Road Columbia	N-40-NO-07884	SC-634
2409 Percival Road Columbia	N-40-NO-07890	SC-635
423 Bitternut Road Columbia	N-40-NO-07894	SC-640
8384 Two Notch Road Columbia	N-40-NO-07886	SC-637
Highways 6 & 76 Ballentine	N-40-NO-07889	SC-610
4240 Broad River Road Columbia	N-40-NO-07891	SC-609

The system test (40 CFR Section 280.52(a)) and the site check (40 CFR Section 280.52(b)) are required at these facilities. To fulfill the requirements of 40 CFR Section 280.52(b), include soil samples and at least one ground-water sample analyzed for benzene, ethylbenzene, toluene and xylene (BETX). The request for monitoring well installation should be submitted to my attention no later than October 10, 1989.

Upon SCDHEC approval and initiation of the preliminary assessment plan requested above, please be reminded that the initial response and reporting requirements outlined in 40 CFR Section 280.60 apply. If you have any questions, contact me at 734-5331.

Sincerely,

James R. Hess, P.G., Manager
Underground Storage Tank Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

JRH/lr
A:HSOVA.TXT

cc: Paul Bristol, Central Midlands District EQC
Jim Kelley, Pee Dee District EQC

CLK

Crown Central Petroleum Corporation
Refiners / marketers of petroleum products & petrochemicals
One North Charles Street • P.O. Box 1168 • Baltimore, Maryland 21203 • (301) 539-7400

September 21, 1989

Mr. Raymond Knox
South Carolina Department
of Health and Environment Control
Groundwater Protection Division
2600 Bull Street
Columbia, South Carolina 29201

RE: Trust Fund Cleanup Money

Dear Mr. Knox:

Crown Central Petroleum parent Company of Fast Fare, Inc. has undertaken a voluntary program to install site assessment wells at all South Carolina facilities. A contractor selected by Crown Central Petroleum, Atlanta Testing and Engineering, is completing the well installation, site assessment and reports. The attached sheet indicates the most recent locations that are determined to be contaminated by arbitrary OVA test results. Verbal discussions with State indicate using greater than 100 PPM in Piedmont and 10 PPM in coastal plane for threshold limits of contamination. If these arbitrary limits are exceeded, additional work is automatically initiated. Under separate cover, Atlanta Testing and Engineering will forward completed reports of all recently completed locations direct to your attention. I request that all locations which are contaminated according to South Carolina guidelines, be authorized to receive cleanup funds under the cleanup funds program.

I expect additional information is required to properly qualify these sites for cleanup funds. I request any affidavits, guidelines and additional information I need be forwarded to ensure qualification. Additional notifications and reports to follow when contamination found.

If I can provide you additional details or comments, please contact me at (301) 539-7400 extension 231.

Sincerely,

CROWN CENTRAL PETROLEUM CORP.

James H. Smith

J. H. Smith
Manager, Projects Engineering

JHS/sar

RECEIVED
SEP 28 1989
GROUND-WATER

Crown Central Petroleum Corporation
Refiners / marketers of petroleum products & petrochemicals
One North Charles Street • P.O. Box 1168 • Baltimore, Maryland 21203 • (301) 539-7400

June 22, 1990

RECEIVED
JUN 25 1990
GR...
PROTECTION DIVISION

Mr. Stan Clark
South Carolina Dept. of
Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

Dear Mr. Clark:

Atlanta Testing & Engineering sent release investigation and confirmation reports dated June 8, 1990, directly to SCDHEC. Enclosed are precision tank and line tests for the following locations:

SC-011, SC-014, SC-015, SC-608, SC-609, SC-610, SC-611
SC-614, SC-615, SC-618, SC-620, SC-634, SC-635, SC-637
SC-666

A copy of a letter from Atlanta Testing & Engineering provides a cross reference between Crown's location number and SCDHEC's permit identification number. The enclosures be duplicates from previous mailings, however, they are being provided to ensure your files are current.

If I can provide further information, please contact me.

Sincerely,

J. Howard Smith
Projects Engineer

dr

Enclosures

cc: Charles Clymer - Atlanta Testing

\gen coor\reportsc.let

Note Reg -0.05 gph. T

UST
45T
DOCKETING

JOB NO.	CROWN REF. NO.	FACILITY ADDRESS
C-1042	SC-011	538 St. Andrews Road, Columbia
C-1043	SC-014	200 Knox Abbott Drive, Cayce
C-1044	SC-015	3800 Devine Street, Columbia
C-1045	SC-608	6340 St. Andrews Road, Columbia
C-1046	SC-609	4240 Broad River Road, Columbia
C-1047	SC-610	Post Office Box 97, Ballentine
C-1048	SC-611	1057 South Lake Drive, Lexington
C-1049	SC-614	1542 North Lake Drive, Lexington
C-1050	SC-615	441 Piney Grove Road, Columbia
C-1051	SC-618	4403 August Highway, West Columbia
C-1052	SC-620	209 Wattling Road, West Columbia
C-1054	SC-634	10110 Two Notch Road, Columbia
C-1055	SC-635	2409 Percival Road, Columbia
C-1056	SC-637	8384 Two Notch Road, Columbia
C-1058	SC-666	210 W. Main Street, Bennettsville

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary
Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Currie B. Spivey, Jr.

Promoting Health, Protecting the Environment

August 27, 1990

Mr. Paul Prohoniak
Crown Central Petroleum Corporation
1345 Garner Lane, Suite 202
Columbia, SC 29210

Re: Request for Inventory Records
SUPERB Qualification
Richland and Lexington Counties

Dear Mr. Prohoniak:

The South Carolina Department of Health and Environmental Control (SCDHEC) is in receipt of the analytical results of the ground-water samples collected from the following sites;

		PCAS #
SC-015	3800 Devine Street, Columbia	7105
SC-016	3402 Main Street, Columbia	7052
SC-611	1057 South Lake Drive, Lexington	7108
SC-623	3862 Old Charleston Highway, West Columbia	7041
SC-635	2409 Percival Road, Columbia	7112
SC-639	163 Rabon Road, Columbia	7017

From the available data ground-water remediation will be required.

To assist in determination of eligibility for State Underground Petroleum Environmental Response Bank Act (SUPERB) funds this office must review the product inventory control records from the one year period prior to the release, August 1988 through August 1989, (or the last year of operation). Please send copies of the inventory records to this office marked for my attention;

If there are any questions concerning this request, please call me at (803) 734-4665.

Sincerely,

Paul M. Bergstrand

Paul M. Bergstrand, Hydrogeologist
Trust Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

PMB/pmb
CCPC-IR

cc: Howard Smith, Crown Central Petroleum Corporation

UST 46T DOCKETING

recycled paper

PCAS 7105

SOUTH CAROLINA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

TO: File N-40-NO-07687
CROWN SC-015
3800 Devine St

MEMO

DATE: 10/2/90

Jim Bills of Crown Central Petroleum called to Report a failed tightness test on the piping at this facility. The piping is no longer in use and Crown will begin assessing the [redacted] release.

Rob

UST
47T
DOCKET

WHITE - ORIGINAL • CANARY - FILE COPY

File

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary
Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Currie B. Spivey, Jr.

Promoting Health, Protecting the Environment

October 24, 1990

Mr. Paul Prohoniak
Crown Central Petroleum Corporation
1345 Garner Lane, Suite 202
Columbia, SC 29210

Re: Request for Inventory Records
SUPERB Qualification
Crown SC-015, 3800 Devine Street (PCAS 7105)
Richland County

Dear Mr. Prohoniak:

The South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the analytical results of the ground-water samples collected at the above referenced site. From the available data, ground-water remediation will be necessary.

To assist in the determination of eligibility for State Underground Petroleum Environmental Bank Act (SUPERB) funds, this office must review the product inventory control records from the one year period prior to the release, August 1988 through August 1989, or the last year in operation. These records were initially requested by Mr. Paul M. Bergstrand in a letter to you dated August 27, 1990. Please have these records submitted to my attention on or before November 23, 1990.
extended per conversation on 11-19-90.

If there are any questions concerning this request, please call me at (803) 734-5331.

Sincerely,

Lee A. Monts

Lee A. Monts
Hydrogeologist, Trust Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

LAM/lam
CROWN.INV

cc: Howard Smith, Crown Central Petroleum Corporation



recycled paper

ORGE M NIGGLE

GEORGE M. NIGGLE

N8°-7'to 39°W

110.00

24736 SQ FT
OR
0683 ACRE

INSTALL NEW BOARD ON BOARD FENCE 6' HIGH (SEE DETAIL DWG)

MW-3

MW-2

MW-4

MW-1

REMOVE EXIST BRICK WALL

EXTEND EXISTING CHAIN LINK FENCE

INSTALL NEW BOARD ON BOARD FENCE 6' HIGH (SEE DETAIL DWG) ATOP NEW CURB

REMOVE EXIST FASCIA & INSTALL MODULAR FASCIA (TYP. 3 SIDES)

REMOVE DETERIORATED CONCRETE WALK

1 STORY GLASS & BRICK

20'-0"

22'-0"

18'-0"

INSTALL NEW CONC. PAD FOR NEW AIR METER TO BE SUPPLIED BY OWNER - SEE DETAIL DWG.

EXIST PRODUCT DISPENSERS (TYP 3 PER ISLAND)

EXIST CONC.

INSTALL NEW MOTOR OIL CABINET (TYP 1 PER ISLAND)

INSTALL NEW COIN OPERATED VACUUM ATOP NEW 5'x8' CONC. PAD

CROWN LOGO IN MODULAR FASCIA

REMOVE EXIST. FASCIA & INSTALL NEW MODULAR FASCIA

EXISTING TWIN COLUMN LIGHT SIGN

INSTALL NEW VACUUM ON 5'x8' CONC. PAD (SEE DETAIL DWG.)

NOTE:
REUSE EXIST. AREA LIGHTS & POLES

S11°27'16"W

N11°27'16"E

98.7' N 39°E

170.00

BITUMINOUS PAVEMENT

DEVINE STREET
(BITUMINOUS PAVEMENT)
U.S. HIGHWAY No. 21 & 76

9' CONCRETE MEDIAN

KILBOURNE ROAD
(BITUMINOUS PAVEMENT)
ROAD S-40-95

VICINITY MAP — SCALE: 1" = 2000'

SITE

EXPLANATION

MW-1 ◆ **APPROXIMATE MONITORING WELL LOCATION AND NUMBER**

Reference is made to the following:

1. Topographical map prepared for Gulf Oil Corporation by B. P. Barber & Associates, Inc., dated April 23, 1974 (Reference No. 1200 file)
2. South Carolina Department of Highways and Public Transportation Plans Docket No. 40 99 Sec C 13.
4. Richland County Tax Assessors Map No. 11807

LAND DESCRIPTION

Beginning at a point at the intersection of the eastern right-of-way of Kilbourne Road (Road S-40-95) and the southern right-of-way of Devine Street (U.S. Highway Nos 21 and 76) and proceeding in a direction of S 80°-16'-39" E along said southern right-of-way of Devine Street (U.S. Highway Nos 21 and 76) for a distance of 170.00 feet to an iron pipe marker; thence turning and proceeding in a direction of S 11°-27'-16" W along the property of George M. Niggle for a distance of 175.00 feet to a point, thence turning and proceeding in a direction of N 80°-16'-39" W also along property of George M. Niggle for a distance of 170.00 feet to a point on the eastern right-of-way of Kilbourne Road (Road S-40-95), thence turning and proceeding in a direction of N 11°-27'-16" E along said right-of-way of Kilbourne Road (Road S-40-95) for a distance of 175.00 feet to a point, this being the point of beginning.

This property is located in Columbia, Richland County, South Carolina and contains 0.681 acre (29,736 square feet) and is more currently shown and delineated on a property survey for Town Central Petroleum Corporation by B. P. Barber & Associates, Inc. - Engineers, dated August 30, 1985 (Dwg No. 32,158-82A).

DLG:gll

PLATE 1

SITE PLAT WITH MONITOR WELL LOCATIONS

SOUTH CAROLINA — REGISTERED — No. 5406 — RICHARD H. RICHARDS

22 0 22 44
scale feet

SC-15

NO.	DATE	REVISION
3	4-17-87	EXISTING VACUUM & KILBOURNE RD.
2	5-2-86	RELOCATED MW-1 & MW-2 TO MORE FAVORABLE LOCATIONS
1	4-4-86	REVISE FOR RECLASSIFICATION

CROWN CENTRAL PETROLEUM CORPORATION

PLOT PLAN - CROWN SERVICE STATION
DEVINE ST. & KILBOURNE RD
RICHLAND CO., COLUMBIA, S.C.

SCALE: 1" = 40' | DATE: AUGUST 30, 1985 | DRAWING NUMBER: SC-15 | REV NO: 3
DRAWN BY: W.L.L. | CHECKED BY: H&D & O.S. | JOB AND NUMBER: 22,158.328

HB 1176
1192

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary

Promoting Health, Protecting the Environment

Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Currie B. Spivey, Jr.

File

October 24, 1990

Mr. Howard Smith
Crown Central Petroleum
One North Charles
Baltimore, MD 20201

Re: Crown SC-015 (PCAS 7105)
August 3, 1989 and June 18, 1990 Reports
of Hydrocarbon Contamination
Richland County

Dear Mr. Smith:

The South Carolina Department of Health and Environmental Control (SCDHEC) is in receipt of your above referenced letters which included the analytical results of the soil and groundwater samples collected June 13, 1989 and December 19, 1989. From the available data (490 parts per billion benzene), groundwater remediation will be required. Enclosed is a Remediation Guidance Document to inform you of the necessary steps that will be required before remediation can be initiated.

An initial site characterization report (SC Underground Storage Tank Control Regulations Section 280.63) should be submitted on or before December 14, 1990 and should contain information about the release, surrounding populations, soil types and land use, water quality, depth of the water table, water use and approximate locations of nearby wells potentially affected by the release.

UST 49T DOCKETING

The contamination problems at this site require further investigation (SCUSTCR 280.65). Please submit an assessment plan, on or before December 14, 1990 to determine the extent (horizontal and vertical) and severity of contamination at the site for Departmental review and approval. The plan should also include a proposal to conduct aquifer tests on the monitoring Mr.

recycled paper

wells previously installed to determine the hydraulic characteristics of the site in anticipation of future ground-water recovery. The assessment plan (2 copies) must be certified by a South Carolina registered Professional Geologist with experience in ground-water investigations. The assessment plan shall include, but not be limited to, the following:

1) List of topics that will be included in the assessment report including a brief summary of events and actions taken;

2) Scaled base map which shows topography, major highways, surrounding land use, nearby water supply wells, and the public water supply;

3) Scaled site map displaying the location of underground storage tanks with associated piping, underground utilities, and proposed monitoring well locations (three triangulated wells minimum);

4) Monitor well installation methods, sampling methods, analytical protocol;

5) Information regarding current use of any nearby wells, the corresponding drillers logs (if available), and the approximate depth to the water table at the site; and,

6) An implementation schedule.

Also concerning this site, Mr. Jim Bills of Crown Central telephoned on October 2, 1990 to report a failed tightness test on the piping associated with the underground storage tanks. Please have a copy of the results of these tests submitted to my attention on or before November 23, 1990, along with any information regarding repairs to the faulty piping.

On all correspondence concerning this site, please reference PCAS 7105. If there are any questions concerning this project, please call me at (803) 734-5331.

Sincerely,

Lee A. Monts

Lee A. Monts, Hydrogeologist
Trust Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

LAM/lam
IN7105.oct

Enclosures: SC UST Control Regulations R.61-92, Part 280

cc: Paul Bristol, Central Midlands District EQC
Charles R. Clymer, Jr., AT&E, CONSULTANT

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613-2002
[919] 782-2832, FAX # [919] 781-7558

Paul,
All of these sites are yours.
Mark

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

November 6, 1990

Mr. Stanley Swartzel
Groundwater Protection Division
South Carolina Department of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

7105 N-40-NO-07680
7108 N-32-NO-06047
7112 N-40-NO-07890

RE: Monitoring Well Installation
Three Crown Central Petroleum Facilities
SC-15, SC-611, SC-635
South Carolina

Dear Mr. Swartzel:

ATEC Environmental Consultants would like to apply for a Monitoring Well Permit at the above referenced site. Please find enclosed a Monitoring Well Diagram and Site Diagrams. ATEC proposes to perform an extent of contamination study by installing a minimum of three monitoring wells at each site. SC-15 is located at 3800 Devine Street, Columbia, SC. SC-611 is located at 1057 South Lake Drive, Lexington, SC. SC-635 is located at 2409 Percinal Road, Columbia, SC. At each site the USTs are still in ground and previously installed monitor wells exist. However, these wells are inactive since groundwater was never reached.

Should you have any questions or desire additional information, please contact this office at your convenience.

Sincerely,

Linda S. Wiggs
Environmental Scientist

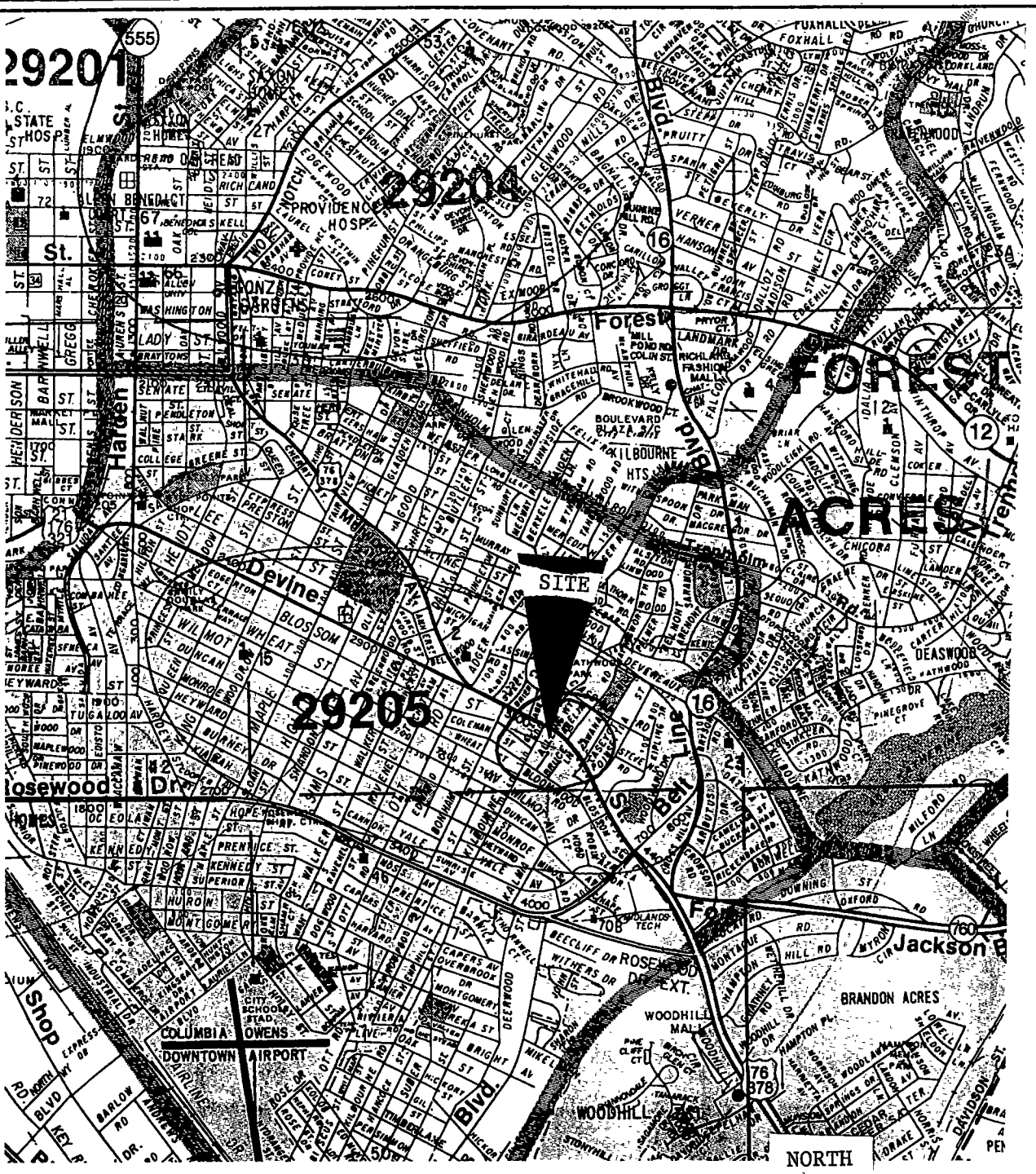
Bill Scarborough
Project Manager

LSW/BS/brb

Enclosures

RECEIVED
NOV 08 1990
GROUND-WATER
PROTECTION DIVISION

UST
SOT
DOCKETING



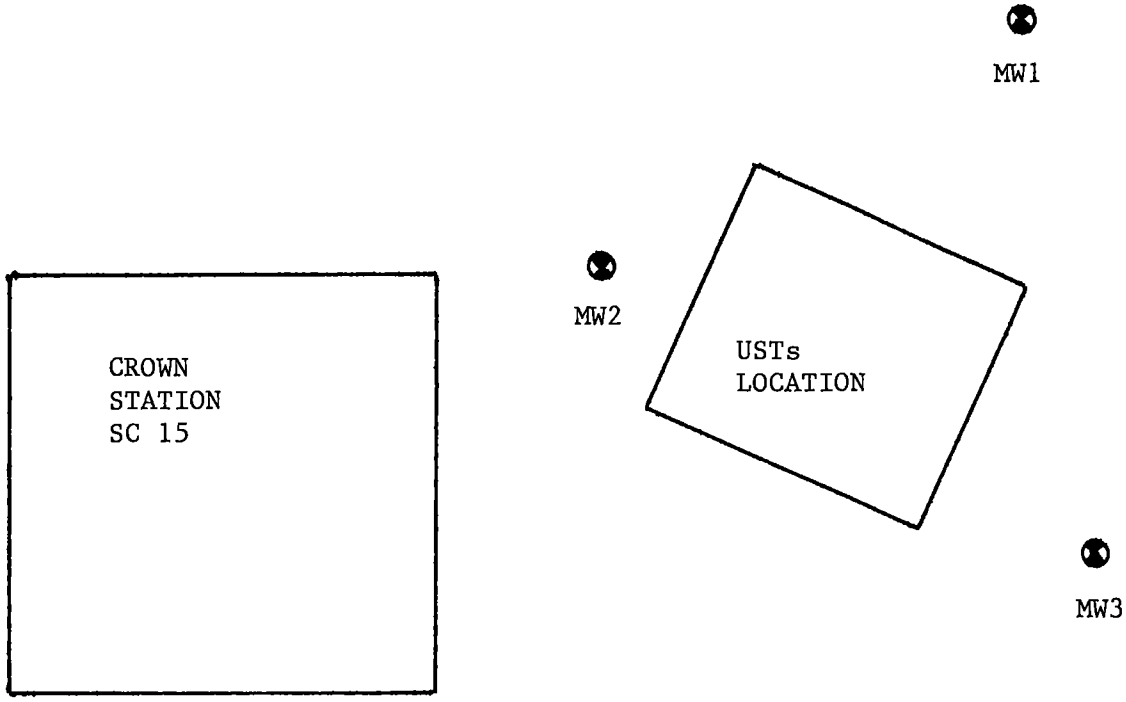
RECEIVED
NOV 08 1990
GROUNDWATER PROTECTION DIVISION

VICINITY MAP

SC 15
3800 Devine St.
Columbia SC

ATEC Environmental Consultants
A Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
NTS	LSW	BS	11/5/90		



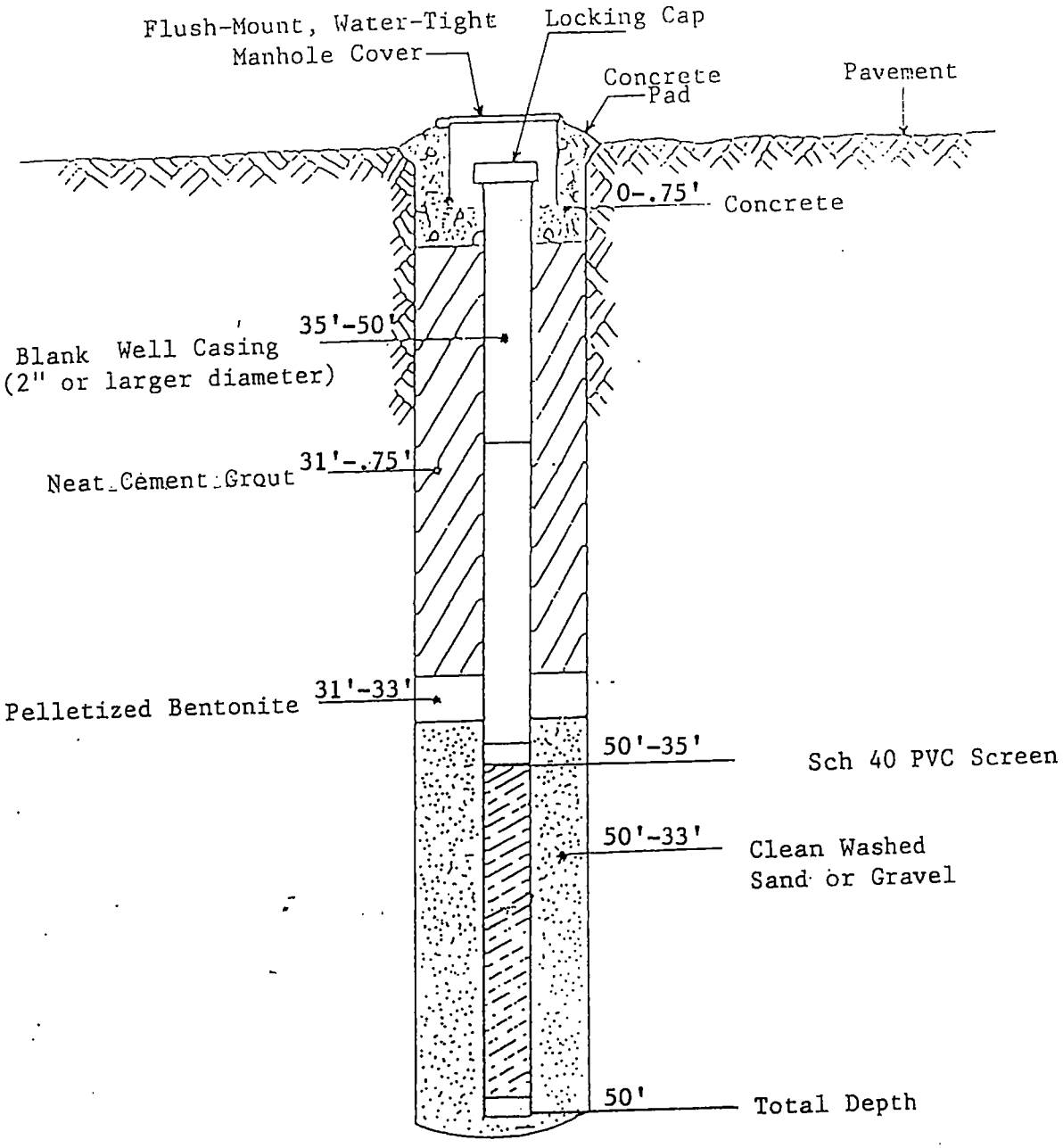
DEVINE ST.

SITE DIAGRAM & PROPOSED MONITOR WELL LOCATIONS

SC 15
3800 Devine St.
Columbia, SC

ATEC Environmental Consultants
A Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
NTS	LSW	BS	11/5/90		



WELL CONSTRUCTION DIAGRAM

SC 15, SC 611, SC 635
Crown Central Facilities
South Carolina

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	DRAWING NO.
NTS	LSW	BS	11/5/90		

ENVIROLABS, INC.

ATEC & ASSOCIATION
6814 DAVIS CIRCLE
RALEIGH, NC 27613

DATE RECEIVED: 11/15/90
DATE REPORTED: 11/27/90
REFERENCE NO. 9012551

PROJECT NAME: CROWN CENTRAL #15

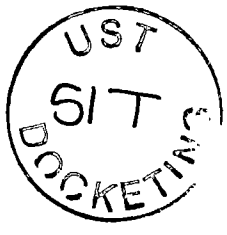
SAMPLE DESCRIPTION: B #1
TPH - < 10 MG/KG

SAMPLE DESCRIPTION: B #2
TPH - < 10 MG/KG

SAMPLE DESCRIPTION: B #3
TPH - < 10 MG/KG



APPROVED BY: _____
LEWIS FREDERICK
LABORATORY DIRECTOR



Lab Certification #32112

200 Rich Lex Drive • Lexington, S.C. 29072 • (803) 796-8623 • FAX: (803) 796-1602

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613-2002
[919] 782-2832, FAX # [919] 781-7558

[redacted]

JW-PB
This person appears dangero.

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

December 5, 1990

Ms. Barbara Blackledge
S.C. DEM
Ground-water Section
2600 Bull Street
Columbia, SC 29201

RECEIVED
DEC 07 1990
GROUND-WATER PROTECTION DIVISION

UST 52-T DOCKETING

To Whom is May Concern:

My name is Bill Scarborough, the Company I represent is ATEC and Associates (Environmental Consultants) 6814 Davis Circle, Raleigh, North Carolina. We have three project sites located in the Columbia, South Carolina area which have Underground Storage Tanks (USTs) the tanks contain unleaded gasoline. We have been contracted by Crown Central Petroleum Corp. to conduct an Environmental Assessment of the groundwater and subsurface soil at each site.

NO PERMIT

The work consisted of installation of three monitoring wells at each project site. During the process of well installation a small amount of auger cuttings (soil) has been properly stored at each site. The total amount of soil combined from the three sites, 1/4 ton. The soil can be described as fine to medium silty sand and clay. The frequency of having to ask your department for permission to dispose of the soil would be two occasions only. We would like to move the soil to the Lexington, South Carolina Landfill.

A series of chemical analysis Total Petroleum Hydrocarbon (TPH) and BTEX has been conducted on the soil. Attached is a copy of the Lab Results. The TPH Level is less than 10 part per million (ppm) and BTEX totals are 1.7 ppb parts per billion. On November 19, 1990 our office spoke to Mr. Harold Seabrook (SC-DEM) (734-5183) concerning soil disposal. He informed our office of local county landfill requirements and analytical analysis limits of soil organic levels of less than 100 ppm TPH and less than 10 ppb BTEX content. A review of the analytical data indicates the sample characteristics fall well within the acceptable limits. In ATEC's opinion the soil is not considered solid hazardous waste and with your permission we would like to move the soil to a local landfill site. The reason for the removal is to restore each site back to its original condition and the property owners insisted that we do so as soon as possible. I spoke to Mr. Howard Mosely on December 4, 1990 concerning our plans for soil remediation. He asked our office to write this letter to inform your office of our intentions and to gain your permission for the soil remediation.

The name and location of each site is as follows:

SC#15 - PB LM	SC#611 - PB	SC#635 PB LM
3800 Devine ST.	1057 S. Lake Dr.	2409 Percival Road
Columbia, SC	Lexington, SC	Columbia, SC

Thank you very much for your tine and consideration in this matter. If your office has any questions or need additional information please call at 1-800-767-2832.

Sincerely,

ATEC ASSOCIATES, INC.

Bill Scarborough

Bill Scarborough
Project Manager

BS/iap

cc: Mr. Howard Mosely

RECEIVED
DEC 07 1990

ENVIROLABS, IN.

ATEC & ASSOCIATES
6814 DAVIS CIRCLE
RALEIGH, NC 27613-2002

DATE RECEIVED: 11/21/90
DATE REPORTED: 12/4/90
REFERENCE NO. 9012599

SAMPLE DESCRIPTION: CROWN CENTRAL, SC#15, SC#635, SC#611

BENZENE - < 1.0 UG/KG
TOLUENE 1.7 UG/KG
ETHYLBENZENE - < 1.0 UG/KG
XYLENE - < 1.0 UG/KG
TPH - < 10 MG/KG

APPROVED BY:
LEWIS FREDERICK
LABORATORY DIRECTOR

Lab Certification #32112

200 Rich Lex Drive • Lexington, S.C. 29072 • (803) 796-8623 • FAX: (803) 796-1602

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613-2002
[919] 782-2832, FAX # [919] 781-7558

MP-PB
This person appears dangerou.

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

December 5, 1990

Ms. Barbara Blackledge
S.C. DEM
Ground-water Section
2600 Bull Street
Columbia, SC 29201

RECEIVED
DEC 07 1990
GROUND-WATER
PROTECTION DIVISION

To Whom is May Concern:

My name is Bill Scarborough, the Company I represent is ATEC and Associates (Environmental Consultants) 6814 Davis Circle, Raleigh, North Carolina. We have three project sites located in the Columbia, South Carolina area which have Underground Storage Tanks (USTs) the tanks contain unleaded gasoline. We have been contracted by Crown Central Petroleum Corp. to conduct an Environmental Assessment of the groundwater and subsurface soil at each site.

The work consisted of installation of three monitoring wells at each project site. During the process of well installation a small amount of auger cuttings (soil) has been properly stored at each site. The total amount of soil combined from the three sites, 1/4 ton. The soil can be described as fine to medium silty sand and clay. The frequency of having to ask your department for permission to dispose of the soil would be two occasions only. We would like to move the soil to the Lexington, South Carolina Landfill.

A series of chemical analysis Total Petroleum Hydrocarbon (TPH) and BTEX has been conducted on the soil. Attached is a copy of the Lab Results. The TPH Level is less than 10 part per million (ppm) and BTEX totals are 1.7 ppb parts per billion. On November 19, 1990 our office spoke to Mr. Harold Seabrook (SC-DEM) (734-5183) concerning soil disposal. He informed our office of local county landfill requirements and analytical analysis limits of soil organic levels of less than 100 ppm TPH and less than 10 ppb BTEX content. A review of the analytical data indicates the sample characteristics fall well within the acceptable limits. In ATEC's opinion the soil is not considered solid hazardous waste and with your permission we would like to move the soil to a local landfill site. The reason for the removal is to restore each site back to its original condition and the property owners insisted that we do so as soon as possible. I spoke to Mr. Howard Mosely on December 4, 1990 concerning our plans for soil remediation. He asked our office to write this letter to inform your office of our intentions and to gain your permission for the soil remediation.

The name and location of each site is as follows:

SC#15	SC#611	SC#635
3800 Devine ST.	1057 S. Lake Dr.	2409 Percival Road
Columbia, SC	Lexington, SC	Columbia, SC

Thank you very much for your tine and consideration in this matter. If your office has any questions or need additional information please call at 1-800-767-2832.

Sincerely,

ATEC ASSOCIATES, INC.

Bill Scarborough

Bill Scarborough
Project Manager

BS/iap

cc: Mr. Howard Mosely

RECEIVED
DEC 07 1990

ENVIROLABS, INC

ATEC & ASSOCIATES
6814 DAVIS CIRCLE
RALEIGH, NC 27613-2002

DATE RECEIVED: 11/21/90
DATE REPORTED: 12/4/90
REFERENCE NO. 9012599

SAMPLE DESCRIPTION: CROWN CENTRAL, SC#15, SC#635, SC#611

BENZENE - < 1.0 UG/KG
TOLUENE 1.7 UG/KG
ETHYLBENZENE - < 1.0 UG/KG
XYLENE - < 1.0 UG/KG
TPH - < 10 MG/KG

APPROVED BY:
LEWIS FREDERICK
LABORATORY DIRECTOR

Lab Certification #32112

200 Rich Lex Drive • Lexington, S.C. 29072 • (803) 796-8623 • FAX: (803) 796-1602

ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27612-2002
(919) 782-2832

FAX COVER SHEET

TO: PAUL Buetstrain

FAX NUMBER: 803 734-4661

FROM: ATEC & ASSOCIATES
BILL SCARBOROUGH

RECEIVED
DEC 11 1990

PHONE NUMBERS: OFFICE (919) 782-2832
FAX (919) 781-7558

NO. OF PAGES: 4 (INCLUDING COVER SHEET)

DATE: 12/11/90

REMARKS: PAUL, the soil ANALysis from the three CROWN Control Sites SC#15, SC#611, SC#635

THANK-YOU

Richland Co
PCAS- 7105

UST
63T
DOCKETING

Three boring from 3 sites

TPH results for each boring at each site; BTEX results from 1 composite sample of the 3 sites.

PRECISION TANK SERVICE INC.

P.O. BOX 1333
KANNAPOLIS, N.C. 28082
(704) 938-TANK

Date: 09/17/90

To: Crown Central Petroleum
1345 Garner Lane Suite 202
Columbia, S.C. 29210
Attention: Paul Prohoniak

TEST#L-900912A-02
DATE: 09/12/90
STATION: Crown #015 Columbia, S.C.

Dear Mr. Prohoniak,

A line integrity test was performed on the above line circuits using the ACUTEST LEAK COMPUTER SYSTEM. This test was performed at a pressure equal to 150 times the system operating pressure. The criteria for acceptable line integrity allowed by this test procedure is based upon a leak detection limit of 0.01 g.p.h., for pressurized piping, and a limit of 0.025 for suction piping.

The results of the test are given below and indicate whether the line(s) passed or failed the integrity criteria. The validity of the information is based on the ability to effectively isolate the line from the tank.

TEST RESULTS

Grade	Pump Type	Isolation	Bleed Back	Volume Change (gph)	Pass Fail
UNLEAD	S.T.P.	ISO-PLUG	WOULD NOT PRESSURIZE		FAIL
PLUS	S.T.P.	ISO-PLUG	OK	-0.0025	PASS
PREMIUM	S.T.P.	ISO-PLUG	OK	-0.0050	PASS

If you have any questions, please contact me at (704) 938-8265.

Sincerely,

David Hicks

David Hicks
Certification Number A/P 211
Precision Tank Service

PROTECTION DIVISION
DEC 28 1990
UST
54T
DOCKETING

PRECISION TANK SERVICE INC.

P.O. BOX 1333
KANNAPOLIS, N.C. 28082
(704) 938-TANK

LEAK DETECTOR TEST

TO: Crown Central Petroleum
1345 Garner Lane, Suite 202
Columbia, SC 29210

REFER: #015
Columbia, S.C.

TEST NUMBER: LD-900912-02

Dear Mr. Prohoniak,

A Leak Detector test was performed at the above site, in accordance with the manufacturer's standards. The results are listed below.

PRODUCT	L.D. TYPE	PASS/ FAIL
PREMIUM	D.L.D.	PASS

If there are any questions, please call me at (704) 938-8265.

Sincerely,

Timothy J Roy

Timothy Roy
Precision Tank Service

TR/tsh

RECEIVED
DEC 28 1990
GROUND-WATER
PROTECTION DIVISION

Crown Central Petroleum Corporation
Refiners / marketers of petroleum products & petrochemicals
One North Charles Street • P.O. Box 1168 • Baltimore, Maryland 21203 • (301) 539-7400

December 27, 1990

Mr. Lee A. Monts
South Carolina Dept. of
Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

RE: SC-015 (PCAS 7105)

Dear Mr. Monts:

As DHEC is aware from previous correspondence, ATEC Associates has been conducting on-going assessment activities at SC-015. Your letter dated October 24, 1990, outlined needed action items. I regret that as of this date (as ATEC informs me), Crown has not met the December 14, 1990, deadline for submittal of initial site characterization report. This report, considering holidays, should be in your office by January 15, 1991. Based upon the verbal discussion with ATEC about their recent work, further assessment planning may be premature. ATEC's initial indication is that contamination of both soil and groundwater does not exceed DHEC contamination levels. After review of draft of the assessment report from ATEC, Crown Central Petroleum in conjunction with DHEC will plan assessment activities, if warranted.

490
116 Benzene!

On or about October 2, 1990, Crown did report that the unleaded product line failed a precision test. Copies of precision test will be forwarded to you by Crown's Columbia district office. The product line that failed the precision test has been temporarily abandoned. Complete system upgrade is anticipated for this location. Inventory records review do not indicate a significant leak, if any. Monitoring and bailing of existing monitor wells continues to see if contamination has resulted from failed test.

I respectfully ask your considerations of the previous correspondence and review of the upcoming ATEC report before planning the next logical step. If I can provide further information, please contact me at (301) 659-4862.

Sincerely,

James H Smith

J. Howard Smith
Projects Engineer

dr

\SC\015\extend.let

RECEIVED
JAN 02 1991
PROTECTION
UST
SITE
DOCKETING
SCANNED

South Carolina
DHEC
Department of Health and Environmental Control

MEMORANDUM

RECEIVED
FEB 19 1991
S.C. Dept. of Health & Environmental Control-Bureau of Solid & Hazardous Waste Management

To: Harold Seabrook, Manager
Waste Assessment Section
Bureau of Solid & Hazardous Waste

From: Timothy A. Mettlen TAM
Assessment & Development Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

Re: Crown Central #611 (PCAS 7108)
Soil Disposal

Date: February 15, 1991

Please note that the referenced analytical results and proposed method of soil disposal are enclosed for your review. Please provide all comments to this office.

If you have any questions, please call me at 734-5326.

tam/pcas7108soil

ENC: Soil Disposal Request

UST 567 DOCKETING

printed on recycled paper

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary

Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Curtis B. Soivey, Jr.

Promoting Health, Protecting the Environment

February 22, 1991

Mr. Bill Scarborough
Environmental Consultants
6814 Davis Circle
Raleigh, N.C. 27613-2002

RE: Crown Central Petroleum Corporation
SC #15; SC #611; and SC #635

Dear Mr. Scarborough:

This office is denying your request to dispose one-fourth tons of petroleum contaminated soil at the Lexington County Landfill.

In order to approve your request, you would need to provide us with a minimum of five (5) to ten (10) vertical composite soil samples of top, middle and bottom of the stock pile for both BTEX and TpH. This is up to 100 cubic yards. We request at least 10% of the soil for vertical composite samples and both BTEX and TpH.

Once we have received this information, your request will be re-evaluated for approval.

Sincerely,

Jacob Baker
Emergency Response Section
Bureau of Solid & Hazardous Waste Management

JB/st

cc: Ed McDowell
Timothy A. Mettlen

UST
57-T
DOCKETING

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary
Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Currie B. Spivey, Jr.

Promoting Health, Protecting the Environment

February 22, 1991

Mr. Bill Scarborough
Environmental Consultants
6814 Davis Circle
Raleigh, N.C. 27613-2002

RECEIVED
FEB 25 1991

RE: Crown Central Petroleum Corporation
SC #15; SC #611; and SC #635

Dear Mr. Scarborough:

This office is denying your request to dispose one-fourth tons of petroleum contaminated soil at the Lexington County Landfill.

In order to approve your request, you would need to provide us with a minimum of five (5) to ten (10) vertical composite soil samples of top, middle and bottom of the stock pile for both BTEX and TpH. This is up to 100 cubic yards. We request at least 10% of the soil for vertical composite samples and both BTEX and TpH.

Once we have received this information, your request will be re-evaluated for approval.

Sincerely,

Jacob Baker
Emergency Response Section
Bureau of Solid & Hazardous Waste Management

JB/st

cc: Ed McDowell
Timothy A. Mettlen

recycled paper

DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Director: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary

Promoting Health, Protecting the Environment

Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Cume B. Spivey, Jr.

February 22, 1991

Mr. Bill Scarborough
Environmental Consultants
6814 Davis Circle
Raleigh, N.C. 27613-2002

RE: Crown Central Petroleum Corporation
SC #15; SC #611; and SC #635

Dear Mr. Scarborough:

This office is denying your request to dispose one-fourth tons of petroleum contaminated soil at the Lexington County Landfill.

In order to approve your request, you would need to provide us with a minimum of five (5) to ten (10) vertical composite soil samples of top, middle and bottom of the stock pile for both BTEX and TpH. This is up to 100 cubic yards. We request at least 10% of the soil for vertical composite samples and both BTEX and TpH.

Once we have received this information, your request will be re-evaluated for approval.

Sincerely,

Jacob Baker
Emergency Response Section
Bureau of Solid & Hazardous Waste Management

JB/st

cc: Ed McDowell
Timothy A. Mettlen

recycled paper

South Carolina
DHEC
Department of Health and Environmental Control

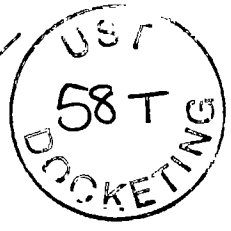
Read
Lee - note
last paragraph

MEMORANDUM

TO: Harold Seabrook, Manager
Waste Assessment Section
Bureau of Solid and Hazardous Waste Management

FROM: James Hess, Manager
Trust Section
Ground-Water Protection Division

RE: Soil Disposal Issues
Heritage U.S.A - PCAS 6563
Crown Central SC15 - PCAS 7108 - May be 7105



DATE: March 6, 1991

Procedures concerning the handling of petroleum contaminated soils between the Bureau of Solid and Hazardous Waste Management and the Bureau of Drinking Water Protection have been established with your concurrence and input. For this Division to maintain oversight (technical and financial), it was agreed that all correspondence concerning disposal of petroleum contaminated soils would be directed back to this office for sites at which GWPD is the lead. Attached are two examples of deviation from this procedure.

With regard to the Heritage U.S.A. correspondence, the responsible party is left with the impression that incineration is the only treatment and/or disposal alternative. However, if correspondence were directed back to this Division, the denial of landfill access would have also included options for soil venting, bioremediation, etc. To avoid this confusion, it may be appropriate for staff in this Division to compare the reported analytical data with your guidelines and advise against landfilling if contaminant concentrations are above those standards. For this scenario, the end result would be less paperwork between the Bureaus. For all sites asking for permission to incinerate petroleum contaminated soils, the data would be submitted to you as usual.

With regard to the Crown Central correspondence, the soil sampling recommendations are not consistent with previously provided guidance. Based on your existing guidance, we recommend one sample per ten cubic yards of stockpiled soil with a two sample minimum and a six sample maximum. In accordance with that correspondence, this site would need to collect and analyze two soil samples. Please inform this Division if the sampling scheme for petroleum contaminated soils has changed.

printed on recycled paper

Unless directed otherwise, this Division will contact both referenced parties and inform them that clarification on the above mentioned letters is forthcoming.

cc: Stan Clark, GWPD
Ron Kinney, BSHWM

Crown Central Petroleum Corporation
Refiners / marketers of petroleum products & petrochemicals
One North Charles Street • P.O. Box 1168 • Baltimore, Maryland 21203 • (301) 539-7400

May 1, 1991

Mr. Lee A. Monts
SOUTH CAROLINA DEPARTMENT OF
HEALTH AND ENVIRONMENTAL CONTROL
2600 Bull Street
Columbia, South Carolina 29201

RE: SC-015 (PCAS 7105)
3800 Devine Street
Columbia, South Carolina 28205

Dear Mr. Monts:

Enclosed is site characterization report for subject location prepared by ATEC. As indicated, contamination appears to be limited to soil in the tank farm area.

Crown has recently elected to close this site on April 19, 1991, and tanks will be removed in the near future. At this time, contaminated soils will be removed from the site for proper disposition. DHEC will be apprised as the scheduled removal is defined.

Very truly yours,
CROWN CENTRAL PETROLEUM CORPORATION

J. A. Bright, Jr., P.E.
Manager of Marketing
Environmental Compliance

JAB:sas

Enclosure

d:\sc\015\monts.let

RECEIVED
MAY 06 1991

UST
597
DOCKETING

Crown Station SC-15
3800 Devine Street
Columbia, South Carolina
ATEC Job No. 35-07004



RECEIVED
MAY 06 1991
GROUND-WATER
PROTECTION DIVISION

RECEIVED
APR 16 1991
J. HOWARD SMITH

ATEC ENVIRONMENTAL CONSULTANTS
6814 DAVIS CIRCLE
RALEIGH, NORTH CAROLINA
(919) 782-2832 FAX: (919) 781-7558



ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613-2002
[919] 782-2832, FAX # [919] 781-7558

Solid & Hazardous Waste Site Assessments
Remedial Design & Construction
Underground Tank Management
Asbestos Surveys & Analysis
Hydrogeologic Investigations & Monitoring
Analytical Testing / Chemistry
Industrial Hygiene / Hazard Communication
Environmental Audits & Permitting
Exploratory Drilling & Monitoring Wells

April 8, 1991

Mr. Howard Smith
Crown Central Petroleum Corporation
One North Charles Street
P.O. Box 1168
Baltimore, MD 21203

RECEIVED
MAY 06 1991
PROTECTION DIVISION

RE: Crown Station SC-15
3800 Devine Street
Columbia, South Carolina
ATEC Job No. 35-07004

Dear Mr. Smith:

ATEC Environmental Consultants (ATEC) has completed an initial site characterization as per federal regulations 40 CFR Part II subpart F 280.63 and site investigation 280.65.

Based on the field activities, laboratory results and data analysis, ATEC presents the following summary and recommendations.

* A site visit was conducted on November 22, 1991 to gather information on site vicinity, population, agricultural lands and land use, well location and usage, surface streams and a survey of one-half mile radius around the project site.

* The project site is located in a moderately small business community with 85% building structures being residential homes. All residents and other business is on city water supply. No water wells were located within one-half mile radius from the project site.

* The document search/review revealed that no incidents had been reported within one-half mile radius from the project site. There is no potential of environmental impact to the subject property from any adjacent properties.

* Previous investigations, reported on August 15, 1989 and June 18, 1990 indicated subsurface soil and groundwater contamination. The contamination levels observed were 37 ppm in soil and 490 ppb of Benzene in groundwater.

* A total of three (3) investigative borings were installed at the project site to a depth of 50 feet below grade. Soil samples were taken for chemical analysis.

* Analytical results from subsurface soil obtained from the project site on November 21, 1990 reveal Total Petroleum Hydrocarbon (TPH) concentrations below SCDHEC's target clean up standards of 10 ppm.

* Each soil boring was converted into a monitor well. The wells were properly developed and water samples obtained for chemical testing.

* Water chemistry data collected from the newly installed wells indicated benzene levels below SCDHEC's standards of 5 ppb.

* Based on analytical data received during the investigation conducted by ATEC on November 21, 1990. ATEC concludes that the contamination zone is confined to the tank-hold area only.

* In order to ensure that environmental standards are maintained, ATEC recommends the removal of the present underground storage tank and excavation of the surrounding soils.

* All the soil associated with the UST system should be excavated and disposed of properly. Any additional soil indicating contamination based on field screening should also be excavated and disposed of.

* The newly installed monitor wells should be sampled again to determine if there is any migration of contaminants.

* ATEC recommends to submit a copy of this report to the DHEC office in Columbia, South Carolina for their review and record.

We trust this report is responsive to your needs. If you have any questions or concerns about this report, please feel free to contact us at your convenience.

Sincerely,

Bill Scarborough

William E. Scarborough
Project Manager

Waheed Rana

Waheed H. Rana, P.G.
Senior Hydrogeologist
District Manager

WES/WHR/iap

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1.1 Purpose 1
1.2 Authorization 2
1.3 Project History 2
2.0 SCOPE OF WORK (40 CFR 280.63) 2
3.0 RESULTS OF SITE CHARACTERIZATION 3
3.1 Record Search and Review 2
3.2 Surrounding Population 3
3.3 Water Quality 3
3.4 Well Usage and Location 4
3.5 Stream Location 4
3.6 Climatological Conditions 4
3.7 Land Use 5
4.0 SCOPE OF WORK (40 CFR 280.65) 5
4.1 Physiography and Geology 6
4.2 Subsurface Soil Investigation 6
4.3 Groundwater 7
4.4 Groundwater Analysis 8
5.0 RESULTS AND CONCLUSIONS 9
6.0 QUALIFICATIONS 12
7.0 REFERENCES 12

LIST OF APPENDICES

APPENDIX A VICINITY MAP
APPENDIX B SITE MAP
APPENDIX C BORE LOGS AND LOCATION MAP
APPENDIX D MONITOR WELL DATA
APPENDIX E SOIL ANALYTICAL DATA
APPENDIX F WATER CHEMISTRY DATA
APPENDIX G GROUNDWATER FLOW DATA

FIGURES

FIGURE 1 BORE LOCATION; JUNE 13, 1989
FIGURE 2 MONITOR WELL LOCATION; JUNE 14, 1989

CROWN CENTRAL STATION SC-15
3800 Devine Street
Columbia, South Carolina
ATEC Job No. 35-07004
January 11, 1991

1.0 INTRODUCTION

ATEC Environmental Consultants (ATEC) was contracted to perform an initial site characterization of a project site referenced above.

The following sections describe the project site, nature and type of contamination surrounding population, water quality, well usage, streams, subsurface conditions and subsurface investigations.

The project site is located at 3800 Devine Street in Columbia, South Carolina (see Appendix A). A number of studies had been conducted at the project site to establish whether or not there is a subsurface contamination originating from activities at the project site.

1.1 Purpose

The primary objective of this report was to complete a site characterization and site investigation of the subject facility as per Federal regulations 40 CFR 280.63 and 280.65.

1.2 Authorization

The investigation was authorized by Mr. Richard Garvine of Crown Central Petroleum Corporation using Crown's P.O. Number 0-301 dated October 8, 1990.

1.3 Project History

In a review of the South Carolina DHEC records for the project site, it was revealed that several contamination assessment studies had been conducted for the UST system at the subject facility. The most recent report dated June 8, 1990 indicated four (4) monitor wells were installed at the project site in the vicinity of the UST pit. Soil samples obtained from the installation of the wells indicated total petroleum hydrocarbon (TPH) concentrations greater than 10 ppm (parts per million) in MW-1, and MW-3.

The TPH levels recorded above the acceptable limits were 37 ppm from MW-1 and 27 ppm from MW-3.

Water samples obtained from MW-3 and MW-4 were analyzed for BTEX constituents. Total volatile organic compounds (TVOCs) levels observed in monitor wells MW-3 and MW-4 were 29 parts per billion (ppb) and 1,690 ppb, respectively. Benzene levels for these two wells were measured at 13 ppb and 490 ppb, respectively.

A letter submitted to Crown on October 24, 1990 addressed the findings referenced in a report dated June 8, 1990. Also mentioned in the letter was a failed tightness test reported by Mr. Jim Bills of Crown Central. The report was prepared by Atlanta testing and engineering.

2.0 SCOPE OF WORK

ATEC was contracted by Crown to conduct an initial site characterization as per Federal Guidelines Part II 40 CFR 280.63. Scope of work included a site visit to observe current field conditions at the project site, and gather information on the surrounding population, well location and usage, water quality, downgradient receptors, general climatological conditions in the area and a subsurface investigation.

3.0 RESULTS OF SITE CHARACTERIZATION

A field visit was conducted on November 22, 1990 to survey the project site and adjacent properties. During that visit efforts were also made to determine nature of subsurface release, if any. The site is located in Richland County of Richland's County which has a total area of 771.38 square miles and water area coverage is only 9.80 square miles. The following section describe our field observations and the findings of record/document search at the DHEC offices.

3.1 Record Search/Review

ATEC conducted a record search at the following agencies to determine if any of the nearby sites within a one-half-mile radius had a history of groundwater incident(s).

1. Water Quality Section, DHEC, Columbia, SC.
2. Groundwater Section, DHEC, Columbia, SC.
3. Hazardous Waste Section, Solid and Hazardous Waste Branch, Columbia, SC.
4. Solid Waste Section, Solid and Hazardous Waste Branch, Columbia, SC.

ATEC's findings, as a result of record review, are described in the following sections under results of site characterization.

3.2 Surrounding Population

A site map can be found in Appendix B. The properties within a one-half-mile radius of the project site are primarily residential. A moderate area of residential population is located around and downslope from the project site. A small-sized strip of commercial business is located along the East Devine Street. None of the sites with business operation have any potential of environmental pollution.

3.3 Water Quality

According to the records of DHEC in Columbia, South Carolina the overall groundwater quality in the area is good. No groundwater incidents from the neighboring sites have been reported in the past.

3.4 Well Usage and Location

All the business and surrounding population are on city water supply system. No water supply well for drinking or other uses are located in the vicinity of the project site.

3.5 Stream Location

The main stream that drains the project site and its adjacent properties is the Gills Creek (see Appendix A). This stream flows 0.7 miles southeast to south downslope of the project site. The Gills Creek intersects with the Congaree River 5.2 miles to the south of the project site.

3.6 Climatological Conditions

The average climatological conditions for the project site and Richland County area were obtained from the U.S. Department of Commerce, National Climate Data Center in Columbia, South Carolina.

Richland County is hot and generally humid in the summer because of moist air from the ocean. Winter is cold but short, because cold waves from the north are impeded by the mountains to the northwest of the county. The average temperature in the winter is 48 °F, the average daily minimum temperature is 38 °F. In the summer the average temperature reaches 80 °F and the average daily maximum temperature rises to 91 °F. Precipitation is evenly distributed throughout the year. Of the annual precipitation, 27 inches, 57 percent usually falls in April through September.

Snowfall is rare; in 38 percent of the winters there is no measurable snow fall. In 55% of the cases snowfall is less than 2 inches. The prevailing wind is from the southwest at an average windspeed of 7.2 miles per hour (mph).

3.7 Land Use

The project site is located at 3800 Devine Street in Columbia, South Carolina. The City of Columbia has a population of 233,868. The total land area of Richland County is about 771.4 square miles (485,000 acres). Population per square mile of land is 378.2. Fort Jackson a small community, occupies about 55,000 acres of this area. The county is rapidly becoming urbanized as farm acreage decreases. The urban and other built-up structures cover more than 84,000 acres. The principal land use for the area in the vicinity of the project site is residential. There are some commercial business, primarily food, retail and light industrial.

4.0 SCOPE OF WORK (CFR 280.65)

ATEC was contracted to perform an extent of contamination study at 3800 Devine Street in Columbia, South Carolina (see Appendix B). ATEC installed three exploratory borings (Appendix C Bore Logs and Location Map) and converted these borings into monitor wells. Well locations and construction records can be found in Appendix D. The new wells were properly developed, sampled and surveyed to determine contamination levels and groundwater flow direction. Based upon the information available, no free product was observed in the soil and groundwater.

4.1 Physiography and Geology

Richland county lies in two physiographic provinces the Piedmont Plauteau Province and the Atlantic Coastal Plain Province of South Carolina. One third of the county is in the Piedmont province and two thirds is in the Coastal Plain Province. The project site is located in the Atlantic Coastal Plain Province. The Coastal Plain province is also known as the "Sand Hills". The Sand Hills has many springs and numerous streams which are fed by rain and groundwater. These streams have a strong flow throughout the year.

The principal geologic formation in the Sand Hills consists of unconsolidated marine deposits of light colored sands and Kaolin clays. The subsoil from surface to a depth of 6.0 feet is sandy clay loam. Permeability is rapid in the surface and subsurface layers and gradually decreases in the subsoil below 7 feet.

4.2 Subsurface Soil Investigation

A subsurface investigation was performed on November 21, 1990. ATEC advanced three exploratory borings with hollow-stem augers to obtain soil samples by split spoon (ASTM 1586D Method). Split-spoon samples were taken at 5-foot intervals. The borings were drilled through the water table surface. The samples were screened with an H-Nu photoionization detector (PID) to measure the Total Vapor Content (TVC). The samples were classified for lithology and PID readings recorded for analysis. The split spoon was disassembled and decontaminated between the samples using an alcanox wash and water rinse. The hollow stem augers (HSA) were also decontaminated by steam cleaning prior to initiating field activities and between borings. The decontamination procedures were performed to minimize the risk of cross-contamination and to obtain representative soil samples.

One sample with the highest PID readings from each exploratory boring was placed in an EPA-approved container, properly labeled, preserved on ice, and shipped to an analytical laboratory in Columbia, South Carolina. The soil samples were analyzed for Total Petroleum Hydrocarbons (TPH) by EPA Method 418.1 (Appendix E). Table I summarizes the test results.

TABLE I

Results of Chemical Analysis for Soil Samples
December 3, 1990

Boring ID	Depth (ft.)	TPH (ppm)
B1-S2	10	<10 ppm
B2-S1	5	<10 ppm
B3-S3	15	<10 ppm

* Parts per million

None of the soil boring samples indicated contamination levels above the action level of 10 ppm set forth by the South Carolina Department of Health and Environmental Commission (SC DHEC).

4.3 Groundwater

Groundwater was encountered in each boring at approximately 36.0 - 37.0 feet depth. All three borings were converted into monitor wells. The wells were constructed with 10 feet of 2-inch schedule 40 PVC slotted screen and a 2-inch schedule 40 PVC Riser to land surface. A clean graded sand pack was placed in the well annulus opposite the screen to at least two feet above the screen. A two foot thick bentonite seal was emplaced above the sand pack, the remaining annulus was grouted to ground surface with cement grout. The well was completed with a locking CAP and set in a water proof protective manhole. The well was installed by a South Carolina certified well driller, Lenny Teague (SC #875). The work was directed by ATEC's hydrogeologist, Waheed Rana. The soils encountered at the site generally consist of silty to clayey medium sand and silty sandy clay. The monitor wells were developed to eliminate fines and drill cuttings. The depth to groundwater and depth of the well were used to calculate volume of water present in each well (also referred to as well volume). Water was bailed from each well until the fine materials were no longer visible within the bailer. The well depth, diameter and water table depth were utilized to determine the volume of water in each monitor well as Well Volume = 5.875 * $(\text{diameter})^2$ * (Well depth-Water depth) gallons.

Note both depths and diameter of PVC casing are in feet.

A minimum of three well volumes of water was bailed, as per requirements. The water removed during well development was stored in containers and removed from the project site. The water was taken and disposed by Noble Oil Company in Sanford, North Carolina (800-544-0184). A new disposable plastic bailer was used to develop and sample each monitor well. Each groundwater sample was placed in an EPA-approved container, properly labeled, preserved on ice, and shipped to an analytical laboratory in Columbia, South Carolina. The groundwater samples were analyzed for Benzene, Toluene, Ethyl-benzene, and Xylene (BTEX) by EPA Method 602.

4.4 Groundwater Analysis

The areal extent of contamination within groundwater was determined based on the laboratory results of groundwater samples. The groundwater samples were analyzed for BTEX using EPA Method 602. Based on the analytical data, groundwater samples obtained from the three wells indicated an absence of dissolved petroleum contamination. The detection limit used for the analysis was set at 5.0 parts per billion (ppb). Water chemistry data can be found in Appendix F. The following table summarizes the water quality results.

TABLE II

Results of Chemical Analysis For Groundwater Samples
December 12, 1991

Monitor Well I.D.	Benzene (ppb)
MW#1	<5 ppb
MW#2	<5 ppb
MW#3	<5 ppb

The newly installed wells were surveyed to obtained relative elevation of the top-of-casings (TOC). Groundwater table elevations were determined by using the TOC elevation and water table depths. Groundwater flow direction was determined by utilizing the triangulation method (Appendix G). Based on the field results and data analysis, groundwater flows to southeast.

5.0 RESULTS AND CONCLUSIONS

Soil samples which were collected from three exploratory borings were analyzed for TPH by method 418.1. None of the samples indicated contamination levels above the action level of 10 ppm. The analytical data obtained from the previous soil sampling (i.e. August 15, 1989) indicated TPH levels of 37 ppm (S1) and 27 ppm (S3) See Figure 1. These soil samples were collected from the area adjacent to the USTs.

Water samples that were collected from the newly installed monitor wells were analyzed for BTEX by method 602. Water quality data indicates absence of petroleum contamination. The old installed wells adjacent to the UST area were dry and no samples were obtained (Figure 2). Previous work performed on December 19, 1989 demonstrated BTEX concentrations ranging from 29 ppb (parts per billion) at MW-3 to 1,690 ppb at MW-4.

Based on the above data and information received from the site characterization and investigation, ATEC concludes the following:

1. No free petroleum product floating on groundwater was observed in any of the wells.

2. Groundwater flows to the southeast with an hydraulic gradient of .0043 ft/ft.

3. Subsurface soils adjacent to the USTs are impacted by petroleum. The levels reported from previous investigation were 37.0 ppm and 27 ppm of TPH. Therefore the zone of contaminated soil is confined to the UST pit area only. Our past experience with such minor level implies that if the soil samples are collected from the same locations, the new levels should be within the acceptable limits provided source of contamination were removed and no other incidents had taken place since then.

4. Subsurface soil outside of the tank hold area showed no sign of petroleum contamination.

5. Shallow subsurface water found near the tank hold area in the previous investigation was found to be contaminated by a dissolved phase of petroleum product. The levels observed were minor (ie. 29 ppb and 1690 ppb of TVOCs). 490 ppb benzene

6. Groundwater at the project site showed no sign of petroleum contamination above the DHEC groundwater standards of 5 ppb (benzene).

In addition to the above, ATEC also concludes the following based on the information obtained during site characterization studies.

1. No surface spills of gasoline had been reported within one half statue miles of the project site.

2. A tightness test was conducted on the piping associated with the underground storage tank which failed. The test results were reported to ATEC by Mr. Jim Bills of Crown Central on October 2, 1990.

no results submitted; just a verbal report

3. Subsurface soils adjacent to the project site have not been impacted by petroleum hydrocarbons and no free product was observed during soil investigations.

4. Water quality in the area is generally good.

6.0 QUALIFICATIONS

Our evaluation of impairment at the site has been based on the available information and data obtained during our research and field investigation. The services have been performed in accordance with generally accepted standards of performance for this level of assessment. Our conclusions are limited to the subsurface conditions at the time of sampling and at the sample locations only. We have conducted such investigations as deemed necessary, in our professional judgement to reasonably identify potential petroleum compounds at this site. ATEC Environmental Consultants is not responsible for the conclusions or opinions made by others based on the findings of this report.

7.0 REFERENCES

1. Monts, Lee reports of Hydrocarbon Contamination at Crown Central SC-15, Columbia, South Carolina, October 24, 1990.

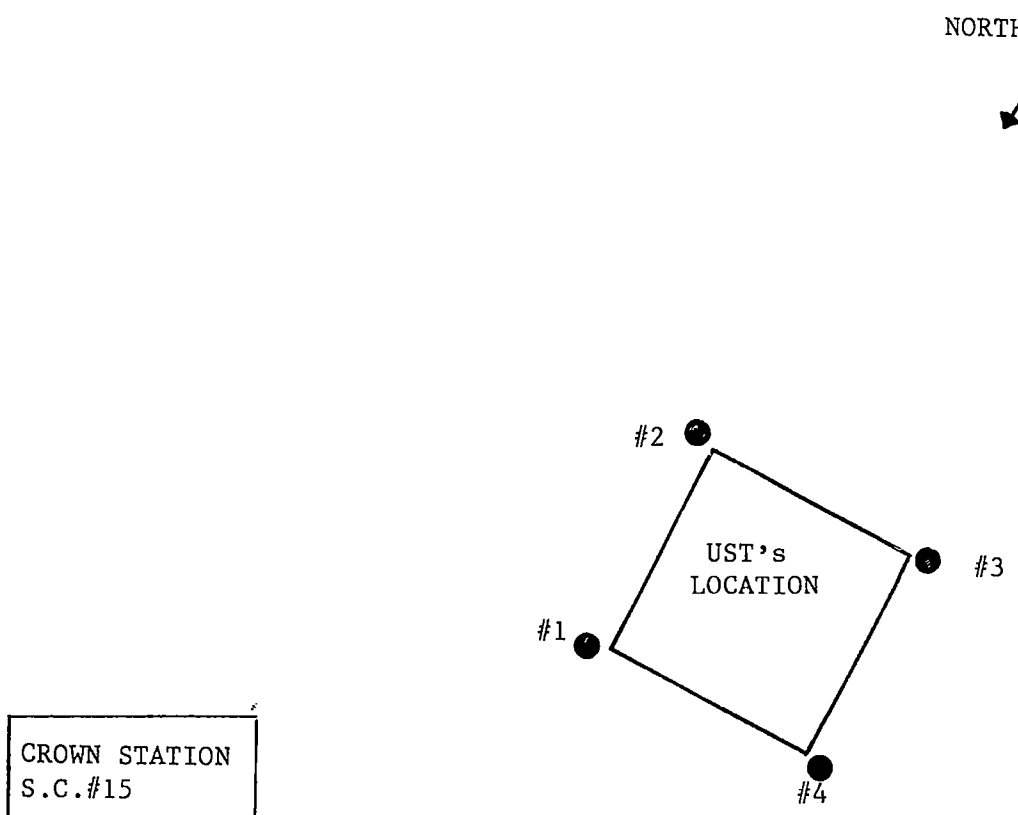
2. Federal Regulations Part II subpart F 40 CFR 280.63 and 280.65.

3. "Richland County Incident Report" DHEC Office, Columbia, South Carolina.

4. National Cooperative Soil Survey, United States Department of Agriculture.

5. National Oceanic and Atmospheric Administration Climatography of South Carolina.

FIGURE 1

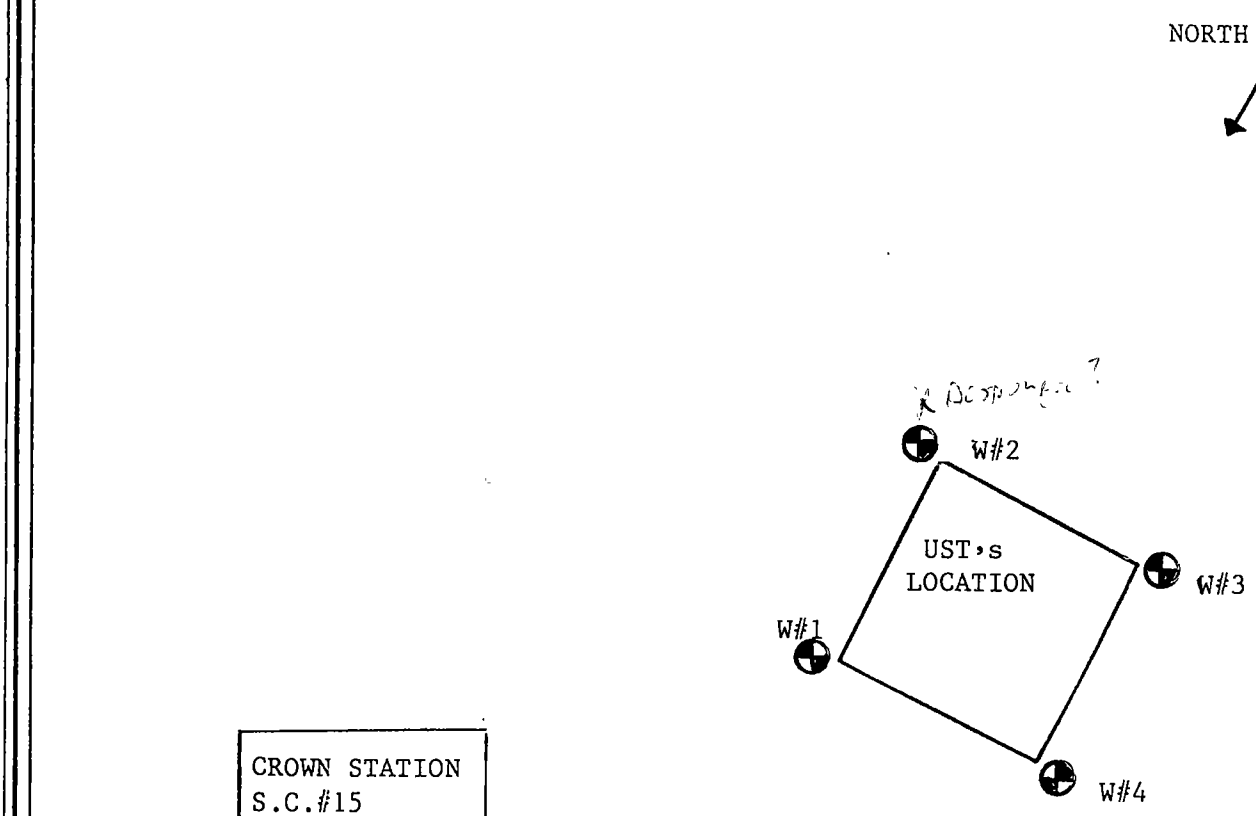


SOIL BORING LOCATION MAP 6/13/89
CROWN CENTRAL PETROLEUM CORP.
S.C.#15 3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

ATEC Environmental Consultants
. Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20ft	BS	WS	3/25/91	35-07004	NA

FIGURE 2



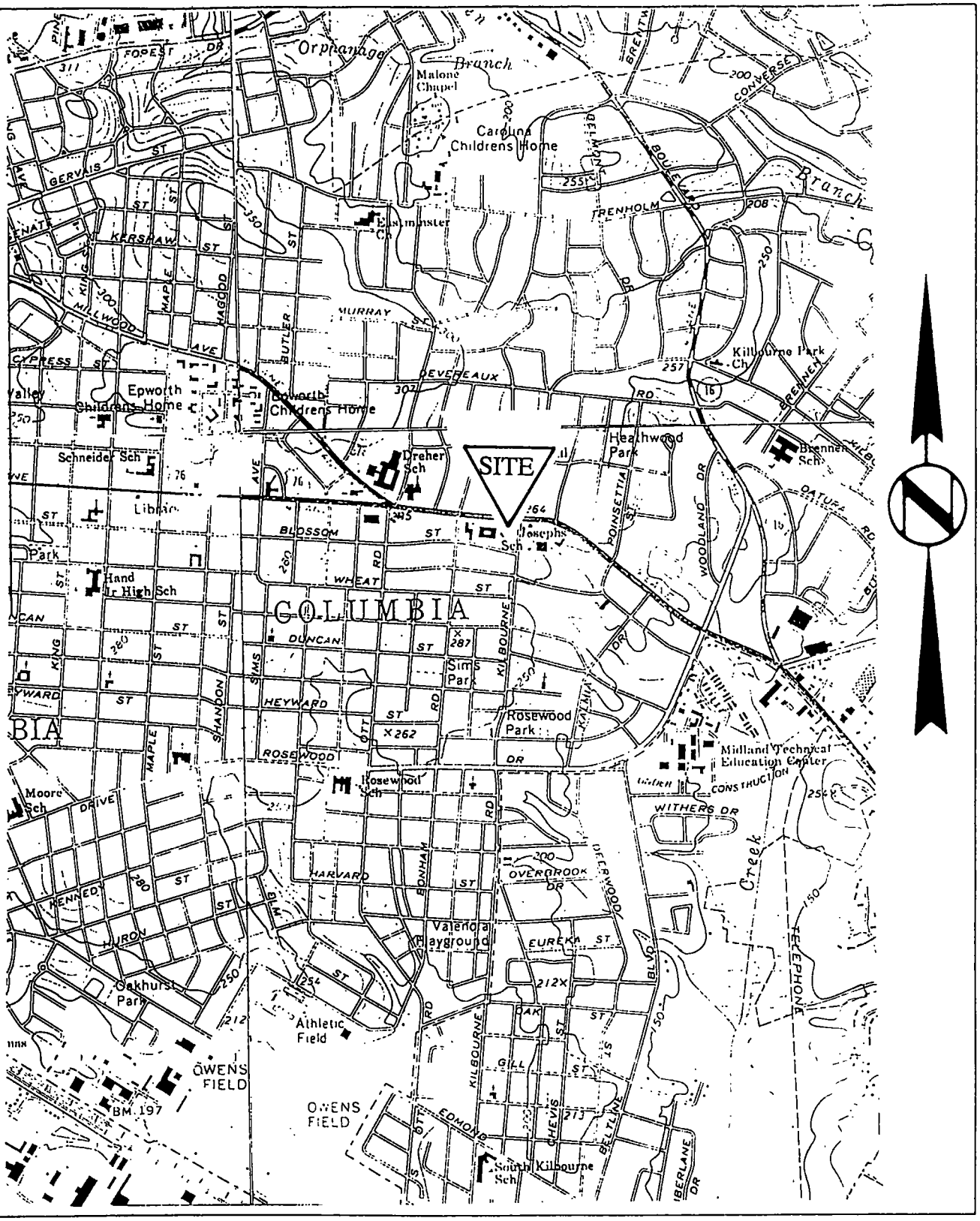
MONITOR WELL LOCATION-MAP 6/14/89
CROWN CENTRAL PETROLEUM CORP.
S.C.#15 3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

ATEC Environmental Consultants
. Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20ft	BS	WS	3/25/91	35-07004	NA

APPENDIX A

VICINITY MAP



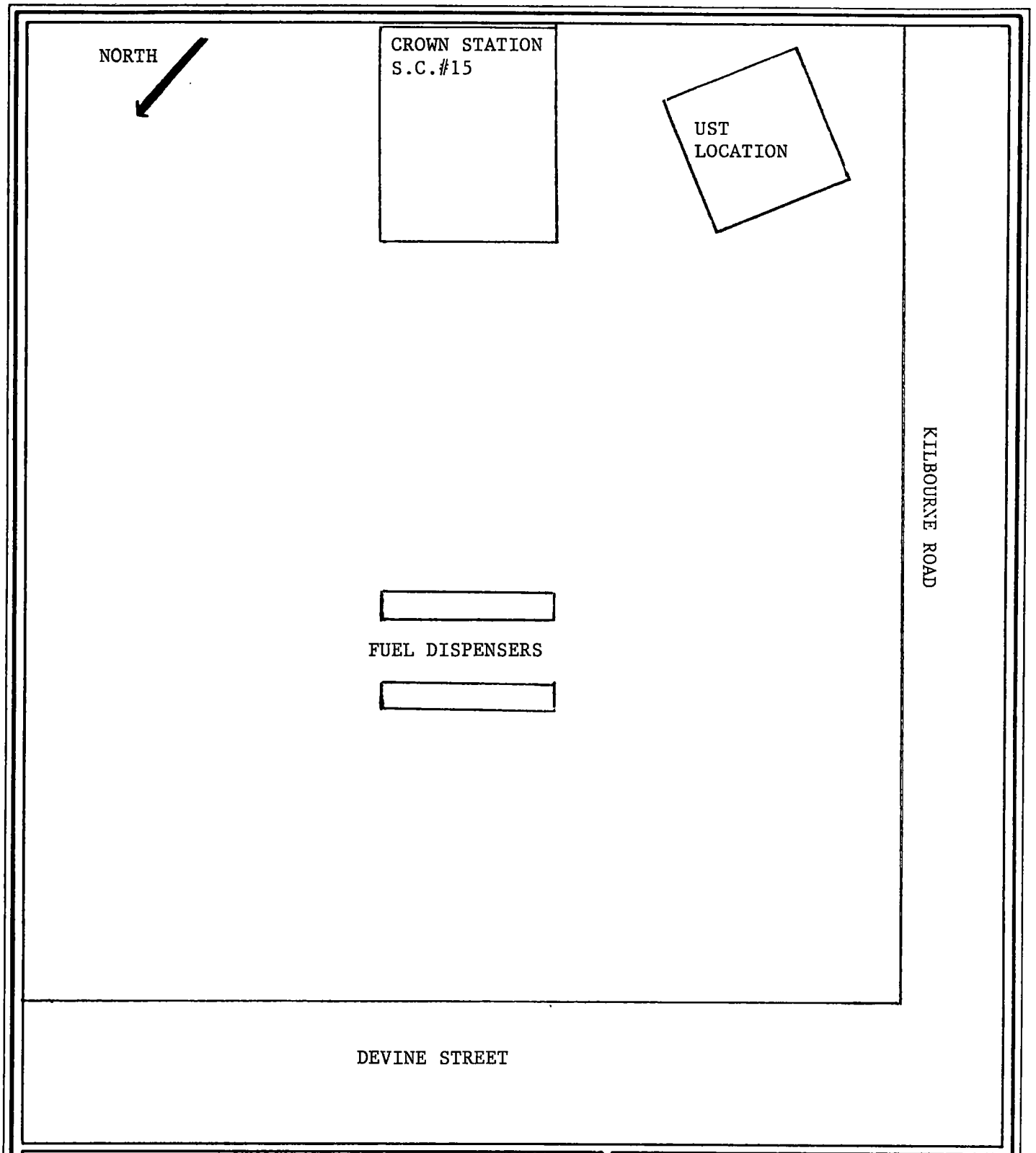
VICINITY MAP
SC-15
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

ATEC Environmental Consultants
A Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1"=2000 FT	U.S.G.S	A.A.	3/11/91	35-070004	1

APPENDIX B

SITE MAP



SITE MAP CROWN STATION S.C.#15
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20ft	BS	WS	3/21/91	35-07004	NA

APPENDIX C

BORE LOGS AND LOCATION MAP

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #1

DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH FROM	— FT. TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon clay and fine SAND	5.0	4.5	
9.5	10.0	Gray-brown clay and find SAND	10.0	10.8	
14.5	15.0	Gray-brown clay and fine SAND	15.0	10.6	
19.5	20.0	Gray silty fine SAND	20.0	8.7	
24.5	25.0	Rust silty fine SAND	25.0	7.9	
29.5	20.0	Rust silty fine SAND	30.0	7.4	
34.5	35.0	Rust silty fine SAND	35.0	6.9	
39.5	40.0	Light brown silty fine SAND	40.0	6.5	Moist
44.5	45.0	Light gray silty fine SAND	45.0	6.0	

Depth Referenced To: Top of Grade

Groundwater noted at: 37.0 ft

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #2

DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH FROM	— FT. TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon clay and fine SAND	5.0	10.2	
9.5	10.0	Maroon clay and fine SAND	10.0	9.0	
14.5	15.0	Maroon clay and fine SAND	15.0	8.6	
19.5	20.0	Rust silty clay and fine SAND	20.0	8.2	
24.5	25.0	Rust silty clay and fine SAND	25.0	7.6	
29.5	20.0	Rust silty clay and fine SAND	30.0	7.4	
34.5	35.0	Maroon silty clay and fine SAND	35.0	6.8	
39.5	40.0	Maroon silty clay and fine SAND	40.0	6.5	Moist
44.5	45.0	Rust fine silty SAND	45.0	5.4	

Depth Referenced To: Top of Grade

Groundwater noted at: 36.0 ft

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #3

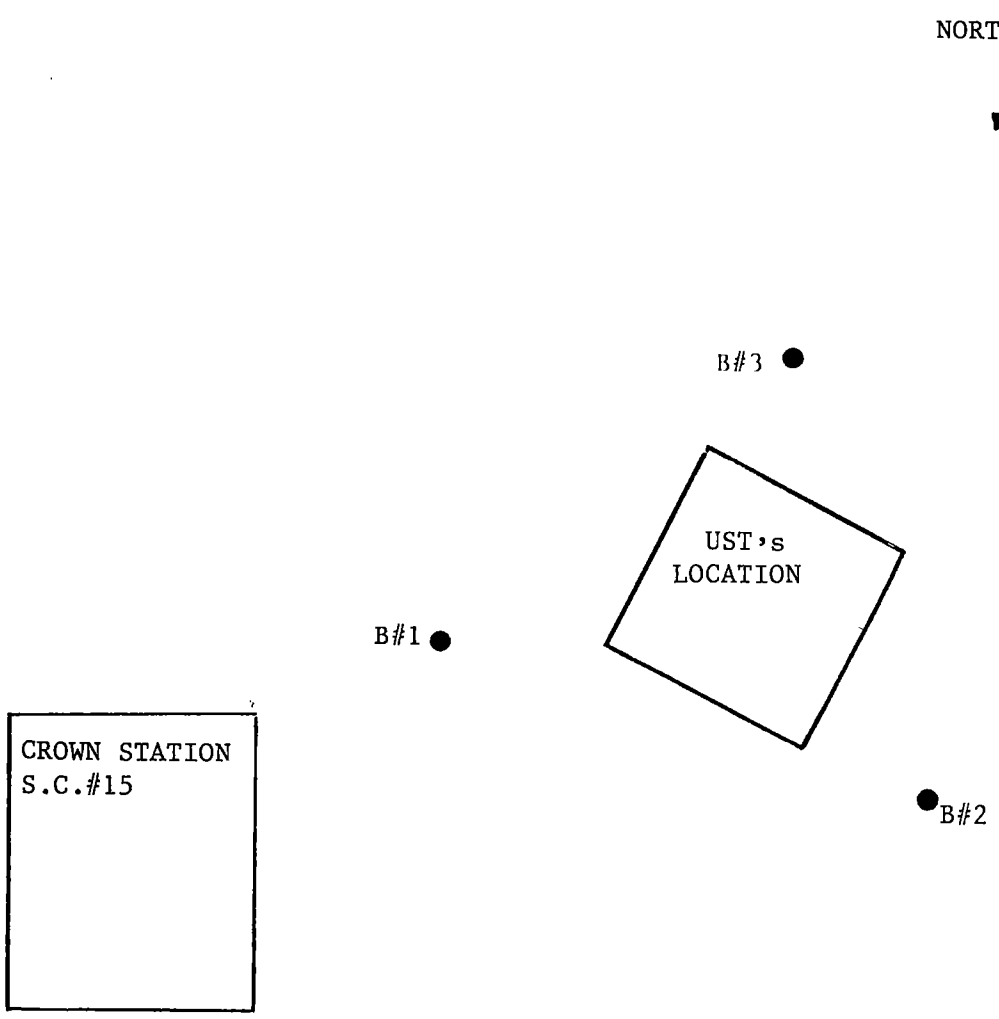
DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH FROM	— FT. TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon silty CLAY	5.0	2.0	
9.5	10.0	Maroon silty clay and fine SAND	10.0	7.0	
14.5	15.0	Maroon silty clay and fine SAND	15.0	9.6	
19.5	20.0	Maroon silty clay and fine SAND	20.0	8.4	
24.5	25.0	Rust silty clay and fine SAND	25.0	7.4	
29.5	20.0	Rust silty clay and fine SAND	30.0	6.8	
34.5	35.0	Maroon silty clay and fine SAND	35.0	4.8	
39.5	40.0	Maroon silty clay and fine SAND	40.0	4.6	Moist
44.5	45.0	Rust fine silty SAND	45.0	4.2	

Depth Referenced To: Top of Grade

Groundwater noted at: 37.5 ft



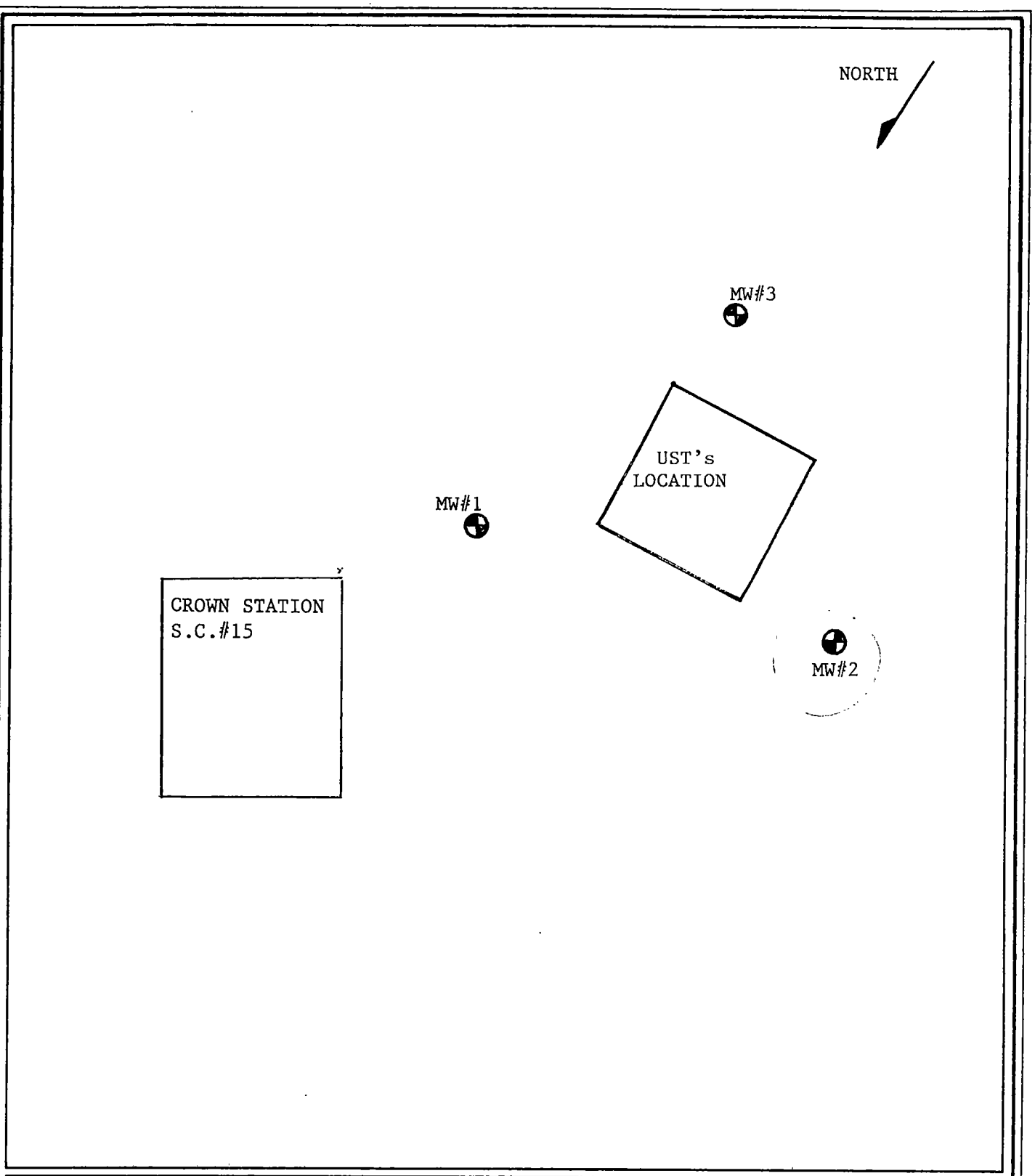
SOIL BORING LOCATION MAP
CROWN CENTRAL PETROLEUM CORP.
S.C.#15 3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20 ft	BS	WS	3/25/91	35-07004	NA

APPENDIX D

MONITOR WELL DATA



MONITOR WELL LOCATION MAP
CROWN CENTRAL PETROLEUM CORP.
S.C.#15 3800 DEVINE STREET
COLUMBIA,SOUTH CAROLINA

ATEC Environmental Consultants
A Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20ft	BS	WS	3/25/91	35-07004	NA

NORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 783-5083

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

I DRILLING CONTRACTOR ATEC Associates, Inc.

DRILLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)

Nearest Town: Columbia, South Carolina

3800 Devine Street
(Road, Community, or Subdivision and Lot No.)

County Richland

2. OWNER Crown Central Petroleum Corp.

ADDRESS One North Charles Street, P.O. Box 1168

Baltimore, Maryland 21203
City or Town State ZIP Code

3. Date Drilled 11/21/90 USE OF WELL Monitor

4. Total Depth 45.0 Cuttings Collected? X Yes ____ No

5. DOES WELL REPLACE EXISTING WELL? ____ Yes X No

6. Static Water Level: 37.0 ft. ____ above X below top of casing.
Top of casing is -.50 ft. below land surface.

7. YIELD (gpm): NA METHOD OF TEST NA

8. Water Zones (depth): NA

9. CHLORINATION: Type NA Amount _____

10. CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
Fr	-.50	To -35.0	Ft.	2	Sch 40	PVC
From		To	Ft.			
Fr		To	Ft.			

11. GROUT:

	Depth			Material	Method
Fr	-.75	To -31.0	Ft.	Cement	HAND
Fr	-31.0	To -33.0	Ft.	Bentonite	HAND

12. SCREEN:

	Depth			Diameter	Slot Size	Material
Fr	-35.0	To -45.0	Ft.	2 in.	.010 in.	PVC
From		To	Ft.	in.	in.	
Fr		To	Ft.	in.	in.	

13. GRAVEL PACK:

	Depth			Size	Material
Fr	-33.0	To -45.0	Ft.	Fine	Filter SAND
Fr		To	Ft.		

14. REMARKS: _____

Depth From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points)

MW-1

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 14 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner.

NORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 783-5083

WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY
Quad No. _____ Serial No. _____
Lat _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

1 DRILLING CONTRACTOR ATEC Associates, Inc.

DRILLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

2 WELL LOCATION: (Show sketch of the location below)

Nearest Town: Columbia, South Carolina
3800 Devine Street
(Road, Community, or Subdivision and Lot No.)

County Richland

OWNER Crown Central Petroleum Corp.

ADDRESS One North Charles Street, P.O. Box 1168

Baltimore, Maryland 21203
City or Town State ZIP Code

3. Date Drilled 11/21/90 USE OF WELL Monitor

Total Depth 45.0 Cuttings Collected? X Yes ____ No

4. DOES WELL REPLACE EXISTING WELL? ____ Yes X No

6. Static Water Level: 36.0 ft. ____ above X below top of casing.
Top of casing is -.50 ft. below land surface.

YIELD (gpm): NA METHOD OF TEST NA

8. Water Zones (depth): NA

CHLORINATION: Type NA Amount _____

10. CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
From	-.50	To -35.0	Ft.	2	Sch 40	PVC
From		To	Ft.			
From		To	Ft.			

11. GROUT:

	Depth			Material	Method
From	-.75	To -31.0	Ft.	Cement	HAND
From	-31.0	To -33.0	Ft.	Bentonite	HAND

12. SCREEN:

	Depth			Diameter	Slot Size	Material
From	-35.0	To -45.0	Ft.	2 in.	.010 in.	PVC
From		To	Ft.	in.	in.	
From		To	Ft.	in.	in.	

13. GRAVEL PACK:

	Depth			Size	Material
From	-33.0	To -45.0	Ft.	Fine	Filter SAND
From		To	Ft.		

14. REMARKS: _____

Depth From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points)

MW-2

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 14 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner.

ORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 783-5083

WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY
Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

D LLING CONTRACTOR ATEC Associates, Inc.

D"LLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Columbia, South Carolina
3800 Devine Street
(Road, Community, or Subdivision and Lot No.)

County: Richland

2 OWNER Crown Central Petroleum Corp.
ADDRESS One North Charles Street, P.O. Box 1168
Baltimore, Maryland 21203
City or Town State ZIP Code

3. Date Drilled 11/21/90 USE OF WELL Monitor

4 Total Depth 45.0 Cuttings Collected? X Yes ____ No

5 DOES WELL REPLACE EXISTING WELL? ____ Yes X No

6. Static Water Level: 36.0 ft. ____ above X below top of casing.
Top of casing is -.50 ft. below land surface.

7 YIELD (gpm): NA METHOD OF TEST NA

8. Water Zones (depth): NA

9 CHLORINATION: Type NA Amount _____

10. CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
Fr	-.50	To -35.0	Ft.	2	Sch 40	PVC
From		To	Ft.			
Fr		To	Ft.			

11 GROUT:

	Depth			Material	Method
Fr	-.75	To -31.0	Ft.	Cement	HAND
Fr	-31.0	To -33.0	Ft.	Bentonite	HAND

12. SCREEN:

	Depth			Diameter	Slot Size	Material
Fr	-35.0	To -45.0	Ft.	2 in.	.010 in.	PVC
From		To	Ft.	in.	in.	
Fr		To	Ft.	in.	in.	

13 GRAVEL PACK:

	Depth			Size	Material
Fr	-33.0	To -45.0	Ft.	Fine	Filter SAND
Fr		To	Ft.		

14. REMARKS: _____

From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

MW-3

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 14 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner.

APPENDIX E

SOIL ANALYTICAL DATA

ENVIROLABS, INC.

ATEC & ASSOCIATION
6814 DAVIS CIRCLE
RALEIGH, NC 27613

DATE RECEIVED: 11/15/90
DATE REPORTED: 11/27/90
REFERENCE NO. 9012551

PROJECT NAME: CROWN CENTRAL #15

SAMPLE DESCRIPTION: B #1
TPH - < 10 MG/KG

SAMPLE DESCRIPTION: B #2
TPH - < 10 MG/KG

SAMPLE DESCRIPTION: B #3
TPH - < 10 MG/KG

APPROVED BY: _____
LEWIS FREDERICK
LABORATORY DIRECTOR

APPENDIX F

WATER CHEMISTRY DATA

ENVIROLABS, INC.

ATEC ASSOCIATION
6814 DAVIS CIRCLE
RALEIGH, NC 27613

DATE RECEIVED: 11/16/90
DATE REPORTED: 11/26/90
REFERENCE NO. 9012570

Xylene !

PROJECT NAME: CC #15

SAMPLE DESCRIPTION: MW-1
BENZENE - 5 UG/L*
CHLOROBENZENE - 5 UG/L*
1,2-DICHLOROBENZENE - 5 UG/L*
1,3-DICHLOROBENZENE - 5 UG/L*
1,4-DICHLOROBENZENE - 5 UG/L*
ETHYLBENZENE - 5 UG/L*
TOLUENE - 5 UG/L*

SAMPLE DESCRIPTION: MW-2
BENZENE - 5 UG/L*
CHLOROBENZENE - 5 UG/L*
1,2-DICHLOROBENZENE - 5 UG/L*
1,3-DICHLOROBENZENE - 5 UG/L*
1,4-DICHLOROBENZENE - 5 UG/L*
ETHYLBENZENE - 5 UG/L*
TOLUENE - 5 UG/L*

SAMPLE DESCRIPTION: MW-3
BENZENE - 5 UG/L*
CHLOROBENZENE - 5 UG/L*
1,2-DICHLOROBENZENE - 5 UG/L*
1,3-DICHLOROBENZENE - 5 UG/L*
1,4-DICHLOROBENZENE - 5 UG/L*
ETHYLBENZENE - 5 UG/L*
TOLUENE - 5 UG/L*

*ANALYZED FOR BUT NOT DETECTED

APPROVED BY: _____
LEWIS FREDERICK
LABORATORY DIRECTOR

APPENDIX G

GROUNDWATER FLOW DATA

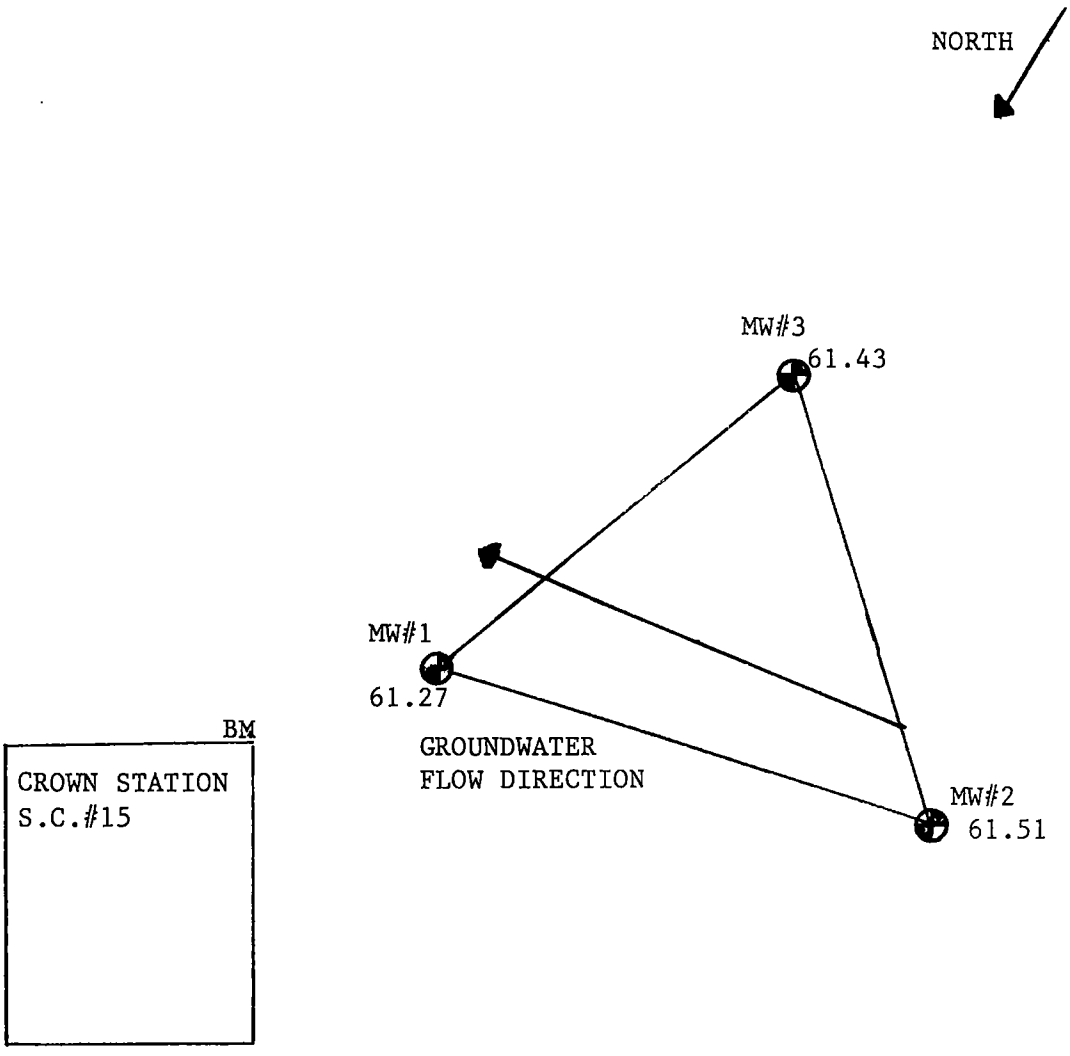
GROUNDWATER ELEVATION DATA
CROWN CENTRAL PETROLEUM CORP.
SC #15
3600 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
JANUARY 11, 1991

WELL I.D.	ROD ELEVATION		ELEVATION
BM	4.82	+100.00	104.82
MW#1	5.92	104.82	98.90
MW#2	7.38	104.82	97.44
MW#3	7.28	104.82	97.54

WELL I.D.	ELEVATIONS (Ft.)	D-G-W-TABLE* (Ft.)	G.W. ELEVATION (Ft.)
MW#1	98.90	37.63	61.27
MW#2	97.44	35.93	61.51
MW#3	97.54	36.11	61.43

* DGW = Depth to Groundwater

Bench mark elevation is an assumed elevation and does not represent AMSL.



GROUNDWATER FLOW DIRECTION MAP
CROWN CENTRAL PETROLEUM CORP.
S.C.#15 3800 DEVINE STREET
COLUMBIA,SOUTH CAROLINA

ATEC Environmental Consultants
A Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

SCALE:	DRAWN BY:	CHECKED BY:	DATE:	PROJECT NO.	FIGURE NO.
1 INCH=20ft	BS	WS	3/25/91	35-07004	NA

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary

Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Robert J. Stripling, Jr.

Promoting Health, Protecting the Environment

File

May 20, 1991

J.A. Bright, Jr.
Crown Central Petroleum Corporation
One North Charles Street
P.O. Box 1168
Baltimore, Maryland 21203



Re: Crown Station SC-015 (PCAS 7105)
Site characterization received April 16, 1991
Richland County

Dear Mr. Bright:

The Ground-Water Protection Division of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the above referenced submittal prepared by ATEC Environmental Consulting Services.

The soil and water chemistry data presented in the April 16, 1991 submittal suggest that the contamination levels at the site are lower than the allowable maximum contamination limits. However, several discrepancies exist in the report. The report (p.7) states that three borings were performed on November 21, 1990. Table I (p.7) indicates that the soil samples from these borings were taken on December 3, 1990. The boring logs (Appendix C) give the date as January 11, 1991. The laboratory results (Appendix 3) indicate that the soil samples were received November 15, 1990. Correspondence from Mr. Bill Scarborough of ATEC dated December 5, 1990 states that three borings were performed at three sites (**SC-15**, SC-611, and SC-635); the laboratory results that were included with this correspondence stated that a composite sample from the three different sites was received on November 21, 1990. A copy of the December 5, 1990 letter is enclosed for your reference. Table II (p. 9) states that the groundwater samples were obtained on December 12, 1991 (90). The laboratory results indicate that the groundwater samples were received on November 16, 1990, one day after receipt of the soil samples. Due to the fact that no chain-of-custody forms were provided in the report, this office is requesting that the monitoring wells (MW-1 through MW-3) be resampled. The samples should be analyzed for TPH and EPA Method 602 **plus xylenes.** The results of these analyses, a detailed description of sampling protocol, and the accompanying chain-of-custody form should be submitted on or before June 28, 1991.

A report prepared by Atlanta Testing & Engineering dated June 8, 1990 indicated that groundwater was measured at 16.00 feet and 16.68 feet from two monitoring wells surrounding the tank pit. These wells were installed to a depth of 18 feet and consisted of a 15 foot screen. Chemical analysis of a groundwater sample from

recycled paper

MW-4 yielded a result of 490 parts per billion benzene. However, groundwater was recently measured to be between 36 feet and 37.5 feet in the monitoring wells installed by ATEC. This represents a difference of approximately 20 feet in groundwater elevation in an eleven to twelve month period of time. This office is requesting that the original four monitoring wells installed by AT&E be measured for the presence of groundwater. If groundwater is present in these wells, please record the level in each well and obtain a representative sample from MW-2 and MW-4 for BTEX analysis. The results of the sampling should be submitted on or before June 28, 1991.

Due to the 490 parts per billion benzene reported in June 1990 and because of a failed tightness test on the associated tank piping that was reported by Mr. Jim Bills on October 2, 1990, this office is suggesting that monitoring wells be proposed downgradient to the tank pit area and between the tank pit and the dispenser islands. These monitoring wells should be proposed on or before June 28, 1991. Please note that approval for MW-1 through MW-3 installed by ATEC was not granted by this office. If any additional wells are installed without prior approval from this office, enforcement actions may be initiated.

On April 23, 1991, the UST Regulatory Section of the Ground-Water Protection Division received notice of your plans to remove the tanks from the site. This office is requiring that the above requested sampling results be submitted prior to the removal of the tanks or by the date provided above. Also, please inform me of the date on which the tanks are scheduled to be removed. If the tanks are to be removed in the immediate future, then a groundwater sample taken during the tank removal, if groundwater is encountered, will suffice instead of taking samples from the tank pit wells installed by AT&E.

On all correspondence regarding this site, please reference PCAS 7105. If you have any questions, please feel free to call me at (803) 734-5431.

Sincerely,

Lee A. Monts

Lee A. Monts, Hydrogeologist
UST State Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

SC157105.591

Enclosure: December 5, 1990 ATEC correspondence

cc: Paul Bristol, Central Midlands District EQC
Bill Scarborough, ATEC

SC[illegible]I CAROLINA DEPARTMENT OF H[illegible]H
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

Craven Central 15 (7105)

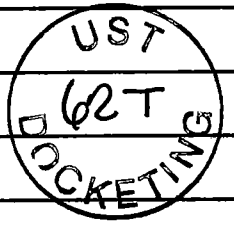
MEMO

DATE: 5-21-91

Niggel Family Partnership (property owner)
P.O. Box 6573
Columbia SC 29260

Contacts: Mr. T. Russel Rooney of Rooney + McArthur Insurance Co.
phone 799-5533

Ms. June Niggels Derrick, family member.
Office phone 253-7874



S(I CAROLINA DEPARTMENT OF HI H
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

UST 63T DOCKETING

To File From L Mouts
Re: Crown Central 15 - 7105

MEMO

DATE: 5-21-91

Ms. June Derrick called to check on the site; She is a representative of the property owners. The property is owned by Nigget Family Partnership. She stated that the lease was up June 30, 1991. I informed her that a Site char./assessment had been performed and that Crown, owner of the tanks, would be responsible for clean-up even after the lease had expired since they were responsible for the problem. I told her that the latest report did not show contamination. She asked if they should obtain a consultant to aquire Samples; I told her that that was not necessary in my opinion since Crown was assessing the site. She said to contact her if we did need them to do anything - See attached Memo for contact information (also stated: Mobil → Cities → Crown)

S(H CAROLINA DEPARTMENT OF H 'H
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

UST 64T DOCKETING

To File from LAMonts
Re: Crown SC-015 RAS 7105

MEMO

DATE: 5-22-91

Ms. Derrick called today to request that I inform her of when the tanks are planned to be pulled. The Riggels Family Partnership plans to hire a consultant to obtain samples for their own information. I informed her that she could contact FOI to receive a copy of the file.

9105173

RECEIVED
MAY 23 1991
FREEDOM OF INFORMATION OFFICE
ENVIRONMENTAL QUALITY CONTROL
ADMINISTRATION

May 22, 1991

S. C. DHEC
2600 Bull Street
Columbia, S. C. 29201

Att: Pat Turner
Freedom of Information Office

Re: Crown Petroleum Station #15
PCAS #7105
3800 Devine St.
Columbia, S. C. 29205

Dear Ms. Turner:

Lee Monts of your DHEC Office advised me in a telephone conversation May 21, 1991 that I would be able to get the file on the reports furnished DHEC by Crown Petroleum on the site assessment of their location at 3800 Devine St. This is under the Freedom of Information Act.

I am a member of the family partnership that owns this property. It is under the name of Niggel Family Partnership. This file is being managed by Lee Monts.

Sincerely,

June Niggel Derrick

June Niggel Derrick
Niggel Family Partnership
P. O. Box 6573
Columbia, S. C. 29260

Pat - Please call me when Copies are ready. I'll pick them up. Thanks —
Office ph# 253-7874 June

OST DOCKETING

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary

Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Robert J. Stripling, Jr.

Promoting Health, Protecting the Environment

File

May 24, 1991

Bill Scarborough
ATEC Environmental Consultants
6814 Davis Circle
Raleigh, NC 27613-2002

Re: Crown Central Station SC-15 (PCAS 7105)
SCDHEC correspondence dated February 22, 1991
Richland County

Dear Mr. Scarborough:

In the above referenced letter, Mr. Jacob Baker of the South Carolina Department of Health and Environmental Control (SCDHEC) Bureau of Solid and Hazardous Waste denied your request to dispose of one-fourth ton of soil removed from three Crown Central stations (SC-15, SC-611 and SC-635). The letter stated that a minimum of five to ten composite samples of the stockpiled soils be analyzed for TPH and BTEX. This guidance provided to you from Mr. Baker was incorrect. If the soils remain stockpiled at one of the Crown sites, only two composite samples need to be collected and analyzed for TPH and BTEX. The results of these samples should be directed to my attention; further directives will then be provided from the Bureau of Solid and Hazardous Waste Management regarding the fate of the stockpiled soils.

Also, please find enclosed a newly developed Soil Remediation Guidance Document that you may find beneficial at this time.

If you have any questions regarding this issue, please feel free to contact me at (803) 734-5431.

Sincerely,

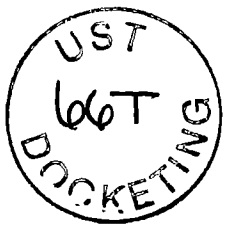
Lee A. Monts

Lee A. Monts, Hydrogeologist
UST State Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

ATECSOIL.591

Enclosure: Soil Remediation Guidance Document
SCDHEC letter dated February 22, 1991

cc: Paul Bristol, Central Midlands District EQC
J.A. Bright, Jr., Crown Central



recycled paper

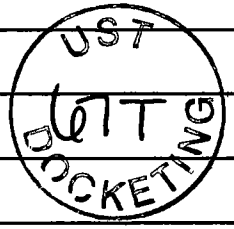
SC CAROLINA DEPARTMENT OF HE H
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

To File From LAM
Re: Crown SC-15 (7105)

MEMO

DATE: 6-4-91

Mr. Russ Rooney of the Riggels Family Partnership called to check on status; I told him that SCDHEC had not yet received 48 hr. notification for the tank removal.



atlanta testing
& engineering
8901 farrow road / suite 108a / columbia, south carolina 29203 / (803) 736-1700 / fax: (803) 736-5005

July 17, 1991

RECEIVED
JUL 24 1991
GROUND-WATER
PROTECTION DIVISION

Mr. Lee A. Monts
South Carolina Department of Health
and Environmental Control
Ground Water Protection Division
2600 Bull Street
Columbia, South Carolina 29201

Re: Groundwater Sampling Report
Crown/Fast Fare SC-015
PCAS 7105
3800 Devine Street
Columbia, South Carolina
Job No. 1044A, Report No. 91228

Dear Mr. Monts:

In accordance with your correspondence of May 20, 1991 and as authorized by Mr. Jack Bright, Crown Central Petroleum Corporation, we have enclosed the results of groundwater sampling at shallow wells MW-1, MW-2, MW-3, and MW-4 (installed by Atlanta Testing & Engineering), and deep wells MW-1A, MW-2A, and MW-3A (our designation, installed by ATEC Environmental Consulting Services). This report includes a site plat with the well locations (Figure 1), depth to water measurements, and the water quality results.

GROUNDWATER SAMPLING

The seven site monitoring wells were sampled on June 27, 1991 for analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX). Depth to water measurements were taken with a gasoline sensitive oil/water Interface probe prior to sampling. The depth to water was approximately 16 to 18 feet in the shallow wells and 34 to 36 feet in the deep wells. No liquid hydrocarbons were measured atop the water table. The water level measurement data are included as Table 1 in the Appendix.

Three to four volumes of water were purged from wells MW-1A, MW-2A, and MW-3A prior to sampling. Wells MW-1, MW-2, MW-3, and MW-4 contained very little water, and were purged to dryness, then sampled. The purging and sampling were performed with a dedicated polyethylene bailer and dedicated rope. The groundwater samples were placed in laboratory prepared sample bottles and transported in an iced cooler to Savannah Laboratories & Environmental Services, Savannah, Georgia for analysis, per EPA Method 602. A chain of custody document accompanied the samples.

UST
68T
DOCKETING

The water quality results at the shallow wells indicate total BTEX concentrations ranging from 8.5 ppb (MW-4) to 22,300 ppb (MW-1). The benzene concentrations ranged from 8.5 ppb at MW-4 to 7,700 ppb at MW-2, which are above the South Carolina Drinking Water Standard of 5.0 ppb.

The BTEX concentrations were below method detection limits (<1.0 ppb) at deep wells MW-1A, MW-2A, and MW-3A.

The laboratory analytical report and chain of custody log are included in the Appendix. A site plat showing the location of the monitoring wells is also included in the Appendix.

CONCLUSIONS AND RECOMMENDATIONS

The water quality data from the shallow wells adjacent to the UST pit indicate a release of hydrocarbons has occurred. The benzene concentrations exceed state drinking water standards. However, the water quality data from the three deep wells do not indicate detectable BTEX concentrations. The water level data indicate two distinct hydrologic units represented by the shallow and deep wells. The water level differences (approximately 18 feet) between the two units indicate a confining (clay) unit must be present below 18 feet. Copies of the ATEC logs are not available to confirm this assumption.

Additional assessment is recommended to define the horizontal extent of dissolved hydrocarbons within the shallow unit. A tank closure assessment report will be provided after the tanks are removed. The tank removal date is tentatively July 30, 1991.

Please contact us if you should have any questions concerning the Groundwater Sampling Report.

Respectfully submitted,

ATLANTA TESTING & ENGINEERING

Charles R. Clymer, Jr., P.G.
Senior Hydrogeologist
SC Registration No. 236

CRC/kb

Attachments

cc: Mr. Jack Bright

RECEIVED
JUL 24 1991

APPENDIX

GEORGE M NIGGLE

GEORGE M NIGGLE

29736 SQ FT
OR
0683 ACRE

7-24-91

MW-3A OK. 4-16-91 submittal
63.2 ◆ (61.43)

MW-3
5100

MW-2
7700

UST AREA

MW-4
8.5

OK
MW-1A
62.91
(61.27)

MW-1
1100 Benzene

63.26 (61.51)
MW-2A
OK

REMOVE EXIST. BRICK WALL

EXTEND EXISTING [illegible]

INSTALL NEW BOARD ON BOARD FENCE (6' HIGH SEE DETAIL DWG)

REMOVE EXIST. FASCIA & INSTALL ALUMINUM FASCIA (TYP 3 SIDES)

REMOVE EXISTING CONCRETE WALK

INSTALL NEW CURB

INSTALL NEW VACUUM SITE (SEE DETAIL DWG)

NOTE:
REUSE EXIST. AREA LIGHTS & POLES

EXIST PRODUCT DISPENSERS (TYP 3 PER ISLAND)

INSTALL NEW CURB. MID-PUMP NEW AIR METER TO BE SUPPLIED BY OWNER - SEE DETAIL DWG

EXIST CURB

INSTALL NEW MOTOR OIL CABINET (TYP 1 PER ISLAND)

INSTALL NEW CONCRETE VACUUM ISLAND NEW 5'x5' CONC. PAD

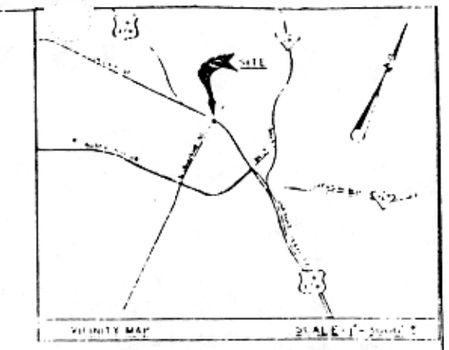
REMOVE EXIST. FASCIA & INSTALL NEW MODULAR FASCIA

CROWN LOGO IN MONAR FASCIA

EASTERN EXIT COLUMBIA LEGAL ABUT

DEVINE STREET
(Bituminous Pavement)
U.S. HIGHWAY No. 21 & 76

KILBOURNE ROAD
(Bituminous Pavement)
ROAD S-40-54



EXPLANATION

MW-1 ◆ APPROXIMATE MONITORING WELL LOCATION AND NUMBER

Reference is made to the following:

1. Topographical map prepared for Gulf Oil Corporation by H. P. Bailey & Associates, Inc., dated April 22, 1971 (Reference No. 26-05 Plat).
2. South Carolina Department of Highways and Public Transportation plans Project No. [illegible]
3. Richland County Tax Assessors Map No. 11507

LAND DESCRIPTION

Beginning at a point at the intersection of the eastern right-of-way of Kilbourne Road (Road S-40-54) and the southern right-of-way of Devine Street (U.S. Highway Nos. 21 and 76) and proceeding in a direction of S 80°-16'-39" E along said southern right-of-way of Devine Street (U.S. Highway Nos. 21 and 76) for a distance of 170.00 feet to an iron pipe marker; thence turning and proceeding in a direction of S 11°-27'-16" W along the property of George M. Niggle for a distance of 175.00 feet to a point, thence turning and proceeding in a direction of N 80°-16'-39" W also along property of George M. Niggle for a distance of 170.00 feet to a point on the eastern right-of-way of Kilbourne Road (Road S-40-54), thence turning and proceeding in a direction of N 11°-27'-16" E along said right-of-way of Kilbourne Road (Road S-40-54) for a distance of 175.00 feet to a point, this being the point of beginning.

This property is located in Columbia, Richland County, South Carolina and contains 0.681 acre (29,736 square feet) and is more currently shown and delineated on a property survey for Town Central Petroleum Corporation by H. P. Bailey & Associates, Inc., Engineers, dated August 30, 1985 (Dwg. No. 22,158-R2B).

PLATE 1

SITE PLAT WITH MONITOR WELL LOCATIONS

22 0 22 44
scale feet

JOB# 1044A SC-15

CROWN CENTRAL PETROLEUM CORPORATION

PLOT PLAN - CROWN SERVICE STATION
DEVINE ST. & KILBOURNE RD.
[illegible] COLUMBIA, S.C.

DATE: AUGUST 30, 1985

DRAWN BY: MED & DS

TABLE 1

GROUNDWATER ELEVATIONS
CROWN CENTRAL PETROLEUM CORPORATION
STORE NUMBER - SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
JOB NO. C-1044A

WELL NUMBER	TOTAL DEPTH	DEPTH TO WATER	DEPTH TO PRODUCT	PRODUCT THICKNESS
MW-1	18.1	17.84	-	0.00
MW-2	18.1	17.85	-	0.00
MW-3	18.1	15.82	-	0.00
MW-4	18.1	16.48	-	0.00
MW-1A	45.0	35.99	-	0.00
MW-2A	44.6	34.18	-	0.00
MW-3A	43.0	34.34	-	0.00

NOTES:

1. *All measurements in feet; measuring point is top of casing.*
2. *Water levels measured on June 27, 1991, with an ORS Interface Probe (electric water/product level meter).*

SL ***SAVANNAH LABORATORIES***
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue (31404) • P.O. Box 13548 • Savannah, GA 31416-0548 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-34366

Received: 28 JUN 91

Mr. Chuck Clymer
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: 1044(a)/Crown
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
34366-1	MW-1 (06.27.91)	06-27-91
34366-2	MW-2 (06.27.91)	06-27-91
34366-3	MW-3 (06.27.91)	06-27-91
34366-4	MW-4 (06.27.91)	06-27-91
34366-5	1A (06.27.91)	06-27-91

PARAMETER	34366-1	34366-2	34366-3	34366-4	34366-5
Purgeable Aromatics (602/8020)					
Benzene, ug/l	1100	7700	5100	8.5	<1.0
Chlorobenzene, ug/l	<100	<100	<100	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<100	<100	<100	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<100	<100	<100	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<100	<100	<100	<1.0	<1.0
Ethylbenzene, ug/l	2600	940	1100	<1.0	<1.0
Toluene, ug/l	7600	<100	380	<1.0	<1.0
Xylenes, ug/l	11000	1300	700	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<1000	<1000	<1000	<10	<10

ATLANTA TESTING
& ENGINEERING
RECEIVED
JUL 12 91
COLUMBIA, SC

SL *SAVANNAH LABORATORIES*
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue (31404) • P.O. Box 13548 • Savannah, GA 31416-0548 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-34366

Received: 28 JUN 91

Mr. Chuck Clymer
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: 1044(a)/Crown
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	DATE SAMPLED
34366-6	2A (06.27.91)	06-27-91
34366-7	3A (06.27.91)	06-27-91

PARAMETER	34366-6	34366-7
Purgeable Aromatics (602/8020)		
Benzene, ug/l	<1.0	<1.0
Chlorobenzene, ug/l	<1.0	<1.0
1,2-Dichlorobenzene, ug/l	<1.0	<1.0
1,3-Dichlorobenzene, ug/l	<1.0	<1.0
1,4-Dichlorobenzene, ug/l	<1.0	<1.0
Ethylbenzene, ug/l	<1.0	<1.0
Toluene, ug/l	<1.0	<1.0
Xylenes, ug/l	<1.0	<1.0
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	<10

SL *SAVANNAH LABORATORIES*
& ENVIRONMENTAL SERVICES, INC.

5102 LaRoche Avenue (31404) • P.O. Box 13548 • Savannah, GA 31416-0548 • (912) 354-7858 • Fax (912) 352-0165

LOG NO: S1-34366

Received: 28 JUN 91

Mr. Chuck Clymer
Atlanta Testing & Engineering
8901 Farrow Rd. Suite 108A
Columbia, SC 29203

Project: 1044(a)/Crown
Sampled By: Client

REPORT OF RESULTS

LOG NO	SAMPLE DESCRIPTION , QC REPORT FOR LIQUID SAMPLES	DATE SAMPLED
34366-8	Method Blank-Liquid	06-27-91
34366-9	Accuracy (Mean % Recovery)-Liquid	06-27-91
34366-10	Precision (% RPD)-Liquid	06-27-91
34366-11	Date Analyzed-Liquid	06-27-91

PARAMETER	34366-8	34366-9	34366-10	34366-11
Purgeable Aromatics (602/8020)				
Benzene, ug/l	<1.0	107 %	5.6 %	07.08.91
Chlorobenzene, ug/l	<1.0	107 %	6.5 %	07.08.91
1,2-Dichlorobenzene, ug/l	<1.0	---	---	07.08.91
1,3-Dichlorobenzene, ug/l	<1.0	---	---	07.08.91
1,4-Dichlorobenzene, ug/l	<1.0	---	---	07.08.91
Ethylbenzene, ug/l	<1.0	---	---	07.08.91
Toluene, ug/l	<1.0	103 %	4.9 %	07.08.91
Xylenes, ug/l	<1.0	---	---	07.08.91
Methyl-Tert-Butyl-Ether (MTBE), ug/l	<10	---	---	07.08.91

Methods: EPA 40 CFR Part 136

Janette D. Long

CHAIN OF CUSTODY LOG

atlanta testing & engineering

CLIENT: Crown | SAMPLE COLLECTED BY: W/K.

AT&E JOB NO.: 1044 (A) | DATE SAMPLED: 6/27/91 | TIME:

SITE LOCATION: 3800 Devine | SHEET NO.: 1 | OF 1

PROJECT NAME: Crown Fast Fare

SAMPLE ID NUMBER	SAMPLE LOCATION	TOTAL NUMBER OF CONTAINERS PER LOCATION	DESCRIPTION (CONTAINERS): 40 mL glass — QUANTITY EACH CONTAINER	COMMENTS
mw-1	Groundwater	2	2	
mw-2		3	3	
mw-3			3	
mw-4			3	
1A			3	
2A			3	
3A			3	

RELINQUISHED BY	DATE/TIME	RECEIVED BY	DATE/TIME
W. K.	6/27/91 1730	J. Johnson SA# 34366	6/28/91 10:30

ANALYZE FOR: 602 + xylene, MTBE

DETECTION LIMITS:

RUSH

SCHEDULE: (1) week per Chuck Clymer 6-28-91 RW

NOTIFICATION: PLEASE CALL C. Clymer - (803)736-1700 (FAX)736-5005

NOTE TO LAB

PLEASE SEND A COPY OF THIS SHEET WITH YOUR SIGNATURE BACK TO

ATLANTA TESTING & ENGINEERING
8901 FARROW RD., SUITE 108-A
COLUMBIA, SC 29203

Deborah

Crown Central Petroleum Corporation
Refiners / marketers of petroleum products & petrochemicals
One North Charles Street • P.O. Box 1168 • Baltimore, Maryland 21203 • (301) 539-7400

DIVISION OFFICE
2765 WOODWIN ROAD
P.O. BOX 47279
DORAVILLE, GEORGIA 30362

August 20, 1991

RECEIVED
AUG 23 1991
CENTRAL MIDLANDS
DISTRICT - EQC

RECEIVED
AUG 27 1991
PROTECTION

Mr. Ed McDowell
Manager, UST Section
South Carolina DHEC
Bldg 5/ P.O. Box 156
State Park, SC 29303

RE: Underground Storage Tank Removal
Permit ID: N-40-NO-07680
PCAS # 7105
Crown/Fast Fare SC-015
3800 Divine St.
Columbia, SC

Dear Mr. McDowell:

Please consider this letter as the **20 day notification**, in accordance with Federal and State Requirements 40 CFR, Subpart F, Part 280.60, 280.61 and 280.62.

40 CFR, Subpart F, Part 280.61 - Initial Response

(a) Report of contaminated soils found during excavation and tank removal was telephonically made to the district DHEC office on July 30, 1991.

(b) Crown Central Petroleum Corporation contracted G&K Tank Services, Inc. of Sumpter, South Carolina to remove one 10,000 gallon, one 8,000 and one 6,000 UST's at the subject site. Contamination of soils was found during removal on July 30, 1991. Completion of the UST removal ensured that no further release was possible.

(c) No fire or safety hazards were detected at the site.

40 CFR, Subpart F, Part 280.62 - Initial Abatement Measures and Site Check

(a-1) Each of the three UST's and associated product lines were evacuated of product and removed from the ground on July 30, 1991. No visible failures of the UST's or product lines were noted.

(a-2) Contamination was noted by OVA meter during excavation. Occasional overfilling was one probable source of contamination. The contamination was confined primarily to the bottom of the tank pit. All old fill was excavated and one to two feet of virgin soil beneath the pit was excavated and the soil was hauled to the thermal treatment facility belonging to G&K Tank Services.

(a-3) No fire or safety hazards were detected at the site. No free product was noted nor was groundwater encountered during the excavation.

UST
69T
DOCKETING

(a-4) An estimated 417 tons of contaminated soil was transported and is staged pending laboratory analysis. The soil will be treated as appropriate for it's analyzed level of contamination.

(a-5) Crown Central Petroleum contracted Atlanta Testing & Engineering to conduct a closure site assessment in conjunction with the UST removal. Soil samples were taken during excavation for analysis. Results of the laboratory analysis will follow.

(a-6) No free product was detected at the site.

Summary

Upon removal of three UST's, contamination was found throughout the excavation. All soils registering over 10 ppm on an OVA meter were excavated down to one to two feet below the limits of the original excavation and transported and staged at a treatment facility. Samples taken from below the bottom of the excavation registered over 100 ppm. Additional excavation was done in this area, but a layer of porous sand was encountered and it was judged that continued excavation was not likely to significantly reduce the contamination present. Samples taken from the stockpile registered from 30 to 1000 ppm. The pit was backfilled with clean material and paved.

If I can provide any further information, please call me at (404) 451-6266.

Sincerely,

C. R. McCord

cc: O. Ortega
J. Bright
B. Robinson

RECEIVED
AUG 27 1991

SOUTH CAROLINA DEPARTMENT OF HEALTH
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

UST 70T DOCKETING

MEMO

To File From LAM
Crown Central # SC-15 PCAS 7105
BWPD 07682

DATE: 10-3-91

June Derrick called to say that she had received a copy of ATTE's report following the tank removal in July - I told her that I had not yet received it. She said she would contact CROWN/ATTE & see about them getting a copy submitted. She stated that there was some shallow contamination found. Crown stopped the lease on the property and the site is vacant. The owners are therefore losing rental money. They are thinking about renting to a non-petroleum vendor.

716

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: John B. Pate, MD, Chairman
William E. Applegate, III, Vice Chairman
John H. Burriss, Secretary
Toney Graham, Jr., MD
Richard E. Jabbour, DDS
Henry S. Jordan, MD
Robert J. Stripling, Jr.

Promoting Health, Protecting the Environment

October 23, 1991

Matt Gilmore
Crown Central Petroleum Corporation
One North Charles Street
P.O. Box 1168
Baltimore, Maryland 21203

Re: Crown Station SC-015
GWPD SITE ID: #07680/PCAS 7105
Monitoring report received July 24, 1991
Tank closure report dated September 19, 1991
SUPERB eligibility
Richland County

Dear Mr. Gilmore:

The Ground-Water Protection Division of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed your request for participation in the early incentive program of the State Underground Petroleum Environmental Response Bank Act of 1988 (SUPERB). None of the exclusions listed in 44-2-110 and -130 exist and the release was reported during the grace period. Further, the Department has determined that site rehabilitation is necessary. Therefore, the use of SUPERB for site rehabilitation is approved. This means that reasonable monies spent can be reimbursed from the fund or direct billing can be established.

Following review of the above referenced submittals, additional assessment is warranted at the site. Therefore, an assessment plan to further define the horizontal extent of contamination must be submitted on or before December 31, 1991.

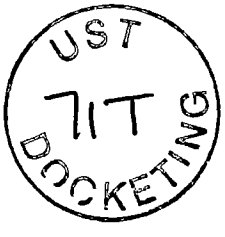
On all correspondence regarding this project, please reference GWPD SITE ID #07680. If you have any questions, please contact me at (803) 734-5431.

Sincerely,

Lee A. Monts

Lee A. Monts, Hydrogeologist
UST State Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

CROWN15.$AP



recycled paper

cc: Paul Bristol, Central Midlands District EQC
Charles R. Clymer, AT&E
June Niggel Derrick, Niggel Family Partnership
Robertha Dorsey, GWPD

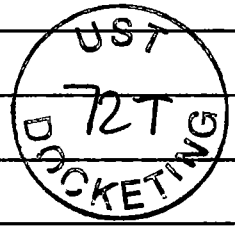
S(H CAROLINA DEPARTMENT OF H TH
AND ENVIRONMENTAL CONTROL
J. MARION SIMS BUILDING • COLUMBIA, SOUTH CAROLINA 29201
PHONE 803-734-5000

To File From LAM
Re: Crown SC-15

MEMO

DATE: 4-7-92

Tom Donn of A+E called and stated that they are going to prepare an EAP for the site and submit it and the cost proposal in the near future.



MEMORANDUM

To: GWPD Project File

From: Lee A. Monts, Hydrogeologist

Re: Crown SC-015
GWPD Site ID #07680
Devine Street & Kilbourne Road
Richland County

Date: May 8, 1992

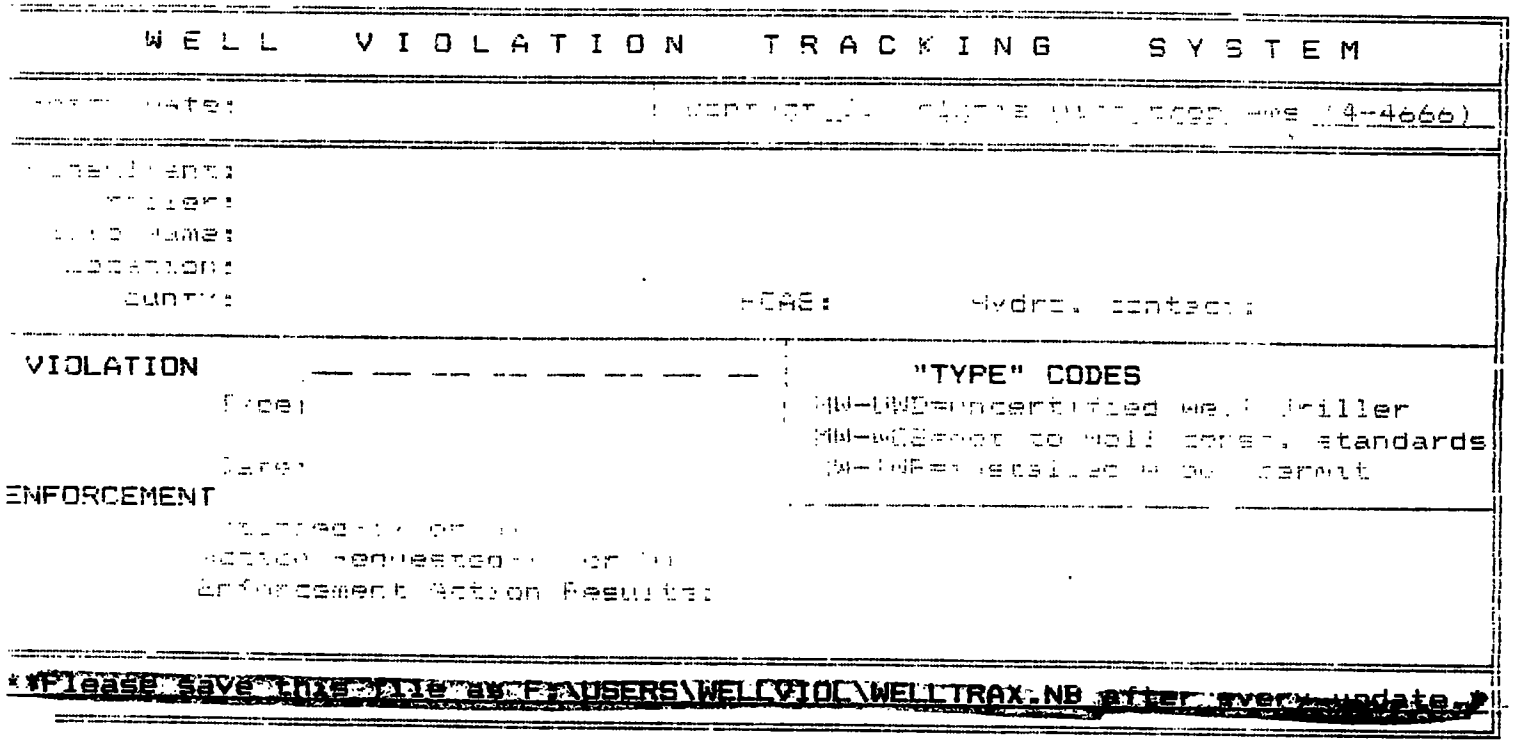


During a recent telephone conversation, Ms. June Derrick, property owner, indicated that the sewer line at the above referenced facility had been severed during tank removal operations on July 30, 1991. The situation was discovered while the abandoned site was being prepared for occupancy for a new tenant, Master Cleaners. Ms. Derrick wished to acquire the name of the tank removal company so that she could seek financial compensation for the damage that resulted. I informed her that G&K Tank Services, Inc. had performed the excavation activities.

Approximately two weeks after the conversation with Ms. Derrick, the writer noticed major activities at the site during efforts to repair the sewer line; these efforts resulted in the sewer line having to be repaired across a major thoroughfare (Kilbourne Road). Upon completion of the repairs, the writer and Mr. James L. White, fellow hydrogeologist, visited the site on May 5, 1992. It was evident that monitoring well designated MW-2A was completely destroyed, as suspected, and that monitoring well MW-3A

had been covered over with dirt. It was also discovered that MW-1A was not secured so as to prevent damage and/or vandalism. A defective two inch locking cap was in place, but without a lock.

MW-1A through MW-3A were installed by ATEC Environmental Consultants without prior approval from the Department. Enforcement actions may be appropriate in light of the newly discovered violation of the South Carolina Well Standards and Regulations. Crown Central will be notified of the findings of the site visit. The situation has been discussed with Mr. Tom Donn, current project manager for Atlanta Testing and Engineering who is handling the project for Crown Central, on May 6, 1992, while Mr. Donn was visiting Central Office. Mr. Donn stated that an Expanded Assessment Plan has been developed and forwarded to Crown Central for submittal to the Department. Fortunately, the monitoring well that was destroyed was not in an area of contamination, and replacement may not be necessary.



① Enter Notebook. IF entering notebook places you INTO PCAS_TRAX EXIT THE Notebook File WITH F7. DO NOT EXIT Notebook.

② Press Shift F10.
Type F:\USERS\WELLVIOL\WELLTRAX Enter.

③ Press F9 - enter information. (use tab)

④ Press F7, F10 ENTER Yes
to Exit "Card" to Save

⑤ Press F7 (to Exit Notebook.) No- yes

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Michael D. Jarrett

Board: William E. Applegate, III, Chairman
John H. Burriss, Vice Chairman
Richard E. Jabbour, DDS, Secretary
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD
Robert J. Stripling, Jr.

Promoting Health, Protecting the Environment

May 28, 1992

Crown Central Petroleum Corporation
Attn: Ms. Merril O'Connell
One North Charles Street
P.O. Box 1168
Baltimore, Maryland 21203

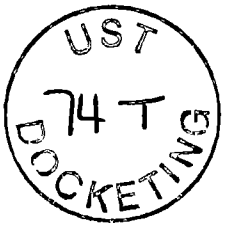
Re: Crown Facilities
Release Detection Monitoring Wells

Dear Ms. O'Connell:

The South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed your correspondence dated May 5, 1992. To clarify this office's position: since the inception of the SUPERB Program, it was never the intent for the SUPERB Fund to provide payment for underground storage tank (UST) testing and repair nor to provide payment for compliance with regulatory operating requirements. This was discussed thoroughly in September 1989 with J. Howard Smith of your company. This office considers the installation of leak detection devices to fall within the purview of regulatory requirements and therefore SUPERB payment is inappropriate. Section 44-2-130(D)(2) of SUPERB states "No person is entitled to direct billing or reimbursement from the SUPERB Account for the costs of repair or replacement of any tank or equipment."

However, funds from the SUPERB Account have been provided at certain sites to cover costs incurred for installation of the original release detection wells when those wells detected free product or dissolved petroleum constituents in the initial sampling event. In those cases, the wells will serve as continuing monitoring points and/or recovery wells. As such, this office has chosen to be flexible and considers those wells to be within the realm of "site rehabilitation" as described within Section 44-2-40(B) of SUPERB. Therefore, those costs are reimbursable.

In summary, SUPERB funds are not available for release detection wells unless their initial sampling event indicates free petroleum product or petroleum constituents dissolved in the ground-water. The determination of the applicability of SUPERB funds for release detection wells will depend on a number of factors and be made on a site specific basis.



recycled paper

If you have any questions or require additional information, please contact the writer at (803) 734-5335.

Sincerely,

James R. Hess

James R. Hess, P.G., Manager
UST State Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

JRH\jrh
F:LDWELLS

cc: UST Regulatory Section
UST State Corrective Action Section
UST Federal Corrective Action Section

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Interim Commissioner: Thomas E. Brown, Jr.

Board: John H. Burriss, Chairman
Richard E. Jabbour, DDS, Vice Chairman
Robert J. Stripling, Jr. Secretary
William E. Applegate, III,
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD

Promoting Health, Protecting the Environment

April 19, 1993

Matt Gilmore
Crown Central Petroleum Corporation
One North Charles Street
Baltimore, MD 21201

Re: Crown Central SC-15
GWPD Site ID #07680
Expanded Assessment Plan (EAP) and
Associated Cost Proposal received May 14, 1992
Richland County

Dear Mr. Gilmore:

The referenced submittals have been placed on file by the Ground-Water Protection Division of the South Carolina Department of Health and Environmental Control (SCDHEC). Assessment activities at the site can be initiated immediately upon receipt of this letter. Monitoring well approval for a maximum of ten shallow wells has been issued to your site rehabilitation contractor; a copy of the approval form is enclosed for your records. In accordance with the implementation schedule provided in the EAP, the assessment report shall be submitted on or before October 29, 1993.

The associated cost proposal will be kept on file so that direct billing can begin. Any rates and/or other criteria included therein may have been adjusted on the cost proposal to insure compliance with current SUPERB program criteria per Section 44-2-20(2). Please reference **CP#0720** on all pertinent invoices and correspondence. A copy of the SCDHEC's cost proposal spreadsheet that reflects adjustments to items not meeting established criteria is enclosed. **Items in the Cost Proposal not appearing on the enclosed spreadsheet have been deemed inappropriate by the SCDHEC and should not be billed to the SCDHEC.** If additional justification is provided, the SCDHEC may allow those previously deleted items to be paid by direct contractor payment. All invoices will be processed as expeditiously as possible as long as SUPERB funds are available.

Please be aware that the costs associated with small volume disposal of soil have been approved as proposed. Although the cost proposal spreadsheet indicates a per drum rate, costs associated with soil disposal and treatment must be billed on a per ton rate not to exceed $58.00 per ton. All appropriate weight tickets must be submitted with the invoice.

A monthly status update form is enclosed. A copy of this form must be completed and submitted with each monthly invoice in accordance with established program criteria. See current SCDHEC guidance documents for additional detail.

As a payee, you must retain all pertinent technical and financial documents related to this site in accordance with Section 44-2-130 of the SUPERB statute. A detailed audit of work performed will be conducted at a later date and will be subject to review under the current criteria. If it is determined that inappropriate payments were made, SCDHEC will seek cost recovery.

All laboratories utilized must be certified in the state of South Carolina for volatile organic analyses in accordance with R.61-81. All monitoring wells and piezometers, whether temporary or permanent, must be installed by or under the **direct** supervision of a S.C. certified well driller as required by Section 40-23-10 of the 1976 SC Code of Laws. All hydrogeological work and submittals that include geological interpretation are required by the S.C. Boards of Registration and by Section 44-2-120 of the SUPERB Act to be supervised/sealed by a S.C. certified Professional Geologist (PG) or Professional Engineer (PE) with training and/or experience in the geological discipline.

UST
75T
DOCKETING

recycled paper

The assessment must be: 1) conducted by or under the supervision of appropriately certified SC registered professional(s), 2) conducted by a contractor with the necessary bonding or insurance (unless #1 above is satisfied), 3) conducted in accordance with accepted industry standards, 4) technically justified, 5) completed in a cost effective manner that adequately protects human health and the environment, and 6) conducted in compliance with all SUPERB criteria for direct billing or reimbursement.

The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified. The SCDHEC will only pay rates in accordance with established criteria. Further, the SCDHEC reserves the right to question and/or reject costs if deemed unreasonable. The SCDHEC reserves the right to audit project records at any time during the project or after completion of the work. Also, the SCDHEC will seek cost recovery where appropriate. This notice to proceed with the work plan does not, in any way, acknowledge SCDHEC concurrence that all the elements contained therein will be necessary at this site.

If the above criteria are not followed, the SCDHEC reserves the right to initiate one or more of the following actions as appropriate; 1) Refer the contractor to the Boards of Registration for Professional Geologists and Engineers, 2) seek cost recovery in accordance with Section 44-2-50 of the SUPERB Act, and/or 3) prohibit future participation in the SUPERB program by the contractor in accordance with Section 44-2-120 of the SUPERB Act.

On all future correspondence, please reference the **GWPD Site ID number**. Questions concerning the above should be addressed to my attention at 734-5601.

Sincerely,

Lee A. Monts

Lee A. Monts, Hydrogeologist
UST Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

EAPSC15.LET

Enc: Monitoring Well Approval Form

cc: Paul Bristol, Central Midlands District EQC
Thomas F. Donn, AT&E (w/CP spreadsheet and status update form)
June Niggel Derrick, Niggel Family Partnership
F&DM Section, GWPD

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Interim Commissioner: Thomas E. Brown, Jr.

Board: John H. Burriss, Chairman
Richard E. Jabbour, DDS, Vice Chairman
Robert J. Stripling, Jr. Secretary

William E. Applegate, III,
Toney Graham, Jr., MD
Sandra J. Molander
John B. Pate, MD

Promoting Health, Protecting the Environment

Monitoring Well Approval

Approval is hereby granted to: Atlanta Testing & Engineering
8901 Farrow Road, Suite 108A
Columbia, SC 29203
Attention: Thomas F. Donn

Re: Crown Facility SC-15
GWPD SITE ID: #07680
Richland County

for the construction of monitoring wells designated MW-5 through MW-14 in accordance with the construction plans and specification submitted on May 14, 1992.

These wells will be constructed to the approximate depth of 25 feet below the surface and screened in the uppermost portion of the aquifer for the purpose of monitoring hydrocarbon contamination.

Conditions:

That the latitude and longitude and actual construction details for each well be submitted with the report of findings.

That Paul Bristol of the Central Midlands District EQC office (803 935-7015) should be notified at least 72 hours prior to well installation.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the South Carolina Department of Health and Environmental Control Well Standards and Regulations R. 61-71.

Date of Issue: April 15, 1993

Christopher S. Doll, P.G., Manager
UST Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection

0415935068/lm

cc: Matt Gilmore, Crown Central Petroleum Corporation
Paul Bristol, Central Midlands District EQC

recycled paper

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

Commissioner: Douglas E. Bryant

Board: Richard E. Jabbour, DDS, Chairman
Robert J. Stripling, Jr., Vice Chairman
Sandra J. Molander, Secretary

Promoting Health, Protecting the Environment

William E. Applegate, III,
John H. Burriss
Tony Graham, Jr., MD
John B. Pate, MD

Date: OCT 0 1 1993

Matt Gilmore
Crown Central Petroleum Corporation
P.O. Box 1168
Baltimore, Maryland 21203

Re: Crown SC-015
GWPD Site #07680
Cost Proposal #731
Underground Storage Tank Release
Priority Ranking

Dear Underground Storage Tank Owner:

All releases from regulated underground storage tanks that have been reported to this Department have been prioritized using a ranking system that evaluates environmental and health related factors. The ranking system identifies those sites that represent the most serious threats where the Department should be allocating available SUPERB monies. Currently, the referenced site ranks below many hundreds of other sites.

Please note that site rehabilitation activities have been previously approved via the direct billing method (per the referenced cost proposal number) for this site. Due to the relative ranking of this site, continued obligation of financial resources under direct billing is not possible at this time and approval for direct billing is hereby suspended. This letter, and a copy of this letter sent to your site rehabilitation contractor, serve as formal notice to complete any ongoing site rehabilitation activity, submit a report of findings to date, and submit the associated invoices to the Department within 30 days of receipt of this letter. SCDHEC will inform you when the status of your site warrants direct billing to be resumed.

However, you may proceed at your own expense with implementing the approved technical plan of action and seek reimbursement from the SUPERB Account. Please note that reimbursement typically takes a much longer period of time to process and that SUPERB funds are dispersed for reimbursement only as long as funds are available. Reimbursement requests are processed by SCDHEC in chronological order of receipt.

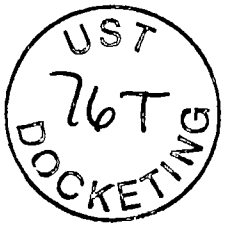
If you have any further questions, please contact Mr. David Baize or Mr. Chris Doll at 734-5331.

Sincerely,

Stanley L. Clark, P.G., Director
Ground-Water Protection Division
Bureau of Drinking Water Protection

SLC/lm.stp

cc: Tom Donn, AT&E
Paul Bristol, Central Midlands District EQC



recycled paper

REPORT OF
EXPANDED HYDROGEOLOGIC ASSESSMENT

Crown Central Petroleum Corporation
Crown Facility SC-15
3800 Devine Street
Columbia, South Carolina

Copy to District
11-30-93

RECEIVED
NOV 08 1993
Groundwater Protection
Division

Atlanta Testing & Engineering

Job No. 1044C, Report No. 93170

November 8, 1993

UST
77T
DOCKETING

atlanta testing & engineering

REPORT OF EXPANDED HYDROGEOLOGIC ASSESSMENT

Crown Central Petroleum Corporation
Crown Facility SC-15
3800 Devine Street
Columbia, South Carolina
Job No. 1044C, Report No. 93170

TABLE OF CONTENTS

Page

INTRODUCTION 1

BACKGROUND 1

SITE CHARACTERIZATION 2

SUBSURFACE EXPLORATION AND TESTING 2

- SOIL SAMPLING AND ANALYSIS 2
- MONITORING WELL INSTALLATION 3
- GROUND-WATER SAMPLING 3
- BOREHOLE PERMEABILITY TESTING 3
- WATER LEVEL MEASUREMENTS 4

FINDINGS 4

- GROUND-WATER OCCURRENCE AND MOVEMENT 4
- SOIL QUALITY 5
- WATER QUALITY 5

SUMMARY OF FINDINGS 6

CONCLUSIONS AND RECOMMENDATIONS 7

REFERENCES
APPENDIX

INTRODUCTION

Atlanta Testing & Engineering (AT&E) has completed the expanded hydrogeologic assessment at the former Crown Facility SC-15 located at 3800 Devine Street, Columbia, South Carolina. The assessment was performed to determine the extent and severity of a release of petroleum hydrocarbons from an underground storage tank (UST) system on subsurface soils and ground water. The work was performed in accordance with the Atlanta Testing & Engineering expanded assessment plan dated April 25, 1992. The work was approved by Mr. Lee Monts of the South Carolina Department of Health and Environmental Control (SCDHEC) per letter dated April 19, 1993. This report presents a description of the work performed, along with our findings based upon evaluation of field and laboratory data acquired during this assessment and previous investigations.

BACKGROUND

The following chronology outlines the site assessment activities which we understand have taken place at the former Crown Facility SC-15:

1. Four leak detection monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed in June, 1989 to a depth of eighteen feet. Organic vapor analysis (OVA) testing results indicated organic vapor concentrations exceeding 10 ppm in soil samples from wells MW-1, MW-2, and MW-3, with a maximum value of 620 ppm in MW-1. Laboratory analysis of soil samples from the wells indicated detectable levels of total petroleum hydrocarbons (TPH) in MW-1 and MW-3.

2. Subsequent ground water sampling and analysis in December 1989 at wells MW-3 and MW-4 indicated BTEX concentrations above maximum contaminant levels (MCL).

3. Three additional (deep) monitoring wells (MW-1A, MW-2A, and MW-3A) were installed adjacent to the UST pit November, 1990. Water quality results from the three deep wells indicated no detectable BTEX constituents. These results and site characterization information were provided in the January 11, 1991 report by ATEC Environmental Consultants.

4. Ground water sampling performed in June 1991 indicated BTEX levels above MCLs at the four shallow wells, and no detectable BTEX concentrations at the three deep wells.

5. Three underground storage tanks, dispenser islands, and associated piping were removed from the site in July, 1991. Results of laboratory analysis on soil samples indicated significant hydrocarbon contamination at a depth of six feet below the dispenser islands. Soils remaining in the tank pit after excavation, as well as in the piping trench, indicated concentrations of TPH and BTEX below detection limits (BDL).

SITE CHARACTERIZATION

The site is located at 3800 Devine Street at the intersection of Devine Street and Kilbourne Road. The site is located in a commercial area with residential homes surrounding the area. Site topography is relatively flat and surface drainage generally flows to the south and east towards a tributary of Gills Creek, located approximately 400 feet from the site. A site vicinity (USGS, topographic) map is enclosed as Figure 1. The site consists of a convenience store with two dispenser islands. A site location map is included as Figure 2. The facility was closed for business by Crown in June or July of 1991, and the property is now operated as a retail dry cleaning store.

REGIONAL AND SITE HYDROGEOLOGY

The site is located within the Coastal Plain physiographic province of South Carolina which is underlain by fluvial and alluvial sediments of recent to Cretaceous age, overlying crystalline bedrock. The shallow topsoils are generally characterized as unconsolidated fine to coarse, arkosic sands with gravels and beds of sandy to fairly clean white kaolinitic clay, commonly associated with the Tuscaloosa (Middendorf) Formation. The sediments beneath the site consist of silty sands alternating with very fine to coarse sands with some silty coarse gravels to approximately 20 feet bls. These sediments are underlain by a silty clay to investigated depths of 40 feet bls.

SUBSURFACE EXPLORATION AND TESTING

SOIL SAMPLING AND ANALYSIS

Fifteen additional soil test borings were drilled at locations selected to evaluate the horizontal and vertical extent of petroleum hydrocarbons beyond the previously assessed area. The borings were located with consideration to existing site cultural features (i.e. water, gas, sewer, electrical utilities, and buildings).

Soil samples were collected at five foot intervals in each boring, classified by a geologist in the field, and retained for total organic vapor analysis. The samples were placed in plastic bags, sealed, allowed to volatilize for at least ten minutes and analyzed using an OVA. The OVA testing procedure is outlined in the Appendix.

Generally, the sample exhibiting the highest OVA concentration from each borehole was shipped to a S.C. certified laboratory for analysis of BTEX, MTBE, and lead. If no elevated OVA concentrations were observed, the deepest sample collected from above the anticipated water table was analyzed.

MONITORING WELL INSTALLATION

Ten ground-water monitoring wells (MW-5 through MW-14) were installed at the boring locations by a South Carolina certified well driller in accordance with the South Carolina Well Standards and Regulations. Shallow borings were advanced from five to eight feet below the anticipated vadose zone/perched ground-water interface and were constructed with 10 feet of 2-inch diameter flush-threaded, slotted PVC screen (0.010 inch) and PVC casing to land surface. The screen was installed to bracket the water table so that liquid hydrocarbons which may be floating on the water table could be measured. A clean, graded sand pack was placed in the well annulus to at least 1 foot above the screen. A bentonite seal was placed above the sand pack, and the remaining annulus was grouted flush with the land surface with bentonite/cement grout. Each of the wells was completed below grade. A steel protective manhole cover and concrete pad were installed flush with the land surface at each well. A detailed description of the well construction is included with the geologist logs in the Appendix. Well construction details for all monitoring wells installed to date are summarized on Table 1. The soil boring/well installation and decontamination procedures are outlined in the Appendix.

GROUND-WATER SAMPLING

After well installation, the monitoring wells were developed to remove drilling material and formational fines and allow clean, representative ground-water samples to be collected. Well development was performed by either a pump or manual bailing. Prior to sample collection, the wells were purged at least three well volumes, or until all water was evacuated from slowly recovering wells. Samples were collected with dedicated polyethylene bailers, placed in laboratory prepared containers, packed in an iced cooler, and shipped to a S.C. certified laboratory for analysis of BTEX and methyl-tert-butyl-ether (MTBE) per EPA Method 602, and total lead per EPA Method 239.2. In addition, a water sample was obtained from the "worst case" well and analyzed for purgeable halocarbons per EPA Method 601, purgeable aromatics per EPA Method 602, polynuclear aromatics per EPA Method 610, biochemical oxygen demand (BOD_5) per EPA Method 405, total lead per EPA Method 239.2, and pH. A chain of custody document accompanied the sample containers. The ground-water sampling procedures are outlined in the Appendix.

BOREHOLE PERMEABILITY TESTING

After the monitoring wells were installed and developed, two borehole permeability tests were performed at wells MW-7 and MW-9 to estimate the hydraulic conductivity of the ground-water zone opposite the well screen. A rising head test was performed by instantaneously removing a solid PVC cylinder of known volume from the well bore, causing a decline in water level, and measuring the subsequent rise in water level in the well casing. The test was analyzed according to methods described by Bouwer and Rice (1976), and as updated by Bouwer (1989). The field data, data plots, calculations, and testing procedures are included in the Appendix.

WATER LEVEL MEASUREMENTS

Water level measurements at all site monitoring wells were recorded with a hydrocarbon sensitive interface probe on July 16, 1993 and October 8, 1993. Top of casing (TOC) elevations were surveyed to a common reference point. The TOC elevations, water level measurements, and ground-water elevation data are included on Table 2.

FINDINGS

GROUND-WATER OCCURRENCE AND MOVEMENT

Shallow ground water occurs under unconfined conditions at a depth of approximately 14 to 20 feet BLS. Ground-water elevations remained fairly stable during the course of the investigation. Ground-water elevations typically fluctuate seasonally in response to variations in precipitation. Potentiometric surface maps of the water table, based on water level measurements obtained from the monitoring wells on July 16, 1993 and October 8, 1993, are included as Figures 6 and 7, respectively. The potentiometric maps indicate the general direction of ground-water flow at the site is to the south-southeast. Southeast of the site, near the Piggly Wiggly grocery store, ground-water flow appears to be in a predominately east-southeasterly direction. The average horizontal hydraulic gradient of the potentiometric surface shown on Figure 6 and Figure 7 was estimated to be approximately 0.01 foot per foot (ft/ft).

The rate of horizontal ground-water flow at the site is controlled by the horizontal hydraulic conductivity (K), effective porosity (n_e), and the horizontal hydraulic gradient (dh/dl). The average linear ground-water velocity (v) can be calculated by substituting these values into the modified Darcy equation:

$$v = (K/n_e)(dh/dl)$$

Estimates of the hydraulic conductivity of the sediments at the site were obtained from borehole permeability tests performed on April 21, 1993. The tests conducted on wells MW-7 and MW-9 indicate an average K value of 1.8 ft/day for the upper portions of the shallow aquifer.

The effective porosity (n_e) in a water-table aquifer for a silty sand to silty sand with some gravel and cobbles is assumed to be approximately 0.30. Therefore, the effective porosity of the sediments was estimated as 30 percent. The average linear ground-water flow velocity, estimated from the modified Darcy equation, is approximately 0.06 ft/day (22 feet/year) based on the aforementioned values for the shallow aquifer.

The water level differential, based on water level measurements of wells MW-3A and MW-3, is estimated to be approximately 16.22 feet downward on July 16, 1993 and approximately 16.95 feet downward on October 8, 1993. This suggests a potential for downward migration of contaminants from the upper portion of the shallow aquifer.

SOIL QUALITY

Soil samples were obtained from each of the new boreholes and screened for organic vapors. OVA concentrations ranged from near the lower detection limits of the instrument at soil borings B-6, B-6A, and monitoring well MW-7, to greater than 1,000 parts per million (ppm) at wells MW-5, MW-6 and MW-9. OVA concentrations obtained from all soil borings installed to date are summarized on Table 3.

Soil samples from the borings of the newly installed wells were collected and shipped for laboratory analysis. The laboratory results indicate the soil BTEX concentrations were below the laboratory detection limits (BDL) for wells MW-5, MW-7, MW-8, MW-10, MW-11, and MW-13. BTEX concentrations were detected at wells MW-6 (220 ug/kg), MW-9 (2860 ug/kg) and MW-12 (860 ug/kg). TPH concentrations for the newly installed wells ranged from BDL at MW-7, MW-8, MW-10, MW-11, and MW-13, to 9.0 ug/kg at MW-6. A summary of all soil quality data (BTEX and TPH) collected from soil borings drilled at the site to date is included on Table 4. The laboratory analytical report for the latest soil data is included in the Appendix. Figure 8 provides a general estimate of the extent of soil contamination in the vadose zone based on the source location, field OVA measurements, and soil laboratory data. The estimated extent takes into account the possibility that some of the soil contamination may have been caused by seasonal fluctuations of the water table.

WATER QUALITY

Ground-water samples were collected for chemical analysis from all monitoring wells which contained sufficient water and no free-phase hydrocarbons. Free-phase hydrocarbons were detected in well MW-5. Ground-water chemical data indicate that BTEX, MTBE and lead concentrations were BDL in water samples obtained from both deep wells MW-1A and MW-3A. Shallow well total BTEX concentrations were BDL for wells MW-10 and MW-14. Detectable BTEX concentrations ranged from 3 ug/l (MW-11) to 42,800 ug/l (MW-6). MTBE concentrations for the shallow wells were BDL at wells MW-3, MW-3A, MW-6, MW-8, and MW-13. Detectable MTBE concentrations ranged from 2 ug/l at MW-1A to 10,000 ug/l at MW-9. Lead concentrations were below the lead MCL of 50 ug/l at MW-9 (24 ug/l) and exceeded the MCL at MW-12 (420 ug/l). All other wells measured BDL for lead concentrations.

The MCL for benzene (5 ug/l) was exceeded at wells MW-6 (9,600 ug/l), MW-7 (2,800 ug/l), MW-8 (130 ug/l), MW-9 (12,000 ug/l), and MW-12 (1,200 ug/l). The MCL of 2,000 ug/l for toluene was exceeded in water samples from wells MW-6 (22,000 ug/l), MW-7 (1,500 ug/l), and MW-9 (12,000 ug/l). The MCL for ethylbenzene (700 ug/l) was exceeded in wells MW-6 (1,900 ug/l) and MW-9 (3,400 ug/l). The xylene MCL (10,000 ug/l) was only exceeded in well MW-9 (13,000 ug/l).

A ground-water sample was obtained from the "worst case" well (MW-5) and analyzed for an expanded list of parameters. Well MW-5 was selected as the "worst case" well since it contained free-phase hydrocarbons and was located adjacent to the UST area. A copy of the laboratory report is included in the Appendix. 7-16-93 .11' FP 10-8-93 1.31' FP

The water quality data indicate that the release of petroleum hydrocarbons has migrated toward the south from the UST area. An isoconcentration map showing the lateral distribution of total BTEX concentrations in the shallow portions of the aquifer is included as Figure 9. Note that Figure 9 was derived from data collected from various sampling dates, as indicated on Table 5.

SUMMARY OF FINDINGS

The expanded hydrogeologic assessment was performed to evaluate the extent of petroleum hydrocarbons in soil and ground water at the Crown Facility SC-15. Based upon the results of soil and ground water laboratory analyses and site hydrogeologic conditions, the following is a summary of our findings:

1. Fifteen additional soil borings were drilled and ten permanent monitoring wells were installed at the boring locations. Based on a description of soil samples collected during drilling activities, soils at the site generally consist of silty sands with some gravel and cobble deposits, underlain by a kaolintic clay to an investigated depth during this investigation of approximately 30 feet (bls).

2. The direction of ground-water flow at the site, based upon water level measurements taken on July 16, 1993 and October 8, 1993, appears to be to the south-southeast. The horizontal hydraulic gradient was estimated as 0.01 ft/ft. The maximum seepage (ground-water flow) velocity within the shallow aquifer across the site was estimated to be 22 feet per year. The water level differential suggests a potential for downward migration of contaminants from the upper portion of the shallow aquifer.

3. OVA measurements of soil samples collected at the recent soil boring and well locations indicate organic vapor concentrations ranging from near the lower detection limits of the instrument at borings B-6, B-6A, and MW-7, to greater than 1,000 ppm at wells MW-5 and MW-6.

4. Soil samples from the recent soil borings (depths of 8.5 ft to 20 ft) were analyzed for BTEX and TPH concentrations. Laboratory results indicate detectable BTEX concentrations at wells MW-6 (260 ug/kg), MW-9 (2,860 ug/kg), and MW-12 (860 ug/kg). All other soil samples were BDL for total BTEX.

5. Free-phase hydrocarbons were detected in well MW-5. Deep wells MW-1A and MW-3A were BDL for BTEX, MTBE, and lead concentrations (deep well MW-2A was destroyed). The MCL for benzene (5 ug/l) was exceeded at wells MW-6, MW-7, MW-8, MW-9 and MW-12. Monitoring wells MW-6, MW-7, and MW-9 exceeded the toluene MCL of 2,000 ug/l. The MCL for ethylbenzene (700 ug/l) was exceeded in wells MW-6 and MW-9. The xylene MCL (10,000 ug/l) was exceeded at MW-9 (13,000 ug/l).

CONCLUSIONS AND RECOMMENDATIONS

Based on the findings of the Expanded Hydrogeologic Assessment, the extent of the subsurface impact of the shallow aquifer is fairly well defined. The ground-water contaminant plume appears to cover a horizontal area of over 50,000 square feet. Water quality data obtained from deep wells MW-1A and MW-3A, which are located within the area of ground-water contamination, suggests that the contaminant plume does not extend to a depth below 45 feet BLS. Free-phase hydrocarbons detected at well MW-5 are presently in the vicinity of the UST dispenser island area.

In accordance with the South Carolina UST Control Regulations, corrective action is warranted at the site to remediate the entire contaminant plume. In order to initiate corrective action, a remediation system should be properly designed and installed.

A remediation system typically consists of a network of ground-water recovery wells or trenches. The ground water is pumped from the recovery wells/trenches which creates a depression of the water table surface in the shallow aquifer. The depression recovers the ground water contaminant plume and prevents further downgradient migration of the plume. The recovered ground water is then pumped to a wastewater treatment system. Once treated, the water is discharged through a system of trenches (infiltration gallery) or injection wells, to a public owned treatment works (POTW), to a NPDES permitted discharge point, or as a combination of these methods. Approval of the discharge option is necessary before a remediation system can be fully designed. Other alternatives which AT&E will pursue are air sparging, soil vapor extraction, and bioremediation, which may not generate any wastewater. A combination of these alternatives should be considered to effectively remediate the site.

To properly design a remediation system, a Corrective Action Plan (CAP) should be prepared. The CAP, which will require approval by the SCDHEC, should be prepared using the Soil/Ground Water Remediation Guidance Document dated January 1, 1992 developed by the Ground-Water Protection Division of the SCDHEC. In order to prepare the CAP, additional site activities will be necessary. AT&E is prepared to submit a proposal upon request following review of the report.

ATLANTA TESTING & ENGINEERING

F. Dean Salisbury
Staff Hydrogeologist

Thomas F. Donn, P.G.
Senior Hydrogeologist
SC Registration No. 908

FDS/TFD:mp

Attachments

REFERENCES

ATEC Environmental Consultants. April 8, 1991. Initial Site Characterization Report, Crown Central Petroleum Facility SC-15 (PCAS 7050), Columbia, Richland County, South Carolina, ATEC Project Number 35-07004. Crown Central Petroleum Corporation.

Bouwer, H. and R.C. Rice. 1976. A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells. Water Resources Research. vol. 12, pp. 423-438.

Bouwer, H. 1989. The Bouwer and Rice Slug Test - An Update. Ground Water, Vol. 27, No. 3, pp. 304-309.

Fetter, C.W. 1988. Applied Hydrogeology, 2nd Edition. Merrill Publication Company.

APPENDIX

FIGURES

FIGURE 1 - Site Vicinity Map With Noted Water Supply Wells

FIGURE 2 - Site Location Map Showing Surrounding Land Use

FIGURE 3 - Site Map Showing Monitor Well Locations With Cross-Section Transects

FIGURE 4 - Generalized Geologic Cross-Section A-A'

FIGURE 5 - Generalized Geologic Cross-Section B-B'

FIGURE 6 - Potentiometric Surface Map for July 16, 1993

FIGURE 7 - Potentiometric Surface Map for October 8, 1993

FIGURE 8 - Site Map Showing Estimated Extent of Soil Contamination in the Vadose Zone

FIGURE 9 - Isoconcentration Map of Total BTEX Concentrations

TABLES

TABLE 1 - Summary of Well Construction Data

TABLE 2 - Ground-Water Elevation Data

TABLE 3 - Soil Organic Vapor Concentrations

TABLE 4 - Soil Laboratory Data

TABLE 5 - Ground-Water Laboratory Data

GEOLOGIST LOGS

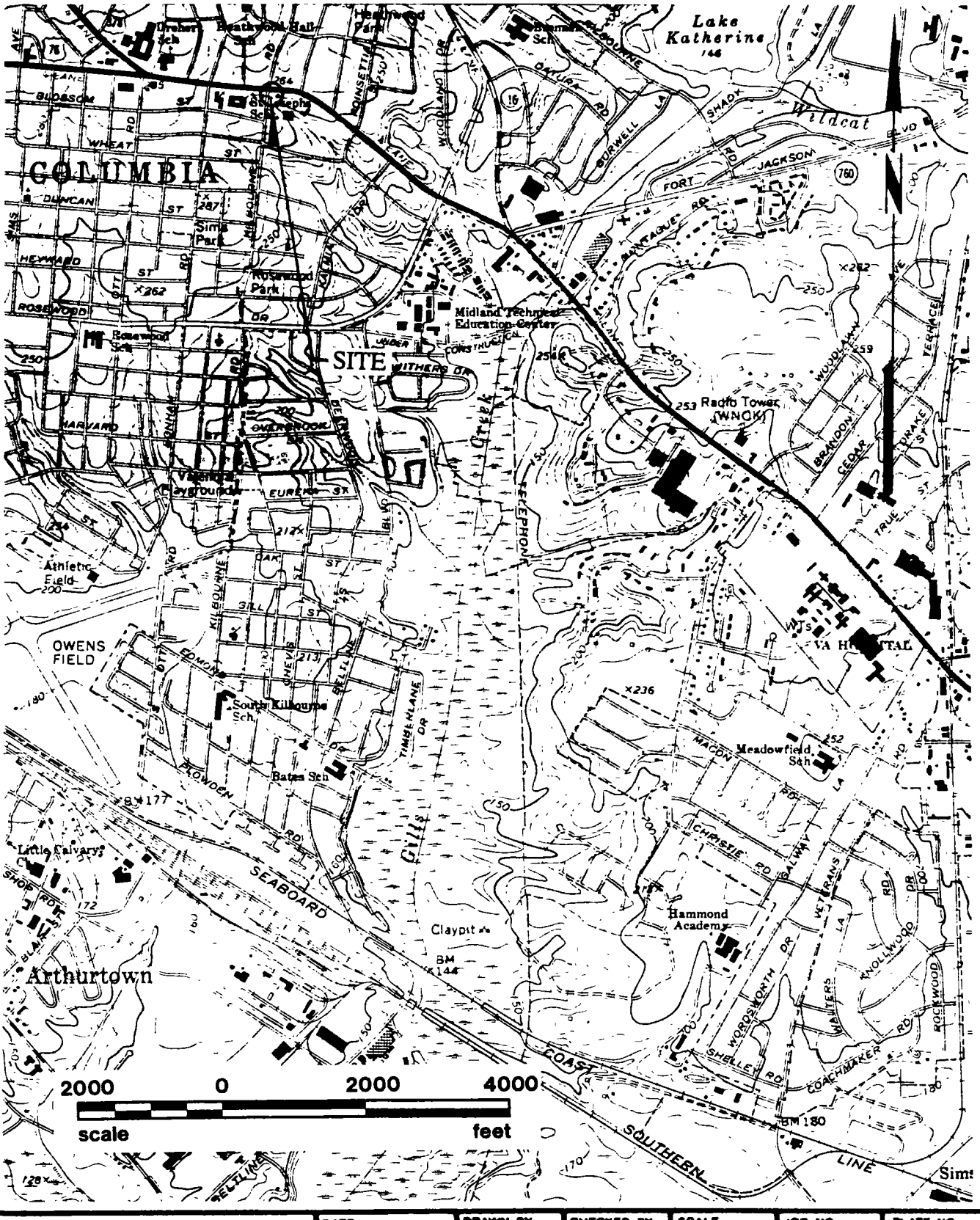
SOIL AND WATER QUALITY LABORATORY REPORTS

BOREHOLE PERMEABILITY TESTING

FIELD EXPLORATION AND TEST PROCEDURES

COMPREHENSIVE SITE SURVEY

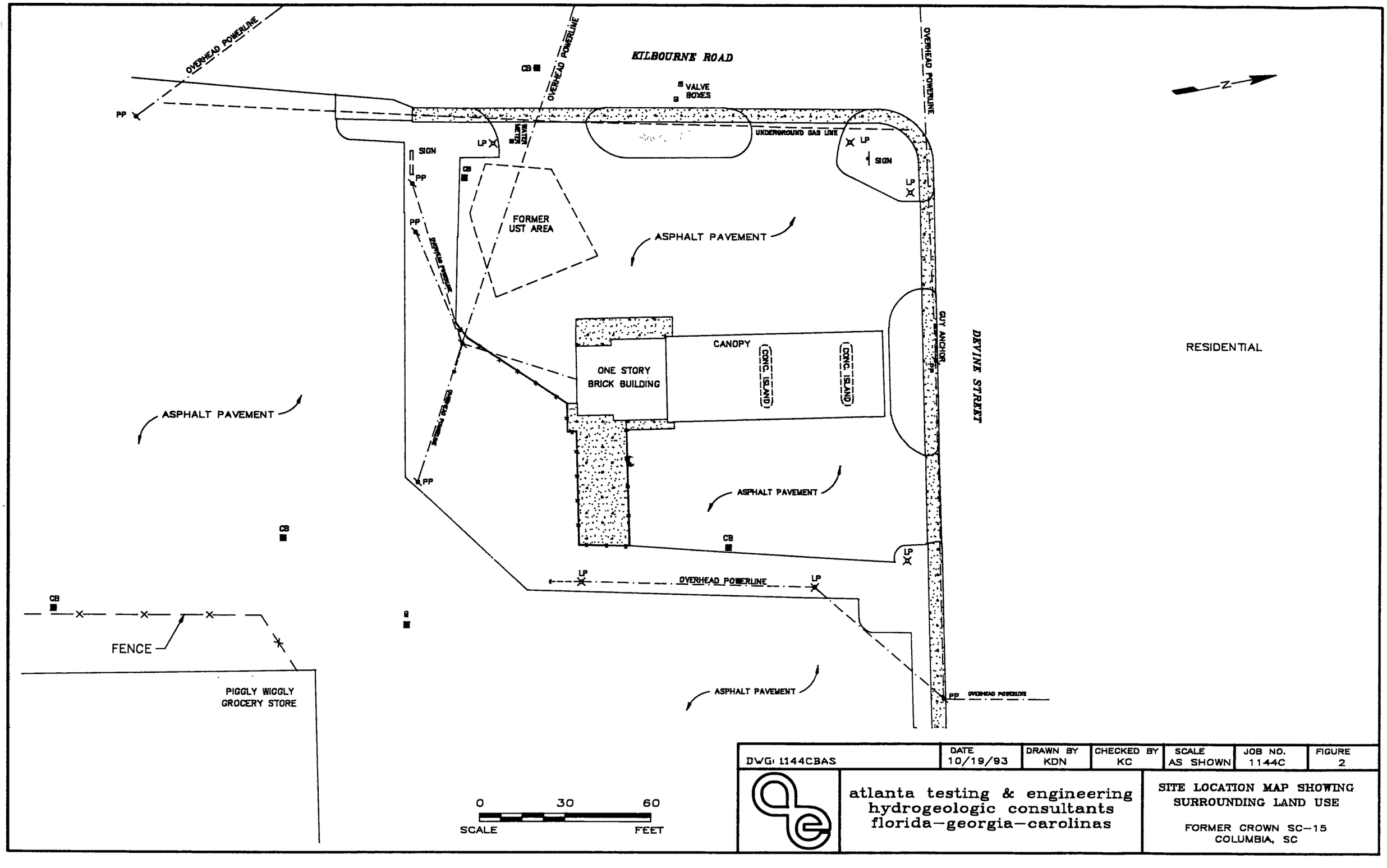
FIGURES



SOURCE: USGS FORT JACKSON SOUTH QUAD	DATE 9/19/91	DRAWN BY JAD	CHECKED BY	SCALE 1"=2000'	JOB NO. 1044B	PLATE NO. 1

atlanta testing & engineering
hydrogeologic consultants
florida - georgia - carolinas

SITE LOCATION MAP
CROWN CENTRAL PETROLEUM CORP.
CROWN SC-15, DEVINE ST.& KILBOURNE RD.
COLUMBIA, SOUTH CAROLINA



DWG: 1144CBAS	DATE 10/19/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 2

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

SITE LOCATION MAP SHOWING SURROUNDING LAND USE

FORMER CROWN SC–15
COLUMBIA, SC

KILBOURNE ROAD

DEVINE STREET

N

B

MW-10

MW-3A

MW-3

FORMER UST AREA

ASPHALT PAVEMENT

MW-6

B-6A

MW-1A

MW-2

B-6

B-5A

B-5B

B-5

CANOPY

CONC. ISLAND

CONC. ISLAND

ONE STORY BRICK BUILDING

MW-11

MW-5

A'

ASPHALT PAVEMENT

MW-9

ASPHALT PAVEMENT

MW-7

MW-8

MW-14

A

MW-12

FENCE

PIGGLY WIGGLY GROCERY STORE

MW-13

B'

ASPHALT PAVEMENT

0 30 60

SCALE FEET

NOTE:
SOIL BORING LOCATIONS ARE SITES WHERE MONITORING WELLS MW-5 AND MW-6 WERE ATTEMTED TO BE INSTALLED, HOWEVER, CONCRETE RUBBLE WAS ENCOUNTERED BELOW EXISTING PAVEMENT.

EXPLANATION

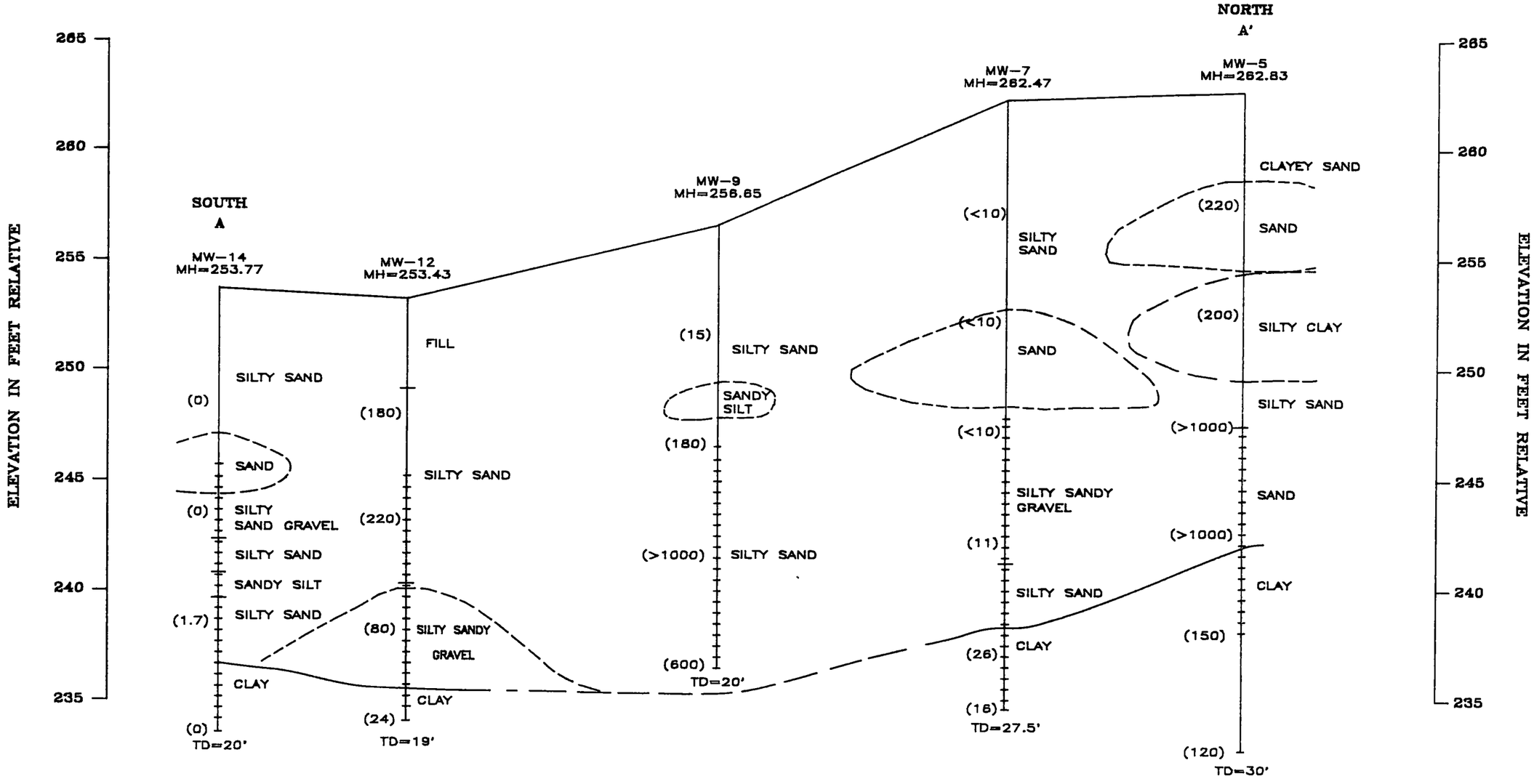
- DEEP MONITORING WELL LOCATION
- SOIL BORING LOCATION
- WATER TABLE MONITORING WELL LOCATION
- A—A' CROSS-SECTION TRANSECT

DWG: 1144CBAS	DATE 10/19/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 3

atlanta testing & engineering
hydrogeologic consultants
florida—georgia—carolinas

SITE MAP SHOWING SOIL BORING AND MONITORING WELLS WITH CROSS-SECTION TRANSECTS

FORMER CROWN SC-15
COLUMBIA, SC



EXPLANATION

MH=TOP OF MANHOLE ELEVATION (in feet)

OVA MEASUREMENT IN PARTS PER MILLION → (>1000)

32.5 CLAYEY SILT

SCREEN INTERVAL

GENERAL GEOLOGIC DESCRIPTION AND DEPTH BELOW GROUND SURFACE

TD=TOTAL INVESTIGATED DEPTH (in feet)

SCALE: HORIZ. : 1" = 30'

VERT. : 1" = 5'

NOTES:

1) GEOLOGIC/LITHOLOGIC CONTACTS BETWEEN TEST HOLES OR WELLS ARE GENERALIZED. ACTUAL SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN.

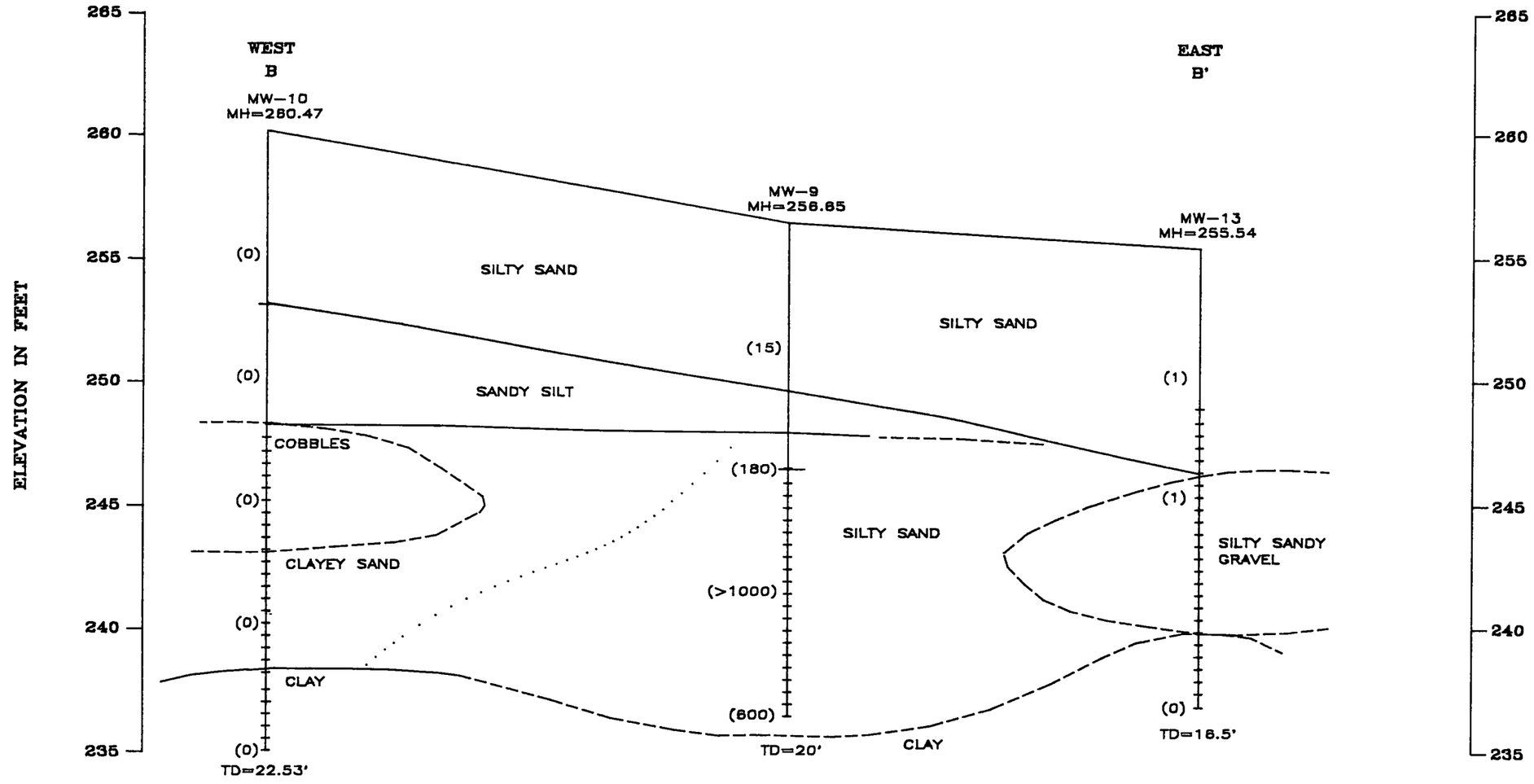
2) MANHOLE ELEVATIONS ARE BASED ON AN ASSUMED ELEVATION AT SITE OF 260'.

DWG: 1144X4	DATE 11/5/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 4

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

GENERALIZED GEOLOGIC CROSS-SECTION A–A'

FORMER CROWN SC–15
COLUMBIA, SC



EXPLANATION

MH=TOP OF MANHOLE ELEVATION (In feet)

OVA MEASUREMENT IN PARTS PER MILLION → (>1000)

32.5 CLAYEY SILT

SCREEN INTERVAL

GENERAL GEOLOGIC DESCRIPTION AND DEPTH BELOW GROUND SURFACE

TD=TOTAL INVESTIGATED DEPTH (In feet)

SCALE: HORIZ. : 1" = 30'

VERT. : 1" = 5'

NOTES:

1) GEOLOGIC/LITHOLOGIC CONTACTS BETWEEN TEST HOLES OR WELLS ARE GENERALIZED. ACTUAL SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN.

2) MANHOLE ELEVATIONS ARE BASED ON AN ASSUMED ELEVATION AT SITE OF 260'.

DWG: 1144X5	DATE 11/5/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 5

atlanta testing & engineering
hydrogeologic consultants
florida-georgia-carolinas

GENERALIZED GEOLOGIC CROSS-SECTION B-B'

FORMER CROWN SC-15
COLUMBIA, SC

KILBOURNE ROAD

DEVINE STREET

N

MW-10
229.36

MW-3A
218.86

MW-3
233.08(?)

FORMER
UST AREA

MW-6
231.27

ASPHALT PAVEMENT

MW-2
DRY

MW-1A
216.56

MW-11
229.09

CANOPY

ONE STORY
BRICK BUILDING

CONC. ISLAND

CONC. ISLAND

MW-5
230.43

ASPHALT PAVEMENT

229.50

MW-9
229.81

230.00

MW-7
230.38

ASPHALT PAVEMENT

MW-8
231.32

230.50

231.00

FENCE

PIGGLY WIGGLY
GROCERY STORE

ASPHALT PAVEMENT

NOTE:
GROUND-WATER ELEVATION FROM DEEP WELLS MW-1A MW-3A, AND WATER TABLE MW-3 NOT INCLUDED IN CONTOURING.

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- DEEP MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- GROUND-WATER CONTOUR (INTERVAL = 0.5')
- APPARENT GROUND-WATER FLOW DIRECTION

0 30 60
SCALE FEET

DWG: 1144CF6	DATE 10/28/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 6

atlanta testing & engineering
hydrogeologic consultants
florida-georgia-carolinas

POTENTIOMETRIC SURFACE MAP
MEASURED JULY 16, 1993

FORMER CROWN SC-15
COLUMBIA, SC

KILBOURNE ROAD

DEVINE STREET

N

229.50

230.00

230.50

229.14 MW-10

MW-3A
215.83

MW-3
232.78

FORMER
UST AREA

MW-6
230.63

229.00

ASPHALT PAVEMENT

MW-2

MW-1A
215.58

MW-11
228.92

CANOPY

ONE STORY
BRICK BUILDING

CONC. ISLAND

CONC. ISLAND

MW-5
229.79

228.50

ASPHALT PAVEMENT

MW-9
229.45

228.00

ASPHALT PAVEMENT

229.34
MW-7

230.23
MW-8

MW-14
227.50

227.00

227.00

226.13
MW-12

226.50

FENCE

PIGGLY WIGGLY
GROCERY STORE

MW-13
229.39

ASPHALT PAVEMENT

0 30 60
SCALE FEET

NOTE:
GROUND-WATER ELEVATION FROM DEEP WELLS MW-1A AND MW-3A AND WATER TABLE MW-3 NOT INCLUDED IN CONTOURING.

EXPLANATION

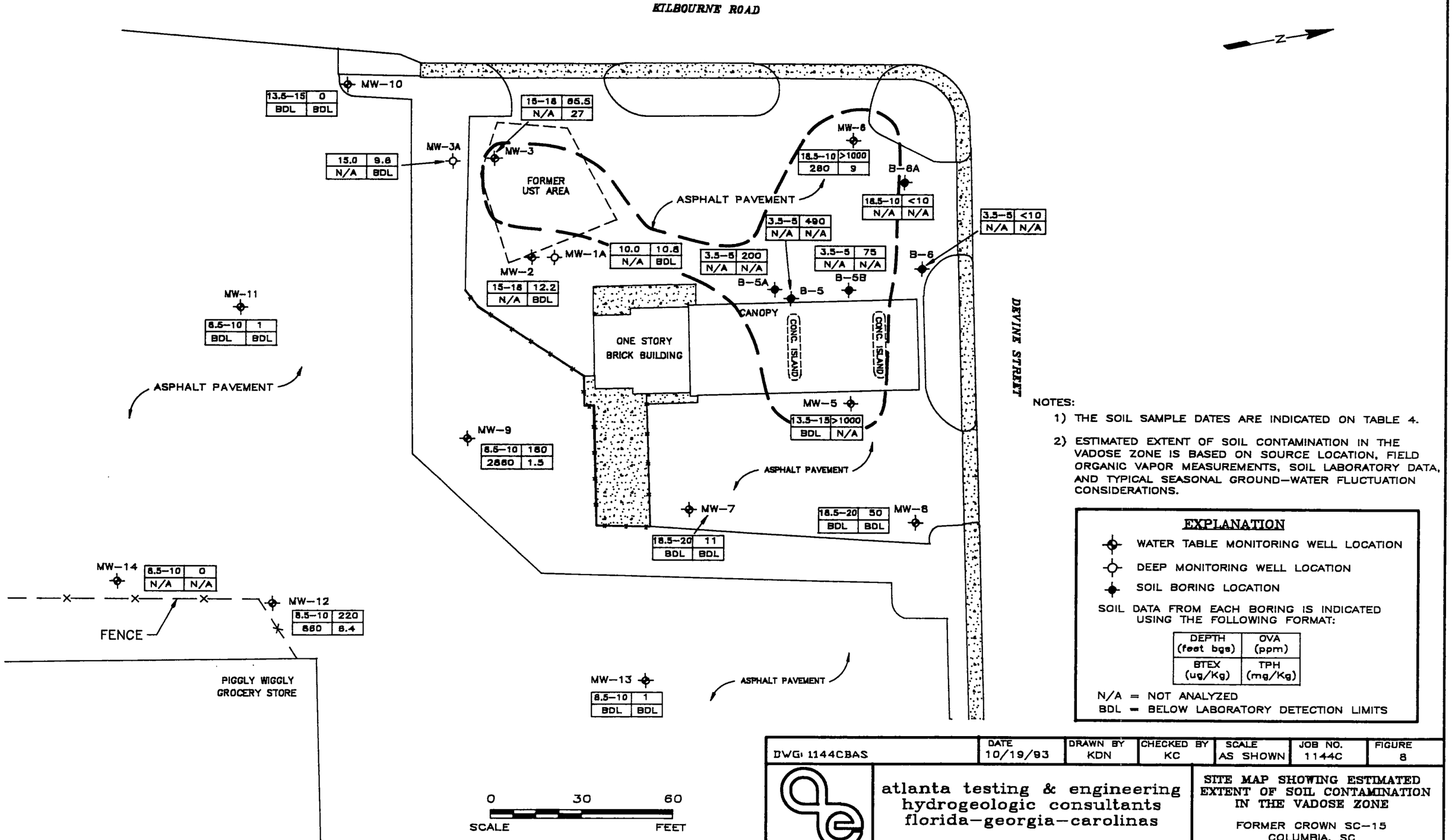
- WATER TABLE MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- DEEP MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- GROUND-WATER CONTOUR (INTERVAL = 0.5')
- APPARENT GROUND-WATER FLOW DIRECTION

DWG: 1144CBAS	DATE 10/19/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 7

atlanta testing & engineering
hydrogeologic consultants
florida-georgia-carolinas

POTENTIOMETRIC SURFACE MAP
MEASUBOR 8, 1993

FORMER CROWN SC-15
COLUMBIA, SC



NOTES:

1) THE SOIL SAMPLE DATES ARE INDICATED ON TABLE 4.

2) ESTIMATED EXTENT OF SOIL CONTAMINATION IN THE VADOSE ZONE IS BASED ON SOURCE LOCATION, FIELD ORGANIC VAPOR MEASUREMENTS, SOIL LABORATORY DATA, AND TYPICAL SEASONAL GROUND–WATER FLUCTUATION CONSIDERATIONS.

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION
- DEEP MONITORING WELL LOCATION
- SOIL BORING LOCATION

SOIL DATA FROM EACH BORING IS INDICATED USING THE FOLLOWING FORMAT:

DEPTH (feet bgs)	OVA (ppm)
BTEX (ug/Kg)	TPH (mg/Kg)

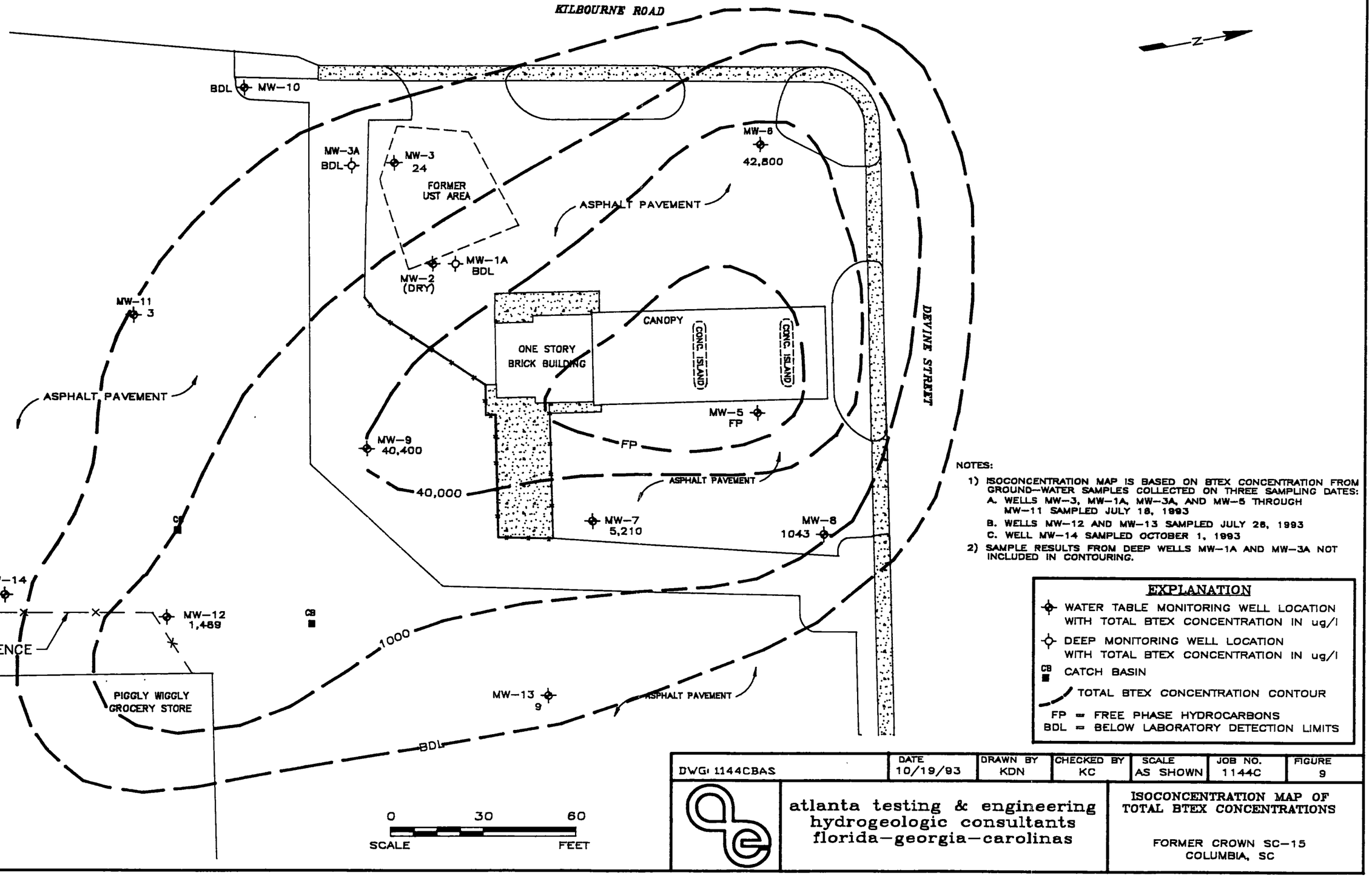
N/A = NOT ANALYZED
BDL = BELOW LABORATORY DETECTION LIMITS

DWG: 1144CBAS	DATE 10/19/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 8

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

SITE MAP SHOWING ESTIMATED EXTENT OF SOIL CONTAMINATION IN THE VADOSE ZONE

FORMER CROWN SC–15
COLUMBIA, SC



NOTES:

1) ISOCONCENTRATION MAP IS BASED ON BTEX CONCENTRATION FROM GROUND-WATER SAMPLES COLLECTED ON THREE SAMPLING DATES:
   A. WELLS MW-3, MW-1A, MW-3A, AND MW-5 THROUGH MW-11 SAMPLED JULY 18, 1993
   B. WELLS MW-12 AND MW-13 SAMPLED JULY 28, 1993
   C. WELL MW-14 SAMPLED OCTOBER 1, 1993
2) SAMPLE RESULTS FROM DEEP WELLS MW-1A AND MW-3A NOT INCLUDED IN CONTOURING.

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION WITH TOTAL BTEX CONCENTRATION IN ug/l
- DEEP MONITORING WELL LOCATION WITH TOTAL BTEX CONCENTRATION IN ug/l
- CB CATCH BASIN
- TOTAL BTEX CONCENTRATION CONTOUR

FP = FREE PHASE HYDROCARBONS
BDL = BELOW LABORATORY DETECTION LIMITS

DWG: 1144CBAS	DATE 10/19/93	DRAWN BY KDN	CHECKED BY KC	SCALE AS SHOWN	JOB NO. 1144C	FIGURE 9

atlanta testing & engineering
hydrogeologic consultants
florida-georgia-carolinas

ISOCONCENTRATION MAP OF TOTAL BTEX CONCENTRATIONS

FORMER CROWN SC-15
COLUMBIA, SC

TABLES

TABLE 1

SUMMARY OF WELL CONSTRUCTION DATA

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DATE COMPLETED	TOC ELEV. (feet)	TOTAL DEPTH (feet, bgs)	CASING DIAMETER (inches)	SCREENED INTERVAL DEPTH (feet)
MW-1	6/13/89	NS	18	4	3-18
MW-2	6/13/89	NS	18	4	3-18
MW-3	6/14/89	248.72	18	4	3-18
MW-4	6/14/89	NS	18	4	3-18
MW-1A*	11/21/90	249.98	45	2	35-45
MW-2A*	11/21/90	NS	45	2	35-45
MW-3A*	11/21/90	248.63	45	2	35-45
MW-5	7/9/93	250.52	25	2	15-25
MW-6	7/12/93	250.83	22.5	2	12.5-22.5
MW-7	7/12/93	250.18	25.7	2	15.7-25.7
MW-8	7/13/93	250.55	25	2	15-25
MW-9	7/13/93	244.41	20	2	10.20
MW-10	7/13/93	247.94	22.5	2	12.5-22.5
MW-11	7/14/93	243.57	15.8	2	5.8-15.8
MW-12	7/21/93	240.78	18.2	2	8.0-18.2
MW-13	7/21/93	243.12	16.5	2	6.5-16.5
MW-14	9/28/93	241.51	18	2	8-18

NOTES:

1) *bgs = below ground surface.*
2) *TOC = top of well casing (elevations referenced to an assumed datum of 250 feet).*
3) *NS = not surveyed.*
4) **Data obtained from April 8, 1991 assessment report prepared by ATEC Environmental Consultants.*
5) *Wells MW-1, MW-2A, and MW-4 are destroyed.*

TABLE 2

GROUND-WATER ELEVATION DATA

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND-WATER ELEVATION
MW-2	7/16/93	3-18	--	ND	ND	Dry
MW-3	7/16/93 10/8/93	3-18	248.72	15.64 15.94	ND ND	233.08 232.78
MW-1A	7/16/93 10/8/93	35-45	249.98	33.42 34.40	ND ND	216.56 215.58
MW-3A	7/16/93 10/8/93	35-45	248.63	31.77 32.80	ND ND	216.86 215.83
MW-5	7/16/93 10/8/93	15-25	250.52	20.18 21.75	0.11 1.31	230.43 229.79
MW-6	7/16/93 10/8/93	12.5-22.5	250.83	19.56 20.20	ND ND	231.27 230.63
MW-7	7/16/93 10/8/93	15.7-25.7	250.18	19.80 20.84	ND ND	230.38 229.34
MW-8	7/16/93 10/8/93	15-25	250.55	19.23 20.32	ND ND	231.32 230.23
MW-9	7/16/93 10/8/93	10-20	244.41	14.60 14.96	ND ND	229.81 229.45
MW-10	7/16/93 10/8/93	12.5-22.5	247.94	18.58 18.80	ND ND	229.36 229.14
MW-11	7/16/93 10/8/93	5.8-15.8	243.57	14.48 14.65	ND ND	229.09 228.92
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53

NOTES:
1) *Units in feet*
2) *Elevations referenced to an assumed datum (250 feet).*
3) *Measurements taken by Atlanta Testing & Engineering personnel.*
4) *btoc = below top of casing.*
5) *bgs = below ground surface.*
6) *ND = None detected.*
7) *Water elevations corrected for wells containing free-phase product using the following formula:*

GW elevation = TOC elevation - [Water Depth - (F.P. thickness x 0.78)]
where gasoline has an assumed specific gravity of 0.78 g/cm^3.

TABLE 3

SOIL ORGANIC VAPOR CONCENTRATIONS

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DEPTH (feet)	TOTAL ORGANIC VAPOR CONCENTRATIONS (ppm)
MW-1	15-18	620.0*
MW-2	15-18	12.2*
MW-3	15-18	65.5*
MW-4	16-18	5.1
MW-1A	5.0	4.5
	10.0	10.8*
	15.0	10.6
	20.0	8.7
	25.0	7.9
	30.0	7.4
	35.0	6.9
	40.0	6.5
	45.0	6.0
MW-2A	5.0	10.2*
	10.0	9.0
	15.0	8.6
	20.0	8.2
	25.0	7.6
	30.0	7.4
	35.0	6.8
	40.0	6.5
	45.0	5.4
MW-3A	5.0	2.0
	10.0	7.0
	15.0	9.6*
	20.0	8.4
	25.0	7.4
	30.0	6.8
	35.0	4.8
	40.0	4.6
	45.0	4.2
B-5	3.5-5	490
B-5A	3.5-5	200

TABLE 3 (continued)

SOIL ORGANIC VAPOR CONCENTRATIONS

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DEPTH (feet)	TOTAL ORGANIC VAPOR CONCENTRATIONS (ppm)
B-5B	3.5-5	75
MW-5	3.5-5	220
	8.5-10	200
	13.5-15	>1.000*
	18.5-20	>1,000
	23.5-25	150
	28.5-30	120
B-6	3.5-5	<10
B-6A	3.5-5	<10
	8.5-10	<10
MW-6	3.5-5	<10
	8.5-10	<10
	13.5-15	120
	15-16.5	100
	18.5-20	>1,000*
	20-21.5	160
	22-23.5	76
	23.5-25	120
MW-7	3.5-5	<10
	8.5-10	<10
	13.5-15	<10
	18.5-20	11*
	21-22	15
	23.5-25	13
	26-27.5	16
MW-8	1-2	<10
	6-7	15
	8.5-10	<10
	13.5-15	<10
	16-17	15
	18.5-20	50*
	23.5-25	12
	25.5-27	<10

TABLE 3 (continued)

SOIL ORGANIC VAPOR CONCENTRATIONS

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DEPTH (feet)	TOTAL ORGANIC VAPOR CONCENTRATIONS (ppm)
MW-9	3.5-5	15
	7-8	13
	8.5-10	180*
	13.5-15	>1,000
	18.5-20	600
MW-10	3.5-5	0
	8.5-10	0
	13.5-15	0*
	18.5-20	0
MW-11	3.5-5	1
	8.5-10	1*
	13.5-15	0
	17-18.5	0
MW-12	3.5-5	180
	8.5-10	220*
	13.5-15	80
	18.5-20	24
MW-13	3.5-5	1
	8.5-10	1*
	13.5-15	0
	17-18.5	0
MW-14	3.5-5	0
	8.5-10	0
	13.5-15	1.7
	18.5-20	0.0

NOTE: 1) **Samples selected for laboratory analysis.*
2) **Data obtained from April 8, 1991 assessment report prepared by ATEC, Inc.*
3) *ppm = parts per million.*

TABLE 4

SOIL LABORATORY DATA

Crown Central Petroleum Corporation
Crown Facility SC- 15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DATE SAMPLED	DEPTH (ft, bgs)	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH
MW-1	6/13/93	15-18	N/A	N/A	N/A	N/A	37
MW-2	6/13/93	15-18	N/A	N/A	N/A	N/A	BDL
MW-3	6/14/93	15-18	N/A	N/A	N/A	N/A	27
MW-1A	11/21/93	10	N/A	N/A	N/A	N/A	BDL
MW-2A	11/21/93	5	N/A	N/A	N/A	N/A	BDL
MW-3A	11/21/93	15	N/A	N/A	N/A	N/A	BDL
MW-5	7/9/93	13.5-15	BDL	BDL	BDL	BDL	N/A
MW-6	7/12/93	18.5-20	BDL	BDL	40	220	9
MW-7	7/12/93	18.5-20	BDL	BDL	BDL	BDL	BDL
MW-8	7/13/93	18.5-20	BDL	BDL	BDL	BDL	BDL
MW-9	7/13/93	8.5-10	140	BDL	720	2,000	1.5
MW-10	7/13/93	13.5-15	BDL	BDL	BDL	BDL	BDL
MW-11	7/14/93	8.5-10	BDL	BDL	BDL	BDL	BDL
MW-12	7/21/93	8.5-10	63	77	140	580	6.4
MW-13	7/21/93	8.5-10	BDL	BDL	BDL	BDL	BDL

NOTES:
1) *BTEX concentrations reported in micrograms per kilogram (ug/kg).*
2) *TPH concentrations reported in milligrams per kilogram (mg/kg).*
3) *bgs = below ground surface.*
4) *N/A = not analyzed.*
5) *BDL = below laboratory detection limits.*
6) **Data obtained from April 8, 1991 assessment report prepared by ATEC Environmental Consultants.*

TABLE 5

GROUND-WATER LABORATORY DATA

Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044C, Report No. 93170

WELL NO.	DATE SAMPLED	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENE(S)	MTBE	LEAD
MW-3	7/16/93	5	13	1	5	BDL	BDL
MW-1A	7/16/93	BDL	BDL	BDL	BDL	2	BDL
MW-3A	7/16/93	BDL	BDL	BDL	BDL	BDL	BDL
MW-5	*	*	*	*	*	*	*
MW-6	7/16/93	9,600	22,000	1,900	9,300 47,800	BDL	BDL
MW-7	7/16/93	2,800	1,500	500	410	600	BDL
MW-8	7/16/93	130	110	73	730	BDL	BDL
MW-9	7/16/93	12,000	12,000	3,400	13,000 4000	10,000	24
MW-10	7/16/93	BDL	BDL	BDL	BDL	970	BDL
MW-11	7/16/93	3.0	BDL	BDL	BDL	56	BDL
MW-12	7/26/93	1,200	29	150	110	1,000	420
MW-13	7/26/93	BDL	4	BDL	5	BDL	BDL
MW-14	10/1/93	BDL	BDL	BDL	BDL	270	BDL

NOTES:
1) *All concentrations expressed in micrograms per liter (ug/l).*
2) *All samples collected by AT&E personnel.*
3) *N/A = not analyzed.*
4) *BDL = below laboratory detection limits.*
5) **Not sampled due to presence of free-phase hydrocarbons.*

GEOLOGIST LOGS

atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-1

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/13/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

MATERIAL:	SAND	BENTONITE	CEMENT
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

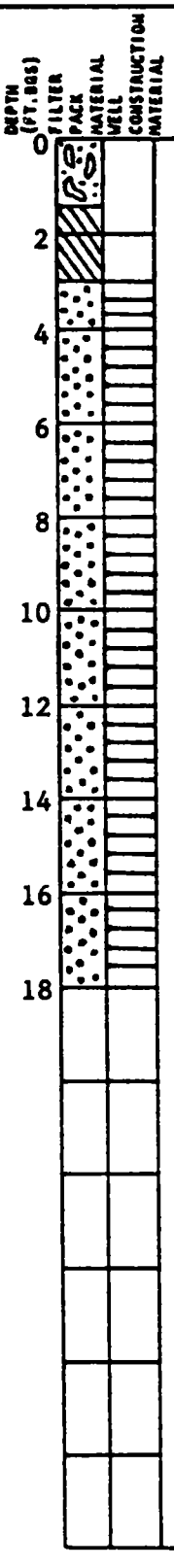
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



SOIL/ROCK DESCRIPTION

- 0 – 6" ASPHALT
- CRUSHED STONE
- 2 – RED CLAYEY SAND
- 4 –
- 6 – RED-BROWN CLAYEY SAND
- 8 –
- 10 –
- 12 –
- 14 –
- 16 – GRAY-BROWN SILTY SAND
- 18 – BORING TERMINATED AT 18 FEET

NO GROUNDWATER ENCOUNTERED

atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-2

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/13/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

MATERIAL	SCREEN	CASING	
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

MATERIAL:	SAND	BENTONITE	CEMENT
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

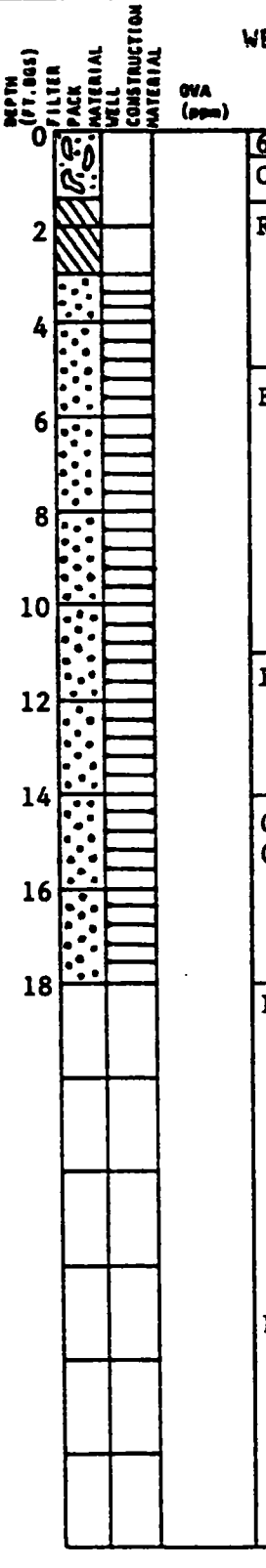
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



SOIL/ROCK DESCRIPTION

- 0 – 6" ASPHALT
- CRUSHED STONE
- 2 – RED CLAYEY SAND
- 4 – BROWN SILTY SAND WITH CLAY
- 6 –
- 8 –
- 10 –
- 12 – BROWN SANDY CLAY
- 14 – GRAY-BROWN SILTY SAND WITH CLAY AND GRAVEL
- 16 –
- 18 – BORING TERMINATED AT 18 FEET

NO GROUNDWATER ENCOUNTERED

atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-3

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/14/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

	SCREEN	CASING	
MATERIAL			
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

	SAND	BENTONITE	CEMENT
MATERIAL:			
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

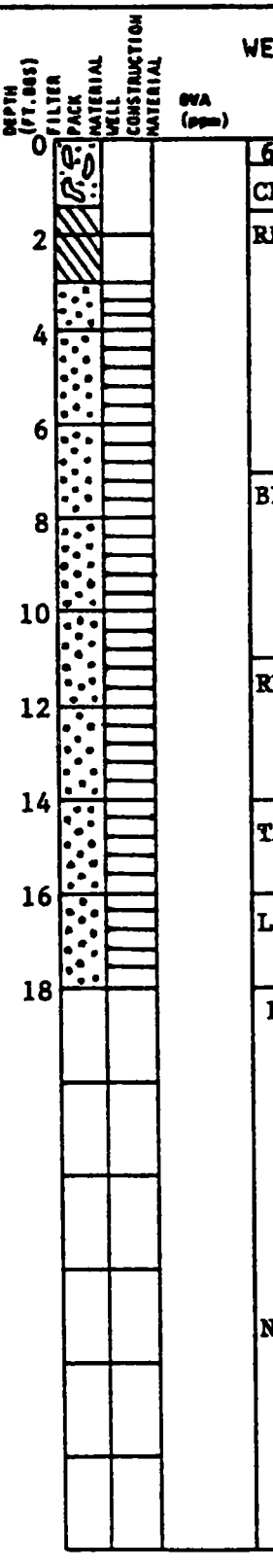
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



atlanta testing & engineering
geotechnical & material engineering and hydrogeology

WELL COMPLETION LOG

CLIENT: CROWN CENTRAL PETROLEUM CORPORATION JOB NO: C-1012 WELL NO: MW-4

LOCATION: SC-15 / 3800 DEVINE STREET LOGGED BY: T. COPPIN

DATE INSTALLED: 6/14/89 DRILLER: T. COPPIN

PURPOSE: MONITOR X RECOVERY ___ WATER SUPPLY ___ TEST ___ OTHER ___

CONSTRUCTION DATA

DRILLING METHOD: HOLLOW STEM AUGER
WELL TYPE: SCREEN/GRAVEL PACK
WELL DEPTH(BGS) 18 FEET

CASING/SCREEN/OPEN HOLE

MATERIAL	SCREEN	CASING	
DIAMETER(IN.)	4" PVC	4" PVC	
INTERVAL(FT.BGS.)	3-18	0-3	
LENGTH(FT.)	15	3	
BORE HOLE DIA.(IN.)	10	10	
SLOT SIZE(IN.)	0.01	-	

ANNULUS MATERIAL

MATERIAL:	SAND	BENTONITE	CEMENT
INTERVAL(FT.BGS.)	3.0-18.0	1.5-3.0	0-1.5
LENGTH(FT.)	15	1.5	1.5

HYDROGEOLOGIC DATA

AQUIFER TYPE: ___
SPECIFIC CAPACITY: ___ gpm/ft.
TRANSMISSIVITY: ___ gpd/ft.
STORAGE COEFFICIENT/SPECIFIC YIELD: ___
DEPTH TO WATER(BTOC) ___ FT.
DATE/TIME ___

ELEVATION DATA

GROUND ELEVATION: ___
CASING STICKUP: ___ FT.
TOC ELEVATION: ___
SURVEYED BY: ___

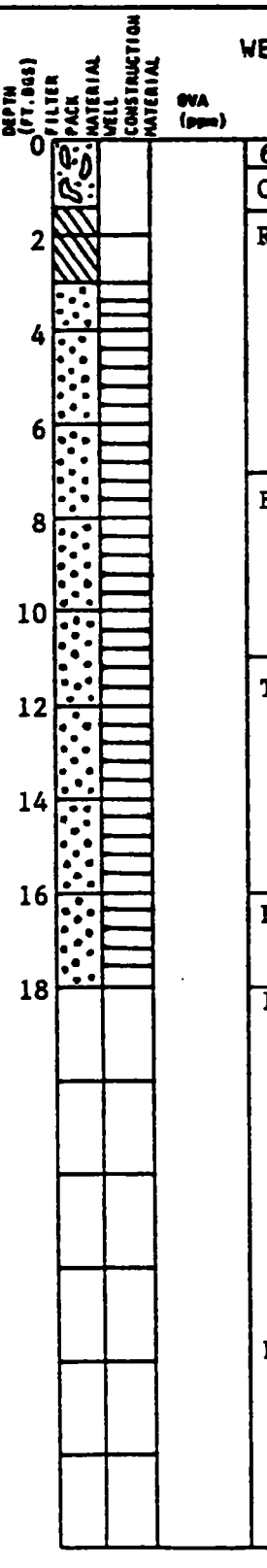
COMMENTS:

LONGITUDE -

LATTITUDE -

WELLS COMPLETED WITH LOCKING WATERTIGHT CAPS AND PROTECTIVE MANHOLES.

WELL CONSTRUCTION DIAGRAM



ORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 733-3083

WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY
Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

DRILLING CONTRACTOR ATEC Associates, Inc.

DRILLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)
Nearest Town: Columbia, South Carolina
3800 Devine Street
(Road, Community, or Subdivision and Lot No.)
County: Richland

2. OWNER Crown Central Petroleum Corp.
ADDRESS One North Charles Street, P.O. Box 1168
Baltimore, Maryland 21203
City or Town State ZIP Code

3. Date Drilled 11/21/90 USE OF WELL Monitor

4. Total Depth 45.0 Cuttings Collected? X Yes ____ No

5. DOES WELL REPLACE EXISTING WELL? ____ Yes X No

6. Static Water Level: 37.0 ft. ____ above X below top of casing.
Top of casing is -.50 ft. below land surface.

7. YIELD (gpm): NA METHOD OF TEST NA

8. Water Zones (depth): NA

9. CHLORINATION: Type NA Amount _____

10. CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
from	-.50	To -35.0	Ft.	2	Sch 40	PVC
From		To	Ft.			
From		To	Ft.			

11. GROUT:

	Depth			Material	Method
From	-.75	To -31.0	Ft.	Cement	HAND
from	-31.0	To -33.0	Ft.	Bentonite	HAND

12 SCREEN:

	Depth			Diameter	Slot Size	Material
from	-35.0	To -45.0	Ft.	2 in.	.010 in	PVC
From		To	Ft.	in.	in.	
From		To	Ft.	in.	in.	

13. GRAVEL PACK:

	Depth			Size	Material
From	-33.0	To -45.0	Ft.	Fine	Filter SAND
from		To	Ft.		

14. REMARKS: _____

Depth From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

MW-1

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 14 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #1

DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH FROM	— FT. TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon clay and fine SAND	5.0	4.5	
9.5	10.0	Gray-brown clay and find SAND	10.0	10.8	
14.5	15.0	Gray-brown clay and fine SAND	15.0	10.6	
19.5	20.0	Gray silty fine SAND	20.0	8.7	
24.5	25.0	Rust silty fine SAND	25.0	7.9	
29.5	20.0	Rust silty fine SAND	30.0	7.4	
34.5	35.0	Rust silty fine SAND	35.0	6.9	
39.5	40.0	Light brown silty fine SAND	40.0	6.5	Moist
44.5	45.0	Light gray silty fine SAND	45.0	6.0	

Depth Referenced To: Top of Grade

Groundwater noted at: 37.0 ft

NORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 733-3083

FOR OFFICE USE ONLY

Quad No. _____ Serial No. _____
Lat. _____ Long. _____ Pc _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

WELL CONSTRUCTION RECORD

1 DRILLING CONTRACTOR ATEC Associates, Inc.

1 DRILLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

WELL LOCATION: (Show sketch of the location below)

Nearest Town: Columbia, South Carolina

County: Richland

3800 Devine Street
(Road, Community, or Subdivision and Lot No.)

OWNER Crown Central Petroleum Corp.

ADDRESS One North Charles Street, P.O. Box 1168

Baltimore, Maryland 21203
City or Town State ZIP Code

Date Drilled 11/21/90 USE OF WELL Monitor

Total Depth 45.0 Cuttings Collected? X Yes ____ No

DOES WELL REPLACE EXISTING WELL? ____ Yes X No

Static Water Level: 36.0 ft. ____ above X below top of casing

Top of casing is -.50 ft. below land surface.

YIELD (gpm): NA METHOD OF TEST NA

Water Zones (depth): NA

CHLORINATION: Type NA Amount _____

Depth From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

1 CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
F 1	-.50	To -35.0	Ft.	2	Sch 40	PVC
I n		To	Ft.			
I 1		To	Ft.			

1 GROUT:

	Depth			Material	Method
1	-.75	To -31.0	Ft.	Cement	HAND
1	-31.0	To -33.0	Ft.	Bentonite	HAND

SCREEN:

	Depth			Diameter	Slot Size	Material
F 1	-35.0	To -45.0	Ft.	2 in.	.010 in.	PVC
I m		To	Ft.	in.	in.	
I 1		To	Ft.	in.	in.	

1. GRAVEL PACK:

	Depth			Size	Material
1	-33.0	To -45.0	Ft.	Fine	Filter SAND
Fi 1		To	Ft.		

REMARKS: _____

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

MW-2

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 15 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #2

DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH — FT. FROM	TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon clay and fine SAND	5.0	10.2	
9.5	10.0	Maroon clay and fine SAND	10.0	9.0	
14.5	15.0	Maroon clay and fine SAND	15.0	8.6	
19.5	20.0	Rust silty clay and fine SAND	20.0	8.2	
24.5	25.0	Rust silty clay and fine SAND	25.0	7.6	
29.5	20.0	Rust silty clay and fine SAND	30.0	7.4	
34.5	35.0	Maroon silty clay and fine SAND	35.0	6.8	
39.5	40.0	Maroon silty clay and fine SAND	40.0	6.5	Moist
44.5	45.0	Rust fine silty SAND	45.0	5.4	

Depth Referenced To: Top of Grade

Groundwater noted at: 36.0 ft

ORTH CAROLINA DEPARTMENT OF HEALTH, ENVIRONMENT, AND NATURAL RESOURCES
DIVISION OF ENVIRONMENTAL MANAGEMENT - GROUNDWATER SECTION
P.O. BOX 27687 - RALEIGH, NC 27611, PHONE (919) 733-5083

WELL CONSTRUCTION RECORD

FOR OFFICE USE ONLY
Quad No. _____ Serial No.
Lat. _____ Long. _____ Pc. _____
Minor Basin _____
Basin Code _____
Header Ent. _____ GW-1 Ent. _____

RILLING CONTRACTOR ATEC Associates, Inc.

D LLER REGISTRATION NUMBER 875

STATE WELL CONSTRUCTION PERMIT NUMBER: _____

1. WELL LOCATION: (Show sketch of the location below)

Nearest Town: Columbia, South Carolina

County: Richland

3800 Devine Street
(Road, Community, or Subdivision and Lot No.)

2. OWNER Crown Central Petroleum Corp.

ADDRESS One North Charles Street, P.O. Box 1168

Baltimore, Maryland 21203
City or Town State ZIP Code

3 Date Drilled 11/21/90 USE OF WELL Monitor

4. Total Depth 45.0 Cuttings Collected? X Yes ____ No

5. DOES WELL REPLACE EXISTING WELL? ____ Yes X No

6 Static Water Level: 36.0 ft. ____ above X below top of casing

Top of casing is -.50 ft. below land surface.

7. YIELD (gpm): NA METHOD OF TEST NA

8 Water Zones (depth): NA

9. CHLORINATION: Type NA Amount _____

10 CASING:

	Depth			Diameter	Wall Thickness or Weight/Ft.	Material
om	-.50	To -35.0	Ft.	2	Sch 40	PVC
Fr		To	Ft.			
		To	Ft.			

11. GROUT:

	Depth			Material	Method
	-.75	To -31.0	Ft.	Cement	HAND
om	-31.0	To -33.0	Ft.	Bentonite	HAND

12 SCREEN:

	Depth			Diameter	Slot Size	Material
om	-35.0	To -45.0	Ft.	2 in.	010 in.	PVC
Fr		To	Ft.	in.	in.	
		To	Ft.	in.	in.	

13. GRAVEL PACK:

	Depth			Size	Material
	-33.0	To -45.0	Ft.	Fine	Filter SAND
om		To	Ft.		

14 REMARKS: _____

From	Depth To	Drilling Log Formation Description
		SEE HAND AUGER BORE LOG

If additional space is needed, use back of form.

LOCATION SKETCH

(Show direction and distance from at least two State Roads, or other map reference points.)

MW-3

SEE MONITOR WELL LOCATION MAP

I DO HEREBY CERTIFY THAT THIS WELL WAS CONSTRUCTED IN ACCORDANCE WITH 14 NCAC 2C, WELL CONSTRUCTION RECORDS, AND THAT A COPY OF THIS RECORD HAS BEEN PROVIDED TO THE WELL OWNER.

Bill Scarbrough 3/20/91
Signature of Contractor or Agent Date

Submit original to Division of Environmental Management & copy to well owner

ATEC Environmental Consultants
Division of ATEC Associates, Inc.
6814 Davis Circle
Raleigh, North Carolina 27613
(919) 782-2832 Raleigh
(919) 781-7558 FAX

HAND AUGER BORING LOG

JOB NO.: 35-70004 NUMBER: B #3

DATE: January 11, 1991 LOCATION: See Site Map

3800 DEVINE STREET

DEPTH FROM	— FT. TO	SOIL DESCRIPTION AND REMARKS	DEPTH FT.	PID READING	
4.5	5.0	Maroon silty CLAY	5.0	2.0	
9.5	10.0	Maroon silty clay and fine SAND	10.0	7.0	
14.5	15.0	Maroon silty clay and fine SAND	15.0	9.6	
19.5	20.0	Maroon silty clay and fine SAND	20.0	8.4	
24.5	25.0	Rust silty clay and fine SAND	25.0	7.4	
29.5	20.0	Rust silty clay and fine SAND	30.0	6.8	
34.5	35.0	Maroon silty clay and fine SAND	35.0	4.8	
39.5	40.0	Maroon silty clay and fine SAND	40.0	4.6	Moist
44.5	45.0	Rust fine silty SAND	45.0	4.2	

Depth Referenced To: Top of Grade

Groundwater noted at: 37.5 ft

atlanta testing & engineering

GEOLOGIST LOG

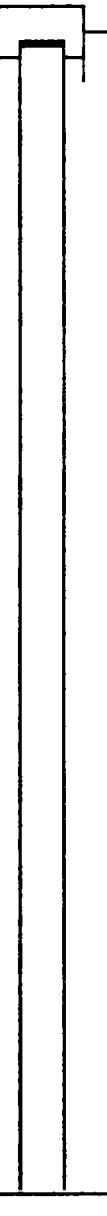
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: B-5
COUNTY: Richland STATE: South Carolina	DATE: 7/9/93	CASING HEIGHT: N/A LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: N/A
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: N/A
TESTS: N/A	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: N/A	SEAL: N/A	GRAVEL PACK: N/A

CASING TYPE: N/A DIAMETER: N/A DEPTH: N/A HOLE DIA: 8 in.

SCREEN TYPE: N/A SLOT: N/A DIAMETER: N/A DEPTH: N/A TOTAL DEPTH: 9.5 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (2 in.)/Crusher Run (1 ft.).
	1			Degraded hydrocarbon odor beneath asphalt.
	2			
	3			
	4			Rig chatter/small obstruction encountered.
			13	
			6	CLAYEY SAND (fill), dark yellowish brown (10 YR 4/2),
490	5		5	moderately sorted, fine to medium grained, subrounded,
	6			moist, hydrocarbon odor.
	7			
	8			Rig chatter.
	9		50	Auger Refusal/No Return.
			–	
	10		–	
	11			Boring terminated at 9.5 ft. BLS.
				Split-spoon to 10 ft. BLS.
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

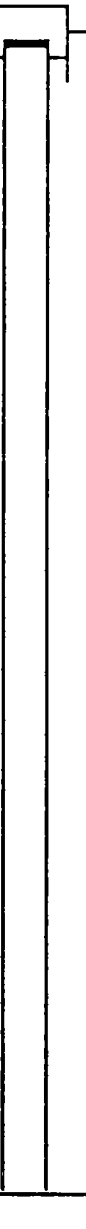
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: B-5A
COUNTY: Richland STATE: South Carolina	DATE: 7/9/93	CASING HEIGHT: N/A LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: N/A
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: N/A
TESTS: N/A	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: N/A	SEAL: N/A	GRAVEL PACK: N/A

CASING TYPE: N/A DIAMETER: N/A DEPTH: N/A — HOLE DIA: 8 in.

SCREEN TYPE: N/A SLOT: N/A DIAMETER: N/A DEPTH: N/A — TOTAL DEPTH: 13 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			CLAYEY SAND (fill), moderate yellowish brown (10 YR 5/4), moderately sorted, fine to medium grained, rounded, damp, no odor.
	2			
	3			As above.
	4		5	
200	5		4 3	
	6			
	7			
	8			Rig chatter.
	9		7	No Return/Concrete.
	10		5 8	
	11			
	12			
	13			Auger Refusal. Boring terminated at 13 ft. BLS. Split-spoon to 10 ft. BLS.
	14			
	15			
	16			
	17			
	18			
	19			
	20			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: B-5B
COUNTY: Richland STATE: South Carolina	DATE: 7/9/93	CASING HEIGHT: N/A LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: N/A
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: N/A
TESTS: N/A	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: N/A	SEAL: N/A	GRAVEL PACK: N/A

CASING TYPE: N/A DIAMETER: N/A DEPTH: N/A — HOLE DIA: 8 in.

SCREEN TYPE: N/A SLOT: N/A DIAMETER: N/A DEPTH: N/A — TOTAL DEPTH: 4 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			
	1			
	2			
	3			
	4		50	CLAY SAND (fill), moderate yellowish brown (10 YR 5/4), moderately sorted, fine to medium grained, rounded, damp, no odor.
75	5		–	Auger Refusal.
	6		–	Boring terminated at 4 ft. BLS.
	7			Split-spoon to 4 ft. BLS.
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

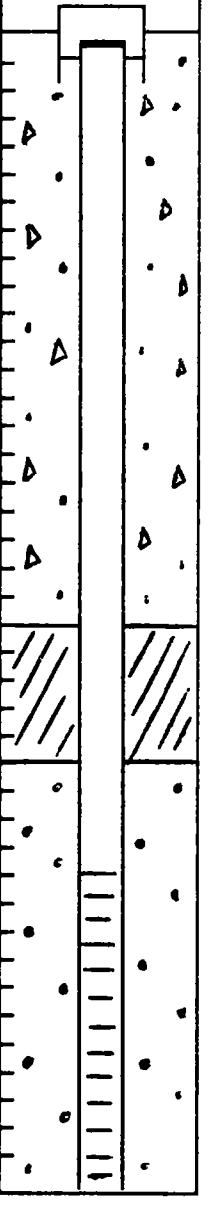
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: MW-5
COUNTY: Richland STATE: South Carolina	DATE: 7/9/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 20 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailer
TESTS: Soil/Ground Water	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: Cement/Bentonite 0-10.5 ft.	SEAL: Bentonite 10.5 - 13 ft.	GRAVEL PACK: FX-50 13-25 ft.

CASING TYPE: PVC DIAMETER: 2 in. DEPTH: 0 - 15 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 15 - 25 ft. TOTAL DEPTH: 25 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			
	2			CLAYEY SAND, moderate reddish orange (10 R 4/6) to dusky yellowish brown (10 YR 2/2), well sorted, fine grained, subrounded, damp, no odor.
	3			
	4		7	
			10	
220	5		5	SAND, dark yellowish brown (10 YR 4/2), well sorted, fine to medium grained, subangular to subrounded, trace organics, damp, no odor.
	6			
	7			
	8			
	9		2	
200			2	SILTY CLAY, light brown, moist, trace organics, no odor.
	10		3	
	11			
	12			
	13			
	14		13	SILTY SAND, grayish orange (10 YR 7/4), poorly sorted, fine to coarse grained, subrounded to rounded, dry, no odor.
>1000			29	
	15		32	
	16			
	17			
	18			
>1000				
	19		12	SAND, moderate reddish orange (10 R 6/6), with medium to coarse gravel pebbles (quartz), very poorly sorted, fine to very coarse grained, angular, trace clay, wet, strong hydrocarbon odor.
	20		15	
			25	

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NO.: MW-5

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS	WELL COMPLETION
	21				
	22			Saturated at 23 ft. BLS.	
	23				
	24		22	CLAY, grayish orange pink (10 R 8/2), hard, trace fine grained sand.	
150			28		
	25		34		
	26				
	27				
	28				
	29		20		
120			50	As above, light gray (N7) with pale red purple (5 RP 6/2) streaks.	
	30		–		
				Boring terminated at 28.5 ft. BLS. .	
				Split-spoon to 30 ft. BLS.	

atlanta testing & engineering

GEOLOGIST LOG

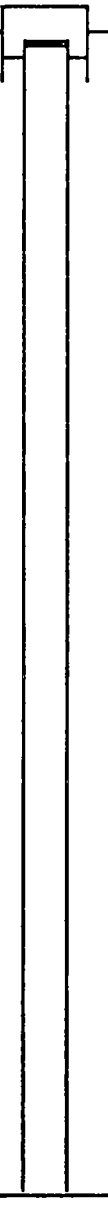
JOB NUMBER: C-1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: B-6
COUNTY: Richland STATE: South Carolina	DATE: 7/12/93	CASING HEIGHT: N/A LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: N/A
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: N/A
TESTS: N/A	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: N/A	SEAL: N/A	GRAVEL PACK: N/A

CASING TYPE: N/A DIAMETER: N/A DEPTH: N/A — HOLE DIA: 8 in.

SCREEN TYPE: N/A SLOT: N/A DIAMETER: N/A DEPTH: N/A — TOTAL DEPTH: 7.5 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			
	2			
	3			
	4		4	SILTY SAND, moderate brown (5 YR 4/4), well sorted,
			3	fine to medium grained, subrounded, damp, no odor.
<10	5		3	
	6			
	7			Auger Refusal/Obstruction Encountered.
	8			
	9			Boring terminated at 7.5 ft. BLS.
	10			Split-spoon to 5 ft. BLS.

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

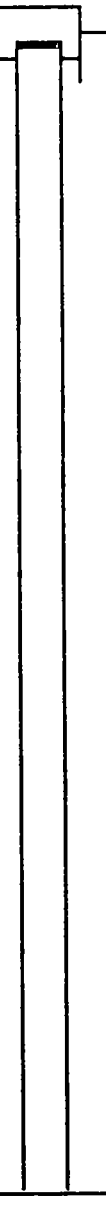
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: B-6A
COUNTY: Richland STATE: South Carolina	DATE: 7/12/93	CASING HEIGHT: N/A LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: N/A
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: N/A
TESTS: N/A	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: N/A	SEAL: N/A	GRAVEL PACK: N/A
CASING TYPE: N/A	DIAMETER: N/A	DEPTH: N/A
SCREEN TYPE: N/A	SLOT: N/A	DIAMETER: N/A DEPTH: N/A

HOLE DIA: 8 in.

TOTAL DEPTH: 9 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			
	1			Asphalt (2 in.).
	2			
	3			
	4		4	SILTY SAND, moderate brown (5 YR 4/4), well sorted,
			5	fine to medium grained, subrounded, damp, no odor.
<10	5		5	
	6			
	7			
	8			
<10				As above, with pieces of teracotta pipe and cement.
	9		17	
			50	Obstruction encountered.
	10		–	
				Boring terminated at 9 ft. BLS.
				Split-spoon to 9.5 ft. BLS.
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	18			
	19			
	20			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

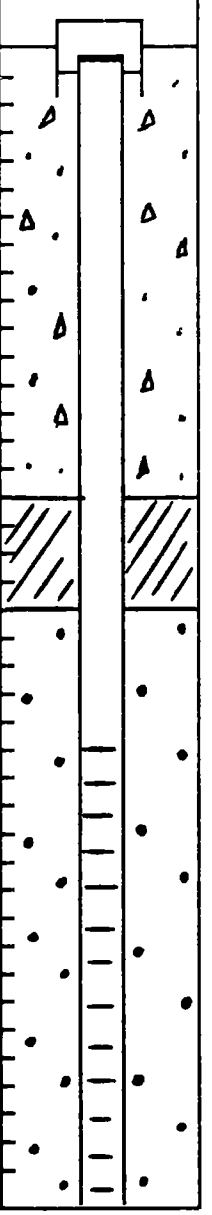
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: MW-6
COUNTY: Richland STATE: South Carolina	DATE: 7/12/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 20 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailer
TESTS: Soil/Ground Water	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: Cement/Bentonite 0-8 ft.	SEAL: Bentonite 8 - 10 ft.	GRAVEL PACK: FX-50 10-22.5 ft.

CASING TYPE: PVC DIAMETER: 2 in. DEPTH: 0 - 12.5 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 12.5 - 22.5 ft. TOTAL DEPTH: 22.5 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			
	2			
	3			
	4		4	SILTY SAND, moderate brown (5 YR 4/4), well sorted,
<10	5		4 4	fine to medium grained, subrounded, damp, no odor.
	6			Rig Chatter/Hard Drilling 6 to 9 ft. BLS.
	7			
	8			
	9		7	As above with gravel, cement, metal wire, wood, plastic
<10	10		50 --	wrapped wire, and organics.
	11			No cuttings.
	12			
	13			
	14		5	As above, moderate yellowish brown (10 YR 5/4), damp,
120	15		5 6	possible degraded hydrocarbon odor.
100	16		7 10 10	As above, possible degraded hydrocarbon odor. No cuttings from approx. 10 - 17 ft. BLS
	17			
	18			
	19		13	CLAYEY SAND, moderate yellowish brown (10 YR 5/4) to
>1000	20		14 14	light gray (N7), moderately sorted, fine to medium grained, subrounded, damp, hydrocarbon odor.

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: SC-15 LOCATION: 3800 Devine St., Cola.	WELL NO.: MW-6

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS	WELL COMPLETION
			12	As above, increase in clay, trace fine pebble gravel,	
160	21		9	moist, slight hydrocarbon odor.	
			10		
	22			Hard drilling.	
			22	As above, dark yellowish orange (10 YR 6/6) to light gray	
76	23		32	(N7).	
			32		
120	24			CLAY and SAND; clay is moderate reddish orange (10 R	
				6/6), firm, damp; sand is light gray (N7), well sorted, fine	
	25			grained, damp, no odor, trace of wire, trace mica.	
				Boring terminated at 25 ft. BLS.	
				Split-spoon to 25 ft. BLS.	

atlanta testing & engineering

GEOLOGIST LOG

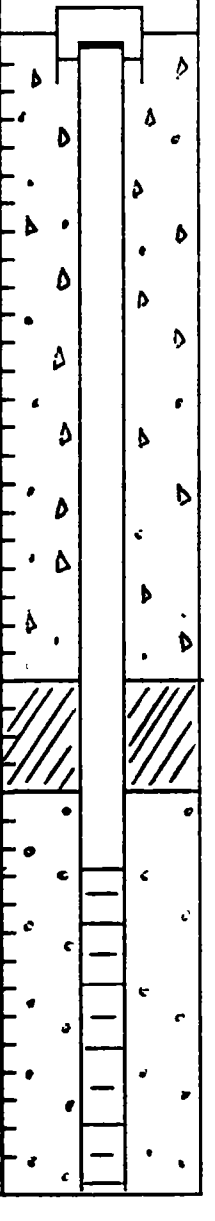
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: MW-7
COUNTY: Richland STATE: South Carolina	DATE: 7/12/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 20 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailer
TESTS: Soil/Ground Water	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: Cement/Bentonite 0-11.5 ft.	SEAL: Bentonite 11.5 - 13.5 ft.	GRAVEL PACK: FX-50 13.5-25.7 ft.

CASING TYPE: PVC DIAMETER: 2 in. DEPTH: 0 - 14.7 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 14.7 - 24.7 ft. TOTAL DEPTH: 25.7 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			
	2			
	3			
<10	4		7	SILTY SAND, moderate brown (5 YR 4/4), well sorted, fine to medium grained, subrounded, dry, no odor.
	5		7	
	6		7	
	7			
	8			
<10	9		5	As above, trace organics (roots).
	10		8	
	11		10	SAND, moderate reddish brown (10 R 3/4), well sorted, fine to medium grained, subangular to subrounded, trace very fine pebbles, dry, no odor.
	12			
	13			
	14			Hard Drilling
<10	15		32	
	16		40	SILTY SANDY GRAVEL, light brown (5 YR 6/4) to moderate reddish brown (10 R 4/6), very poorly sorted, very fine to very coarse grained, angular to rounded; dry, no odor; gravel is weathered quartz; well rounded.
	17		41	
	18			
	19			
11	20		8	As above, moderate reddish orange (10 R 6/6), with increase in silt, moist, no odor.
			11	
			11	

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NO.: MW-7

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS	WELL COMPLETION
	21				
15	22			SILTY SAND, light brown (5 YR 6/4), moderately sorted, fine to medium grained, subangular to subrounded, trace fine pebbles, trace mica, wet, easy drilling, no odor.	
	23			As above, light gray (N7), very fine grained.	
13	24		5		
			5	CLAY, light gray (N7) with grayish red purple streaks (5 RP 4/2), firm, trace fine sand, trace mica, moist.	
	25		6		
	26				
			13		
16	27		18	As above.	
			23	Boring terminated at 26 ft. BLS.	
	28			Split-spoon to 27.5 ft. BLS.	

atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: MW-8
COUNTY: Richland STATE: South Carolina	DATE: 7/13/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 20 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailer
TESTS: Soil/Ground Water	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: Cement/Bentonite 0-10 ft.	SEAL: Bentonite 10 - 12 ft.	GRAVEL PACK: FX-50 12-25 ft.
CASING TYPE: PVC	DIAMETER: 2 in.	DEPTH: 0 - 15 ft.
SCREEN TYPE: PVC	SLOT: 0.010 in. DIAMETER: 2 in.	DEPTH: 15 - 25 ft.

HOLE DIA: 8 in.

TOTAL DEPTH: 25 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (0 - 2 in.).
	1			SILTY SAND, moderate reddish brown (10 R 4/6), well
<10	2			sorted, fine to medium grained, subrounded, dry, no odor.
	3			
NR	4		5	No Sample - spoon plugged with gravel.
			3	
	5		3	
15	6			
	7			As above, moderate yellowish brown (10 YR 5/4), damp.
	8			
<10	9		8	As above, moderate yellowish brown (10 YR 5/4) to
			18	moderate reddish brown (10 R 4/6), coarse sand, damp,
	10		23	no odor.
	11			
	12			
	13			
	14		22	As above, moderate brown (5 YR 3/4) to light gray (N7),
<10			28	poorly sorted, fine to coarse grained, subangular to
	15		32	subrounded, damp.
				Slight rig chatter.
15	16			SAND, moderate brown (5 YR 3/4), poorly sorted, fine to
	17			very coarse grained, subrounded to rounded, damp, no
	18			odor.
	19		14	SILTY SANDY GRAVEL, moderate reddish orange (10 R
50			16	6/6), very poorly sorted, very fine to very coarse grained,
	20		15	angular to rounded; damp, no odor; gravel is weathered
				quartz, well rounded.

WELL COMPLETION



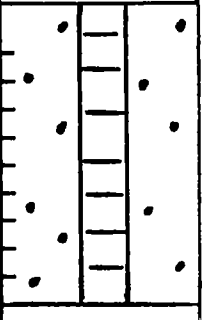
atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NO.: MW-8

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	21			
	22			Moist.
	23			
	24		8	CLAY, light gray (N7), hard, trace fine sand, dry, no odor.
12			15	
	25		25	Hard Drilling.
	26		14	
			22	As above.
<10	27		27	
				Boring terminated at 25.5 ft. BLS.
	28			Split-spoon to 27 ft. BLS.
	29			
	30			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

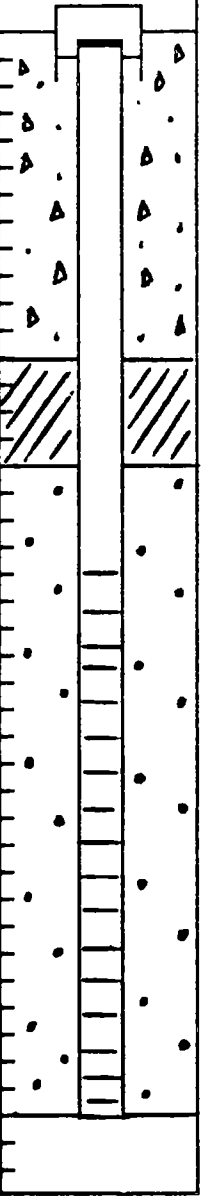
JOB NUMBER: 1044C	NAME: Former SC-15 LOCATION: 3800 Devine St., Cola.	WELL NUMBER: MW-9
COUNTY: Richland STATE: South Carolina	DATE: 7/13/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 15 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailer
TESTS: Soil/Ground Water	DRILLING METHOD: 4 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
GROUT: Cement/Bentonite 0-6 ft.	SEAL: Bentonite 6 - 8 ft.	GRAVEL PACK: FX-50 8-20 ft.

CASING TYPE: PVC DIAMETER: 2 in. DEPTH: 0 - 10 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 10 - 20 ft. TOTAL DEPTH: 20 ft.

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Grass/organics (0 - 6 in.).
	1			
	2			SILTY SAND, moderate brown (5 YR 3/4), well sorted, fine to medium grained, subrounded, dry, no odor.
	3			
	4		3	
			14	
15	5		15	As above, dusky yellowish brown (10 YR 2/2), trace gravel, dry, no odor.
	6			
	7			
13	8			SANDY SILT, dark yellowish brown (10 YR 4/2), sand is very fine grained, moist, degraded hydrocarbon odor.
	9		2	
			2	
180	10		3	SILTY SAND, moderate yellowish brown (10 YR 5/4), well sorted, fine to medium grained, subrounded, moist, degraded hydrocarbon odor.
	11			
	12			
	13			
>1000	14		2	
			5	As above, wet, hydrocarbon odor.
	15		5	
	16			
	17			
	18			
	19		14	SILTY SAND, dark yellowish orange (10 YR 6/6), very poorly sorted, very fine to coarse grained, angular to rounded, trace gravel (weathered quartz), wet, hydrocarbon odor.
			28	
600	20		30	
	21			Boring terminated at 20 ft. BLS. Split-spoon to 20.5 ft. BLS.

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

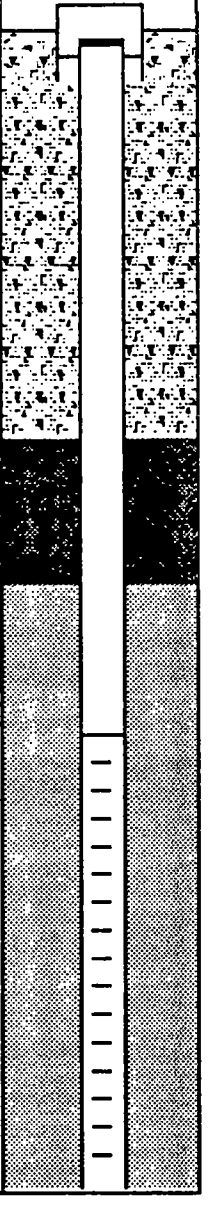
JOB NUMBER: 1044C	NAME: Former SC-015 LOCATION: Devine St.	WELL NUMBER: MW-10
COUNTY: Richland STATE: South Carolina	DATE: 7/13/93	CASING HEIGHT: bgs
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: 19.0 ft.
GRID COORD.: 30 - P	LOGGED BY: L. Mattila	DEVELOPMENT METHOD: Bail
TESTS: Water/Soil	DRILLING METHOD: 4.25 ID HSA	SAMPLING METHOD: Split Spoon
GROUT: Portland 0 - 7.3 ft.	SEAL: Bentonite 7.3 - 10.2 ft.	GRAVEL PACK: FX-50 10.2 - 23.0 ft.

CASING TYPE: PVC 40 DIAMETER: 2 in. DEPTH: 0.5 - 12.5 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC 40 SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 12.5 - 22.5 ft. TOTAL DEPTH: 22.8 ft.

OVA (ppm)	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			
	1			
	2			FILL, grayish orange silty sand.
	3			
	4		7	
0			7	
	5		10	
	6			
	7			
	8			
0				
	9		10	SANDY SILT with trace clay, grayish orange swirled (mottled) with moderate yellowish brown, fine to coarse (almost fill), odor at 11.0 ft. (hard drilling at 12.0 ft.
	10		15	
			19	
	11			
	12			
	13			Cobbles, rounded, quartz with some weathered feldspar.
	14		31	
0			50 @	
	15		5.5 in.	
	16			
	17			
	18			
0				
	19		10	CLAYEY SAND, angular, moderate reddish orange to pale reddish brown , banded to mottled (speckled), with grayish orange pink and yellowish orange (damp at 19.0 ft.)
	20		8	
			13	

WELL COMPLETION



atlanta testing
& engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-015 LOCATION: Columbia, SC	WELL NO.: MW-10

OVA	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS	WELL COMPLETION
	21				
	22				
0	23				
	24		10 25 25	Kaolin, silty clay, firm, light gray and purple (light brown), plastic at 22.0 - 23.0 ft.	
	25			TD = 23.0 ft.	

atlanta testing & engineering

GEOLOGIST LOG

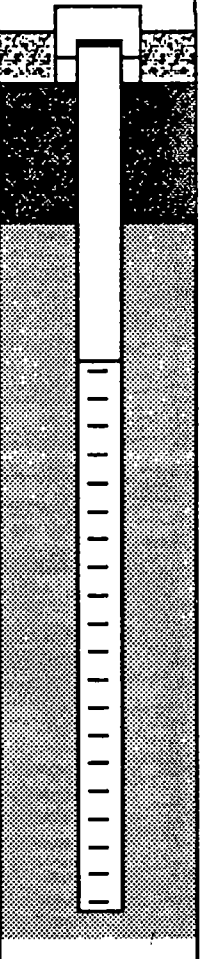
JOB NUMBER: 1044C	NAME: Former SC-015 LOCATION: Devine St.	WELL NUMBER: MW-11
COUNTY: Richland STATE: South Carolina	DATE: 7/14/93	CASING HEIGHT: bgs
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: 14.5 ft.
GRID COORD.: 30 - P	LOGGED BY: L. Mattila	DEVELOPMENT METHOD: Bail
TESTS: Water/Soil	DRILLING METHOD: 4.25 ID HSA	SAMPLING METHOD: Split Spoon
GROUT: Portland 0 - .8 ft.	SEAL: Bentonite 0.8 - 3.8 ft.	GRAVEL PACK: FX-50 3.8 - 16.1 ft.
CASING TYPE: PVC 40	DIAMETER: 2 in.	DEPTH: 0.2 - 5.8 ft.
SCREEN TYPE: PVC 40	SLOT: 0.010 in. DIAMETER: 2 in.	DEPTH: 5.8 - 15.8 ft.

HOLE DIA: 8 in.

TOTAL DEPTH: 16.1 ft.

OVA (ppm)	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			
	1			Asphalt and base
	2			
	3			
	4		5	Fill, silty sand, moderate yellowish brown.
1	5		3	
			3	
	6			
	7			
	8			
	9		10	SANDY (30%) CLAY, yellowish gray, fine to coarse grained, angular, swirled with reddish brown sandy silt, fine to medium grained.
1			16	
	10		25	
	11			
	12			
	13			Cobbles, light gray to white, rounded.
	14		14	
0			14	SANDY (40%) SILT with trace clay (gray), subangular, mottled yellowish orange and reddish brown.
	15		14	
	16			
	17			SILTY CLAY (kaolin), white with trace pink and trace yellowish orange, firm.
			9	
0	18		24	
			23	
	19			
	20			

WELL COMPLETION



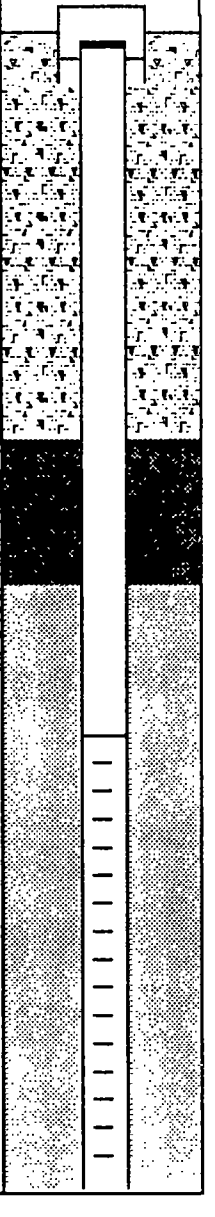
atlanta testing & engineering

GEOLOGIST LOG

JOB NUMBER: 1044C	NAME: Former SC-015 LOCATION: Devine St.	WELL NUMBER: MW-12
COUNTY: Richland STATE: South Carolina	DATE: 7/21/93	CASING HEIGHT: bgs
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: 12.0 ft.
GRID COORD.: 30 - P	LOGGED BY: L. Mattila	DEVELOPMENT METHOD: Surge/Bail
TESTS: Water/Soil	DRILLING METHOD: 4.25 ID HSA	SAMPLING METHOD: Split Spoon
GROUT: Portland 0 - 3.9 ft.	SEAL: Bentonite 3.9 - 6.2 ft.	GRAVEL PACK: FX-50 6.2 - 18.5 ft.
CASING TYPE: PVC 40 DIAMETER: 2 in. DEPTH: 0.5 - 18.2 ft.		HOLE DIA: 8 in.
SCREEN TYPE: PVC 40 SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 8.2 - 18.2 ft.		TOTAL DEPTH: 18.5 ft.

OVA (ppm)	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			0.5 asphalt and base.
	1			
	2			
	3			COMPACTED FILL: clayey silt with some sand, reddish brown to yellowish brown sand.
	4		3	
180	5		6 8	SILTY SAND with trace clay, light olive grey.
	6			
	7			
	8			FILL, silty sand with clay to clayey silt with sand, staining, odor (sticky).
220	9		3	
	10		3 2	
	11			
	12			
	13			AS ABOVE.
	14		3	COARSE gravel with silty sand.
80	15		3	
	16			
	17			
	18		7	
24	19		10 14	SILTY SAND with angular pebbles. CLAYEY SAND.
	20			CLAY, white (kaolin) firm to slightly plastic. TD = 18.5

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

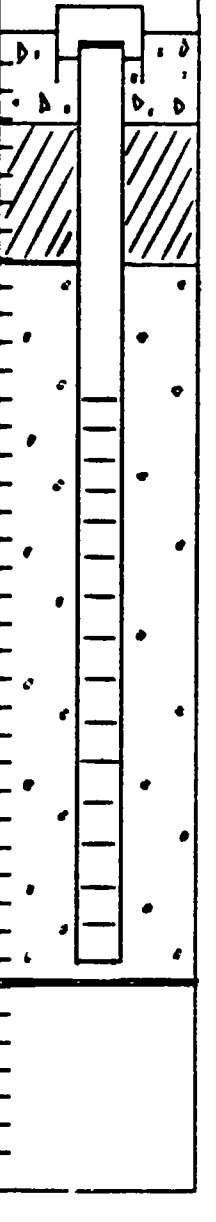
JOB NUMBER: 1044C	NAME: Former SC-015 LOCATION: Devine St.	WELL NUMBER: MW-13
COUNTY: Richland STATE: South Carolina	DATE: 7/21/93	CASING HEIGHT: bgs
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: 13.0 ft.
GRID COORD.: 30 - P	LOGGED BY: L. Mattila	DEVELOPMENT METHOD: Surge/Bail
TESTS: Water/Soil	DRILLING METHOD: 4.25 ID HSA	SAMPLING METHOD: Split Spoon
GROUT: Portland 0 - 1.6 ft.	SEAL: Bentonite 1.6 - 4.1 ft.	GRAVEL PACK: FX-50 4.1 - 17.0 ft.

CASING TYPE: PVC 40 DIAMETER: 2 in. DEPTH: 0.5 - 6.5 ft. HOLE DIA: 8 in.

SCREEN TYPE: PVC 40 SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 6.5 - 16.5 ft. TOTAL DEPTH: 16.8 ft.

OVA (ppm)	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			
	1			0.5 asphalt and base.
	2			
	3			
	4		8	
1			6	
	5		10	
	6			
	7			SILTY SAND, fine to medium grained, light olive grey (fill) sulfur odor at 6 - 7 ft.
	8			
1				
	9		22	
			38	COBBLES, with silty sand, rounded quartz (white), pale yellowish orange to dusky red.
	10		31	
	11			
	12			
	13			
	14		12	
0			12	CRUSHED ROCK (cobble) white to pink (small amount of return).
	15		13	
	16			CLAY, white to pink.
	17			
	18		12	
			19	
0			34	SILTY CLAY, firm, white with trace pink.
	19			
	20			

WELL COMPLETION



atlanta testing & engineering

GEOLOGIST LOG

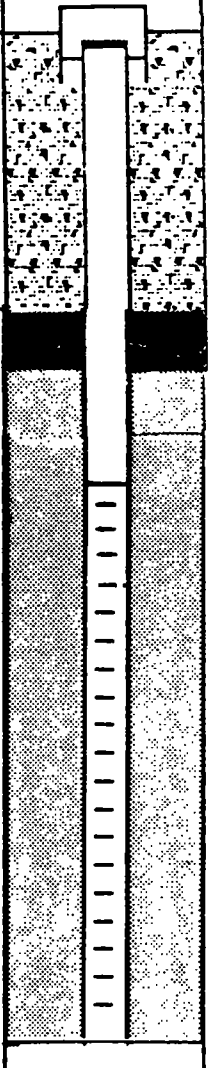
JOB NUMBER: C-1044C	NAME: Crown Facility SC-15 LOCATION: 3800 Devine Street	WELL NUMBER: MW-14
COUNTY: Richland STATE: South Carolina	DATE: 9/28/93	CASING HEIGHT: BLS LAND SURF. ELEV.: N/A
LAT.: 33° 59' 46" LON.: 80° 59' 13"	DRILLED BY: M. King	STATIC WATER LEVEL: Approx. 13 ft. BLS
GRID COORD.: P30	LOGGED BY: K. Caulk	DEVELOPMENT METHOD: Bailing
TESTS: Soil/Ground Water	DRILLING METHOD: 6 1/4 ID Hollow Stem Auger	SAMPLING METHOD: Split Spoon
Portland/Bentonite GROUT: (0 - 4.8)	SEAL: Bentonite (4.8 - 6)	GRAVEL PACK: FX-50 (6-18)

CASING TYPE: PVC DIAMETER: 2 in. DEPTH: 0 ft. - 8.0 ft. HOLE DIA: 10 in.

SCREEN TYPE: PVC SLOT: 0.010 in. DIAMETER: 2 in. DEPTH: 8 ft. - 18 ft. TOTAL DEPTH: 18 ft.

OVA (ppm)	DEPTH (FT)	SAMPLE RECOV.	PEN. RES.	LITHOLOGY / REMARKS
	0			Asphalt (2 in.).
	1			SILTY SAND, moderate brown (5 YR 3/4), poorly sorted, fine to very coarse grained, subrounded to subangular, moist, no odor.
	2			
	3			
	4	2"	4	SILTY SAND, dusky yellowish brown (10 YR 2/2), fine grained, moist, no odor.
0	5		6 11	
	6			
	7			SAND, dark yellowish brown (10 YR 4/2), fine to medium grained, subrounded, damp, no odor.
	8			
	9	2"	7	
0	10		20 22	SILTY SANDY GRAVEL, light brown (5 YR 6/4) to moderate reddish brown (10 R 4/6), very poorly sorted, very fine to very coarse grained, angular to rounded, dry, no odor; gravel is weathered quartz, well rounded.
	11			
	12			SILTY SAND, moderate yellowish brown (10 YR 5/4), poorly sorted, very fine to coarse grained, subrounded, dry, no odor.
	13			
	14	2"	18	SANDY SILT, very pale orange (10 YR 8/2), sand is very fine grained, moist, no odor.
1.7	15		33 50/3	SILTY SAND and GRAVEL (weathered quartz), dark yellowish orange (10 YR 6/6), very poorly sorted, very fine to coarse grained, angular to rounded, saturated, no odor.
	16			
	17			
	18			CLAY, light gray (N7), hard, trace fine sand, dry, no odor.
	19	2"	9	AS ABOVE.
0.0			19	
	20		27	Boring terminated at 18.5 ft. BLS; split-spoon to 20 ft. BLS.

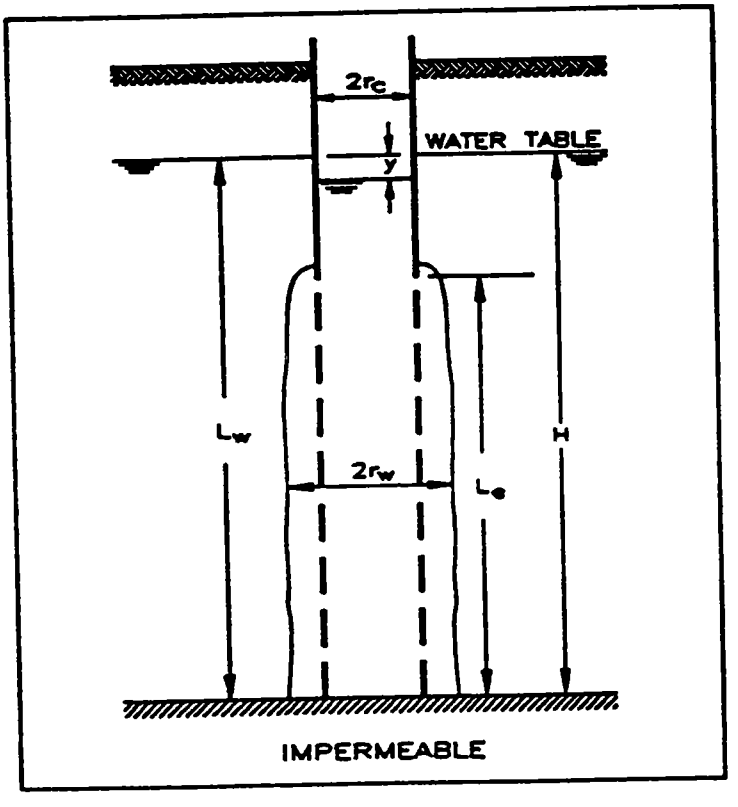
WELL COMPLETION



BOREHOLE PERMEABILITY TESTING

SLUG TEST DATA CALCULATION
Bouwer and Rice, 1976
Updated by Bouwer, 1989
Crown SC-015

Well No. MW-7



r_c^2 = 0.04 ft²
r_w = 0.33 ft
L_e = 3.80 ft
H = 3.10 ft
L_e/r_w = 11.50
L_w = 3.80 ft
y_o = 0.55
yt = 0.49
t = 1 min
C = 1.2

Where:

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

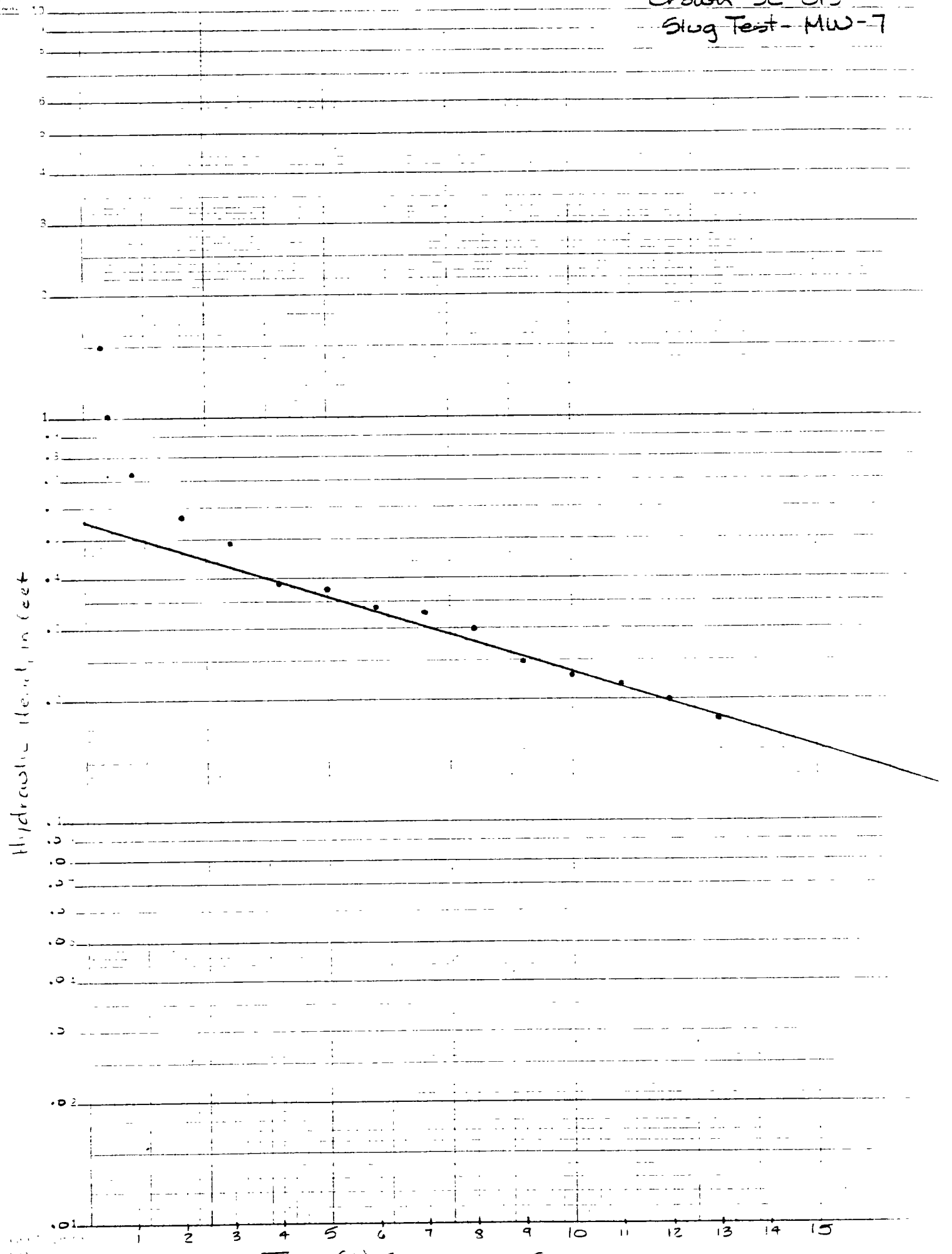
$$\ln R_e/r_w = \left[\frac{1.1}{\ln(L_w/r_w)} + \frac{C}{L_e/r_w} \right]^{-1}$$

$$= \left[\frac{1.1}{\ln (11.5)} + \frac{1.3}{11.5} \right]^{-1} = 1.8$$

$$K = \frac{(0.04)(1.8)}{2(3.8)} \frac{1}{1} \ln \frac{0.55}{0.49} = 1 \times 10^{-3} \text{ ft/min (rounded)} = 1.6 \text{ ft/day (rounded)}$$

Note: rc = [screen radius² + gravel pack porosity (Borehole Radius² − screen radius²)]

Crown SC-015
Slug Test - MW-7



atlanta testing
& engineering

SLUG TEST DATA SHEET

Well No. MW-7

Well Owner: Crown Central Petroleum

Date of Test: 10-24-93

Location: 3800 Devine St.
Columbia SC
SC-015

Static Water Level: 20.90 ft below TOC

Recorders: _____

Remarks: _____

Time	Minutes since displacement tube removed	Water Level Below measuring point (feet)	Head (feet)	Remarks
	0.20	22.40	1.50	
	0.30	21.95	1.05	
	0.40	21.75	0.85	
	0.50	21.67	0.77	
	1:00	21.63	0.73	
	1:15	21.55	0.65	
	1:30	21.55	0.65	
	1:45	21.50	0.60	
	2:00	21.47	0.57	
	2:30	21.42	0.52	
	2:45	21.41	0.51	
	3:00	21.39	0.49	
	3:30	21.32	0.42	
	4:00	21.29	0.39	
	4:30	21.31	0.41	
	5:00	21.28	0.38	
	5:30	21.27	0.37	
	6:00	21.24	0.34	
	6:30	21.23	0.33	
	7:00	21.23	0.33	
	8:00	21.20	0.30	
	9:00	21.15	0.25	
	10:00	21.13	0.23	

atlanta testing
& engineering

SLUG TEST DATA SHEET

Page ___ of ___

Well No. MW-7

Well Owner: Crown Central Petroleum Corp.

Date of Test: 10-24-93

Location: 3800 Devine Street
Columbia, SC
SC-015

Static Water Level: 20.90 ft below TOC

Recorders: TBHughes

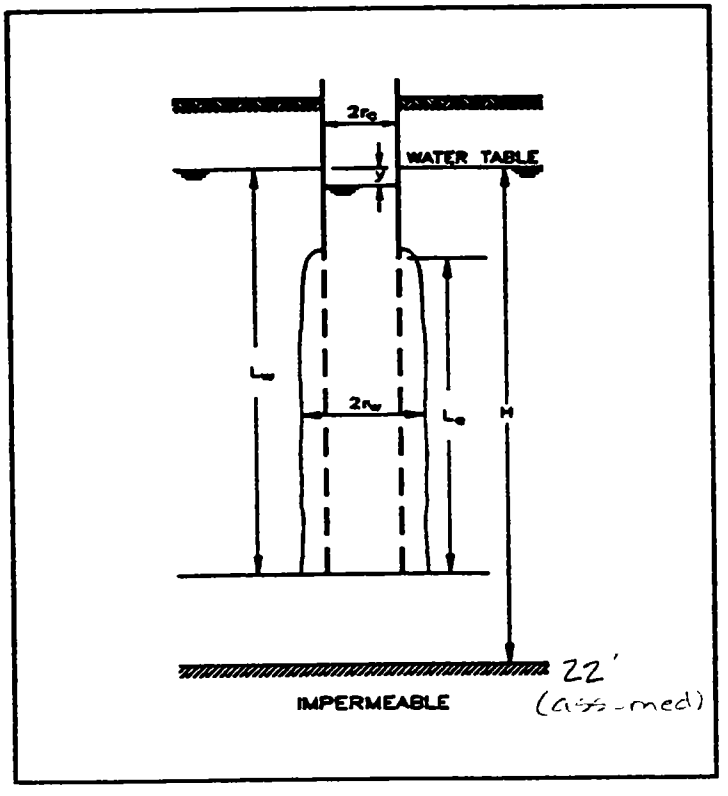
Remarks:

Time	Minutes since displacement tube removed	Water Level Below measuring point (feet)	Head (feet)	Remarks
	11:00	21.12	0.22	
	12:00	21.10	0.20	
	13:00	21.08	0.18	

SLUG TEST DATA CALCULATION
Bouwer and Rice, 1976
Updated by Bouwer, 1989

Crown SC-015

Well No. MW-9



r_c^2 = 0.01 ft²
r_w = 0.33 ft
L_e = 4.97 ft
H = 6.97 ft
L_e/r_w = 15.06
L_w = 4.97 ft
y_o = 1.13 ft
yt = 0.92 ft
t = 1 min
A = 2.1
B = 0.3

$$K = \frac{r_c^2 \ln (R_e/r_w)}{2 L_e} \frac{1}{t} \ln \frac{y_o}{y_t}$$

Where:

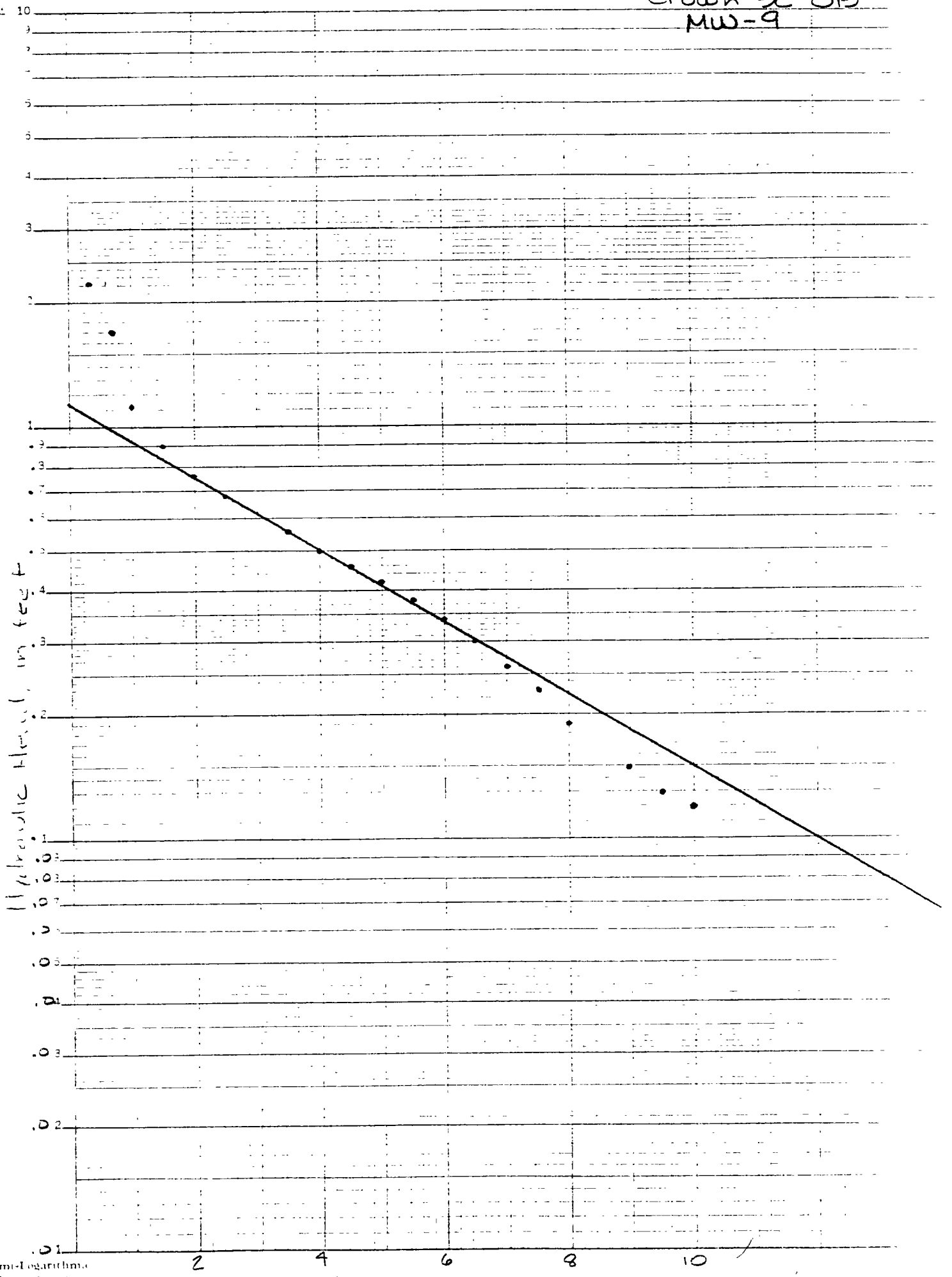
$$\ln R_e/r_w = \left[\frac{1.1}{\ln (L_w/r_w)} + \frac{A + B \ln [(H-L_w)/r_w]}{L_e/r_w} \right]^{-1}$$

$$= \left[\frac{1.1}{\ln (15.06)} + \frac{2.1 + 0.3 \ln [(2.0)/0.33]}{15.06} \right]^{-1} = 1.7$$

$$K = \frac{(0.04)(1.7)}{2(4.97)} \frac{1}{1} \ln \frac{1.13}{0.92} = \frac{1.4 \times 10^{-3}}{2} \text{ ft/min} = \text{ft/day (rounded)}$$

Note: r_c^2 = [screen radius² + gravel pack porosity (Borehole Radius² - screen)]

Crown SC-015
MW-9



Semi-Logarithmic

atlanta testing
& engineering

SLUG TEST DATA SHEET

Well No. MW-9

Well Owner: Crown Central Petroleum Corp.

Date of Test: 10-24-93

Location: 3800 Devine Street
Columbia SC
SC-015

Static Water Level: 15.03 ft below TOC

Recorders: Tracy Hughes

Remarks:

Time	Minutes since displacement tube removed	Water Level Below measuring point (feet)	Head (feet)	Remarks
	0:20	17.26	2.23	
	0.35	16.73	1.70	
	0:45	16 38	1.35	
	1:00	16 15	1.12	
	1:15	16.03	1.00	
	1:30	15.93	0.90	
	1:45	15.86	0.83	
	2:00	1579	0.76	
	2:30	15.71	0 68	
	3:30	15.59	0 56	
	4:00	15 53	0.50	
	4 30	15 49	0.46	
	5:00	15.45	0.42	
	5:30	15.41	0.38	
	6:00	15.37	0 34	
	6:30	15.33	0.30	
	7 00	15.29	0.26	
	7.30	15.26	0.23	
	8 00	15.22	0.19	
	8 30	—	—	
	9:00	15.18	0 15	
	9 30	15.16	0.13	
	10 00	15 15	0.12	

FIELD EXPLORATION AND TEST PROCEDURES

FIELD EXPLORATION AND TEST PROCEDURES

SOIL BORINGS/MONITOR WELL INSTALLATION

The wells/borings were drilled using the hollow-stem auger method. Shallow monitoring wells were constructed of 2-inch diameter schedule 40 PVC screen, plugged at the bottom, and threaded (flush joint) to a 2-inch diameter PVC riser. The wells were sand-packed with clean, coarse silica sand to a height of 2 to 3 feet above the screen elevation, a 2-foot bentonite seal was emplaced, and the annulus was then grouted to the surface with a cement/bentonite grout. Each well was sealed at the surface with cement and enclosed with a locking well cap and manhole cover.

All drilling and well installation was supervised by a hydrogeologist, and the soils and rock encountered were examined and logged in the field.

The monitoring wells were constructed in accordance with the standards promulgated by SCDHEC.

ORGANIC VAPOR ANALYSIS

The soil samples were obtained from standard penetration test boring, placed in plastic bags, sealed, and allowed to volatilize for at least 10 minutes. The samples were tested with a Foxboro 128 Century Organic Vapor Analyzer (OVA), a flame ionization detector designed to measure organic compounds in the 0 to 1,000 parts per million range in the presence of atmospheric moisture, nitrogen oxides, carbon monoxide, and carbon dioxide. A continuous sample is drawn into the probe and transmitted to the detector chamber by an internal pumping system. The sample stream is metered and passed through particle filters before reaching the detector chamber, where the sample is exposed to a hydrogen flame which ionizes the organic vapors. When most organic vapors burn, they leave positively charged carbon-containing ions, which are driven to a collecting electrode. As the positive ions are collected, a current corresponding to the collection rate is generated and this current is measured with a linear electrometer preamplifier, which has an output signal proportional to the ionization current. A signal conditioning amplifier is used to amplify the signal from the preamp and to condition it for subsequent meter or external recorder display.

DECONTAMINATION PROCEDURES

A. All equipment used during the drilling program was decontaminated by steam cleaning at the following times:

   1. Before the first well is started;
   2. After each well is completed and before the next well is started; and
   3. After the last well of the program is completed.

B. Equipment used to measure water levels and collect groundwater samples were triple rinsed (deion-water, lab grad detergent, deion-water) and air-dried prior to use at the next measuring or sampling point.

HYDRAULIC CONDUCTIVITY

Hydraulic conductivity testing was performed by the in-situ rising head test method. The tests were performed by instantaneously removing a known volume of water from the well and measuring recovery versus time. A semi-log plot of the data was made and calculations were made based on the plot "*straight-line*" segment as follows:

$$k = \frac{r_c^2 \ln (R_e/r_w)}{2L} \frac{1}{t} \ln \frac{y_o}{y_t}$$

Where:

k = hydraulic conductivity
r_c = well radius
r_w = borehole radius
R_e = effective radial distance over which head difference y is dissipated
L = saturated screen length
D = distance between water table and lower confining unit
H = distance from water table to bottom of well
y_o = water level at time zero
y_t = water level at time t
t = time since y_o

Ref: *Bouwer, Herman, and Rice, R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, in Water Resources Research, v. 12, no. 3: American Geophysical Union, pp. 423-428.*

GROUNDWATER SAMPLING PROCEDURE

The following sequential steps were taken to obtain groundwater samples.

1. The static groundwater level and total well depth was measured in each well.
2. Total well volume was calculated for each well.
3. A minimum of three volumes of water were purged from each well or the well was evacuated to dryness. Dedicated gloves were utilized at each well.
4. Samples were extracted from each well with a dedicated polyethylene bailer.
5. Water samples were placed in laboratory prepared containers, iced down, and shipped to the laboratory.
6. Chain of custody and sample collection log sheets were prepared and are on file.

COMPREHENSIVE SITE SURVEY

Rooney and McArthur

Insurance

T. RUSSELL ROONEY, CPCU
B. PALMER McARTHUR, CPCU
O. WAYNE STONER, CPCU, CIC

RECEIVED
NOV 22 1993
Groundwater Protection

November 19, 1993

Mr. Lee A. Monts, Hydrogeologist
UST Corrective Action Section
Ground-Water Protection Division
Bureau of Drinking Water Protection
Department of Health and Environmental Control
2600 Bull Street
Columbia SC 29201

RE: Crown Central SC-15
GWPD Site ID #07680

Dear Mr. Monts:

I am one of the owners of the property indicated above.

I would appreciate it very much if you could advise us as to the status of the clean-up at this location.

When DHEC has finally approved the clean-up, do the owners of the property get some certification that it has been done and that we have some immunity as a result of the actions performed.

Any light that you can throw on this subject would be most appreciated by me and the other owners.

Yours very truly,

T. Russell Rooney, CPCU

TRR/lg

1600 St. Julian Place, Columbia, South Carolina 29204
P.O. Box 8087 Columbia, South Carolina 29202-8087
Phone (803) 799-5533

UST
78T
DOCKETING

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201-1708

Commissioner: Douglas E. Bryant

Board: John H. Burriss, Chairman
William M. Hull, Jr., MD, Vice Chairman
Roger Leaks, Jr., Secretary
Richard E. Jabbour, DDS
Cyndi C. Mosteller
Brian K. Smith
Rodney L. Grandy

Promoting Health, Protecting the Environment

JUL 31 1996

Rick Shaeffer
Crown Central Petroleum Corporation
P.O. Box 1168
Baltimore, Maryland 21203

Re: Crown SC-015
Site ID #07680
Availability of SUPERB Funding
Richland County

Dear Mr. Shaeffer:

Currently, the release reported August 15, 1989 at the referenced site has a priority classification of 3B. Therefore, this release is eligible to receive SUPERB funds to immediately implement the next necessary scope of work. As the Owner or Operator of the Underground Storage Tanks (USTs) for this site, you have two funding options for proceeding with implementation:

Funding Option 1

You or your contractor can receive direct billing from the fund at the SUPERB allowable costs. If you need assistance in finding a contractor, please let us know and we will provide you with a list of companies for you to contact. If you wish to proceed under this option and you do not require assistance, please inform this office of your selected contractor within 5 days in order for the necessary technical and financial approvals to be issued at the appropriate time.

Funding Option 2

The SCDHEC will directly procure the services of an environmental contractor on your behalf. All activities will be directed and coordinated by SCDHEC and you will be informed of the results. If you wish to use this option, please complete the enclosed Right-Of-Entry form(s). Completed Right-Of-Entry forms are needed from both the underground storage tank and property owners. If you own the underground storage tank but do not own the property, please provide a copy of the appropriate form to the property owner and return the completed forms **within ten days of receipt of this letter**.

UST 79T DOCKETING

recycled paper

The next scope of work deemed necessary for the referenced site is the completion of a Rapid Assessment and Tier II Evaluation. If you wish to proceed under Funding Option 1, please complete and submit the enclosed Assessment Component Cost Proposal form and Rapid Assessment Plan forms within thirty days of the date of this letter. Every component may not be necessary to complete the above scope of work. The SUPERB allowable cost for each component is included on the Assessment Cost Proposal form.

On all correspondence regarding this site, please reference site ID #07680. Please feel free to call Lee Monts at (803) 734-4664 if you have questions or need additional information.

Sincerely,

Technical Section
Bureau of Underground Storage Tank Management

Lee A. Monts, Hydrogeologist

David G. Baize, Director

07680.OPT

enc: Right-Of-Entry forms
Rapid Assessment Plan
Assessment Component Cost Proposal Form

cc: Administrative Section

ASSESSMENT COMPONENT COST PROPOSAL

SOUTH CAROLINA
Department of Health and Environmental Control
Bureau of Underground Storage Tank Management
State Underground Petroleum Environmental Response Bank

Site Name _____
Site ID # 07680 CP# _____

ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
1. Plan Preparation*	_____	x	$100.00	$ _____
2. Receptor Survey*	1	x	$500.00	$ _____
3. Comprehensive Survey	_____	x	$1,000.00	$ _____
4. Mob/Demob (List component #)				
A. Equipment _____	1	x	$500.00	$ _____
B. Personnel _____	_____	x	$250.00	$ _____
5. Soil Borings (hand auger)*	_____	feet x	$11.00	$ _____
6. Soil Borings (drilled)	(includes collection and quantification)			
and Field Screening*	40	feet x	$17.00	$ _____
7. Soil Leachability Model	1	x	$200.00	$ _____
8. Abandonment*				
(separate from #5 and #6)	_____	feet x	$4.00	$ _____
9. Well Installation*	(includes drilling costs)			
A. Water Table (hand auger)	_____	feet x	$17.00	$ _____
B. Water Table	_____	feet x	$35.00	$ _____
C. Telescoping	_____	feet x	$55.00	$ _____
D. Rock Drilling	_____	feet x	$55.00	$ _____
10. Ground–water sample collection				
A. Initial event	_____	samples x	$50.00	$ _____
B. Subsequent event*	13	samples x	$50.00	$ _____
11. Analyses–Groundwater	(See RA Guidance for site specific analyses)			
A. BTEX+Napth.+MTBE	2	samples x	$100.00	$ _____
B. PAH's	_____	samples x	$120.00	$ _____
C. Lead	_____	samples x	$20.00	$ _____
D. EDB	_____	samples x	$55.00	$ _____
E. 8 RCRA Metals	_____	samples x	$140.00	$ _____
F. TPH (9070)	10	samples x	$55.00	$ _____
G. pH	_____	samples x	$10.00	$ _____
H. BOD		samples x	$40.00	$

Continue on back of page

ASSESSMENT COMPONENT COST PROPOSAL

11. Analyses – Soil					
I. BTEX + Napth.	2	samples	x	$100.00	$
J. PAH's	2	samples	x	$120.00	$
K. 8 RCRA Metals		samples	x	$150.00	$
L. TPH (9071)		samples	x	$60.00	$
M. TPH (3550)	1	samples	x	$65.00	$
N. Grain size / hydrometer	1	samples	x	$63.00	$
O. Total Organic Carbon	1	samples	x	$35.00	$
12. Aquifer Characterization*					
A. Pumping Test		hours	x	$120.00	$
B. Slug test		tests	x	$150.00	$
13. Free Product Recovery Rate Test*	1	tests	x	$120.00	$
14. Fate/Transport Modeling					
A. Mathematical Model		models	x	$300.00	$
B. Computer Model	1	models	x	$500.00	$
15. Risk Evaluation					
A. Tier I			x	$300.00	$
B. Tier II	1		x	$500.00	$
16. Subsequent Survey*			x	$260.00	$
17. Disposal					
A. Wastewater					
1. Purging/Sampling		drums	x	$90.00	$
2. Pumping test		gallons	x	$0.60	$
B. Free Product		drums	x	$110.00	$
C. Soil (Treatment/Disposal)*		tons	x	$50.00	$
	2	drums	x	$50.00	$
18. Miscellaneous					
			x		$
			x		$
			x		$
			x		$
19. Report/Project Management and Coordination	0.15		x	(SUBTOTAL) $0.00	$
20. Total					$

South Carolina
DHEC
Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201-1708

Commissioner: Douglas E. Bryant

Board: John H. Burriss, Chairman
William M. Hull, Jr., MD, Vice Chairman
Roger Leaks, Jr., Secretary
Richard E. Jabbour, DDS
Cyndi C. Mosteller
Brian K. Smith
Rodney L. Grandy

Promoting Health, Protecting the Environment

November 6, 1996

Mr. Jerry A. Brannon
Resident Maintenance Engineer
South Carolina Department of Transportation (SCDOT) Columbia Maintenance Facility
7201 Fairfield Road
Columbia, SC 29203

Re: Application for Encroachment Permit received November 1, 1996
Crown #SC-015
Site ID #07680
Richland County

Dear Mr. Brannon:

The South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the referenced Application for Encroachment Permit submitted by Atlanta Testing and Engineering on behalf of Crown Central Petroleum. The application requests permission to install two permanent monitoring wells in the median of US 76/378 (Devine Street) and one permanent monitoring well in the turning lane of Kilbourne Road in Forest Acres, SC.

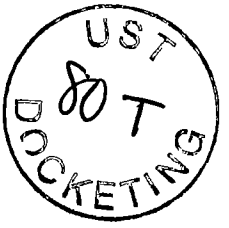
The SCDHEC considers the proposed location of the monitoring wells within the rights-of-way as necessary and appropriate to assess the severity and extent of ground-water contamination at the Crown #SC-015 site. This assessment is in the public interest of protecting the ground-water supply of the state of South Carolina. The Department, therefore, respectfully requests that the SCDOT approve the application as submitted. Should you require additional information regarding this site, feel free to contact me at (803) 734-5432.

Sincerely,

Joel P. Padgett, P.G., SCDOT Liaison
Assessment and Corrective Action Division
Bureau of Underground Storage Tank Management

JPP/jpp
07680.OFF

DHEC/UST/ACAD/JPP/110696



recycled paper

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

DIVISION OF
UNDERGROUND STORAGE TANK MANAGEMENT

Phone (803) 734-4844 Fax (803) 734-3604

Ms. June Derrick
Niggel Family Partnerships
P.O. Box 6573
Columbia, SC 29260

Re: Site # 07680, Former Crown #015, 3800 Devine St., Columbia, SC
Site Status and Availability of SUPERB Funds
Richland County

Dear Ms. Derrick:

Currently, the release reported on August 15, 1989, at the referenced site has a priority classification of 3B. SUPERB funds are available to implement the next necessary scope of work. The scope of work to be implemented is Active Corrective Action.

The SCDHEC will directly procure the services of an environmental contractor on behalf of the responsible Part, Crown Central Petroleum. All activities will be directed and coordinated by SCDHEC and you will be informed of the results. Please complete and return the enclosed Permission Form **within 15 days of receipt of this letter.**

On all correspondence regarding this site, please reference Site ID #07680. Please be sure to include the requested information so that the appropriate approvals can be issued. Please feel free to call B. Treadwell Kissam, at (803) 734-4844 or (800) 826-5435 (within SC only) if you have questions or need additional information.

Sincerely,
Owner/Operator Assistance Section
Assessment and Corrective Action Branch

B. Treadwell Kissam

B. Treadwell Kissam, P.G., Hydrogeologist

Lee A. Monts

Lee A. Monts , Manager

enc: Permission Form

cc: Technical File

DHEC/UST/031898

atlanta testing & engineering

3 technology circle / columbia, south carolina 29203 / phone (803) 935-1700 / fax (803) 935-1606

December 4, 1996

Mr. Lee Monts
Bureau of UST Management
South Carolina Department of
Health and Environmental Control
2600 Bull Street
Columbia, SC 29201

Re: Request for Extension
CROWN SC-015
Site ID No. 07680, CP No. 02386
3800 Devine Street
Columbia, South Carolina
AT&E Job No. 1044D

Dear Mr. Monts:

This correspondence is to request an extension of the Standard Limited Assessment (SLA) report submittal date for the above referenced site. The extension is requested due to unforseen drilling schedule delays incurred during November. An extension date of January 16, 1997 is requested to allow for data analysis and report preparation activities to be completed.

If you have any questions or need additional information, please feel free to call me at 935-1700.

Sincerely,

ATLANTA TESTING & ENGINEERING

P. Michael Hudgins

P. Michael Hudgins, P.G.
Project Hydrogeologist
SC Registration No. 1137

PMH/mp

UST &IT DOCKETING

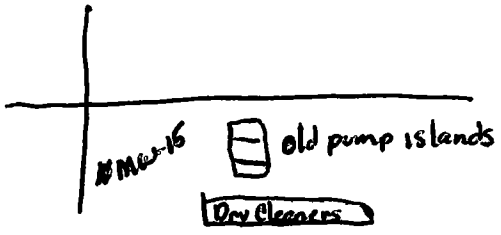
RECEIVED
DEC 26 1996
Bureau of Storage Tank Management

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 734-5300

DHEC — PROMOTE PROTECT PROSPER

1. LOCATION OF WELL:
County: Richland
System Name:
Latitude: Longitude:
Distance and Direction from Road Intersections: Devine St & Kilbourne Rd, Columbia, SC
Street Address & City of Well Location:

Sketch Map:



2. CUTTING SAMPLES: ☒ Yes ☐ No — See AT&E Report
Geophysical Logs: ☐ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Tn Sndy Cl	10	10
W Sdy Cl	16	26
* Tn Sdy S	9	35

RECEIVED
FEB 26 1997
Groundwater Assessment and Development Section

UST 82TG DOCKETING

*Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

KTSAMBT #0766

3. REMARKS:
MW-15
Bentonite seal from 16 to 18'

4. OWNER OF WELL: Crown Central Petroleum
Address: 1 North Charles St.
Telephone No.: Baltimore, MD
Engineer: Atlanta Testing & Engineering (803) 935-1700
Address: 3 Technology Circle
Telephone No.: Columbia, SC 29203

5. WELL DEPTH (completed): 35' ft. Date Started: 10 Jan 97 Date Completed: 10 Jan 97

6. ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☒ Other HSA

7. USE: ☐ Domestic ☐ Public Supply–Permit No. ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☒ Monitor Well ☐

8. CASING: ☒ Threaded ☐ Welded
Diam.: 2" Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 20 ft. depth
in. to ft. depth
Height: Above/Below Surface 0 ft.
Weight Sch 40 lb./ft.
Drive Shoe? ☐ Yes ☒ No

9. SCREEN
Type: PVC Diam.: 2"
Slot/Gauge: .01 Length: 15'
Set Between: 20' ft. and 35' ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

10. STATIC WATER LEVEL dry ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
N/A Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results. See AT&E Report

13. ARTIFICIAL FILTER (gravel pack) ☒ Yes ☐ No
Installed from 18 ft. to 35 ft.
Effective size 20/30 Uniformity Coefficient Silica Sand

14. WELL GROUTED? ☒ Yes ☐ No
☒ Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other
Depth: From 15 ft. to 16 ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
N/A Type well disinfected ☐ Yes Type:
upon completion ☐ No Amount:

16. PUMP: Date Installed: ☐ Not Installed
Mfr. Name: Model No.:
N/A H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: George Flinn (EC) Date: 1-27-97
Address: P.O. Box 703 Matthews NC 28106
Signed: Authorized Representative Cert. No.: 854

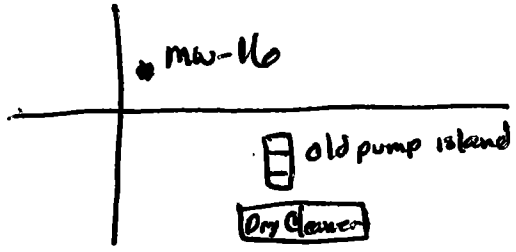
DHEC 1903 (10/96) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 734-5300

DHEC — PROMOTE PROTECT PROSPER

1. LOCATION OF WELL:
County: Richland
System Name:
Latitude: Longitude:
Distance and Direction from Road Intersections: Devine St. & Kilbourne Rd. Columbia, SC
Street Address & City of Well Location:

Sketch Map:



2. CUTTING SAMPLES: ☒ Yes ☐ No
See ATRE Report
Geophysical Logs: ☐ Yes (please enclose) ☐ No

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Tn Sndy Cl	10	10
W Slty Cl	16	26
* Tn Slty S	9	35
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

3. REMARKS:
MW-16
Bentonite Seal from 16' to 18'

4. OWNER OF WELL: Crown Central Petroleum
Address: 1 North Charles St.
Telephone No.: Baltimore, MD
Engineer: Atlanta Testing & Engineering (803)
Address: 3 Technology Circle 935-1700
Telephone No.: Columbia, SC 29203

5. WELL DEPTH (completed) 35' ft. Date Started: 10 Jan 97 Date Completed: 10 Jan 97

6. ☐ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☒ Other HSA

7. USE: ☐ Domestic ☐ Public Supply–Permit No. ☐ Industry ☐ Irrigation ☐ Air Conditioning ☐ Commercial ☐ Test Well ☒ Monitor Well ☐

8. CASING: ☒ Threaded ☐ Welded
Diam.: 2"
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
0 in. to 20 ft. depth
in. to ft. depth
Height: Above/Below Surface 0 ft.
Weight Sch 40 lb./ft.
Drive Shoe? ☐ Yes ☒ No

9. SCREEN
Type: PVC Diam.: 2"
Slot/Gauge: .01 Length: 15'
Set Between: 20 ft. and 35 ft. NOTE: MULTIPLE SCREENS
ft. and ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

10. STATIC WATER LEVEL 27' ft. below land surface after 24 hours

11. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
N/A Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

12. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results. See ATRE Report

13. ARTIFICIAL FILTER (gravel pack) ☒ Yes ☐ No
Installed from 18' ft. to 35' ft.
Effective size 20/30 Uniformity Coefficient Silica Sand

14. WELL GROUTED? ☒ Yes ☐ No
☒ Neat Cement ☐ Sand Cement ☐ Concrete ☐ Other
Depth: From .5' ft. to 16' ft.

15. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
N/A Type well disinfected ☐ Yes Type:
upon completion ☐ No Amount:

16. PUMP: Date installed: ☐ Not installed
Mfr. Name: Model No.:
N/A H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

17. WATER WELL CONTRACTOR'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Registered Business Name: George Flinton (GFS) Date: 1-27-97
Address: P.O. Box 703 Matthews NC 28106
Signed: Authorized Representative Cert. No.: 854

RECEIVED
FEB 26 1997
Groundwater Assessment and Development Section

DHEC 1903 (10/96) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

atlanta testing & engineering

RECEIVED
FEB 2 8 1997
Bureau of Underground
Storage Tank Management

RAPID ASSESSMENT AND TIER 2 EVALUATION REPORT

Crown Central Petroleum Corporation
Facility No. SC-015
SCDHEC Site No. 07680
3800 Devine Street
Columbia, South Carolina

SCANNED

Atlanta Testing & Engineering

Job No. 1044D, Report No. 100080

February 28, 1997

UST
837
DOCKETING

RAPID ASSESSMENT
AND TIER 2 EVALUATION REPORT

Crown Central Petroleum Corporation
Facility No. SC-015
3800 Devine Street
Columbia, South Carolina
Job No. 1044D, Report No. 100080

TABLE OF CONTENTS

Page No.

INTRODUCTION 1

BACKGROUND 1

SITE CHARACTERIZATION 2
- SITE GEOLOGY 2
- GROUND WATER OCCURRENCE AND MOVEMENT 3
- AQUIFER EVALUATION 3
- SOIL CHARACTERIZATION 4
  - Soil Boring Installation 4
  - Soil Sampling 4
  - Soil Quality 4
- GROUND WATER CHARACTERIZATION 5
  - Monitoring Well Installation 5
  - Ground Water Sampling 5
  - Ground Water Analytical Data 6
- SITE RECEPTOR SURVEY 6
- SITE PRIORITY CLASSIFICATION 8

EXPOSURE ANALYSIS AND TIER EVALUATION 8
- SITE CONCEPTUAL EXPOSURE MODEL 8

TIER 2 EVALUATION 9
- SOIL LEACHABILITY MODEL 9
- CONTAMINANT TRANSPORT MODEL 10
  - Model Input Parameters 10

MODEL SIMULATIONS - RESULTS 12

CONCLUSIONS AND RECOMMENDATIONS 12

ACKNOWLEDGMENT 13

APPENDIX

atlanta testing & engineering • atlanta testing & engineering • atlanta testing & engineering •

INTRODUCTION

Atlanta Testing & Engineering (AT&E) has completed a Rapid Assessment and Tier 2 Evaluation at the former Crown Central Petroleum Corporation (Crown) facility SC-015 located in Columbia, South Carolina. The work was performed in accordance with the Assessment Component Cost Proposal approved by the South Carolina Department of Health and Environmental Control (SCDHEC) dated October 8, 1996, and the SCDHEC Rapid Assessment Guidance and Risk Based Corrective Action documents published in June of 1995. The purpose of the assessment was to determine the horizontal and vertical extent of a release of hydrocarbons previously reported at the site, and to evaluate the current and potential future risk to human health and the environment associated with this release. This report includes a description of the activities performed during this assessment along with our current findings, conclusions and recommendations.

BACKGROUND

The former Crown SC-015 facility is located at 3800 Devine Street in Columbia, Richland County, South Carolina (Figure 1). The building improvements on-site include a single story brick building, canopy, and asphalt paved parking lot, and is currently occupied by a dry cleaning business as Master Cleaners. The site occupies the northwest portion of a larger parcel owned by the Niggel Family partnership. Crown formerly operated a gasoline service station on this property and maintained three underground storage tanks (USTs), pump islands and distribution lines for the retail distribution of petroleum products. The site is located in a commercial business district, with mostly light commercial and residential properties in the vicinity of the site. A site vicinity map showing the surrounding land use is included as Figure 2.

Four leak detection monitoring wells (MW-1, MW-2, MW-3, and MW-4) were installed in June 1989 to a depth of eighteen feet. Laboratory analysis of soil samples from the wells indicated detectable levels of total petroleum hydrocarbons (TPH) in MW-1 and MW-3. Subsequent ground water sampling and analysis in December 1989 at wells MW-3 and MW-4 indicated benzene, toluene, ethylbenzene, and xylenes (BTEX) concentrations above maximum contaminant levels (MCL's).

Three additional (deep) monitoring wells (MW-1A, MW-2A, and MW-3A) were installed adjacent to the UST pit November, 1990. Water quality results from the three deep wells indicated no detectable BTEX constituents. These results and site characterization information were provided in the January 11, 1991 report by ATEC Environmental Consultants.

Additional ground water sampling was performed in June 1991, and the results indicated BTEX levels above MCLs at the four shallow wells, and no detectable BTEX concentrations at the three deep wells.

Three underground storage tanks, dispenser islands, and associated piping were removed from the site in July 1991. Laboratory results of soil samples indicated significant hydrocarbon contamination at a depth of six feet below land surface at the dispenser islands. Analysis of soils remaining in the tank pit after excavation, as well as in the piping trench, indicated no detectable concentrations of TPH and BTEX compounds.

Additional assessment activities were performed in March 1994 to assess the horizontal and vertical extent of the dissolved hydrocarbons in the groundwater. Ten monitoring wells were installed, and five additional soil borings were installed and sampled. Free phase petroleum product was measured in well MW-5, and a "worst case" ground water sample was collected from this well. Concentrations of benzene were detected at 19,000 micrograms per liter (ug/l), with a total BTEX concentration of 130,500 ug/l. Additionally, concentrations of BTEX and Methyl-tert-butyl-ether (MTBE) were detected in ground water samples collected from monitoring wells located hydraulically downgradient from the former UST pit and dispenser island locations. No hydrocarbons were detected in any of the "deep" monitoring wells. AT&E prepared a ground water assessment report in 1994 (AT&E, 1994) which detailed the results of this assessment, including three rising head permeability ("slug") tests test performed to determine the rate of ground water flow within the shallow aquifer underlying the site. All monitoring well locations installed to date are shown on Figure 3.

The results of the previous assessments have indicated hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the site property boundaries to the south and southeast. Ground water was encountered at a depth of approximately 12 to 15 feet below land surface, and was estimated to flow toward the south-southwest at an estimated flow velocity of 22 feet per year.

SITE CHARACTERIZATION

SITE GEOLOGY

The site is situated in the upper Coastal Plain Physiographic Province near the boundary with the Piedmont of South Carolina and is characterized by low to moderate hills and gently rolling lowlands. The Coastal Plain consists of clastic and carbonate sedimentary formations of unconsolidated sand, clay, gravel, marl and limestone. These sediments have been deposited on a surface of granite, schist, and gneiss bedrock, which is a continuation of the rocks underlying the adjoining Piedmont Province. The sedimentary formations range in age from Late Cretaceous to recent.

The site is underlain by the Late Cretaceous sediments of the Middendorf Formation, which overlie Paleozoic crystalline rocks. The Middendorf Formation consists of silty sand and gravel, micaceous clayey sand and sandy clay with laterally discontinuous sand and clay units (lenses).

Based on geologic logs prepared during this assessment and prior assessments, the subsurface lithology beneath the site is comprised of intercalated clayey and silty sand separated by a silt lens from 20 to 24 feet, and a silty clay unit from 30 to 36 feet, underlain by sandy silt to the investigated depth of 55 feet. Geologic cross-sections illustrating the underlying lithology at the site are included as Figures 4 and 5.

GROUND WATER OCCURRENCE AND MOVEMENT

All of the monitoring well top of casing (TOC) elevations were surveyed and referenced to mean sea level (msl). Water level measurements at all monitoring wells were recorded by AT&E on January 14, 1997 with a hydrocarbon sensitive interface probe with an accuracy of 0.01 foot. The interface probe was decontaminated prior to and between each measurement to prevent cross-contamination. The well construction details, water level measurements, and ground water elevation data are included on Table 1.

The water table aquifer occurs under unconfined conditions underlying the site. A potentiometric map of the water table, based on water level measurements obtained from site monitoring wells is included as Figure 6. Inspection of the potentiometric map indicates the surficial aquifer ground water flow direction is to the south and southeast, corresponding to topographic relief. The average horizontal hydraulic gradient of the potentiometric surface shown is estimated to range from approximately 0.009 ft/ft at the former Crown site to 0.03 ft/ft downgradient from the site, for an estimated average of 0.02 ft/ft.

AQUIFER EVALUATION

The rate of horizontal ground-water flow at the site is controlled by the horizontal hydraulic conductivity (K), effective porosity (n_e), and the horizontal hydraulic gradient (dh/dl). The average linear ground-water seepage velocity (v) can be calculated by substituting these values into the modified Darcy equation:

$$v = (K/n_e)\ (dh/dl)$$

Estimates of the hydraulic conductivity (K) of the sediments at the site were obtained from borehole permeability (slug) tests performed at monitoring well MW-7 and MW-9. The calculated hydraulic conductivities ranged from 1.03 ft/day (MW-7) to 1.35 ft/day (MW-9),which is in a range of values which may be expected for the soils identified at the site.

The effective porosity (n_e) in a water table aquifer for soils described at the site is estimated to be approximately 0.15 (Walton, 1986). Thus, the average linear ground-water flow velocity, calculated using the above values and the modified Darcy equation, is approximately 0.17 ft/day (63.2 ft/yr).

SOIL CHARACTERIZATION

Soil Boring Installation

One soil test boring (bg-1)was performed to a depth of seven feet at a background location away from the area of known hydrocarbon impact. One soil boring (wc-1) was performed to a depth of 15 feet in the area of greatest soil impact as determined from previous assessments. The borings were drilled using a hand auger, and composite soil samples were collected at 2 foot intervals during advancement. The borings for the monitoring wells were installed using a drilling rig, and samples were collected from soil cuttings and composited at 5 foot intervals.

Soil samples were classified in the field and retained for total organic vapor analysis. The samples were placed in plastic bags, sealed, allowed to volatize for at least ten minutes, and analyzed using a Foxboro Model 128 OVA flame ionization detector. The OVA results for each sample collected are included in Table 1.

Soil Sampling

The soil sample exhibiting the highest vapor concentration at each boring was retained for laboratory analysis. If no vapors were detected, the sample from the bottom of the borehole was analyzed. Each sample was placed in laboratory prepared sample containers, packed in an iced cooler with completed chain of custody documentation, and shipped to a South Carolina certified laboratory for analysis. Select soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and total xylenes (BTEX) and naphthalene per EPA Method 8260, total petroleum hydrocarbons (TPH) per EPA Method 3550, and polynuclear aromatic hydrocarbons (PAHs) per EPA Method 8270. Additionally, a soil sample was analyzed for grain size by hydrometer to determine the representative amounts of sand and clay within the underlying soils. The background sample (bg-1) was collected and analyzed for total organic carbon (TOC) per EPA Method 415.1 to estimate the representative amount of natural organic carbon content in the site soils. Following sample collection, the background and worst case borings were abandoned from the base of the borehole to the land surface using the auger cuttings. All boring locations performed to date are shown on Figure 3.

Soil Quality

Based on organic vapor screening, elevated vapor readings (>100 ppm) were recorded from samples collected at the worst case boring wc-1 (>1,000 ppm). No vapor concentrations were detected at the borings for MW-15, MW-16 or background soil boring bg-1. A summary of OVA analysis is included as Table 2.

Worst case soil sample wc-1 collected at a depth of 13-15 feet yielded a benzene concentration of 0.033 milligrams per kilogram (mg/kg) total BTEX concentration of 0.051 mg/kg. Benzene was the only compound detected at concentrations above risk-based screening levels (RBSL's) for sandy soils, as established in the RBCA document (SCDHEC, 1995). No naphthalene, TPH as diesel range organics or other PAH compounds were detected in the samples collected. Grain-size/hydrometer analysis collected at MW-15 from a depth of 34-35 feet indicated the interval contains 84.8% sand and 7.8% clay. No hydrocarbons were detected above the laboratory detection limits from the samples collected at the borings for MW-15 and MW-16. The background TOC concentration sample collected at a depth of 7 feet at boring BG-1 was 920 mg/kg. A summary of the soil analytical results is included as Table 3.

GROUND WATER CHARACTERIZATION

Monitoring Well Installation

Two shallow monitoring wells (MW-15 and MW-16) were installed in conjunction with this evaluation. The wells were constructed in accordance with South Carolina Well Standards and Regulations. The wells were completed at a depth of 35 feet with 2-inch PVC casing and 15 feet of 0.010-inch slot screen. A clean graded sand pack was placed around the annulus of the wells to at least 1 foot above the screens. A bentonite seal was placed above the sand pack and the remaining annulus was grouted to land surface with cement grout. A locking cap and vault cover with concrete pad was installed at land surface at each well.

Although no ground water was encountered at monitoring well MW-15 during drilling, the well was installed based on the appearance of the soils and the ground water elevations at other wells on site. However, no ground water was encountered within three days after installation. Ground water may likely accumulate at a later date according to seasonal variations, and should be sampled at that time. MW-16 was developed with a submersible pump to remove formational fines from the monitoring well. The depths and screen settings of the monitoring wells are summarized on Table 1. Boring logs for the monitoring wells are included in the Appendix.

Soils and development water generated during monitoring well installation and sampling were disposed by G&K Tank Services, Sumter, South Carolina. Disposal manifests are included in the Appendix.

Ground Water Sampling

Approximately 0.04 feet of free product was recorded at monitoring well MW-6, and therefore was not sampled. No other wells contained measurable amounts of free product. Free product was previously recorded at monitoring well MW-5 (1.31 feet, 10/8/93), however the well was recorded to be dry at the time of sampling and was not sampled. Additionally, well MW-15 not sampled as no water was encountered.

Thirteen wells were sampled as part of this assessment. The wells were purged of at least three well volumes and sampled. Samples were collected with dedicated polyethylene bailers, placed in laboratory prepared containers, packed in an iced cooler with completed chain of custody documents, and shipped to a South Carolina certified laboratory for analysis of BTEX and Naphthalene per EPA Method 8260, PAH compounds per EPA Method 8270, dissolved lead per EPA method 6010A. Additionally, samples were collected from MW-7 and MW-10 for laboratory analysis of inorganic parameters to include nitrate, sulfate, and ferrous iron. Dissolved oxygen was measured in the field at these two wells with a calibrated field meter.

Ground Water Analytical Data

The highest concentration of total BTEX compounds (20,800 ug/l) was reported from the water sample collected at monitoring well MW-7. The maximum contaminant levels (MCLs) for benzene (5.0 ug/l) were exceeded in samples at monitoring wells MW-7 (7,000 ug/l), MW-8 (40 ug/l), MW-9 (5,700 ug/l), MW-11(13 ug/l) and MW-13 (18 ug/l). The MCL for toluene (2,000 ug/l) was exceeded at wells MW and MW-9 at concentrations of 8,900 ug/l and 2,600 ug/l, respectively. The MCL for ethylbenzene (700 ug/l) was exceeded at wells MW-7 and MW-9 at concentrations of 1,700 ug/l and 2,600 ug/l, respectively. MTBE was detected in shallow monitoring wells ranging in concentration from 14.0 ug/l (MW-14) to 4,300 ug/l (MW-7). Naphthalene was detected in shallow monitoring wells, ranging in concentration from 1.2 ug/l (MW-13) to 500 ug/l (MW-9). PAH compounds as 1- and 2-methylnaphthalene were detected in monitoring wells, MW-7, MW-8, and MW-9, with the maximum concentrations detected at MW-9 of 150 ug/l and 83 ug/l, respectively.

Ferrous iron was detected at wells MW-9 and MW-10 at concentrations of 27 mg/l and 0.081 mg/l, respectively. Nitrate was detected at MW-10 only (2.3 mg/l), and no sulfate was detected in either sample. Dissolved oxygen concentrations were 1.3 mg/l at MW-9 and 6.1 mg/l at MW-10.

No hydrocarbon concentrations were detected from "deep" monitoring wells MW-1A, MW-2A, or from offsite (background) monitoring well MW-16. No concentrations of dissolved lead were detected in any of the samples analyzed. A summary of all ground water samples collected to date is included as Table 4. A benzene/total BTEX concentration map is included as Figure 8, and a MTBE/Naphthalene concentration map is included as Figure 9.

SITE RECEPTOR SURVEY

A site reconnaissance of the site vicinity was performed to determine potential receptors of impacted ground water or soil vapors in the area. The reconnaissance included inspecting the area to document the location of any potential water supply wells, streams or other receptors that could potentially be impacted by the potential hydrocarbon plume migration from the site.

The site is located in a commercial area with residential homes surrounding the area. The facility was closed as a convenience store and gasoline sales by Crown in June or July of 1991, and the property is now operated as a retail dry cleaning store (Master Cleaners). The property is subdivided into three parcels owned by the Niggle Family Partnership which are occupied by the dry cleaners on the subject site, a drug store (Long's Drugs) south of the site, and a Piggly Wiggly grocery store southeast of the site. The Niggle property bordered to the west by parcel is occupied by a funeral home business (Dunbar Funeral Home). A site map showing surrounding site usage is included as Figure 2.

According to information from the Water Supply Permitting Section, of the South Carolina Department of Health and Environmental Control (SCDHEC), the site receives water from the City of Columbia and no public water supply wells are located within one-half mile of the site. A windshield well survey was conducted by Atlanta Testing & Engineering personnel to locate private water wells within one-quarter mile radius of the site. No private water wells were noted. Municipal sewer lines also serve the site.

The south and east boundaries of the site slope downward with approximately five to ten feet of relief. Surface drainage from the paved area is to the south and west across an asphalt parking lot toward a storm drain catch basin located on site and on the grocery store parking lot.

Underground utilities existing on-site include sanitary sewer lines, water lines and a storm drain. A review of the City of Columbia Department of Public Utilities (DPU) was conducted to obtain the locations and construction details of utilities serving the site. Information obtained during this review indicated the utilities on-site are not likely to be buried at depths below the water table, encountered approximately 20 feet below ground surface, and are therefore not considered as on-site potential receptors for this evaluation. A site utility map is included as Figure 10.

A real estate office (Russell and Jeffcoat) is located across from the site at the southwest portion of the intersection of Devine Street and Kilbourne Road, upgradient from the site. Information obtained during the utility records review indicate the property was formerly a Gulf service station. No other information was revealed during this assessment concerning the prior use of this property.

Storm drains are constructed along Kilbourne Road west of the site which converge into a 66-inch storm drain headed at a catch basin constructed near the southwest property boundary. This storm drain traverses the property to the southeast, underneath the grocery store and beyond the adjoining property, eventually discharging to an open drainage feature approximately 0.68 miles (3600 feet) from the site as an unnamed tributary of Gillis Creek. Review of the construction details of this storm drain provided by the City of Columbia DPU indicate the invert elevation for this storm drain is above water table beneath the areas of hydrocarbon impact. However, it is anticipated that ground water from the upper shallow aquifer would likely intersect the grade elevation of this drain at some distance downgradient from the grocery store property. A conservative estimate for this point of intersection is within 580 feet of the Niggle property boundary, 950 feet hydraulically downgradient from the source area. For the

purposes of this evaluation, ground water discharge to this utility will be considered as the potential receptor .

SITE PRIORITY CLASSIFICATION

Based on the data obtained during the previous and current site assessments with regard to the concentrations of the COCs, the distance to the nearest potential receptor, and the estimated velocity of ground water , there appears to be no immediate threat of human exposure to the chemicals of concern (COCs) identified at the site.

EXPOSURE ANALYSIS and TIER EVALUATION

SITE CONCEPTUAL EXPOSURE MODEL

A site conceptual exposure model was developed to evaluate the current and reasonably anticipated land use, to identify potential transport mechanisms and exposure pathways, and to identify the potential population which could reasonably expect to be exposed to impacted ground water or hydrocarbon vapors.

Current and Anticipated Land Use- Land use in the site vicinity is characterized as commercial/retail, residential and wooded lots. The site is currently occupied by a dry cleaners store. It is reasonable to assume the subject property and immediate area will remain commercial and residential. There are currently no plans to terminate the operation of the dry cleaner store. The area which has been impacted by petroleum hydrocarbons have been paved with asphalt since the facility was constructed.

Shallow ground water beneath the site or down gradient from the site is not anticipated to be utilized as a drinking water source for the facility or surrounding area. The subject site and surrounding area is serviced drinking water from a municipal water supply.

Exposure Pathways-Data obtained from this assessment and previous site assessments have indicated the presence of free-phase and dissolved hydrocarbons in the soil and ground water at the former dispenser locations at the site. As the area of impacted ground water is paved, and given the depth of impacted soils and the depth to ground water, the inhalation of hydrocarbon vapors from the subsurface to the ambient air is considered to be an incomplete exposure pathway for this site and was not considered further. Thus, the exposure pathways for the COCs are limited to leaching to and transport by ground water. For the purposes of this evaluation, contaminant transport by ground water is considered to be the exposure pathways, collected at a subsurface utility, and discharging to an exposed creek.

Potentially Exposed Population- The potentially exposed population considered for this evaluation includes off-site residents, workers and visitors. Dermal contact or ingestion of hydrocarbon-impacted water is considered to be the exposure route.

TIER 2 EVALUATION

Exposure Point (Potential Receptor) -For the purposes of this evaluation, the nearest downgradient receptor from the site was considered to be a subsurface utility located hydraulically downgradient from the former UST (source) area. Potentially impacted ground water may collect in this drain and discharge to a tributary creek. The location and proximity of this receptor to the contaminant plume indicates a potential for human exposure to the hydrocarbon compounds released at the site. Thus, the exposure point is considered the closest potential receptor, and dermal contact, or ingestion of impacted storm water is considered as the potential risk pathway.

Point of Compliance (POC) - MW-12 was established as the point of compliance based upon the current hydrocarbon concentrations and its location both hydraulically downgradient of the source (UST) area and upgradient of the exposure point. A minimum travel time of 11 years from the POC to the exposure point was estimated for the compliance point based on a ground water flow (seepage) velocity calculated for the site.

Site Specific Target Level (SSTL) - SSTL's are contaminant concentrations established for a site to determine the maximum allowable concentration of COC's in ground water at the source area to protect the potential downgradient receptor from impact above the MCL's or RBSL's established for the COC. SSTL's were calculated by the use of the contaminant transport model as discussed below.

SOIL LEACHABILITY MODEL

The COC concentrations indicated from soil samples collected from the former dispenser island (source) areas (wc-1) have exceeded RBSLs for the sandy soils encountered at the site, therefore, a soil leachability model was simulated for the site conditions. The model was performed to determine if the current COC in the soil continues to be a threat to ground water for the leaching to ground water pathway. The soil leachability model is used to establish a COC target concentration for determining whether soil remediation is necessary or the level of soil cleanup required to protect the shallow aquifer water from hydrocarbon impact beyond allowable limits.

The laboratory analytical data collected from worst case (wc-1) and background (bg-1) borings were utilized in the calculations. The grain-size data was collected from a sample collected from the boring for well MW-15. The results of the soil leachability model are discussed below. The input parameters

and calculations for the soil leachability model are included on the In-Situ Soil Risk Evaluation forms, in the Appendix.

Site-Specific Target Level (SSTL) concentrations for soils were calculated to be 0.003 mg/kg benzene; 1,010 mg/kg toluene; 972.5 mg/kg ethylbenzene; 10,253 mg/kg xylene; and 288 mg/kg naphthalene. The concentrations of benzene detected in soils exceeds the calculated SSTL's. Concentrations of benzene, toluene, ethylbenzene, and naphthalene detected in ground water at monitoring wells MW-7 and MW-9 exceeded the calculated maximum allowable concentrations for soil pore water. Thus, the soil leachability model indicates the source area soils may be a contributing source of hydrocarbons to ground water within the shallow aquifer underlying the site.

CONTAMINANT TRANSPORT MODEL

The Bioscreen Natural Attenuation model was chosen to simulate the fate and transport of the contaminant plume in both the horizontal and vertical flow directions. The model, developed by the Air Force Center for Environmental Excellence (AFCEE), is based on the Domenico (1987) three dimensional analytical solute transport model, which simulates the effects of advective transport, three-dimensional dispersion, adsorption, and first order decay.

Three alternate model types can be utilized to represent reduction by biodegradation as 1) solute transport with no decay, 2) solute transport with first order decay, and 3) solute transport with "instantaneous" biodegradation reaction. In order to demonstrate the most conservative approach for the migration of contaminants from the source area, transport is simulated along the centerline of the observed contaminant plume in the downgradient direction of ground water flow.

One of three models can be used which are chosen by the availability of data applicable to the decay rate of the contaminant. The instantaneous reaction model was simulated for the former Crown SC-015 site. Transport with no decay and degradation by first order decay model results are also presented for comparison to the instantaneous model.

Model Input Parameters

The following values were used as model input parameters: the maximum chemical concentrations of the COC at the source area; width and thickness of the source; longitudinal, transverse and vertical dispersivity; the average linear ground-water flow (seepage) velocity; and the biodegradation decay parameters for the COC. The COC concentrations and the time of travel were systematically altered for various computer simulations. The input parameters are discussed individually below.

The model was simulated for the worst-case COC concentrations identified at monitoring well MW-5 (1993 data) for varying simulation times (years). Based on the assessment data, the actual source of

contaminants was considered to be an area of impacted soils and ground-water approximately 135 feet in width and 10 feet saturated thickness, sourced from the former dispenser island area. The plume length was estimated to be 240 feet based on the concentrations identified at monitoring well MW-12.

Values are estimated for longitudinal (Dx=x/10), transverse (Dy=Dx/3) and vertical (Dz=Dx/20) dispersivity based on the observed contaminant plume length, and seepage velocity is determined from the hydraulic conductivity, horizontal hydraulic gradient, and effective porosity values estimated during the initial assessment The retardation factor to estimate the rate of contaminant adsorption onto the soil matrix was calculated the soil bulk density (rho), contaminant partition coefficient (Koc), and soil organic carbon content (foc). The amount of ground water in the plume (acre-ft), calculated in the calibration simulation, and the initial concentration of COC (worst case sample at MW-5, 1993) were used to estimate the amount of contaminant (in kg) within the source area given.

Secondary lines of evidence for natural attenuation were collected from a background monitoring well (MW-10) and from a well located in the source area (MW-7). The differences in dissolved oxygen, nitrate, and sulfate measured in the two wells, and the value of ferrous iron measured at the impacted well were input as chemical data values for the model.

Previous analytical data from monitoring wells were used to calibrate the model to current site conditions. MW-12 was established as the point of compliance well for each simulation as it is located in the modeled centerline of the contaminant transport flow path downgradient from source area. Simulation No.1 models contaminant flow from the source area to the point of compliance calibrated to existing site data. Simulation No. 2 was run to establish the time at which the COC concentrations reach the potential receptor downgradient from the source area. Simulation No. 3 was run to establish SSTL's for ground water at the source area and at the point of compliance in order for no hydrocarbon concentrations above mcl's to migrate beyond the Niggel property boundary.

The model parameters were entered into the model for each simulation and are listed on the model input data sheets in the Appendix. The results are illustrated graphically as plots of concentrations vs. distance for each simulation. A summary of input calibration parameters and the simulation calculations and graphs are included in the Appendix.

MODEL SIMULATIONS - RESULTS

Inspection of the model simulation results indicates the following:

1. Benzene concentrations were calibrated to observed ground water concentrations at monitoring wells MW-7, MW-8, MW-9 and MW-12 after a period of three years. Concentrations were calibrated to current conditions after a period of seven years at wells MW-9 and MW-12.

2. Benzene exceeds the established MCL of 5 ug/l at the receptor after 20 years, with a maximum concentration of 5,429 ug/l at 800 feet from the source area. Toluene exceeded the established MCL of 1000 ug/l with a maximum concentration of 16,105 ug/l at 720 feet from the source area.

3. Ethylbenzene, Xylenes, MTBE, and Naphthalene did not exceed their respective MCL's or RBSL's at the potential receptor using the worst case concentrations.

4. The SSTL calculated for benzene and toluene at the source area are 1,500 ug/l and 2,000 ug/l, respectively, and were simulated to reach MCL's at the adjacent property boundary after a period of 12 years. Concentrations at the POC (MW-12) using these source values would reach a maximum of 462 ug/l and 1,141 ug/l, respectively, after a period of five years.

5. No SSTL's were established for ethylbenzene, xylenes, MTBE, and naphthalene as the simulations using the maximum observed concentrations indicated these COC's would be reduced prior to the plume reaching the adjacent property boundary.

CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our site assessment activities, it has been demonstrated that the zone of ground water impact has migrated offsite, downgradient of the UST and pump island areas. The extent of impact from the former Crown SC-015 site has been defined by the monitoring well network to a practical extent. The vertical extent of ground water impact has indirectly been defined by the findings at monitoring wells MW-1A .

The findings of our risk-based assessment indicate that the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek. Contaminant transport modeling of current ground water concentrations indicates that COCs will reach the receptor at concentrations above MCL's within a period of 20 years from present.

The COC concentrations and ground water flow rates determined during this assessment indicate that potential environmental impact from the hydrocarbons detected at the site is a valid concern.

Inspection of the ground water quality data collected as part of this assessment and from previous work indicates the contaminant plume continues to migrate downgradient from the source area, and corrective action should be implemented. Removal of COC's from the ground water to concentrations as determined by the calculated SSTL's is recommended to protect the identified potential receptor or other properties from potential or further impact. Corrective action by active remediation is recommended due to the presence of free product.

In order to determine the effectiveness of corrective action, a long-term ground water monitoring plan should be developed. The intent of the monitoring is to assess the site conditions over time, confirming the effectiveness of active remediation coupled with naturally occurring processes at reducing contaminant mass and minimizing migration. The results of long-term monitoring will be used to validate model predictions and assure compliance with regulatory standards. If the monitoring data indicates natural attenuation is not occurring at the predicted rates, then that data can be utilized to refine and recalibrate the model, as necessary.

ACKNOWLEDGMENT

Atlanta Testing & Engineering appreciates the opportunity to provide environmental consulting services to Crown Central Petroleum Corporation. If you have any questions regarding this information, or if we can provide any additional assistance, please contact us.

Sincerely,

ATLANTA TESTING & ENGINEERING

P. Michael Hudgins

P. Michael Hudgins, P.G.
Project Hydrogeologist
SC Registration No. 1137

Thomas F. Donn

Thomas F. Donn, P.G.
Senior Hydrogeologist
SC Registration No. 908

PMH/TFD:bh

SELECTED REFERENCES

American Society for Testing Materials, 1995, "Emergency Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites," ASTM E-1739, Philadelphia, PA.

ATEC Environmental Consultants, 1991, Initial site characterization report for the Crown Fast Fare SC-15, 3800 Devine Street, Columbia, South Carolina: April 8, 1991.

Atlanta Testing & Engineering, Inc. (AT&E),1989, Tank Assessment Report, Crown Central Petroleum Facility, Store No. SC-015, 3800 Devine Street, Columbia South Carolina: August 3, 1989.

_____,1992, Tank Closure Report, Crown Central Petroleum Corporation - Facility No. SC-15, 3800 Devine Street, Columbia South Carolina: September 19, 1991.

_____,1994, Report of Expanded Hydrogeologic Assessment, Crown Central Petroleum Corporation, Crown Facility SC-015, 3800 Devine Street, Columbia, South Carolina: November 8, 1993.

Bouwer, H., and R. C. Rice, 1976, "A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells", Water Resources Research, v. 12, no. 3, p. 423-428.

Bouwer, H., 1989, "The Bouwer and Rice Slug Test - An Update", Groundwater, v. 27, no. 3, p. 15-20.

Domenico, P. A., 1987, An Analytical Model for Multidimensional Transport of a Decaying Contaminant Species: Journal of Hydrology, n. 91, p. 49-58.

Domenico, P. A. and Robbins, G. A., 1985, A New Method of Contaminant Plume Analysis: Ground Water, v. 23, no. 4, p. 476-485.

South Carolina Department of Health and Environmental Control, 1995, Risk-Based Corrective Action for Petroleum Releases, June 1995.

Walton, W. C., 1988, Practical Aspects of Ground Water Modeling: National Water Well Association, Worthington, Ohio, p. 587.

APPENDIX

FIGURES

FIGURE 1 - Site Vicinity Map

FIGURE 2 - Surrounding Land Use Map

FIGURE 3 - Site Map with Monitoring Well Locations

FIGURE 4 - Generalized West-East Geologic Cross-Section A-A'

FIGURE 5 - Generalized North-South Geologic Cross-Section B-B'

FIGURE 6 - Potentiometric Map of the Upper Portion of the Shallow water-Table Aquifer

FIGURE 7 - Isoconcentration Map of Benzene/Total BTEX Concentrations

FIGURE 8 - Map of MTBE/Naphthalene Concentrations

FIGURE 9 - Site Utility Map

TABLES

TABLE 1 -Ground Water Elevation Data

TABLE 2 - Soil Organic Vapor Concentrations

TABLE 3 - Soil Analytical Results

Table 4 - Ground Water Analytical Results

HYDRAULIC CONDUCTIVITY DATA CALCULATIONS

SOIL LEACHABILITY MODELING RESULTS

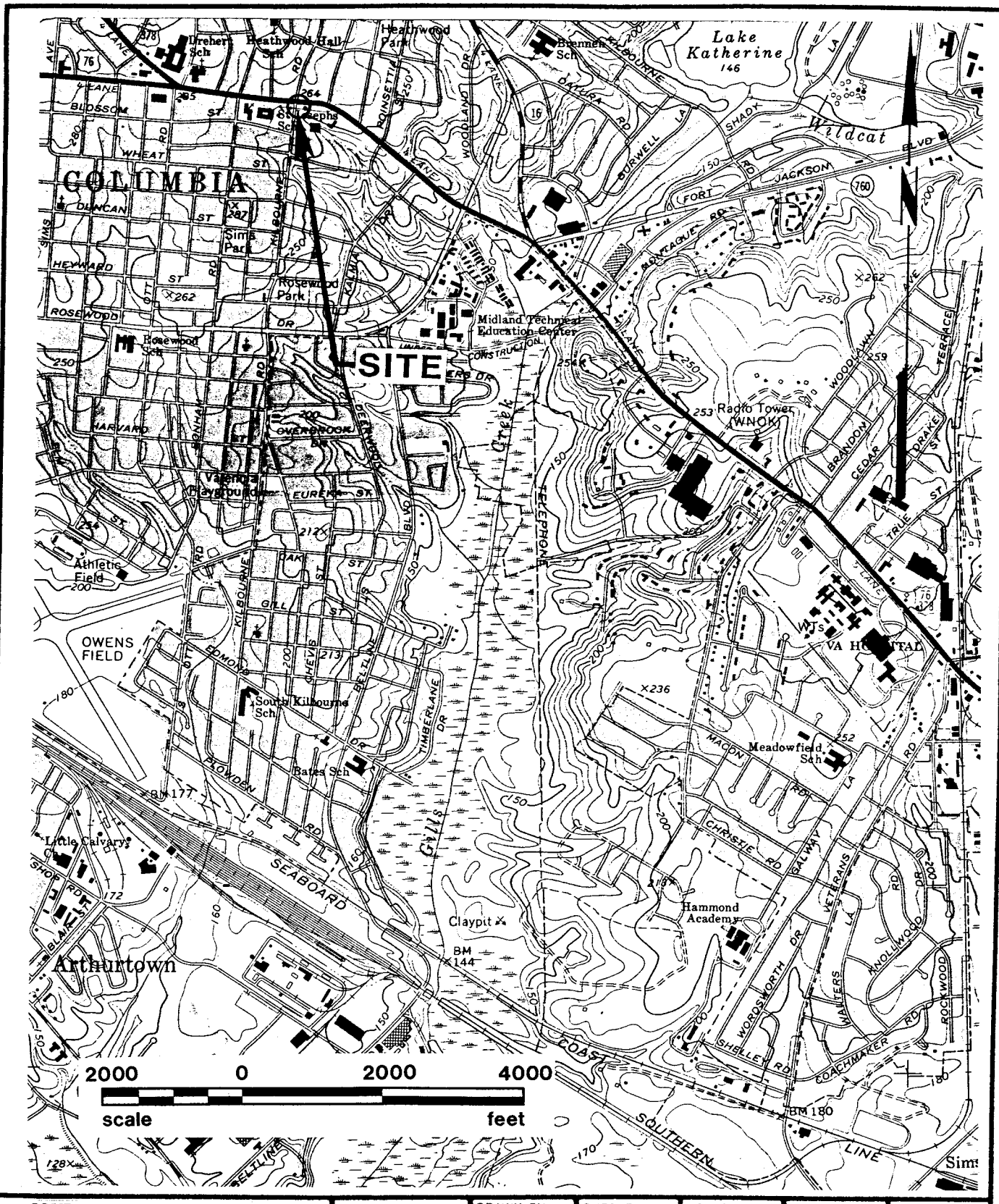
BIOSCREEN MODELING RESULTS

GEOLOGIST LOGS

LABORATORY REPORTS

WASTE DISPOSAL MANIFESTS

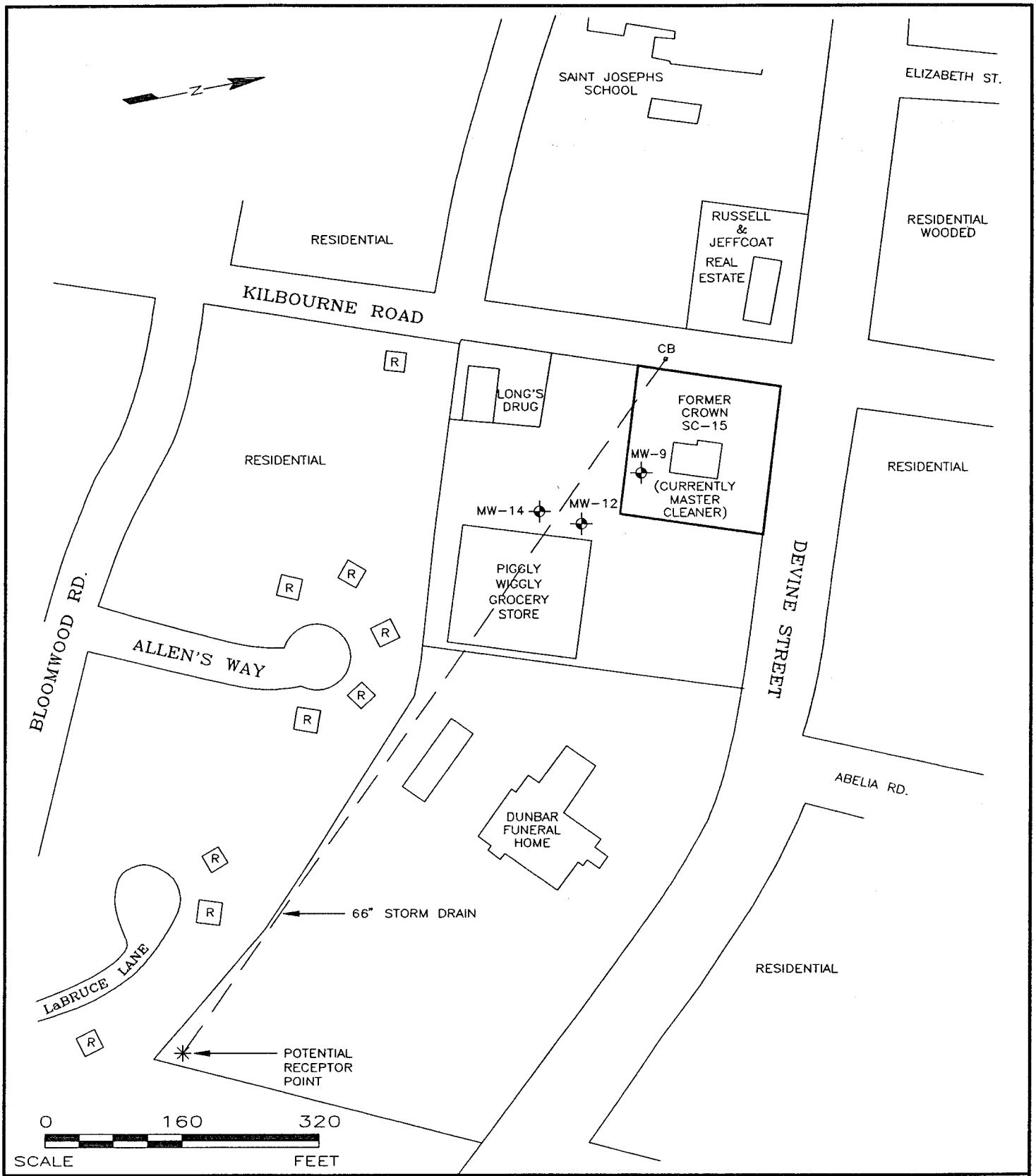
FIGURES



SOURCE: USGS FORT JACKSON SOUTH QUAD	DATE	DRAWN BY	CHECKED BY	SCALE	JOB NO.	PLATE NO.
	9/19/91	JAD		1"=2000'	1044B	1

atlanta testing & engineering
hydrogeologic consultants
florida - georgia - carolinas

SITE LOCATION MAP
CROWN CENTRAL PETROLEUM CORP.
CROWN SC-15, DEVINE ST.& KILBOURNE RD.
COLUMBIA, SOUTH CAROLINA



DWG: 1044D2	DATE	DRAWN BY	CHECKED BY	SCALE	JOB NO.	FIGURE
	2/17/97	KDN	MH	AS SHOWN	1044D	2

atlanta testing & engineering
geotechnical & hydrogeologic consultants
florida–georgia–carolinas

SURROUNDING LAND USE MAP

FORMER CROWN SC-15
COLUMBIA, SC

0 30 60

SCALE FEET

N

KILBOURNE ROAD

B

MW-10

MW-2A (DESTROYED)

MW-15

MW-4 (DESTROYED 7/30/91)

MW-16

MW-6

MW-3A

MW-3

(DESTROYED) MW-1

FORMER UST AREA

ASPHALT PAVEMENT

P-1

P-2

P-3

MW-2

MW-1A

MW-11

CANOPY

ONE STORY BRICK BUILDING

D-1

D-2

CONC. ISLAND

CONC. ISLAND

DEVINE STREET

ASPHALT PAVEMENT

MW-5

A'

MW-9

ASPHALT PAVEMENT

MW-7

MW-8

MW-14

A

MW-12

FENCE

ASPHALT PAVEMENT

PIGGLY WIGGLY GROCERY STORE

MW-13

B'

EXPLANATION

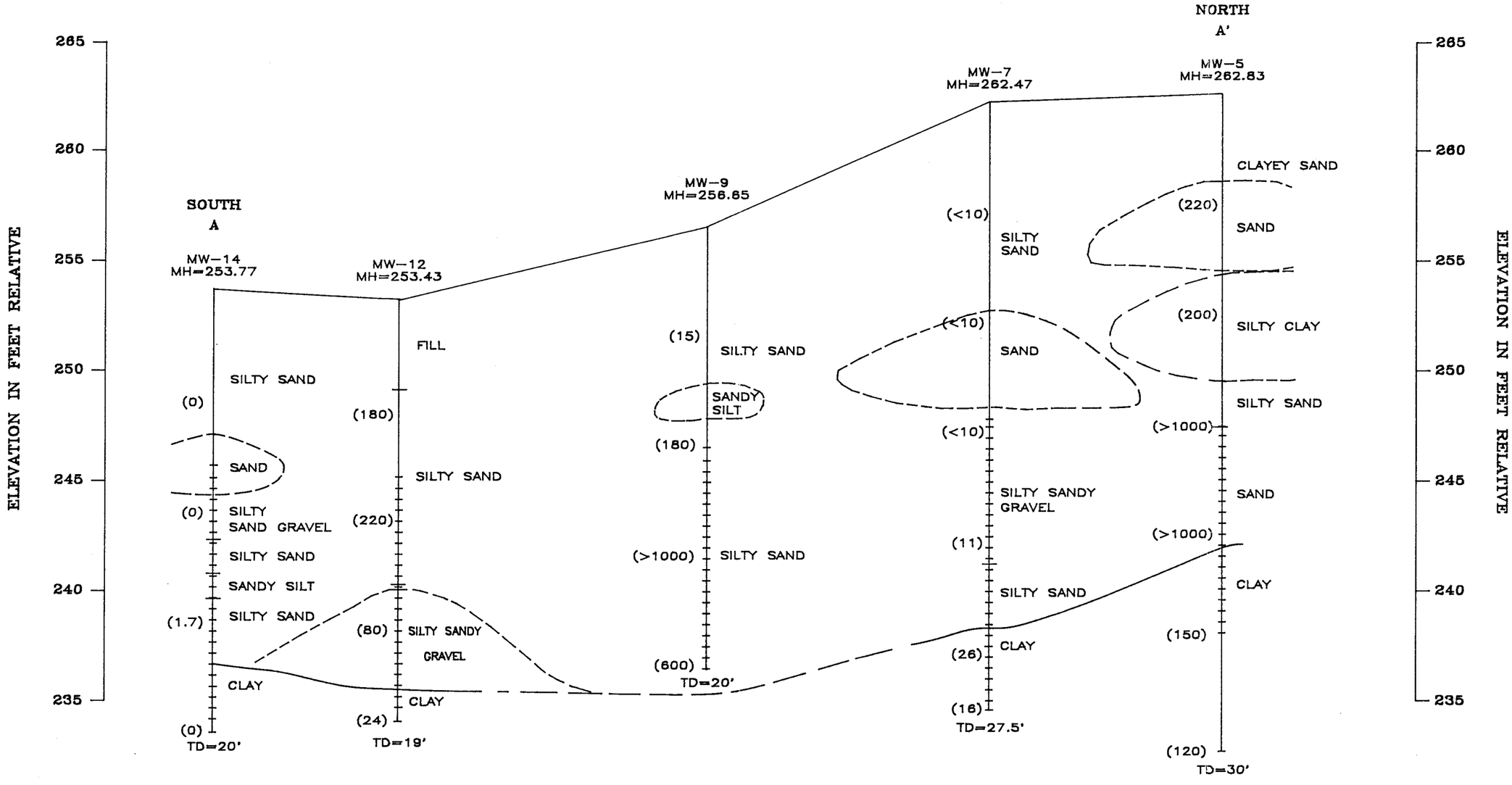
- DEEP MONITORING WELL LOCATION
- SOIL BORING LOCATION
- WATER TABLE MONITORING WELL LOCATION
- SOIL SAMPLE LOCATIONS
- A—A' CROSS-SECTION TRANSECT

DWG: 1044CBAS	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 3

atlanta testing & engineering
hydrogeologic consultants
florida—georgia—carolinas

SITE MAP SHOWING SOIL BORING AND MONITORING WELLS WITH CROSS-SECTION TRANSECTS

FORMER CROWN SC-15
COLUMBIA, SC



EXPLANATION

MH=TOP OF MANHOLE ELEVATION (in feet)

OVA MEASUREMENT IN PARTS PER MILLION → (>1000)

32.5 CLAYEY SILT

SCREEN INTERVAL

GENERAL GEOLOGIC DESCRIPTION AND DEPTH BELOW GROUND SURFACE

TD=TOTAL INVESTIGATED DEPTH (in feet)

SCALE: HORIZ. : 1" = 30'

VERT. : 1" = 5'

NOTES:

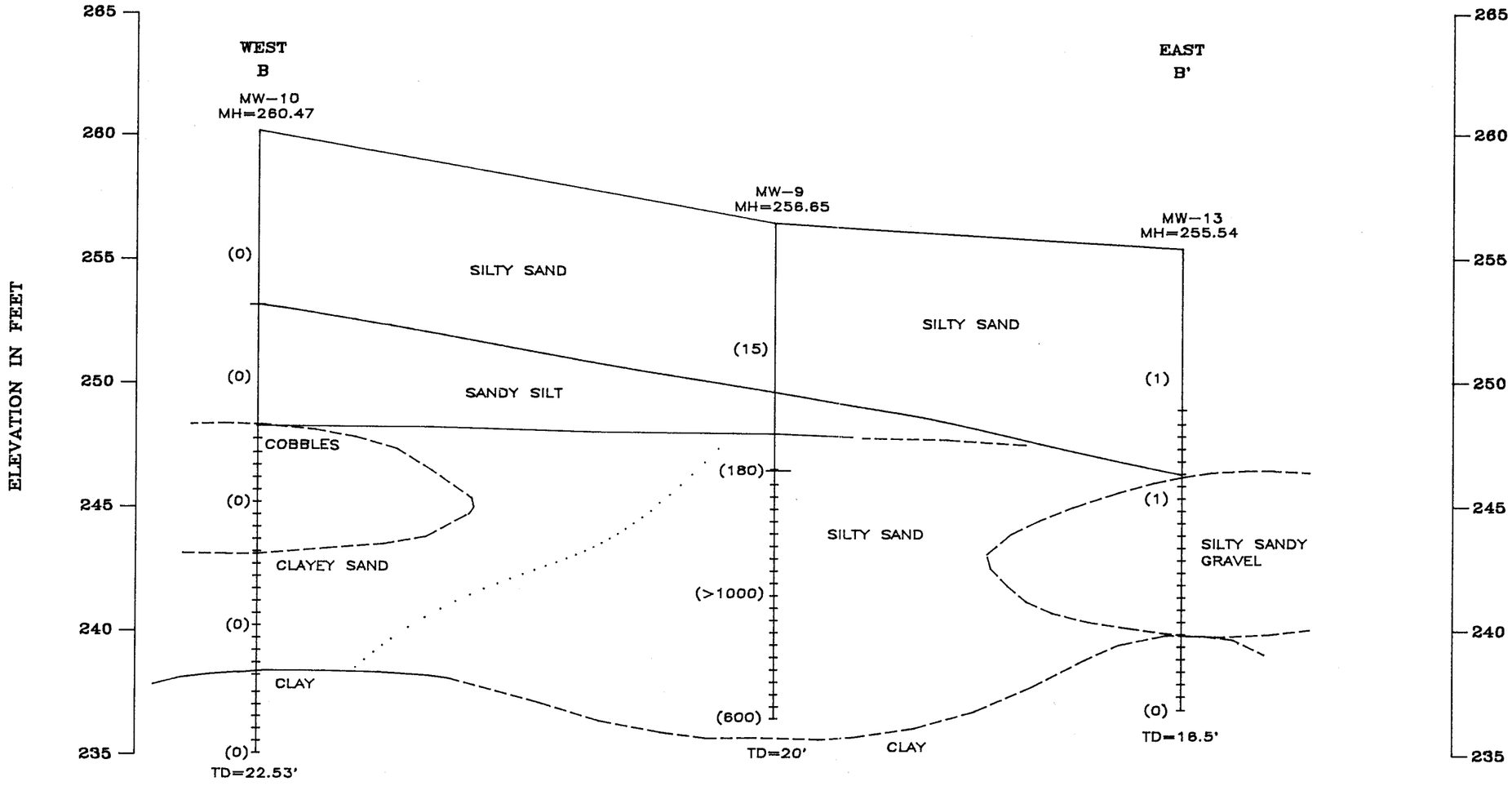
1) GEOLOGIC/LITHOLOGIC CONTACTS BETWEEN TEST HOLES OR WELLS ARE GENERALIZED. ACTUAL SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN.
2) MANHOLE ELEVATIONS ARE BASED ON AN ASSUMED ELEVATION AT SITE OF 260'.

DWG: 1044DX4	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 4

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

GENERALIZED GEOLOGIC CROSS–SECTION A–A'

FORMER CROWN SC–15
COLUMBIA, SC



EXPLANATION

MH=TOP OF MANHOLE ELEVATION (in feet)

OVA MEASUREMENT IN PARTS PER MILLION → (>1000)

32.5 CLAYEY SILT

SCREEN INTERVAL

GENERAL GEOLOGIC DESCRIPTION AND DEPTH BELOW GROUND SURFACE

TD=TOTAL INVESTIGATED DEPTH (in feet)

SCALE: HORIZ. : 1" = 30'

VERT. : 1" = 5'

NOTES:

1) GEOLOGIC/LITHOLOGIC CONTACTS BETWEEN TEST HOLES OR WELLS ARE GENERALIZED. ACTUAL SUBSURFACE CONDITIONS MAY VARY FROM THOSE SHOWN.
2) MANHOLE ELEVATIONS ARE BASED ON AN ASSUMED ELEVATION AT SITE OF 260'.

DWG: 1044X5	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 5

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

GENERALIZED GEOLOGIC CROSS-SECTION B-B'

FORMER CROWN SC-15
COLUMBIA, SC

0 30 60
SCALE FEET

N

KILBOURNE ROAD

DEVINE STREET

230

229.28 MW-10

MW-15
DRY

MW-16
224.29

MW-6
230.52

MW-3A
214.27

MW-3
232.63

FORMER
UST AREA

ASPHALT PAVEMENT

MW-1A
214.02

MW-2
233.79

MW-11
228.92

CANOPY

CONC. ISLAND

CONC. ISLAND

ONE STORY
BRICK BUILDING

MW-5
DRY

ASPHALT PAVEMENT

229

MW-9
228.92

228

229.66
MW-7

230.02
MW-8

MW-14
227.41

227.00
227.00

225.48
MW-12

226.50

FENCE

ASPHALT PAVEMENT

PIGGLY WIGGLY
GROCERY STORE

MW-13
228.61

227

226

NOTE:
GROUND-WATER ELEVATION FROM DEEP WELLS MW-1A AND MW-3A NOT INCLUDED IN CONTOURING.

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- DEEP MONITORING WELL LOCATION WITH GROUND-WATER ELEVATION
- GROUND-WATER CONTOUR (INTERVAL = 1.0')
- APPARENT GROUND-WATER FLOW DIRECTION

DWG: 1044CBAS	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 6

atlanta testing & engineering
hydrogeologic consultants
florida-georgia-carolinas

POTENTIOMETRIC SURFACE MAP
MEASURED NOVEMBER 14, 1996

FORMER CROWN SC-15
COLUMBIA, SC

0 30 60
SCALE FEET

N

KILBOURNE ROAD

BDL / BDL MW-10

MW-15 DRY

MW-16 BDL / BDL

MW-3A BDL / BDL

MW-3 BDL / BDL

FORMER UST AREA

MW-6 FP

ASPHALT PAVEMENT

MW-2 BDL

MW-1A BDL / BDL

MW-11 13 / 13

CANOPY

ONE STORY BRICK BUILDING

CONC. ISLAND

CONC. ISLAND

DEVINE STREET

MW-5 DRY

MW-9 5,700 / 15,600

ASPHALT PAVEMENT

MW-7 7,000 / 20,800

CB

MW-8 40 / 75.3

ASPHALT PAVEMENT

BDL / DBL MW-14

4.9 / 6.1 MW-12

FENCE

5.0

ASPHALT PAVEMENT

MW-13 18 / 18

PIGGLY WIGGLY GROCERY STORE

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION WITH TOTAL BENZENE/BTEX CONCENTRATION IN ug/l
- DEEP MONITORING WELL LOCATION WITH BENZENE/BTEX CONCENTRATION IN ug/l
- BENZENE CONCENTRATION CONTOUR

FP = FREE PHASE HYDROCARBONS
BDL = BELOW LABORATORY DETECTION LIMITS

DWG: 1044CBAS	DATE	DRAWN BY	CHECKED BY	SCALE	JOB NO.	FIGURE
	2/26/97	KDN	MH	AS SHOWN	1044D	7

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

MAP OF BENZENE/BTEX CONCENTRATIONS
SAMPLES COLLECTED JAN. 14, 1997
FORMER CROWN SC–15
COLUMBIA, SC

0 30 60
SCALE FEET

N

KILBOURNE ROAD

32 BDL MW-10

MW-15 DRY

MW-16 BDL BDL

MW-6 FP

MW-3A BDL BDL

MW-3 BDL BDL

FORMER UST AREA

ASPHALT PAVEMENT

MW-1A BDL BDL

MW-2 BDL BDL

MW-11 190 BDL

CANOPY

ONE STORY BRICK BUILDING

CONC. ISLAND

CONC. ISLAND

DEVINE STREET

MW-5 DRY

MW-9 3,800 500

ASPHALT PAVEMENT

MW-7 4,300 150

CB

MW-8 BDL 31

CB

14 DBL MW-14

CB

MW-12 74 BDL

FENCE

CB

ASPHALT PAVEMENT

PIGGLY WIGGLY GROCERY STORE

MW-13 28 1.2

10.0

EXPLANATION

- WATER TABLE MONITORING WELL LOCATION WITH MTBE/NAPHTHALENE CONCENTRATION IN ug/l
- DEEP MONITORING WELL LOCATION WITH MTBE/NAPHTHALENE CONCENTRATION IN ug/l
- MTBE CONCENTRATION CONTOUR

FP = FREE PHASE HYDROCARBONS
BDL = BELOW LABORATORY DETECTION LIMITS

DWG: 1044CBAS	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 8

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

MAP OF MTBE/NAPHTHALENE CONCENTRATIONS
SAMPLES COLLECTED JAN. 14, 1997
FORMER CROWN SC–15
COLUMBIA, SC

0 30 60
SCALE FEET

N

12" R.C.P.

KILBOURNE ROAD

24" R.C.P.

UNDERGROUND TEL. LINE

MH

12" SANITARY SEWER

2" HIGH PRESSURE GAS MAINS

MH

UNDERGROUND TEL. LINE

CB

40" R.C.P

12" WATER MAIN

MW-10

MW-15

MW-16

MW-6

MW-3A

MW-3

FORMER UST AREA

ASPHALT PAVEMENT

FORMER PIPING TRENCH

MW-1A

MW-2

MW-11

CANOPY

CONC. ISLAND

CONC. ISLAND

ONE STORY BRICK BUILDING

DEVINE STREET

66" R.C.P.

ASPHALT PAVEMENT

MW-5

MW-9

ASPHALT PAVEMENT

CB

MW-7

MW-8

CB

MW-14

CB

MW-12

CB

FENCE

ASPHALT PAVEMENT

PIGGLY WIGGLY GROCERY STORE

MW-13

NOTE: LOCATION OF UTILITIES ARE ESTIMATED BASED ON RECORDS REVIEW AND FIELD OBSERVATORS. ACTUAL LOCATIONS MAY VARY.

EXPLANATION

- DEEP MONITORING WELL LOCATION
- SOIL BORING LOCATION
- WATER TABLE MONITORING WELL LOCATION
- WATER LINE
- SANITARY SEWER LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND R.C.P LINE
- GAS LINE

DWG 1044CBAS	DATE 2/26/97	DRAWN BY KDN	CHECKED BY MH	SCALE AS SHOWN	JOB NO. 1044D	FIGURE 9

atlanta testing & engineering
hydrogeologic consultants
florida–georgia–carolinas

SITE UTILITY MAP

FORMER CROWN SC-15
COLUMBIA, SC

TABLES

TABLE 1
GROUND-WATER ELEVATION DATA
Crown Central Petroleum Corporation
Crown Facility SC-15
Columbia, South Carolina
Job No. 1044D, Report No. 100080

WELL NO.	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND-WATER ELEVATION
MW-2	7/16/93	3-18	261.98	ND	ND	Dry
	1/14/97			15.90	ND	246.08
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
MW-1A	10/8/93	35-45	249.98	33.42	ND	215.58
	1/14/97			34.40	ND	214.02
MW-3A	10/8/93	35-45	248.63	31.77	ND	215.83
	1/14/97			32.80	ND	214.27
MW-5	10/8/93	15-25	250.52	20.18	1.31	229.79
	1/14/97			Dry	Dry	Dry
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	230.63
	1/14/97			20.34	0.04	230.52
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	229.34
	1/14/97			20.52	ND	229.66
MW-8	10/8/93	15-25	250.55	19.23	ND	230.23
	1/14/97			20.53	ND	230.02
MW-9	10/8/93	10-20	244.41	14.60	ND	229.45
	1/14/97			15.49	ND	228.92
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66		229.28
MW-11	10/8/93	5.8-15.8	243.57	14.65	ND	228.92
	1/14/97			14.60	ND	228.97
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30		225.48
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/97			14.51		228.61
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10		227.41
MW-15	1/14/97	20-35	249.43	Dry	ND	Dry
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29

NOTES:

1) *Units in feet*
2) *Elevations referenced to an assumed datum (250 feet).*
3) *Measurements taken by Atlanta Testing & Engineering personnel.*
4) *btoc = below top of casing.*
5) *bgs = below ground surface.*
6) *ND = None detected.*
7) *Water elevations corrected for wells containing free-phase product using the following formula:*

GW elevation = TOC elevation - [Water Depth - (F.P. thickness x 0.78)]

where gasoline has an assumed specific gravity of 0.78 g/cm^3.

TABLE 2

SOIL ORGANIC VAPOR CONCENTRATIONS

Crown Central Petroleum Corporation
Crown Facility SC-015
Columbia, South Carolina
Job No. 1044D, Report No. 100080

SOIL BORING NO.	DEPTH (feet)	TOTAL ORGANIC VAPOR CONCENTRATIONS (ppm)
WC-1	3.5-5.0	40
	8.5-10.0	480
	13.5-15.0*	1,000+
BG-1	0-2	0
	3-5	0
	5-7*	0
MW-15	2-3	0
	3.5-5.0	0
	5.0-7.0	0
	8.5-10.0	0
	13.5-15.0	0
	18.5-20.0	0
	23.5-25.0	0
	28.5-30	0
	33.5-35*	0
MW-16	1-3	0
	3.5-5.0	0
	8.5-10.0	0
	13.5-15.0	0
	18.5-20.0	0
	23.5-25	0
	28.5-35	0
	33.5-35*	0

NOTE: 1) **Samples selected for laboratory analysis.*
2) *ppm = parts per million.*
3) *Measurements recorded on 1/9/97 with a Foxboro Model 128 OVA-flame ionization detector.*

TABLE 3
SOIL LABORATORY DATA
Crown Central Petroleum Corporation
Crown Facility SC-015
Columbia, South Carolina
Job No. 1044D, Report No. 100080

WELL NO.	DATE SAMPLED	DEPTH (ft, bgs)	BENZENE	TOLUENE	ETHYL-BENZENE	XYLENES	TPH
MW-1	6/13/89	15-18	N/A	N/A	N/A	N/A	37
MW-2	6/13/89	15-18	N/A	N/A	N/A	N/A	BDL
MW-3	6/14/89	15-18	N/A	N/A	N/A	N/A	27
P-1	7/30/91	4 -4.5	BDL	BDL	BDL	BDL	BDL
P-2	7/30/91	4 -4.5	BDL	BDL	BDL	BDL	BDL
P-3	7/30/91	4 -4.5	BDL	BDL	BDL	BDL	BDL
D-1	7/30/91	4 - 6	<12,000	43,000	30,000	82,000	<1,200
D-2	7/30/91	4 - 6	11,000	82,000	47,000	260,000	2,200
MW-1A*	11/11/91	10	N/A	N/A	N/A	N/A	BDL
MW-2A*	11/11/91	5	N/A	N/A	N/A	N/A	BDL
MW-3A*	11/11/91	15	N/A	N/A	N/A	N/A	BDL
MW-5	7/9/93	13.5-15	BDL	BDL	BDL	BDL	N/A
MW-6	7/12/93	18.5-20	BDL	BDL	40	220	9
MW-7	7/12/93	18.5-20	BDL	BDL	BDL	BDL	BDL
MW-8	7/13/93	18.5-20	BDL	BDL	BDL	BDL	BDL
MW-9	7/13/93	8.5-10	140	BDL	720	2,000	1.5
MW-10	7/13/93	13.5-15	BDL	BDL	BDL	BDL	BDL
MW-11	7/14/93	8.5-10	BDL	BDL	BDL	BDL	BDL
MW-12	7/21/93	8.5-10	63	77	140	580	6.4
MW-13	7/21/93	8.5-10	BDL	BDL	BDL	BDL	BDL
MW-15	1/09/97	33.5 - 35	8	BDL	12	12	N/A
MW-16	1/09/97	33.5 - 35	BDL	BDL	BDL	BDL	N/A
WC -1	1/14/97	13-15	33	6.7	BDL	11	BDL

NOTES: 1) BTEX concentrations reported in micrograms per kilogram (ug/kg).

2) TPH concentrations reported in milligrams per kilogram (mg/kg).

3) N/A = not analyzed.

4) BDL = below laboratory detection limits.

*5) *Data obtained from April 8, 1991 assessment report prepared by ATEC Environmental Consultants.*

TABLE 4

GROUND WATER ANALYTICAL RESULTS

Crown Central Petroleum Corporation
Crown Facility SC-015
Columbia, South Carolina
Job No. 1044D, Report No. 100080

		BTEX - METHOD 8020 (ug/l)						
WELL NO.	DATE SAMPLED	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	Naph-thalene	Lead
MW-1A	7/16/93 1/14/97	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	2 <1.0	NA <1.0	<5.0 <5.0
MW-2	7/16/93 1/14/97	NS <1.0	NS <1.0	NS <1.0	NS <1.0	NS 1.0	NS <1.0	NS 5.0
MW-3	7/16/93 1/14/97	5 <1.0	13 <1.0	1 <1.0	5 <1.0	<1.0 <1.0	NA <1.0	<5.0 <5.0
MW-3A	7/16/93 1/14/97	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	<1.0 <1>0	NA <1.0	<5.0 <5.0
MW-5	7/26/93* 1/14/97	19,000 NS	86,000 NS	3,500 NS	22,00 NS	4,000 NS	6,000 NS	<200 NS
MW-6	7/16/93 1/14/97	9,600 NS	22,000 NS	1,900 NS	9,300 NS	<100 NS	NA NS	<5.0 NS
MW-7	7/16/93 1/14/97	2,800 7,000	1,500 8,900	500 1700	410 3200	600 4,300	NA 150	<5.0 <5.0
MW-8	7/16/93 1/14/97	130 **40**	110 1.7	73 1.6	730 32	<5.0 <1.0	NA 31	<5.0 <5.0
MW-9	7/16/93 1/14/97	12,000 **5,700**	12,000 **2,600**	3,400 **2,600**	13,000 4,700	10,000 **3,800**	NA **500**	24 <5.0
MW-10	7/16/93 1/14/97	<10 <1.0	<10 <1.0	<10 <1.0	<10 <1.0	970 32	NA <1.0	<5.0 <1.0
MW-11	7/16/93 1/14/97	3 **13**	<1.0 <1.0	<1.0 <1.0	<1.0 <1.0	56 **190**	NA **500**	24 <5.0
MW-12	7/26/93 1/14/97	1,200 4.9	29 <1.0	150 1.2	110 <1.0	1,000 74	NA <1.0	<5.0 <5.0
MW-13	7/26/93 1/14/97	<1.0 **18**	4.0 <1.0	<1.0 <1.0	5.0 <1.0	<1.0 28	NA 1.2	<200 <5.0
MCL	--	*5*	*1,000*	*700*	*10,000*	*40**	*25**	*50*

TABLE 4
(continued)
GROUND WATER ANALYTICAL RESULTS

Crown Central Petroleum Corporation
Crown Facility SC-015
Columbia, South Carolina
Job No. 1044D, Report No. 100080

		BTEX - METHOD 8020 (ug/l)						
WELL NO.	DATE SAMPLED	Benzene	Toluene	Ethyl-benzene	Total Xylenes	MTBE	Naph-thalene	Lead
MW-14	10/1/93	<1.0	<1.0	<1.0	<1.0	270	NA	<5.0
	1/14/97	<1.0	<1.0	<1.0	<1.0	14	<1.0	<5.0
MW-15	1/14/97	NS	NS	NS	NS	NS	NS	NS
MW-16	1/14/97	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<5.0
MCL	*1/14/97*	*5*	*1,000*	*700*	*10,000*	*40**	*25**	*50*

NOTES:

1) *ug/l = micrograms per liter (or parts per billion, ppb).*
2) *Polynuclear aromatic hydrocarbons (PAH'S) as 2-Methylnaphthalene and 1-Methylnaphthalene were detected at Wells MW-7 (41 ug/l and 36 ug/l), MW-8 (35 ug/l and 16 ug/l) and MW-9 (150 ug/l and 83 ug/l).*
3) *MTBE = methyl-tert-butyl-ether.*
4) *All samples collected by AT&E personnel.*
5) *Ground water samples analyzed by VOC Analytical Laboratories, Inc. of Irmo, South Carolina.*
6) *MCL = maximum contaminant level for drinking water quality as established by the State Primary Drinking Water Regulations R.61-58. * indicates RBSL's for ground water as established by the RBCA Document, Table 4.*
7) *Results shown in bold face indicate concentrations which currently exceed the MCL or RBSL for that compound.*
8) *NS = not sampled due to the presence of free-product.*
9) *NA = not analyzed.*

HYDRAULIC CONDUCTIVITY CALCULATIONS, DATA AND PLOTS

SUMMARY of SLUG TEST

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

Site Data

SITE ID: # 07680 COUNTY Richland

FACILITY NAME Crown SC-015

Slug Data

See Appendix X Table_____ Figure_____ for a list of all data measurements.
(water level logs, etc.) (Complete as appropriate).

Water Level Recovery Data was measured by Hermit DATA Logger
(Hermit Data Logger, Manually with Water Level Indicator, etc.) (List Method).

Complete the following table for each well tested.
COMPETE A SECOND SHEET IF MORE THAN FOUR WELLS ARE TESTED

Slug Test Conducted in well(s) number	MW-7	MW-9
Initial Rise/Drawdown in well (feet)	1.03	1.31
Radius of Well Casing (feet)	0.007	0.007
Effective Radius of Well (feet)	0.155	0.155
Static Saturated Aquifer Thickness (feet)	4.5	9.51
Length of Well Screen (feet)	10	10
Static Height of Water Column in Well (ft)	4.5	9.51

Calculations

See Appendix X Table_____ Figure_____ for calculations. (Complete as appropriate).

The method for aquifer calculations was Bouwer-Rice (i.e. Bouwer-Rice, Cooper, etc

Calculated values by well were as follows:

Slug Test Conducted in well(s) number	MW-7	MW-9
Hydraulic Conductivity	1.03 ft/day	1.35 ft/day

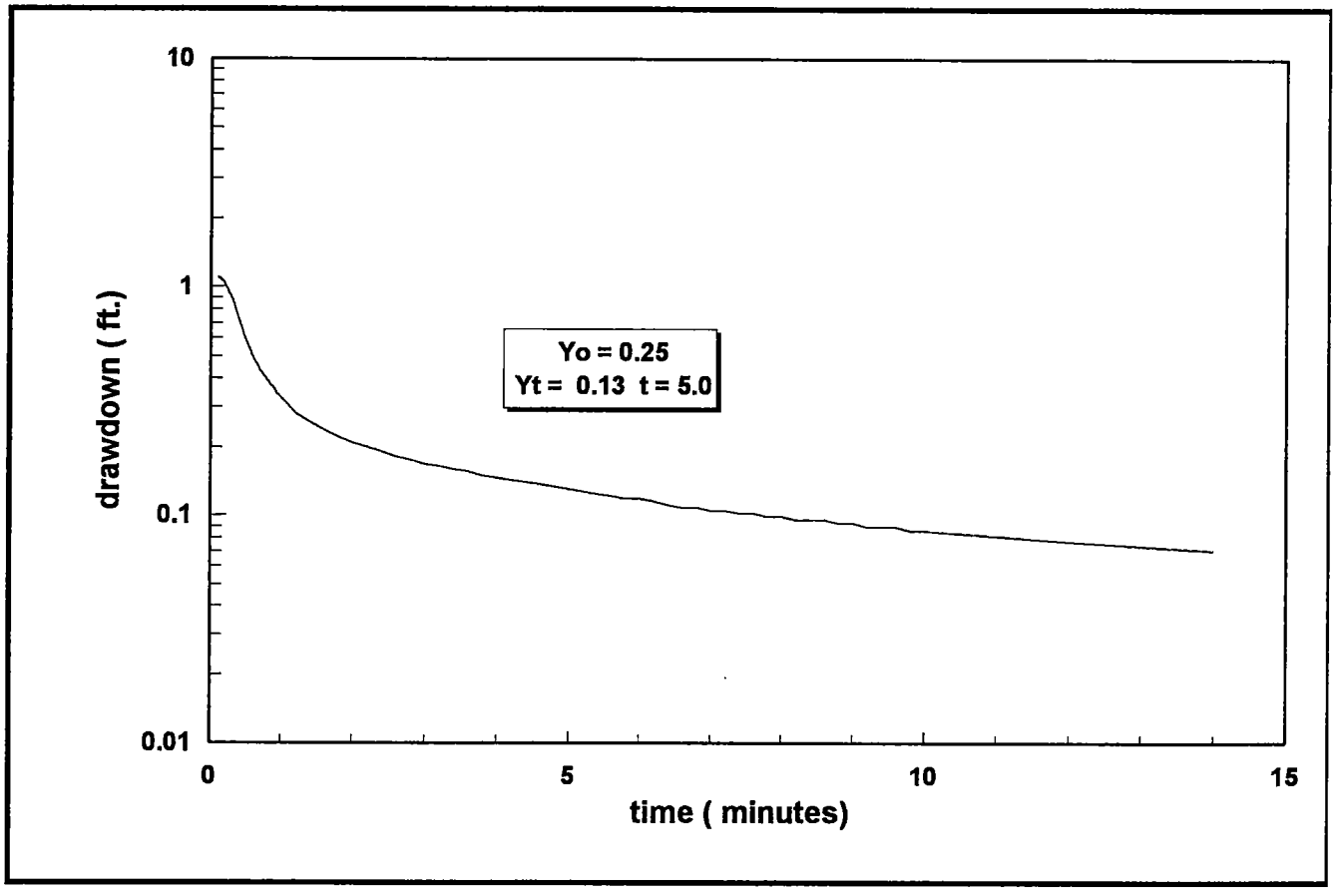
Thickness of the aquifer used to calculate hydraulic conductivity was 25 feet.

The aquifer is _____ confined _____ semi-confined X water table (Check as appropriate).

The estimated seepage velocity is 63.2 feet per year based on a hydraulic conductivity of 1.35 ft/day, a hydraulic gradient of 0.02 ft/ft, and a porosity of 15 per cent for Sandy soil (list type i.e., silty sand ,clay, etc).

SLUG TEST DATA - MONITORING WELL MW-7

Crown SC- 015
3000 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D



Well Radius^2	**rc^2 =**	**0.024 ft^2**
1.00 inches		
0.01 feet^2	**rw =**	**0.250 ft**
Borehole Radius	**Le =**	**4.5 ft**
3.00 inches		
0.25 feet	**H =**	**4.5 ft**
Gravel Pack Porosity	**Le/ rw =**	**18**
0.30		
	Lw =	**4.5**
Well radius corrected for gravel pack	**yo =**	**0.25 ft**
0.024 feet^2	**yt =**	**0.13 ft**
	t =	**5 min**
	C =	**1.75**

$$K = \frac{rc^2 \ln(Le/r) \; 1 \; \ln yo}{2 \; Le \quad t \quad yt}$$

ln Re/rw = 0.380574
0.097222

ln Re/rw = **2.09294298**

K= 7.18E-04 ft/min

K= 1.03 ft/day

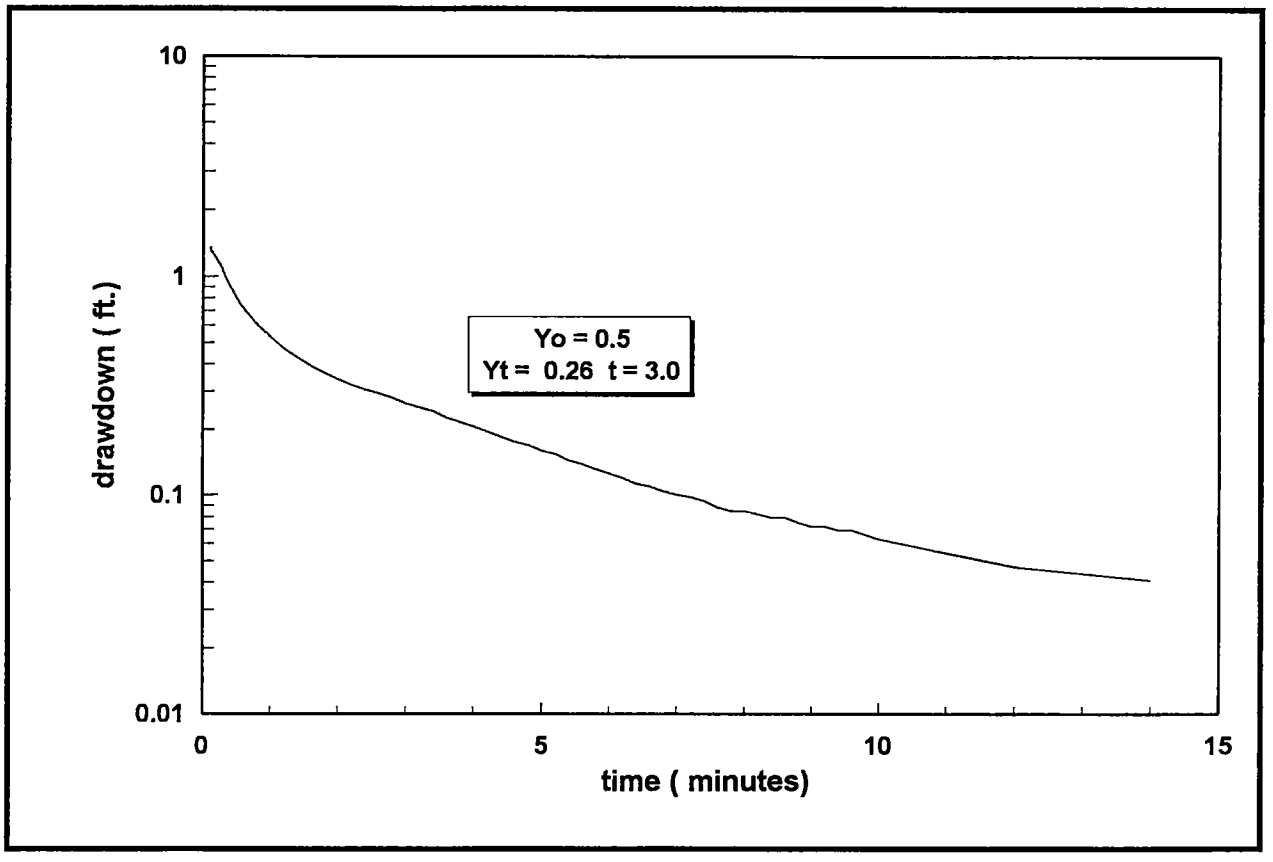
K= 3.65E-04 cm/sec

Slug Test Data Monitoring Well MW-7

0.1	21.304	1.104	0.35	21.004	0.804	3.4	20.359	0.159
0.1033	21.304	1.104	0.3666	20.972	0.772	3.6	20.356	0.156
0.1066	21.304	1.104	0.3833	20.947	0.747	3.8	20.349	0.149
0.11	21.301	1.101	0.4	20.918	0.718	4	20.346	0.146
0.1133	21.301	1.101	0.4166	20.89	0.690	4.2	20.343	0.143
0.1166	21.298	1.098	0.4333	20.868	0.668	4.4	20.34	0.140
0.12	21.298	1.098	0.45	20.843	0.643	4.6	20.337	0.137
0.1233	21.295	1.095	0.4666	20.82	0.620	4.8	20.334	0.134
0.1266	21.295	1.095	0.4833	20.802	0.602	5	20.33	0.130
0.13	21.291	1.091	0.5	20.783	0.583	5.2	20.327	0.127
0.1333	21.291	1.091	0.5166	20.764	0.564	5.4	20.324	0.124
0.1366	21.291	1.091	0.5333	20.748	0.548	5.6	20.321	0.121
0.14	21.288	1.088	0.55	20.732	0.532	5.8	20.318	0.118
0.1433	21.288	1.088	0.5666	20.719	0.519	6	20.318	0.118
0.1466	21.285	1.085	0.5833	20.704	0.504	6.2	20.315	0.115
0.15	21.279	1.079	0.6	20.691	0.491	6.4	20.311	0.111
0.1533	21.279	1.079	0.6166	20.681	0.481	6.6	20.308	0.108
0.1566	21.276	1.076	0.6333	20.669	0.469	6.8	20.308	0.108
0.16	21.273	1.073	0.65	20.659	0.459	7	20.305	0.105
0.1633	21.273	1.073	0.6666	20.65	0.450	7.2	20.305	0.105
0.1666	21.269	1.069	0.6833	20.64	0.440	7.4	20.302	0.102
0.17	21.266	1.066	0.7	20.631	0.431	7.6	20.302	0.102
0.1733	21.263	1.063	0.7166	20.624	0.424	7.8	20.299	0.099
0.1766	21.26	1.060	0.7333	20.615	0.415	8	20.299	0.099
0.18	21.257	1.057	0.75	20.609	0.409	8.2	20.296	0.096
0.1833	21.254	1.054	0.7666	20.602	0.402	8.4	20.296	0.096
0.1866	21.25	1.050	0.7833	20.596	0.396	8.6	20.296	0.096
0.19	21.244	1.044	0.8	20.59	0.390	8.8	20.293	0.093
0.1933	21.241	1.041	0.8166	20.587	0.387	9	20.293	0.093
0.1966	21.235	1.035	0.8333	20.577	0.377	9.2	20.289	0.089
0.2	21.228	1.028	0.85	20.571	0.371	9.4	20.289	0.089
0.2033	21.225	1.025	0.8666	20.568	0.368	9.6	20.289	0.089
0.2066	21.222	1.022	0.8833	20.561	0.361	9.8	20.286	0.086
0.21	21.219	1.019	0.9	20.555	0.355	10	20.286	0.086
0.2133	21.212	1.012	0.9166	20.549	0.349	12	20.277	0.077
0.2166	21.206	1.006	0.9333	20.542	0.342	14	20.27	0.070
0.22	21.203	1.003	0.95	20.539	0.339			
0.2233	21.197	0.997	0.9666	20.533	0.333			
0.2266	21.193	0.993	0.9833	20.53	0.330			
0.23	21.187	0.987	1	20.526	0.326			
0.2333	21.184	0.984	1.2	20.482	0.282			
0.2366	21.178	0.978	1.4	20.457	0.257			
0.24	21.175	0.975	1.6	20.438	0.238			
0.2433	21.168	0.968	1.8	20.422	0.222			
0.2466	21.165	0.965	2	20.409	0.209			
0.25	21.159	0.959	2.2	20.4	0.200			
0.2533	21.156	0.956	2.4	20.391	0.191			
0.2566	21.149	0.949	2.6	20.381	0.181			
0.26	21.143	0.943	2.8	20.375	0.175			
0.2633	21.14	0.940	3	20.368	0.168			
0.2666	21.133	0.933	3.2	20.365	0.165			

SLUG TEST DATA - MONITORING WELL MW-9

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D



Well Radius^2	rc^2 =	0.024 ft^2
1.00 inches		
0.007 feet^2	rw =	0.250 ft
Borehole Radius	Le =	4.96 ft
3.00 inches		
0.25 feet	H =	9.96 ft
Gravel Pack Porosity	Le/ rw =	19.84
0.30		
	Lw =	4.96
Well radius corrected		
for gravel pack	yo =	0.5 ft
0.024 feet^2	yt =	0.265 ft
	t =	3 min
	A =	2
	B =	0.45

$$K = \frac{rc^2 \ln(Le/rw)}{2 Le} \cdot \frac{1}{t} \ln \frac{yo}{yt}$$

ln Re/rw = 0.36817618
0.16875401

ln Re/rw = 1.86243953

K= 9.38E-04 ft/min

K= 1.35 ft/day

K= 4.77E-04 cm/sec

atlanta testing & engineering

Slug Test Data Monitoring Well MW-9

1/15/97

0.1133	16.396	1.356	0.2866	16.111	1.071	0.95	15.59	0.55
0.12	16.355	1.315	0.29	16.105	1.065	0.9666	15.583	0.543
0.1233	16.345	1.305	0.2933	16.102	1.062	0.9833	15.577	0.537
0.1266	16.342	1.302	0.2966	16.096	1.056	1	15.574	0.534
0.13	16.339	1.299	0.3	16.089	1.049	1.2	15.511	0.471
0.1333	16.336	1.296	0.3033	16.083	1.043	1.4	15.47	0.43
0.1366	16.329	1.289	0.3066	16.077	1.037	1.6	15.432	0.392
0.14	16.329	1.289	0.31	16.073	1.033	1.8	15.406	0.366
0.1433	16.326	1.286	0.3133	16.067	1.027	2	15.381	0.341
0.1466	16.32	1.28	0.3166	16.061	1.021	2.2	15.362	0.322
0.15	16.31	1.27	0.32	16.058	1.018	2.4	15.346	0.306
0.1533	16.304	1.264	0.3233	16.051	1.011	2.6	15.334	0.294
0.1566	16.301	1.261	0.3266	16.045	1.005	2.8	15.321	0.281
0.16	16.295	1.255	0.33	16.035	0.995	3	15.305	0.265
0.1633	16.292	1.252	0.3333	16.029	0.989	3.2	15.293	0.253
0.1666	16.288	1.248	0.35	16.007	0.967	3.4	15.283	0.243
0.17	16.282	1.242	0.3666	15.985	0.945	3.6	15.267	0.227
0.1733	16.276	1.236	0.3833	15.963	0.923	3.8	15.258	0.218
0.1766	16.273	1.233	0.4	15.944	0.904	4	15.248	0.208
0.18	16.266	1.226	0.4166	15.925	0.885	4.2	15.236	0.196
0.1833	16.263	1.223	0.4333	15.906	0.866	4.4	15.226	0.186
0.1866	16.26	1.22	0.45	15.887	0.847	4.6	15.217	0.177
0.19	16.254	1.214	0.4666	15.871	0.831	4.8	15.21	0.17
0.1933	16.25	1.21	0.4833	15.855	0.815	5	15.201	0.161
0.1966	16.244	1.204	0.5	15.836	0.796	5.2	15.195	0.155
0.2	16.241	1.201	0.5166	15.824	0.784	5.4	15.185	0.145
0.2033	16.238	1.198	0.5333	15.808	0.768	5.6	15.179	0.139
0.2066	16.231	1.191	0.55	15.792	0.752	5.8	15.172	0.132
0.21	16.228	1.188	0.5666	15.779	0.739	6	15.166	0.126
0.2133	16.222	1.182	0.5833	15.767	0.727	6.2	15.16	0.12
0.2166	16.219	1.179	0.6	15.754	0.714	6.4	15.153	0.113
0.22	16.216	1.176	0.6166	15.745	0.705	6.6	15.15	0.11
0.2233	16.209	1.169	0.6333	15.732	0.692	6.8	15.144	0.104
0.2266	16.206	1.166	0.65	15.723	0.683	7	15.141	0.101
0.23	16.203	1.163	0.6666	15.713	0.673	7.2	15.138	0.098
0.2333	16.197	1.157	0.6833	15.704	0.664	7.4	15.134	0.094
0.2366	16.194	1.154	0.7	15.694	0.654	7.6	15.128	0.088
0.24	16.19	1.15	0.7166	15.685	0.645	7.8	15.125	0.085
0.2433	16.184	1.144	0.7333	15.678	0.638	8	15.125	0.085
0.2466	16.178	1.138	0.75	15.669	0.629	8.2	15.122	0.082
0.25	16.175	1.135	0.7666	15.662	0.622	8.4	15.119	0.079
0.2533	16.168	1.128	0.7833	15.653	0.613	8.6	15.119	0.079
0.2566	16.162	1.122	0.8	15.647	0.607	8.8	15.115	0.075
0.26	16.159	1.119	0.8166	15.637	0.597	9	15.112	0.072
0.2633	16.152	1.112	0.8333	15.631	0.591	9.2	15.112	0.072
0.2666	16.146	1.106	0.85	15.625	0.585	9.4	15.109	0.069
0.27	16.14	1.1	0.8666	15.618	0.578	9.6	15.109	0.069
0.2733	16.137	1.097	0.8833	15.612	0.572	9.8	15.106	0.066
0.2766	16.13	1.09	0.9	15.606	0.566	10	15.103	0.063
0.28	16.124	1.084	0.9166	15.599	0.559	12	15.087	0.047
0.2833	16.118	1.078	0.9333	15.596	0.556	14	15.081	0.041

SOIL LEACHABILITY MODEL CALCULATIONS

atlanta testing & engineering

SOIL LEACHABILITY MODEL FOR PETROLEUM CONTAMINATED SITES

Risk Based Corrective Action Evaluation

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D

EQUATION SET 1

Determine soil pore water concentration resulting from physical partitioning (Cw)

STEP 1 Calculate total organic carbon content of the soil

fcs = (foc + TPH/ 1.724) (1x E-6)

natural organic content of uncontaminated soil (mg/kg)	foc	**920**	mg/kg
Total Petroleum Hydrocarbons (mg/kg) per EPA 3550	TPH	**0**	mg/kg
conversion from organic matter to organic carbon fraction	1.724		
conversion from milligrams per kilogram to decimal %	1x E-6		
	fcs =	**9.20E-04**	**%**

STEP 2 Determine the COC concentration in soil pore water directly in contact with contaminated soil **(CW)**

$$Cw = Cs * \frac{Wr * 1g/cc + Bd}{(Bd * Koc * fcs) + Wr + (n - Wr) * H}$$

Benzene

concentration of the COC in soil (mg/kg)	Cs	**0.033**	mg/kg
porosity of soil (Figure 4)	n	0.48	
residual water content (Figure 5)	Wr	0.05	
bulk density of soil (g/cc) (Figure 1)	Bd	1.55	g/cc
density of water	1g/cc	1	
soil organic/water partitioning coefficient (ml/g) from Table 1	Koc	81	ml/g
total organic content of contaminated soil (%)	fcs	9.20E-04	%
Henry's Law Constant (Table 1)	H'	0.226	mg/l
	Cw =	**0.20100043**	**mg/l**

EQUATION SET 2

Determine velocity of soil pore water (Vw)

STEP 1 Approximate the air filled porosity (f)

f = n - Wr

porosity (Figure 4)	n	0.48	
residual water content (Figure 5)	Wr	0.05	
	f =	**0.43**	

STEP 2 Determine the infiltration rate of water through soil for the time required to travel from the worst case sample to the water table

t = [f/Kf] [L- (Hw-Hf) { ln (Hw + L - Hf / Hw -Hf) }]

air filled porosity of soil (%)		f	0.43	%
field saturated hydraulic conductivity (cm/sec) ; from Figure 3		Kf	6.5E-04	cm/sec
distance from the worst case soil sample to the water table (cm)	ft. x 30.48	L	167.6	cm
average annual rainfall ; default value= 25cm		Hw	25	cm
wetting front suction head (cm) ; from Figure 2		Hf	-10	cm
		t =	**7.02E+04**	**sec**
			0.00223	years

STEP 3 Convert the velocity of water to feet per year

Vw= L / 30.48 / (t / 3.15E7 sec/year)

distance from the worst case soil sample to the water table (cm)	L=	167.6	
time required for water to travel distance L (seconds)	t=	7.02E+04	
	Vw=	**2466.72**	**ft/year**

EQUATION SET 3

Determine the organic retardation effect of the contaminant (Vc)

STEP 1 Calculate the soil/water distribution coefficient (Kd) for uncontaminated soil

Kd= Koc x (foc) (1x10E-6)

		Benzene
soil organic/water partitioning coeffecient from Table 1	Koc=	81 ml/g
natural organic carbon content of uncontaminated soil (mg/kg)	foc=	920 mg/kg
	Kd=	**0.07452**

STEP 2 Calculate the retardation effect of natural soil organic matter on COC migration by computing the Contaminant Percolation Rate (VC)

$$Vc = \frac{Vw}{1 + \{ (Bd \times Kd) / n \}}$$

water percolation rate (ft/yr) Eq. Set 2, Step 3	Vw=	2466.72 ft/yr
bulk density of soil (g/cc) Figure 1	Bd=	1.55 g/cc
soil water distribution coeffecient Step 1 (mg/l)	Kd=	0.07452 mg/l
porosity	n=	0.48 %
	Vc=	**1988.26 ft/yr**

EQUATION SET 4

Determine the biodegradation rates and provides final COC concentration at depth of concern

STEP 1 Calculate the time (days) required for the COC to reach ground water (Tc)

Tc= 365 x L/ 30.48 / Vc

COC percolation rate (ft/yr) Eq.Set 3, Set 2	Vc=	1988.26 ft/yr
distance from the worst case soil sample to the water table (cm)	L=	167.6 cm
	Tc=	**1.01** days

STEP 2 Calculate an estimate of the concentration of COC in the soil pore water necessary to protect ground water **Cp**

log Cp = log Crbsl + { (Tc / 2.3) x (0.693/ t 1/2)

		Benzene
Risk Based Screening Level for COC in ground water (mg/l)	Crbsl=	0.005 mg/l
time required for the COC to reach ground water (days)	Tc=	1.01 days
biodegradation " half-life" of COC (days) Table 1	t 1/2=	16 days
If Cp is greater than Cw, then it is not necessary to proceed to Equation Set V.	log Cp=	-2.28
	Cp=	**0.00522371 mg/l**

EQUATION SET 5

Determine the Site Specific Target Levels (SSTL's) for impacted soil

Cw = 0.20100043 mg/l

STEP 1 Select the Dilution/ Attenuation Factor (DAF)

Sandy Soil (hydraulic conductivity > 10E-4 cm/sec)	**DAF=** 8
Clayey Soil (hydraulic conductivity < 10E-4 cm/sec)	**DAF=** 2

STEP 2 Determine the site specific target level of the COC in soil

C sstl = DAF x Cp x Koc x fcs

Dilution / Attenuation Factor Table 2 (unitless)	DAF=	8
Concentration in soil pore water necessary to protect ground water (mg/l)	Cp=	0.00522371 mg/l
Soil organic/ water partitioning coefficient (ml/g)	Koc=	81 ml/g
total organic carbon content of the contaminated soil	fcs=	9.20E-04 %
	Csstl=	**0.00311417 mg/kg**

SOIL RISK EVALUATION DATA

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D

Total Petroleum Hydrocarbons (TPH)			0	mg/kg
SOIL % SAND			70	%
SOIL % CLAY			7	%
Worst Case Soil Analyses	Benzene	Cs=	0.033	mg/kg
	Toluene	Cs=	0.0067	mg/kg
	Ethylbenzene	Cs=	0.0005	mg/kg
	Xylenes	Cs=	0.011	mg/kg
	Naphthalene	Cs=	0.0005	mg/kg
Natural Organic Carbon Content		foc=	920	mg/kg
Average Annual Recharge		Hw=	25	cm
Distance from highest Soil Contamination to the Water Table		L=	167.6	cm
Bulk Density of Soil (Figure 1)		Bd=	1.55	g/cc
Wetting Front Suction Head (Figure 2)		Hf=	-10	cm
Soil Hydraulic Conductivity (Figure 3)		Kf=	0.00065	cm/sec
porosity (Figure 4)		n=	0.48	decimal %
Residual Water Content (Figure 5)		Wr=	0.05	decimal %

List possible Human Exposure Pathways from surface soil

1. Infiltration through soil to ground water, transport to a surface water body, lending to possible dermal contact or ingestion.

Benzene

Bioremediation " half life " (Table1)	t 1/2=	16	days
Soil/ Water partitioning coefficient (Table 2)	Koc=	81	ml/g

Results

Total Organic Carbon Content	f cs=	9.20E-04	decimal %
Leachate Concentration	Cw=	0.201000434	mg/l
Air Filled Porosity	f=	0.43	decimal %
Infiltration Rate Time	t=	7.02E+04	seconds
Velocity of Water	Vw=	2466.72	ft/yr
Soil/ Water Distribution Coefficient	Kd=	7.45E-02	ml/g
Contaminant percolation Rate	Vc=	1988.26	ft/yr
Time to reach Ground Water	Tc=	1.01	days
Maximum allowable COC concentration	Cp=	0.005223711	mg/l
Site Specific Target Level	Csstl=	0.003114168	mg/kg

SOIL RISK EVALUATION DATA

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D

TOLUENE

Bioremediation " half life "	t 1/2=	22	days
Soil/ Water partitioning coefficient	Koc=	133	ml/g

Results

Total Organic Carbon Content	f cs=	9.20E-04	decimal %
Leachate Concentration	Cw=	0.02904456	mg/l
Air Filled Porosity	f=	0.43	decimal %
Infiltration Rate Time	t=	7.02E+04	seconds
Velocity of Water	Vw=	2466.72	ft/yr
Soil/ Water Distribution Coefficient	Kd=	1.22E-01	ml/g
Contaminant percolation Rate	Vc=	1768.10	ft/yr
Time to reach Ground Water	Tc=	1.14	days

Maximum allowable COC concentration	Cp=	1032.34499	mg/l
Site Specific Target Level	Csstl=	1010.54186	mg/kg

ETHYLBENZENE

Bioremediation " half life "	t 1/2=	10	days
Soil/ Water partitioning coefficient	Koc=	176	ml/g

Results

Total Organic Carbon Content	f cs=	9.20E-04	decimal %
Leachate Concentration	Cw=	0.00189854	mg/l
Air Filled Porosity	f=	0.43	decimal %
Infiltration Rate Time	t=	7.02E+04	seconds
Velocity of Water	Vw=	2466.72	ft/yr
Soil/ Water Distribution Coefficient	Kd=	0.16	ml/g
Contaminant percolation Rate	Vc=	1619.78	ft/yr
Time to reach Ground Water	Tc=	1.24	days

Maximum allowable COC concentration	Cp=	750.780036	mg/l
Site Specific Target Level	Csstl=	972.530427	mg/kg

SOIL RISK EVALUATION DATA

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D

XYLENES

Bioremediation " half life "	t 1/2=	28	days
Soil/ Water partitioning coefficient	Koc=	639	ml/g

Results

Total Organic Carbon Content	f cs=	0.00092	decimal %
Leachate Concentration	Cw=	0.01628493	mg/l
Air Filled Porosity	f=	0.43	decimal %
Infiltration Rate Time	t=	70218.3427	seconds
Velocity of Water	Vw=	2466.71532	ft/yr
Soil/ Water Distribution Coefficient	Kd=	0.58788	ml/g
Contaminant percolation Rate	Vc=	851.07205	ft/yr
Time to reach Ground Water	Tc=	2.35822689	days

Maximum allowable COC concentration Cp= **10253.2698 mg/l**

Site Specific Target Level Csstl= **48221.5379 mg/kg**

NAPHTHALENE

Bioremediation " half life "	t 1/2=	48	days
Soil/ Water partitioning coefficient	Koc=	1543	ml/g

Results

Total Organic Carbon Content	f cs=	0.00092	decimal %
Leachate Concentration	Cw=	0.03603447	mg/l
Air Filled Porosity	f=	0.43	decimal %
Infiltration Rate Time	t=	70218.3427	seconds
Velocity of Water	Vw=	2466.71532	ft/yr
Soil/ Water Distribution Coefficient	Kd=	1.41956	ml/g
Contaminant percolation Rate	Vc=	441.747342	ft/yr
Time to reach Ground Water	Tc=	4.54336859	days

Maximum allowable COC concentration Cp= **25.3674258 mg/l**

Site Specific Target Level Csstl= **288.084664 mg/kg**

BIOSCREEN NATURAL ATTENUATION MODEL

SUMMARY of CONTAMINANT FATE and TRANSPORT PARAMETERS and SIMULATION RESULTS

Crown SC- 015
3800 Devine Street Columbia, South Carolina
Site ID No. 07680 AT&E Job No. 1044D

Contaminant	Initial Concentration	Calculated Plume Mass (kg)	Simulated Concentration (ug/l) POC	Simulated Concentration (ug/l) Receptor	SSTL Concentration (ug/l) Source	SSTL Concentration (ug/l) POC
Benzene	19,000	23.5	170	0	1,500	462
Toluene	86,000	106	9,982	3,500	2,000	1,141
Ethylbenzene	3,500	4.3	0	0	> obs. max	0
Xylene	2,200	2.7	0	0	> obs. max	0
MTBE	4,000	0.5	0	0	> obs. max	0
Naphthalene	6,000	7.4	0	0	> obs. max	0

1. *Plume Mass was calculated using the worst case concentration and the volume of ground water in the contaminant plume calculated in the calibratiion simulation.*
2. *> obs. max - greater than the observed Initial concentration at the source area (MW-5, 1993)*
3. *Simulated Concentrations were maximized at the potential receptor after a period of 20 years*
4. *SSTL Concentrations were maximized at the potential receptor after a period of 5 years*

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 — 1. Enter value directly, or
or — 2. Calculate by filling in grey
0.02 — cells below. (To restore formulas, hit button below).

Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	56.8	(ft/yr)
or		↑ or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.17	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		↑ or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

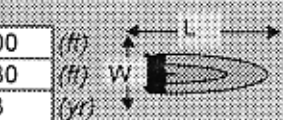
Retardation Factor*	R	1.3	(-)
or		↑ or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	9.20E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		↑ or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	200	(ft)
Modeled Area Width*	180	(ft)
Simulation Time*	3	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

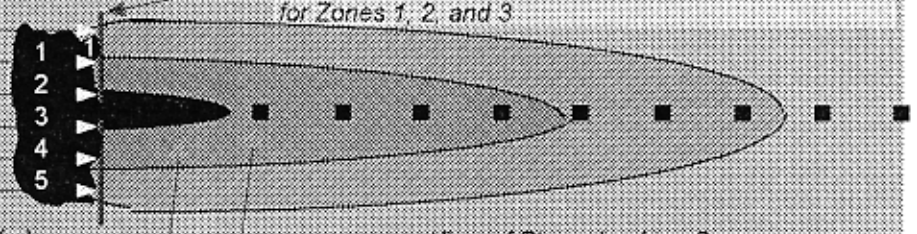
Source Zones:

Width* (ft)	Conc. (mg/L)*
20	1
30	19
35	25
30	19
20	1

Source Decay (see Help):

SourceHalflife*	2 - 3	(yr)
Soluble Mass	↑ or	
In NAPL, Soil	23.4	(Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	Concentration (mg/L)
0	
20	
40	
60	
80	
100	12.0
120	
140	
160	
180	1.2
200	

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — **View Output**

RUN ARRAY — **View Output**

Help

Recalculate This Sheet

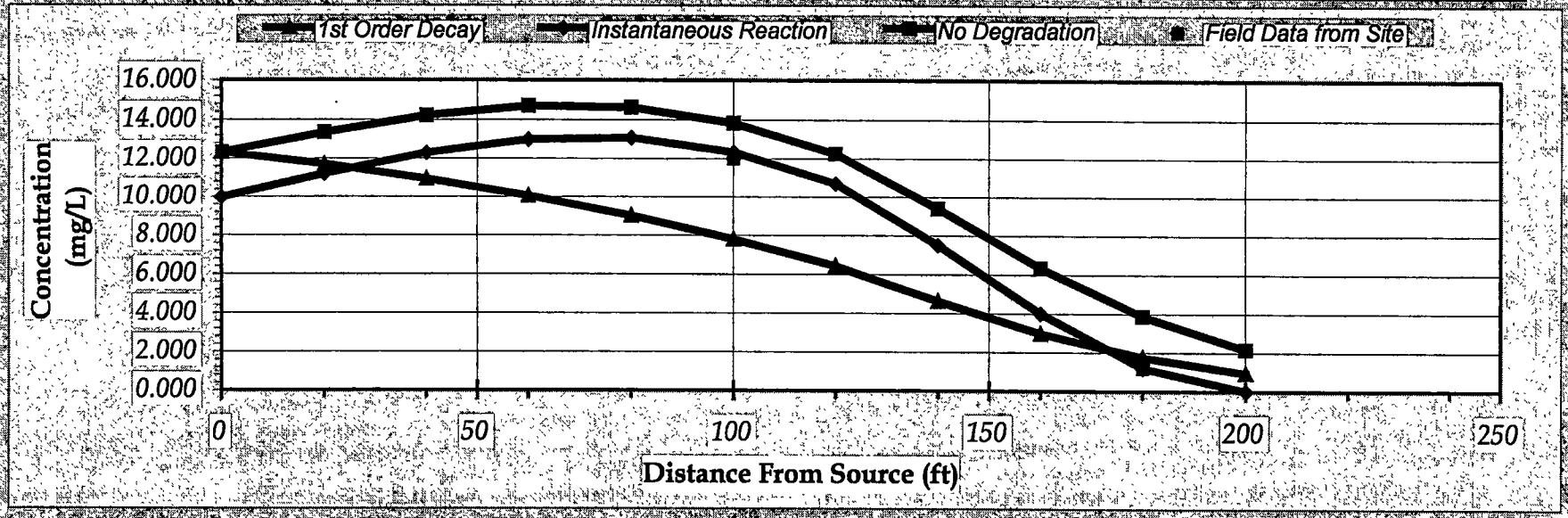
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 1. Calibration Simulation for Benzene - 3 years Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft) 0	20	40	60	80	100	120	140	160	180	200
No Degradation	12.321	13.353	14.212	14.693	14.626	13.831	12.256	9.394	6.325	3.872	2.142
1st Order Decay	12.321	11.709	10.936	10.040	9.004	7.791	6.413	4.629	2.969	1.748	0.937
Inst. Reaction	9.975	11.201	12.294	12.993	13.083	12.345	10.699	7.493	3.999	1.201	0.000
Field Data from Site						12.000				1.200	



Calculate Animation

Time:

3 Years

Return to Input

Recalculate This Sheet

Simulatin 1. Calibration Simulation for Benzene - 3 years. Centerline Output

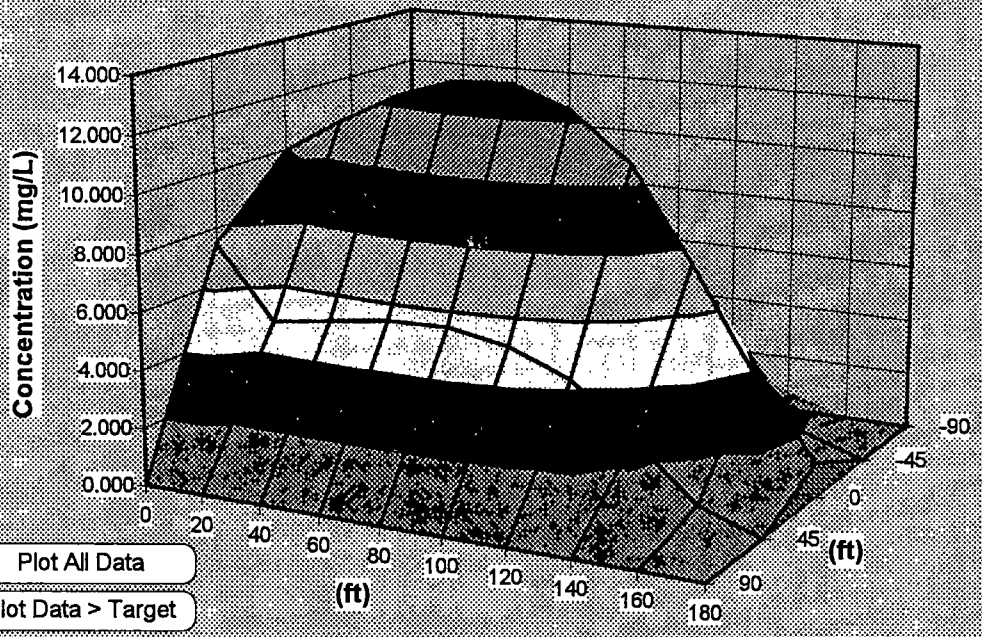
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) Y	Distance from Source (ft) 0	20	40	60	80	100	120	140	160	180	200
90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	7.431	4.928	5.212	5.494	5.522	5.143	4.294	2.602	0.734	0.000	0.000
0	9.975	11.201	12.294	12.993	13.083	12.345	10.699	7.493	3.999	1.201	0.000
-45	7.431	4.928	5.212	5.494	5.522	5.143	4.294	2.602	0.734	0.000	0.000
-90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: 3 Years Target Level: 0.005 mg/L Displayed Model: Inst. Reaction



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	13.5	(Kg)
- Actual Plume Mass	8.4	(Kg)
= Plume Mass Removed by Biodeg	5.0	(Kg) (37 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-7.5	-3.6	+42.1	+0.0	+0.0	(Kg)

Original Mass In Source (Time = 0 Years)	23.4	(Kg)
Mass In Source Now (Time = 3Years)	9.9	(Kg)
Current Volume of Groundwater in Plume	1.0	(ac-ft)
Flowrate of Water Through Source Zone	0.294	(ac-ft/yr)

Mass HELP

Recalculate

Simulation 1. Calibration Simulation for Benzene - 3 years Centerline Output

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 or 0.02 — 1. Enter value directly, or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* — Data used directly in model

20 — Value calculated by model. (Don't enter any data)

1. HYDROGEOLOGY

Seepage Velocity*	Vs	56.8	(ft/yr)
or			
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.17	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or			
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

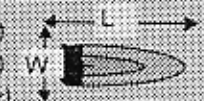
Retardation Factor*	R	1.3	(-)
or			
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	9.20E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or			
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	500	(ft)
Modeled Area Width*	180	(ft)
Simulation Time*	6.5	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

Source Zones

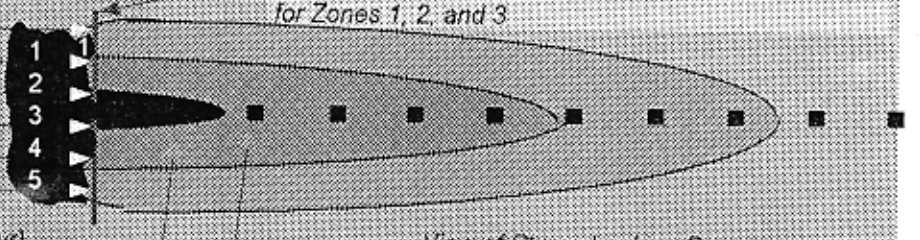
Width* (ft)	Conc. (mg/L)*
20	1
30	19
35	25
30	19
20	1

Source Decay (see Help)

Source Halflife* 2 - 3 (yr)

Soluble Mass in NAPL Soil or 23.4 (Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells. If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	50	100	150	200	250	300	350	400	450	500
Concentration (mg/L)			5.7		.005						

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

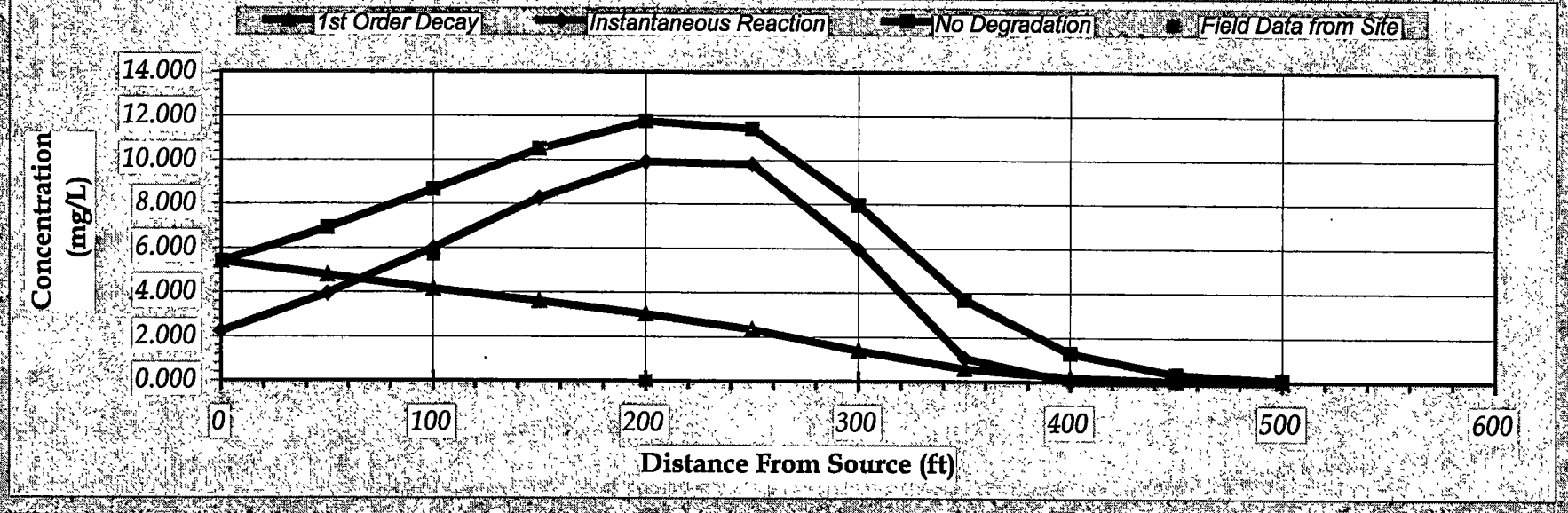
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 1. Calibration Simulation for Benzene - 7 years Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft) 0	50	100	150	200	250	300	350	400	450	500
No Degradation	5.397	6.905	8.642	10.505	11.775	11.429	7.942	3.693	1.287	0.328	0.060
1st Order Decay	5.397	4.768	4.154	3.601	3.018	2.332	1.373	0.569	0.183	0.044	0.008
Inst. Reaction	2.244	3.952	6.001	8.253	9.922	9.809	5.946	1.048	0.000	0.000	0.000
Field Data from Site			5.700		0.005						



Calculate Animation

Time: 7 Years

Return to Input

Recalculate This Sheet

Simulation 1. Calibration Simulation for Benzene - 7 years. Centerline Output

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ψ	Distance from Source (ft) 0	50	100	150	200	250	300	350	400	450	500
90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
45	1.309	0.686	1.760	3.055	4.122	4.241	2.163	0.000	0.000	0.000	0.000
0	2.244	3.952	6.001	8.253	9.922	9.809	5.946	1.048	0.000	0.000	0.000
-45	1.309	0.686	1.760	3.055	4.122	4.241	2.163	0.000	0.000	0.000	0.000
-90	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

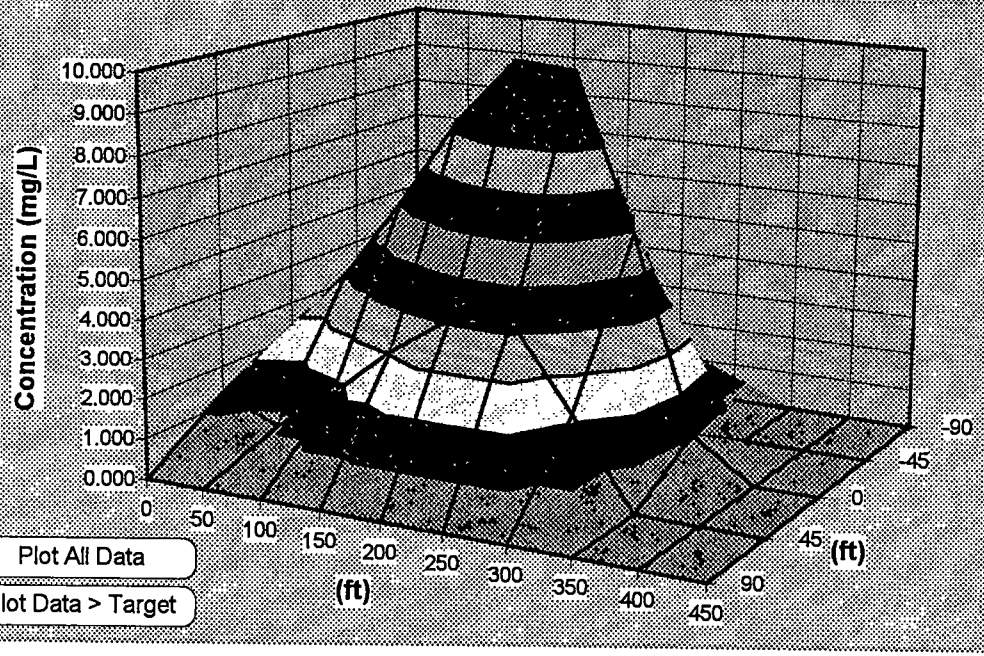
Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: 6.5 Years

Target Level: 0.005 mg/L

Displayed Model: Inst. Reaction



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation:	19.8	(Kg)
- Actual Plume Mass:	9.7	(Kg)
= Plume Mass Removed by Biodeg:	10.1	(Kg) (51 %)

Change in Electron Acceptor/Byproduct Masses:

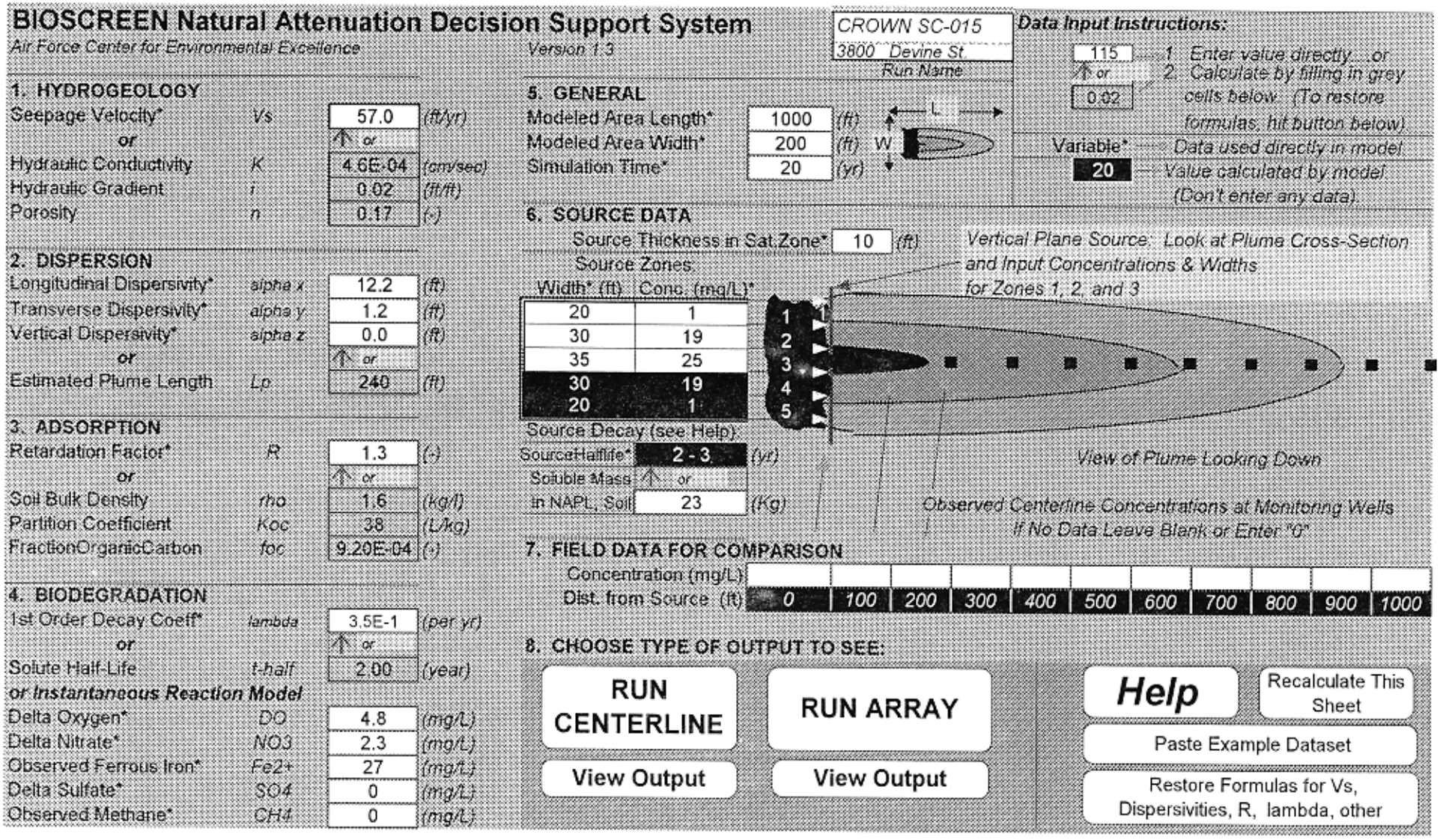
Oxygen	Nitrate	Iron II	Sulfate	Methane	
-14.9	-7.2	+83.9	+0.0	+0.0	(Kg)

Original Mass In Source (Time = 0 Years):	23.4	(Kg)
Mass In Source Now (Time = 6.5Years):	3.6	(Kg)
Current Volume of Groundwater in Plume:	1.9	(ac-ft)
Flowrate of Water Through Source Zone:	0.294	(ac-ft/yr)

Mass HELP

Recalculate

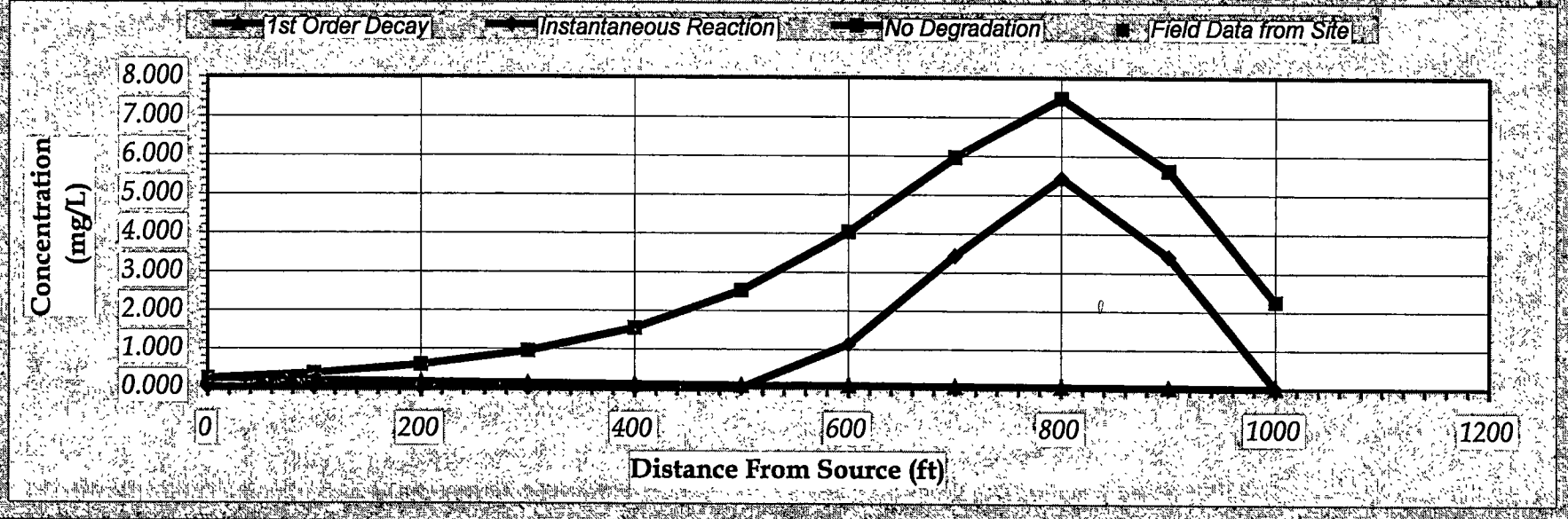
Simulation 1. Calibration Simulation for Benzene - 7 yearsCenterline Output



Simulation 2. Transport Simulation for Benzene after 20 years. Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft) 0	100	200	300	400	500	600	700	800	900	1000
No Degradation	0.220	0.359	0.583	0.950	1.550	2.528	4.035	5.963	7.476	5.620	2.253
1st Order Decay	0.220	0.170	0.132	0.102	0.079	0.062	0.048	0.038	0.028	0.014	0.004
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	1.134	3.437	5.429	3.414	0.000
Field Data from Site											



Calculate Animation

Time:

20 Years

Return to Input

Recalculate This Sheet

Simulation 2 . Transport Simulation for Benzene after 20 years. Centerline Output

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓	Distance from Source (ft) 0	100	200	300	400	500	600	700	800	900	1000
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.983	2.447	1.264	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	1.134	3.437	5.429	3.414	0.000
-50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.983	2.447	1.264	0.000
-100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

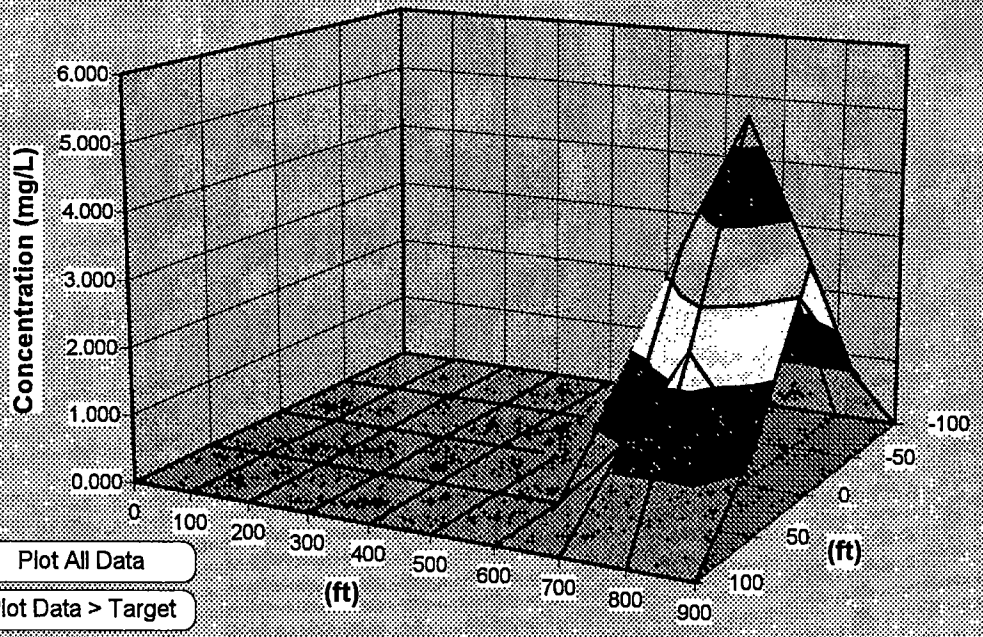
Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: 20 Years

Target Level: 0.005 mg/L

Displayed Model: Inst. Reaction



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	23.3	(Kg)
- Actual Plume Mass	5.9	(Kg)
= Plume Mass Removed by Biodegr	17.4	(Kg) (75 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-25.9	-12.4	+145.5	+0.0	+0.0	(Kg)

Original Mass in Source (Time = 0 Years)	23.4	(Kg)
Mass in Source Now (Time = 20Years)	0.1	(Kg)
Current Volume of Groundwater in Plume	1.9	(ac-ft)
Flowrate of Water Through Source Zone	0.295	(ac-ft/yr)

Mass HELP

Recalculate

Simulation 2. Transport Simulation for Benzene after 20 years. Plume Output.

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 or 0.02 — 1. Enter value directly ...or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* — Data used directly in model

20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	57.0	(ft/yr)
or		or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.167	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

Retardation Factor*	R	1.3	(-)
or		or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	8.00E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	1200	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	20	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

Source Zones

Width* (ft)	Conc. (mg/L)*
10	1
28	10
30	86
28	10
10	1

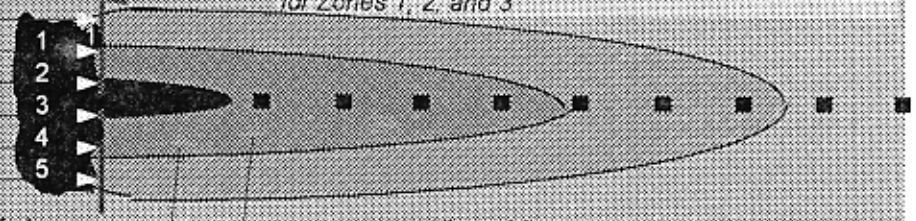
Source Decay (see Help)

SourceHalflife* 8 - 9 (yr)

Soluble Mass: or:

In NAPL Soil 106 (Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	120	240	360	480	600	720	840	960	1080	1200
Concentration (mg/L)											

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

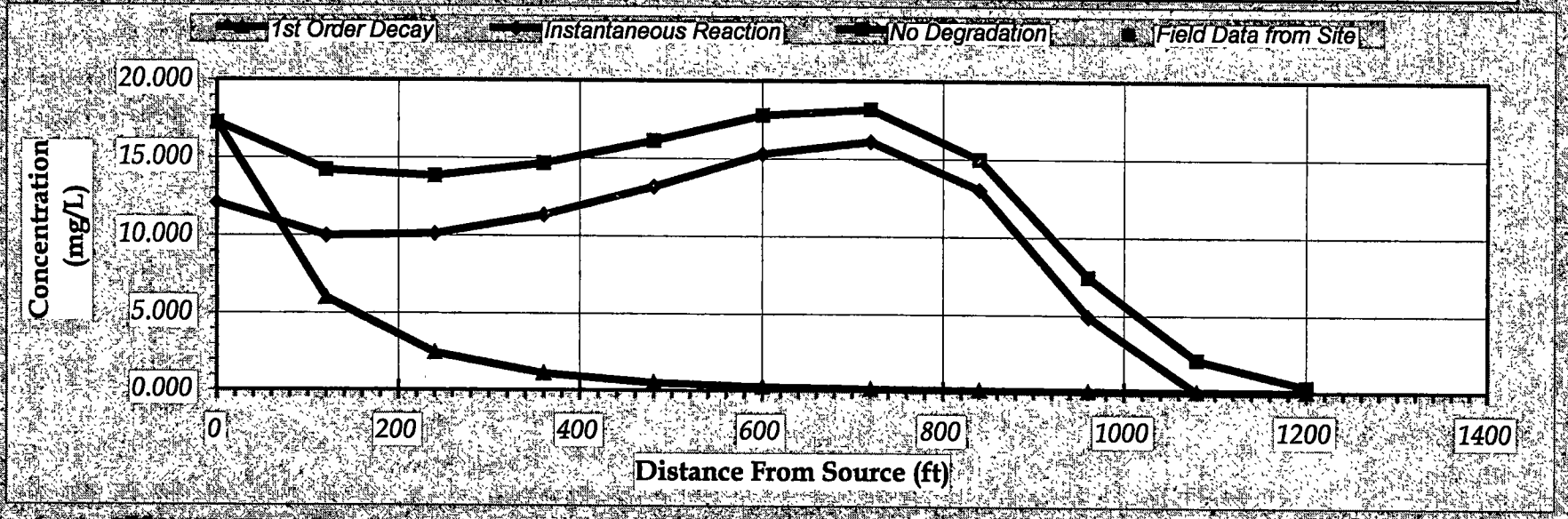
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 2. Transport Simulation for Toluene after 20 years Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

	Distance from Source (ft)										
TYPE OF MODEL	0	120	240	360	480	600	720	840	960	1080	1200
No Degradation	17.257	14.200	13.831	14.667	16.142	17.800	18.190	14.988	7.441	2.115	0.347
1st Order Decay	17.257	5.976	2.449	1.093	0.508	0.241	0.115	0.052	0.017	0.004	0.001
Inst. Reaction	12.094	9.982	10.113	11.325	13.188	15.289	16.105	13.035	4.908	0.000	0.000
Field Data from Site											



Calculate Animation

Time

20 Years

Return to Input

Recalculate This Sheet

Simulation 2. Transport Simulation for Toluene after 20 years Centerline Output

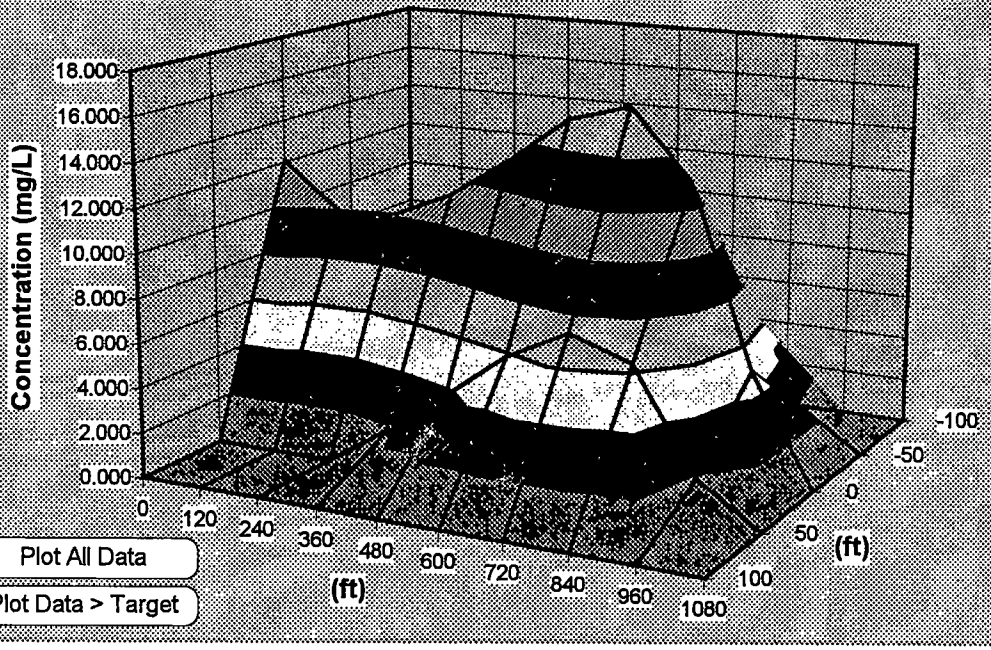
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft) →	0	120	240	360	480	600	720	840	960	1080	1200
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	1.750	3.748	5.859	7.281	6.314	1.837	0.000	0.000
0	12.094	9.982	10.113	11.325	13.188	15.289	16.105	13.035	4.908	0.000	0.000
-50	0.000	0.000	0.000	1.750	3.748	5.859	7.281	6.314	1.837	0.000	0.000
-100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: **20 Years** Target Level: **0.005** mg/L Displayed Model: **Inst. Reaction**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass If No Biodegradation	88.1	(Kg)
- Actual Plume Mass	53.9	(Kg)
= Plume Mass Removed by Biodeg	34.3	(Kg)
	(39 %)	

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-50.8	-24.4	+285.9	+0.0	+0.0	(Kg)

Original Mass In Source (Time = 0 Years)	106.0	(Kg)
Mass In Source Now (Time = 20Years)	17.9	(Kg)
Current Volume of Groundwater in Plume	4.8	(ac-ft)
Flowrate of Water Through Source Zone	0.232	(ac-ft/yr)

Mass HELP Recalculate

Simulation 2. Treansport Simulation for Toluene after 20 years. Plume Output

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 / or / 0.02 — 1. Enter value directly... or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* — Data used directly in model

20 — Value calculated by model (Don't enter any data)

1. HYDROGEOLOGY

Seepage Velocity*	Vs	57.0	(ft/yr)
or		↑ or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.167	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		↑ or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

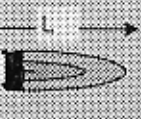
Retardation Factor*	R	1.3	(-)
or		↑ or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	8.00E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		↑ or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	400	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	12	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

Source Zones

Width* (ft)	Conc. (mg/L)*
20	0.1
30	0.96
35	1.5
30	0.96
20	0.1

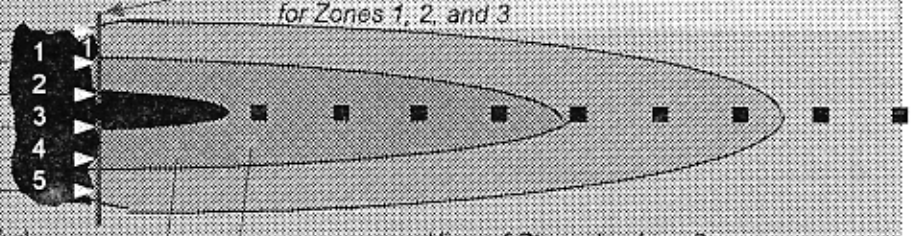
Source Decay (see Help):

Source Halflife* 10 - 50 (yr)

Soluble Mass ↑ or

In NAPL, Soil 23 (Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
Concentration (mg/L)											

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — **View Output**

RUN ARRAY — **View Output**

Help

Recalculate This Sheet

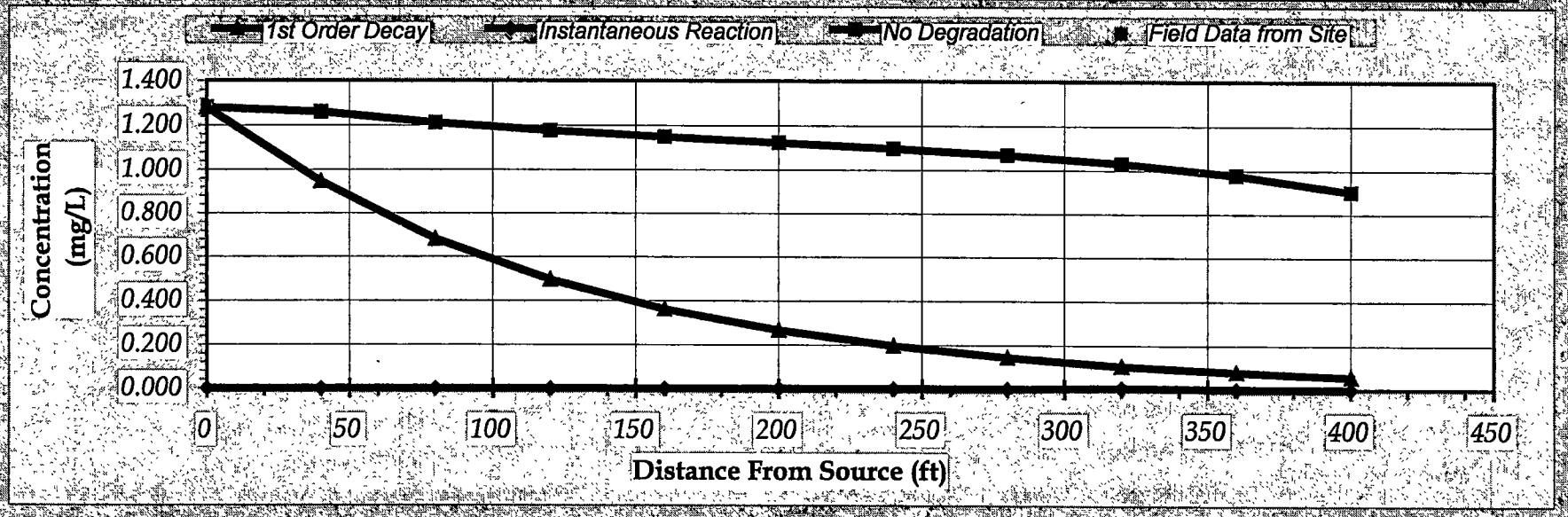
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 3. SSTL Simulation for Benzene at Source. Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft) 0	40	80	120	160	200	240	280	320	360	400
No Degradation	1.281	1.261	1.212	1.176	1.148	1.123	1.097	1.068	1.030	0.978	0.902
1st Order Decay	1.281	0.945	0.681	0.495	0.362	0.266	0.195	0.144	0.106	0.077	0.056
Inst. Reaction	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000
Field Data from Site											



Calculate Animation

Time:

12 Years

Return to Input

Recalculate This Sheet

Simulation 3 . SSTL simulation for Benzene at source. Centerline Output

DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓	Distance from Source (ft) 0	40	80	120	160	200	240	280	320	360	400
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.005	0.000	0.000
-50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

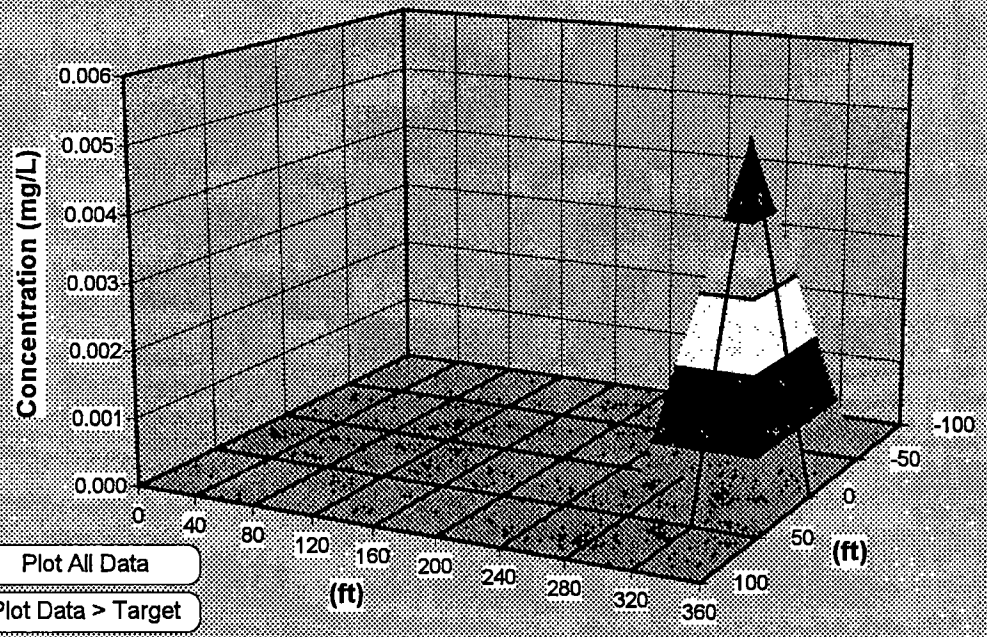
Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: 12 Years

Target Level: 0.005 mg/L

Displayed Model: Inst. Reaction



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	12.5	(Kg)
- Actual Plume Mass	0.0	(Kg)
= Plume Mass Removed by Biodeg	12.5	(Kg) (100 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-18.5	-8.9	+104.0	+0.0	+0.0	(Kg)

Original Mass In Source (Time = 0 Years)	23.4	(Kg)
Mass in Source Now (Time = 12Years)	10.9	(Kg)
Current Volume of Groundwater in Plume	0.1	(ac-ft)
Flowrate of Water Through Source Zone	0.295	(ac-ft/yr)

Mass HELP

Recalculate

Simulation 3. SSTL simulation for Benzene at source. Plume Output

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 or 0.02 — 1. Enter value directly ...or 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data).

1. HYDROGEOLOGY

Seepage Velocity*	Vs	57.0	(ft/yr)
or		or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.167	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

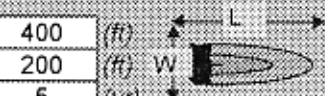
Retardation Factor*	R	1.3	(-)
or		or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	8.00E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	400	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	5	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

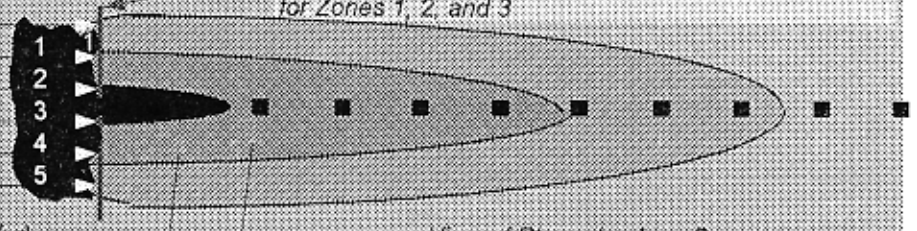
Source Zones

Width* (ft)	Conc. (mg/L)*
20	0.1
30	1
35	1.5
30	1
20	0.1

Source Decay (see Help):

SourceHalflife*	10 - 50	(yr)
Soluble Mass	or	
In NAPL Soil	23	(Kg)

Vertical Plane Source. Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells. If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
Concentration (mg/L)											

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — **View Output**

RUN ARRAY — **View Output**

Help

Recalculate This Sheet

Paste Example Dataset

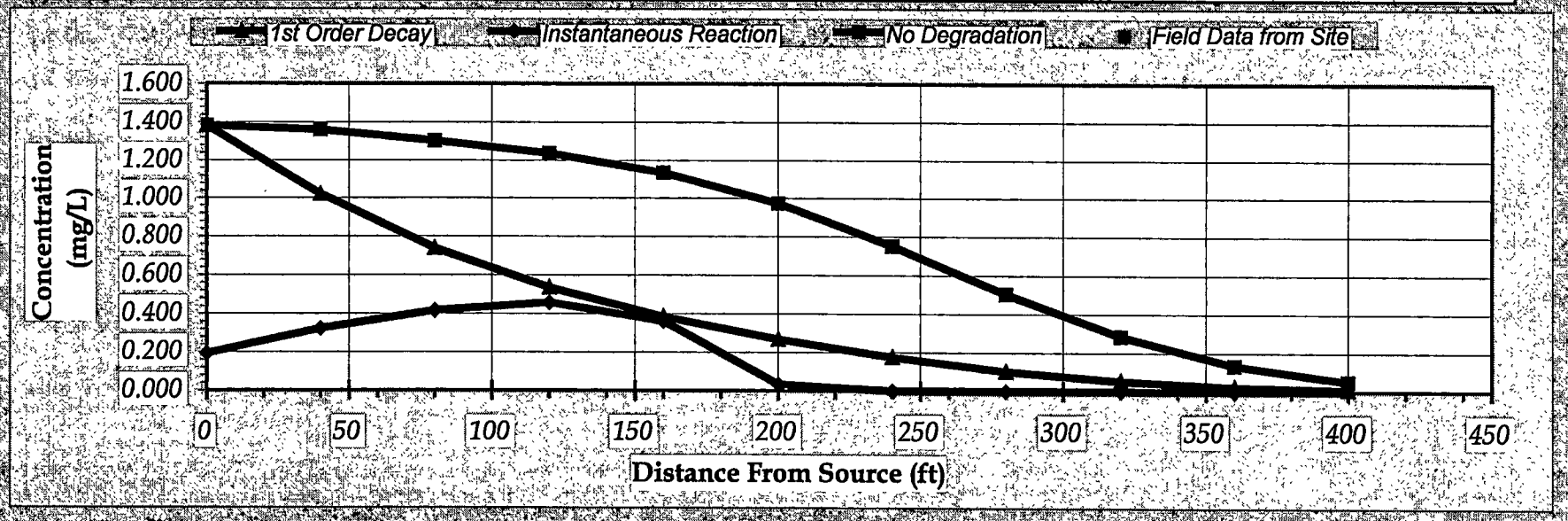
Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 3. SSTL Simulation for Benzene at POC Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

Distance from Source (ft)

TYPE OF MODEL	0	40	80	120	160	200	240	280	320	360	400
No Degradation	1.401	1.372	1.297	1.189	1.012	0.763	0.483	0.249	0.102	0.033	0.008
1st Order Decay	1.401	1.034	0.744	0.531	0.366	0.234	0.131	0.061	0.024	0.007	0.002
Inst. Reaction	0.379	0.501	0.551	0.462	0.108	0.000	0.000	0.000	0.000	0.000	0.000
Field Data from Site											



Calculate Animation

Time:

5 Years

Return to Input

Recalculate This Sheet

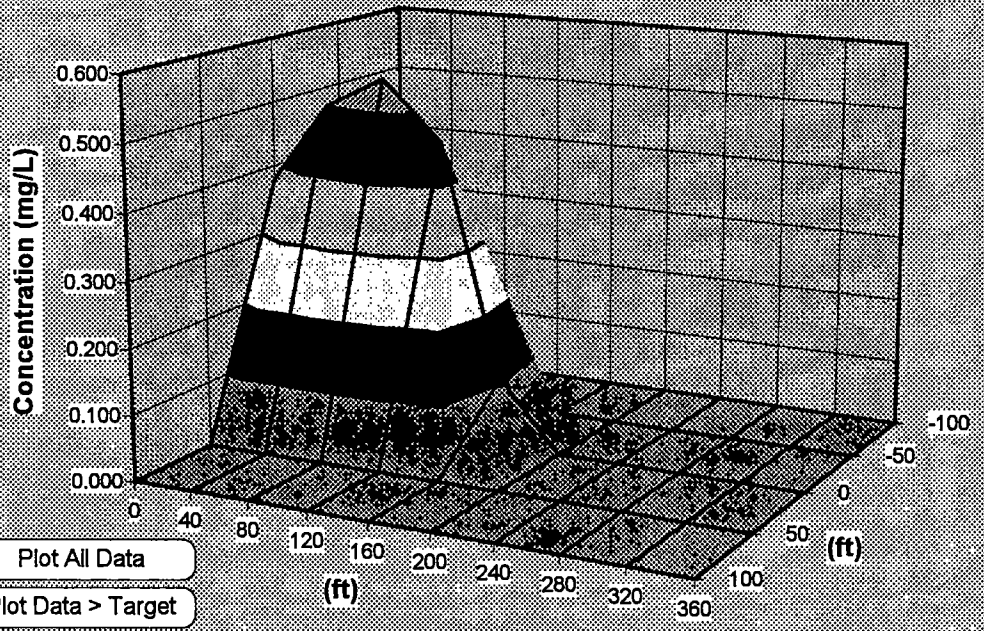
DISSOLVED HYDROCARBON CONCENTRATIONS IN PLUME (mg/L at Z=0)

Transverse Distance (ft) ↓ / Distance from Source (ft) →	0	40	80	120	160	200	240	280	320	360	400
100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
0	0.379	0.501	0.551	0.462	0.108	0.000	0.000	0.000	0.000	0.000	0.000
-50	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
-100	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Model to Display:

- No Degradation Model
- 1st Order Decay Model
- Instantaneous Reaction Model

Time: **5 Years** Target Level: **0.005** mg/L Displayed Model: **Inst. Reaction**



Plot All Data

Plot Data > Target

Plume and Source Masses (Order-of-Magnitude Accuracy)

Plume Mass if No Biodegradation	6.4	(Kg)
- Actual Plume Mass	0.2	(Kg)
= Plume Mass Removed by Biodeg	6.2	(Kg) (97 %)

Change in Electron Acceptor/Byproduct Masses:

Oxygen	Nitrate	Iron II	Sulfate	Methane	
-9.1	-4.4	+51.4	+0.0	+0.0	(Kg)

Original Mass In Source (Time = 0 Years)	23.0	(Kg)
Mass In Source Now (Time = 5Years)	16.6	(Kg)
Current Volume of Groundwater in Plume	0.4	(ac-ft)
Flowrate of Water Through Source Zone	0.295	(ac-ft/yr)

Mass HELP Recalculate

SIMULATION 3. SSTL Simulation for Benzene at POC Plume Output.

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence — *Version 1.3*

CROWN SC-015
3800 Devine St
Run Name

Data Input Instructions:

115 — 1. Enter value directly...or
or — 2. Calculate by filling in grey
0.02 — cells below. (To restore
formulas, hit button below)

Variable* — Data used directly in model.
20 — Value calculated by model.
(Don't enter any data)

1. HYDROGEOLOGY

Seepage Velocity*	Vs	57.0	(ft/yr)
or		↑ or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.167	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		↑ or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

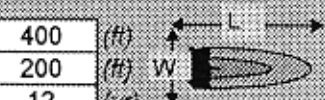
Retardation Factor*	R	1.3	(-)
or		↑ or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	8.00E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		↑ or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	400	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	12	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

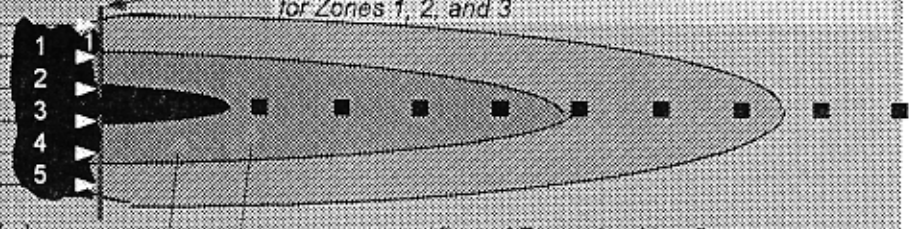
Source Zones:

Width* (ft)	Conc. (mg/L)*
20	0.1
30	1
35	2
30	1
20	0.1

Source Decay (see Help):

SourceHalflife*	50 - 200	(yr)
Soluble Mass	↑ or	
in NAPL, Soil	106	(Kg)

Vertical Plane Source. Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
Concentration (mg/L)											

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — **View Output**

RUN ARRAY — **View Output**

Help

Recalculate This Sheet

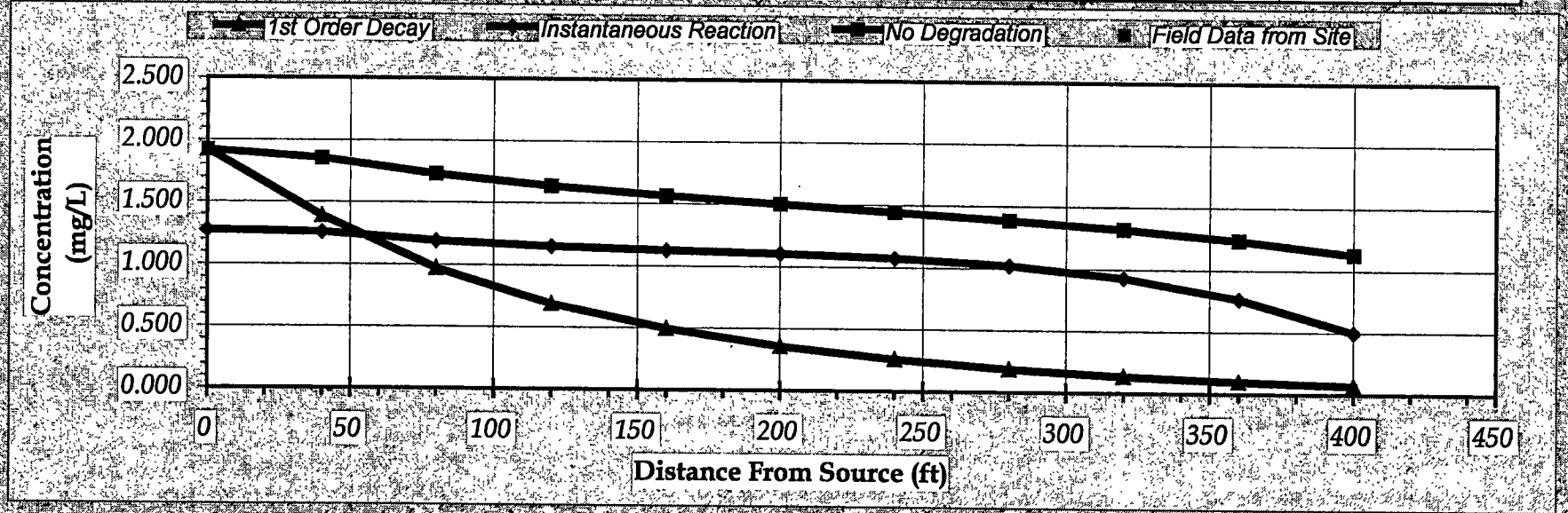
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 3. SSTL Simulation for Toluene at Source. Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft) 0	40	80	120	160	200	240	280	320	360	400
No Degradation	1.920	1.852	1.727	1.635	1.562	1.500	1.443	1.385	1.319	1.236	1.127
1st Order Decay	1.920	1.388	0.970	0.688	0.493	0.355	0.257	0.186	0.135	0.098	0.070
Inst. Reaction	1.271	1.256	1.190	1.151	1.126	1.104	1.074	1.023	0.930	0.765	0.498
Field Data from Site											



Calculate Animation

Time:

12 Years

Return to Input

Recalculate This Sheet

Simulation 3 . SSTL simulation for Toluene at source. Centerline Output

BIOSCREEN Natural Attenuation Decision Support System

Air Force Center for Environmental Excellence

Version 1.3

CROWN SC-015
3800 Devine St.
Run Name

Data Input Instructions:

115 — 1. Enter value directly ... or
or
0.02 — 2. Calculate by filling in grey cells below. (To restore formulas, hit button below)

Variable* — Data used directly in model.
20 — Value calculated by model. (Don't enter any data)

1. HYDROGEOLOGY

Seepage Velocity*	Vs	57.0	(ft/yr)
or		or	
Hydraulic Conductivity	K	4.6E-04	(cm/sec)
Hydraulic Gradient	i	0.02	(ft/ft)
Porosity	n	0.167	(-)

2. DISPERSION

Longitudinal Dispersivity*	alpha x	12.2	(ft)
Transverse Dispersivity*	alpha y	1.2	(ft)
Vertical Dispersivity*	alpha z	0.0	(ft)
or		or	
Estimated Plume Length	Lp	240	(ft)

3. ADSORPTION

Retardation Factor*	R	1.3	(-)
or		or	
Soil Bulk Density	rho	1.6	(kg/l)
Partition Coefficient	Koc	38	(L/kg)
FractionOrganicCarbon	foc	6.00E-04	(-)

4. BIODEGRADATION

1st Order Decay Coeff*	lambda	3.5E-1	(per yr)
or		or	
Solute Half-Life	t-half	2.00	(year)
or Instantaneous Reaction Model			
Delta Oxygen*	DO	4.8	(mg/L)
Delta Nitrate*	NO3	2.3	(mg/L)
Observed Ferrous Iron*	Fe2+	27	(mg/L)
Delta Sulfate*	SO4	0	(mg/L)
Observed Methane*	CH4	0	(mg/L)

5. GENERAL

Modeled Area Length*	400	(ft)
Modeled Area Width*	200	(ft)
Simulation Time*	5	(yr)



6. SOURCE DATA

Source Thickness in Sat.Zone* 10 (ft)

Source Zones:

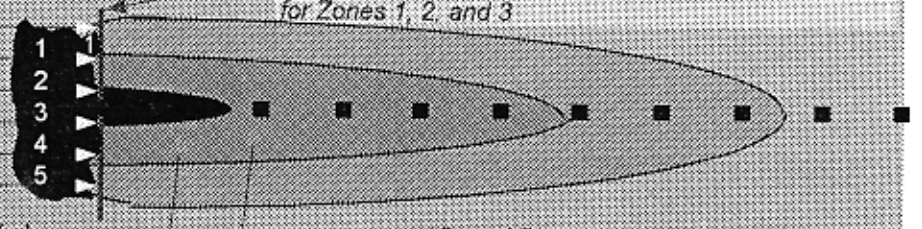
Width* (ft)	Conc. (mg/L)*
20	0.1
30	1
35	2
30	1
20	0.1

Source Decay (see Help):

Source Half-life* 50 - 200 (yr)

Soluble Mass or
in NAPL, Soil 106 (Kg)

Vertical Plane Source: Look at Plume Cross-Section and Input Concentrations & Widths for Zones 1, 2, and 3



View of Plume Looking Down

Observed Centerline Concentrations at Monitoring Wells
If No Data Leave Blank or Enter "0"

7. FIELD DATA FOR COMPARISON

Dist. from Source (ft)	0	40	80	120	160	200	240	280	320	360	400
Concentration (mg/L)											

8. CHOOSE TYPE OF OUTPUT TO SEE:

RUN CENTERLINE — View Output

RUN ARRAY — View Output

Help

Recalculate This Sheet

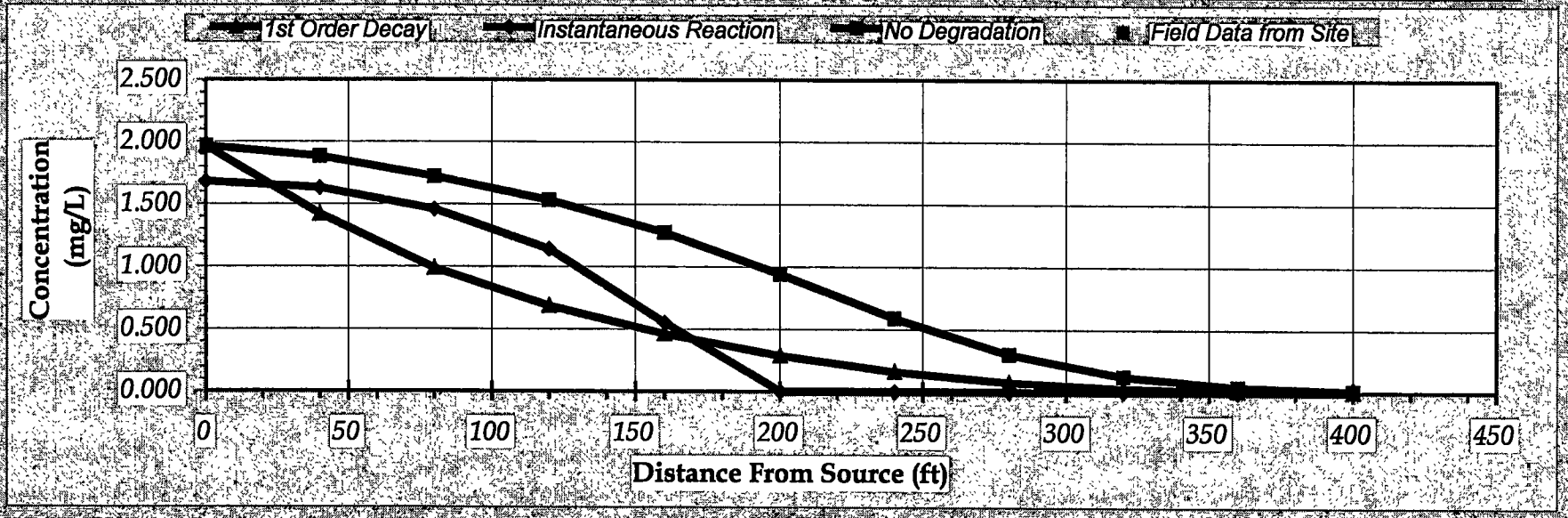
Paste Example Dataset

Restore Formulas for Vs, Dispersivities, R, lambda, other

Simulation 3. SSTL Simulation for Toluene at POC. Input Screen

DISSOLVED HYDROCARBON CONCENTRATION ALONG PLUME CENTERLINE (mg/L at Z=0)

TYPE OF MODEL	Distance from Source (ft)										
	0	40	80	120	160	200	240	280	320	360	400
No Degradation	1.966	1.883	1.720	1.532	1.274	0.940	0.588	0.301	0.123	0.039	0.010
1st Order Decay	1.966	1.419	0.986	0.684	0.461	0.288	0.159	0.074	0.028	0.009	0.002
Inst. Reaction	1.681	1.631	1.458	1.141	0.551	0.000	0.000	0.000	0.000	0.000	0.000
Field Data from Site											



Calculate Animation

Time:

5 Years

Return to Input

Recalculate This Sheet

Simulation 3 . SSTL simulation for Toluene at POC. Centerline Output

BORING LOGS

GEOLOGIST LOG

Boring/Well No: MW-15

Project: Crown SC-015	**Location:** 3800 Devine Street	**Logged By:** M. Hudgins		
County: Richland **State:** South Carolina	**Latitude/Longitude:**	**Drilling/Installation Date:** 1/9/97	**Drilled Depth:** 35.5 ft.	**Well Depth:** 35.5 ft.
Driller: R. Neis **Drilling Co.:** ECS, Inc.	**Method:** Hollow Stem Auger **Equipment:**	**Development Method:** Dry **Sampling Method:** Cuttings		
TOC Elevation:	**Ground Elevation:**	**Static Water Level/Date:** Dry	**Reference Point:**	**Ground-Water Elevation:**
Casing Type: PVC	**Casing Diameter:** 2 in.	**Depth Interval:** 0.5-20.0 ft.	**Hole Diameter:** 6 in.	
Screen Type: PVC	**Screen Diameter:** 2 in.	**Depth Interval:** 20.0-35.0 ft.	**Slot Size:** 0.010	
Grout: Neat Cement **Interval:** 0.5-16.0 ft.	**Seal:** Bentonite Pellets **Interval:** 16.0-18.0 ft.	**Gravel Pack:** **Interval:** 18.0-35.5 ft.		

Sample	Depth	Penetration Resistance	Sample Rec. (%)	OVA Test Data (ppm)	Lithology / Remarks	Graphic Log	Well Completion
				0	Clayey **SAND**, pale yellowish brown fine to medium, subrounded to subangular, well sorted, loose.		
	5			0	Silty **SAND**, with clay (<5%), moderate brown fine to medium with few coarse grains, moderately sorted,		
					_____, as above color grading to pale to moderate reddish brown mottled with very pale orange.		
	10			0	_____, as above with fine to medium gravel (<10%), moist.		
					_____, as above, moderate yellowish brown to moderate brown grading to pale brown, moist, few coarse grains.		
	15			0			
					Clayey **SAND**, moderate yellowish brown, mottled with light gray, pale yellow and dark yellowish orange, moderately plastic, firm.		
				0			

Notes:

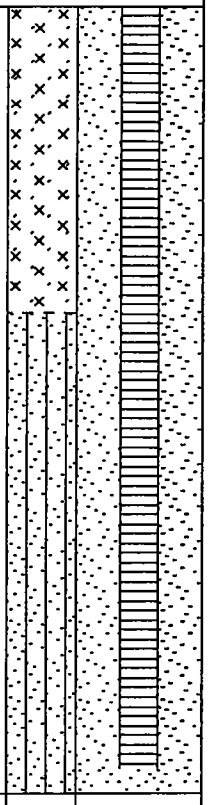
Job No.: C-1044D **Grid No.:**	Atlanta Testing & Engineering	Page 1 of 2

GEOLOGIST LOG

Boring/Well No: MW-15

Project:	Location:	Logged By:
Crown SC-015	3800 Devine Street	M. Hudgins

25	0	Sandy **SILT**, moderate to grayish orange pink mottled with pale yellow and white, few coarse grains, slightly plastic, trace mica.
30	0	Silty **SAND**, moderate yellowish brown, fine to coarse, subrounded to subangular, moderately sorted, loose, moist, micaceous.
35	0	Silty **SAND**, very pale orange, fine to coarse, well sorted, wet, loose.
		Boring terminated at 35.5 feet.
40		
45		
50		



Notes:

Job No.:	Grid No.:		
C-1044D		Atlanta Testing & Engineering	Page 2 of 2

GEOLOGIST LOG

Boring/Well No: MW-16

Project: Crown SC-015	**Location:** 3800 Devine Street	**Logged By:** M. Hudgins		
County: Richland **State:** South Carolina	**Latitude/Longitude:**	**Drilling/Installation Date:** 1/9/97	**Drilled Depth:** 35.5 ft.	**Well Depth:** 35.5 ft.
Driller: R. Neis **Drilling Co.:** ECS, Inc.	**Method:** Hollow Stem Auger **Equipment:**	**Development Method:** Dry **Sampling Method:** Cuttings		
TOC Elevation:	**Ground Elevation:**	**Static Water Level/Date:** 27.45 ft.btoc/1-14-97	**Reference Point:**	**Ground-Water Elevation:**
Casing Type: PVC	**Casing Diameter:** 2 in.	**Depth Interval:** 0.5-20.0 ft.	**Hole Diameter:** 6 in.	
Screen Type: PVC	**Screen Diameter:** 2 in.	**Depth Interval:** 20.0-35.0 ft.	**Slot Size:** 0.010	
Grout: Neat Cement **Interval:** 0.5-16.0 ft.	**Seal:** Bentonite Pellets **Interval:** 16.0-18.0 ft.	**Gravel Pack:** **Interval:** 18.0-35.5 ft.		

Sample	Depth	Penetration Resistance	Sample Rec. (%)	OVA Test Data (ppm)	Lithology / Remarks	Graphic Log	Well Completion
					Silty **SAND**, moderate brown, poorly sorted, fine to very coarse subrounded to subangular, loose.		
				0	Clayey **SAND**, dusky yellowish brown, mottled with light brown and moderate reddish brown, very fine to coarse with some fine gravel (<5%), poorly sorted, slightly plastic, moist.		
	5			0			
	10			0	Silty **CLAY**, light gray and very pale orange to grayish orange pink plastic with sand (<15%), fine to coarse, subangular to angular poorly sorted.		
	15			0	grading to Clayey **SILT**, colors as above, less plastic and increasing amount of fine sand.		
				0			

Notes:

Job No.: C-1044D **Grid No.:**

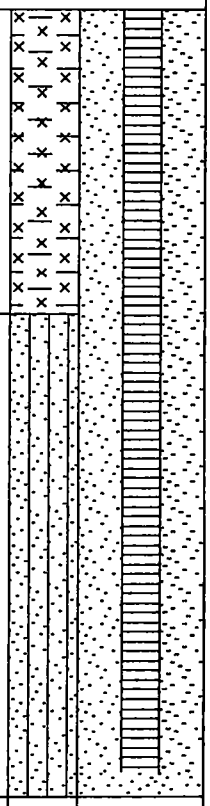
Atlanta Testing & Engineering

GEOLOGIST LOG

Boring/Well No: MW-16

Project:	Location:	Logged By:
Crown SC-015	3800 Devine Street	M. Hudgins

25	0	Clayey **SILT**, very pale orange and grayish orange pink to white slightly plastic, micaceous; with sand, very fine to medium, angular well sorted grading to
30	0	Silty **SAND**, moderate yellowish brown, fine to coarse, subrounded to subangular, well sorted, loose. increasing grain size with depth
35		Boring terminated at 35.5 feet.
40		
45		
50		



Notes:

Job No.:	Grid No.:		
C-1044D		Atlanta Testing & Engineering	Page 2 of 2

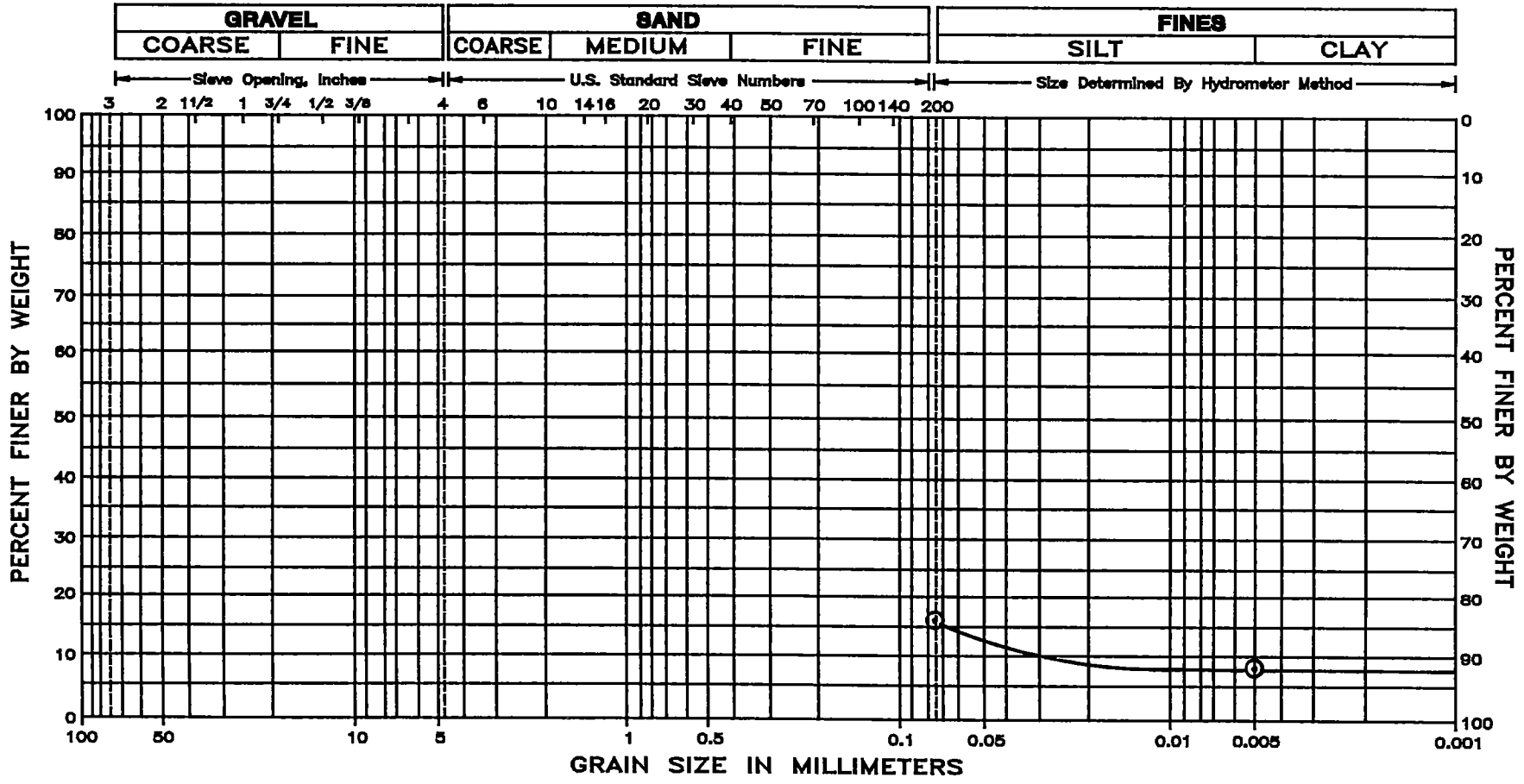
LABORATORY REPORTS

atlanta testing & engineering

GRAIN SIZE DISTRIBUTION TEST REPORT

PROJECT:	Crown SC-015		**JOB NO.:** 1044D	**REPORT NO.:**	
DATE:	1/29/97	**BORING/PIT NO.:** MW-15	**DEPTH/ELEV.:** 34-35 ft.	**REVIEWED:**	2/4/97
TEST PROCEDURE:	ASTM D422		**SAMPLE TYPE:** Spilt-Spoon	**SAMPLE NO.:**	2
SOIL DESCRIPTION:	Whitish yellow fine Sand with some silt and a trace of clay; 84.8% Sand; 7.4% Silt; 7.8% Clay.				

INDEX PROPERTIES:	**LL:** --	**PI:** --	**MC,%:** --	**FINES,%:** 15.2	**G_S:** --



RECEIVED
JAN 28
ATLANTA TESTING & ENGINEERING
Columbia, S. C.

Our Quality Control Is Your Quality Assurance

Client #: SC-95-061003
Address: Atlanta Testing and Engineering
3 Technology Circle
Columbia, SC 29203
Attn: Dean Salisbury

Page: Page 1 of 2
Date: 01/24/97
Log #: L14624-1

Sample Description:

Crown SC-015
1044D

Label: MW-15
Date Sampled: 01/09/97
Time Sampled: 14:30
Date Received: 01/11/97
Collected By: Client

Parameter	Results	Units	Method	Reportable Detect Limit	Extr. Date	Analysis Date	Analyst
Polynuclear Aromatic Hydrocarbons							
Naphthalene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
2-Methylnaphthalene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
1-Methylnaphthalene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Acenaphthylene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Acenaphthene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Fluorene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Phenanthrene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Anthracene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Fluoranthene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Pyrene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Benzo(a)anthracene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Chrysene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Benzo(b)fluoranthene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Benzo(k)fluoranthene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Benzo(a)pyrene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Dibenzo(a,h)Anthracene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Indeno(1,2,3-c,d)pyrene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Benzo(g,h,i)perylene	BDL	mg/kg	3550/8270	0.10	01/14	01/16	FS
Dilution Factor	1.0		3550/8270		01/14	01/16	FS
BTEX/Naphthalene							
Benzene	0.008	mg/kg	5030/8260	0.0040	01/16	01/16	KS
Toluene	BDL	mg/kg	5030/8260	0.0040	01/16	01/16	KS
Ethylbenzene	0.012	mg/kg	5030/8260	0.0040	01/16	01/16	KS
Total Xylenes	0.012	mg/kg	5030/8260	0.0040	01/16	01/16	KS
Total BTEX	0.032	mg/kg	5030/8260	0.0040	01/16	01/16	KS

South Carolina DHEC
Department of Health and Environmental Control

Report On Records Destroyed
Division Of Support Services

1. Date:	Return this form to:
4/28/97	Bureau of Business Management Division of Support Services-Records and Forms Management Unit 2600 Bull Street Columbia, SC 29201

The records listed below have been disposed of in accordance with provisions of the Public Records Act, Code of Laws of South Carolina, 1976, Sections 30-1-10 through 30-1-140, as amended, and approved Records Retention Schedules.

2. Signature: C Kuchinsky

3. Title: Prog. Coord.

Agency Records Officer signature:

4. Record Series Titles	5. Record Series #	6. Inclusive Dates	7. Volume (cubic footage)	8. Date of Destruction
Assessment Plan (Phase II - ATs 6)	09344	11/5/91	.007	4/25/97 Mike Rasch BNF
Assessment Plan (EAP - ATs 6)	09344	3/25/92	.007	"
			9).014	Total Cubic Feet destroyed

UST 84TG DOCKETING

DHEC 0521 (8/1996)

Site ID # 07680 Site Name Crown SC-015

Reviewed by Cooper/Wright

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

BUREAU OF UNDERGROUND STORAGE TANK MANAGEMENT

Phone (803) 734-4844 Fax (803) 734-3604

DEC 23 1997

Ms. June Derrick
Nigel Family Partnerships
P.O. Box 6573
Columbia, SC 29260

Re: Site # 07680, Former Crown #015, 3800 Devine St., Columbia, SC
Site Status and Availability of SUPERB Funds
Richland County

Dear Ms. Derrick:

The status of the release at the referenced site and an explanation of the applicable regulations is provided in response to your request, regarding the former Crown Central Petroleum #015 service station. This site has been assessed for petroleum contamination resulting from underground petroleum storage tanks. The site is qualified for the State Underground Petroleum Environmental Response Bank (SUPERB) Act and is currently being funded. A Rapid Assessment Report has been submitted and reviewed by this office. Active Corrective Action will be required for the site. The Responsible Party (Crown Central Petroleum) will be given the option of either procuring three bids for the necessary activities or having SCDHEC procure bids through the State Lead Section which requires the owner/operator to grant SCDHEC and its contractor access to the site.

Qualification for SUPERB monies

The following information applies to Crown Central Petroleum #015 Site # 07680, for the release reported on August 18, 1989. The referenced release was qualified to participate in the SUPERB Account on March 9, 1994. This means that this release is qualified to receive up to $1,000,000 for costs associated with the investigation and cleanup of petroleum from the underground storage tanks.

Availability of SUPERB monies

Because the amount of SUPERB monies available is limited, cleanup funding is not possible from the SUPERB Account at all the releases reported in South Carolina concurrently. Therefore, SCDHEC uses a classification system to prioritize the reported releases. Releases are placed into one of five classes based on the threat the release poses to human health and the environment (classification one represents an immediate risk and classification five represents the least serious risk). To ensure the protection of human health, the limited funds are being allocated first to those releases that pose an immediate risk (e.g., contaminated drinking water wells) to human health. Currently this site has petroleum constituents in both ground water and soil documented by the Rapid Assessment Report, dated February 28, 1997.



The release has a priority classification of 3B and continues to receive SUPERB monies at this time. If you have any further questions, please call B. Treadwell Kissam at (803) 734-4844.

Sincerely,
Owner/Operator Assistance Section
Assessment and Corrective Action Division

B. Treadwell Kissam

B. Treadwell Kissam, Hydrogeologist

Lee A. Monts

Lee A. Monts, Manager

cc: Read/Technical files

SCDHEC/UST/121997

CrownCen Marketing Co.

One North Charles Street
Baltimore, MD 21201-3709
410-539-7400

RECEIVED
MAR 3 0 1998
Bureau of Underground
Storage Tank Management

CROWN Quality Gasolines And a good deal more!™

27 March, 1998

B. Treadwell Kissam, P.G.
South Carolina Dept. of Health and Environmental Control
Division of UST Management
2600 Bull Street
Columbia, SC 29201-1708

RE: **Former Crown SC-015**
Site ID #07680
SUPERB Funding

Dear B. Treadwell Kissam:

Enclosed is the completed Permission Form received on March 23, 1998 for the above referenced site. Please do not hesitate to contact me if you have any questions or need additional information. We appreciate your assistance with this site.

Sincerely,

John H. Wolf
Manager - Remediation

enclosure
c: Lee A. Monts (DHEC)

UST & T DOCKETING

RECEIVED
MAR 3 0 1998
Bureau of Underground
Storage Tank Management

UNDERGROUND STORAGE TANK OWNER

PERMISSION FORM - SITE ID #07680

If you are the owner of the former or existing underground storage tanks or are designated as their authorized representative, but do not own the property, please complete this form.

I, John Wolf certify that I am the legal owner of the underground storage tank(s) located at the facility identified below or serve as the authorized representative for the UST owner. I grant permission to the South Carolina Department of Health and Environmental Control (SCDHEC) to secure on my behalf services of a contractor to conduct assessment and corrective action activities, as required. The contractor will be designated as my contractor for only the required environmental site rehabilitation activities. Compensation to the contractor will be from the SUPERB Account and I will have no obligation to pay the contractor. I understand that SCDHEC will be responsible for obtaining right-of-entry from the property owner and notifying me of all activities that are necessary prior to their initiation and will promptly provide to me a copy of each environmental report. I understand that I may choose to select my own contractor at the completion of any phase of work by notifying the Bureau of Underground Storage Tank Management in writing.

Name of Facility **Former Crown SC-015** Phone # NA

Street Address of Facility **3800 Devine Street**

Town, City, District, Suburb **Columbia, South Carolina 29205**

Name of nearest intersecting street, road, highway, alley **Kilbourne Road**

Is this facility within the city limits? (yes or no) **Yes**

Were underground storage tanks previously removed from the ground at this facility? (yes or no) Yes, if yes, please provide the name and phone number of a person we can contact that can assist in the location of the former underground storage tank excavation. Name John Wolf - Crown Central Petroleum Corp., Phone number (410) 659-4862

Is the property currently leased or rented to someone? (yes or no) * see note below, if yes, please provide their name _____ and phone number _____ and let them know about the pending assessment activities. If vehicles or other mobile structures are parked over the former or existing underground storage tanks, they should be moved before SCDHEC's contractor gets to the site.

NAME of UST owner (Please Print): John Wolf - Manager-Remediation, Crown Central Petroleum Corp.

Phone Number (home) 410 552 1154 (work) (410) 659-4862

Signature of Underground Storage Tank Owner: John H Wolf

Witness: David Daniels

Date: 3 Month 27 Day 1998 Year

* site was formerly leased by Crown from: Niggil Family Partnership
1219 Sanford Rd
Columbia SC 29206
c/o Ms. Margaret Rankin

CrownCen Marketing Co.

One North Charles Street
Baltimore, MD 21201-3709

PRESORTED
FIRST CLASS

RETURN SERVICE REQUESTED 03-28-98

CROWN Quality Gasolines
And a good deal more!™

B. Treadwell Kissam, P.G.
South Carolina Dept. of Health and Environmental
Control
Division of UST Management
2600 Bull Street
Columbia, SC 29201-1708

AUTO 29201

) H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

DIVISION
UNDERGROUND STORAGE TANK MANAGEMENT

Phone (803) 734-4844 Fax (803) 734-3604

MAR 20 1998

Ms. June Derrick
Niggel Family Partnerships
P.O. Box 6573
Columbia, SC 29260

Re: Site # 07680, Former Crown #015, 3800 Devine St., Columbia, SC
Site Status and Availability of SUPERB Funds
Richland County

Dear Ms. Derrick:

Currently, the release reported on August 15, 1989, at the referenced site has a priority classification of 3B. SUPERB funds are available to implement the next necessary scope of work. The scope of work to be implemented is Active Corrective Action.

The SCDHEC will directly procure the services of an environmental contractor on behalf of the responsible Part, Crown Central Petroleum. All activities will be directed and coordinated by SCDHEC and you will be informed of the results. Please complete and return the enclosed Permission Form **within 15 days of receipt of this letter.**

On all correspondence regarding this site, please reference Site ID #07680. Please be sure to include the requested information so that the appropriate approvals can be issued. Please feel free to call B. Treadwell Kissam, at (803) 734-4844 or (800) 826-5435 (within SC only) if you have questions or need additional information.

Sincerely,
Owner/Operator Assistance Section
Assessment and Corrective Action Branch

B. Treadwell Kissam

B. Treadwell Kissam, P.G., Hydrogeologist

Lee A. Monts

Lee A. Monts , Manager

enc: Permission Form

cc: Technical File

DHEC/UST/031898

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

DIVISIO
UNDERGROUND STORAGE TANK MANAGEMENT

Phone (803) 734-4844 Fax (803) 734-3604

MAR 20 1998

Mr. Bob Hughes
P.O. Box 1168
Baltimore, MD 21203-1168

Re: Former Crown SC-015
Site ID #07680
March 5,1998, telephone discussion, availability of SUPERB Funding
Richland County

Dear Mr. Hughes:

Currently, the release reported on August 15, 1989, at the referenced site has a priority classification of 3B. SUPERB funds are available to implement the next necessary scope of work. The scope of work to be implemented is Active Corrective Action.

Per a March 5, 1998, telephone discussion with Richard Garvine, the SCDHEC will directly procure the services of an environmental contractor on your behalf. All activities will be directed and coordinated by SCDHEC and you will be informed of the results. Please complete and return the enclosed Permission Form **within 15 days of receipt of this letter.**

On all correspondence regarding this site, please reference Site ID #07680. Please be sure to include the requested information so that the appropriate approvals can be issued. Please feel free to call B. Treadwell Kissam, at (803) 734-4844 or (800) 826-5435 (within SC only) if you have questions or need additional information.

Sincerely,
Owner/Operator Assistance Section
Assessment and Corrective Action Branch

B. Treadwell Kissam
B. Treadwell Kissam, P.G., Hydrogeologist

Lee A. Monts
Lee A. Monts , Manager

enc: Permission Form

cc: Technical File

DHEC/UST/031898

PROPERTY OWNER ACA NRC (3 Brs)

RECEIVED
MAR 3 1 1998
Bureau of Underground Storage Tank Management

RIGHT OF ENTRY - SITE ID #07680

If you are the Property Owner or are the authorized representative for that person, but did not own the former or existing underground storage tanks at the time the release was reported, please complete this form.

Niggel Family Partnerships, certify that we are the legal owner of the property identified below or serve as the authorized representative for the property owner. We authorize the South Carolina Department of Health and Environmental Control (SCDHEC), or a contractor selected by SCDHEC, to enter this property at reasonable times only to conduct assessment and corrective action activities, as required. The contractor will be designated as the contractor for the UST owner or operator for only the required environmental site rehabilitation activities. Compensation to the contractor will be from the SUPERB Account and we will have no obligation to pay the contractor. We understand that SCDHEC will notify us of all activities that are necessary prior to their initiation and will promptly provide to us a summary of the data upon request.

Town, City, District, Suburb Columbia, South Carolina 29205

Name of nearest intersecting street, road, highway, alley Kilbourne Road

Is this facility within the city limits? (yes or no) Yes

Is this facility serviced by a public water or sewer utility? (yes or no) Yes, if no, please provide the name of a person we can contact that can assist in the location of private water and septic tank lines.

Were underground storage tanks previously removed from the ground at this facility? (yes or no) Yes.

Is the property currently leased or rented to someone? (yes or no) No, if yes, please provide their name _____ and phone number _____ and let them know about the pending assessment activities. If vehicles or other mobile structures are parked over the former or existing underground storage tanks, they should be moved before SCDHEC's contractor gets to the site.

NAME of property owner (Please Print): Niggel Family Partnerships (four joint owners)

Phone Number (home) 803-782-6274 (work) _____

Current Mailing Address: P.O. Box 6573, Columbia, SC 29260

Signature of Property Owner: Carl A. Niggel

Signature of Property Owner: Jane N. Derrick

Signature of Property Owner: Norma N. Rogers

Signature of Property Owner: Margaret N. Rankin

Witness: Mary Key Escue

Date: Mar. 29 Month Sunday Day 1998 Year

UST 87T DOCKETING

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

BUREAU OF
UNDERGROUND STORAGE TANK MANAGEMENT

Phone (800) 826-5435 Fax (803) 898-4330

MAY 30 2000

Carolina Technical Services, Inc.
Attn: Steve Bush. P.E.
PO Box 115
Irmo, SC 29063

Re: Former Crown Facility SC-15, 3800 Devine Street, Columbia, SC
UST Permit #07680
Richland County

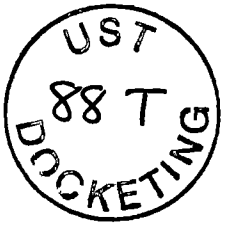
Dear Mr. Bush:

Per your facsimile dated May 25, 2000, this office is pleased to provide you with an update on the environmental conditions at the above facility.

We received a report in August 1989 documenting petroleum contamination in the subsurface in the vicinity of the former underground storage tank system. Our records revealed that three (3) underground storage tanks (USTs) that were owned by Crown Central Petroleum were removed in July 1991. In response to the initial report of contamination, we directed Crown Central Petroleum, as the party responsible for performing this activity under state and federal law, to determine the extent and severity of the contamination. A report of findings was submitted in February 1997.

You also wanted us to clarify for you the financial and liability issues surrounding the petroleum contamination at this facility. Crown Central Petroleum is entitled to up to $1,000,000 in coverage under the conditions spelled out in the SUPERB Act.

Section 80(C) of the SUPERB Act provides that a subsequent purchaser of property from which an UST has been removed is not responsible for site rehabilitation activities other than abatement actions necessary to eliminate any imminent threat to human health or the environment. This exemption applies to the extent that the release is eligible for compensation from the SUPERB Account, provided that the person allows reasonable access to the property for rehabilitation activities, and does not or has not had any familial, financial, or other interest with the person who owned or operated the UST. This applies equally to subsequent lenders or to those who would acquire this property through foreclosure in the future.



You should be aware that there are currently no laws or regulations that prohibit the use or development of properties where a petroleum release has occurred. However, as petroleum contamination has been documented in the soil approximately 4 – 6 ft. below the former UST dispenser islands, caution should be exercised if excavation occurs in this area of the site. Proper screening and disposal of any generated native soil should commence if site conditions warrant it.

Please inform me of any future activities which may compromise any existing monitoring wells (see enclosed map). Also, it is unknown at this time if future remediation activities will impact the usage or operations at this site due to the site specific nature of each project.

If you have any questions, please feel free to contact me at (803) 898-4360 or (800) 826-5435 (within South Carolina only).

Sincerely,

H. Reed Corley, Hydrogeologist
State Lead and Field Services Section
Assessment and Corrective Action Division
Bureau of Underground Storage Tank Management

Hrc/07680con.doc

Enc.: SUPERB Act
Site Map

Cc: Jim Janson, Crown Central Petroleum, 8227 Cloverleaf Drive, Suite 304, Millersville, MD 21108 (w/out enc.)
Technical File (w/out enc.)

DHEC/UST/053000

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

BUREAU OF
UNDERGROUND STORAGE TANK MANAGEMENT

Phone (800) 826-5435 Fax (803) 898-4330

JUN 07 2000

Davis & Floyd
Attn: Jim Ferguson, PG
240 Stoneridge
Columbia, SC

Re: Former Crown Facility SC-15, 3800 Devine Street, Columbia, SC
UST Permit #07680
Richland County

Dear Mr. Ferguson:

Per your June 1, 2000 e-mail, this office is pleased to provide you with an update on the environmental conditions at the above facility.

We received a report in August 1989 documenting petroleum contamination in the subsurface in the vicinity of the former underground storage tank system. Our records revealed that three (3) underground storage tanks (USTs) that were owned by Crown Central Petroleum were removed in July 1991. In response to the initial report of contamination, we directed Crown Central Petroleum, as the party responsible for performing this activity under state and federal law, to determine the extent and severity of the contamination. A report of findings was submitted in February 1997.

You also wanted us to clarify for you the financial and liability issues surrounding the petroleum contamination at this facility. Crown Central Petroleum is entitled to up to $1,000,000 in coverage under the conditions spelled out in the SUPERB Act.

Section 80(C) of the SUPERB Act provides that a subsequent purchaser of property from which an UST has been removed is not responsible for site rehabilitation activities other than abatement actions necessary to eliminate any imminent threat to human health or the environment. This exemption applies to the extent that the release is eligible for compensation from the SUPERB Account, provided that the person allows reasonable access to the property for rehabilitation activities, and does not or has not had any familial, financial, or other interest with the person who owned or operated the UST. This applies equally to subsequent lenders or to those who would acquire this property through foreclosure in the future.

UST
89T
DOCKETING

You should be aware that there are currently no laws or regulations that prohibit the use or development of properties where a petroleum release has occurred. However, as petroleum contamination has been documented in the soil approximately 4 – 6 ft. below the former UST dispenser islands, caution should be exercised if excavation occurs in this area of the site. Proper screening and disposal of any generated native soil should commence if site conditions warrant such.

It is my understanding that existing monitoring wells may pose a problem during construction. Please provide me a draft layout of building dimensions superimposed over the enclosed site map. A review of the layout will be conducted and comments subsequently rendered soon after. If any wells are compromised which are deemed necessary for corrective action monitoring, they must be replaced at no expense to the SUPERB Account.

Also, even though the majority of proposed cleanup methodologies are conducted in-situ with little to no impact upon operating businesses, it is unknown at this time if this will be the case at the referenced facility due to the site specific nature of each project. However, the corrective action contractors are directed to work closely with operating businesses to ensure minimum disruption occurs during normal business hours.

If you have any questions, please feel free to contact me at (803) 898-4360 or (800) 826-5435 (within South Carolina only).

Sincerely,

H. Reed Corley, Hydrogeologist
State Lead and Field Services Section
Assessment and Corrective Action Division
Bureau of Underground Storage Tank Management

[illegible]

Enc.: Site Map

Cc: Jim Janson, Crown Central Petroleum, 8227 Cloverleaf Drive, Suite 304, Millersville, MD 21108 (w/out enc.)
Technical File (w/out enc.)

DHEC/UST/060500

RECEIVED
AUG 21 2000
Bureau of Underground
Storage Tank Management

The Niggel Family LLC
c/o June Niggel Derrick
1219 Sanford Drive
Columbia, South Carolina 29206

August 17, 2000
CERTIFIED MAIL RETURN RECEIPT REQUESTED

Mr. John Farley
Crown Central Petroleum
Post Office Box 1168
Baltimore, Maryland 21203-1168

07680

Re: SC-15
3800 Devine Street
Columbia, SC 29205

Dear Mr. Farley:

As you know, Crown Central Petroleum ("Crown") is responsible for a release of petroleum products from the former gasoline service station (the "Crown Site") previously leased by Crown. We are aware that Crown has undertaken site rehabilitation activities under the direction of the South Carolina Department of Health and Environmental Control ("DHEC") which has included the installation of numerous groundwater monitoring wells both within the boundaries of the former leased premises and without. We have now secured a new ground tenant for this parcel and it is in the process of negotiating subleases for the Crown Site and is redeveloping the remaining parcel. These developments will likely encompass a number of the existing monitoring wells. Once final site plans have been completed, we will provide Crown with this information in order that Crown might properly abandon the affected wells. We are willing to continue to allow reasonable access for the construction and maintenance of replacement monitoring wells that do not interfere with the intended use of the property by our ground tenant and its subtenants.

I would appreciate your contacting me at your earliest convenience in order that we might discuss our development schedule.

Sincerely,

June Niggel Derrick

cc: Reid Corley
W. Thomas Lavender, Esquire

NPCOL1:453195.1-LT-(WTL) 026700-00001

UST
90T
DOCKETING

DHEC
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

BUREAU OF
UNDERGROUND STORAGE TA MANAGEMENT
Phone: (803) 826-5435 Fax: (803) 898-4330

AUG 31 2000

Crown Central Petroleum
Attn: John Farley
PO Box 1168
Baltimore, MD 21203-1168

Re: Former Crown Facility SC-15
UST Permit #07680
Niggel Family LLC Correspondence dated August 17, 2000
Richland County

Dear Mr. Farley:

The Bureau of Underground Storage Tank Management has reviewed the referenced correspondence. It is my understanding that a new tenant has been secured for the referenced property and redevelopment is underway. In the process, monitoring wells (see enclosure) may be compromised. Per my letter dated June 7, 2000, please provide me a draft layout of building dimensions superimposed over the enclosed site map.

As you may be aware, the next scope of work deemed necessary by this office is the performance of a comprehensive round of ground-water sampling and subsequent corrective action (at a minimum to remove measurable free product). However, the release has a priority classification of 3BA and does not pose an immediate risk to human health or the environment. Therefore, based on the releases priority classification and the limited availability of State Underground Petroleum Environmental Response Bank (SUPERB) funds, monies cannot be made available at this time. You will be informed when SUPERB funds become available.

Should you wish to proceed with site rehabilitation activities at this time, you can fund those activities and seek reimbursement from the SUPERB Account when, and if, funds become available. If you elect this option, please direct your selected contractor to submit a cost agreement for the proposed scope of work along with the enclosed Owner/Operator Information Sheet **within 30 days** from the date of this letter. A list of certified contractors is enclosed for your information.

If you elect not to submit the Owner/Operator Information Sheet within 30 days, this office will continue to coordinate site rehabilitation activities on your behalf once SUPERB funds become available. This is based on the submission of your SCDHEC Permission Form dated March 27, 1998.

Please remember that all site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor. On all correspondence regarding this site, please reference the UST Permit Number. Note: technical and financial approval from the Department must be issued before work begins. Should you have any questions, please feel free to contact me at (803) 898-4360 or (800) 826-5435 (within SC only).

Sincerely,

H. Reed Corley, Hydrogeologist
State Lead and Field Services Section
Assessment and Corrective Action Division
Bureau of Underground Storage Tank Management



Hrc/07680mis.doc

Enc.: Monitoring Well Site Map
Owner/Operator Lead Information Sheet
Certified Contractors List

Cc: June Niggel Derrick, The Niggel Family LLC, 1219 Sanford Drive, Columbia, SC 29206 (w/site map only)
Technical File (w/out enc.)

DHEC/UST/082500

CTSI

Carolina Technical Services, Inc.

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS

October 23, 2000

RECEIVED

OCT 2 4 2000

Bureau of Underground
Storage Tank Management

SCDHEC
UST Division
2600 Bull Street
Columbia, SC 29201

Attention: Mr. Michael Bishop

Reference: Crown Central SC-015 Site
3800 Devine Street
Columbia, SC
SCDHEC Facility ID: N-40-NO-07680

UST
92T
DOCKETING

Dear Mr. Bishop,

I appreciate you taking the time to meet with us at the above referenced site last week. As we related to you at the site meeting, our client, Asbill-Christopher Development, Inc. is interested in developing this site as a retail pharmacy building. The proposed development will require demolition of the existing building, regrading the site and construction of the new building.

We understand from our conversations with you and from information obtained from the SCDHEC Freedom of Information office that soil and groundwater contamination has been confirmed at this site. We also understand that the site has been qualified for assessment and remediation under the SUPERB program. This site has been categorized as classification 3 under SCDHEC's Risk-Based Corrective Action (RBCA) Site Priority Classification System, with sites in classification 1 representing the most significant threat and classification 5 representing the least threat. You indicated that SCDHEC is currently beginning funding for assessment and remediation of sites in classification 2. You also indicated that this site is slated for remediation when funds become available due to the presence of free product in some of the wells at the site.

In order to help our client evaluate if and how to proceed with the proposed development, we would appreciate it if you would address the following issues:

- Would any of the known environmental contamination problems at this site preclude development of the site as proposed?
- Does SCDHEC place any restrictions on development of sites which are enrolled under the SUPERB program?

- Will the developer or new owner incur any liability for pre-existing site contamination?

- We understand that SCDHEC will require that the existing monitor wells be maintained or replaced at the developer's expense if the development impacts these wells. What information is needed by SCDHEC to determine how the proposed development will affect the existing monitor wells on the site and to provide instructions on how the wells are to be maintained?

- If contaminated soils are encountered during work at the site such as during performance of geotechnical borings or site grading activities, how are these contaminated soils to be handled? Does SUPERB cover the cost of disposal or remediation if necessary?

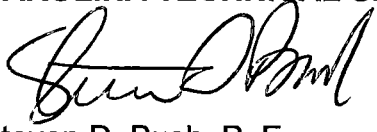
- Will any special monitoring or testing be necessary during construction?

- We understand that the schedule for remediation activities at this site is not known due to funding needs, however, you indicated that it would likely be several years before remediation activities start at this site. Since the proposed pharmacy will likely be in operation by the time remediation is implemented, remediation activities could affect operation of the business. Based on your experience with similar sites, could you offer an opinion as to what type of activities are likely to be necessary at this site?

- You indicated that remediation contractors are required to coordinate their activities with occupants of the property and carry out their work in a manner that will minimize disruption of the business activities at the site. Is it possible for us to obtain a copy of the contract provision that addresses this issue? This would assist our client in evaluating his risk in this area.

If you have any questions please give me a call. Your assistance with this matter is greatly appreciated.

Sincerely,
CAROLINA TECHNICAL SERVICES, INC.



Steven D. Bush, P. E.
President

cc: Mr. Jim Christopher

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

BUREAU OF
LAND AND WASTE MANAGEMENT

Phone (800) 826-5435 Fax (803) 898-4330

OCT 26 2000

Asbill-Christopher Development, Inc.
Mr. James E. Christopher, Jr.
PO Box 1058
Columbia, SC 29202

Re: Former Crown SC-015, 3800 Devine Street, Columbia
UST Permit # 07680
Richland County

Dear Mr. Christopher:

Mr. Steve Bush of Carolina Technical Services, Inc. requested that this office provide you with an update on the environmental conditions at the above referenced facility.

We received a report in August 1989 documenting contamination in the subsurface in the vicinity of the former underground storage tanks. Our records revealed that three underground storage tanks (USTs) that were owned by Crown Central Petroleum were removed in July 1991. In response to the initial report of contamination, we directed Crown Central Petroleum, as the party responsible for performing this activity under state and federal law, to determine the extent and severity of the contamination. Free phase petroleum has been identified in the subsurface at this facility and Active Corrective Action (ACA) is necessary to remove the free phase petroleum.

Mr. Bush also wanted us to clarify for you the financial and liability issues surrounding the petroleum contamination at this facility. State funds from the State Underground Petroleum Environmental Response Bank (SUPERB) Account are available for Crown Central Petroleum to access for site rehabilitation under the conditions of the SUPERB Act. Crown Central Petroleum is entitled to up to $1,000,000 in total coverage from the SUPERB Account. The priority ranking for this site is 3B and does not pose an immediate threat to human health or environment. Therefore, funds from the SUPERB Account are not immediately available to initiate ACA activities at this site.

Section 80(C) of the SUPERB Act provides that a subsequent purchaser of property from which an UST has been removed is not responsible for site rehabilitation activities other than abatement actions necessary to eliminate any imminent threat to human health or the environment. This exemption applies to the extent that the release is eligible for compensation from the SUPERB Account, provided that the person allows reasonable access to the property for rehabilitation activities, and does not or has not had any familial, financial, or other interest with the person who owned or operated the UST. This applies equally to subsequent lenders or to those who would acquire this property through foreclosure in the future.



The Bureau is unaware of any laws or regulations that prohibit the use or development of properties where a petroleum release has occurred. If the developers plans for this site include constructions activities that may disturb onsite monitoring wells, the Bureau should be notified so that necessary steps can be taken to protect the wells and/or determine locations for replacement wells. If wells must be replaced or modified, monies from the SUPERB Account would not be available for these activities. If contaminated soils are encountered during construction activities, they must be handled in accordance with DHEC guidelines to protect onsite workers and the environment. If disposal of contaminated soils is required, the SUPERB Fund would pay for the associated costs as long as the costs are preapproved prior to removal from the site. The SUPERB Account will not pay costs associated with excavation or transporting. Technical approval to transport any contaminated soil must be issued by this office.

Item 4 included in specifications for corrective action bids states *"Implement the CAP within 30 days of receipt of notice to proceed and any required permit to construct.* ***Disruption to the owner/operator's normal business will be kept to a minimum.*** *Upon completion of any required construction, DHEC will inspect the system and issue a permit to operate."* The Bureau will work with Crown Central Petroleum , their contractor and the business owner to implement this specification.

The Bureau currently has 192 sites in Active Corrective Action. The most frequent methods of remediation are Air Sparge/Vapor Extraction, Biological Treatment and Enhanced Fluid Recovery. None of these methods, if utilized, would cause significant site disruption.

If you have any questions, please feel free to contact me. I can be reached at (803) 898-4325 or (800) 826-5435 (within South Carolina only).

Sincerely,

Michael A. Bishop, Hydrogeologist
Owner/Operator Assistance Section
Assessment and Corrective Action Division
Underground Storage Tank Program
Bureau of Land and Waste Management

Enc.: SUPERB Act

cc: Crown Central Petroleum, Jim Janson, 8227 Cloverleaf Drive, Suite 304, Millersville MD21108
Steve Bush, CTS, PO Box 969, Simpsonville, SC 29681
Technical File

SCDHEC/UST/1023/00

D H E C
PROMOTE PROTECT PROSPER
2600 Bull Street
Columbia, SC 29201-1708

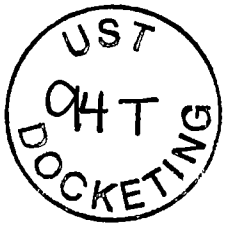
UNDERGROUND STORAGE TANK PROGRAM
BUREAU OF LAND AND WASTE MANAGEMENT

Phone (803) 896-6240 Fax (803) 896-6245

JUL 28 2003

MR JIM WOLF
CROWN CENTRAL PETROLEUM
8701 PARK CENTRAL DR STE 100
RICHMOND VA 23227

Re: SCO15, 3800 Devine St, Columbia, SC
UST Permit # 07680; CA# 18379
Release # 1 Reported August 15, 1989
Richland County



Dear Mr. Wolf:

The Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control (SCDHEC) recognizes your commitment to continue work at this site utilizing your own contractor. The Program has reviewed the technical file and determined the next necessary scope of work to be a comprehensive groundwater sampling event

Cost Agreement #18379 has been approved in the amount shown on the enclosed cost agreement form to sample all monitoring wells associated with the release. Samples should be collected and analyzed for BTEX + Naph. +MTBE by EPA method 8260B. The monitoring report submitted at the completion of these activities should include the following:

- A narrative portion documenting current site conditions and noting the names of field personnel, date, time, ambient air temperature, and general weather conditions during the sampling event. The report shall also contain well purging data, pH, specific conductivity, water temperature, PID readings (where applicable) and turbidity comments.
- Groundwater elevations, depth to groundwater, measurable free product thickness (where applicable), total well depth and screened interval for the specified monitoring wells associated with the site. Unless otherwise directed by the Program, all data shall be presented in tabular form. Groundwater laboratory analytical data for all monitoring wells shall also be presented in tabular format.
- A groundwater elevation contour map of the site based on current groundwater potentiometric data.
- A CoC map based on current groundwater laboratory analytical data. The groundwater data should be adjacent to the relevant monitoring well location.
- Manifests for any contaminated soil and/or groundwater removed from the site for treatment and/or disposal.
- The report must be signed and sealed by a professional geologist or engineer registered in the State of South Carolina.

Earth Management Systems can submit an invoice for direct billing from the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Please note that all applicable South Carolina certification requirements apply to the laboratory services, well installation, and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

A Report of Findings and invoice are due within 60 days from the date of this letter. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Program is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be preapproved by the Program for the cost to be paid. The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable, and the right to audit project records at any time during the project or after completion of work.

The Program grants preapproval for transportation of virgin petroleum contaminated soil and groundwater from the referenced site to a permitted treatment facility. The contaminated soil or groundwater must be properly stored in labeled containers or covered with plastic as appropriate. The contaminated soil and/or groundwater must be accepted by the approved treatment facility. There can be no spillage or leakage in transport. A copy of the disposal manifest and/or acceptance letter from the receiving facility that clearly designates the quantity received must be included as an appendix to the final report. If the levels of petroleum contamination based on laboratory analysis are below risk-based screening levels, please contact the project manager for approval to dispose of soil and/or groundwater on site. The SUPERB Account will not compensate for transportation or treatment of clean soil and/or groundwater.

On all correspondence concerning this site, please reference **UST Permit #07680 and CA #18379.** If there are any questions concerning this project, please contact me at (803) 896-6649 or (800) 826-5435 (within South Carolina only).

Sincerely,

Laura S. Daye

Laura S. Daye, Hydrogeologist
Owner/Operator Assistance Section
Assessment and Corrective Action Division

enc: Approved Cost Agreement

cc: Technical File (w/enc) / Read File (w/out enc)
Earth Management Systems, PO Box 24287, Columbia, SC 29224 (w/enc)

SCDHEC/UST/ 3/7/2003/LSD

Approved Cost Agreement '9

Facility: 07680 SC015
DAYELS
PO Number:

Task / Description	Categories	Item Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB					
		B PERSONNEL	2.0000	250.00	500.00
10 SAMPLE COLLECTION					
		A GROUND WATER	16.0000	55.00	880.00
11 ANALYSES					
	GW GROUNDWATER	A BTEX+NAPTH+MTBE	16.0000	100.00	1,600.00
17 DISPOSAL					
		A1 WASTEWATER - PURGING/SAMPLING	2.0000	90.00	180.00
19 RPT/PROJECT MNGT & COORDINATIO					
		PCT PERCENT	0.1500	3,160.00	474.00
			Total Amount		3,634.00

EARTH MANAGEMENT SYSTEMS, INC.
Environmental Consultants

P.O. Box 24287 Columbia, SC 29224
3025 McNaughton Drive Columbia, SC 29223
(803) 736-3800 FAX (803) 736-3050

December 4, 2003

Ms. Laura Daye
SC Department of Health and Environmental Control
Underground Storage Tank Program
2600 Bull Street
Columbia, South Carolina 29201

RECEIVED
DEC 0 5 2003
UNDERGROUND STORAGE
TANK PROGRAM

RE: Former SC-015 Facility
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680, C.P. No. 18379
EMS Job No. 2325-054

Dear Ms. Daye:

Please find enclosed a copy of the Ground Water Sampling and Analysis Report and a copy of the associated invoice for the former Crown SC-015 facility.

If there are any questions regarding this submittal, please contact us at (803) 736-3800.

Sincerely,

Earth Management Systems, Inc.

Norman E. Partin, Jr., C.H.M.M.
Project Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
SC Registration No. 1137

NEP/PMH:np

Enclosure

cc: Mr. John Wolf / CrownCen Marketing Co.

UST 95T DOCKETING

ASSESSMENT COMPONENT INVOICE

SOUTH CAROLINA

Department of Health and Environmental Control (DHEC)

Bureau of Underground Storage Tank Management

COPY

ASSESSMENT COMPONENT INVOICE

****See back of form for instructions.****

SITE ID # 07680 COUNTY Richland

FACILITY NAME Former Crown SC-015

STREET ADDRESS 3800 Devine St., Columbia

INVOICE # 2325-054-2752 **Cost Proposal #** 18379

For work performed during (specify time period) 7/03 to 12/03

I certify, under penalty of law, that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, and any other information I may be aware of, I believe that the submitted information is true, accurate, and complete. I further agree, in accordance with any DHEC demand letter, to promptly repay any overpayment received.

**Please fill out both the Contractor and the Owner/Operator (original signatures) Sections. Also, indicate the Payee by placing a check in the box next to the Contractor or the Owner/Operator. **

[X X X] CONTRACTOR

P. Michael Hudgins		57-0869301	
Name (Type or Print)		Federal Tax ID or Social Security Number, if Payee	
Earth Management Systems, Inc.			(803) 736-3800
Company			Phone Number
P.O. Box 24287	Columbia	SC	29224
Address	City	State	Zip Code
P. Michael Hudgins	Senior Hydrogeologist		12-4-03
Signature (please use non-black ink), if Payee	Title		Date Signed

[ ] OWNER OR OPERATOR

Please attach copies of CANCELLED CHECKS (Front and Back)

John Wolf			
Name (Type or Print)		Federal Tax ID or Social Security Number, if Payee	
			(804) 515-8687
Company			Phone Number
8701 Park Central Drive, Suite 100	Richmond	VA	23227
Address	City	State	Zip Code
J. Wolf	Environmental Compliance Manager		12-4-03
Signature (please use non-black ink)	Title		Date Signed

If payment is to be sent to an address other than above, please indicate below:

Name of Individual or Company (please print)		Federal Tax ID or Social Security Number	
Address (please print)	City	State	Zip Code

Invoice Amount: $ 1,178.75

Less Submitted/Paid Well Drilling Costs: $

Amount Requested : $ 1,178.75

SCDHEC USE ONLY = $

Amount Requested is for Assessment activities as Defined in the SCDHEC Letter

ASSESSMENT COMPONENT INVOICE

SOUTH CAROLINA
Department of Health and Environmental Control
Underground Storage Tank Program
State Underground Petroleum Environmental Response Bank Account

UST Facility Name: Crown SC-015
UST Permit #: 07680 CP#: 18379

ITEM	QUANTITY	UNIT		UNIT PRICE	TOTAL
1. A. Plan Preparation*		x		$100.00	$ 0.00
B. Tax Maps		x		$50.00	$
2. Receptor Survey*		x		$500.00	$ 0.00
3. Comprehensive Survey		x		$1,000.00	$ 0.00
4. Mob/Demob (List component #)					
A. Equipment		x		$500.00	$ 0.00
B. Personnel 10	1	x		$250.00	$ 250.00
5. Soil Borings (hand auger)*		feet	x	$14.00	$ 0.00
6. Soil Borings (drilled)	(includes collection and quantification)				
and Field Screening*		feet	x	$17.00	$ 0.00
7. Soil Leachability Model		x		$200.00	$ 0.00
8. Abandonment*		feet	x	$4.00	$ 0.00
9. Well Installation*	(includes drilling costs)				
A. Water Table (hand auger)		feet	x	$20.00	$ 0.00
B. Water Table (drilled)		feet	x	$38.00	$ 0.00
C. Telescoping		feet	x	$58.00	$ 0.00
D. Rock Drilling		feet	x	$58.00	$ 0.00
10. A. Groundwater Sample Collection*	5	samples	x	$55.00	$ 275.00
B. Air/Vapor Sample Collection*		samples	x	$90.00	$
11. Analyses-Groundwater	(See Analytical Methodology for analyses)				
A. BTEX+Naph.+MTBE	5	samples	x	$100.00	$ 500.00
B. Rush BTEX Analysis		samples	x	$120.00	$
C. BTEX+Naph.+MTBE+Trimethylbenzene		samples	x	$135.00	$ 0.00
D. PAHs		samples	x	$120.00	$ 0.00
E. Lead		samples	x	$20.00	$ 0.00
F. EDB		samples	x	$55.00	$ 0.00
G. 8 RCRA Metals		samples	x	$140.00	$ 0.00
H. TPH (9070)		samples	x	$55.00	$ 0.00
I. pH		samples	x	$10.00	$ 0.00
J. BOD		samples	x	$40.00	$ 0.00
K. Nitrate		samples	x	$20.00	$ 0.00
L. Sulfate		samples	x	$20.00	$ 0.00
M. Ferrous Iron		samples	x	$20.00	$ 0.00
N. Methane		samples	x	$110.00	$ 0.00
O. Organic Lead		samples	x	$100.00	$ 0.00
P. 8 Oxygenates		samples	x	$85.00	$ 0.00

ASSESSMENT COMPONENT INVOICE					
11. Analyses-Soil					
O. BTEX + Naph.	_____	samples	x	$100.00	$ 0.00
P. PAHs	_____	samples	x	$120.00	$ 0.00
Q. 8 RCRA Metals	_____	samples	x	$150.00	$ 0.00
R. TPH (9071)	_____	samples	x	$60.00	$ 0.00
S. TPH (3550)	_____	samples	x	$65.00	$ 0.00
T. TPH (5030)	_____	samples	x	$65.00	$ 0.00
U. Grain size / hydrometer	_____	samples	x	$75.00	$ 0.00
V. Total Organic Carbon	_____	samples	x	$35.00	$ 0.00
12. Aquifer Characterization*					
A. Pumping Test	_____	hours	x	$120.00	$ 0.00
B. Slug test	_____	tests	x	$150.00	$ 0.00
13. Free Product Recovery Rate Test*	_____	tests	x	$120.00	$ 0.00
14. Fate/Transport Modeling					
A. Mathematical Model	_____	models	x	$300.00	$ 0.00
B. Computer Model	_____	models	x	$500.00	$ 0.00
15. Risk Evaluation					
A. Tier I	_____		x	$300.00	$ 0.00
B. Tier II	_____		x	$500.00	$ 0.00
16. Subsequent Survey*	_____		x	$260.00	$ 0.00
17. Disposal*					
A. Wastewater					
1. Purging/Sampling	_____	drums	x	$90.00	$ 0.00
2. Pumping test	_____	gallons	x	$0.60	$ 0.00
B. Free Product	_____	drums	x	$110.00	$ 0.00
C. Soil (Treatment/Disposal)	_____	tons	x	$50.00	$ 0.00
	_____	drums	x	$50.00	$ 0.00
18. Miscellaneous*					
_____	_____		x	_____	$ 0.00
_____	_____		x	_____	$ 0.00
_____	_____		x	_____	$ 0.00
_____	_____		x	_____	$ 0.00
19. Report/Project Management				(SUBTOTAL)	0.00
and Coordination	0.15		x	$1,025.00	$ 153.75
20. Total					$ 1,178.75

*The appropriate mobilization cost can be added to complete these tasks, as necessary.

RECEIVED
DEC 0 5 2003
UNDERGROUND STORAGE
TANK PROGRAM

GROUND WATER SAMPLING AND ANALYSIS REPORT

Former Crown SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680
EMS Job No. 2325-054

Prepared For:

CrownCen Marketing Corporation
8701 Park Central Drive, Suite 100
Richmond, Virginia 23227

Prepared By:

Earth Management Systems, Inc.
3025 McNaughton Drive
Columbia, South Carolina 29203

Date:

December 4, 2003

Norman E. Partin, Jr., C.H.M.M.
Project Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
SC Registration No.1137

INTRODUCTION

Earth Management Systems, Inc. (EMS) has completed the ground water sampling and analysis at the Former Crown SC-015 facility, 3800 Devine Street, Columbia, South Carolina. A site location map is included as Figure 1. This work was performed in accordance with SCDHEC Cost Proposal No. 18379. The purpose of the sampling was to evaluate the current ground water quality conditions in response to a release of petroleum hydrocarbons from an underground storage tank (UST) system at the site.

This site is currently a Long's Drug Store. The construction of the new building and the site improvements, including changes in the grade elevation, resulted in the destruction of some monitoring wells and the altering of the top of casing elevations of others. Crown worked with the construction contractors to save as many wells as possible during construction activities in 2001. However, wells MW-3, MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12, and MW-14 were destroyed. Previous assessments indicated free product was present in monitoring wells MW-5 and MW-6.

This report includes a brief summary of the field methods utilized along with results of ground water elevation measurements, field and laboratory ground water analytical results, and our conclusions and recommendations.

GROUND WATER SAMPLING AND LABORATORY DATA

Water level measurements were recorded at all monitoring wells on September 19, 2003. A site map with monitoring well locations is included as Figure 2. Ground water levels were measured using an oil/water interface probe accurate to 0.01 feet. No free product was detected in any of the existing monitoring wells. Ground water level data are presented in Table 1. A potentiometric surface map of the water table aquifer could not be generated from the limited data.

Ground water samples were collected from all monitoring wells on September 19, 2003. The samples were obtained from the monitoring wells with dedicated sampling equipment and surgical gloves to prevent cross-contamination between wells. A minimum of three well water volumes was purged from each of the wells prior to sampling. Dissolved oxygen (DO), pH, specific conductivity

(SC), and temperature measurements were recorded in the field during purging with clean, calibrated field meters. Less than 5 gallons of purge water were generated during sampling of impacted wells. Purge water was placed in a drum and disposed of with purge water from another site.

Ground water samples were analyzed for benzene, toluene, ethylbenzene, xylenes (BTEX), naphthalene, and methyl-tert-butyl-ether (MTBE) per Environmental Protection Agency (EPA) Method 8260. All samples were placed in laboratory prepared containers with a completed chain of custody log, packed in a cooler filled with ice, and shipped to a South Carolina certified laboratory for chemical analysis.

A summary of ground water quality data collected for this assessment is provided as Table 2. Inspection of the laboratory data indicates the presence of MTBE at concentrations above Risk Based Screening Levels (RBSLs) in well MW-15. A Benzene/Total BTEX concentration map, illustrating the current distribution of hydrocarbon compounds, is included as Figure 4. A copy of the laboratory report and the ground water sampling Field Data Information Sheets are included in the Appendix.

CONCLUSIONS AND RECOMMENDATIONS

The results of this comprehensive sampling and analysis indicate that the presence of MTBE in well MW-15 at concentrations above the RBSL for MTBE in ground water.

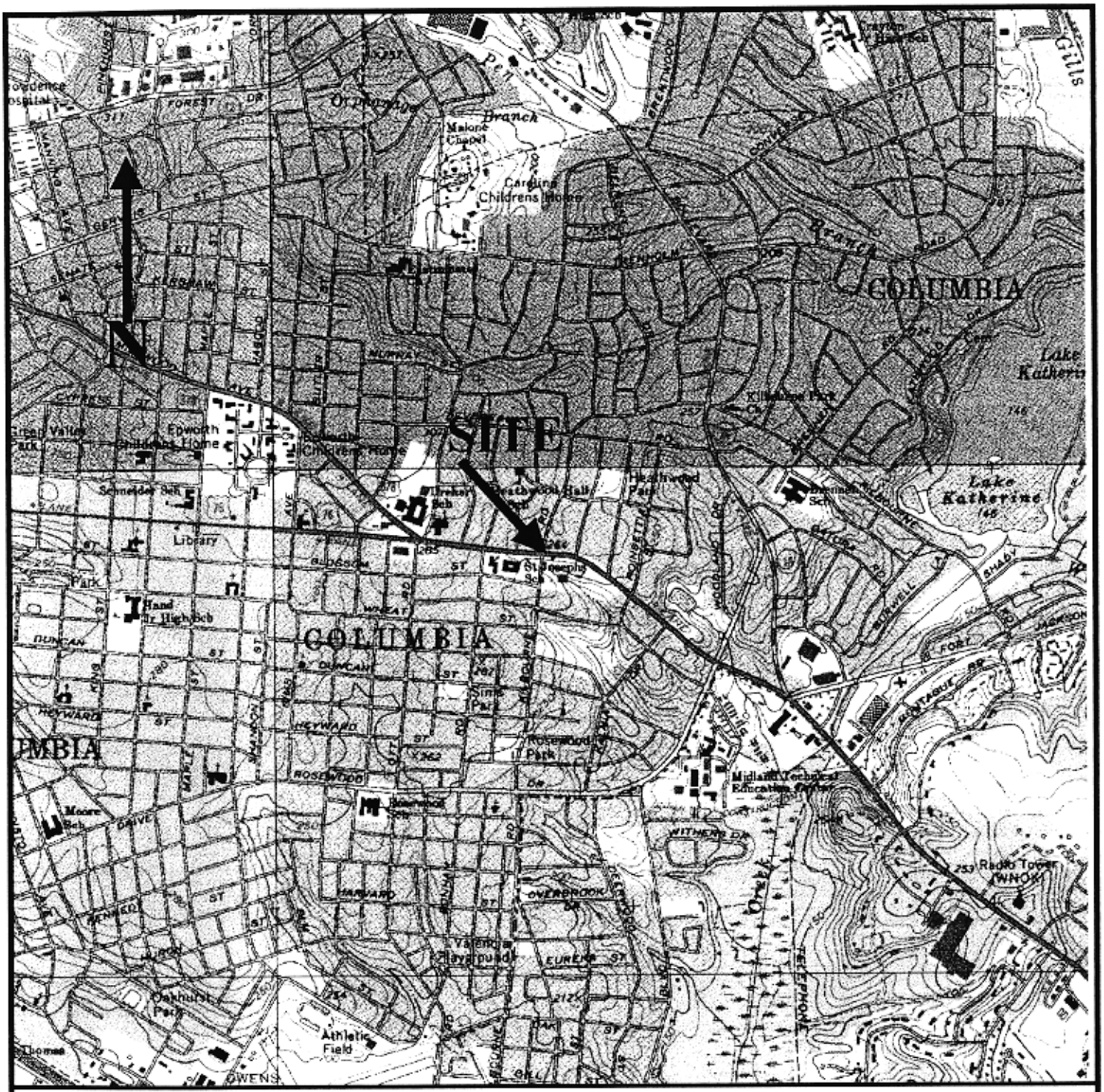
The extent of the hydrocarbon plume has not been defined. Additional and replacement monitoring wells should be installed. EMS recommends a Tier II Risk Based Assessment be performed to delineate the extent of impact and to evaluate the potential for exposure. The installation of replacement wells in the area of the former MW-5 and MW-6 should reveal if free product is still present on the soils beneath the site.

LIMITATIONS

This report has been prepared for the exclusive use of Crown Central Petroleum for specific application to the Former Crown SC-015 facility – 3800 Devine Street, Columbia, South Carolina. Our findings have been developed in accordance with generally accepted standards of geology and hydrogeology practice in South Carolina. No other warranty is expressed or implied. We accept no responsibility for damages or claims resulting from past or future contamination, or subsequent remediation.

APPENDIX

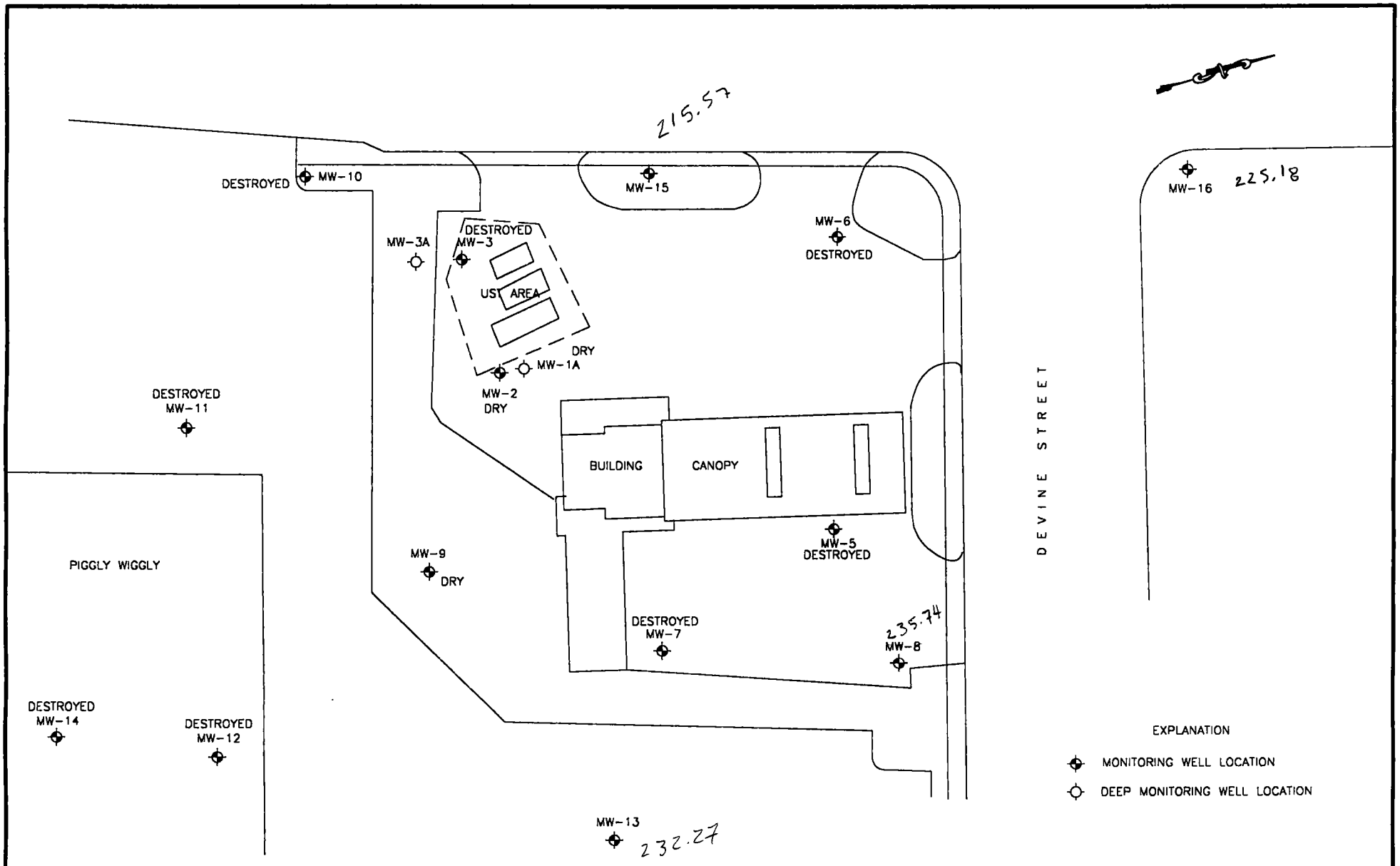
FIGURES



Base Map: Fort Jackson South , South Carolina
USGS 7.5 Minute Topographic Quadrangle (1990)
Contour Interval 10 Feet
Scale 1:24,000 (1" = 2000')

EARTH MANAGEMENT SYSTEMS, INC.
Environmental Consultants

Figure 1
Site Location
Former Crown SC-015
Columbia, South Carolina
Earth Management Systems
Job No. 2325-054



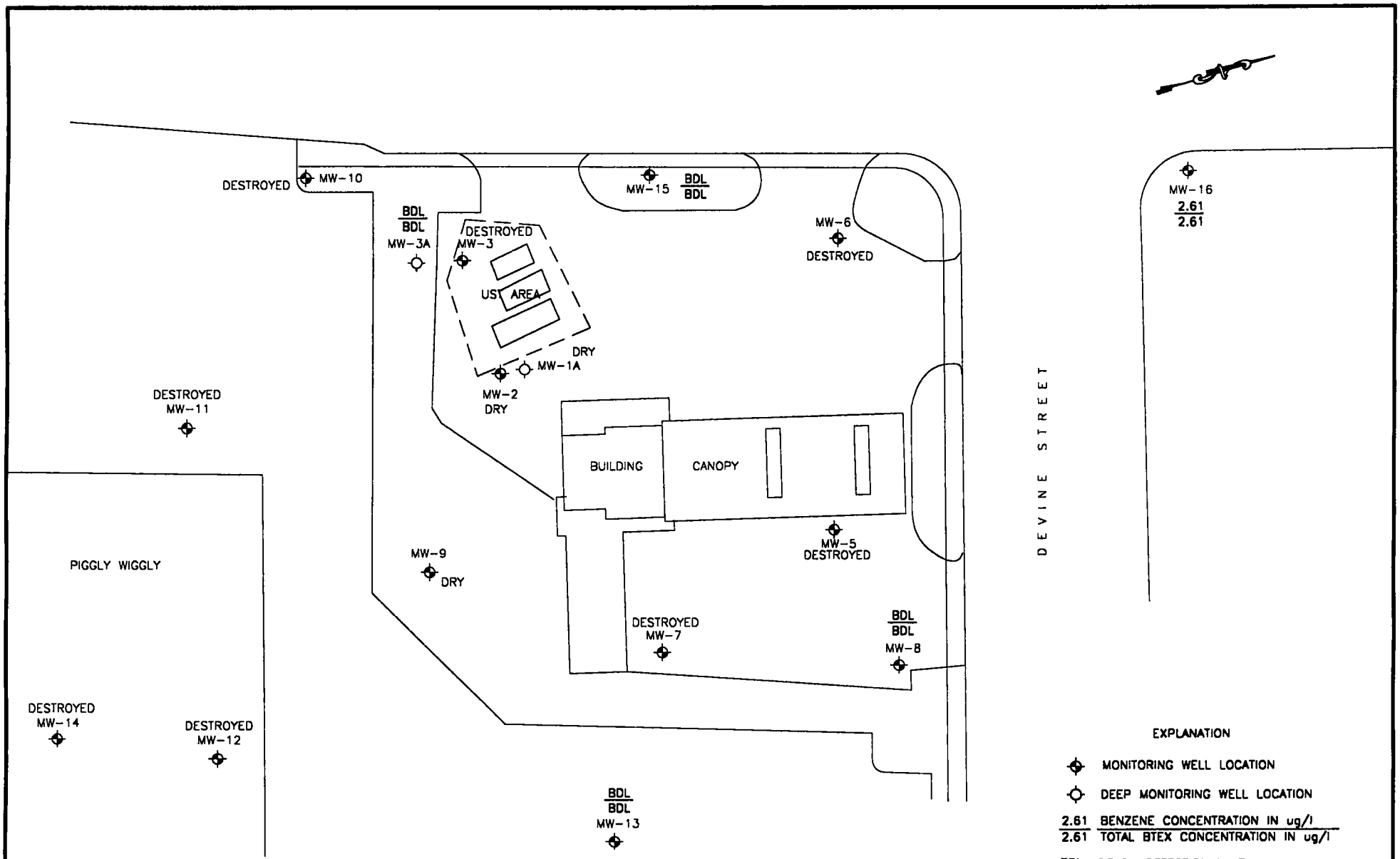
EARTH MANAGEMENT SYSTEMS, INC.
Environmental Consultants

FIGURE 2
SITE PLAN

FORMER CROWN SC 015
COLUMBIA, SOUTH CAROLINA

JOB NO.: 2325-054

2325-054 SC015



EARTH MANAGEMENT SYSTEMS, INC.
Environmental Consultants

FIGURE 3
BENZENE/TOTAL BTEX CONCENTRATION MAP
FORMER CROWN SC 015
COLUMBIA, SOUTH CAROLINA
JOB NO.: 2325-054

2325-054 SC015

TABLES

TABLE 1
GROUND WATER ELEVATION DATA

Crown Central Petroleum Corporation
Former Crown Facility SC-015
Devine Street and Kilbourne Rd.
Columbia, South Carolina

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	9/19/2003	35-45	249.98	DRY	ND	ND
MW-2	9/19/2003	3-18	261.98	DRY	ND	ND
MW-3A	9/19/2003	35-45	248.63	NR	ND	NR
MW-8	9/19/2003	15-25	250.55	14.81	ND	235.74
MW-9	9/19/2003	10-20	244.41	DRY	ND	ND
MW-13	9/19/2003	6.5-16.5	243.12	10.85	ND	232.27
MW-15	9/19/2003	20-35	249.43	33.86	ND	215.57
MW-16	9/19/2003	20-35	251.74	26.56	ND	225.18

NOTES:
**** = Due to new construction at this site and changes in the grade elevation, the top of casing elevations are unreliable.***
1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded

TABLE 2
GROUND WATER ANALYTICAL DATA
(ORGANICS)

Crown Central Petroleum Corporation
Former Crown Facility SC-015
Devine Street and Kilbourne Rd.
Columbia, South Carolina

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	TOTAL PAHs (ug/l)
MW-1A	9/19/2003	NS	NS	NS	NS	NS	NS	NS	NS
MW-2	9/19/2003	NS	NS	NS	NS	NS	NS	NS	NS
MW-3A	9/19/2003	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA
MW-8	9/19/2003	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA
MW-9	9/19/2003	NS	NS	NS	NS	NS	NS	NS	NS
MW-13	9/19/2003	BDL	BDL	BDL	BDL	BDL	NA	BDL	NA
MW-15	9/19/2003	BDL	BDL	BDL	BDL	**300**	NA	BDL	NA
MW-16	9/19/2003	2.61	BDL	BDL	BDL	5.66	NA	BDL	NA
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*5*	*25*	*25*

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) ug/l - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) NF = not found
7) BDL = below detection levels

GROUND WATER LABORATORY REPORT

ACCESS ANALYTICAL, INC.

Mike Hudgins
E.M.S.
3025 McNaughton Drive

Columbia, SC 29223

October 10, 2003
Report # 309001126
Order # 80669
STL Miami Cert ID# 96023
NELAP ID# E86349

Site Location/Project
South Carolina
SC-15

Sample I.D.: MW-3A
Collected: 09/19/03 15:20
Received: 09/23/03 10:00
Collected by: B.Maples

PARAMETER	RESULT	UNITS	METHOD	DETECTION LIMIT	DATE EXT.	DATE ANALY.	ANALYST
8260B BTEX w/Naph+MTBE in Water by GC/MS (S.C.)			MEDF	1			
Methyl-Tert-Butyl-Ether	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
Benzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
Toluene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
Ethylbenzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
m & p-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
o-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
Total Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
Naphthalene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:40PMD
SURROGATE: Toluene-D8	97.75%						
SURROGATE: Bromofluorobenzene	116.00%						
SURROGATE: Dibromofluoromethane	97.25%						

REPORT COMMENTS:
BDL: Indicates Analyte is Below Detection Limit MEDF: Matrix Effected Dilution Factor
Unless otherwise noted, mg/Kg denotes wet weight

Unless otherwise noted in analyst section, all work performed by STL MIAMI.
10200 USA Today Way, Miramar Florida 33025. (954) 431-4550 (South Carolina Cert ID# 96023)
Certs: FL=E86349, AL=41180,CT=PH0217, MD.=#271, MA.=#M-FL535,PR=FL00535 SC=96023,TN=TN02836
*Tests results meet all the requirements of NELAC, unless identified as "certification in-process"
Unless otherwise noted, samples submitted for EPA 5035 were collected,preserved and analyzed in accordance with all methodology requirements.

Company Representative

Mike Hudgins
E.M.S.
3025 McNaughton Drive

Columbia, SC 29223

October 10, 2003
Report # 309001126
Order # 80670
STL Miami Cert ID# 96023
NELAP ID# E86349

Site Location/Project
South Carolina
SC-15

Sample I.D.: MW-8
Collected: 09/19/03 14:50
Received: 09/23/03 10:00
Collected by: B.Maples

PARAMETER	RESULT	UNITS	METHOD	DETECTION LIMIT	DATE EXT.	DATE ANALY.	ANALYST
8260B BTEX w/Naph+MTBE in Water by GC/MS (S.C.)			MEDF	1			
Methyl-Tert-Butyl-Ether	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
Benzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
Toluene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
Ethylbenzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
m & p-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
o-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
Total Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
Naphthalene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	20:59PMD
SURROGATE: Toluene-D8	99.50%						
SURROGATE: Bromofluorobenzene	121.60%						
SURROGATE: Dibromofluoromethane	96.25%						

REPORT COMMENTS:
BDL: Indicates Analyte is Below Detection Limit MEDF: Matrix Effected Dilution Factor
Unless otherwise noted, mg/Kg denotes wet weight

Unless otherwise noted in analyst section, all work performed by STL MIAMI.
10200 USA Today Way, Miramar Florida 33025. (954) 431-4550 (South Carolina Cert ID# 96023)
Certs: FL=E86349, AL=41180,CT=PH0217, MD.=#271, MA.=#M-FL535,PR=FL00535 SC=96023,TN=TN02836
*Tests results meet all the requirements of NELAC, unless identified as "certification in-process"
Unless otherwise noted, samples submitted for EPA 5035 were collected,preserved and analyzed in accordance with all methodology requirements.

Company Representative

Mike Hudgins
E.M.S.
3025 McNaughton Drive

Columbia, SC 29223

October 10, 2003
Report # 309001126
Order # 80671
STL Miami Cert ID# 96023
NELAP ID# E86349

Site Location/Project
South Carolina
SC-15

Sample I.D.: MW-13
Collected: 09/19/03 14:30
Received: 09/23/03 10:00
Collected by: B.Maples

PARAMETER	RESULT	UNITS	METHOD	DETECTION LIMIT	DATE EXT.	DATE ANALY.	ANALYST
8260B BTEX w/Naph+MTBE in Water by GC/MS (S.C.)			MEDF	1			
Methyl-Tert-Butyl-Ether	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
Benzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
Toluene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
Ethylbenzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
m & p-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
o-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
Total Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
Naphthalene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:15PMD
SURROGATE: Toluene-D8	99.00%						
SURROGATE: Bromofluorobenzene	118.40%						
SURROGATE: Dibromofluoromethane	101.75%						

REPORT COMMENTS:
BDL: Indicates Analyte is Below Detection Limit MEDF: Matrix Effected Dilution Factor
Unless otherwise noted, mg/Kg denotes wet weight

Unless otherwise noted in analyst section, all work performed by STL MIAMI.
10200 USA Today Way, Miramar Florida 33025. (954) 431-4550 (South Carolina Cert ID# 96023)
Certs: FL=E86349, AL=41180,CT=PH0217, MD.=#271, MA.=#M-FL535,PR=FL00535 SC=96023,TN=TN02836
*Tests results meet all the requirements of NELAC, unless identified as "certification in-process"
Unless otherwise noted, samples submitted for EPA 5035 were collected,preserved and analyzed in accordance with all methodology requirements.

Company Representative

Mike Hudgins
E.M.S.
3025 McNaughton Drive

Columbia, SC 29223

October 10, 2003
Report # 309001126
Order # 80672
STL Miami Cert ID# 96023
NELAP ID# E86349

Site Location/Project
South Carolina
SC-15

Sample I.D.: MW-15
Collected: 09/19/03 16:00
Received: 09/23/03 10:00
Collected by: B.Maples

PARAMETER	RESULT	UNITS	METHOD	DETECTION LIMIT	DATE EXT.	DATE ANALY.	ANALYST
8260B BTEX w/Naph+MTBE in Water by GC/MS (S.C.)			MEDF	1			
Methyl-Tert-Butyl-Ether	300	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
Benzene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
Toluene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
Ethylbenzene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
m & p-Xylene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
o-Xylene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
Total Xylene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
Naphthalene	BDL	ug/L	5030/8260B	1.000	09/24/2003	09/24/2003	13:20AA1
SURROGATE: Toluene-D8	97.50%						
SURROGATE: Bromofluorobenzene	114.00%						
SURROGATE: Dibromofluoromethane	95.00%						

REPORT COMMENTS:
BDL: Indicates Analyte is Below Detection Limit MEDF: Matrix Effected Dilution Factor
Unless otherwise noted, mg/Kg denotes wet weight

Unless otherwise noted in analyst section, all work performed by STL MIAMI.
10200 USA Today Way, Miramar Florida 33025. (954) 431-4550 (South Carolina Cert ID# 96023)
Certs: FL=E86349, AL=41180,CT=PH0217, MD.=#271, MA.=#M-FL535,PR=FL00535 SC=96023,TN=TN02836
*Tests results meet all the requirements of NELAC, unless identified as "certification in-process"
Unless otherwise noted, samples submitted for EPA 5035 were collected,preserved and analyzed in accordance with all methodology requirements.

Company Representative

Mike Hudgins
E.M.S.
3025 McNaughton Drive

Columbia, SC 29223

October 10, 2003
Report # 309001126
Order # 80673
STL Miami Cert ID# 96023
NELAP ID# E86349

Site Location/Project
South Carolina
SC-15

Sample I.D.: MW-16
Collected: 09/19/03 16:30
Received: 09/23/03 10:00
Collected by: B.Maples

PARAMETER	RESULT	UNITS	METHOD	DETECTION LIMIT	DATE EXT.	DATE ANALY.	ANALYST
8260B BTEX w/Naph+MTBE in Water by GC/MS (S.C.)			MEDF	1			
Methyl-Tert-Butyl-Ether	5.66	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
Benzene	2.61	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
Toluene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
Ethylbenzene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
m & p-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
o-Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
Total Xylene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
Naphthalene	BDL	ug/L	5030/8260B	1.000	09/23/2003	09/23/2003	23:35PMD
SURROGATE: Toluene-D8	100.00%						
SURROGATE: Bromofluorobenzene	118.80%						
SURROGATE: Dibromofluoromethane	99.50%						

REPORT COMMENTS:
BDL: Indicates Analyte is Below Detection Limit MEDF: Matrix Effected Dilution Factor
Unless otherwise noted, mg/Kg denotes wet weight

Unless otherwise noted in analyst section, all work performed by STL MIAMI.
10200 USA Today Way, Miramar Florida 33025. (954) 431-4550 (South Carolina Cert ID# 96023)
Certs: FL=E86349, AL=41180,CT=PH0217, MD.=#271, MA.=#M-FL535,PR=FL00535 SC=96023,TN=TN02836
*Tests results meet all the requirements of NELAC, unless identified as "certification in-process"
Unless otherwise noted, samples submitted for EPA 5035 were collected,preserved and analyzed in accordance with all methodology requirements.

Company Representative

EC Access Analytical - Chain of Custody Record

Laboratory ID: _____

Project Submission #: 309-1126 80669-80673 RUSH # _____ PO #: 2325-054

Company Name: Ens	Preservative: (*see codes below)									
Address: 3025 McNaughton Dr.										
City: Cola State: SC Zip: 29223										
Project Name: SC-15										
Report To: M. Hudgins										
Sampled By (print): B. Maples										

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	↓ REQUESTED LAB ANALYSIS: ↓ Btex Naph MTBE					
MW 3A	9-19-03	1520	GW	21	X			80669		
mw 8	↑	1450	↑	2	↑			80670		
mw13		1430		2				80671		
mw15	↓	1600	↓	2	↓			80672		
mw18 16 dup	9-19-03	1630	GW	2	X			80673		

ACCESS ANALYTICAL, INC.

1248 Lake Murray Blvd.
Irmo, SC 29063

Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

✓ Std. (5-7 Bus. days)
___RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___No

Project Location:
✓ SC
___NC
___Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
Steve Pate	9-22-03	1425	Cheryl Burr
Cheryl Burr	9/22/03	1700	Edee
Edee	9/23/03	10.00	

* Preservative Codes *(place corresponding # in block above analysis field)*: 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

FIELD DATA INFORMATION SHEETS

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. MAPLES
General Weather Conditions: SUNNY

Ambient Air Temperature: _____ °C

Quality Assurance

pH Meter		Conductivity Meter	
serial no.		serial no.	
pH=4.0		standard	
pH=7.0		standard	
pH=10.0		standard	

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: SC-15
Facility ID#: _____ Well #: MW 1A

Well Diameter (D): 2" inch or _____ feet

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: - feet
Depth to Ground Water (DGW) _____ feet
Total Well Depth (TWD) _____ feet
Length of Water Column (LWC = TWD - DGW) _____ feet

1 Casing Volume (CV = LWC X C) = _____ X _____ = _____ gals
3 Casing Volume 3 X CV = _____ gals (standard purge volume)

Total Volume of Water Purged Before Sampling _____ gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							
pH (s.u.)							
Specific Cond. (µmhos/cm)			DRY				
Water Temperature (°C)							
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: BRANT MAPLES
General Weather Conditions: SUNNY

Ambient Air Temperature: _____ °C

Quality Assurance

pH Meter		Conductivity Meter	
serial no.		serial no.	
pH=4.0		standard	
pH=7.0		standard	
pH=10.0		standard	

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: # SC-15
Facility ID#: _____ Well #: MW 2

Well Diameter (D): 2" inch or _____ foot

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: _____ feet
Depth to Ground Water (DGW) _____ feet
Total Well Depth (TWD) _____ feet
Length of Water Column (LWC = TWD - DGW) _____ feet

1 Casing Volume (CV = LWC X C) = _____ X _____ = _____ gals
3 Casing Volume 3 X CV = _____ gals (standard purge volume)

Total Volume of Water Purged Before Sampling _____ gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							
pH (s.u.)							
Specific Cond. (µmhos/cm)			DRY				
Water Temperature (°C)							
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. MAPLES
General Weather Conditions: SUNNY

Ambient Air Temperature: _____ °C

Facility Name: SC-15
Facility ID#: _____ Well #: MW3A

Well Diameter (D): _____ inch or _____ feet

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: — feet
Depth to Ground Water (DGW) — feet
Total Well Depth (TWD) — feet
Length of Water Column (LWC = TWD - DGW) _____ feet

1 Casing Volume (CV = LWC X C) = _____ X _____ = _____ gals
3 Casing Volume 3 X CV = _____ gals (standard purge volume)

Total Volume of Water Purged Before Sampling — gals

* If free product is present over 1/8 inch, sampling will not be required

Quality Assurance

pH Meter		Conductivity Meter	
serial no.		serial no.	
pH=4.0		standard	
pH=7.0		standard	
pH=10.0		standard	

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							1520
pH (s.u.)							
Specific Cond. (µmhos/cm)							
Water Temperature (°C)							
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. MAPLES
General Weather Conditions: _____

Ambient Air Temperature: _____ °C

Quality Assurance

pH Meter
serial no. _____
pH=4.0 _____
pH=7.0 _____
pH=10.0 _____

Conductivity Meter
serial no. _____
standard _____
standard _____
standard _____

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: SC-15
Facility ID#: _____ Well #: MW8

Well Diameter (D): 2" inch or _____ feet

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: — feet
Depth to Ground Water (DGW) 14.81 feet
Total Well Depth (TWD) 25 feet
Length of Water Column (LWC = TWD - DGW) 10.19 feet

1 Casing Volume (CV = LWC X C) = ____ X ____ = 1.3 gals
3 Casing Volume 3 X CV = 3.9 gals (standard purge volume)

Total Volume of Water Purged Before Sampling 3.9 gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling	
Cumulative Volume Purged (gallons)								
Time (military)								1450
pH (s.u.)	6.2	6.2	6.2	6.2				
Specific Cond. (µmhos/cm)	253	226	226	222				
Water Temperature (°C)	26.3	25.6	25.7	25.8				
Turbidity (subjective: clear, slightly cloudy, cloudy)								
PID Readings (if required)								

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. maples
General Weather Conditions: Sunny

Ambient Air Temperature: _____ °C

Facility Name: SC - 15
Facility ID#: _____ Well #: mw 9

Well Diameter (D): 2" Inch or _____ feet

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: _____ feet
Depth to Ground Water (DGW) _____ feet
Total Well Depth (TWD) _____ feet
Length of Water Column (LWC = TWD - DGW) _____ feet

1 Casing Volume (CV = LWC X C) = _____ X _____ = _____ gals
3 Casing Volume 3 X CV = _____ gals (standard purge volume)

Total Volume of Water Purged Before Sampling _____ gals

* If free product is present over 1/8 inch, sampling will not be required

Quality Assurance

pH Meter		Conductivity Meter	
serial no.	_____	serial no.	_____
pH=4.0	_____	standard	_____
pH=7.0	_____	standard	_____
pH=10.0	_____	standard	_____

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							
pH (s.u.)							
Specific Cond. (µmhos/cm)							
Water Temperature (°C)							
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

FILLED W/ DRT

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page _____ of _____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. MAPLES
General Weather Conditions: _____
Ambient Air Temperature: _____ °C

Quality Assurance

pH Meter		Conductivity Meter	
serial no.	_____	serial no.	_____
pH=4.0	_____	standard	_____
pH=7.0	_____	standard	_____
pH=10.0	_____	standard	_____

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: _____
Facility ID#: _____ Well #: MW 13

Well Diameter (D): 2" inch of _____ foot

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: - feet
Depth to Ground Water (DGW) 10.85 feet
Total Well Depth (TWD) 15 feet
Length of Water Column (LWC = TWD - DGW) 4.15 feet

1 Casing Volume (CV = LWC X C) = _____ X _____ = .6 gals
3 Casing Volume 3 X CV = 1.8 gals (standard purge volume)

Total Volume of Water Purged Before Sampling 1.8 gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							~~1430~~ 1438
pH (s.u.)	6.5	6.6	6.6	6.6			
Specific Cond. (µmhos/cm)	1.32	112	113	112			
Water Temperature (°C)	30.0	29.1	29.0	28.8			
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

D H E C

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Date (mm/dd/yy): 9-19-03
Field Personnel: B. MAPLES
General Weather Conditions: SUNNY

Ambient Air Temperature: ____ °C

Quality Assurance

pH Meter		Conductivity Meter	
serial no.		serial no.	
pH=4.0		standard	
pH=7.0		standard	
pH=10.0		standard	

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: SC-15
Facility ID#: ____ Well #: MW15

Well Diameter (D): 2" Inch of ____ feet

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: — feet
Depth to Ground Water (DGW) 33.86 feet
Total Well Depth (TWD) 35.00 feet
Length of Water Column (LWC = TWD - DGW) 1.14 feet

1 Casing Volume (CV = LWC X C) = ____ X ____ = 0.1 gals
3 Casing Volume 3 X CV = .3 gals (standard purge volume)

Total Volume of Water Purged Before Sampling — gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							1600
pH (s.u.)							
Specific Cond. (µmhos/cm)							
Water Temperature (°C)							
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

SMALL AMOUNT OF WATER

Field Data Information Sheet for Ground-Water Sampling
Division of Underground Storage Tank Management

Page ____ of ____

Date (mm/dd/yy): 9-19-03
Field Personnel: B. Maples
General Weather Conditions: SUNNY

Ambient Air Temperature: ____ °C

Quality Assurance

pH Meter		Conductivity Meter	
serial no.		serial no.	
pH=4.0		standard	
pH=7.0		standard	
pH=10.0		standard	

Chain of Custody

Relinquished by	Date/Time	Received by	Date/Time

Facility Name: SC-15
Facility ID#: ____ Well #: MW-16

Well Diameter (D): 2" Inch of ____ foot

Conversion factor (C): 3.14 X (D/2)² for a 2 inch well C = 0.163
for a 4 inch well C = 0.652

* Free Product Thickness: — feet
Depth to Ground Water (DGW) 26.56 feet
Total Well Depth (TWD) 35 feet
Length of Water Column (LWC = TWD - DGW) 8.44 feet

1 Casing Volume (CV = LWC X C) = ____ X ____ = 1.3 gals
3 Casing Volume 3 X CV = 3.9 gals (standard purge volume)

Total Volume of Water Purged Before Sampling 3.9 gals

* If free product is present over 1/8 inch, sampling will not be required

	Initial	1st Vol	2nd Vol	3rd Vol	4th Vol	5th Vol	Post Sampling
Cumulative Volume Purged (gallons)							
Time (military)							1630
pH (s.u.)	6.2	6.3	6.3	6.2			
Specific Cond. (µmhos/cm)	239	340	273	272			
Water Temperature (°C)	26.2	24.3	21.3	21.3			
Turbidity (subjective: clear, slightly cloudy, cloudy)							
PID Readings (if required)							

D H E C
PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner
Promoting and protecting the health of the public and the environment.

JAN 09 2004

MR JOHN WOLF
CROWN CENTRAL MARKETING CO
8701 PARK CENTRAL DR STE 100
RICHMOND VA 23227-1151

Re: Former Crown SC-015, 3800 Devine St. Columbia, SC 29205
UST Permit # 07680 CA # 20827 MWA # UMW-17908
Release 1 Reported August 15, 1989
Monitoring Report Received December 5, 2003
Richland County



Dear Mr. John Wolf:

The Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the Monitoring Report submitted by Earth Management Systems, Inc. that noted that monitoring wells MW-3, MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12, and MW-14 were destroyed during recent construction. As continuing site remediation activities are necessary the monitoring wells must be re-installed in accordance with the South Carolina Well Standards and Regulations. As the SUPERB Account originally paid for these wells, replacement costs cannot be paid by the account. Approval for the replacement of the monitoring wells has been granted to your environmental consultant; a copy of the approval is provided for your records. Well replacement activities at the site should commence immediately upon receipt of this letter. Please have your consultant submit the monitoring well logs and DHEC 1093 forms for the replacement wells to the Program within 60 days of the date of this letter.

The included cost agreement form is for ground water sampling of all the wells. All applicable South Carolina certification requirements apply to the laboratory services, well installation and report preparation. Please note that all rehabilitation activities associated with a UST release must be performed by a SCDHEC certified site rehabilitation contractor as required by R.61-98. The requested information should be submitted **within 60 days of the date of this correspondence.** If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available. Please note that payment from the SUPERB Account will be made upon review of the report and confirmation that all work performed was technically justified.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Program is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be preapproved by the Program for the cost to be paid. **The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable or excessive,** and the right to audit project records at any time during the project or after completion of work.

The Program grants pre-approval for transportation of virgin-petroleum contaminated water and soil from the referenced sites to an approved disposal facility. The contaminated soil and/or groundwater must be properly stored in labeled containers. The contaminated soil and/or groundwater must be accepted by the approved treatment facility. There can be no spillage or leakage in transport. A copy of the disposal manifest and/or acceptance letter from the receiving facility that clearly designates the quantity received must be included as an appendix to the final report. If the levels of petroleum contamination based on laboratory analysis are below risk-based screening levels, please contact the project manager for approval to dispose of soil and/or groundwater on-site. The SUPERB Account will not compensate transportation or treatment of clean soil and/or groundwater.

On all correspondence regarding this site, please reference UST Permit #07680,and CA #20827. If you have any questions, please call me at (803) 896-6323 or at 1-800-826-5435 (within SC only) or by fax # (803) 896-6245. I can also be reached by email at brineysm@dhec.sc.gov.

Sincerely,

Stephanie Briney

Stephanie Briney, Hydrogeologist
Owner/Operator Assistance
Assessment and Corrective Action Division
Underground Storage Program
Bureau of Land and Waste Management

enc: Approved Cost Agreement (ACA)
Monitoring Well Approval (MWA)

cc: Mr. Norman E. Partin, Jr., Earth Management Systems, Inc., 3025 McNaughton Drive Columbia, SC 29223 (w/ original MWA and ACA)
Technical File (w/ copy of MWA)

DHEC/UST/12-9-03

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Monitoring Well Installation Approval Form

Date of Issue: December 11, 2003

Approval No.: UMW-17908

Approval is hereby granted to:	Earth Management Systems, Inc.
On behalf of:	Crown Central Marketing Co.
UST Permit #:	07680, 3800 Devine St. Columbia, SC 29205
County:	Richland

This approval is for the construction of nine shallow permanent monitoring wells in accordance with the South Carolina Well Standards and Regulations. The well(s) are to be constructed within the surficial aquifer for the intended purpose of monitoring groundwater quality and/or water level(s) at the referenced facility. Approval is provided with the following conditions:

1. The latitude and longitude, surveyed elevations, boring and/or geologist logs and actual (as built) construction details for each well will be submitted with the technical report.

2. Each well will be labeled with an identification plate constructed of a durable material affixed to the casing or surface pad where it is readily visible. The plate will provide monitoring well I.D.#, date of construction, static water level, and driller name and state certification #.

3. Well construction and sampling derived waste including, but not necessarily limited to, drill cuttings, drilling fluids, development and purge water should be managed properly and in compliance with applicable requirements. If containerized, each vessel should be clearly labeled with regard to contents, source, and date of activity.

4. A minimum of forty-eight (48) hours prior to initiation of drilling activities, please provide notice to Stephanie Briney at (803) 896-6323 or brineysm@dhec.sc.gov.

5. Please provide groundwater quality analytical data (chemical analysis and/or water level(s)) and associated measurements (i.e., in-situ field measurements) to me with the technical report.

6. Monitoring wells and temporary monitoring wells will be installed by or under the direct supervision of a licensed well driller certified by the State of South Carolina.

7. Monitoring wells and temporary monitoring wells will be abandoned by or under the direct supervision of a licensed well driller certified by the State of South Carolina. Temporary monitoring wells shall not remain in place for longer than 30 days from the date of installation. Monitoring wells may be abandoned only upon concurrence by this Bureau.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and the Department of Health and Environmental Control Regulations R.61-71. Please remember to have a copy of this approval on the site during well installation.

Approved by: Stephanie Briney

Stephanie Briney, Hydrogeologist
Owner/Operator Assistance Section
Underground Storage Tank Program
Bureau of Land and Waste Management

cc: Central Midlands EQC District
Technical File

Approved Cost Agreement 27

Facility: 07680 SC015
BRINEYSM
PO Number:

Task / Description	Categories	Item Description	Qty / Pct	Unit Price	Amount
01 PLAN					
		B TAX MAPS	1.0000	50.00	50.00
04 MOB/DEMOB					
		B PERSONNEL	2.0000	250.00	500.00
10 SAMPLE COLLECTION					
		A GROUND WATER	16.0000	55.00	880.00
11 ANALYSES					
	GW GROUNDWATER	A BTEX+NAPTH+MTBE	16.0000	100.00	1,600.00
		E LEAD	16.0000	20.00	320.00
		F EDB	16.0000	55.00	880.00
17 DISPOSAL					
		A1 WASTEWATER - PURGING/SAMPLING	2.0000	90.00	180.00
19 RPT/PROJECT MNGT & COORDINATIO					
		PCT PERCENT	0.1500	4,410.00	661.50
			Total Amount		5,071.50

GAGE
GROUP
A Terracon Company

7/16
left msg that
replace mw-1 wells
@ Crown expense —
Sr. pd's per Stephy Bing
Director
AS

May 26, 2004

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

Attn: Mr. Art Shrader

Re: Tier II Assessment Addendum
Former Crown SC-015
3800 Devine Street, Columbia, South Carolina
UST Permit # 07680, CA# 20827
GAGE Job No. 73048005

RECEIVED
JUN 0 1 2004
UNDERGROUND STORAGE
TANK PROGRAM

Dear Mr. Shrader,

We have received the Bureau's directive for ground water sampling and monitoring well replacement at the Former Crown SC-015 site. Upon further review of our files of historical data and current site conditions, we offer the following information:

- Monitoring well MW-15 is screened across both the upper and lower zones (20-35 ft.) During installation, there was no water at the expected depth of 20-25 ft., therefore this well was extended to 35 feet. The depth to water was last measured at 33.9 feet. It cannot be determined whether the source of this water is from the upper or lower unit. The upper zone in this area should be evaluated by installing a shallow (20-30 ft.) monitoring well to determine the water quality of the upper unit in this area, if water exists;

- All COC concentrations have been below detection limits or RBSLs in MW-1A, MW-2, MW-3, MW-3A, and MW-10. Based on this data, further investigation of the former UST area is not necessary. Monitoring wells MW-2 and MW-3A can be used to monitor the water quality of this portion of the site.

- Four of the eight existing monitoring wells were dry during the last ground water sampling event;

- No vertical extent well has been installed at this site;

- No ground samples have been analyzed for EDB at this site;

- Recent construction of a grocery store will not permit installation of a monitoring well at the former location of MW-14.

Monitoring wells MW-5, MW-6, MW-7, MW-9, MW-11, and MW-12 are crucial to evaluate the ground water quality conditions at this site. SUPERB funding is requested to replace monitoring

UST 97T DOCKETING

wells MW-5, MW-6, MW-7, and MW-11. Based on the ground water levels recorded during the last sampling event (9/03), these wells would have likely been dry had they existed. MW-9 can be restored to near its original condition. We will seek costs to replace MW-12 from the previous site developer. Ground water screening prior to well installation should be performed prior to installation to optimize these new locations.

Based on the above information please find attached an addendum to the above referenced cost proposal to complete plume delineation at this site. This plan was prepared to include:

- Field screening of the upper zone to determine the side-gradient and down-gradient extent of impact;
- Installation of shallow wells in the areas of MW-5, MW-6, MW-7, MW-11, and MW-15 based on the screening results;
- Field screening of the lower zone to determine the vertical extent of impact in the area of the former dispensers and downgradient from the site;
- Installation of a 'deep' Type III monitoring well based on the screening results;
- Horizontal hydraulic conductivity (slug) testing of the lower portion of the shallow aquifer;
- A comprehensive site survey to document the current site improvements due to recent construction.

Please find attached a site map showing the proposed screening point and monitoring well locations.

If you have any questions regarding this information, or if you would like to discuss this further, please to contact me at 803-741-9000.

Sincerely,

GAGE Group, Inc.

P. Michael Hudgins, P.G.
Senior Hydrogeologist
SC Registration No. 1137

Attachments:
Site Map
Additional Assessment Cost Agreement

cc: Mr. John Wolf / Crown Central Petroleum Corporation

ASSESSMENT COMPONENT COST AGREEMENT - ADDENDUM

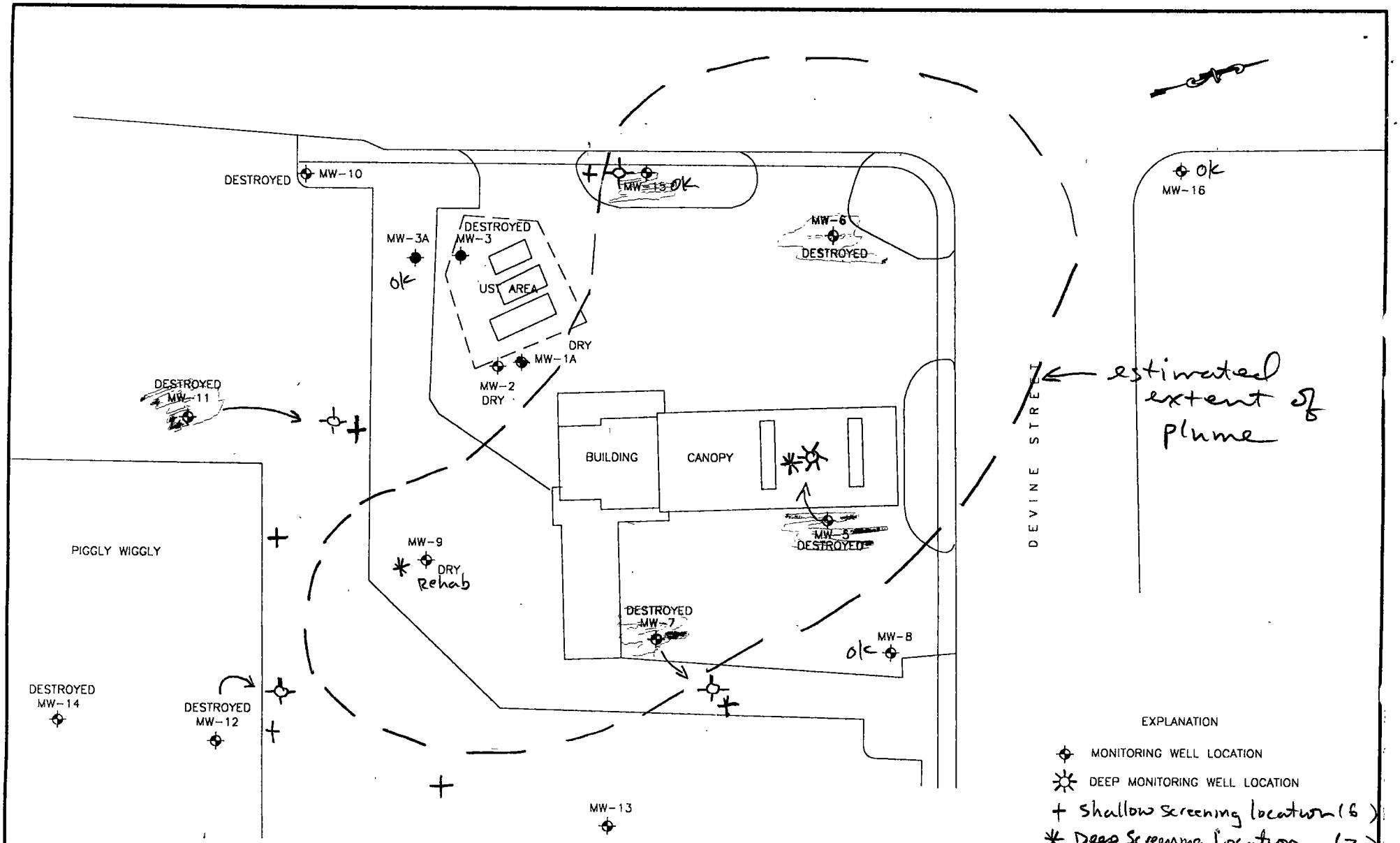
SOUTH CAROLINA
Department of Health and Environmental Control
Bureau of Underground Storage Tank Management
State Underground Petroleum Environmental Response Bank Account

UST Facility Name: Former CROWN SC-015
UST Permit #: 07680 CA#: 20827

	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL
1.	Plan*					
	A. Plan Preparation*			x	$100.00	$0.00
	B. Tax Maps			x	$50.00	$0.00
2.	Receptor Survey*			x	$500.00	$0.00
3.	Comprehensive Survey		1	x	$1,000.00	$1,000.00
4.	Mob/Demob (List component #)					
	A. Equipment	6,9	2	x	$500.00	$1,000.00
	B. Personnel	6,9	2	x	$250.00	$500.00
5.	Soil Borings (hand auger)*			feet x	$14.00	$0.00
6.	Soil Borings (drilled)		(includes collection and quantification)			
	and Field Screening*	6 x 20 ft. shallow 2 x 50 ft. deep	220	feet x	$17.00	$3,740.00
7.	Soil Leachability Model			x	$200.00	$0.00
8.	Abandonment*		220	feet x	$4.00	$880.00
9.	Well Installation*		(includes drilling costs)			
	A. Water Table (hand auger)			feet x	$20.00	$0.00
	B. Water Table (drilled)	5 shallow (25 ft. wells)	125	feet x	$38.00	$4,750.00
	C. Telescoping	1 deep (50 ft.) well	50	feet x	$58.00	$2,900.00
	D. Rock Drilling			feet x	$58.00	$0.00
10.	Sample collection*					
	A. Ground water			samples x	$55.00	$0.00
	B. Air / Vapor			samples x	$90.00	$0.00
11.	Analyses-Groundwater		(See Analytical Methodology for analyses)			
	A. BTEX+Napth.+MTBE			samples x	$100.00	$0.00
	B. BTEX+Napth.+MTBE+TMB (rush)			samples x	$120.00	$0.00
	C. BTEX+Napth.+MTBE+TMB			samples x	$135.00	$0.00
	D. PAHs			samples x	$120.00	$0.00
	E. Lead			samples x	$20.00	$0.00
	F. EDB (8011)			samples x	$55.00	$0.00
	G. 8 RCRA Metals			samples x	$140.00	$0.00
	H. TPH (9070)			samples x	$55.00	$0.00
	I. pH			samples x	$10.00	$0.00
	J. BOD			samples x	$40.00	$0.00
	K. Nitrate			samples x	$20.00	$0.00
	L. Sulfate			samples x	$20.00	$0.00
	M. Ferrous Iron			samples x	$20.00	$0.00
	N. Methane			samples x	$110.00	$0.00
	O. Organic Lead			samples x	$100.00	$0.00
	P. 8 Oxygenates			samples x	$85.00	$0.00

ASSESSMENT COMPONENT COST AGREEMENT - ADDENDUM					
11. Analyses-Soil					
Q. BTEX + Napth.	_____	samples	x	$100.00	$ $0.00
R. PAHs	_____	samples	x	$120.00	$ $0.00
S. 8 RCRA Metals	_____	samples	x	$150.00	$ $0.00
T. TPH (9071)	_____	samples	x	$60.00	$ $0.00
U. TPH (3550)	_____	samples	x	$65.00	$ $0.00
V. TPH (5035)	_____	samples	x	$65.00	$ $0.00
W. Grain size / hydrometer	_____	samples	x	$75.00	$ $0.00
X. Total Organic Carbon	_____	samples	x	$35.00	$ $0.00
12. Aquifer Characterization*					
A. Pumping Test	_____	hours	x	$120.00	$ $0.00
B. Slug test	1	tests	x	$150.00	$ $150.00
13. Free Product Recovery Rate Test*	_____	tests	x	$120.00	$ $0.00
14. Fate/Transport Modeling					
A. Mathematical Model	_____	models	x	$300.00	$ $0.00
B. Computer Model	_____	models	x	$500.00	$ $0.00
15. Risk Evaluation					
A. Tier I	_____		x	$300.00	$ $0.00
B. Tier II	_____		x	$500.00	$ $0.00
16. Subsequent Survey*	_____		x	$260.00	$ $0.00
17. Disposal*					
A. Wastewater					
1. Purging/Sampling	2	drums	x	$90.00	$ $180.00
2. Pumping test	_____	gallons	x	$0.60	$ $0.00
B. Free Product	_____	drums	x	$110.00	$ $0.00
C. Soil (Treatment/Disposal)	_____	tons	x	$50.00	$ $0.00
	6	drums	x	$50.00	$ $300.00
18. Miscellaneous*					
_____	_____	days	x	_____	$ $0.00
_____	_____		x	_____	$ $0.00
_____	_____		x	_____	$ $0.00
_____	_____		x	_____	$ $0.00
19. Report/Project Management				(SUBTOTAL)	$0.00
and Coordination	0.15		x	$15,400.00	$ $2,310.00
20. Total					$ $17,710.00

*The appropriate mobilization cost can be added to complete these tasks, as necessary.



EARTH MANAGEMENT SYSTEMS, INC.
Environmental Consultants

FIGURE 2
SITE PLAN

FORMER CROWN SC 015
COLUMBIA, SOUTH CAROLINA
JOB NO.: 2325-054

2325-054 SC015

From: Art A. Shrader
To: Hudgins, P. Michael
Date: 10/19/2004 9:03:14 AM
Subject: Re: FW: UST Site #07680

Mike,

I though I talked with someone in late July based on the letter you sent I thought in July....
If I remember correctly:
... The directive/cost agreement was sent December/January to replace destroyed wells and sample all wells.
....Your letter said some of the wells could not be replaced in the old locations because of construction and the deep well was constructed in two aquifers...
... I said OK to move the locations of the replacement wells and sample all wells (no additions to the cost agreement).....

Please call if we need to discuss further.
Art

>>> "Hudgins, P. Michael" <MHudgins@gagegroup.org> 10/15/2004 2:01:36 PM >>>
Art, please let me know the status of this cost agreement, as I would
like to update Crown.

Thanks, Mike H.

From: Hudgins, P. Michael [mailto:mhudgins@gagegroup.org]
Sent: Tuesday, June 01, 2004 6:32 PM
To: 'Art A. Shrader'
Subject: RE: UST Site #07680

Art, please find attached the Addendum Cost Agreement for former Crown
SC-015, we discussed. (excel Spreadsheet).
Sorry for the omission.
Mike H.

-----Original Message-----
From: Art A. Shrader [mailto:SHRADEAA@dhec.sc.gov]
Sent: Tuesday, May 25, 2004 8:54 AM
To: mhudgins@gagegroup.org
Subject: Re: UST Site #07680

Mike,

There has been no addendum enter into the system...
Please send me an addendum to replace the dry wells.
Since this release is ranked 3B, this will be our only chance to define this plume unless the tank owner would like to pay fo activities. In the future we are only funding releases ranked 1 or 2...

Art



>>> "Hudgins, P. Michael" <mhudgins@gagegroup.org> 05/24/04 01:56PM >>>

Art,

Please review the status of the above referenced site and cost agreement #

20827. The last correspondence I have is with the previous project manager,

who said she would send out a cost agreement to replace four of the wells

that would have been dry at the last sampling in September 2003. Please let

me know if this is correct, or call me to discuss further.

Thank you,
Mike

This email and any files transmitted with it are the property of Terracon Consultants, Inc., and/or its affiliates, and may contain information that is confidential or otherwise protected from disclosure. The information is intended solely for the use of the individual or entity to whom this email is addressed. If you are not the intended recipient, please contact the sender by reply email and destroy all copies of the original message and delete the material from any computer. Any other use, review, retention, dissemination, forwarding, printing, or copying of, or reliance on, this email or attachments is strictly prohibited.

GROUND WATER ASSESSMENT REPORT

FORMER SC-015

3800 DEVINE STREET

COLUMBIA, SOUTH CAROLINA

UST PERMIT # 07680

Prepared for:

Crown Central, LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:

521 Clemson Road
Columbia, South Carolina 29229

January 25, 2008
Terracon Project No. 73078012

January 25, 2008

Terracon
Consulting Engineers & Scientists

Terracon Consultants, Inc.
521 Clemson Road
Columbia, South Carolina 29229
Phone 803.741.9000
Fax 803.741.9900
www.terracon.com

Mr. Arthur Shrader
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: ***Ground Water Assessment Report***
Former SC-015
3800 Devine Street, Columbia, South Carolina
UST Permit # 07680, CA # 20827
Terracon Project No. 73078012

Dear Mr. Shrader:

On behalf of Crown Central, LLC, **Terracon Consultants, Inc.** is pleased to submit this Ground Water Assessment Report for the Former SC-015 facility located at 3800 Devine Street in Columbia, South Carolina. This report summarizes the ground water sampling activities and our findings, conclusions, and recommendations.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.

Melissa Roberts
Staff Geologist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

Attachment

cc: Jim Janson/Crown Central, LLC

TABLE OF CONTENTS

SECTION	PAGE NO.
1.0 INTRODUCTION	1
2.0 GROUND WATER SAMPLING	2
3.0 ASSESSMENT RESULTS	3
4.0 CONCLUSIONS AND RECOMMENDATIONS	3

FIGURES

1 Site Location Map
2 Site Map
3 Potentiometric Surface Map
4 Benzene/MTBE Concentration Map

TABLES

1 Ground Water Elevation Data
2 Ground Water Analytical Data – Petroleum Compounds

APPENDICES

A Tax Map with Surrounding Property Ownership Information
B Ground Water Sampling Logs
C Chemical Analytical Data

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the ground water sampling and analysis at the Former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement # 20827 and the Risk Based Corrective Action (RBCA) guidance document prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, and a church/school, and a realty office which was formerly a service station. Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1). A tax map indicating parcel boundary locations and a table listing property ownership information are included as Appendix A.

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed in July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA. Assessment activities following this release included installation of sixteen permanent monitoring wells on the property and adjacent properties. Free product has been identified in monitoring wells MW-5 and MW-6. A site map showing the former and existing monitoring well locations is presented as Figure 2.

Redevelopment of the site occurred in 2001 to include construction of the Long's Drugstore and the expansion of the adjacent Piggly Wiggly grocery store. Despite Crown's efforts to protect the existing wells, nine monitoring wells (MW-3, MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12, and MW-14) were destroyed during constriction. Additionally, site development may have altered top-of-casing elevations of the remaining monitoring wells.

In December 2007, the SCDHEC issued a directive to perform a comprehensive ground water assessment event at this site. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, field and laboratory ground water analytical results, and our conclusions and recommendations.

2.0 INVESTIGATIVE METHODS

2.1 Groundwater Sampling

Ground water sampling of monitoring wells was performed at the former SC-015 site on December 3, 2007. Water levels were measured in the monitoring wells using an electric water level indicator and converted to elevations relative to previously-reported top of well casing (TOC) elevations. A summary of the water level data is presented on Table 1. A potentiometric surface map of the shallow aquifer is included as Figure 3.

Four site monitoring wells were sampled as part of this assessment. One monitoring well (MW-8) was purged fully with a disposable polyethylene bailer prior to sampling. Three monitoring wells that bracketed the water table were not purged prior to sampling. Four site monitoring wells (MW1A, MW-2, MW-3A, and MW-9) which were sampled in 2003 were not sampled as part of this comprehensive ground water assessment. Monitoring wells MW-1A and MW-2 were dry at the time of sampling. Monitoring well MW-3A was bent below ground surface and would not allow lowering of a bailer. Monitoring well MW-9 was not located despite use of a metal detector; this well also is believed destroyed.

Ground water samples were collected using disposable polyethylene bailers dedicated to each well. Dissolved oxygen, specific conductance, pH, and temperature measurements were taken prior to sampling and were recorded on Ground Water Sampling Logs, included in Appendix B. Samples were placed in an iced cooler and delivered along with chain of custody documentation to Access Analytical, Inc. in Irmo, South Carolina for analysis of the following parameters:

Analysis	Method
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Methyl-tert-butyl-ether (MTBE) Naphthalene	EPA Method 8260B
Total lead	EPA Method 6010B

Ground water analytical results are included in Table 2. A copy of the laboratory analytical report is included in Appendix C.

3.0 ASSESSMENT RESULTS

Ground water occurs within the shallow aquifer under unconfined conditions at depths ranging from approximately 10.9 to 34.1 feet below ground surface across the study area. Analysis of Figure 3 indicates the ground water flow direction is to the southwest. Inspection of Table 1 indicates the ground water elevations in the shallow aquifer ranged from approximately 0.4 feet higher to 1.3 feet lower than the elevations recorded during the previous ground water sampling event (September 2003).

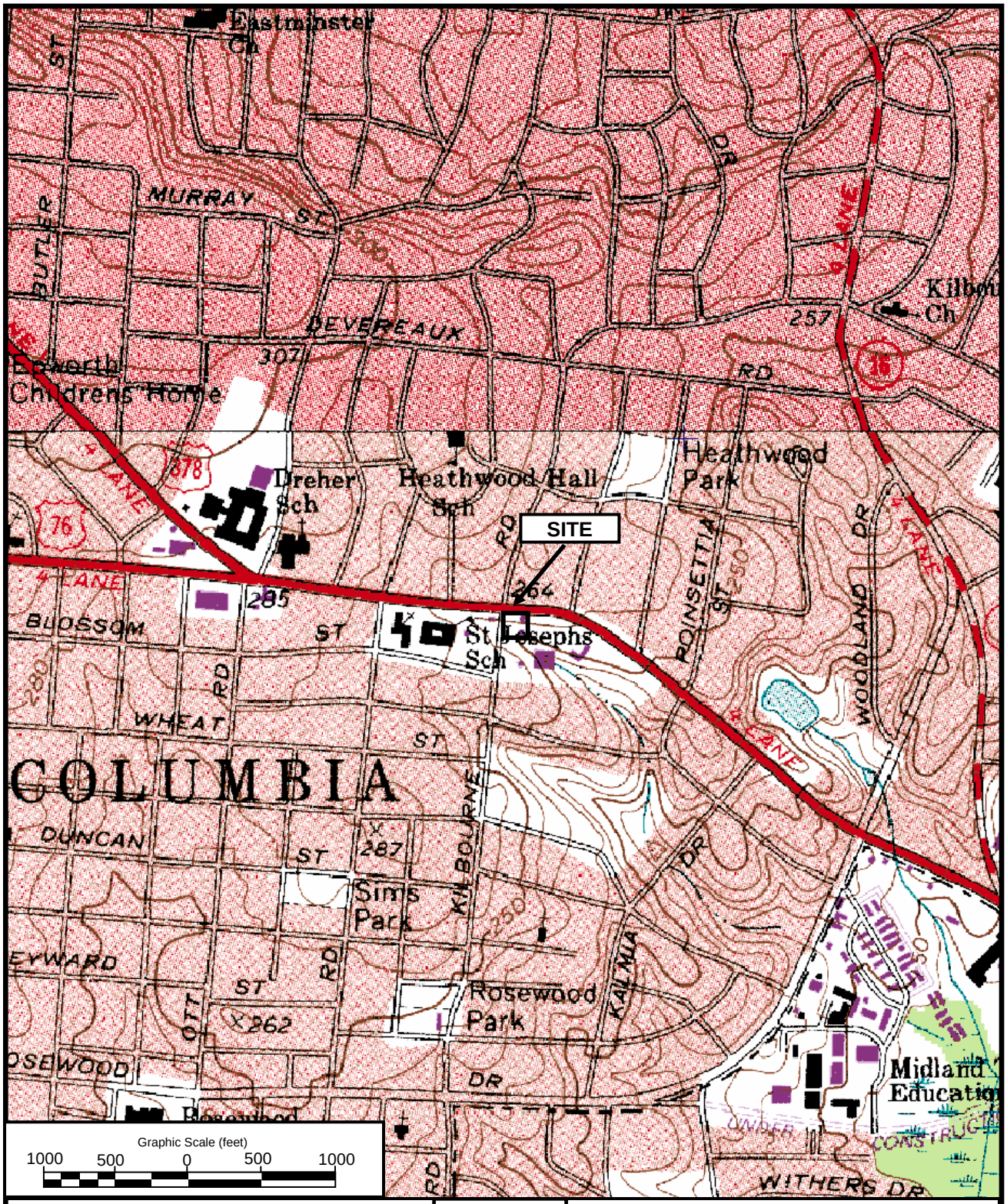
Free-phase petroleum product was not detected in any of the site monitoring wells. Petroleum compounds were detected at concentrations above Risk Based Screening Levels (RBSLs) in ground water samples collected from monitoring wells MW-15 and MW-16. A benzene/MTBE concentration map of the shallow aquifer is included as Figure 4. Based upon data from the current monitoring well network, the contaminant plume is oriented approximately north-south, is approximately 215 feet long, is approximately 30 to 60 feet wide, and affects a residential property to the north of the site.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Petroleum hydrocarbons were detected at concentrations above RBSLs in ground water samples from two monitoring wells (MW-15 and MW-16). Measurable thicknesses of free-product were not observed in any of the site monitoring wells.

Review of the ground water data provided in Table 2 indicates that in 2001, elevated hydrocarbon concentrations were noted in the groundwater samples from monitoring wells MW-5, MW-6, and MW-7 before these wells were destroyed during site redevelopment activities. Monitoring wells MW-5, MW-6, and MW-7 are recommended to be replaced in order to evaluate the groundwater conditions from the former UST system as well as from potential offsite sources. If free product or significant RBSL exceedances are detected in these replacement wells, Terracon recommends installation of a deep well in the vicinity of the former fuel dispensers in order to define the vertical extent of contamination at the site. Additional ground water sampling is also recommended to evaluate this site as a candidate for corrective action by monitored natural attenuation.

FIGURES



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

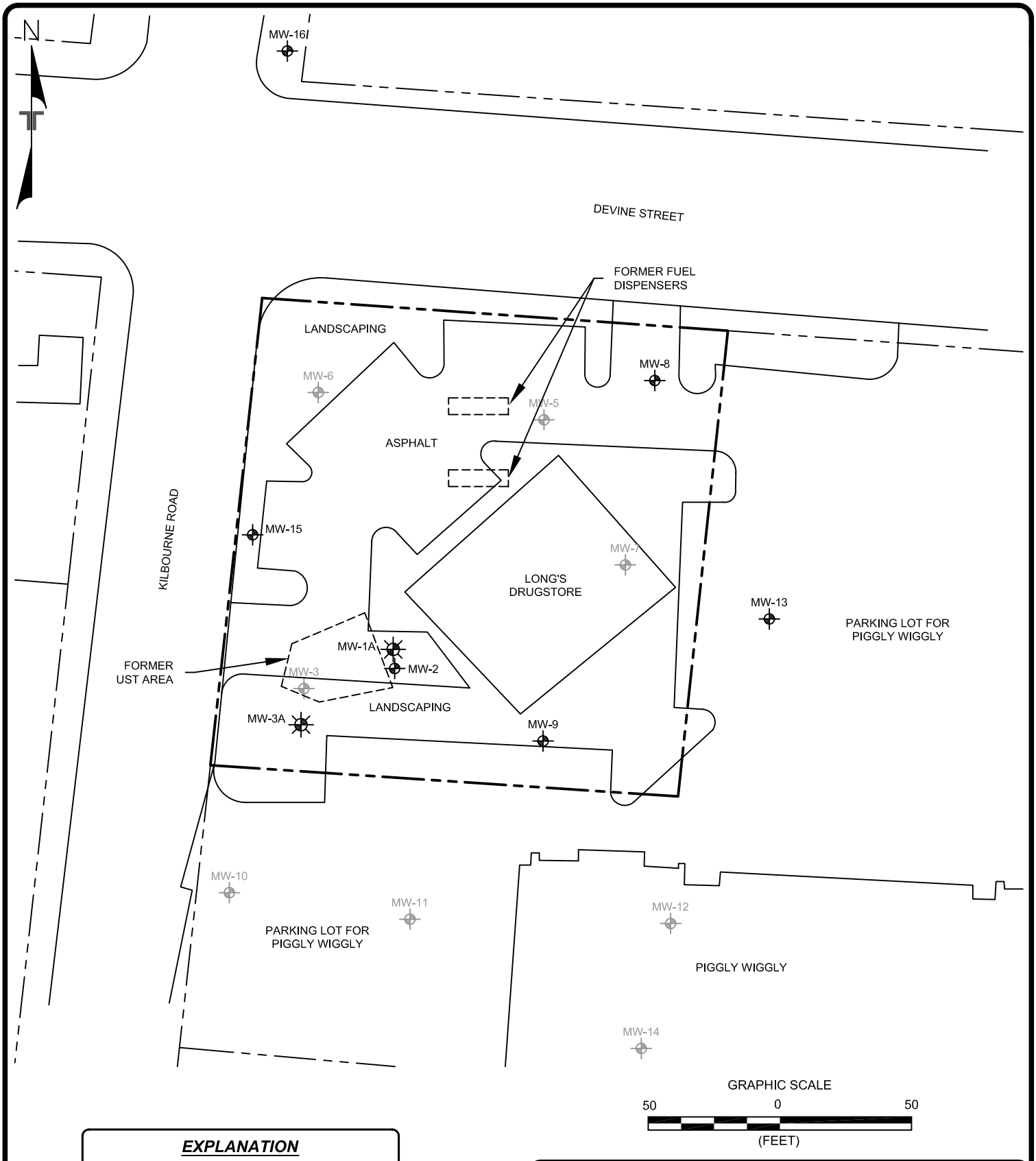
DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



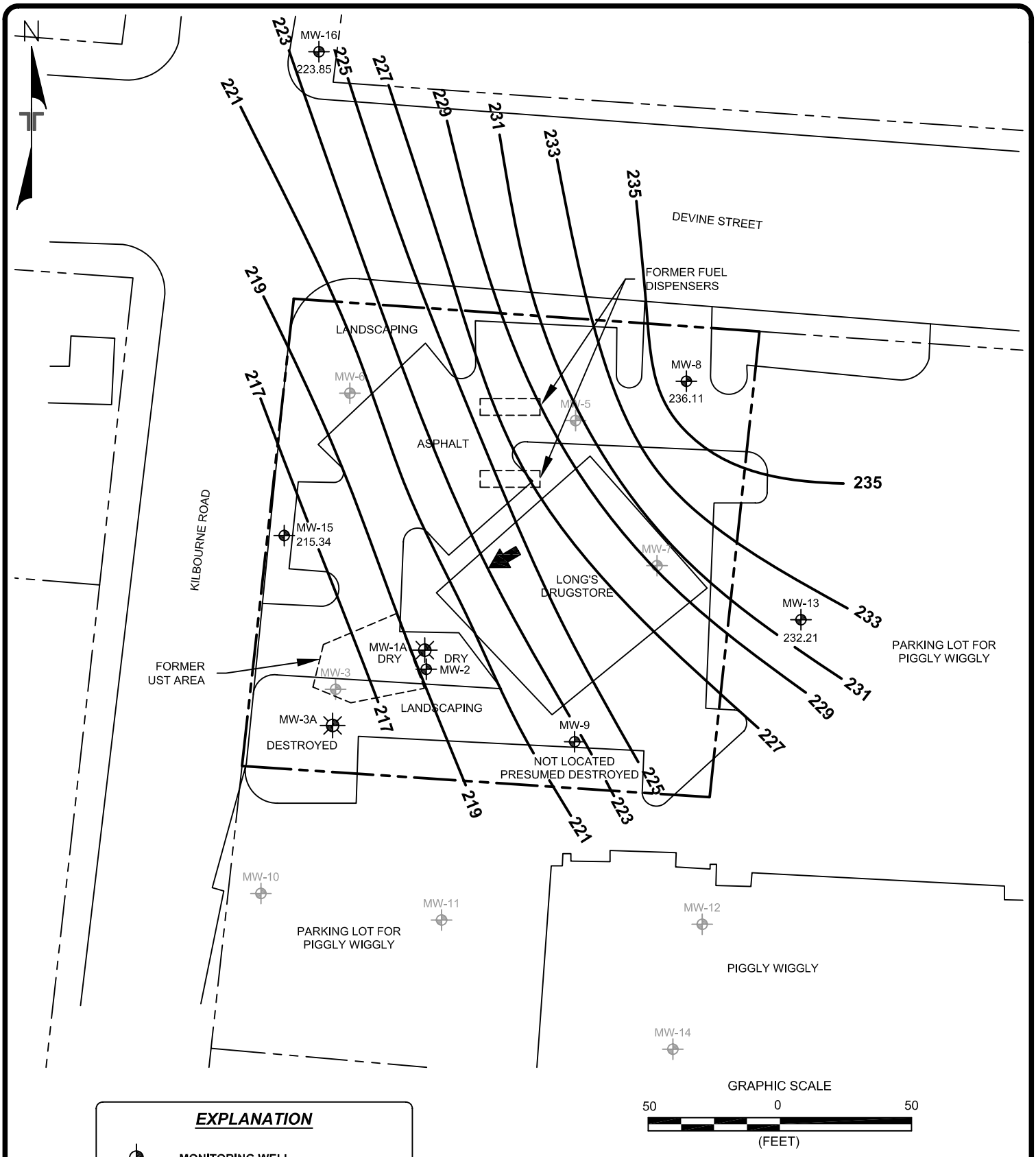
EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- APPROXIMATE PROPERTY BOUNDARY

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR	521 Clemson Road	Scale: 1 IN = 50 FT
Checked By:	PMH	Columbia, South Carolina 29229	Date: 1-4-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2



EXPLANATION

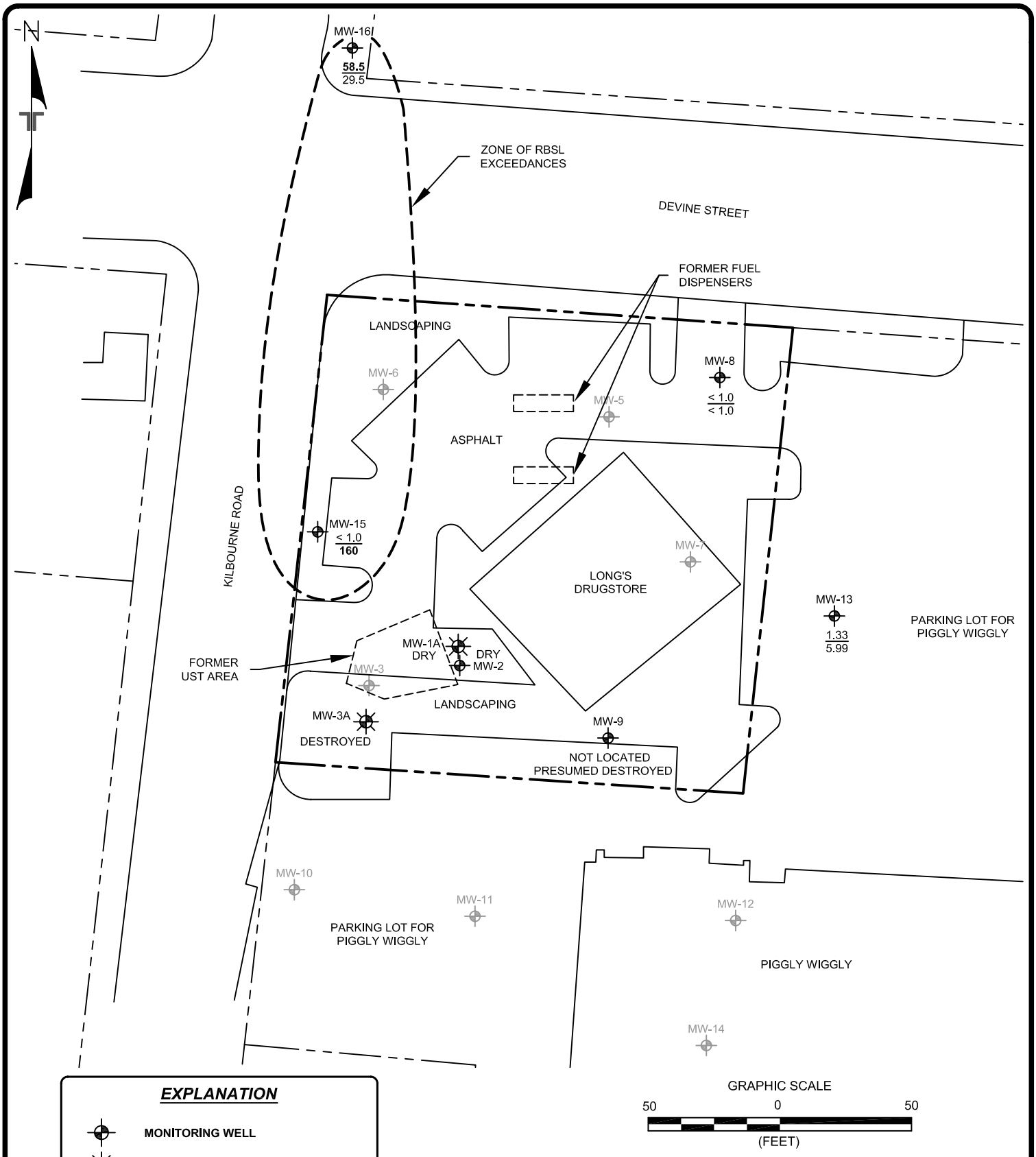
- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

POTENTIOMETRIC SURFACE MAP
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 1-4-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 3



GRAPHIC SCALE

50 0 50

(FEET)

EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- 58.5 / 29.5 — BENZENE CONCENTRATION IN ug/L / MTBE CONCENTRATION IN ug/L
- MTBE — METHYL TERT-BUTYL ETHER
- ug/L — MICROGRAMS PER LITER
- APPROXIMATE PROPERTY BOUNDARY

CONCTRATIONS IN BOLD EXCEED RBSLs

BENZENE / MTBE CONCENTRATION MAP
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR	521 Clemson Road	Scale: 1 IN = 50 FT
Checked By:	PMH	Columbia, South Carolina 29229	Date: 1-4-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 4

TABLES

TABLE 1
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	34.4
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		

TABLE 1
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		

TABLE 1
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-15	1/14/97	20-35	249.43	DRY	ND	ND
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85

NOTES:
**** = Due to new construction at this site and changes in the grade elevation, the top of casing elevations are unreliable.***
1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded

TABLE 2
GROUND WATER ANALYTICAL DATA
(ORGANICS)

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)
MW-1A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	2	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00
	9/19/03	DRY						
	12/3/07	DRY						
MW-2	7/16/93	NS	NS	NS	NS	NS	NS	NS
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00
	9/19/03	DRY						
	12/3/07	DRY						
MW-3	7/16/93	5	13	1	5	< 1.00	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00
	9/19/03	DESTROYED						
MW-3A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	1/14/97	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00
	12/3/07	DESTROYED						
MW-5	7/26/93	**19,000**	**86,000**	**3,500**	**22,000**	**4,000**	NA	**6,000**
	1/14/97	NS	NS	NS	NS	NS	NS	NS
	9/19/03	DESTROYED						
MW-6	7/26/93	**9,600**	**2,200**	**1,900**	9,300	< 1.00	NA	NA
	1/14/97	NS	NS	NS	NS	NS	NS	NS
	9/19/03	DESTROYED						
MW-7	7/16/93	**19,000**	**86,000**	3,500	2,200	**4,000**	NA	NA
	1/14/97	**7,000**	**8,900**	**1,700**	3,200	**4,300**	NA	**150**
	9/19/03	DESTROYED						

TABLE 2
GROUND WATER ANALYTICAL DATA
(ORGANICS)

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)
MW-8	7/16/93	**130**	**1,100**	73	730	< 5.00	NA	NA
	1/14/97	**40**	1.70	1.60	32	< 1.00	NA	31
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00
MW-9	7/16/93	< 10	< 10	< 10	< 10	**10,000**	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	**3,800**	NA	**500**
	9/19/03	NS	NS	NS	NS	NS	NS	NS
	12/3/07	WELL NOT LOCATED						
MW-10	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	**970**	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	32	NA	< 1.00
	9/19/03	DESTROYED						
MW-11	7/16/93	3	< 1.00	< 1.00	< 1.00	**56**	NA	NA
	1/14/97	**13**	< 1.00	< 1.00	< 1.00	**190**	NA	**500**
	9/19/03	DESTROYED						
MW-12	7/26/93	**1,200**	29	150	110	**1,000**	NA	NA
	1/14/97	4.90	< 1.00	1.20	< 1.00	**74**	NA	< 1.00
	9/19/03	DESTROYED						
MW-13	7/26/93	< 1.00	4.00	< 1.00	5.00	< 1.00	NA	NA
	1/14/97	**18**	< 1.00	< 1.00	< 1.00	28	NA	1.20
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00
	12/3/07	1.33	< 1.00	< 1.00	< 3.00	5.99	NA	< 5.00

TABLE 2
GROUND WATER ANALYTICAL DATA
(ORGANICS)

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)
MW-14	10/1/93	< 1.00	< 1.00	< 1.00	< 1.00	**270**	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	14	NA	< 1.00
	9/19/03	DESTROYED						
MW-15	1/14/97	NS	NS	NS	NS	NS	NS	NS
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	**300**	NA	< 5.00
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	**160**	NA	< 5.00
MW-16	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00
	9/19/03	2.60	< 1.00	< 1.00	< 3.00	5.66	NA	< 5.00
	12/3/07	**58.5**	< 1.00	< 1.00	4.06	29.5	NA	5.23
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*5*	*25*

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) ug/l - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) NF = not found
7) < 1.00 = below detection levels

APPENDIX A
Tax Map with Surrounding Property Ownership Information

Tax Map Information

FORMER SC-015

3800 DEVINE STREET, COLUMBIA, SOUTH CAROLINA

UST PERMIT NO. 07680

TAX MAP NO.	ADDRESS	PROPERTY OWNER	PROPERTY USE
R13807-03-01	630 KILBOURNE RD.	NIGGEL FAMILY PARTNERSHIP P.O. Box 6573 Columbia, SC 29260	Subject Site
R13807-03-02	3818 DEVINE ST.	NIGGEL FAMILY PARTNERSHIP P.O. Box 6573 Columbia, SC 29260	Commerical
R13807-03-31	600 KILBOURNE RD.	NIGGEL FAMILY PARTNERSHIP P.O. Box 6573 Columbia, SC 29260	Commerical
R13808-11-01	3600 DEVINE ST.	BISHOP OF CHARLESTON 3600 & 3632 Devine Street Columbia, SC 29205	Residential
R13808-11-03	3722 DEVINE ST.	RUSSELL-JEFFCOAT ENTERPRISE 1931 Assembly Street Columbia, SC 29201	Office & Institutional
R13808-04-02	21 HEATHWOOD CR.	LUMPKIN, JOSEPHINE STOUT LIFE ESTATE 21 Heathwood Circle Columbia, SC 29205	Residential
R13808-10-12	700 KILBOURNE RD.	PERKINS, CHERYL F. & PAUL R 700 Kilbourne Road Columbia, SC 29205	Residential
R13808-10-11	3827 DEVINE ST.	LADSON, JEANETTE CLAIRE 3827 Devine Street Columbia, SC 29205	Residential

Tax Map
Former SC-015
3800 Devine Street, Columbia, South Carolina
UST Site No: 07680



APPENDIX B
Ground Water Sampling Logs

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-3a
Date:	12/3/07
Site Name:	SC-015
Project No.:	
Field Personnel:	W. Waller
Weather Conditions:	Sunny
Air Temperature:	75°F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2 in.
1 Casing Volume = LWC x .17 =	gal.
3 Casing Volumes:	gal.

Remarks: well was only a pvc stick, covered w/ grass, the casing is bent to far to obtain H_2O & well is full of sediment, probe sounds off @ 1½"

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-8
Date:	12/3/07
Site Name:	SC-015
Project No.:	
Field Personnel:	L. Walker
Weather Conditions:	Sunny
Air Temperature:	75°F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1300

Total Well Depth:	15-25	ft. BTOC
Depth to water:	14.44	ft. BTOC
Length of Water Column (LWC):	10.56	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	1.79	gal.
3 Casing Volumes:		gal.

Remarks:

Field Analyses

Volume Purged (gal.)	1.79	3.6	5.4				
Time							
pH	5.02	4.68	4.47				
Specific Conductivity (umhos/cm)	144.7	144.7	149.4				
Water Temperature ©	25.1	25.0	25.0				
Turbidity	Mod	Mod	Mod				
Dissolved Oxygen (mg/L)			4.50				

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-13
Date:	12/3/07
Site Name:	SC-015
Project No.:	
Field Personnel:	W. Walker
Weather Conditions:	Sunny
Air Temperature:	75°F
Well Evacuation Method:	Bale-
Sample Collection Method:	Bale-
Sampled at (time):	1240

Total Well Depth:	6.5-16.5	ft. BTOC
Depth to water:	10.91	ft. BTOC
Length of Water Column (LWC):	5.59	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	0.95	gal.
3 Casing Volumes:		gal.
Remarks:		

Field Analyses

Volume Purged (gal.)							
Time							
pH	5.86						
Specific Conductivity (umhos/cm)	234.5us						
Water Temperature ©	24.8						
Turbidity	Med						
Dissolved Oxygen (mg/L)	1.91						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-15
Date:	12/3/07
Site Name:	SC-015
Project No.:	
Field Personnel:	W. Schaller
Weather Conditions:	Sunny
Air Temperature:	75°F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1330

Total Well Depth:	20 - 35	ft. BTOC
Depth to water:	34.09	ft. BTOC
Length of Water Column (LWC):	0.91	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x	.17 = 0.15	gal.
3 Casing Volumes:		gal.

Remarks: only obtained one vile of BTEX, Hg-6, MTBE the well is only 34.15 total

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-16
Date:	12/3/07
Site Name:	SC-015
Project No.:	
Field Personnel:	L. Walker
Weather Conditions:	Sunny
Air Temperature:	75°F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1520

Total Well Depth:	20-35 ft. BTOC
Depth to water:	27.89 ft. BTOC
Length of Water Column (LWC):	7.11 ft.
Casing Diameter:	2 in.
1 Casing Volume = LWC x .17 =	1.2 gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH	5.04						
Specific Conductivity (umhos/cm)	155.1us						
Water Temperature ©	20.9						
Turbidity	low						
Dissolved Oxygen (mg/L)	3.58						

APPENDIX C
Chemical Analytical Data

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Rd
Columbia, SC 29205

ATTENTION
Mike Hudgins

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
207120524

DATE
12/11/2007

Primary Data Review By

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 12/11/2007

GCAL Report 207120524

Deliver To	Terracon 521 Clemson Rd Columbia, SC 29205 803-741-9000
Attn	Mike Hudgins

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 207120524

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 363169, the MS/MSD exhibited recovery failures. All LCS/LCSD recoveries and RPDs were acceptable.

METALS

In the SW-846 6010B analysis for prep batch 362849, the batch MS and duplicate is not reportable because the batch QC sample was not target for Lead. The LCS recovery was acceptable.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 207120524

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052401	MW-8	Water	12/03/2007 13:00	12/05/2007 09:08
20712052402	MW-15	Water	12/03/2007 13:30	12/05/2007 09:08
20712052403	MW-16	Water	12/03/2007 15:20	12/05/2007 09:08
20712052404	MW-13	Water	12/03/2007 12:40	12/05/2007 09:08

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052402	**MW-15**	Water	12/03/2007 13:30	12/05/2007 09:08

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**160**	**1.00**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052403	**MW-16**	Water	12/03/2007 15:20	12/05/2007 09:08

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**58.5**	**1.00**		**ug/L**
1330-20-7	**Xylene (total)**	**4.06**	**3.00**		**ug/L**
91-20-3	**Naphthalene**	**5.23**	**5.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**29.5**	**1.00**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052404	**MW-13**	Water	12/03/2007 12:40	12/05/2007 09:08

SW-846 6010B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.026**	**0.015**		**mg/L**

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**1.33**	**1.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**5.99**	**1.00**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052401	**MW-8**	Water	12/03/2007 13:00	12/05/2007 09:08

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/09/2007 11:17	AEL	363169

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	1.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.4	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	56.7	ug/L	113	77 - 127
2037-26-5	Toluene d8	50	56.4	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	57.2	ug/L	114	71 - 127

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
12/05/2007 11:15	362849	SW-846 3010A	1	12/07/2007 23:04	CNB	363148

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052402	**MW-15**	Water	12/03/2007 13:30	12/05/2007 09:08

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/09/2007 11:40	AEL	363169

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	1.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**160**	**1.00**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	46.6	ug/L	93	78 - 130
1868-53-7	Dibromofluoromethane	50	59.7	ug/L	119	77 - 127
2037-26-5	Toluene d8	50	56.8	ug/L	114	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	58.6	ug/L	117	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052403	**MW-16**	Water	12/03/2007 15:20	12/05/2007 09:08

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/09/2007 12:02	AEL	363169

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**58.5**	**1.00**		**ug/L**
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	**Xylene (total)**	**4.06**	**3.00**		**ug/L**
91-20-3	**Naphthalene**	**5.23**	**5.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**29.5**	**1.00**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.8	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	57.7	ug/L	115	77 - 127
2037-26-5	Toluene d8	50	55.9	ug/L	112	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	57.2	ug/L	114	71 - 127

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
12/05/2007 11:15	362849	SW-846 3010A	1	12/07/2007 23:11	CNB	363148

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20712052404	**MW-13**	Water	12/03/2007 12:40	12/05/2007 09:08

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/09/2007 12:25	AEL	363169

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**1.33**	**1.00**		**ug/L**
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**5.99**	**1.00**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.1	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	55	ug/L	110	77 - 127
2037-26-5	Toluene d8	50	56.3	ug/L	113	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	54.5	ug/L	109	71 - 127

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
12/05/2007 11:15	362849	SW-846 3010A	1	12/07/2007 23:18	CNB	363148

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.026**	**0.015**		**mg/L**

GC/MS Volatiles Quality Control Summary

Analytical Batch 363169	**Client ID**	MB363169	LCS363169	LCSD363169	
Prep Batch N/A	**GCAL ID**	554454	554455	554456	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	12/09/2007 10:09	12/09/2007 09:01	12/09/2007 09:24	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike**			**Control**				**RPD**
		Result	**RDL**	**Added**	**Result**	**% R**	**Limits % R**	**Result**	**% R**	**RPD**	**Limit**
107-06-2	1,2-Dichloroethane	ND	5.00	25.0	24.5	98	75 - 122	25.3	101	3	30
100-41-4	Ethylbenzene	ND	1.00	25.0	25.2	101	80 - 125	26.2	105	4	30
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	25.0	22.4	90	72 - 127	22.3	89	0.4	30
1330-20-7	Xylene (total)	ND	3.00	75.0	76.0	101	80 - 129	76.6	102	0.8	30
91-20-3	Naphthalene	ND	5.00	25.0	26.8	107	67 - 149	25.6	102	5	30
71-43-2	Benzene	ND	1.00	25.0	22.8	91	80 - 120	24.4	98	7	11
108-88-3	Toluene	ND	1.00	25.0	24.3	97	80 - 124	25.3	101	4	13
Surrogate											
460-00-4	4-Bromofluorobenzene	50.5	101	50	50.7	101	78 - 130	51.7	103		
1868-53-7	Dibromofluoromethane	57.1	114	50	53.8	108	77 - 127	56.6	113		
2037-26-5	Toluene d8	56.6	113	50	57.4	115	76 - 134	58.2	116		
17060-07-0	1,2-Dichloroethane-d4	58.1	116	50	52.9	106	71 - 127	56.4	113		

Analytical Batch 363169	**Client ID**	MW-1	552942MS	552942MSD	
Prep Batch N/A	**GCAL ID**	20712051615	554484	554485	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	12/09/2007 13:10	12/09/2007 14:23	12/09/2007 14:45	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike**			**Control**				**RPD**
		Result	**RDL**	**Added**	**Result**	**% R**	**Limits % R**	**Result**	**% R**	**RPD**	**Limit**
107-06-2	1,2-Dichloroethane	0.00	25.0	125	129	103	75 - 122	130	104	0.8	30
100-41-4	Ethylbenzene	239	5.00	125	321	**66***	80 - 125	325	**69***	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.00	5.00	125	121	97	72 - 127	112	90	8	30
1330-20-7	Xylene (total)	1230	15.0	375	1350	**32***	80 - 129	1380	**40***	2	30
91-20-3	Naphthalene	109	25.0	125	233	99	67 - 149	240	105	3	30
71-43-2	Benzene	31.1	5.00	125	151	96	80 - 120	148	94	2	30
108-88-3	Toluene	146	5.00	125	237	**73***	80 - 124	241	**76***	2	30
Surrogate											
460-00-4	4-Bromofluorobenzene			250	251	100	78 - 130	252	101		
1868-53-7	Dibromofluoromethane			250	288	115	77 - 127	288	115		
2037-26-5	Toluene d8			250	279	112	76 - 134	287	115		
17060-07-0	1,2-Dichloroethane-d4			250	284	114	71 - 127	287	115		

Inorganics Quality Control Summary

Analytical Batch	363163	**Client ID**	MB362849		LCS362849		
Prep Batch	362849	**GCAL ID**	552943		552944		
Prep Method	SW-846	**Sample Type**	Method Blank		LCS		
	3010A	**Prep Date**	12/05/2007 11:15		12/05/2007 11:15		
		Analytical Date	12/08/2007 13:27		12/08/2007 13:35		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike**	**Result**		**Control**
		Result	**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	ND	0.015	0.50	0.53	107	80 - 120

Access/4565/20712052 4/12-10-07

Access Analytical - Chain of Custody Record

Project Submission #_____ **PO #**_____ **Laboratory ID:**_____

Company Name: Terracon
Report To: Mike Hudgins
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-015
Sampled By (print): William Walker

Preservative: (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.
Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	BTEX, Naph, MTBE	Lead						NOTES / COMMENTS
MW-8	12/3/07	1300	L	3	2	1					1	
MW-15	12/3/07	1330	L	1	1						2	not enough H_2O for full sample
MW-16	12/3/07	1520	L	3	2	1					3	
MW-13	12/3/07	1240	L	3	2	1					4	

Turnaround Time:
✓ Std. (5-7 Bus. days)
___RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___No

Project Location:
✓ SC
___NC
___Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	12/3/07	1300	Christy Rankin
Christy Rankin	12/3/07	1700	FedEx
FedEx	12-5-07	905	M

Pg_____of_____

Access Analytical, Inc.
See Reverse for Terms and Conditions

3

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

D H E C
PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

FEB 12 2008

MR JIM JANSEN
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21201-1168

Re: Assessment Report Directive
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 31633; MWA #UMW-17908
Release Reported August 15, 1989
Groundwater Assessment Report received January 28, 2008
Richland County

Dear Mr. Jansen:

The Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control has reviewed the referenced report submitted by Terracon Consultants Incorporated on your behalf. The report documents several monitoring wells that are dry and destroyed as part of redevelopment of the facility and adjacent properties. To determine the current risk to human health and in accordance with Section 280.65 of the South Carolina Underground Storage Tank Regulations, additional assessment activities must be conducted as petroleum Chemicals of Concern (CoC) are above the risk-based-screening levels.

Assessment activities at the site should begin immediately upon receipt of this letter. Cost agreement 31633 has been approved in the amount shown on the enclosed cost agreement for a comprehensive survey, installation of eight shallow and one deep monitoring wells, slug tests and sieve analyses for the new shallow and the new deep well in the vicinity of monitoring well MW-5, groundwater sampling event of the monitoring well network, and preparation of a report of findings. A map is enclosed that shows the approximate locations of the replacement monitoring wells. Shallow monitoring wells should be installed with a fifteen-foot screen that brackets the water table. A fifty-foot deep pit cased well should be installed adjacent to MW-5R with a screen from forty-five to fifty feet. Monitoring wells approval has been provided to your site rehabilitation contractor. A copy of the monitoring well approval is enclosed for your records. Laboratory analyses for BTEX and naphthalene has been provided for a soil sample with the highest screening value above the water table for each new permanent monitoring well. Please collect a soil sample from the screen interval from monitoring well MW-5R and adjacent deep monitoring well and have percent sand, silt, and clay reported. Please have you site rehabilitation contractor conduct slug tests on monitoring wells MW-5R, MW-6R and MW-7R. Groundwater samples from all private wells within 1,000 feet of the facility should be collected and analyzed for BTEX, naphthalene, MtBE, EDB, and 1,2 DCA. Groundwater samples from all monitoring wells associated with the release should be collected and analyzed for BTEX, naphthalene, MtBE, 8 oxygenates, 1,2 DCA, lead, nitrates, sulfates, methane, and ferrous iron in accordance with *Analytical Methodology for Groundwater and Soil Assessment Guidelines* dated August 24, 2005. A copy of this publication is available on line at http://www.scdhec.gov/eqc/admin/html/..%5C..ust%5Cpubs% 5Canalmet.

The Tier II Assessment Report and invoice are due within 90 days from the date of this letter. The report submitted at the completion of these activities should include a minimum the following:

UST PROGRAM
DOCKETING #

- Boring logs and well logs (DHEC form 1903) signed by a well driller licensed in the state of South Carolina for each new well.
- A narrative portion documenting current site conditions during the groundwater sampling event noting the names of field personnel, date, time, ambient air temperature, and general weather conditions during the sampling event. The report shall also contain well purging data, pH, specific conductivity, water temperature, PID readings (where applicable) and turbidity comments.
- Groundwater elevations, depth to groundwater, measurable free product thickness (where applicable), total well depth and screened interval for all monitoring wells associated with the site, unless otherwise directed by the Program, shall be presented in tabular form. Groundwater laboratory analytical data for all monitoring wells for this and all previous sampling events shall be presented in tabular format.
- A CoC map based on current groundwater laboratory analytical data. The groundwater data should be adjacent to the relevant monitoring well location.
- A groundwater elevation contour map of the site based on current groundwater potentiometric data.
- Manifests for any contaminated soil and/or groundwater removed from the site for treatment and/or disposal.
- Signature and seal by a professional geologist or engineer registered in the State of South Carolina.

Terracon Consulting Engineers and Scientists, Incorporated can submit an invoice for direct billing from the State Underground Petroleum Environmental Response Bank (SUPERB) Account for approved costs. An interim well drilling invoice may be submitted for well installation. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available. Please be advised if the time frame exceeds 45 days between the date when groundwater samples are collected and the date the report of findings is received, the analytical data will not be considered current and Terracon Consulting Engineers and Scientists, Incorporated will not be reimbursed for a personnel mobilization to collect the groundwater samples, laboratory analyses, or associated disposal costs.

Please be advised that all applicable South Carolina certification requirements apply to the laboratory services, well installation, and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

Please note that you and/or your contractor are responsible for obtaining all off-site access agreements and/or encroachment permits necessary for this scope of work.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Program is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be preapproved by the Program for the cost to be paid. The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Department grants pre-approval for transportation of virgin petroleum impacted soil and groundwater from the referenced site to a permitted treatment facility. There can be no spillage or leakage in transport. All investigation-derived waste (IDW) must be properly contained and labeled prior to disposal. IDW should not be stored on-site longer than ninety (90) days. A copy of the disposal manifest and/or acceptance letter from the receiving facility that clearly designates the quantity received must be included as an appendix to the report. If the COC concentrations, based on laboratory analysis, are below Risk Based Screening Levels (RBSLs), please contact the project manager for approval to dispose of soil and/or groundwater on site. The SUPERB Account will not reimburse for transportation or treatment of soil and/or groundwater with concentrations below RBSLs.

On all correspondence or inquiries regarding these contracts, please reference UST Permit number 07680. If you have any questions, please contact me at (803) 896-6669, or fax me at (803) 896-6245.

Sincerely,

Arthur Shrader, Hydrogeologist
Assessment Section
Assessment and Corrective Action Division
Underground Storage Tank Program
Bureau of Land and Waste Management

Enc: Site Map with Proposed Monitoring Well Locations
Approved Cost Agreement (ACA)
Monitoring Well Approval (ACA)

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (with enc.)
Technical File (with enc.)

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Monitoring Well Installation Approval Form

Approval is hereby granted to: Terracon Consultants, Incorporated
(on behalf of): Crown Central Petroleum
Facility: Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit Number: 07680
County: Richland

This approval is for the installation of eight shallow and one deep pit cased monitoring wells. The monitoring wells are to be installed in the approved locations. Monitoring wells are to be installed following the South Carolina Well Standards, R.61-71, and the applicable guidance documents.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.

2. All monitoring wells shall be labeled as required by R.61-71.H.2.c.

3. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted to the Department within 30 days after well completion or abandonment unless another schedule has been approved by the Department. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f

4. All analytical data and water levels obtained from each monitoring well shall be submitted to the Department within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

5. If any of the information provided to the Department changes, notification to Arthur Shrader (tel: (803) 896-6669 or e-mail: shradeaa@dhec.sc.gov) shall be provided a minimum of twenty-four (24) hours prior to well construction as required by R.61-71.H.1.a.

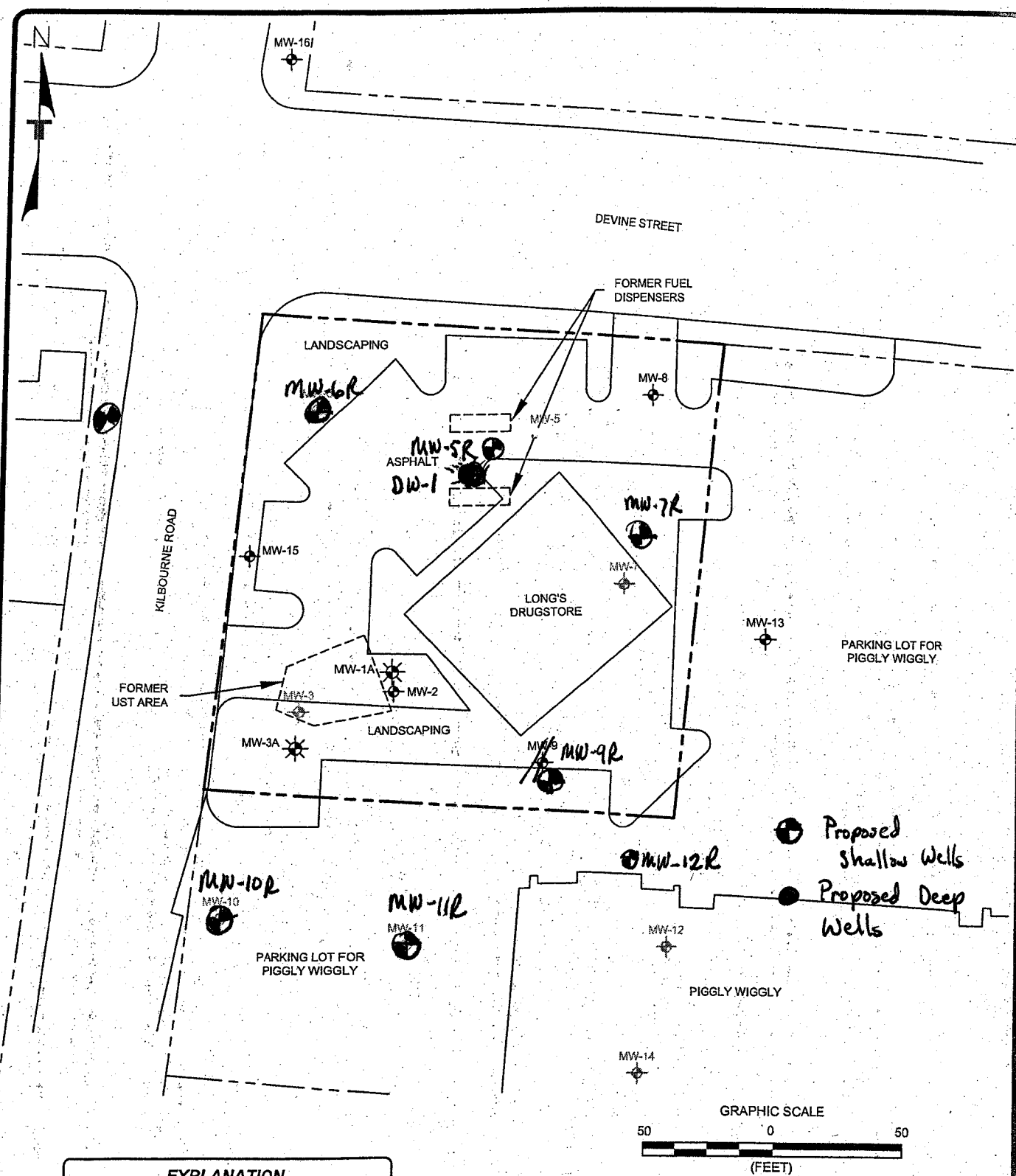
6. All temporary monitoring wells shall be abandoned within 5 days of borehole completion using appropriate methods as required by R.61-71.H.4.c. All other wells shall be properly developed per R.61-71.H.2.d.

7. Departmental approval is required prior to abandonment of all monitoring wells as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002. A copy of this approval should be on the site during well installation.

Date of Issuance: **January 29, 2008** **Approval #:** **UMW-17908**

Arthur Shrader, Hydrogeologist
Assessment Section
Division of Assessment and Corrective Action
Bureau of Land and Waste Management



EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- APPROXIMATE PROPERTY BOUNDARY

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 1-4-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2

Approved Cost Agreement 31633

Facility: 07680 SC015
SHRADEAA
PO Number:

Task / Description	Categories	Item Description	Qty / Pct	Unit Price	Amount
03 COMPREHENSIVE SURVEY					
		COMPREHENSIVE SURVEY	1.0000	1,000.00	1,000.00
04 MOB/DEMOB					
		A EQUIPMENT	1.0000	550.00	550.00
		B PERSONNEL	3.0000	275.00	825.00
09 WELL INSTALLATION					
		B WATER TABLE (DRILLED)	240.0000	38.00	9,120.00
		C TELESCOPING	50.0000	58.00	2,900.00
10 SAMPLE COLLECTION					
		A GROUND WATER	9.0000	55.00	495.00
		D GROUNDWATER NO-PURGE	6.0000	35.00	210.00
11 ANALYSES					
	GW GROUNDWATER	A BTEX+NAPTH+MTBE	15.0000	100.00	1,500.00
		BB 1,2-DCA	15.0000	10.75	161.25
		E LEAD	15.0000	20.00	300.00
		F EDB	15.0000	55.00	825.00
		K NITRATE	15.0000	20.00	300.00
		L SULFATE	15.0000	20.00	300.00
		M FERROUS IRON	15.0000	20.00	300.00
		P 8 OXYGENATES	15.0000	85.00	1,275.00
	SOIL SOIL	Q BTEX+NAPTH	9.0000	100.00	900.00
		W GRAIN SIZE/HYDROMETER	2.0000	75.00	150.00
12 AQUIFER CHARACTERIZATION					
		B SLUG TEST	3.0000	150.00	450.00
17 DISPOSAL					
		A1 WASTEWATER - PURGING/SAMPLING	2.0000	90.00	180.00
		C SOIL (TREATMENT/DISPOSAL)	15.0000	50.00	750.00
19 RPT/PROJECT MNGT & COORDINATIO					
		PCT PERCENT	0.1500	22,491.25	3,373.69
			Total Amount		25,864.94

ADDITIONAL ASSESSMENT REPORT
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST PERMIT # 07680

Prepared for:

Crown Central, LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:

521 Clemson Road
Columbia, South Carolina 29229

July 8, 2008
Terracon Project No. 73078012

Terracon
Consulting Engineers & Scientists

Terracon Consultants, Inc.
521 Clemson Road
Columbia, South Carolina 29229
Phone 803.741.9000
Fax 803.741.9900
www.terracon.com

July 8, 2008

Mr. Arthur Shrader
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: ***Additional Assessment Report***
Former SC-015
3800 Devine Street, Columbia, South Carolina
UST Permit # 07680, CA # 31633
Terracon Project No. 73078012

Dear Mr. Shrader:

On behalf of Crown Central, LLC, **Terracon Consultants, Inc.** is pleased to submit this Additional Assessment Report for the Former SC-015 facility located at 3800 Devine Street in Columbia, South Carolina. This report summarizes the monitoring well installations, ground water sampling activities, and our findings, conclusions, and recommendations.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.

Melissa Roberts, P.G.
Staff Geologist
S.C. Registration No. 2485

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

Attachment

cc: Jim Janson/Crown Central, LLC

TABLE OF CONTENTS

ADDITIONAL ASSESSMENT REPORT
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SC
UST PERMIT NO. 07680

TABLE OF CONTENTS i

1.0 INTRODUCTION 1

1.1 Site Description and History 1

2.0 INVESTIGATIVE METHODS 2

2.1 Monitoring Well Installation and Soil Sampling 2

2.2 Groundwater Sampling 3

2.3 Hydraulic Conductivity Testing 4

3.0 ASSESSMENT RESULTS 4

3.1 Soil Screening and Analytical Results 4

3.2 Site Geology and Hydrogeology 5

3.3 Groundwater Analytical Results 7

4.0 CONCLUSIONS AND RECOMMENDATIONS 8

FIGURES

1 Site Location Map
2 Site Vicinity Map
3 Site Map
4 Potentiometric Surface Map
5 Benzene/MTBE Concentration Map

TABLES

1 Soil Analytical Data – Petroleum Compounds
2 Ground Water Elevation Data
3 Ground Water Analytical Data – Petroleum Compounds
4 Ground Water Analytical Data – Petroleum Additives (Oxygenates)
5 Ground Water Analytical Data – Natural Attenuation Indicator Parameters

APPENDICES

A Geologist Logs and Water Well Forms
B Ground Water Sampling Logs
C Chemical Analytical Data
D Waste Disposal Manifest
E Aquifer Tests and Grain Size Analyses
F Comprehensive Survey

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the monitoring well installations, hydraulic conductivity testing, and ground water sampling and analysis at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement # 31633 and the Risk Based Corrective Action (RBCA) guidance document prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, a church/school, and a realty office which was formerly a service station. Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1). A site vicinity map showing surrounding land usage is included as Figure 2.

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed in July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA. Assessment activities included installation of fifteen permanent monitoring wells on the property and adjacent properties. Free product has been identified in monitoring wells MW-5 and MW-6. A site map showing the former and existing monitoring well locations is presented as Figure 3.

Redevelopment of the site in 2001 included construction of the Long's Drugstore and the expansion of the adjacent Piggly Wiggly grocery store. Despite Crown's efforts to protect the existing wells, nine monitoring wells (MW-3, MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12, and MW-14) were destroyed during constriction. Additionally, site development may have altered top-of-casing elevations of the remaining monitoring wells.

In January 2008, Terracon performed a groundwater sampling event for existing wells at the site. Petroleum hydrocarbons were detected at concentrations above RBSLs in groundwater samples from monitoring wells MW-15 and MW-16. Measurable thicknesses of free-product were not observed in any of the site monitoring wells. Terracon recommended replacement of shallow monitoring wells MW-5, MW-6, and MW-7 based upon historical elevated

hydrocarbon concentrations in the groundwater samples from these wells before they were destroyed during site redevelopment activities.

In February 2008, the SCDHEC issued a directive to replace monitoring wells MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, and MW-12, to install a new shallow well to the west of the site, and to install a new deep well adjacent to MW-5R. The scope of work also included performance of three hydraulic conductivity tests and a comprehensive ground water assessment event at this site. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 INVESTIGATIVE METHODS

2.1 Monitoring Well Installation and Soil Sampling

The scope of work at the site dictated replacement of monitoring wells MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, and MW-12. The scope also directed installation of one shallow monitoring well at the west-adjacent (Russell-Jeffcoat) property and one deep Type III telescoping well adjacent to MW-5R.

Each shallow monitoring well was installed as a single-cased, Type II well using 2-inch schedule 40 PVC casing and 15 feet of 0.010-inch slotted screen. The deep monitoring well (DW-1) was installed as a double-cased, Type III well using 3-inch schedule 40 PVC outer casing set to 25 feet depth, and 2-inch schedule 40 PVC inner casing and 5 feet of 0.010-inch slotted screen set to 40 feet depth. An appropriately graded sand filter pack was placed within the annulus opposite each well screen to a height of approximately two feet above the top of the well screen. A minimum two-foot bentonite pellet layer was placed above the sand filter pack in each well and hydrated. The remaining annulus of each well was grouted to land surface with cement grout. The wells were completed below-grade within steel protective manhole covers, and a 2x2 foot concrete pad was constructed around each well. Well construction details are included on the Geologist Logs and on Table 1.

Shallow monitoring well MW-6 was not replaced during these assessment activities. A total of seven (7) attempts to install this well within the Longs parking lot using hollow-stem augers and the Mobile B-59 drill rig met refusal on presumed construction debris at approximately 6 feet depth. Also, five (5) hand-augered borings were advanced in the adjacent landscaping, which also met refusal at approximately 5 feet depth. A Geoprobe rig was mobilized to the site to work within the landscaping. One point was pushed to 11 feet depth before meeting refusal. All borings were appropriately abandoned, and replacement well MW-6R was eliminated from the scope of work by the SCDHEC project manager.

The soil sample with the greatest organic vapor screening concentration was collected from each of the new well locations. These soil samples were collected into laboratory prepared containers, placed in cooler refrigerated with ice, and delivered with chain-of-custody documentation to Access Analytical, Inc. for benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds and naphthalene per EPA Method SW-846 8260B. The laboratory analytical report and chain-of-custody information for these soil samples is included in Appendix C. A summary of the soil analytical data is presented in Table 1.

All drilling and well installation was performed by a South Carolina Certified Well Driller per the South Carolina Well Standards R.61-71. The geologist logs for the borings and water well records (SCDHEC 1903 form), as compiled by the certified driller, are included in Appendix A.

After installation, the wells were developed by bailing until the pH and specific conductivity of the water stabilized and the wells were producing relatively clear water. Soil cuttings and water generated during well drilling and development were collected in 55-gallon drums and disposed by Regulatory Solutions, Inc., Lexington, South Carolina. The disposal manifest is included in Appendix D.

The location of each well and vertical elevation of the top of each well casing were surveyed by a South Carolina Registered Land Surveyor (Jay S. Joshi, P.L.S. # 14811), referenced to the top-of-casing elevation of monitoring well MW-1A (previously reported to be 98.41 feet). A copy of the comprehensive survey is included in Appendix G.

2.2 Groundwater Sampling

Ground water sampling of monitoring wells was performed at the former SC-015 site on May 14 and 15 and June 3, 2008. Water levels were measured in the monitoring wells using an electric water level indicator and converted to elevations relative to top of well casing (TOC) elevations. A summary of the water level data is presented on Table 2. A potentiometric surface map of the shallow aquifer is included as Figure 3.

Ten site monitoring wells were sampled as part of this assessment. Five newly-installed monitoring wells (MW-7R, MW-9R, MW-12R, MW-17, and DW-1) were purged fully with a disposable polyethylene bailer prior to sampling. One newly-installed monitoring well (MW-5R) was purged to near-dryness before groundwater samples were collected. Newly-installed monitoring well MW-11R was sampled without purging due to the small volume of water available. Three pre-existing monitoring wells (MW-8, MW-13, and MW-16) that bracketed the water table were not purged prior to sampling. Monitoring wells MW-1A, MW-2, MW-10R, and MW-15 were dry at the time of sampling.

Ground water samples were collected using disposable polyethylene bailers dedicated to each well. Dissolved oxygen, specific conductance, pH, and temperature measurements were taken prior to sampling and were recorded on Ground Water Sampling Logs, included

in Appendix B. Samples were placed in an iced cooler and delivered along with chain of custody documentation to Access Analytical, Inc. in Irmo, South Carolina for analysis of the following parameters:

Analysis	Method
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Methyl-tert-butyl-ether (MTBE) Naphthalene 1,2-dichloroethane (1,2-DCA) 8 Oxygenates	EPA Method 8260B
Total lead	EPA Method 6010B
1,2-dibromoethane (EDB)	EPA Method 8011
Nitrate/Nitrite	EPA Method 353.2 N+N
Sulfate	EPA Method 375.4 Sulfate
Ferrous Iron	SM 3500—Fe D

Ground water analytical results are included in Table 3 (Petroleum Compounds), Table 4 (Petroleum Additives), and Table 5 (Natural Attenuation Indicator Parameters). Copies of the laboratory analytical reports are included in Appendix C.

2.3 Hydraulic Conductivity Testing

Borehole permeability tests (slug tests) were performed in shallow monitoring wells MW-5R and MW-7R and in deep well DW-1. Each test was performed by removing a 1.5-inch diameter by five foot PVC bailer from the well and recording the response as the water level returned to equilibrium. The Bouwer and Rice method was used to interpret the field data and assess the hydraulic conductivity of the aquifer. A summary of slug test data, results, and the calculated semi-log graphs of draw down versus time are included in Appendix E.

3.0 ASSESSMENT RESULTS

3.1 Soil Screening and Analytical Results

Screening of organic vapor concentrations in soils was conducted during installation of the monitoring wells. Organic vapor concentrations were relatively low (less than 50 ppm) to the maximum depths of the well attempts at MW-6 and at monitoring well MW-7R. Elevated (100 to 200 ppm) organic vapor concentrations were noted between 10 and 20 feet depth at monitoring well MW-9R and MW-10R, from 10 to 15 feet depth at monitoring well MW-11R, and from 20 to 25 feet depth at monitoring well MW-17. Very high (> 1,000 ppm) organic vapor concentrations were detected between 5 and 15 feet depth at monitoring well MW-12R. Organic vapor concentrations in the vicinity of well pair MW-5R/DW-1 ranged from 4,732 ppm

to 140,300 ppm in the upper 20 feet of soils. Below 20 feet, the organic vapor concentrations decreased rapidly with depth.

A soil sample collected from each well at the depth which produced the greatest organic vapor screening result above the water table was submitted for laboratory analysis. A total of 8 soil samples were collected during this assessment. Soil analytical results are included in Table 1.

Review of Table 1 indicates that the contaminants of concern were below detection limits in the soil samples collected from monitoring wells MW-10R (10-15 ft; 181 ppm organic vapors), MW-11R (10-15 ft; 138 ppm organic vapors), and MW-17 (20-25 ft; 144 ppm organic vapors). Low concentrations of benzene were detected in the soil sample from 5 to 10 feet depth at monitoring wells MW-9R (4.05 ug/kg) and MW-12R (3.60 ug/kg). Low concentrations of xylenes were detected in the soil samples from 5 to 10 feet depth at monitoring well MW-9R (9.16 ug/kg) and from 13.5 to 15 feet depth at deep well DW-1 (671 ug/kg). The concentrations of benzene (1,570 ug/kg), toluene (22,600 ug/kg), ethylbenzene (12,600 ug/kg), xylenes (53,100 ug/kg), and naphthalene (12,600 ug/kg) in the soil sample collected from 13.5 to 15 feet depth in monitoring well MW-5R greatly exceeded Risk-Based Screening Levels (RBSLs). The soil sample from 8.5 to 10 feet depth at MW-7R and from 13.5 to 15 feet depth at deep well DW-1 contained concentrations of naphthalene (339 ug/kg and 951 ug/kg, respectively) which exceeded the RBSL.

3.2 Site Geology and Hydrogeology

Based on the geologist logs of monitoring wells installed at the site, the site is underlain by sands and silty/clayey sands approximately 10 to 19 feet thick, overlying very fine-grained materials including sandy silts, silts, and clays. This silt/clay unit is of variable thickness, ranging from 6 to more than 25 feet across the site. Based upon the lithology data collected from monitoring wells MW-10R, MW-11R, and DW-1, this silt/clay unit is underlain by a sand layer of unknown thickness and extent. Buried construction debris was encountered at the northwest corner of the Long's Drugstore parking lot.

Groundwater occurs both as perched water on the upper silt/clay unit and as the shallow water table within and below the perched layer under semiconfined conditions. Source area monitoring well MW-5R was screened completely within the perched aquifer. Monitoring wells MW-7R and MW-9R were screened across the upper sand/silt interface and are believed to derive their water primarily from the perched aquifer. Monitoring wells MW-10R and MW-11R are screened within the water table aquifer, across the silt/clay unit, and within the underlying sand. The screened interval of monitoring well MW-17 is set entirely within the silt/clay unit. Deep monitoring well DW-1 is screened entirely within the basal sand layer, terminating at the top of a silty clay layer at a depth of 40 feet.

The depth to the perched water table as measured in monitoring wells MW-5R, MW-7R, MW-8, MW-9R, MW-12R, and MW-13 ranged from approximately 12.8 feet to 16.2 feet depth. The perched aquifer appears to be absent in the vicinity of MW-2 and MW-10R. The

potentiometric surface of the perched aquifer indicates ground water flows to the northwest, southwest, and southeast at the site (Figure 4).

The potentiometric surface of the water table aquifer as measured in monitoring wells MW-1A, MW-10R, MW-11R, and MW-17 ranged from 29.3 feet to greater than 45 feet below land surface.

The water level in the deep well DW-1 (35.31 ft bls) was recorded to be approximately 20.5 feet lower than in companion shallow well MW-5R (14.82 ft bls), indicating a downward vertical hydraulic gradient exists between the perched and semiconfined surficial aquifers.

Soil samples collected from 13.5-15 feet depth at monitoring well MW-5R and from 33.5-35 feet and 38.5-40 feet at deep monitoring well DW-1 were submitted for grain-size analysis and hydrometer testing. The grain-size analysis results are summarized below and are included with the hydraulic conductivity data in Appendix E:

Well Number	MW-5R	DW-1	DW-1
Depth (ft)	13.5-15	33.5-35	38.5-40
Sand (%)	71.2	84.4	18.1
Silt (%)	6.3	9.2	26.9
Clay (%)	22.5	6.4	55.0
Description	Tan silty clayey fine to medium SAND	Tan silty clayey fine to medium SAND	Light tan silty CLAY with fine sand

The rate of horizontal ground water flow at the site is controlled by the horizontal hydraulic conductivity (K), effective porosity (n_e), and the horizontal hydraulic gradient (dh/l). The linear ground water seepage velocity (v) can be calculated by substituting these values into the modified Darcy equation:

$$\mathbf{v = (K/n_e)\ (dh/l)}$$

The effective porosity (n_e) of sediments in the perched aquifer and the water table aquifer (DW-1) at the site is estimated to be approximately 0.20. The hydraulic gradient for the perched portion of the shallow aquifer was calculated to be 0.04. The hydraulic gradient for the water table aquifer was calculated to be 0.001. The estimated linear seepage velocity in the perched aquifer was calculated to be 0.15 feet per year based on the shallow hydraulic gradient and a calculated hydraulic conductivity of 0.002 from slug tests performed on monitoring wells MW-5R and MW-7R. The estimated linear seepage velocity in the water table aquifer was calculated to be 0.018 feet per year based on an effective porosity of 0.02, a hydraulic gradient of 0.001, and a calculated hydraulic conductivity of 0.010 from one slug test performed (DW-1). The effective porosity of the clay unit at 40 feet depth in boring DW-1

is estimated to range from 0.05 to 0.1 and is expected to significantly retard downward migration of contaminants in the source area.

3.3 Groundwater Analytical Results

Free product was not measured in any of the monitoring wells during this assessment. Significant exceedances of the BTEX, MTBE, and EDB RBSLs were observed in the groundwater samples from monitoring well MW-5R (former dispenser island area). Benzene concentrations in excess of the RBSL also were detected in shallow monitoring wells MW-7R, MW-9R, and MW-12R at concentrations ranging from 34.9 ug/l to 74.4 ug/l. An MTBE concentration (145 ug/l) in excess of the RBSL was detected in the groundwater samples from shallow monitoring well MW-12R. Naphthalene concentrations in excess of RBSLs were detected at monitoring wells MW-7R, MW-9R, and MW-12R at concentrations ranging from 29.7 ug/l to 175 ug/l.

Benzene (17.1 ug/l) and naphthalene (43.8 ug/l) concentrations exceeded the RBSLs in the groundwater samples from deep monitoring well DW-1.

1,2-dichloroethane (1,2-DCA) was not detected in any of the ground water samples collected. 1,2-dibromoethane (EDB) was detected at a concentration of 4.84 ug/l in the groundwater samples from monitoring well MW-5R. Total lead concentrations exceeded the 15 ug/l RBSL in shallow monitoring wells MW-12R and MW-13 at concentrations of 34 ug/l and 37 ug/l, respectively.

Petroleum oxygenates were detected in ground water samples from 8 of the 9 shallow monitoring wells and the deep well. A review of Table 4 suggests that ethanol is the primary oxygenate present in groundwater at the site. Ethanol concentrations, where observed, ranged from 43.9 ug/l to 71.6 ug/l. Monitoring wells MW-5R and MW-12R contained *t*-butanol concentrations of 6,880 ug/l and 89.6 ug/l, respectively. The oxygenate *t*-amyl methyl ether was detected at 5.28 ug/l in the groundwater samples from monitoring well MW-12R. Groundwater samples from monitoring wells MW-5R, MW-7R, MW-12R, and DW-1 also contained *tert*-amyl alcohol at concentrations ranging from 35.5 ug/l (DW-1) to 115 ug/l (MW-5R). Risk-based screening levels have not been established for these petroleum additives.

Natural attenuation indicator parameters, including nitrate/nitrite, sulfate, and ferrous iron concentrations, were analyzed as part of the Tier II Assessment. Nitrate/nitrite concentrations, where detected, ranged from 0.019 mg/l (MW-13) to 5.26 mg/l (MW-8). Sulfate concentrations were detected only in the groundwater samples from monitoring wells MW-5R (11.8 mg/l) and MW-7R (102 mg/l). Ferrous iron concentrations, where detected, ranged from 0.088 mg/l (MW-17) to 38.8 mg/l (MW-12R). Comparison of this data to the contaminant concentrations indicates the concentrations of nitrates/nitrites and sulfate within the plume do not correlate to expected relative distributions produced during intrinsic

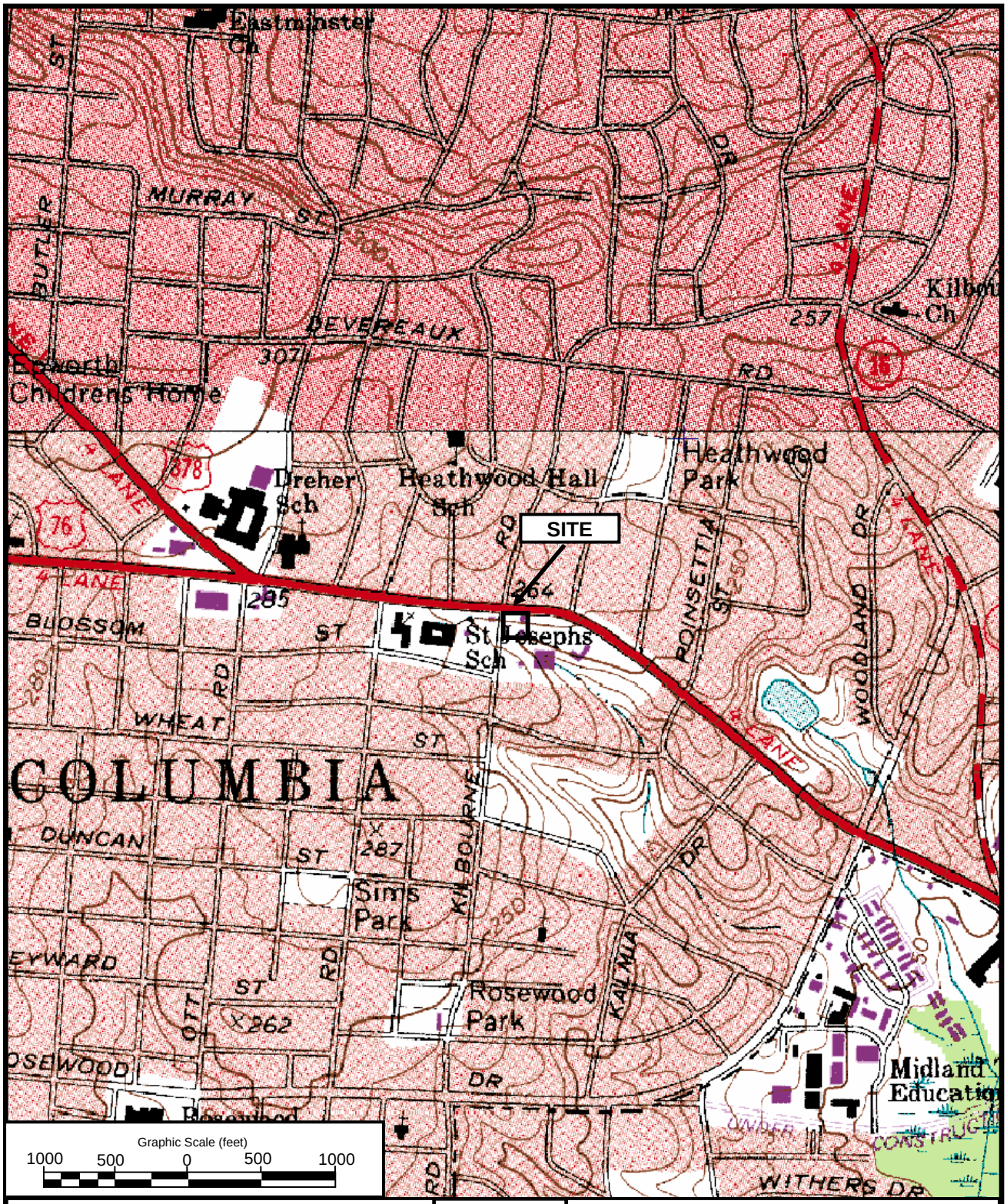
biodegradation processes. However, ferrous iron concentrations were relatively high within the plume as compared to background concentrations. It appears that biodegradation via ferric iron reduction is the dominant biodegradation process acting within the plume at this time.

A groundwater Benzene/MTBE concentration map is included as Figure 5. The zone of RBSL exceedances appears to be approximately 240 feet long from the upgradient edge northwest of MW-5R to the downgradient edge southeast of monitoring well MW-12R and is approximately 90 feet wide. Inspection of Figure 5 indicates the zone of RBSL exceedances does not extend beyond the adjacent Piggly Wiggly property.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Petroleum hydrocarbons were detected at concentrations above RBSLs in ground water samples from four shallow monitoring wells (MW-5R, MW-7R, MW-9R, and MW-12R) and one deep monitoring well (DW-1). Additionally, petroleum compounds were detected above RBSLs in soil samples collected from source area wells MW-5R, MW-7R, and DW-1. Although measurable thicknesses of free-product were not observed in any of the site monitoring wells, the contaminant concentrations observed in samples from monitoring wells MW-5R indicate the potential for free product development in this vicinity. Terracon recommends Aggressive Fluid Vapor Recovery (AFVR) be performed on monitoring well MW-5R in order to remove the petroleum compounds from the source area soils and to decrease the high dissolved concentrations in groundwater. Once the high concentrations have been reduced, this site may be an appropriate candidate for remediation by monitored natural attenuation.

FIGURES



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



GRAPHIC SCALE

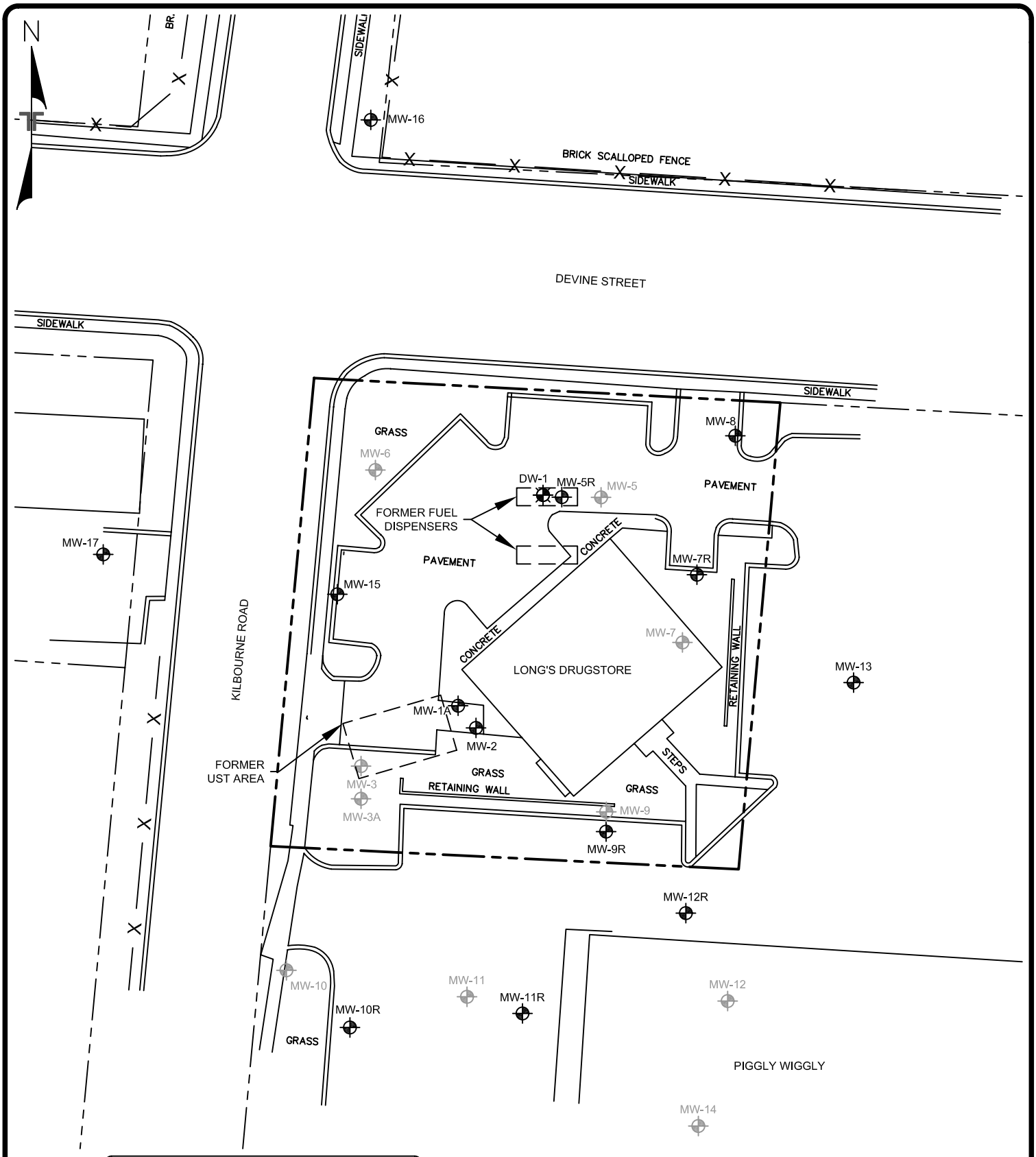
100 0 100

(FEET)

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE VICINITY MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 100 FT
Checked By:	PMH	521 Clemson Road	Date: 7-1-08
Approved By:	CRC	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2



EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

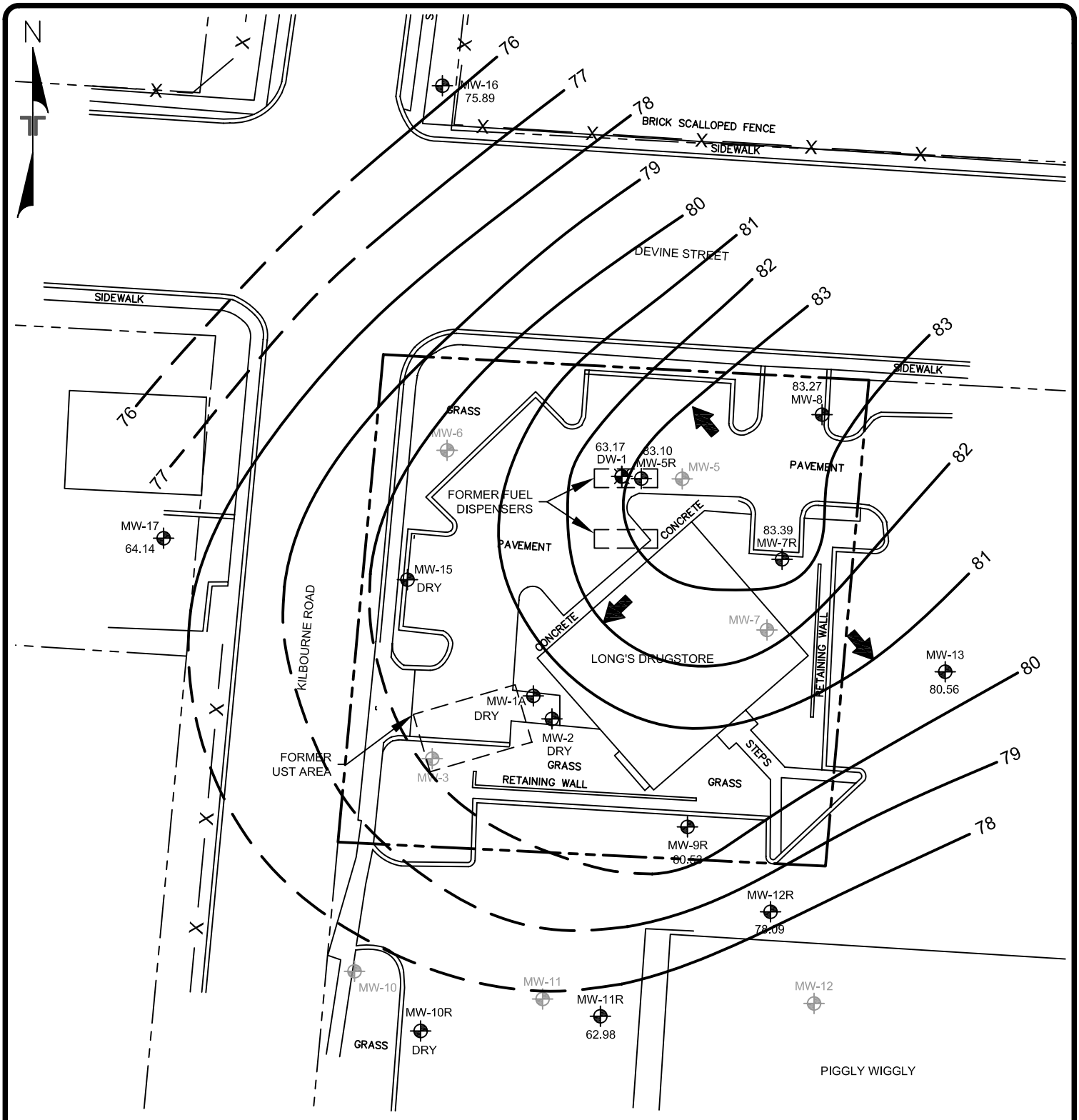
GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road	Date: 7-1-08
Approved By:	CRC	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 3



EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

GRAPHIC SCALE

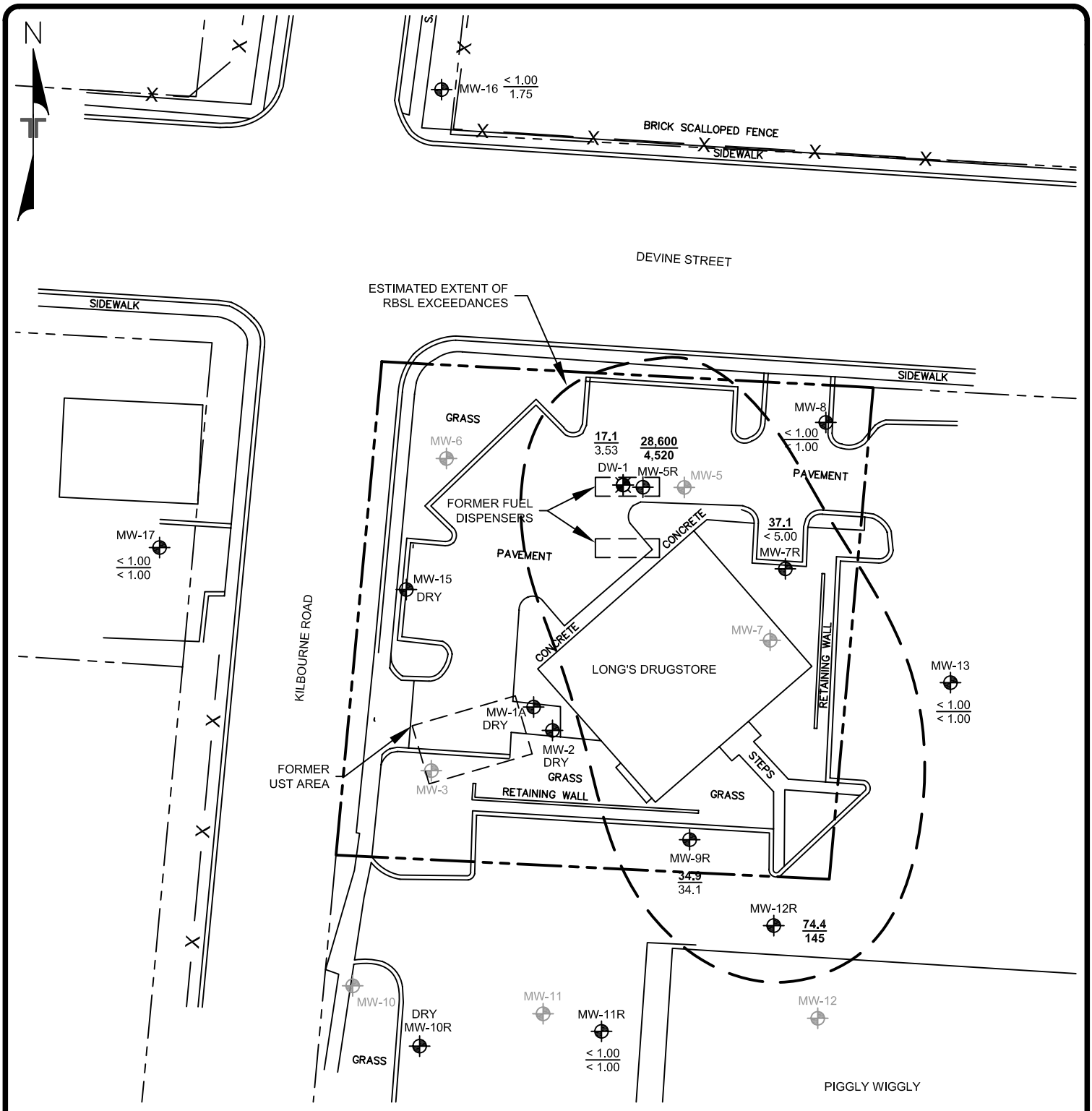
50 0 50

(FEET)

NOTE: POTENTIOMETRIC SURFACE ELEVATIONS FROM MONITORING WELLS DW-1, MW-11R, AND MW-17 WERE NOT USED IN CONTOURING THE SHALLOW AQUIFER.

POTENTIOMETRIC SURFACE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road	Date: 7-1-08
Approved By:	CRC	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 4



EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- 58.5 / 29.5 — BENZENE CONCENTRATION IN ug/L / MTBE CONCENTRATION IN ug/L
- MTBE — METHYL TERT-BUTYL ETHER
- ug/L — MICROGRAMS PER LITER
- APPROXIMATE PROPERTY BOUNDARY

CONCENTRATIONS IN BOLD EXCEED RBSLs

GRAPHIC SCALE

50 0 50

(FEET)

BENZENE / MTBE CONCENTRATION MAP
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 7-1-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 5

TABLES

TABLE 1
SOIL ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	DEPTH (ft)	OVA (ppm)	BENZENE (ug/kg)	TOLUENE (ug/kg)	ETHYL-BENZENE (ug/kg)	XYLENES (ug/kg)	NAPHTH-ALENE (ug/kg)
MW-5R	5/13/08	13.5-15	140,300	**1,570**	**22,600**	**12,600**	**53,100**	**12,600**
MW-6R	ELIMINATED DUE TO BURIED CONSTRUCTION DEBRIS							
MW-7R	5/13/08	10-13	36	< 220	< 220	< 220	< 440	**339**
MW-9R	5/9/08	5-10	3.7	4.05	< 3.91	< 3.91	9.16	< 3.91
MW-10R	5/9/08	10-15	181	< 4.74	< 4.74	< 4.74	< 9.47	< 4.74
MW-11R	5/9/08	10-15	138	< 3.95	< 3.95	< 3.95	< 7.91	< 3.95
MW-12R	5/9/08	5-10	2,895	3.60	< 3.11	< 3.11	< 6.23	< 3.11
MW-17	5/8/08	20-25	144	< 4.24	< 4.24	< 4.24	< 8.48	< 4.24
DW-1	5/14/08	13.5-15	140,300	< 266	< 266	< 266	671	**951**
RBSLs				*7*	*1,450*	*1,150*	*14,500*	*36*

Notes:

1) Results shown in boldface type indicate concentrations exceeding the RBSL for that compound
2) ug/kg = micrograms per kilogram dry soil
3) NA = Not Analyzed
4) RBSL = Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NE = Soil concentration not established in the SCDHEC RBCA Document
6) MW-6R attempted at 8 boring locations for a total of 37 feet.

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	216.56
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
	6/3/08		98.41	DRY	ND	DRY
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
	6/3/08		98.45	DRY	ND	DRY
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-5R	5/14/08	5-20	98.29	15.19	ND	83.10
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		
MW-7R	5/14/08	10-25	98.85	15.46	ND	83.39
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
	5/15/08		99.48	16.21	ND	83.27
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-9R	5/14/08	5-20	93.32	12.79	ND	80.53
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-10R	5/14/08	15-30	95.71	DRY	ND	DRY
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		
MW-11R	5/14/08	15-30	92.26	29.28	ND	62.98
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		
MW-12R	5/14/08	5-20	92.43	14.34	ND	78.09

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
	6/3/08		94.26	13.70	ND	80.56
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		
MW-15	1/14/97	20-35	249.43	DRY		
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
	5/15/08		99.70	DRY		
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85
	5/15/08		102.85	26.96	ND	75.89
MW-17	5/14/08	25.5-39.5	100.84	36.70	ND	64.14
DW-1	5/15/08	35-40	98.48	35.31	ND	63.17

NOTES:

1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded
5) * = Top-of-casing elevations were altered during site redevelopment. A new survey was conducted in 2008 by Jay Joshi, PLS #14811, as part of the additional assessment event.

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (ug/l)
MW-1A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	2	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
MW-2	7/16/93	NS	NS	NS	NS	NS	NS	NS	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
MW-3	7/16/93	5	13	1	5	< 1.00	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-3A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA	NA
	1/14/97	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	DESTROYED							
MW-5	7/26/93	**19,000**	**86,000**	**3,500**	**22,000**	**4,000**	NA	**6,000**	NA
	1/14/97	NS	NS	NS	NS	NS	NS	NS	NA
	9/19/03	DESTROYED							
MW-5R	5/15/08	**28,600**	**64,500**	**3,620**	**17,300**	**4,520**	**4.84**	< 2,500	< 15
MW-6	7/26/93	**9,600**	**2,200**	**1,900**	9,300	< 1.00	NA	NA	NA
	1/14/97	NS	NS	NS	NS	NS	NS	NS	NA
	9/19/03	DESTROYED							
MW-7	7/16/93	**19,000**	**86,000**	3,500	2,200	**4,000**	NA	NA	NA
	1/14/97	**7,000**	**8,900**	**1,700**	3,200	**4,300**	NA	**150**	NA
	9/19/03	DESTROYED							

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (ug/l)
MW-7R	5/14/08	**37.1**	355	68.1	91.8	< 5.00	< 0.010	**29.7**	**23**
MW-8	7/16/93	**130**	**1,100**	73	730	< 5.00	NA	NA	NA
	1/14/97	**40**	1.70	1.60	32	< 1.00	NA	31	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	< 15
MW-9	7/16/93	< 10	< 10	< 10	< 10	**10,000**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	**3,800**	NA	**500**	NA
	9/19/03	NS	NS	NS	NS	NS	NS	NS	NS
	12/3/07	WELL NOT LOCATED							
MW-9R	5/14/08	**34.9**	11.9	126	249	34.1	< 0.010	**175**	< 15
MW-10	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	**970**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	32	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-10R	6/3/08	DRY							
MW-11	7/16/93	3	< 1.00	< 1.00	< 1.00	**56**	NA	NA	NA
	1/14/97	**13**	< 1.00	< 1.00	< 1.00	**190**	NA	**500**	NA
	9/19/03	DESTROYED							
MW-11R	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	< 15
MW-12	7/26/93	**1,200**	29	150	110	**1,000**	NA	NA	NA
	1/14/97	4.90	< 1.00	1.20	< 1.00	**74**	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-12R	5/14/08	**74.4**	2.46	52.3	25.2	**145**	< 0.010	**138**	**34**
MW-13	7/26/93	< 1.00	4.00	< 1.00	5.00	< 1.00	NA	NA	NA
	1/14/97	**18**	< 1.00	< 1.00	< 1.00	28	NA	1.20	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	1.33	< 1.00	< 1.00	< 3.00	5.99	NA	< 5.00	NA
	6/3/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	**37**
MW-14	10/1/93	< 1.00	< 1.00	< 1.00	< 1.00	**270**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	14	NA	< 1.00	NA
	9/19/03	DESTROYED							

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (ug/l)
MW-15	1/14/97	NS	NS	NS	NS	NS	NS	NS	NS
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	**300**	NA	< 5.00	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	**160**	NA	< 5.00	NA
	5/15/08	DRY							
MW-16	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	2.60	< 1.00	< 1.00	< 3.00	5.66	NA	< 5.00	NA
	12/3/07	**58.5**	< 1.00	< 1.00	4.06	29.5	NA	5.23	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 1.00	1.75	NA	< 1.00	< 15
MW-17	5/14/08	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	< 15
DW-1	5/15/08	**17.1**	96.6	19.2	104	3.53	< 0.010	**43.8**	< 15
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*5*	*25*	*15*

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) ug/l - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) < 1.00 = below detection levels

TABLE 4
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (ug/L)	Ethanol (ug/L)	ETBE (ug/L)	DIPE (ug/L)	ETBA (ug/L)	TBA (ug/L)	TAME (ug/L)	TAA (ug/L)	TBF (ug/L)
MW-1A	5/14/08	DRY								
MW-2	5/14/08	DRY								
MW-5R	5/15/08	< 2,500	< 10,000	< 500	< 500	< 1,000	**6,880**	< 500	**46,900**	< 1,000
MW-7R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	**125**	< 10.0
MW-8	5/15/08	< 5.00	< 20.0	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
MW-9R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	< 50.0	< 10.0
MW-10R	5/14/08	DRY								
MW-11R	5/15/08	< 5.00	**71.6**	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
MW-12R	5/14/08	< 5.00	**59.2**	< 1.00	< 1.00	< 2.00	**89.6**	**5.28**	**141**	< 2.00
MW-13	6/3/08	< 5.00	**49.4**	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
MW-15	5/15/08	DRY								
MW-16	5/15/08	< 5.00	**43.9**	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
MW-17	5/14/08	< 5.00	**47.1**	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
DW-1	5/15/08	< 5.00	**45.7**	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	**35.5**	< 2.00
RBSL	-	*5*	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*	*NE*

Notes:
1) Results shown in boldface type indicate detected compounds.
2) ug/l - micrograms per liter or parts per billion
3) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
4) NE - Not Established
5) 1,2-DCA = 1,2-dichloroethane
6) 8 Oxygenates abbreviated as:

ETBE = ethyl tert-butyl ether
DIPE = diisopropyl ether
ETBA = ethyl tert-butanol
TBA = t-butanol
TAME = t-amyl methyl ether
TAA = tert-amyl alcohol
TBF = tert-butyl formate

TABLE 5
GROUND WATER ANALYTICAL DATA
Natural Attenuation Indicator Parameters

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	DISSOLVED OXYGEN (mg/l)	NITRATE/ NITRITE (mg/l)	SULFATE (mg/l)	FERROUS IRON (mg/l)	pH (SU)
MW-1A	6/3/08	DRY				
MW-2	6/3/08	DRY				
MW-5R	5/15/08	5.14	0.126	11.8	4.0	NM
MW-7R	5/14/08	3.61	0.044	102	19.0	5.87
MW-8	5/15/08	3.81	5.26	< 5.0	< 0.10	5.29
MW-9R	5/14/08	3.64	< 0.010	< 5.0	19.0	6.03
MW-10R	6/3/08	DRY				
MW-11R	5/15/08	2.23	0.246	< 5.0	0.437*	5.27
MW-12R	5/14/08	2.13	< 0.010	< 5.0	38.8	6.02
MW-13	6/3/08	2.08	0.019	< 5.0	0.361	6.21
MW-15	5/15/08	DRY				
MW-16	5/15/08	6.57	1.22	< 5.0	< 0.10	6.64
MW-17	5/14/08	7.57	1.56	< 5.0	0.088	5.77
DW-1	5/15/08	4.75	0.047	< 5.0	< 0.10	7.63

Notes:
1) mg/l = milligrams per liter or parts per million
2) SU = standard units
3) Ferrous iron sample collected on 6/3/08.

APPENDIX A
Geologist Logs and Water Well Forms

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Crocon Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3300 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	10	10
Silty Clayey sand	9	19
Clay	1	20
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-5R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680 ; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 20 ft. Date Started: 5/13/08 Date Completed: 5/15/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 5 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight NA lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN: Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 5 ft. and 15 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☒ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL 14.82 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No Slug Test
Yield: _____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 3 ft. to 20 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Probe Monroe, GA 30655 Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph L. Smith (Well Driller) Date: 5/15/08
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-5R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/13/08	Date Completed: 5/15/08	Screen: 2" (0.010) Slotted PVC	From: 5 - To: 20
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 3 - To: 20
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 2 - To: 3
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 2
Boring Depth (ft.): 20.0	TOC Elevation: 98.29	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 3.25	GW Level: ▼ 14.82 / Time/Date: 1030 5/15/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2						**SAND**, brown, medium to coarse grained, loose to medium dense, poorly sorted, moist, high petroleum odor.		2
4	X	1		5860		**SAND**, some clay and small quartz fragments, mottled (white, tan, and red), fine to coarse grained, poorly sorted, dry, petroleum odor, heavy iron oxidation.		4
6								6
8								8
10	X	2		1.17%		Silty Clayey **SAND**, some clay, mottled (white, red, and yellow), fine to medium grained, dense, sub-rounded, high petroleum odor, some iron oxidation.		10
12								12
14	X	3		14.03%			▼	14
16								16
18								18
20	X	4		6.8%		**CLAY**, white to rose, fine grained, dense, plastic, no petroleum odor, some iron oxidation.		20
						Boring Terminated at 20 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3300 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☒ Yes ☐ No
Grouted Depth: from 0 ft. to 6 ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	6	6
Repeated attempts met refusal @ 6 ft bls – presumed construction debris		

*Indicate Water Bearing Zones (Use a 2nd sheet if needed)

5. REMARKS: soil borings for MW-6R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☒ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well attempted ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 6 ft. Date Started: 5/13/08 Date Completed: 5/15/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in N/A
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to N/A ft. depth
in. to ft. depth
Height: Above ☐ Below ☐
Surface ft.
Weight N/A lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN: Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in/N/A Length:
Set Between: ft. and ft.
ft. and ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface
N/A ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

14. WATER QUALITY
Chemical Analysis ☐ Yes ☒ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from ft. to ft.
Effective size Uniformity Coefficient

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other
Depth: From N/A ft. to ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type
Well Disinfected ☐ Yes ☐ No Type: Amount:

18. PUMP: Date installed: N/A Not installed ☐
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Probe Monroe, GA 30655
Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith Well Driller Date: 5/15/08
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-6R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/13/08	Date Completed: 5/13/08		
Logged By: R. Norris	Coordinates:		
Drilling Co.: Land Probe	Driller: Joe Smith		
Method: HSA	Equipment: Mobile B-59		
Boring Depth (ft.): 6.0	TOC Elevation:		
Boring Diameter (in): 2.75	GW Level:	Time/Date:	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Depth
2						**ASPHALT**	
						SAND, orange to brown, medium to coarse grained, loose, poorly sorted, dry, no petroleum odor.	2
4	X	1		1.3			4
6						**Boring Terminated at 6 ft due to refusal on presumed construction debris.**	6
						This monitoring well was eliminated by the SCDHEC project manager.	

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3800 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	5	5
Clayey sand	5	10
Silty clayey sand	5	15
Clay	5	20
Silty clay	5	25
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-7R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 25 ft. Date Started: 5/13/08 Date Completed: 5/15/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 10 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface NA ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: _____
Set Between: 10 ft. and 25 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL 15.46 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 8 ft. to 25 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 8 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1520 Hwy 138 Prode Monroe, GA 30655 Level: A B C D (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith Well Driller Date: 5/15/08
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: MW-7R
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/13/08	Date Completed: 5/15/08	Screen: 2" (0.010) Slotted PVC	From: 10 - To: 25
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 8 - To: 25
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 6 - To: 8
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 6
Boring Depth (ft.): 25.0	TOC Elevation: 98.85	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 3.25	GW Level: ▼ 15.46 / Time/Date: 5/15/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2						**SAND**, brown, medium to coarse grained, loose to medium loose, poorly sorted, moist, no petroleum odor.		2
4		1		0				4
6						Clayey **SAND**, with quartz fragments, white, fine to coarse grained, poorly sorted, semi-plastic, dry, no petroleum odor, heavy iron oxidation.		6
8		2		0.55				8
10						Silty Clayey **SAND**, some clay, mottled (white, red, and tan), coarse grained, dense, high petroleum odor, some iron oxidation.		10
12		3		36				12
14								14
16						**CLAY**, white, dense, plastic, no petroleum odor, iron oxidation, saturated from 14.5 to 16 ft. ▼		16
18		4		41				18
20						Silty **CLAY**, mottled (white, purple, and tan), dense, plastic, no petroleum odor, some oxidation.		20
22		5		48				22
24								24
						Boring Terminated at 25 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3800 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	10	10
Sandy silt	9	19
Silt	1	20
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-9R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 20 ft. Date Started: 5/9/08 Date Completed: 5/9/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 5 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight NA lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: _____
Set Between: 5 ft. and 20 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL 12.79 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 3 ft. to 20 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 3 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Probe Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Monroe, GA 30655
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith Well Driller Date: 5/9/08
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: MW-9R
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/9/08	Date Completed: 5/9/08	Screen: 2" (0.010) Slotted PVC	From: 5 - To: 20
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 3 - To: 20
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 1 - To: 3
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 1
Boring Depth (ft.): 20.0	TOC Elevation: 93.32	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6.25	GW Level: ▼ 12.79 Time/Date: 5/15/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2		1		2		**SAND**, brown, loose, fine to medium grained, poorly sorted, no petroleum odor.		2
4								4
6		2		3.7		**SAND**, brown to tan, loose, fine to medium grained, poorly sorted, damp, no petroleum odor.		6
8								8
10		3		173		Sandy **SILT**, gray, dense, fine to medium grained, poorly sorted, high petroleum odor.		10
12						Sandy **SILT**, gray, dense, fine to medium grained, poorly sorted, saturated, high petroleum odor. ▼		12
14								14
16		4		141		Sandy **SILT**, dense, fine to medium grained, poorly sorted, high petroleum odor.		16
18								18
20						**SILT**, white, dense, some petroleum odor.		20
						Boring Terminated at 20 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3300 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	19	19
Silt	6	25
Sand (saturated)	5	30
Well never		
produced water		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-10R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 30 ft. Date Started: 5/8/08 Date Completed: 5/9/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 15 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight NA lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: _____
Set Between: 15 ft. and 30 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☒ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 13 ft. to 30 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 13 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not Installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith, Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Prode Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Monroe, GA 30655
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph G. Smith Well Driller Date: 5/9/08

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

Terracon GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-10R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/9/08	Date Completed: 5/9/08	Screen: 2" (0.010) Slotted PVC	From: 15 - To: 30
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 13 - To: 30
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 11 - To: 13
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 11
Boring Depth (ft.): 30.0	TOC Elevation: 95.71	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6.25	GW Level: dry / Time/Date: 6/3/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		1.5		**ASPHALT** **SAND**, brown, loose, medium to coarse grained, poorly sorted, dry, no petroleum odor.		2
4								4
6		2		12		**SAND**, some small quartz fragments, orange, loose, medium to coarse grained, poorly sorted, dry.		6
8								8
10						**SAND**, brown, loose, medium to coarse grained, poorly sorted, dry.		10
12		3		181		**SAND**, some small quartz fragments, orange, loose, medium to coarse grained, poorly sorted, dry.		12
14								14
16						**SAND**, brown, loose, medium to coarse grained, poorly sorted, damp.		16
18		4		120				18
20						**SILT**, white, dense, well sorted, dry.		20
22		5		39				22
24								24
26						**SAND**, tan, loose, poorly sorted, saturated.		26
28		6		27				28
30						**SILT**, pink, dense, dry, no petroleum odor.		30
						Boring Terminated at 30 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Crocon Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3300 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	15	15
Silt	9.5	24.5
Sand	5.5	30
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-11R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST# 07680; UMW-17908

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 30 ft. Date Started: 5/9/08 Date Completed: 5/9/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 15 ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight NA lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN: Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: _____
Set Between: 15 ft. and 30 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL 28.68 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 13 ft. to 30 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 13 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Hobe Level: A B C D (circle one)
Monroe, GA 30655
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph L. Smith Well Driller Date: 5/9/08

If D Level Driller, provide supervising driller's name:

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-11R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/9/08	Date Completed: 5/9/08	Screen: 2" (0.010) Slotted PVC	From: 15 - To: 30
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 13 - To: 30
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 11 - To: 13
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 11
Boring Depth (ft.): 30.0	TOC Elevation: 92.26	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6.25	GW Level: 28.68 Time/Date: 6/3/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		0		**ASHPALT** / **SAND**, brown, medium to coarse grained, loose, poorly sorted, no petroleum odor.		2
4								4
6						**SAND**, orange, loose, medium to coarse grained, poorly sorted, no petroleum odor.		6
8		2		40		**SAND**, with quartz, orange, loose, medium to coarse grained, poorly sorted, no petroleum odor.		8
10						**SAND**,with quartz fragments, loose, medium to coarse grained, poorly sorted, dry, no petroleum odor.		10
12		3		138				12
14						**SAND**, loose, medium to coarse grained, poorly sorted, dry, no petroleum odor. / **SILT**, white, dense, dry, no petroleum odor.		14
16								16
18		4		24				18
20						**SILT**, white to rose, dense, fdry, no petroleum odor.		20
22		5		1				22
24						**SAND**, tan, loose, medium to coarse grained, poorly sorted, moist. / **SAND**, tan, loose, medium to coarse grained, wet, no petroleum odor.		24
26								26
28		6		13			▼	28
30						**Boring Terminated at 30 ft.**		30

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Crocon Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3500 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	5	5
Sand, some silt	5	10
Silty sand	9	19
Silt	1	20
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
MW-12R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER:
UST# 07680; UMW-17908

8. USE:
☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
_____ ft. Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to _____ ft. depth
_____ in. to _____ ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight NA lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: _____
Set Between: _____ ft. and _____ ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from _____ ft. to _____ ft.
Effective size _____ Uniformity Coefficient _____

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other _____
Depth: From _____ ft. to _____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: NA Not installed ☐
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Mode Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Monroe, GA 30655
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph L. Smith Date: _____
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Terracon

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-12R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/9/08	Date Completed: 5/9/08	Screen: 2" (0.010) Slotted PVC	From: 5 - To: 20
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 3 - To: 50
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 1 - To: 3
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 1
Boring Depth (ft.): 20.0	TOC Elevation: 92.43	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6.25	GW Level: ▼ 14.34 / Time/Date: 1520 5/14/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2		1		1.3		**SAND**, brown, loose, medium to coarse grained, poorly sorted, dry, no petroleum odor.		2
4								4
6		2		2895		**SAND**, some silt, loose, medium to coarse grained, poorly sorted, moist, no petroleum odor.		6
8								8
10						Silty **SAND**, loose, fine to medium grained, poorly sorted, damp, no petroleum odor.		10
12		3		1345		Silty **SAND**, loose, fine to medium grained, poorly sorted, saturated, no petroleum odor.	▼	12
14								14
16						Silty **SAND**,gray, loose to medium loose, fine to medium grained, poorly sorted, high petroleum odor.		16
18		4		72				18
20						**SILT**, white, dense, fine grained, high petroleum odor.		20
						Boring Terminated at 20 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015.
Street Address: 3800 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	22	22
Silt	18	40
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
MW-17

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER:
UST# 07680; UMW-17908

8. USE:
☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 40 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to ft. depth
in. to ft. depth
Height: Above ☐ Below ☐
Surface ft.
Weight N/A lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length:
Set Between: ft. and ft. NOTE: MULTIPLE SCREENS
ft. and ft. USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
ft. after hrs. Pumping G.P.M.
Pumping Test: ☐ Yes (please enclose) ☐ No
Yield:

14. WATER QUALITY
Chemical Analysis ☐ Yes ☐ No Bacterial Analysis ☐ Yes ☐ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☐ Yes ☐ No
Installed from ft. to ft.
Effective size Uniformity Coefficient

16. WELL GROUTED? ☐ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☐ Bentonite/Cement ☐ Other
Depth: From ft. to ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ft. direction
Type
Well Disinfected ☐ Yes ☐ No Type: Amount:

18. PUMP: Date installed: N/A Not installed ☐
Mfr. Name: Model No.:
H.P. Volts Length of drop pipe ft. Capacity gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Joe Smith Land CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Mobe Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Monroe, GA 30655
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph G. Smith Date:
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

Terracon GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-17**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/8/08	Date Completed: 5/8/08	Screen: 2" (0.010) Slotted PVC	From: 25 - To: 40
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 23 - To: 40
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 21 - To: 23
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 21
Boring Depth (ft.): 40.0	TOC Elevation: 100.84	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 3.25	GW Level: ▼ 36.70 / Time/Date: 1400 5/14/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description
0						**ASPHALT**, rock
2–4		1		1.2		**SAND**, brown, medium to coarse grained, loose, poorly sorted, dry, slight petroleum odor.
6–8		2		2.1		**SAND**, brown to orange, medium to coarse grained, loose, poorly sorted, dry, no petroleum odor.
10–12		3		17.5		**SAND**, orange, medium to coarse grained, loose, poorly sorted, dry, no petroleum odor.
14–18		4		38		Silty **SAND**, with rounded quartz fragments, light orange, fine to medium grained, dense, poorly sorted, moist, no petroleum odor.
20–22		5		144		**SILT**, pink, dense, friable, no petroleum odor
24–26						**SILT**, white to pink, dense, dry, no petroleum odor.
28		6		48		**SILT**, white to pink, very dense, dry, no petroleum odor.
30–32		7		56		**SILT**, white, dense, dry.
34–36						Sandy **SILT**, brown to gray, dense, wet. ▼
38–40		8		86		
40						**Boring Terminated at 40 ft.**

Well Detail

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/25/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

D H E C
PROMOTE PROTECT PROSPER

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21201-1168
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015
Street Address: 3800 Devine Street
City: Columbia Zip:
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
Sand	10	10
Silty clayey sand	9	19
Clay	1	20
Silty Clay	10	30
Sandy silt	5	35
Silty clayey sand	4	39
Silty clay w/fine sand	1	40

*Indicate Water Bearing Zones
(Use a 2nd sheet if needed)

5. REMARKS:
DW-1

6. TYPE: ☒ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER:
UST# 07680; UMW-17908

8. USE:
☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 40 ft. Date Started: 5/13/08 Date Completed: 5/15/08

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in 3 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
3 in. to 25 ft. depth
2 in. to 35 ft. depth
Height: Above ☐ Below ☐
Surface _____ ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2in
Slot/Gauge: 0.010 in Length: 5 ft
Set Between: 35 ft. and 40 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☒ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL 35.31 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No Slug Test
Yield: _____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 33 ft. to 40 ft.
Effective size 20/30 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 0 ft. to 31 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☐ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☒
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A B C D (circle one) ☐ ☒ ☐ ☐
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph G. Smith (Well Driller) Date: 5/15/08

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

Terracon GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: DW-1
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 5/13/08	Date Completed: 5/15/08	Screen: 2" (0.010) Slotted PVC	From: 35 - To: 40
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 33 - To: 40
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 31 - To: 33
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 31
Boring Depth (ft.): 40.0	TOC Elevation: 98.48	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 3.25	GW Level: 35.31 Time/Date: 5/15/2008	Outer Casing/Stick Up: 3" Outer casing to 25 ft	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		6572		**ASPHALT** / **SAND**, brown, medium to coarse grained, loose to medium loose, poorly sorted, moist, high petroleum odor.		2
4								4
6		2		9176		**SAND**, some clay and small quartz fragments, mottled (white, tan, and red), fine to coarse grained, poorly sorted, dry, petroleum odor, heavy iron oxidation.		6
8								8
10		3		14.03%		**SAND/QUARTZ**, some clay, mottled (white, red, and yellow), coarse grained, dense, sub-rounded, high petroleum odor, some iron oxidation.		10
12								12
14								14
16		4		4732				16
18								18
20						**CLAY**, white to rose, fine grained, dense, plastic, no petroleum odor, iron oxidation. /		20
22		5		115		Silty **CLAY**, mottled (white, purple, and red), dense, plastic, petroleum odor, some oxidation.		22
24								24
26		6		13		Silty **CLAY**, with medium grained quartz, white and brown, wet.		26
28								28
30						Sandy **SILT**, with medium grained quartz, white and brown, moist.		30
32		7		3.6				32
34						Silty Clayey **SAND**, with coarse grained quartz, fine to medium grained, wet. ▼		34
36								36
38		8		0				38
40						Silty **CLAY**, with fine sand, light tan with pink and red mottling.		40
						Boring Terminated at 40 ft.		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 6/26/08

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

APPENDIX B
Ground Water Sampling Logs

Terracon

Groundwater Sampling Log

Well ID:	MW-5R
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	10:30

Total Well Depth:	20 ft. BTOC
Depth to water:	14.82 ft. BTOC
Length of Water Column (LWC):	5.18 ft.
Casing Diameter:	2 in.
1 Casing Volume = LWC x 0.17 =	0.88 gal.
3 Casing Volumes:	2.64 gal.
Remarks:	Dry @ 1.75 gal - allow to recharge then sample

Field Analyses

Volume Purged (gal.)							
Time							
pH	NM						
Specific Conductivity (~~umhos~~ uS/cm)	1127						
Water Temperature ©	27.2						
Turbidity	low						
Dissolved Oxygen (mg/L)	5.14						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-7R
Date:	5/14/05
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	L. Walker
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1530

Total Well Depth:	24.70	ft. BTOC	
Depth to water:	15.46	ft. BTOC	
Length of Water Column (LWC):	9.24	ft.	
Casing Diameter:	2	in.	
1 Casing Volume = LWC x	.17	= 1.57	gal.
3 Casing Volumes:	4.71	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.57	3.14	4.71				
Time							
pH	6.02	5.84	5.87				
Specific Conductivity (umhos/cm)	446.1	424.2	454.4				
Water Temperature ©	20.9	20.6	20.1				
Turbidity	Mod	Mod	—				
Dissolved Oxygen (mg/L)			3.61				

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-8
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	13:00

Total Well Depth:	25 ft. BTOC
Depth to water:	16.21 ft. BTOC
Length of Water Column (LWC):	8.79 ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	No purge

Field Analyses

Volume Purged (gal.)							
Time							
pH	5.29						
Specific Conductivity (~~umhos~~ uS/cm)	197.1						
Water Temperature ©	25.0						
Turbidity	high						
Dissolved Oxygen (mg/L)	3.81						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-9R
Date:	5/14/08
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W. Walker
Weather Conditions:	sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1440

Total Well Depth:	19.9	ft. BTOC
Depth to water:	12.79	ft. BTOC
Length of Water Column (LWC):	7.11	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	1.2	gal.
3 Casing Volumes:	3.6	gal.

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.2	2.4	3.6				
Time							
pH	6.14	6.15	6.03				
Specific Conductivity (umhos/cm)	238.0	240.5	230.9				
Water Temperature ©	21.2	20.4	20.1				
Turbidity	Mod	Mod	Mod				
Dissolved Oxygen (mg/L)			3.64				

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-10R
Date:	6/3/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	
Weather Conditions:	
Air Temperature:	
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	30.20 ft. BTOC
Depth to water:	29.95 ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	dry

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-11R
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	13:35

Total Well Depth:	16.5 ft. BTOC
Depth to water:	11.43 ft. BTOC
Length of Water Column (LWC):	5.07 ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	No purge – insufficient water

Field Analyses

Volume Purged (gal.)							
Time							
pH	5.27						
Specific Conductivity (~~umhos~~ µS/cm)	118.3						
Water Temperature ©	25.0						
Turbidity	high						
Dissolved Oxygen (mg/L)	2.23						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-11R
Date:	6/3/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	W.W
Weather Conditions:	sunny
Air Temperature:	85
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	12:00

Total Well Depth:	30.20	ft. BTOC
Depth to water:	28.68	ft. BTOC
Length of Water Column (LWC):	1.52	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =		gal.
3 Casing Volumes:		gal.

Remarks: Full sample obtained over 40min, no H2O for field analysis

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12R
Date:	5/14/08
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W Walker
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1520

Total Well Depth:	20.00	ft. BTOC	
Depth to water:	14.34	ft. BTOC	
Length of Water Column (LWC):	5.66	ft.	
Casing Diameter:	2	in.	
1 Casing Volume = LWC x	0.17	= 0.96	gal.
3 Casing Volumes:	2.88	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	0.96	2	2.88				
Time							
pH	6.06	6.03	6.02				
Specific Conductivity (umhos/cm)	388.1	399.2	406.8				
Water Temperature ©	Mod/20.5	20.2	20.0				
Turbidity	Mod	Mod	Mod				
Dissolved Oxygen (mg/L)			2.13				

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-13
Date:	6/3/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	W. Walker
Weather Conditions:	Sunny
Air Temperature:	86
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1400

Total Well Depth:	14.85	ft. BTOC
Depth to water:	13.70	ft. BTOC
Length of Water Column (LWC):	1.15	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x	.17 = 0.195	gal.
3 Casing Volumes:		gal.
Remarks:		

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.21						
Specific Conductivity (umhos/cm)	61.7us						
Water Temperature ©	24.4						
Turbidity	High						
Dissolved Oxygen (mg/L)	2.08						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-15
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Sunny
Air Temperature:	80°
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	NS - dry

Total Well Depth:	34.3 ft. BTOC
Depth to water:	Dry ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	Dry

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity ~~(umhos~~ uS/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-16
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Sunny
Air Temperature:	80°
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	11:00

Total Well Depth:	35 ft. BTOC
Depth to water:	26.96 ft. BTOC
Length of Water Column (LWC):	8.04 ft.
Casing Diameter:	2 in.
1 Casing Volume = LWC x	0.17 = 1.37 gal.
3 Casing Volumes:	gal.
Remarks:	No purge

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.64						
Specific Conductivity (~~umhos~~ µS/cm)	173.7						
Water Temperature ©	18.5						
Turbidity	high						
Dissolved Oxygen (mg/L)	6.57						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-17
Date:	5/14/08
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W Walker
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1400

Total Well Depth:	39.50	ft. BTOC
Depth to water:	36.70	ft. BTOC
Length of Water Column (LWC):	2.8	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	0.476	gal.
3 Casing Volumes:	1.42	gal.

Remarks:

Field Analyses

Volume Purged (gal.)	0.476	0.94	1.42				
Time							
pH	6.27	6.05	5.77				
Specific Conductivity (umhos/cm)	126.2	124.6	118.0				
Water Temperature ©	22.3	21.4	21.3				
Turbidity	Mod	Mod	Mod				
Dissolved Oxygen (mg/L)			7.57				

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	DW-1
Date:	5/15/08
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Sunny
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	10:00

Total Well Depth:	40	ft. BTOC
Depth to water:	35.31	ft. BTOC
Length of Water Column (LWC):	4.69	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x 0.17 =	0.80	gal.
3 Casing Volumes:	2.4	gal.

Remarks: ____

Field Analyses

Volume Purged (gal.)							
Time							
pH	8.20	7.85	7.63				
Specific Conductivity (~~umhos~~ uS/cm)	9.50	3436	3472				
Water Temperature ©	19.4	23.0	22.6				
Turbidity	1000	1000	1000				
Dissolved Oxygen (mg/L)	4.75						

521 Clemson Rd. * Columbia, SC, 29229 * Phone (803) 741-9000 * Fax (803) 741-9900
www.terracon.com

APPENDIX C
Chemical Analytical Data

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208051022

DATE
05/15/2008

Primary Data Review By

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 05/15/2008

GCAL Report 208051022

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208051022

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 373492, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208051022

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102201	MW-9R (5-10)	Solid	05/09/2008 13:15	05/10/2008 08:55
20805102202	MW-10R (10-15)	Solid	05/09/2008 09:30	05/10/2008 08:55
20805102203	MW-11R (10-15)	Solid	05/09/2008 14:45	05/10/2008 08:55
20805102204	MW-12R (5-10)	Solid	05/09/2008 11:30	05/10/2008 08:55
20805102205	MW-17 (20-25)	Solid	05/08/2008 14:00	05/10/2008 08:55

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102201	**MW-9R (5-10)**	Solid	05/09/2008 13:15	05/10/2008 08:55

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**4.05**	**3.91**		**ug/Kg**
1330-20-7	**Xylene (total)**	**9.16**	**7.81**		**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102204	**MW-12R (5-10)**	Solid	05/09/2008 11:30	05/10/2008 08:55

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**3.60**	**3.11**		**ug/Kg**
1330-20-7	**Xylene (total)**	**8.28**	**6.23**		**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102201	**MW-9R (5-10)**	Solid	05/09/2008 13:15	05/10/2008 08:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/14/2008 16:32	WAS	373492

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**4.05**	**3.91**		**ug/Kg**
108-88-3	Toluene	ND	3.91		ug/Kg
100-41-4	Ethylbenzene	ND	3.91		ug/Kg
1330-20-7	**Xylene (total)**	**9.16**	**7.81**		**ug/Kg**
91-20-3	Naphthalene	ND	3.91		ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	35.2	37.4	ug/Kg	106	62 - 127
1868-53-7	Dibromofluoromethane	35.2	40.2	ug/Kg	114	65 - 130
2037-26-5	Toluene d8	35.2	42.9	ug/Kg	122	71 - 132
17060-07-0	1,2-Dichloroethane-d4	35.2	41.9	ug/Kg	119	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102202	**MW-10R (10-15)**	Solid	05/09/2008 09:30	05/10/2008 08:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/14/2008 16:52	WAS	373492

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	4.74		ug/Kg
108-88-3	Toluene	ND	4.74		ug/Kg
100-41-4	Ethylbenzene	ND	4.74		ug/Kg
1330-20-7	Xylene (total)	ND	9.47		ug/Kg
91-20-3	Naphthalene	ND	4.74		ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	43.3	46.4	ug/Kg	107	62 - 127
1868-53-7	Dibromofluoromethane	43.3	43.7	ug/Kg	101	65 - 130
2037-26-5	Toluene d8	43.3	44.8	ug/Kg	104	71 - 132
17060-07-0	1,2-Dichloroethane-d4	43.3	48.2	ug/Kg	111	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102203	**MW-11R (10-15)**	Solid	05/09/2008 14:45	05/10/2008 08:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/14/2008 17:13	WAS	373492

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	3.95		ug/Kg
108-88-3	Toluene	ND	3.95		ug/Kg
100-41-4	Ethylbenzene	ND	3.95		ug/Kg
1330-20-7	Xylene (total)	ND	7.91		ug/Kg
91-20-3	Naphthalene	ND	3.95		ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	34.6	40.5	ug/Kg	117	62 - 127
1868-53-7	Dibromofluoromethane	34.6	37.1	ug/Kg	107	65 - 130
2037-26-5	Toluene d8	34.6	38.5	ug/Kg	111	71 - 132
17060-07-0	1,2-Dichloroethane-d4	34.6	38.5	ug/Kg	111	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102204	**MW-12R (5-10)**	Solid	05/09/2008 11:30	05/10/2008 08:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/14/2008 17:34	WAS	373492

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**3.60**	**3.11**		**ug/Kg**
108-88-3	Toluene	ND	3.11		ug/Kg
100-41-4	Ethylbenzene	ND	3.11		ug/Kg
1330-20-7	**Xylene (total)**	**8.28**	**6.23**		**ug/Kg**
91-20-3	Naphthalene	ND	3.11		ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	27.3	31.3	ug/Kg	115	62 - 127
1868-53-7	Dibromofluoromethane	27.3	31.8	ug/Kg	117	65 - 130
2037-26-5	Toluene d8	27.3	33.5	ug/Kg	123	71 - 132
17060-07-0	1,2-Dichloroethane-d4	27.3	32.2	ug/Kg	118	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805102205	**MW-17 (20-25)**	Solid	05/08/2008 14:00	05/10/2008 08:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/14/2008 17:55	WAS	373492

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	4.24		ug/Kg
108-88-3	Toluene	ND	4.24		ug/Kg
100-41-4	Ethylbenzene	ND	4.24		ug/Kg
1330-20-7	Xylene (total)	ND	8.48		ug/Kg
91-20-3	Naphthalene	ND	4.24		ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	37.2	40.4	ug/Kg	109	62 - 127
1868-53-7	Dibromofluoromethane	37.2	40.9	ug/Kg	110	65 - 130
2037-26-5	Toluene d8	37.2	38	ug/Kg	102	71 - 132
17060-07-0	1,2-Dichloroethane-d4	37.2	43.2	ug/Kg	116	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	373492	**Client ID**	MB373492			LCS373492				LCSD373492		
Prep Batch	N/A	**GCAL ID**	604865			604866				604867		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	05/14/2008 14:57			05/14/2008 13:48				05/14/2008 14:09		
		Matrix	Solid			Solid				Solid		
SW-846 8260B		**Units**	ug/Kg	**Spike**	**Result**		**Control**	**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**
100-41-4	Ethylbenzene	ND	5.00	50.0	53.3	107	80 - 120	53.9	108	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00	50.0	48.4	97	71 - 130	49.6	99	2	30
1330-20-7	Xylene (total)	ND	10.0	150	150	100	80 - 120	152	101	1	30
91-20-3	Naphthalene	ND	5.00	50.0	56.7	113	62 - 146	58.8	118	4	30
71-43-2	Benzene	ND	5.00	50.0	52.6	105	80 - 120	53.9	108	2	21
108-88-3	Toluene	ND	5.00	50.0	50.9	102	80 - 120	52.0	104	2	21
Surrogate											
460-00-4	4-Bromofluorobenzene	44.4	89	50	44.2	88	62 - 127	47.9	96		
1868-53-7	Dibromofluoromethane	45.7	91	50	43.1	86	65 - 130	47.3	95		
2037-26-5	Toluene d8	48.1	96	50	44.3	89	71 - 132	49.8	100		
17060-07-0	1,2-Dichloroethane-d4	46	92	50	44.4	89	62 - 125	47.2	94		

Access Analytical - Chain of Custody Record

Access/1565/20080522/5-16-08

Project Submission # 7307801Z **PO #** _____ **Laboratory ID:** GCA

Company Name: C. Terracon
Report To: Melissa Roberts
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: (803) 741-9000 Fax: (803) 741-9900
Email:
Project Name: SC-015
Sampled By (print): Regan W. Norris

↓ REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	Preservative (*see codes below)	1 BTEX, Naph						
MW-9R 5-10'	5-9-08	1315	S	4		X						1
MW-10R 10-15'	5-9-08	930	S	4		X						2
MW-11R 10-15'	5-9-08	1445	S	4		X						3
MW-12R 5-10'	5-9-08	1130	S	4		X						4
MW-17 20-25'	5-8-08	1400	S	4		X						5

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.
Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:
- ✓ Std. (5-7 Bus. days)
- ___ RUSH*

*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
- ✓ Yes
- ___ No

Project Location:
- ✓ SC
- ___ NC
- ___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
	5-9-08	1420	
	5/9/08	1715	FEDEX
FEDEX	5-10-08	855	

Pg 1 of 1

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Regan Norris

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208051614

DATE
05/23/2008

Primary Data Review By

Curtis Ekker
Fri May 23 16:14:23 2008

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 05/23/2008

GCAL Report 208051614

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Regan Norris

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208051614

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, sample 20805161402 (MW-9R) had to be diluted due to the presence of non-target background. This dilution is reflected in the elevated reporting limits.

In the SW-846 8260B - Gas Additives analysis, samples 20805161401 (MW-7R) and 20805161402 (MW-9R) had to be diluted due to the presence of non-target background. This dilution is reflected in the elevated reporting limits.

In the SW-846 8260B analysis, sample 20805161401 (MW-7R) had to be diluted due to compounds that were detected above the linear range of the calibration.

CONVENTIONALS

In the SM 3500 Fe D analysis, samples 20805161402 (MW-9R) and 20805161403 (MW-12R) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the EPA 353.2 analysis, sample 20805161404 (MW-17) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the EPA 375.4 analysis, sample 20805161401 (MW-7R) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Fri May 23 16:14:42 2008

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208051614

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161401	MW-7R	Water	05/14/2008 15:30	05/16/2008 09:23
20805161402	MW-9R	Water	05/14/2008 14:40	05/16/2008 09:23
20805161403	MW-12R	Water	05/14/2008 15:20	05/16/2008 09:23
20805161404	MW-17	Water	05/14/2008 14:00	05/16/2008 09:23

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161401	**MW-7R**	Water	05/14/2008 15:30	05/16/2008 09:23

SW-846 6010B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	0.023	0.015		mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	37.1	5.00		ug/L
108-88-3	Toluene	355	5.00		ug/L
100-41-4	Ethylbenzene	68.1	5.00		ug/L
1330-20-7	Xylene (total)	91.8	15.0		ug/L
91-20-3	Naphthalene	29.7	25.0		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
75-85-4	tert-amyl alcohol (TAA)	125	50.0		ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	Ferrous Iron	19.0	0.050		mg/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	102	25.0		mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	0.044	0.010		mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161402	**MW-9R**	Water	05/14/2008 14:40	05/16/2008 09:23

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	34.9	5.00		ug/L
108-88-3	Toluene	11.9	5.00		ug/L
100-41-4	Ethylbenzene	126	5.00		ug/L
1330-20-7	Xylene (total)	249	15.0		ug/L
91-20-3	Naphthalene	175	25.0		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	34.1	5.00		ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	Ferrous Iron	19.0	0.500		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161403	**MW-12R**	Water	05/14/2008 15:20	05/16/2008 09:23

SW-846 6010B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	0.034	0.015		mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	74.4	1.00		ug/L
108-88-3	Toluene	2.46	1.00		ug/L
100-41-4	Ethylbenzene	52.3	1.00		ug/L
1330-20-7	Xylene (total)	25.2	3.00		ug/L
91-20-3	Naphthalene	138	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	145	1.00		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	59.2	20.0		ug/L
75-65-0	t-Butanol (TBA)	89.6	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	5.28	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	141	10.0		ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	Ferrous Iron	38.8	1.00		mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161404	**MW-17**	Water	05/14/2008 14:00	05/16/2008 09:23

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**47.1**	**20.0**		**ug/L**

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**0.088**	**0.050**		**mg/L**

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**1.56**	**0.020**		**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161401	**MW-7R**	Water	05/14/2008 15:30	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/21/2008 13:13	AEL	373913

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**37.1**	**5.00**		**ug/L**
108-88-3	**Toluene**	**355**	**5.00**		**ug/L**
100-41-4	**Ethylbenzene**	**68.1**	**5.00**		**ug/L**
1330-20-7	**Xylene (total)**	**91.8**	**15.0**		**ug/L**
91-20-3	**Naphthalene**	**29.7**	**25.0**		**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	5.00		ug/L
107-06-2	1,2-Dichloroethane	ND	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	268	ug/L	107	78 - 130
1868-53-7	Dibromofluoromethane	250	254	ug/L	102	77 - 127
2037-26-5	Toluene d8	250	267	ug/L	107	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	242	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/22/2008 11:31	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	ND	100		ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	5.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	5.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	10.0		ug/L
75-65-0	t-Butanol (TBA)	ND	50.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	5.00		ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**125**	**50.0**		**ug/L**
762-75-4	tert-butyl formate (TBF)	ND	10.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	261	ug/L	104	50 - 150
1868-53-7	Dibromofluoromethane	250	241	ug/L	96	50 - 150
2037-26-5	Toluene d8	250	273	ug/L	109	50 - 150
17060-07-0	1,2-Dichloroethane-d4	250	235	ug/L	94	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 15:30	373643	SW-846 8011	1	05/21/2008 22:58	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161401	**MW-7R**	Water	05/14/2008 15:30	05/16/2008 09:23

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 11:30	373642	SW-846 3010A	1	05/16/2008 20:44	DJH	373777

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.023**	**0.015**		**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/20/2008 07:11	RLY	373759

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.044**	**0.010**		**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/16/2008 11:49	RLY	373652

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**19.0**	**0.050**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/21/2008 15:57	JEM	373945

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	**Sulfate**	**102**	**25.0**		**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161402	**MW-9R**	Water	05/14/2008 14:40	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/21/2008 13:35	AEL	373913

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**34.9**	**5.00**		**ug/L**
108-88-3	**Toluene**	**11.9**	**5.00**		**ug/L**
100-41-4	**Ethylbenzene**	**126**	**5.00**		**ug/L**
1330-20-7	**Xylene (total)**	**249**	**15.0**		**ug/L**
91-20-3	**Naphthalene**	**175**	**25.0**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**34.1**	**5.00**		**ug/L**
107-06-2	1,2-Dichloroethane	ND	25.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	268	ug/L	107	78 - 130
1868-53-7	Dibromofluoromethane	250	263	ug/L	105	77 - 127
2037-26-5	Toluene d8	250	256	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	241	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	05/22/2008 11:55	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	ND	100		ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	5.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	5.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	10.0		ug/L
75-65-0	t-Butanol (TBA)	ND	50.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	5.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	50.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	10.0		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	276	ug/L	110	50 - 150
1868-53-7	Dibromofluoromethane	250	249	ug/L	100	50 - 150
2037-26-5	Toluene d8	250	274	ug/L	110	50 - 150
17060-07-0	1,2-Dichloroethane-d4	250	229	ug/L	92	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 15:30	373643	SW-846 8011	1	05/21/2008 23:59	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161402	**MW-9R**	Water	05/14/2008 14:40	05/16/2008 09:23

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 11:30	373642	SW-846 3010A	1	05/16/2008 21:14	DJH	373777

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/20/2008 07:13	RLY	373759

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	ND	0.010		mg/L

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	05/16/2008 11:46	RLY	373652

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**19.0**	**0.500**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/21/2008 15:58	JEM	373945

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161403	**MW-12R**	Water	05/14/2008 15:20	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/21/2008 13:57	AEL	373913

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**74.4**	**1.00**		**ug/L**
108-88-3	**Toluene**	**2.46**	**1.00**		**ug/L**
100-41-4	**Ethylbenzene**	**52.3**	**1.00**		**ug/L**
1330-20-7	**Xylene (total)**	**25.2**	**3.00**		**ug/L**
91-20-3	**Naphthalene**	**138**	**5.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**145**	**1.00**		**ug/L**
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	46.6	ug/L	93	77 - 127
2037-26-5	Toluene d8	50	49.5	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.8	ug/L	92	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 12:19	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**59.2**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	**t-Butanol (TBA)**	**89.6**	**10.0**		**ug/L**
994-05-8	**t-amyl methyl ether (TAME)**	**5.28**	**1.00**		**ug/L**
75-85-4	**tert-amyl alcohol (TAA)**	**141**	**10.0**		**ug/L**
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	55.5	ug/L	111	50 - 150
1868-53-7	Dibromofluoromethane	50	47	ug/L	94	50 - 150
2037-26-5	Toluene d8	50	51.4	ug/L	103	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46.2	ug/L	92	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 15:30	373643	SW-846 8011	1	05/22/2008 01:21	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161403	**MW-12R**	Water	05/14/2008 15:20	05/16/2008 09:23

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 11:30	373642	SW-846 3010A	1	05/16/2008 21:20	DJH	373777

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.034**	**0.015**		**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/20/2008 07:26	RLY	373760

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	ND	0.010		mg/L

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			20	05/16/2008 11:48	RLY	373652

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**38.8**	**1.00**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/21/2008 15:59	JEM	373945

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161404	**MW-17**	Water	05/14/2008 14:00	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/21/2008 12:49	AEL	373913

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	1.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.3	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	50.7	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	53	ug/L	106	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.8	ug/L	94	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 12:42	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**47.1**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	54.6	ug/L	109	50 - 150
1868-53-7	Dibromofluoromethane	50	49.2	ug/L	98	50 - 150
2037-26-5	Toluene d8	50	55.1	ug/L	110	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	45.5	ug/L	91	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 15:30	373643	SW-846 8011	1	05/22/2008 02:22	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161404	**MW-17**	Water	05/14/2008 14:00	05/16/2008 09:23

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/16/2008 11:30	373642	SW-846 3010A	1	05/16/2008 21:46	DJH	373777

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	05/20/2008 07:39	RLY	373760

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**1.56**	**0.020**		**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/16/2008 11:38	RLY	373652

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**0.088**	**0.050**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/21/2008 16:00	JEM	373945

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GC/MS Volatiles Quality Control Summary

Analytical Batch	373913	Client ID	MB373913			LCS373913			LCSD373913			
Prep Batch	N/A	GCAL ID	606840			606841			606842			
		Sample Type	Method Blank			LCS			LCSD			
		Analytical Date	05/21/2008 08:34			05/21/2008 07:27			05/21/2008 07:50			
		Matrix	Water			Water			Water			
SW-846 8260B		Units	ug/L	Spike Added	Result	Result	% R	Control Limits	RPD	Result	% R	RPD	RPD Limit
107-06-2	1,2-Dichloroethane		ND	5.00	50.0	48.5	97	75 - 122		45.2	90	7	30
100-41-4	Ethylbenzene		ND	1.00	50.0	49.4	99	80 - 125		47.6	95	4	30
1634-04-4	tert-Butyl methyl ether (MTBE)		ND	1.00	50.0	49.4	99	72 - 127		50.1	100	1	30
1330-20-7	Xylene (total)		ND	3.00	150	147	98	80 - 129		141	94	4	30
91-20-3	Naphthalene		ND	5.00	50.0	48.9	98	67 - 149		47.9	96	2	35
71-43-2	Benzene		ND	1.00	50.0	48.5	97	80 - 120		45.1	90	7	11
108-88-3	Toluene		ND	1.00	50.0	52.6	105	80 - 124		51.2	102	3	13
Surrogate													
460-00-4	4-Bromofluorobenzene		49.4	99	50	47	94	78 - 130		49.6	99		
1868-53-7	Dibromofluoromethane		52.1	104	50	47.7	95	77 - 127		47.1	94		
2037-26-5	Toluene d8		53.6	107	50	46.2	92	76 - 134		47.8	96		
17060-07-0	1,2-Dichloroethane-d4		47.1	94	50	51.1	102	71 - 127		48.2	96		

Analytical Batch	373913	Client ID	COMP 1			606338MS			606338MSD			
Prep Batch	N/A	GCAL ID	20805194201			607036			607037			
		Sample Type	SAMPLE			MS			MSD			
		Analytical Date	05/21/2008 12:27			05/21/2008 14:27			05/21/2008 14:49			
		Matrix	Solid			Solid			Solid			
SW-846 8260B		Units	ug/L	Spike Added	Result	Result	% R	Control Limits	RPD	Result	% R	RPD	RPD Limit
107-06-2	1,2-Dichloroethane		0.00	200	2000	1740	87	76 - 125		1690	85	3	30
71-43-2	Benzene		0.00	40.0	2000	1890	95	80 - 120		1800	90	5	21
Surrogate													
460-00-4	4-Bromofluorobenzene				2000	2030	102	62 - 127		2040	102		
1868-53-7	Dibromofluoromethane				2000	1780	89	65 - 130		1790	90		
2037-26-5	Toluene d8				2000	1930	97	71 - 132		1950	98		
17060-07-0	1,2-Dichloroethane-d4				2000	1760	88	62 - 125		1770	89		

GC/MS Volatiles Quality Control Summary

Analytical Batch	374005	**Client ID**	MB374005			LCS374005				LCSD374005		
Prep Batch	N/A	**GCAL ID**	607401			607402				607403		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	05/22/2008 11:02			05/22/2008 09:34				05/22/2008 09:58		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		ND	1.00	50.0	49.5	99	50 - 150		48.9	98	1	50
75-65-0	t-Butanol (TBA)		ND	10.0	50.0	49.9	100	50 - 150		49.4	99	1	50
108-20-3	diisopropyl Ether (DIPE)		ND	1.00	50.0	51.6	103	50 - 150		49.6	99	4	50
637-92-3	Ethyl tert-butyl ether (ETBE)		ND	1.00	50.0	53.0	106	50 - 150		51.9	104	2	50
624-95-3	ethyl tert-butanol (ETBA)		ND	2.00	50.0	45.3	91	50 - 150		45.9	92	1	50
64-17-5	Ethanol		ND	20.0	200	178	89	50 - 150		183	92	3	50
75-85-4	tert-amyl alcohol (TAA)		ND	10.0	200	192	96	50 - 150		198	99	3	50
762-75-4	tert-butyl formate (TBF)		ND	2.00	50.0	54.0	108	50 - 150		51.7	103	4	50
Surrogate													
460-00-4	4-Bromofluorobenzene		51.2	102	50	54	108	50 - 150		55.5	111		
1868-53-7	Dibromofluoromethane		49.1	98	50	50.8	102	50 - 150		49.9	100		
2037-26-5	Toluene d8		54.5	109	50	50.6	101	50 - 150		51.9	104		
17060-07-0	1,2-Dichloroethane-d4		46.6	93	50	49	98	50 - 150		48	96		

Analytical Batch	374005	**Client ID**	MW-5R			606488MS				606488MSD		
Prep Batch	N/A	**GCAL ID**	20805201401			607659				607660		
		Sample Type	SAMPLE			MS				MSD		
		Analytical Date	05/22/2008 15:05			05/22/2008 16:15				05/22/2008 16:38		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		0.00	500	25000	25400	102	50 - 150		24600	98	3	50
75-65-0	t-Butanol (TBA)		6880	5000	25000	26700	79	50 - 150		29200	89	9	50
108-20-3	diisopropyl Ether (DIPE)		0.00	500	25000	25900	104	50 - 150		24800	99	4	50
637-92-3	Ethyl tert-butyl ether (ETBE)		0.00	500	25000	26300	105	50 - 150		25600	102	3	50
624-95-3	ethyl tert-butanol (ETBA)		0.00	1000	25000	25100	100	50 - 150		25800	103	3	50
64-17-5	Ethanol		0.00	10000	100000	128000	128	50 - 150		102000	102	23	50
75-85-4	tert-amyl alcohol (TAA)		46900	5000	100000	141000	94	50 - 150		148000	101	5	50
762-75-4	tert-butyl formate (TBF)		0.00	1000	25000	27500	110	50 - 150		25000	100	10	50
Surrogate													
460-00-4	4-Bromofluorobenzene				25000	26600	106	50 - 150		27100	108		
1868-53-7	Dibromofluoromethane				25000	25100	100	50 - 150		25700	103		

GC/MS Volatiles Quality Control Summary

Analytical Batch	374005	**Client ID**	MW-5R		606488MS			606488MSD			
Prep Batch	N/A	**GCAL ID**	20805201401		607659			607660			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	05/22/2008 15:05		05/22/2008 16:15			05/22/2008 16:38			
		Matrix	Water		Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8			25000	25000	100	50 - 150	25300	101		
17060-07-0	1,2-Dichloroethane-d4			25000	24800	99	50 - 150	24200	97		

General Chromatography Quality Control Summary

Analytical Batch	374047	**Client ID**	MB373643			LCS373643			LCSD373643			
Prep Batch	373643	**GCAL ID**	605649			605650			605651			
Prep Method	SW-846 8011	**Sample Type**	Method Blank			LCS			LCSD			
		Prep Date	05/16/2008 15:30			05/16/2008 15:30			05/16/2008 15:30			
		Analytical Date	05/21/2008 20:54			05/21/2008 21:14			05/21/2008 21:35			
		Matrix	Water			Water			Water			
SW-846 8011		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane		ND	0.010	1.21	1.65	136	62 - 140	1.57	132	5	40

Inorganics Quality Control Summary

Analytical Batch	373777	**Client ID**	MB373642		LCS373642		
Prep Batch	373642	**GCAL ID**	605645		605646		
Prep Method	SW-846 3010A	**Sample Type**	Method Blank		LCS		
		Prep Date	05/16/2008 11:30		05/16/2008 11:30		
		Analytical Date	05/16/2008 20:31		05/16/2008 20:37		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**		**Control Limits % R**
		Result	**RDL**			**% R**	
7439-92-1	Lead	ND	0.015	0.50	0.51	101	80 - 120

Analytical Batch	373777	**Client ID**	MW-7R		605607MS		
Prep Batch	373642	**GCAL ID**	20805161401		605648		
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE		MS		
		Prep Date	05/16/2008 11:30		05/16/2008 11:30		
		Analytical Date	05/16/2008 20:44		05/16/2008 20:56		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**		**Control Limits % R**
		Result	**RDL**			**% R**	
7439-92-1	Lead	0.023	0.015	0.50	0.52	99	75 - 125

Analytical Batch	373777	**Client ID**	MW-7R	605607DUP		
Prep Batch	373642	**GCAL ID**	20805161401	605647		
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE	DUP		
		Prep Date	05/16/2008 11:30	05/16/2008 11:30		
		Analytical Date	05/16/2008 20:44	05/16/2008 20:50		
		Matrix	Water	Water		
SW-846 6010B		**Units**	mg/L	**Result**	**RPD**	**RPD Limit**
		Result	**RDL**			
7439-92-1	Lead	0.023	0.015	0.021	9	20

General Chemistry Quality Control Summary

Analytical Batch	373759	Client ID	MB373759		LCS373759		
Prep Batch	N/A	GCAL ID	606175		606176		
		Sample Type	Method Blank		LCS		
		Analytical Date	05/20/2008 06:38		05/20/2008 06:39		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
C-005	Nitrate/Nitrite	ND	0.010	0.500	0.498	99.5	90 - 110

Analytical Batch	373759	Client ID	MW M1		605564MS		
Prep Batch	N/A	GCAL ID	20805161101		606178		
		Sample Type	SAMPLE		MS		
		Analytical Date	05/20/2008 06:45		05/20/2008 06:48		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
C-005	Nitrate/Nitrite	36.3	1.00	50.0	93.8	115	75 - 125

Analytical Batch	373759	Client ID	MW M1	605564DUP		
Prep Batch	N/A	GCAL ID	20805161101	606177		
		Sample Type	SAMPLE	DUP		
		Analytical Date	05/20/2008 06:45	05/20/2008 06:46		
		Matrix	Water	Water		
EPA 353.2 N+N		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
C-005	Nitrate/Nitrite	36.3	1.00	36.0	0.83	25

Analytical Batch	373760	Client ID	MB373760		LCS373760		
Prep Batch	N/A	GCAL ID	606179		606180		
		Sample Type	Method Blank		LCS		
		Analytical Date	05/20/2008 07:24		05/20/2008 07:25		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
C-005	Nitrate/Nitrite	ND	0.010	0.500	0.492	98.3	90 - 110

General Chemistry Quality Control Summary

Analytical Batch 373760	**Client ID**	MW-12R			605613MS		
Prep Batch N/A	**GCAL ID**	20805161403			606182		
	Sample Type	SAMPLE			MS		
	Analytical Date	05/20/2008 07:26			05/20/2008 07:35		
	Matrix	Water			Water		
EPA 353.2 N+N		**Units**	mg/L	**Spike**	**Result**		**Control**
		Result		**RDL Added**		**% R**	**Limits % R**
C-005 Nitrate/Nitrite		0.000	0.010	0.500	0.492	98.5	75 - 125

Analytical Batch 373760	**Client ID**	MW-12R		605613DUP			
Prep Batch N/A	**GCAL ID**	20805161403		606181			
	Sample Type	SAMPLE		DUP			
	Analytical Date	05/20/2008 07:26		05/20/2008 07:27			
	Matrix	Water		Water			
EPA 353.2 N+N		**Units**	mg/L	**Result**		**RPD**	
		Result	**RDL**		**RPD**	**Limit**	
C-005 Nitrate/Nitrite		0.000	0.010	0.000	0	25	

General Chemistry Quality Control Summary

Analytical Batch	373652	Client ID	MB373652		LCS373652		
Prep Batch	N/A	GCAL ID	605705		605706		
		Sample Type	Method Blank		LCS		
		Analytical Date	05/16/2008 11:37		05/16/2008 11:37		
		Matrix	Water		Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
WET-045	Ferrous Iron	ND	0.050	1.00	0.983	98.3	80 - 120

Analytical Batch	373652	Client ID	MW-17		605616MS		
Prep Batch	N/A	GCAL ID	20805161404		605708		
		Sample Type	SAMPLE		MS		
		Analytical Date	05/16/2008 11:38		05/16/2008 11:39		
		Matrix	Water		Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
WET-045	Ferrous Iron	0.088	0.050	1.00	0.956	86.8	75 - 125

Analytical Batch	373652	Client ID	MW-9R	605610DUP		
Prep Batch	N/A	GCAL ID	20805161402	605707		
		Sample Type	SAMPLE	DUP		
		Analytical Date	05/16/2008 11:46	05/16/2008 11:47		
		Matrix	Water	Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
WET-045	Ferrous Iron	19.0	0.500	18.8	1.1	25

General Chemistry Quality Control Summary

Analytical Batch	373945	Client ID	MB373945			LCS373945		
Prep Batch	N/A	GCAL ID	607040			607041		
		Sample Type	Method Blank			LCS		
		Analytical Date	05/21/2008 15:10			05/21/2008 15:11		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike				
		Result	RDL	Added	Result	% R	Control Limits % R	
14808-79-8	Sulfate	ND	5.0	20.0	19.1	95	80 - 120	

Analytical Batch	373945	Client ID	MW-56R			MW-56R MS			MW-56R MSD			
Prep Batch	N/A	GCAL ID	20805133904			20805133905			20805133906			
		Sample Type	SAMPLE			MS			MSD			
		Analytical Date	05/21/2008 15:32			05/21/2008 15:33			05/21/2008 15:33			
		Matrix	Water			Water			Water			
EPA 375.4 Sulfate		Units	mg/L	Spike			Control					
		Result	RDL	Added	Result	% R	Limits % R	RPD	Result	% R	RPD	RPD Limit
14808-79-8	Sulfate	91.2	25.0	100	183	91	75 - 125	3	177	86	3	25

Analytical Batch	373945	Client ID	MW-58R		604375DUP		
Prep Batch	N/A	GCAL ID	20805133901		607042		
		Sample Type	SAMPLE		DUP		
		Analytical Date	05/21/2008 15:14		05/21/2008 15:14		
		Matrix	Water		Water		
EPA 375.4 Sulfate		Units	mg/L				
		Result	RDL	Result	RPD	RPD Limit	
14808-79-8	Sulfate	140	25.0	142	1	25	

Access/4565/20805/1614/5-23

Access Analytical - Chain of Custody Record

Project Submission # 7307-8012 PO # _____ Laboratory ID: GCAL

Company Name: Terracon
Report To: Ragen Norris
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-015
Sampled By (print): William Walker

* REQUESTED LAB ANALYSIS: *

Preservative (*see codes below)

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	Lead	Nitrate / Nitrite	Sulfate	Oxygenates	B, N, MTBE, 1,2 DCA	EDB	Fe++	NOTES / COMMENTS
MW-7R	5/14/08	1530	L	11	1	1	1	2	2	2	2	-1
MW-9R	"	1440	"	"	"	"	"	"	"	"	"	-2
MW-12R	"	1520	"	"	"	"	"	"	"	"	"	-3
MW-17	"	1400	"	"	"	"	"	"	"	"	"	-4

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___ No

Project Location:
✓ SC
___ NC
___ Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	5/14/08	11:15	M. Robertson
M. Robertson	5/15	1700	FedEx
FedEx	5-16-08	9:23	Shane Ingram

Pg 1 of 1

Access Analytical, Inc.
See Reverse for Terms and Conditions

4°

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Regan Norris

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208051618

DATE
05/27/2008

Primary Data Review By

Curtis Ekker
Tue May 27 13:41:51 2008

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 05/27/2008

GCAL Report 208051618

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Regan Norris

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208051618

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 374240, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

In the SW-846 8260B analysis, samples 20805161801 (MW-5R), 20805161802 (MW-7R) and 20805161803 (MW-1) had to be diluted due to compounds that were detected above the linear range of the calibration.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Tue May 27 13:42:11 2008

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208051618

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161801	MW-5R	Solid	05/13/2008 09:00	05/16/2008 09:23
20805161802	MW-7R	Solid	05/13/2008 10:45	05/16/2008 09:23
20805161803	MW-1	Solid	05/14/2008 15:50	05/16/2008 09:23

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161801	**MW-5R**	Solid	05/13/2008 09:00	05/16/2008 09:23

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**1570**	**826**		**ug/Kg**
108-88-3	**Toluene**	**22600**	**826**		**ug/Kg**
100-41-4	**Ethylbenzene**	**12600**	**826**		**ug/Kg**
1330-20-7	**Xylene (total)**	**53100**	**1650**		**ug/Kg**
91-20-3	**Naphthalene**	**12600**	**826**		**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161802	**MW-7R**	Solid	05/13/2008 10:45	05/16/2008 09:23

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
91-20-3	**Naphthalene**	**339**	**220**		**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161803	**MW-1**	Solid	05/14/2008 15:50	05/16/2008 09:23

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
1330-20-7	**Xylene (total)**	**671**	**532**		**ug/Kg**
91-20-3	**Naphthalene**	**951**	**266**		**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161801	**MW-5R**	Solid	05/13/2008 09:00	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			200	05/24/2008 19:17	WAS	374240

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**1570**	**826**		**ug/Kg**
108-88-3	**Toluene**	**22600**	**826**		**ug/Kg**
100-41-4	**Ethylbenzene**	**12600**	**826**		**ug/Kg**
1330-20-7	**Xylene (total)**	**53100**	**1650**		**ug/Kg**
91-20-3	**Naphthalene**	**12600**	**826**		**ug/Kg**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	7600	7760	ug/Kg	102	62 - 127
1868-53-7	Dibromofluoromethane	7600	7250	ug/Kg	95	65 - 130
2037-26-5	Toluene d8	7600	7700	ug/Kg	101	71 - 132
17060-07-0	1,2-Dichloroethane-d4	7600	8030	ug/Kg	106	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161802	**MW-7R**	Solid	05/13/2008 10:45	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	05/24/2008 19:42	WAS	374240

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	220		ug/Kg
108-88-3	Toluene	ND	220		ug/Kg
100-41-4	Ethylbenzene	ND	220		ug/Kg
1330-20-7	Xylene (total)	ND	440		ug/Kg
91-20-3	**Naphthalene**	**339**	**220**		**ug/Kg**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1880	1900	ug/Kg	101	62 - 127
1868-53-7	Dibromofluoromethane	1880	2010	ug/Kg	107	65 - 130
2037-26-5	Toluene d8	1880	1890	ug/Kg	100	71 - 132
17060-07-0	1,2-Dichloroethane-d4	1880	1860	ug/Kg	99	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805161803	**MW-1**	Solid	05/14/2008 15:50	05/16/2008 09:23

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	05/24/2008 20:06	WAS	374240

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	266		ug/Kg
108-88-3	Toluene	ND	266		ug/Kg
100-41-4	Ethylbenzene	ND	266		ug/Kg
1330-20-7	**Xylene (total)**	**671**	**532**		**ug/Kg**
91-20-3	**Naphthalene**	**951**	**266**		**ug/Kg**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	2370	2410	ug/Kg	102	62 - 127
1868-53-7	Dibromofluoromethane	2370	2400	ug/Kg	101	65 - 130
2037-26-5	Toluene d8	2370	2440	ug/Kg	103	71 - 132
17060-07-0	1,2-Dichloroethane-d4	2370	2270	ug/Kg	96	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	374240	**Client ID**	MB374240		LCS374240				LCSD374240			
Prep Batch	N/A	**GCAL ID**	608244		608245				608246			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	05/24/2008 14:26		05/24/2008 13:02				05/24/2008 13:39			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
100-41-4	Ethylbenzene	ND	250	2500	2830	113	80 - 120		2700	108	5	30
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	250	2500	0.00	0*	71 - 130		0.00	0*	0	30
1330-20-7	Xylene (total)	ND	500	7500	8120	108	80 - 120		7750	103	5	30
91-20-3	Naphthalene	ND	250	2500	3050	122	62 - 146		3000	120	2	30
71-43-2	Benzene	ND	250	2500	2580	103	80 - 120		2460	98	5	21
108-88-3	Toluene	ND	250	2500	2640	106	80 - 120		2540	102	4	21
Surrogate												
460-00-4	4-Bromofluorobenzene	2500	100	2500	2650	106	62 - 127		2590	104		
1868-53-7	Dibromofluoromethane	2690	108	2500	2440	98	65 - 130		2420	97		
2037-26-5	Toluene d8	2500	100	2500	2550	102	71 - 132		2530	101		
17060-07-0	1,2-Dichloroethane-d4	2490	100	2500	2260	90	62 - 125		2290	92		

Access Analytical - Chain of Custody Record

Project Submission # 7307-8012 PO # ACCESS/4565/208051618 5-23-8 Laboratory ID: GCA

Company Name: Terracon
Report To: Ragen Norris
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-015
Sampled By (print): William Walker

Preservative (*see codes below)

* Requested Lab Analysis: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	BTEX, MtBE							
MW-5R	5/13/08	900	S	4	4						-1	B-15 ft
MW-7R	5/13/08	1045	"	"	"						-2	10-15 ft
DW-1	5/14/08	1550	"	"	"						-3	13-15 ft

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:
___Std. (5-7 Bus. days)
___RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
___Yes
___No

Project Location:
___SC
___NC
___Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	5/14/08	11:15	M. Robertson
M. Robertson	5/15	1700	FedEx
FedEx			

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208052014

DATE
05/30/2008

Primary Data Review By

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 05/30/2008

GCAL Report 208052014

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208052014

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, sample 20805201401 (MW-5R) had to be diluted due to compounds that were detected above the linear range of the calibration.

In the SW-846 8260B - Gas Additives analysis, sample 20805201401 (MW-5R) had to be diluted due to compounds that were detected above the linear range of the calibration.

In the SW-846 8260B analysis for analytical batch 374004, the MS/MSD exhibited recovery failures.

SEMI-VOLATILES GAS CHROMATOGRAPHY

In the SW-846 8011 analysis, sample 20805201401 (MW-5R) had to be diluted to bracket target compounds within the calibration range of the instrument. This is reflected in elevated reporting limits.

METALS

In the SW-846 6010B analysis the Sample/Duplicate RPD for Lead for prep batch 373843 is not applicable because the sample and/or duplicate concentration is less than five times the reporting limit.

CONVENTIONALS

In the EPA 353.2 analysis, samples 20805201402 (MW-8) and 20805201404 (MW-16) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208052014

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201401	MW-5R	Water	05/15/2008 10:30	05/20/2008 09:22
20805201402	MW-8	Water	05/15/2008 13:00	05/20/2008 09:22
20805201403	MW-11	Water	05/15/2008 13:35	05/20/2008 09:22
20805201404	MW-16	Water	05/15/2008 11:00	05/20/2008 09:22
20805201405	DW-1	Water	05/15/2008 10:00	05/20/2008 09:22

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201401	**MW-5R**	Water	05/15/2008 10:30	05/20/2008 09:22

SW-846 8011

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	4.84	0.050		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
75-65-0	t-Butanol (TBA)	6880	5000		ug/L
75-85-4	tert-amyl alcohol (TAA)	46900	5000		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	28600	500		ug/L
100-41-4	Ethylbenzene	3620	500		ug/L
108-88-3	Toluene	64500	500		ug/L
1330-20-7	Xylene (total)	17300	1500		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	4520	500		ug/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	11.8	5.0		mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	0.126	0.010		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201402	**MW-8**	Water	05/15/2008 13:00	05/20/2008 09:22

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	5.26	0.100		mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201403	**MW-11**	Water	05/15/2008 13:35	05/20/2008 09:22

SW-846 6010B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	0.091	0.015		mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	71.6	20.0		ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	0.246	0.010		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201404	**MW-16**	Water	05/15/2008 11:00	05/20/2008 09:22

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	43.9	20.0		ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.75	1.00		ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	1.22	0.020		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201405	**DW-1**	Water	05/15/2008 10:00	05/20/2008 09:22

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	45.7	20.0		ug/L
75-85-4	tert-amyl alcohol (TAA)	35.5	10.0		ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201405	**DW-1**	Water	05/15/2008 10:00	05/20/2008 09:22

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	**Benzene**	**17.1**	**1.00**		**ug/L**
100-41-4	**Ethylbenzene**	**19.2**	**1.00**		**ug/L**
91-20-3	**Naphthalene**	**43.8**	**5.00**		**ug/L**
108-88-3	**Toluene**	**96.6**	**1.00**		**ug/L**
1330-20-7	**Xylene (total)**	**104**	**3.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**3.53**	**1.00**		**ug/L**

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.047**	**0.010**		**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201401	**MW-5R**	Water	05/15/2008 10:30	05/20/2008 09:22

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	05/22/2008 15:05	AEL	374004

CAS#	Parameter	Result	RDL	REG LIMIT	Units
107-06-2	1,2-Dichloroethane	ND	2500		ug/L
71-43-2	**Benzene**	**28600**	**500**		**ug/L**
100-41-4	**Ethylbenzene**	**3620**	**500**		**ug/L**
91-20-3	Naphthalene	ND	2500		ug/L
108-88-3	**Toluene**	**64500**	**500**		**ug/L**
1330-20-7	**Xylene (total)**	**17300**	**1500**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**4520**	**500**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	27900	ug/L	112	78 - 130
1868-53-7	Dibromofluoromethane	25000	23800	ug/L	95	77 - 127
2037-26-5	Toluene d8	25000	26900	ug/L	108	76 - 134
17060-07-0	1,2-Dichloroethane-d4	25000	22700	ug/L	91	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	05/22/2008 15:05	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	ND	10000		ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	500		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	500		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	1000		ug/L
75-65-0	**t-Butanol (TBA)**	**6880**	**5000**		**ug/L**
994-05-8	t-amyl methyl ether (TAME)	ND	500		ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**46900**	**5000**		**ug/L**
762-75-4	tert-butyl formate (TBF)	ND	1000		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	27900	ug/L	112	50 - 150
1868-53-7	Dibromofluoromethane	25000	23800	ug/L	95	50 - 150
2037-26-5	Toluene d8	25000	26900	ug/L	108	50 - 150
17060-07-0	1,2-Dichloroethane-d4	25000	22700	ug/L	91	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/21/2008 08:30	373894	SW-846 8011	5	05/22/2008 15:06	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	**1,2-Dibromoethane**	**4.84**	**0.050**		**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201401	**MW-5R**	Water	05/15/2008 10:30	05/20/2008 09:22

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/20/2008 13:50	373843	SW-846 3010A	1	05/28/2008 12:04	CLB	374398

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 15:07	RLY	374328

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.126**	**0.010**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 09:55	JEM	374295

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	**Sulfate**	**11.8**	**5.0**		**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201402	**MW-8**	Water	05/15/2008 13:00	05/20/2008 09:22

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 13:30	AEL	374004

CAS#	Parameter	Result	RDL	REG LIMIT	Units
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L
71-43-2	Benzene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	50.1	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	54.2	ug/L	108	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45.6	ug/L	91	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 13:30	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	ND	20.0		ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	50 - 150
1868-53-7	Dibromofluoromethane	50	50.1	ug/L	100	50 - 150
2037-26-5	Toluene d8	50	54.2	ug/L	108	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	45.6	ug/L	91	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/21/2008 08:30	373894	SW-846 8011	1	05/22/2008 13:23	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201402	**MW-8**	Water	05/15/2008 13:00	05/20/2008 09:22

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/20/2008 13:50	373843	SW-846 3010A	1	05/28/2008 12:10	CLB	374398

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	05/27/2008 15:23	RLY	374328

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**5.26**	**0.100**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 09:56	JEM	374295

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201403	**MW-11**	Water	05/15/2008 13:35	05/20/2008 09:22

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 13:53	AEL	374004

CAS#	Parameter	Result	RDL	REG LIMIT	Units
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L
71-43-2	Benzene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.7	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	53.5	ug/L	107	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46	ug/L	92	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 13:53	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**71.6**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.7	ug/L	101	50 - 150
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	50 - 150
2037-26-5	Toluene d8	50	53.5	ug/L	107	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46	ug/L	92	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/21/2008 08:30	373894	SW-846 8011	1	05/22/2008 13:43	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201403	**MW-11**	Water	05/15/2008 13:35	05/20/2008 09:22

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/20/2008 13:50	373843	SW-846 3010A	1	05/28/2008 12:17	CLB	374398

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.091**	**0.015**		**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 15:12	RLY	374328

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.246**	**0.010**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 10:11	JEM	374295

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201404	**MW-16**	Water	05/15/2008 11:00	05/20/2008 09:22

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 14:17	AEL	374004

CAS#	Parameter	Result	RDL	REG LIMIT	Units
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L
71-43-2	Benzene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.75**	**1.00**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.1	ug/L	98	78 - 130
1868-53-7	Dibromofluoromethane	50	50.6	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	53.9	ug/L	108	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.8	ug/L	94	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 14:17	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**43.9**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.1	ug/L	98	50 - 150
1868-53-7	Dibromofluoromethane	50	50.6	ug/L	101	50 - 150
2037-26-5	Toluene d8	50	53.9	ug/L	108	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46.8	ug/L	94	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/21/2008 08:30	373894	SW-846 8011	1	05/22/2008 14:04	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201404	**MW-16**	Water	05/15/2008 11:00	05/20/2008 09:22

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/20/2008 13:50	373843	SW-846 3010A	1	05/28/2008 12:35	CLB	374398

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	05/27/2008 15:16	RLY	374328

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**1.22**	**0.020**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 10:11	JEM	374295

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201405	**DW-1**	Water	05/15/2008 10:00	05/20/2008 09:22

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 14:41	AEL	374004

CAS#	Parameter	Result	RDL	REG LIMIT	Units
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L
71-43-2	**Benzene**	**17.1**	**1.00**		**ug/L**
100-41-4	**Ethylbenzene**	**19.2**	**1.00**		**ug/L**
91-20-3	**Naphthalene**	**43.8**	**5.00**		**ug/L**
108-88-3	**Toluene**	**96.6**	**1.00**		**ug/L**
1330-20-7	**Xylene (total)**	**104**	**3.00**		**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**3.53**	**1.00**		**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	55.3	ug/L	111	78 - 130
1868-53-7	Dibromofluoromethane	50	49.8	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	54	ug/L	108	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.1	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/22/2008 14:41	AEL	374005

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**45.7**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**35.5**	**10.0**		**ug/L**
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	55.3	ug/L	111	50 - 150
1868-53-7	Dibromofluoromethane	50	49.8	ug/L	100	50 - 150
2037-26-5	Toluene d8	50	54	ug/L	108	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.1	ug/L	96	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/21/2008 08:30	373894	SW-846 8011	1	05/22/2008 14:25	TLS	374047

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20805201405	**DW-1**	Water	05/15/2008 10:00	05/20/2008 09:22

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
05/20/2008 13:50	373843	SW-846 3010A	1	05/28/2008 12:41	CLB	374398

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 15:17	RLY	374328

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.047**	**0.010**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	05/27/2008 10:12	JEM	374295

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GC/MS Volatiles Quality Control Summary

Analytical Batch	374004	**Client ID**	MB374004			LCS374004				LCSD374004		
Prep Batch	N/A	**GCAL ID**	607398			607399				607400		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	05/22/2008 11:02			05/22/2008 09:34				05/22/2008 09:58		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
107-06-2	1,2-Dichloroethane	ND	5.00	50.0	43.3	87	75 - 122	41.1	82	5	30	
100-41-4	Ethylbenzene	ND	1.00	50.0	51.0	102	80 - 125	49.0	98	4	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00	50.0	45.2	90	72 - 127	45.1	90	0.2	30	
1330-20-7	Xylene (total)	ND	3.00	150	155	103	80 - 129	148	99	5	30	
91-20-3	Naphthalene	ND	5.00	50.0	49.3	99	67 - 149	47.4	95	4	35	
71-43-2	Benzene	ND	1.00	50.0	49.4	99	80 - 120	46.5	93	6	11	
108-88-3	Toluene	ND	1.00	50.0	54.9	110	80 - 124	53.6	107	2	13	
Surrogate												
460-00-4	4-Bromofluorobenzene	51.2	102	50	54	108	78 - 130	55.5	111			
1868-53-7	Dibromofluoromethane	49.1	98	50	50.8	102	77 - 127	49.9	100			
2037-26-5	Toluene d8	54.5	109	50	50.6	101	76 - 134	51.9	104			
17060-07-0	1,2-Dichloroethane-d4	46.6	93	50	49	98	71 - 127	48	96			

Analytical Batch	374004	**Client ID**	MW-5R			606488MS				606488MSD		
Prep Batch	N/A	**GCAL ID**	20805201401			607661				607662		
		Sample Type	SAMPLE			MS				MSD		
		Analytical Date	05/22/2008 15:05			05/22/2008 16:15				05/22/2008 16:38		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
107-06-2	1,2-Dichloroethane	0.00	2500	25000	24800	99	75 - 122	23700	95	5	30	
100-41-4	Ethylbenzene	3620	500	25000	30400	107	80 - 125	28200	98	8	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	4520	500	25000	31100	106	72 - 127	30000	102	4	30	
1330-20-7	Xylene (total)	17300	1500	75000	100000	110	80 - 129	92800	101	7	30	
91-20-3	Naphthalene	1000	2500	25000	25700	99	67 - 149	26100	100	2	30	
71-43-2	Benzene	28600	500	25000	55200	106	80 - 120	50700	88	8	30	
108-88-3	Toluene	64500	500	25000	82000	**70***	80 - 124	76900	**50***	6	30	
Surrogate												
460-00-4	4-Bromofluorobenzene	27900	112	25000	26600	106	78 - 130	27100	108			
1868-53-7	Dibromofluoromethane	23800	95	25000	25100	100	77 - 127	25700	103			
2037-26-5	Toluene d8	26900	108	25000	25000	100	76 - 134	25300	101			
17060-07-0	1,2-Dichloroethane-d4	22700	91	25000	24800	99	71 - 127	24200	97			

GC/MS Volatiles Quality Control Summary

Analytical Batch	374005	**Client ID**	MB374005			LCS374005				LCSD374005		
Prep Batch	N/A	**GCAL ID**	607401			607402				607403		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	05/22/2008 11:02			05/22/2008 09:34				05/22/2008 09:58		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**		**Result**		**Control**		**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**			**% R**	**RPD**	**Limit**
994-05-8	t-amyl methyl ether (TAME)	ND	1.00	50.0	49.5	99	50 - 150		48.9	98	1	50
75-65-0	t-Butanol (TBA)	ND	10.0	50.0	49.9	100	50 - 150		49.4	99	1	50
108-20-3	diisopropyl Ether (DIPE)	ND	1.00	50.0	51.6	103	50 - 150		49.6	99	4	50
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00	50.0	53.0	106	50 - 150		51.9	104	2	50
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00	50.0	45.3	91	50 - 150		45.9	92	1	50
64-17-5	Ethanol	ND	20.0	200	178	89	50 - 150		183	92	3	50
75-85-4	tert-amyl alcohol (TAA)	ND	10.0	200	192	96	50 - 150		198	99	3	50
762-75-4	tert-butyl formate (TBF)	ND	2.00	50.0	54.0	108	50 - 150		51.7	103	4	50
Surrogate												
460-00-4	4-Bromofluorobenzene	51.2	102	50	54	108	50 - 150		55.5	111		
1868-53-7	Dibromofluoromethane	49.1	98	50	50.8	102	50 - 150		49.9	100		
2037-26-5	Toluene d8	54.5	109	50	50.6	101	50 - 150		51.9	104		
17060-07-0	1,2-Dichloroethane-d4	46.6	93	50	49	98	50 - 150		48	96		

Analytical Batch	374005	**Client ID**	MW-5R			606488MS				606488MSD		
Prep Batch	N/A	**GCAL ID**	20805201401			607659				607660		
		Sample Type	SAMPLE			MS				MSD		
		Analytical Date	05/22/2008 15:05			05/22/2008 16:15				05/22/2008 16:38		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**		**Result**		**Control**		**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**			**% R**	**RPD**	**Limit**
994-05-8	t-amyl methyl ether (TAME)	0.00	500	25000	25400	102	50 - 150		24600	98	3	50
75-65-0	t-Butanol (TBA)	6880	5000	25000	26700	79	50 - 150		29200	89	9	50
108-20-3	diisopropyl Ether (DIPE)	0.00	500	25000	25900	104	50 - 150		24800	99	4	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.00	500	25000	26300	105	50 - 150		25600	102	3	50
624-95-3	ethyl tert-butanol (ETBA)	0.00	1000	25000	25100	100	50 - 150		25800	103	3	50
64-17-5	Ethanol	0.00	10000	100000	128000	128	50 - 150		102000	102	23	50
75-85-4	tert-amyl alcohol (TAA)	46900	5000	100000	141000	94	50 - 150		148000	101	5	50
762-75-4	tert-butyl formate (TBF)	0.00	1000	25000	27500	110	50 - 150		25000	100	10	50
Surrogate												
460-00-4	4-Bromofluorobenzene	27900	112	25000	26600	106	50 - 150		27100	108		
1868-53-7	Dibromofluoromethane	23800	95	25000	25100	100	50 - 150		25700	103		

GC/MS Volatiles Quality Control Summary

Analytical Batch 374005	**Client ID**	MW-5R	606488MS	606488MSD	
Prep Batch N/A	**GCAL ID**	20805201401	607659	607660	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	05/22/2008 15:05	05/22/2008 16:15	05/22/2008 16:38	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**
2037-26-5	Toluene d8	26900	108	25000	25000	100	50 - 150	25300	101		
17060-07-0	1,2-Dichloroethane-d4	22700	91	25000	24800	99	50 - 150	24200	97		

General Chromatography Quality Control Summary

Analytical Batch	374047	**Client ID**	MB373894	LCS373894	LCSD373894
Prep Batch	373894	**GCAL ID**	606785	606786	606787
Prep Method	SW-846 8011	**Sample Type**	Method Blank	LCS	LCSD
		Prep Date	05/21/2008 08:30	05/21/2008 08:30	05/21/2008 08:30
		Analytical Date	05/22/2008 12:00	05/22/2008 12:21	05/22/2008 12:41
		Matrix	Water	Water	Water

SW-846 8011		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**
106-93-4	1,2-Dibromoethane	ND	0.010	1.20	1.28	107	62 - 140	1.32	109	3	40

Inorganics Quality Control Summary

Analytical Batch	374398	**Client ID**	MB373843		LCS373843		
Prep Batch	373843	**GCAL ID**	606548		606549		
Prep Method	SW-846	**Sample Type**	Method Blank		LCS		
	3010A	**Prep Date**	05/20/2008 13:50		05/20/2008 13:50		
		Analytical Date	05/28/2008 11:18		05/28/2008 11:25		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike**	**Result**		**Control**
		Result	**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	ND	0.015	0.50	0.53	105	80 - 120

Analytical Batch	374398	**Client ID**	080519-W79A		606501MS		
Prep Batch	373843	**GCAL ID**	20805201501		606641		
Prep Method	SW-846	**Sample Type**	SAMPLE		MS		
	3010A	**Prep Date**	05/20/2008 13:50		05/20/2008 13:50		
		Analytical Date	05/28/2008 11:32		05/28/2008 11:45		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike**	**Result**		**Control**
		Result	**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	0.0033	0.015	0.50	0.52	103	75 - 125

Analytical Batch	374398	**Client ID**	080519-W79A		606501DUP		
Prep Batch	373843	**GCAL ID**	20805201501		606640		
Prep Method	SW-846	**Sample Type**	SAMPLE		DUP		
	3010A	**Prep Date**	05/20/2008 13:50		05/20/2008 13:50		
		Analytical Date	05/28/2008 11:32		05/28/2008 11:38		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Result**		**RPD**	
		Result	**RDL**		**RPD**	**Limit**	
7439-92-1	Lead	0.0033	0.015	0.0024	**32***	20	

General Chemistry Quality Control Summary

Analytical Batch	374328	Client ID	MB374328			LCS374328		
Prep Batch	N/A	GCAL ID	608549			608550		
		Sample Type	Method Blank			LCS		
		Analytical Date	05/27/2008 15:01			05/27/2008 15:02		
		Matrix	Water			Water		
EPA 353.2 N+N		Units	mg/L	Spike	Result		Control
		Result	RDL	Added		% R	Limits % R
C-005	Nitrate/Nitrite	ND	0.010	0.500	0.474	94.8	90 - 110

Analytical Batch	374328	Client ID	MW-5R			606488MS		
Prep Batch	N/A	GCAL ID	20805201401			608552		
		Sample Type	SAMPLE			MS		
		Analytical Date	05/27/2008 15:07			05/27/2008 15:22		
		Matrix	Water			Water		
EPA 353.2 N+N		Units	mg/L	Spike	Result		Control
		Result	RDL	Added		% R	Limits % R
C-005	Nitrate/Nitrite	0.126	0.010	0.500	0.687	112	75 - 125

Analytical Batch	374328	Client ID	MW-5R		606488DUP		
Prep Batch	N/A	GCAL ID	20805201401		608551		
		Sample Type	SAMPLE		DUP		
		Analytical Date	05/27/2008 15:07		05/27/2008 15:08		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Result		RPD
		Result	RDL		RPD	Limit
C-005	Nitrate/Nitrite	0.126	0.010	0.127	0.79	25

General Chemistry Quality Control Summary

Analytical Batch	374295	**Client ID**	MB374295			LCS374295		
Prep Batch	N/A	**GCAL ID**	608422			608423		
		Sample Type	Method Blank			LCS		
		Analytical Date	05/27/2008 09:54			05/27/2008 09:54		
		Matrix	Water			Water		
EPA 375.4 Sulfate		**Units**	mg/L	**Spike**	**Result**		**Control**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**	
14808-79-8	Sulfate	ND	5.0	20.0	18.6	93	80 - 120	

Analytical Batch	374295	**Client ID**	MW-8			606489MS		
Prep Batch	N/A	**GCAL ID**	20805201402			608425		
		Sample Type	SAMPLE			MS		
		Analytical Date	05/27/2008 09:56			05/27/2008 09:56		
		Matrix	Water			Water		
EPA 375.4 Sulfate		**Units**	mg/L	**Spike**	**Result**		**Control**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**	
14808-79-8	Sulfate	0.08	5.0	20.0	18.9	94	75 - 125	

Analytical Batch	374295	**Client ID**	MW-5R		606488DUP		
Prep Batch	N/A	**GCAL ID**	20805201401		608424		
		Sample Type	SAMPLE		DUP		
		Analytical Date	05/27/2008 09:55		05/27/2008 09:55		
		Matrix	Water		Water		
EPA 375.4 Sulfate		**Units**	mg/L	**Result**		**RPD**	
		Result	**RDL**		**RPD**	**Limit**	
14808-79-8	Sulfate	11.8	5.0	12.1	3	25	

Access Analytical - Chain of Custody Record

Access - FE++ / GCAL

Project Submission # 7307801Z PO # ACCESS/4565/20805 2014/5288 Laboratory ID:

Company Name: Terracon

Report To: Melissa Roberts

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: (803) 741-9000 Fax: (803) 741-9900

Email:

Project Name: SC-015

Sampled By (print): Regan Norris / Neil Akre

↓ REQUESTED LAB ANALYSIS: ↓

Preservative (*see codes below): 3 0 Z 1 0 0

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	Nitrite / Nitrate	Sulfide	Lead	BTEX, Naphth, MTBE, 1,2 DCA	Oxygenates	EDB	FE++ *	NOTES / COMMENTS
MW-5R	5-15-08	1030	L	11	x	x	x	x	x	x	x	-1
MW-8		1300			x	x	x	x	x	x	x	-2 * Fe ++ subbed to Access
MW-11		1335			x	x	x	x	x	x	x	-3
~~MW-15RN~~												
MW-16		1100			x	x	x	x	x	x	x	-4
DW-1	↓	1000	↓	↓	x	x	x	x	x	x	x	-5

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:

✓ Std. (5-7 Bus. days)

___ RUSH*

*Date Required:_____

(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?

✓ Yes

___ No

3°

Project Location:

✓ SC

___ NC

___ Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
	5/19/08	1425	
	5/19/08	1700	FEDEX
FEDEX	5/20/8	922	

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208060429

DATE
06/12/2008

Primary Data Review By

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 06/12/2008

GCAL Report 208060429

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208060429

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

CONVENTIONALS

In the EPA 353.2 analysis, sample 20806042901 (MW-11R) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

The Sample/Duplicate RPD for Sulfate for analytical batch 375066 is not applicable because the sample and/or duplicate concentration is less than five times the reporting limit.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Thu Jun 12 09:42:41 2008

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208060429

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042901	MW-11R	Water	06/03/2008 12:00	06/04/2008 09:20
20806042902	MW-13	Water	06/03/2008 14:00	06/04/2008 09:20

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042901	**MW-11R**	Water	06/03/2008 12:00	06/04/2008 09:20

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	Ferrous Iron	0.437	0.050		mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	1.56	0.050		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042902	**MW-13**	Water	06/03/2008 14:00	06/04/2008 09:20

SW-846 6010B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	0.037	0.015		mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	49.4	20.0		ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	Ferrous Iron	0.361	0.050		mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	Nitrate/Nitrite	0.019	0.010		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042901	**MW-11R**	Water	06/03/2008 12:00	06/04/2008 09:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/07/2008 14:54	JCK	375155

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	1.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	45.8	ug/L	92	78 - 130
1868-53-7	Dibromofluoromethane	50	50.7	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	54.5	ug/L	109	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.9	ug/L	94	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/07/2008 14:54	JCK	375156

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	Ethanol	ND	20.0		ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	45.8	ug/L	92	50 - 150
1868-53-7	Dibromofluoromethane	50	50.7	ug/L	101	50 - 150
2037-26-5	Toluene d8	50	54.5	ug/L	109	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46.9	ug/L	94	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
06/04/2008 13:30	374826	SW-846 8011	1	06/05/2008 21:32	SMH	375130

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042901	**MW-11R**	Water	06/03/2008 12:00	06/04/2008 09:20

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
06/04/2008 14:50	374827	SW-846 3010A	1	06/07/2008 15:10	DJH	375150

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	Lead	ND	0.015		mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	06/09/2008 10:49	RLY	375196

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**1.56**	**0.050**		**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/04/2008 12:35	RLY	374824

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**0.437**	**0.050**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/05/2008 15:25	JEM	375066

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042902	**MW-13**	Water	06/03/2008 14:00	06/04/2008 09:20

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/07/2008 16:26	WAS	375155

CAS#	Parameter	Result	RDL	REG LIMIT	Units
71-43-2	Benzene	ND	1.00		ug/L
108-88-3	Toluene	ND	1.00		ug/L
100-41-4	Ethylbenzene	ND	1.00		ug/L
1330-20-7	Xylene (total)	ND	3.00		ug/L
91-20-3	Naphthalene	ND	5.00		ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	ND	1.00		ug/L
107-06-2	1,2-Dichloroethane	ND	5.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	46.8	ug/L	94	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	55.6	ug/L	111	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.2	ug/L	92	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/07/2008 16:26	WAS	375156

CAS#	Parameter	Result	RDL	REG LIMIT	Units
64-17-5	**Ethanol**	**49.4**	**20.0**		**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00		ug/L
108-20-3	diisopropyl Ether (DIPE)	ND	1.00		ug/L
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00		ug/L
75-65-0	t-Butanol (TBA)	ND	10.0		ug/L
994-05-8	t-amyl methyl ether (TAME)	ND	1.00		ug/L
75-85-4	tert-amyl alcohol (TAA)	ND	10.0		ug/L
762-75-4	tert-butyl formate (TBF)	ND	2.00		ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	46.8	ug/L	94	50 - 150
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	50 - 150
2037-26-5	Toluene d8	50	55.6	ug/L	111	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46.2	ug/L	92	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
06/04/2008 13:30	374826	SW-846 8011	1	06/05/2008 21:53	SMH	375130

CAS#	Parameter	Result	RDL	REG LIMIT	Units
106-93-4	1,2-Dibromoethane	ND	0.010		ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20806042902	**MW-13**	Water	06/03/2008 14:00	06/04/2008 09:20

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
06/04/2008 14:50	374827	SW-846 3010A	1	06/07/2008 15:44	DJH	375150

CAS#	Parameter	Result	RDL	REG LIMIT	Units
7439-92-1	**Lead**	**0.037**	**0.015**		**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/09/2008 10:21	RLY	375196

CAS#	Parameter	Result	RDL	REG LIMIT	Units
C-005	**Nitrate/Nitrite**	**0.019**	**0.010**		**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/04/2008 12:37	RLY	374824

CAS#	Parameter	Result	RDL	REG LIMIT	Units
WET-045	**Ferrous Iron**	**0.361**	**0.050**		**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	06/05/2008 15:26	JEM	375066

CAS#	Parameter	Result	RDL	REG LIMIT	Units
14808-79-8	Sulfate	ND	5.0		mg/L

GC/MS Volatiles Quality Control Summary

Analytical Batch	375155	**Client ID**	MB375155			LCS375155				LCSD375155		
Prep Batch	N/A	**GCAL ID**	612346			612347				612351		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	06/07/2008 12:54			06/07/2008 11:45				06/07/2008 12:08		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		ND	5.00	50.0	47.4	95	75 - 122		45.5	91	4	30
100-41-4	Ethylbenzene		ND	1.00	50.0	53.0	106	80 - 125		48.4	97	9	30
1634-04-4	tert-Butyl methyl ether (MTBE)		ND	1.00	50.0	56.2	112	72 - 127		51.1	102	10	30
1330-20-7	Xylene (total)		ND	3.00	150	166	111	80 - 129		147	98	12	30
91-20-3	Naphthalene		ND	5.00	50.0	53.2	106	67 - 149		55.3	111	4	35
71-43-2	Benzene		ND	1.00	50.0	51.5	103	80 - 120		46.9	94	9	11
108-88-3	Toluene		ND	1.00	50.0	57.6	115	80 - 124		51.2	102	12	13
Surrogate													
460-00-4	4-Bromofluorobenzene		48.3	97	50	50.9	102	78 - 130		47.8	96		
1868-53-7	Dibromofluoromethane		49.9	100	50	50.1	100	77 - 127		49.6	99		
2037-26-5	Toluene d8		55.4	111	50	47.6	95	76 - 134		46.6	93		
17060-07-0	1,2-Dichloroethane-d4		44.8	90	50	50.5	101	71 - 127		45.6	91		

Analytical Batch	375155	**Client ID**	MW-11R			611055MS				611055MSD		
Prep Batch	N/A	**GCAL ID**	20806042901			612403				612404		
		Sample Type	SAMPLE			MS				MSD		
		Analytical Date	06/07/2008 14:54			06/07/2008 15:17				06/07/2008 15:40		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.00	5.00	50.0	47.1	94	75 - 122		43.8	88	7	30
100-41-4	Ethylbenzene		0.00	1.00	50.0	53.3	107	80 - 125		46.4	93	14	30
1634-04-4	tert-Butyl methyl ether (MTBE)		0.00	1.00	50.0	42.1	84	72 - 127		46.4	93	10	30
1330-20-7	Xylene (total)		0.00	3.00	150	160	107	80 - 129		144	96	11	30
91-20-3	Naphthalene		0.00	5.00	50.0	53.0	106	67 - 149		53.9	108	2	30
71-43-2	Benzene		0.00	1.00	50.0	49.0	98	80 - 120		47.0	94	4	30
108-88-3	Toluene		0.00	1.00	50.0	56.4	113	80 - 124		51.3	103	9	30
Surrogate													
460-00-4	4-Bromofluorobenzene		45.8	92	50	51.8	104	78 - 130		47.9	96		
1868-53-7	Dibromofluoromethane		50.7	101	50	49.1	98	77 - 127		50.5	101		
2037-26-5	Toluene d8		54.5	109	50	46.2	92	76 - 134		47.8	96		
17060-07-0	1,2-Dichloroethane-d4		46.9	94	50	51.6	103	71 - 127		49.7	99		

GC/MS Volatiles Quality Control Summary

Analytical Batch 375156	**Client ID**	MB375156			LCS375156			LCSD375156			
Prep Batch N/A	**GCAL ID**	612348			612349			612350			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	06/07/2008 12:54			06/07/2008 11:45			06/07/2008 12:08			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	ND	1.00	50.0	47.0	94	50 - 150	45.4	91	3	50
75-65-0	t-Butanol (TBA)	ND	10.0	50.0	42.2	84	50 - 150	42.8	86	1	50
108-20-3	diisopropyl Ether (DIPE)	ND	1.00	50.0	52.1	104	50 - 150	49.8	100	5	50
637-92-3	Ethyl tert-butyl ether (ETBE)	ND	1.00	50.0	48.2	96	50 - 150	45.8	92	5	50
624-95-3	ethyl tert-butanol (ETBA)	ND	2.00	50.0	41.0	82	50 - 150	45.5	91	10	50
64-17-5	Ethanol	ND	20.0	200	179	90	50 - 150	191	96	6	50
75-85-4	tert-amyl alcohol (TAA)	ND	10.0	200	168	84	50 - 150	163	82	3	50
762-75-4	tert-butyl formate (TBF)	ND	2.00	50.0	56.1	112	50 - 150	48.3	97	15	50
Surrogate											
460-00-4	4-Bromofluorobenzene	48.3	97	50	50.9	102	50 - 150	47.8	96		
1868-53-7	Dibromofluoromethane	49.9	100	50	50.1	100	50 - 150	49.6	99		
2037-26-5	Toluene d8	55.4	111	50	47.6	95	50 - 150	46.6	93		
17060-07-0	1,2-Dichloroethane-d4	44.8	90	50	50.5	101	50 - 150	45.6	91		

Analytical Batch 375156	**Client ID**	MW-11R			611055MS			611055MSD			
Prep Batch N/A	**GCAL ID**	20806042901			612407			612408			
	Sample Type	SAMPLE			MS			MSD			
	Analytical Date	06/07/2008 14:54			06/07/2008 15:17			06/07/2008 15:40			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	0.00	1.00	50.0	50.0	100	50 - 150	50.5	101	1	50
75-65-0	t-Butanol (TBA)	0.00	10.0	50.0	40.3	81	50 - 150	55.9	112	32	50
108-20-3	diisopropyl Ether (DIPE)	0.00	1.00	50.0	54.9	110	50 - 150	56.8	114	3	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.00	1.00	50.0	49.9	100	50 - 150	51.1	102	2	50
624-95-3	ethyl tert-butanol (ETBA)	0.00	2.00	50.0	42.0	84	50 - 150	46.1	92	9	50
64-17-5	Ethanol	0.00	20.0	200	218	109	50 - 150	238	119	9	50
75-85-4	tert-amyl alcohol (TAA)	0.00	10.0	200	175	88	50 - 150	190	95	8	50
762-75-4	tert-butyl formate (TBF)	0.00	2.00	50.0	49.7	99	50 - 150	30.6	61	48	50
Surrogate											
460-00-4	4-Bromofluorobenzene	45.8	92	50	51.8	104	50 - 150	47.9	96		
1868-53-7	Dibromofluoromethane	50.7	101	50	49.1	98	50 - 150	50.5	101		

GC/MS Volatiles Quality Control Summary

Analytical Batch	375156	**Client ID**	MW-11R		611055MS			611055MSD			
Prep Batch	N/A	**GCAL ID**	20806042901		612407			612408			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	06/07/2008 14:54		06/07/2008 15:17			06/07/2008 15:40			
		Matrix	Water		Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8		54.5	109	50	46.2	92	50 - 150	47.8	96		
17060-07-0	1,2-Dichloroethane-d4		46.9	94	50	51.6	103	50 - 150	49.7	99		

General Chromatography Quality Control Summary

Analytical Batch	375130	**Client ID**	MB374826			LCS374826			LCSD374826			
Prep Batch	374826	**GCAL ID**	611114			611115			611118			
Prep Method	SW-846 8011	**Sample Type**	Method Blank			LCS			LCSD			
		Prep Date	06/04/2008 13:30			06/04/2008 13:30			06/04/2008 13:30			
		Analytical Date	06/05/2008 16:22			06/06/2008 11:25			06/06/2008 11:46			
		Matrix	Water			Water			Water			
SW-846 8011		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane		ND	0.010	1.20	1.24	103	62 - 140	1.36	112	9	40

Inorganics Quality Control Summary

Analytical Batch	375150	**Client ID**	MB374827		LCS374827		
Prep Batch	374827	**GCAL ID**	611119		611120		
Prep Method	SW-846 3010A	**Sample Type**	Method Blank		LCS		
		Prep Date	06/04/2008 14:50		06/04/2008 14:50		
		Analytical Date	06/07/2008 14:58		06/07/2008 15:05		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**	**% R**	**Control Limits % R**
		Result	**RDL**				
7439-92-1	Lead	ND	0.015	0.50	0.50	99	80 - 120

Analytical Batch	375150	**Client ID**	MW-11R		611055MS		
Prep Batch	374827	**GCAL ID**	20806042901		611122		
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE		MS		
		Prep Date	06/04/2008 14:50		06/04/2008 14:50		
		Analytical Date	06/07/2008 15:10		06/07/2008 15:22		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**	**% R**	**Control Limits % R**
		Result	**RDL**				
7439-92-1	Lead	0.014	0.015	0.50	0.53	102	75 - 125

Analytical Batch	375150	**Client ID**	MW-11R	611055DUP		
Prep Batch	374827	**GCAL ID**	20806042901	611121		
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE	DUP		
		Prep Date	06/04/2008 14:50	06/04/2008 14:50		
		Analytical Date	06/07/2008 15:10	06/07/2008 15:16		
		Matrix	Water	Water		
SW-846 6010B		**Units**	mg/L	**Result**	**RPD**	**RPD Limit**
		Result	**RDL**			
7439-92-1	Lead	0.014	0.015	0.014	0	20

General Chemistry Quality Control Summary

Analytical Batch	375196	Client ID	MB375196			LCS375196		
Prep Batch	N/A	GCAL ID	612484			612485		
		Sample Type	Method Blank			LCS		
		Analytical Date	06/09/2008 10:12			06/09/2008 10:13		
		Matrix	Water			Water		
EPA 353.2 N+N		Units	mg/L	Spike	Result		Control
		Result	RDL	Added		% R	Limits % R
C-005	Nitrate/Nitrite	ND	0.010	0.500	0.487	97.4	90 - 110

Analytical Batch	375196	Client ID	MW-11R			611055MS		
Prep Batch	N/A	GCAL ID	20806042901			612487		
		Sample Type	SAMPLE			MS		
		Analytical Date	06/09/2008 10:49			06/09/2008 10:52		
		Matrix	Water			Water		
EPA 353.2 N+N		Units	mg/L	Spike	Result		Control
		Result	RDL	Added		% R	Limits % R
C-005	Nitrate/Nitrite	1.56	0.050	2.50	4.19	105	75 - 125

Analytical Batch	375196	Client ID	MW-11R		611055DUP		
Prep Batch	N/A	GCAL ID	20806042901		612486		
		Sample Type	SAMPLE		DUP		
		Analytical Date	06/09/2008 10:49		06/09/2008 10:51		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L				RPD
		Result	RDL	Result	RPD	RPD	Limit
C-005	Nitrate/Nitrite	1.56	0.050	1.56	0		25

General Chemistry Quality Control Summary

Analytical Batch	374824	Client ID	MB374824		LCS374824		
Prep Batch	N/A	GCAL ID	611109		611110		
		Sample Type	Method Blank		LCS		
		Analytical Date	06/04/2008 12:33		06/04/2008 12:35		
		Matrix	Water		Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
WET-045	Ferrous Iron	ND	0.050	1.00	1.05	105	80 - 120

Analytical Batch	374824	Client ID	MW-13		611064MS		
Prep Batch	N/A	GCAL ID	20806042902		611112		
		Sample Type	SAMPLE		MS		
		Analytical Date	06/04/2008 12:37		06/04/2008 12:38		
		Matrix	Water		Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
WET-045	Ferrous Iron	0.361	0.050	1.00	1.30	94.2	75 - 125

Analytical Batch	374824	Client ID	MW-11R	611055DUP		
Prep Batch	N/A	GCAL ID	20806042901	611111		
		Sample Type	SAMPLE	DUP		
		Analytical Date	06/04/2008 12:35	06/04/2008 12:36		
		Matrix	Water	Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
WET-045	Ferrous Iron	0.437	0.050	0.461	5.3	25

General Chemistry Quality Control Summary

Analytical Batch 375066	**Client ID**	MB375066		LCS375066			
Prep Batch N/A	**GCAL ID**	611693		611694			
	Sample Type	Method Blank		LCS			
	Analytical Date	06/05/2008 15:14		06/05/2008 15:15			
	Matrix	Water		Water			
EPA 375.4 Sulfate	**Units**	mg/L	**Spike**	**Result**		**Control**	
	Result	**RDL**	**Added**		**% R**	**Limits % R**	
14808-79-8 Sulfate	ND	5.0	20.0	20.1	100	80 - 120	

Analytical Batch 375066	**Client ID**	MW-13		611064MS			
Prep Batch N/A	**GCAL ID**	20806042902		611696			
	Sample Type	SAMPLE		MS			
	Analytical Date	06/05/2008 15:26		06/05/2008 15:27			
	Matrix	Water		Water			
EPA 375.4 Sulfate	**Units**	mg/L	**Spike**	**Result**		**Control**	
	Result	**RDL**	**Added**		**% R**	**Limits % R**	
14808-79-8 Sulfate	0.00	5.0	20.0	20.0	100	75 - 125	

Analytical Batch 375066	**Client ID**	MW-11R	611055DUP			
Prep Batch N/A	**GCAL ID**	20806042901	611695			
	Sample Type	SAMPLE	DUP			
	Analytical Date	06/05/2008 15:25	06/05/2008 15:25			
	Matrix	Water	Water			
EPA 375.4 Sulfate	**Units**	mg/L	**Result**		**RPD**	
	Result	**RDL**		**RPD**	**Limit**	
14808-79-8 Sulfate	0.37	5.0	0.51	**32***	25	

ACCESS/4565/20806042? / 6-11-8

Access Analytical - Chain of Custody Record

Project Submission # 7307-8012 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon
Report To: Melissa Roberts
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-915
Sampled By (print): William Lutter

Preservative: (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	2 B, N, MTBE, 1,1-DCA	EDB	8 Oxygenates	Fe++	Nitrate / Sulfate	Lead
MW-11R	6/3/08	1200	L	11	2	2	2	2	2	1
MW-13	✓	1400	✓	✓	✓	✓	✓	✓	✓	✓

NOTES / COMMENTS
-1
-2

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
✓ Std. (5-7 Bus. days)
RUSH*
*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
No
3°

Project Location:
✓ SC
NC
Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	6/3/08	1515	[signature]
[signature]	6/3/08	1700	Fed Ex
FEDEX	6/4/8	0920	[signature]

Pg 1 of 1

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

APPENDIX D
Waste Disposal Manifest

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number
2. Page 1 of 1
3. Emergency Response Phone: 803-926-0090
4. Waste Tracking Number: 13517

GENERATOR

5. Generator's Name and Mailing Address: Crown Central LLC, 630 Kilbourne Road, Columbia, SC, 410- 659-4753
Generator's Site Address (if different than mailing address)
Generator's Phone:

6. Transporter 1 Company Name: Regulatory Solutions, Inc 803-926-0089
U.S. EPA ID Number

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address: Regulatory Solutions, Inc., 40 Pason Court, Gaston, SC, 29053, 803-926-0089
U.S. EPA ID Number
Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	NON-RCRA, NON-DOT REGULATED MATERIAL 10416 - 550	15	CM	825	G
2.					
3.					
4.					

13. Special Handling Instructions and Additional Information
Pick-up drums
Long's Drugstore and Piggly Wiggly

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste
Generator's/Offeror's Printed/Typed Name: Melissa Roberts (signatory agent for Crown Central LLC) Signature: Melissa Roberts Month: 5 Day: 21 Year: 08

TRANSPORTER INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Frederick Beaufort Signature: Month: 5 Day: 21 Year: 08
Transporter 2 Printed/Typed Name: Signature: Month: Day: Year:

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Ashley Johnson Signature: Month: 05 Day: 21 Year: 08

169-BLC-O S 11977 (Rev. 6/05) DESIGNATED FACILITY TO GENERATOR

APPENDIX E
Aquifer Tests and Grain Size Analyses

SUMMARY of SLUG TEST

SOUTH CAROLINA
Department of Health and Environmental Control (DHEC)

Site Data

SITE ID: # 7680 COUNTY Richland

FACILITY NAME SC-015

Slug Data

See Appendix E Table _____ Figure _____ for a list of all data measurements.
(water level logs, etc) (complete as appropriate)
Water Level Recovery Data was measured by Manually with water level indicator
(Hermit Data Logger, Manually with Water Level Indicator, etc.) (list method).
Complete the following table for each well tested.
COMPLETE A SECOND SHEET IF MORE THAN FOUR WELLS ARE TESTED

Slug Test Conducted in well(s) number	MW-5R	MW-7R	DW-1	
Initial Rise/Drawdown in well (feet)	1.33	0.95	0.82	
Radius of Well Casing (feet)	0.083	0.083	0.083	
Effective Radius of Well (feet)	0.667	0.667	0.667	
Static Saturated Aquifer Thickness (feet)	50	50	50	
Length of Well Screen (feet)	15	15	5	
Static Height of Water Column in Well (ft)	5.15	10.05	3.71	

Calculations

See Appendix D Table _____ Figure _____ for calculations. (complete as appropriate).
The method for aquifer calculations was Bouwer and Rice (i.e. Bouwer and Rice, etc.)
Calculated values by well were as follows:

Slug Test Conducted in Well(s) Number	MW-5R	MW-7R	DW-1
Hydraulic Conductivity (ft./day)	0.002	0.002	0.010

The thickness of the aquifer used to calculate hydraulic conductivity was 100 feet.
The aquifer is _____ confined X semiconfined X Water Table (Check as appropriate)

The estimated seepage velocity in the **perched portion of the shallow aquifer** is
0.146 , feet per year based on:
a hydraulic conductivity of 0.002 , a hydraulic gradient of 0.04 , and
a porosity of 20 percent for silty clayey fine to medium sand .

The estimated seepage velocity in the **water table aquifer** is
0.018 , feet per year based on:
a hydraulic conductivity of 0.010 , a hydraulic gradient of 0.001 , and
a porosity of 20 percent for silty clayey fine to medium sand .

SUMMARY of SLUG TEST

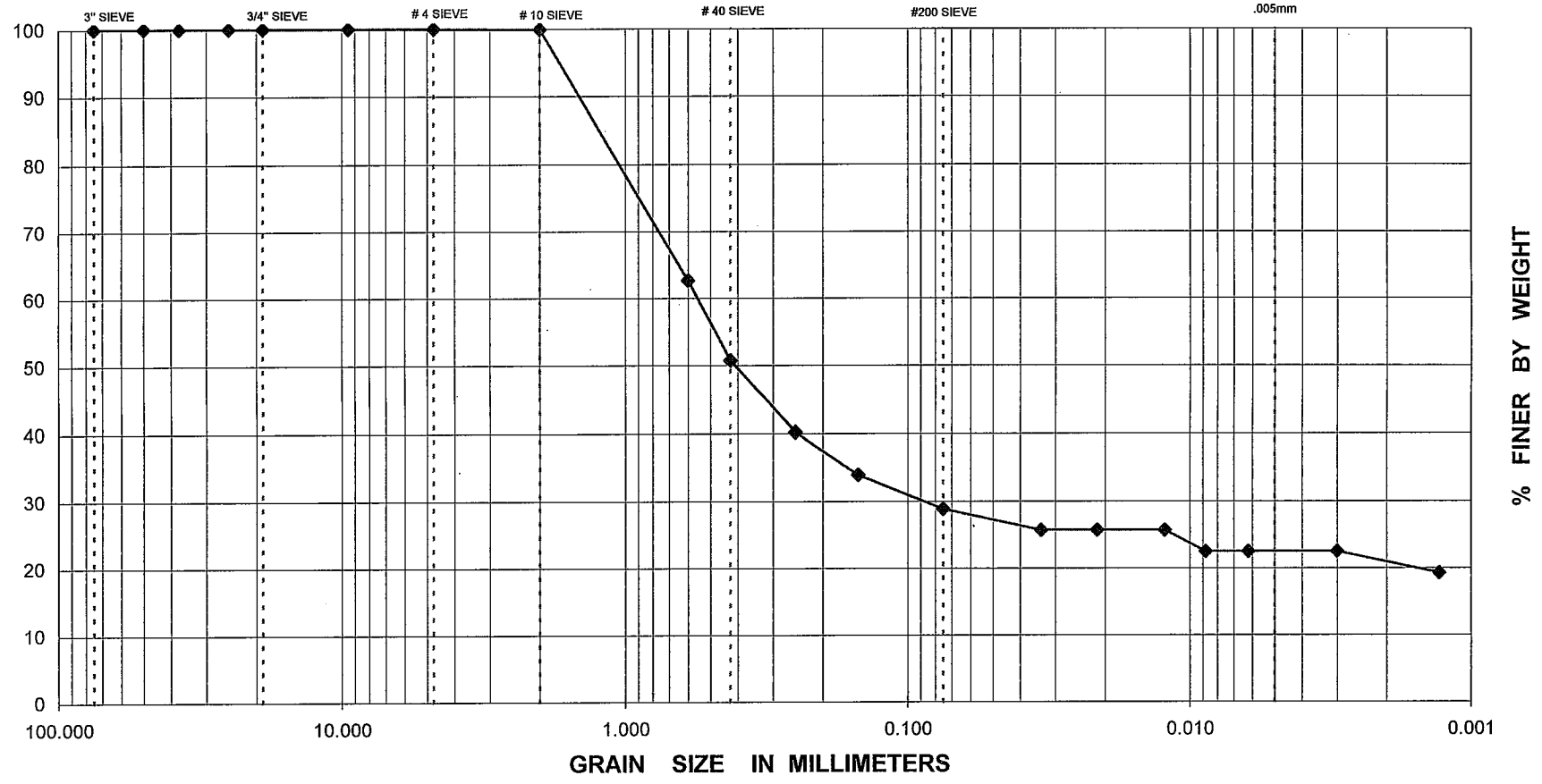
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	**DATE:**	05/19/08	**TESTED BY :**	RGS	**REVIEWED BY :**	*MR*
BORING / PIT NO. :	MW-5R	**DEPTH, ft.:**	13.5-15	**SAMPLE ID :**	*0.003*	**SAMPLE TYPE :**	*Bulk*
SAMPLE LOCATION:							
SOIL DESCRIPTION :	Tan silty clayey fine to medium SAND					**SP. GRAVITY, Gs :**	-
LIQUID LIMIT, %:		**PLASTICITY INDEX, %:**		**MOISTURE, %:**	-	**FINES, %:**	*29*
D10, MM:	-	**D30, MM:**	-	**D60, MM:**	-	**COEFF. OF CURVATURE, C_C:**	-
CLASSIFICATION		**UNIFIED:**	-	**AASHTO:**	-	**COEFF. OF UNIFORMITY, C_U:**	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur May

GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)

Rev. Jan 2006

PROJECT	SC-015								
JOB NO.	73078012	DATE		5/19/2008	TESTED BY	RGS	REVIEWED BY	MR	
BORING / PIT NO.	MW-5R		DEPTH	13.5-15	SAMPLE TYPE		Bulk	SAMPLE ID	0.003
LOCATION									
SOIL DESCRIPTION	Tan silty clayey fine to medium SAND								
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines			SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012

AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS

OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

	SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
COARSER THAN # 4 SIEVE	3"	0.00	0.0	75.00	100.00
	2"	0.00	0.00	50.00	100.00
	1 1/2"	0.00	0.00	37.50	100.00
	1"	0.00	0.00	25.00	100.00
	3/4"	0.00	0.00	19.00	100.00
	3/8"	0.00	0.00	9.50	100.00
	# 4	0.00	0.00	4.75	100.00
FINER THAN # 4 SIEVE	#10	0.04	0.08	2.000	99.92
	#30	18.67	37.34	0.600	62.66
	#40	24.64	49.28	0.425	50.72
	#60	29.90	59.80	0.250	40.20
	# 100	33.02	66.04	0.150	33.96
	# 200	35.58	71.16	0.075	28.84

HYDROMETER DATA

Date & Time	Zero CORR.	Temp °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)		
					0.034	25.70
					0.021	25.70
					0.012	25.70
					0.009	22.48
					0.006	22.48
					0.003	22.48
					0.001	19.27

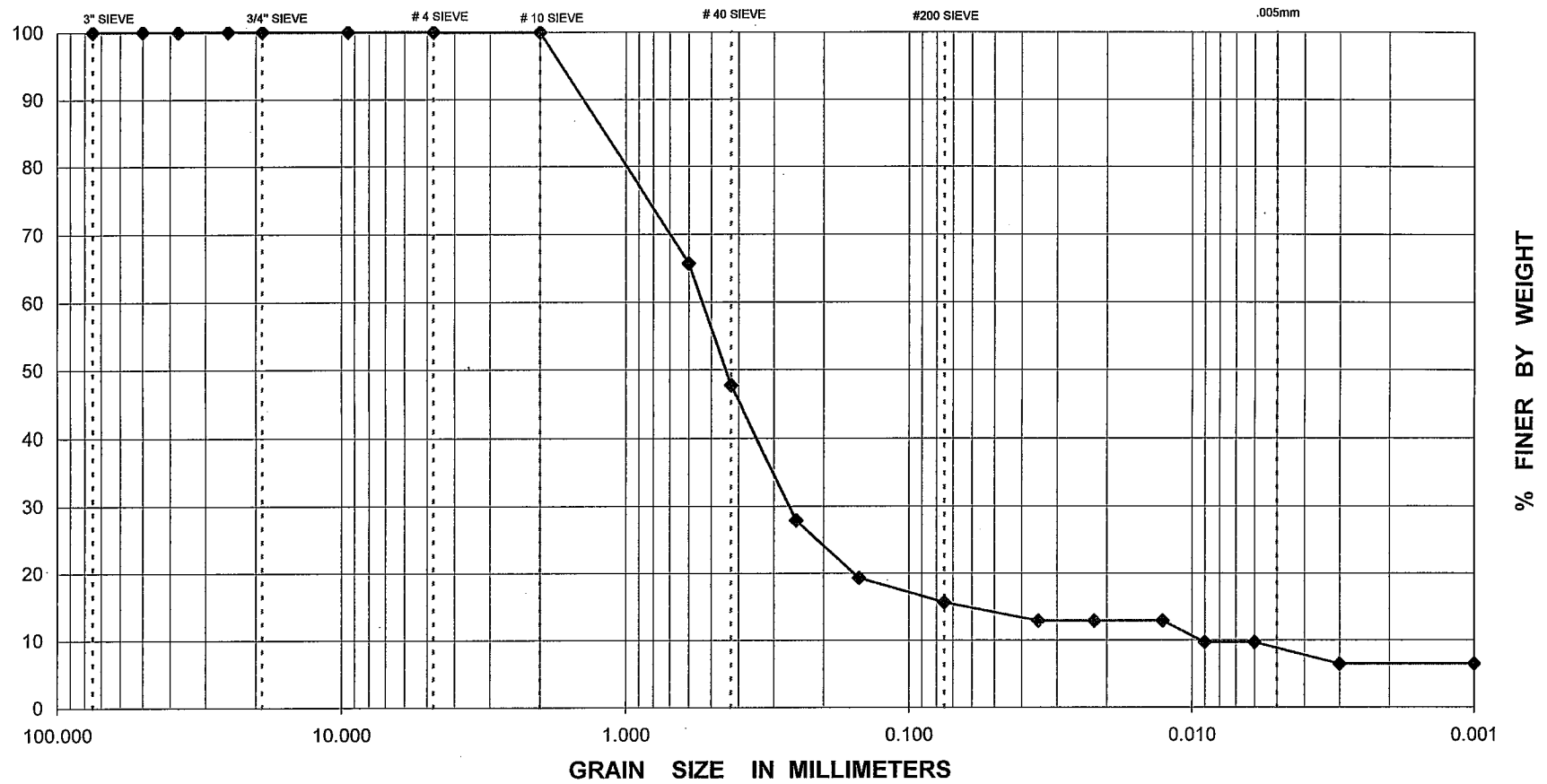
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	DATE:	05/19/08	TESTED BY :	RGS	REVIEWED BY :	*MR*
BORING / PIT NO. :	DW-1	DEPTH, ft.:	33.5-35	SAMPLE ID :	*0.001*	SAMPLE TYPE :	*Bulk*
SAMPLE LOCATION:							
SOIL DESCRIPTION :	Tan silty clayey fine to medium SAND					SP. GRAVITY, Gs :	-
LIQUID LIMIT, %:		PLASTICITY INDEX, %:		MOISTURE, %:	-	FINES, %:	*16*
D10, MM:	-	D30, MM:	-	D60, MM:	-	COEFF. OF CURVATURE, C_C:	-
CLASSIFICATION		UNIFIED:	-	AASHTO:	-	COEFF. OF UNIFORMITY, C_U:	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur May

Rev. Jan 2006

GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)

PROJECT	SC-015							
JOB NO.	73078012	DATE		5/19/2008	TESTED BY	RGS	REVIEWED BY	MR
BORING / PIT NO.	DW-1		DEPTH	33.5-35	SAMPLE TYPE	Bulk	SAMPLE ID	0.001
LOCATION								
SOIL DESCRIPTION	Tan silty clayey fine to medium SAND							
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines		SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012

AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS

OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

COARSER THAN # 4 SIEVE

FINER THAN # 4 SIEVE

SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
3"	0.00	0.0	75.00	100.00
2"	0.00	0.00	50.00	100.00
1 1/2"	0.00	0.00	37.50	100.00
1"	0.00	0.00	25.00	100.00
3/4"	0.00	0.00	19.00	100.00
3/8"	0.00	0.00	9.50	100.00
# 4	0.00	0.00	4.75	100.00
#10	0.03	0.06	2.000	99.94
#30	17.15	34.30	0.600	65.70
#40	26.17	52.34	0.425	47.66
#60	36.06	72.12	0.250	27.88
# 100	40.36	80.72	0.150	19.28
# 200	42.20	84.40	0.075	15.60
			0.035	12.85
			0.022	12.85
			0.013	12.85
			0.009	9.64
			0.006	9.64
			0.003	6.42
			0.001	6.42

HYDROMETER DATA

Date & Time	Zero CORR.	Temp °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)

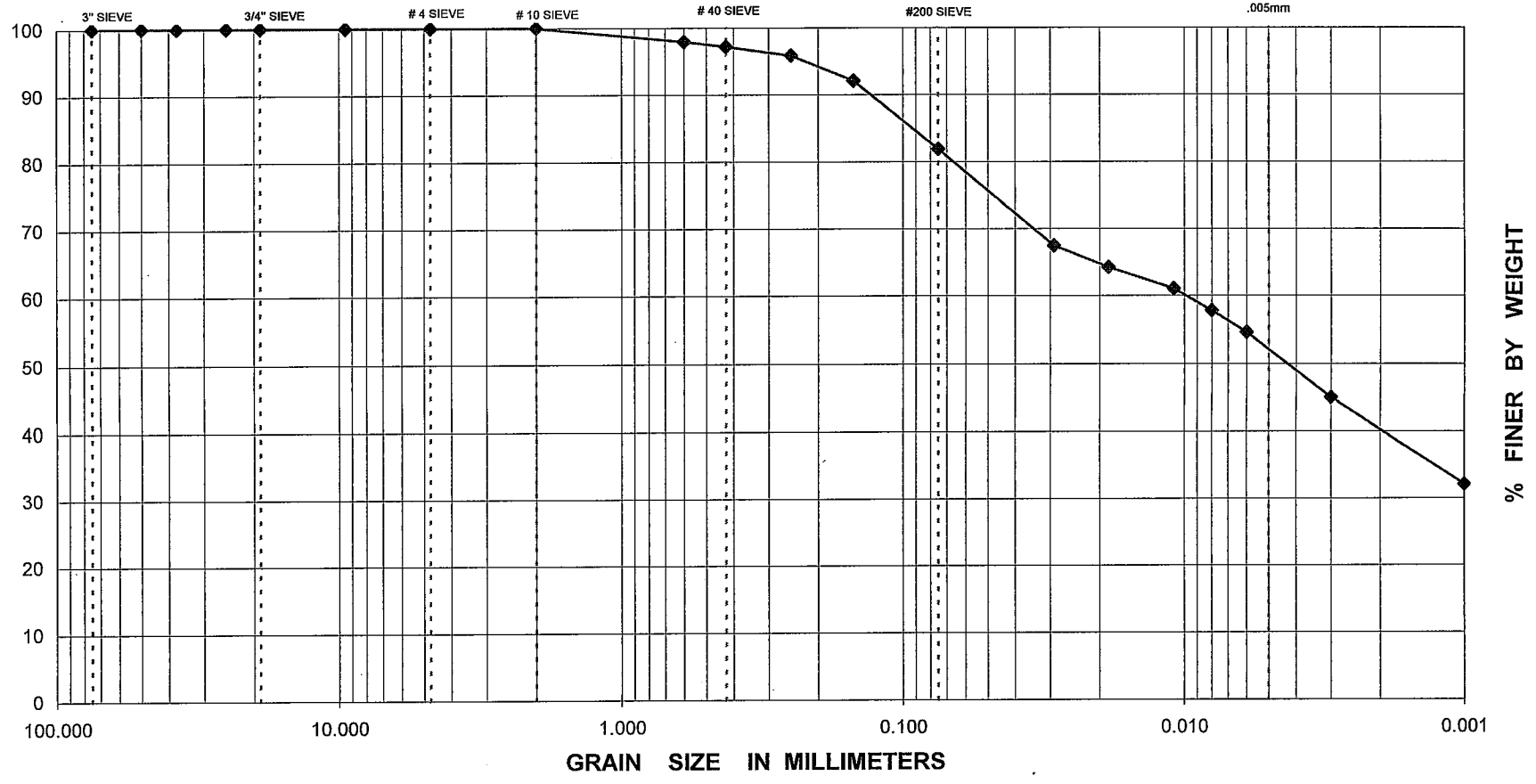
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	**DATE:**	05/19/08	**TESTED BY :**	RGS	**REVIEWED BY :**	*MR*
BORING / PIT NO. :	DW-1	**DEPTH, ft.:**	38.5-40	**SAMPLE ID :**	*0.002*	**SAMPLE TYPE :**	*Bulk*
SAMPLE LOCATION:							
SOIL DESCRIPTION :	Light tan silty CLAY with fine sand					**SP. GRAVITY, Gs :**	-
LIQUID LIMIT, %:		**PLASTICITY INDEX, %:**		**MOISTURE, %:**	-	**FINES, %:**	*82*
D10, MM:	-	**D30, MM:**	-	**D60, MM:**	-	**COEFF. OF CURVATURE, C_C:**	-
CLASSIFICATION		**UNIFIED:**	-	**AASHTO:**	-	**COEFF. OF UNIFORMITY, C_U:**	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur May

Rev. Jan 2006

GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)

PROJECT	SC-015								
JOB NO.	73078012	DATE		5/19/2008	TESTED BY	RGS	REVIEWED BY	MR	
BORING / PIT NO.	DW-1		DEPTH	38.5-40	SAMPLE TYPE		Bulk	SAMPLE ID	0.002
LOCATION									
SOIL DESCRIPTION	Light tan silty CLAY with fine sand								
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines			SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012		
AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS

OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

	SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
COARSER THAN # 4 SIEVE	3"	0.00	0.0	75.00	100.00
	2"	0.00	0.00	50.00	100.00
	1 1/2"	0.00	0.00	37.50	100.00
	1"	0.00	0.00	25.00	100.00
	3/4"	0.00	0.00	19.00	100.00
	3/8"	0.00	0.00	9.50	100.00
	# 4	0.00	0.00	4.75	100.00
FINER THAN # 4 SIEVE	#10	0.00	0.00	2.000	100.00
	#30	1.04	2.08	0.600	97.92
	#40	1.42	2.84	0.425	97.16
	#60	2.08	4.16	0.250	95.84
	# 100	3.96	7.92	0.150	92.08
	# 200	9.05	18.10	0.075	81.90
				0.029	67.45
				0.019	64.24
				0.011	61.03
				0.008	57.82
				0.006	54.61
				0.003	44.97
				0.001	32.12

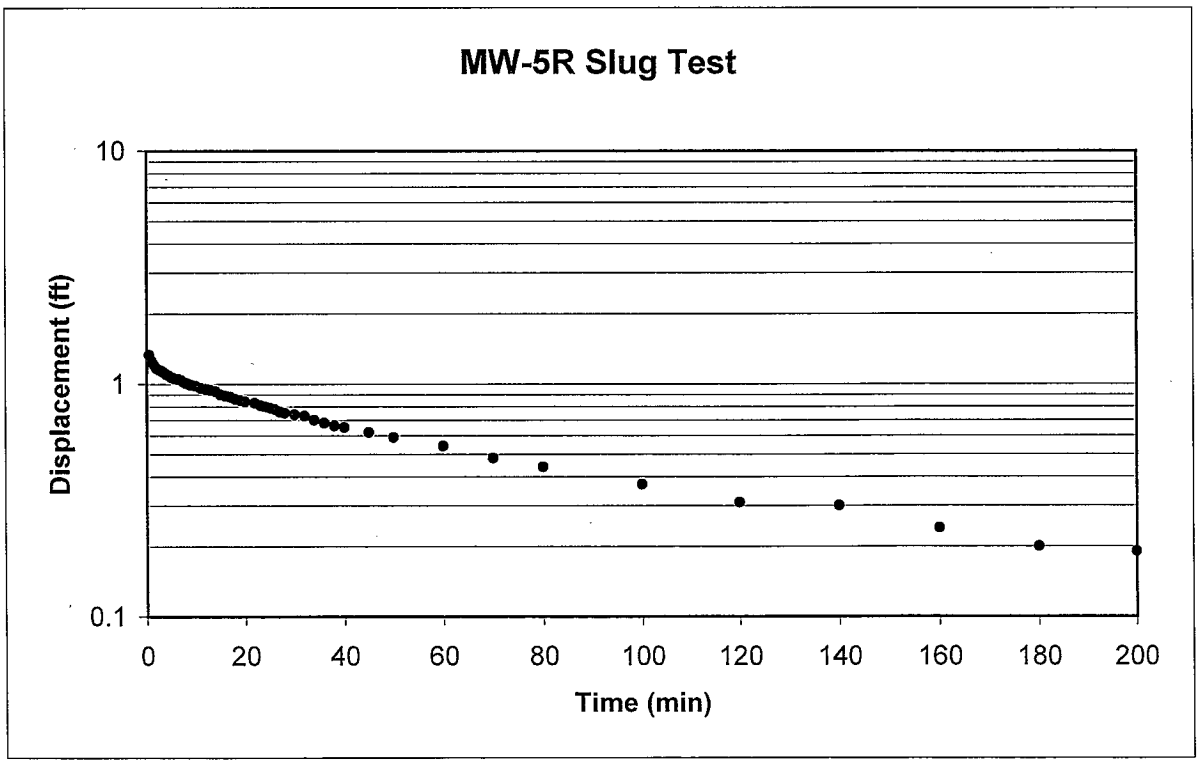
HYDROMETER DATA

Date & Time	Zero CORR.	Temp °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)

SLUG TEST LOG

Project Name: SC-015 **Project Number:** 73078012
Well ID: MW-5R **Date:** 5/19/2008
Equipment/method: Electric Water Level Indicator/Bouwer and Rice
Test Start Time: 11:00
Static Water Level: 14.85 **Time of SWL:** 11:00

Elapsed Time (min)	Depth to Water	Displacement (ft)	Elapsed Time (min)	Depth to Water	Displacement (ft)
0	14.85	0.00	19	15.70	0.85
0.5	16.18	1.33	20	15.69	0.84
1	16.11	1.26	22	15.68	0.83
1.5	16.06	1.21	23	15.66	0.81
2	16.02	1.17	24	15.65	0.80
2.5	16.00	1.15	25	15.64	0.79
3	15.99	1.14	26	15.63	0.78
3.5	15.97	1.12	27	15.61	0.76
4	15.95	1.10	28	15.60	0.75
4.5	15.94	1.09	30	15.59	0.74
5	15.92	1.07	32	15.58	0.73
5.5	15.91	1.06	34	15.55	0.70
6.5	15.90	1.05	36	15.53	0.68
7	15.89	1.04	38	15.51	0.66
7.5	15.87	1.02	40	15.50	0.65
8	15.86	1.01	45	15.47	0.62
8.5	15.85	1.00	50	15.44	0.59
9	15.84	0.99	60	15.39	0.54
10	15.83	0.98	70	15.33	0.48
11	15.81	0.96	80	15.29	0.44
12	15.80	0.95	100	15.22	0.37
13	15.79	0.94	120	15.16	0.31
14	15.78	0.93	140	15.15	0.30
15	15.75	0.90	160	15.09	0.24
16	15.74	0.89	180	15.05	0.20
17	15.73	0.88	200	15.04	0.19
18	15.71	0.86			



Slug Test Calculation

Monitoring Well		MW-5R	
Project		SC-015	
Test Date		5/19/2008	
Casing Diameter	=	2.000	in
Borehole Diameter	=	6.500	in
r_c		0.0833	ft
r_c^2	=	0.0069	ft^2
r_w	=	0.2708	ft
r_w^2		0.0734	ft^2
L_e	=	5.15	ft
L_w	=	5.15	ft
L_e/r_w	=	19.02	
L_w/r_w	=	19.02	
H	=	35.15	ft
y_0	=	16.18	ft
y_t	=	15.04	ft
t	=	200.00	min
A	=	2.4	
B	=	0.4	
C	=	0.0	
n	=	0.2	
Depth to Water	=	14.85	ft
Depth to Impermeable	=	50.0	ft
Depth to Screen Bottom	=	20.0	ft

$$r_{eq} = ((1-n)r_c^2 + nr_w^2)^{1/2} = 0.1422 \text{ ft}$$

$$r_{eq}^2 = 0.020225694$$

$$\ln(R_e/R_w) = \left[\frac{1.1}{\text{Ln}(L_w/r_w)} + \frac{A + B\ln[(H - Lw)/ rw]}{L_e/r_w} \right]^{-1} = 1.6702$$

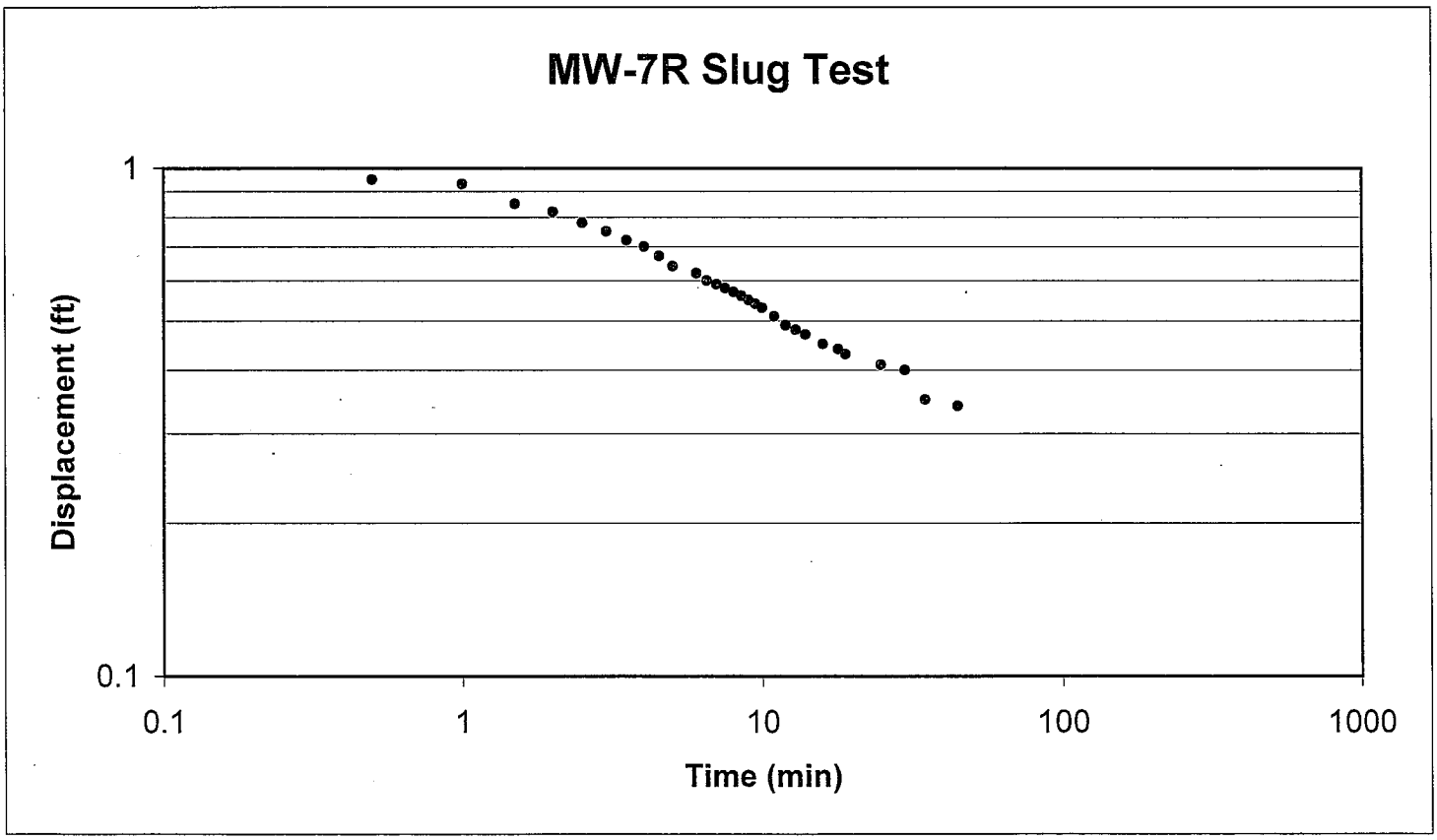
$$K \text{ (ft/min)} = \frac{r_{eq}^2 \ln(Re/Rw)}{2L_e} * \frac{1}{t} \ln\frac{y_0}{y_t} = 0.00000120$$

K (ft/day) =	**0.002**	**ft/day**
K (ft/sec) =	**0.000000**	**ft/sec**
K (cm/sec) =	**0.000001**	**cm/sec**

SLUG TEST DATA

Project Name: SC-015 **Project Number:** 73078012
Well ID: MW-7R **Date:** 5/19/2008
Equipment/method: Electric Water Level Indicator/Bouwer and Rice
Test Start Time: 13:25
Static Water Level: 14.95 **Time of SWL:** 13:25

Elapsed Time (min)	Depth to Water	Displacement (ft)	Elapsed Time (min)	Depth to Water	Displacement (ft)
0	14.95	0.00	8.5	15.51	0.56
0.5	15.9	0.95	9	15.5	0.55
1	15.88	0.93	9.5	15.49	0.54
1.5	15.8	0.85	10	15.48	0.53
2	15.77	0.82	11	15.46	0.51
2.5	15.73	0.78	12	15.44	0.49
3	15.7	0.75	13	15.43	0.48
3.5	15.67	0.72	14	15.42	0.47
4	15.65	0.70	16	15.4	0.45
4.5	15.62	0.67	18	15.39	0.44
5	15.59	0.64	19	15.38	0.43
6	15.57	0.62	25	15.36	0.41
6.5	15.55	0.60	30	15.35	0.40
7	15.54	0.59	35	15.3	0.35
7.5	15.53	0.58	45	15.29	0.34
8	15.52	0.57			



Slug Test Calculation

Monitoring Well		MW-7R	
Project		SC-015	
Test Date		5/19/2008	
Casing Diameter	=	2.000	in
Borehole Diameter	=	6.500	in
r_c		0.0833	ft
r_c^2	=	0.0069	ft^2
r_w	=	0.2708	ft
r_w^2		0.0734	ft^2
L_e	=	10.05	ft
L_w	=	10.05	ft
L_e/r_w	=	37.11	
L_w/r_w	=	37.11	
H	=	35.05	ft
y_0	=	15.90	ft
y_t	=	15.30	ft
t	=	55.00	min
A	=	2.8	
B	=	0.5	
C	=	0.0	
n	=	0.2	
Depth to Water	=	15.0	ft
Depth to Impermeable	=	50.0	ft
Depth to Screen Bottom	=	25.0	ft

$$r_{eq} = ((1-n)r_c^2 + nr_w^2)^{1/2} = 0.1422 \text{ ft}$$

$$r_{eq}^2 = 0.020225694$$

$$\ln(R_e/R_w) = \left[\frac{1.1}{\text{Ln}(L_w/r_w)} + \frac{A + B\ln[(H - Lw)/ rw]}{L_e/r_w} \right]^{-1} = 2.2685$$

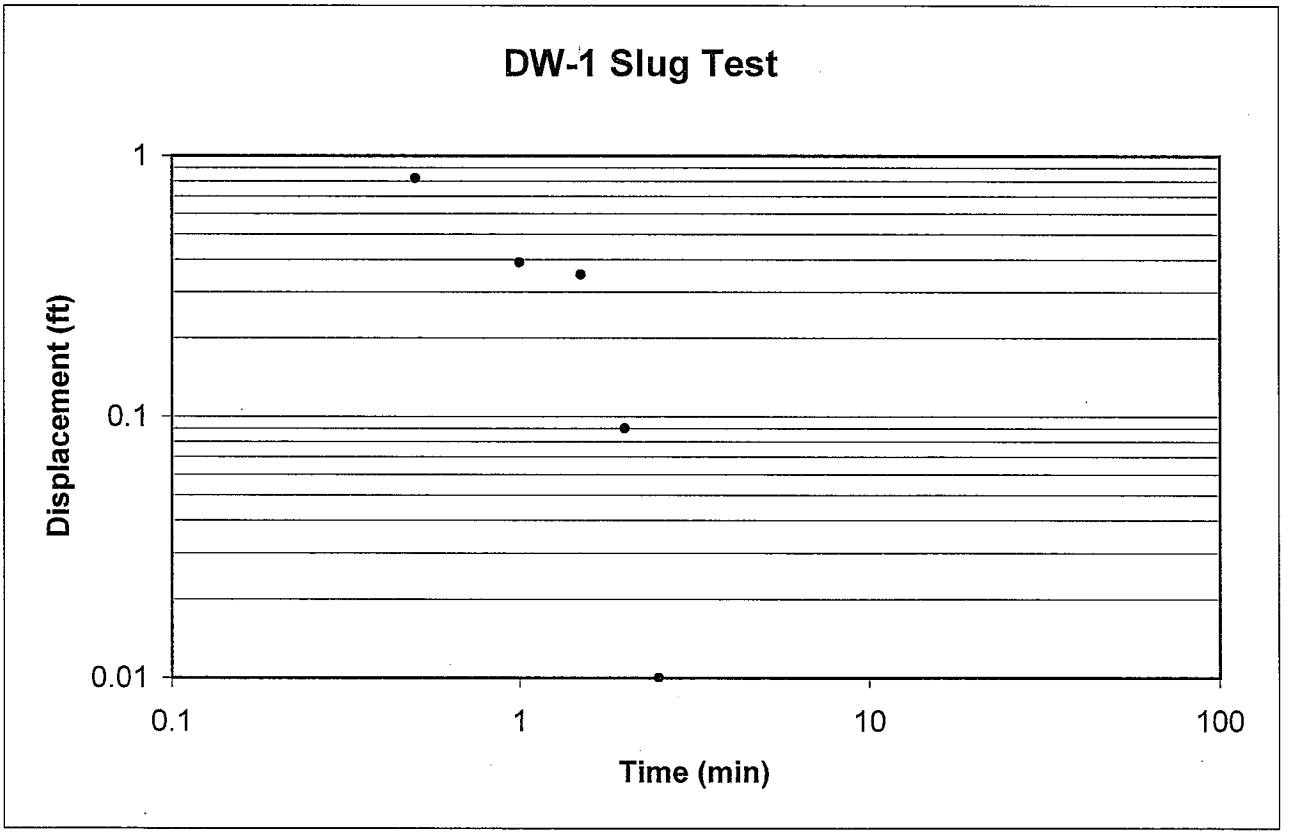
$$K \text{ (ft/min)} = \frac{r_{eq}^2 \ln(Re/Rw)}{2L_e} * \frac{1}{t} \ln\frac{y_0}{y_t} = 0.00000160$$

K (ft/day) =	**0.002**	**ft/day**
K (ft/sec) =	**0.000000**	**ft/sec**
K (cm/sec) =	**0.000001**	**cm/sec**

SLUG TEST DATA

Project Name: SC-015 **Project Number:** 73078012
Well ID: DW-1 **Date:** 6/3/2008
Equipment/method: Electric Water Level Indicator/Bouwer and Rice
Test Start Time: 14:05
Static Water Level: 35.29 **Time of SWL:** 13:30

Elapsed Time (min)	Depth to Water	Displacement (ft)	Elapsed Time (min)	Depth to Water	Displacement (ft)
0.0	35.29	0.00	5.5	35.28	-0.01
0.5	36.11	0.82	6.0	35.29	0.00
1.0	35.68	0.39	6.5	35.29	0.00
1.5	35.04	-0.25	7.0	35.29	0.00
2.0	35.38	0.09	7.5	35.29	0.00
2.5	35.30	0.01	8.0	35.29	0.00
3.0	35.28	-0.01	8.5	35.29	0.00
3.5	35.25	-0.04	9.0	35.29	0.00
4.0	35.28	-0.01	9.5	35.29	0.00
4.5	35.29	0.00	10.0	35.29	0.00
5.0	35.29	0.00			



Slug Test Calculation

Monitoring Well: DW-1
Project: SC-015
Test Date: 6/3/2008

Casing Diameter	=	2.000	in
Borehole Diameter	=	6.500	in
r_c		0.0833	ft
r_c^2	=	0.0069	ft^2
r_w	=	0.2708	ft
r_w^2		0.0734	ft^2
L_e	=	5.00	ft
L_w	=	3.71	ft
L_e/r_w	=	18.46	
L_w/r_w	=	13.70	
H	=	64.71	ft
y_0	=	36.11	ft
y_t	=	35.29	ft
t	=	10.00	min
A	=	2.3	
B	=	0.8	
C	=	0.0	
n	=	0.25	
Depth to Water	=	35.3	ft
Depth to Impermeable	=	100.0	ft
Depth to Screen Bottom	=	39.0	ft

$$r_{eq} = ((1-n)r_c^2 + nr_w^2)^{1/2} = 0.1534 \text{ ft}$$

$$r_{eq}^2 = 0.023546007$$

$$\ln(R_e/R_w) = \left[\frac{1.1}{\text{Ln}(L_w/r_w)} + \frac{A + B\ln[(H - Lw)/ rw]}{L_e/r_w} \right]^{-1} = 1.3119$$

$$K \text{ (ft/min)} = \frac{r_{eq}^2 \ln(Re/Rw)}{2L_e} * \frac{1}{t} \ln\frac{y_0}{y_t} = 0.00000710$$

K (ft/day) =	**0.010**	**ft/day**
K (ft/sec) =	**0.000000**	**ft/sec**
K (cm/sec) =	**0.000004**	**cm/sec**

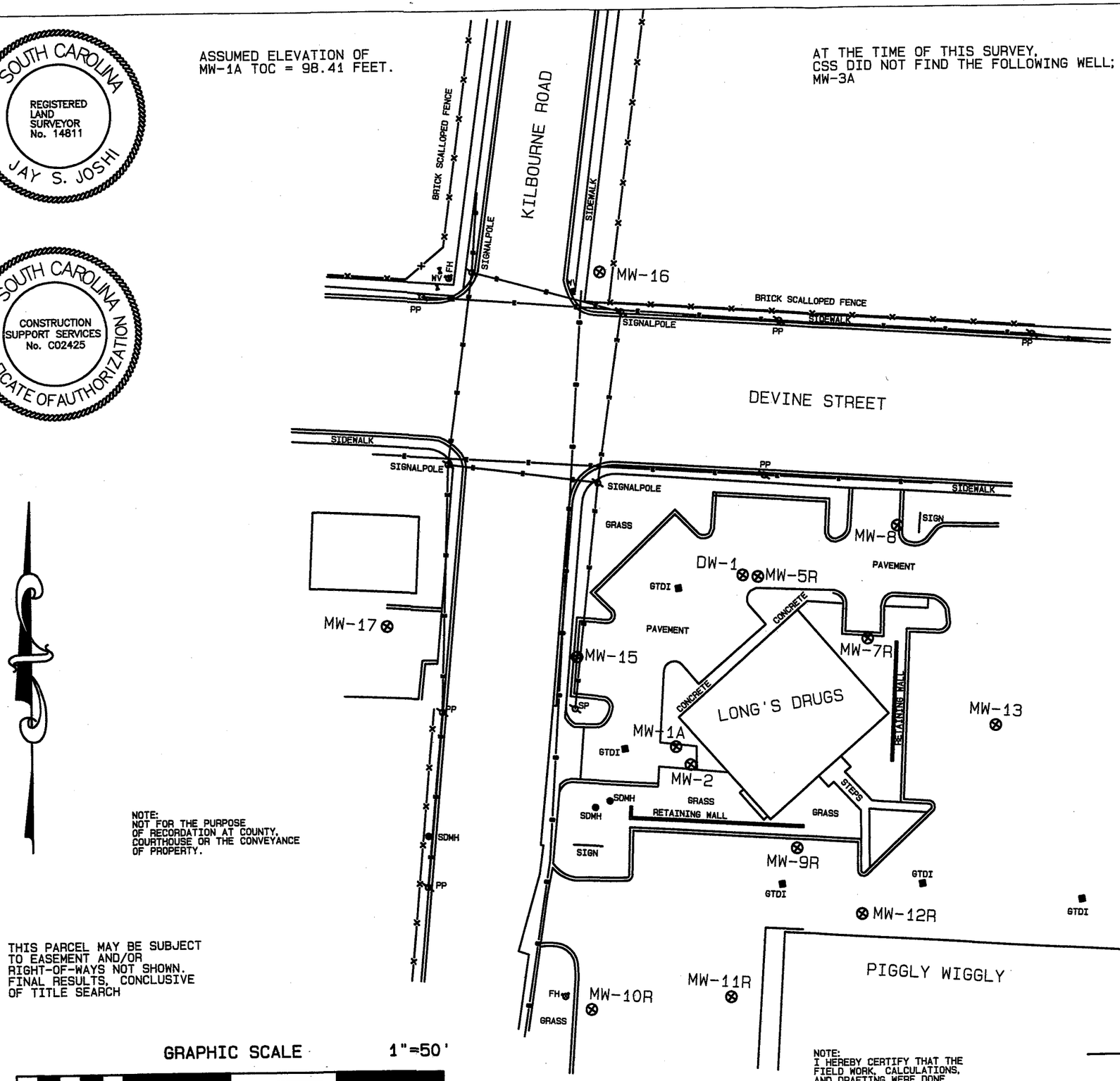
APPENDIX F
Comprehensive Survey

SOUTH CAROLINA
REGISTERED LAND SURVEYOR
No. 14811
JAY S. JOSHI

SOUTH CAROLINA
CONSTRUCTION SUPPORT SERVICES
No. C02425
CERTIFICATE OF AUTHORIZATION

ASSUMED ELEVATION OF
MW-1A TOC = 98.41 FEET.

AT THE TIME OF THIS SURVEY,
CSS DID NOT FIND THE FOLLOWING WELL;
MW-3A



NOTE:
NOT FOR THE PURPOSE OF RECORDATION AT COUNTY, COURTHOUSE OR THE CONVEYANCE OF PROPERTY.

THIS PARCEL MAY BE SUBJECT TO EASEMENT AND/OR RIGHT-OF-WAYS NOT SHOWN. FINAL RESULTS, CONCLUSIVE OF TITLE SEARCH

GRAPHIC SCALE 1"=50'

0 50 100 150

LEGEND AND ABBREVIATIONS:

- MW = MONITORING WELL
- TPED = TELEPHONE PEDESTAL
- SDMH = STORM DRAIN MAN HOLE
- SSMH = SANITARY SEWER MAN HOLE
- TMH = TELEPHONE MAN HOLE
- WM = WATER METER
- WV = WATER VALVE
- FH = FIRE HYDRANT
- FP = FLAG POLE
- PP = POWER POLE
- GM = GAS METER
- GV = GAS VALVE
- UST = UNDERGROUND STORAGE TANK
- USTF = UNDERGROUND STORAGE TANK FILL
- USTV = UNDERGROUND STORAGE TANK VENT
- CTCB = CONCRETE TOP CATCH BASIN
- SIGN = SIGN
- RCP = REINFORCED CONCRETE PIPE
- VAC/AIR= VACUUM AND AIR DISPENSER
- PHONE = PAY TELEPHONE
- FD = FUEL DISPENSER
- KTANK = KEROSENE TANK
- KDISP = KEROSENE DISPENSER
- E = OVERHEAD POWER LINE
- = WOODLINE

MONITOR WELLS

WELL	TOL ELEV.	TOC ELEV.
MW-1A	98.48	98.41
MW-2	98.62	98.45
MW-5R	98.60	98.29
MW-7R	99.08	98.85
MW-8	99.71	99.48
MW-9R	93.44	93.32
MW-10R	95.96	95.71
MW-11R	92.68	92.26
MW-12R	92.68	92.43
MW-13	94.49	94.26
MW-15	99.85	99.70
MW-16	103.21	102.85
MW-17	101.07	100.84
DW-1	98.63	98.48

NOTE:
I HEREBY CERTIFY THAT THE FIELD WORK, CALCULATIONS, AND DRAFTING WERE DONE UNDER MY DIRECT SUPERVISION.

COMPREHENSIVE SITE SKETCH OF

LONG'S DRUGS

630 KILBOURNE ROAD
COLUMBIA, RICHLAND COUNTY, SC
SCDHEC SITE ID #07680
PREPARED FOR

TERRACON

Jay S. Joshi

JAY S. JOSHI PLS # 14811
8009 SUMTER HWY, SUITE 101, COLUMBIA, SC, 29209 803-776-9909

DATE: JUNE 19, 2008 JOB #061808L

LETTER OF TRANSMITTAL

RECEIVED
JUL 2 5 2008
UNDERGROUND STORAGE TANK PROGRAM

TerraCon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9001 fax

TO Mr. Arthur Shrader

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 7/24/08	JOB NO. 73078012
RE: Former SC-015, Columbia UST Permit No. 07680	
Cross-sections	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	7/24/08	Cross-sections

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS:

Mr. Shrader,

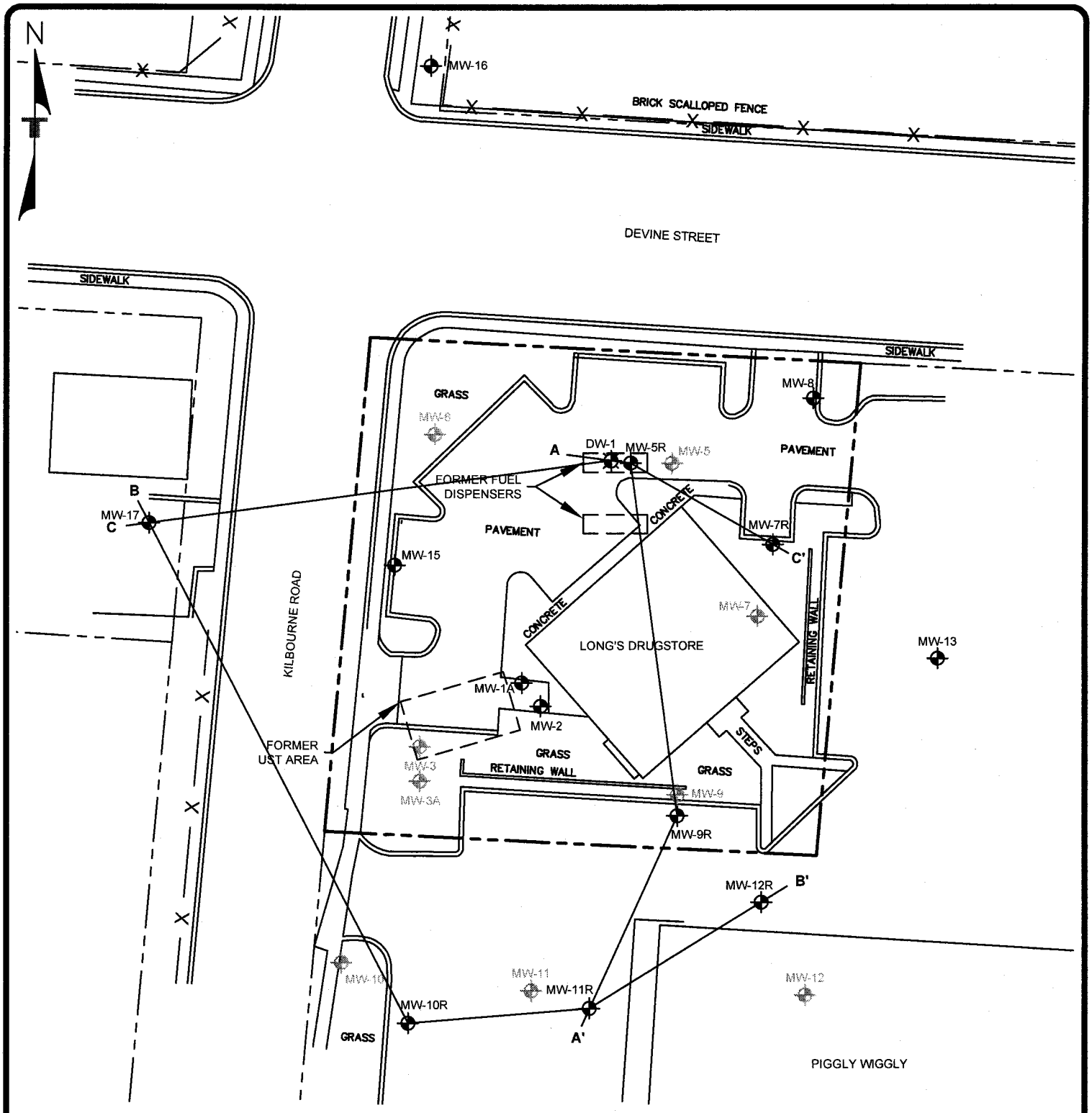
Enclosed are the cross-sections you requested for the above referenced site. Please feel free to call me if you have any questions.

COPY TO: _____

SIGNED: **Melissa Roberts**

If enclosures are not as noted, kindly notify us at once.

UST DOCKET
4T



GRAPHIC SCALE

50 0 50

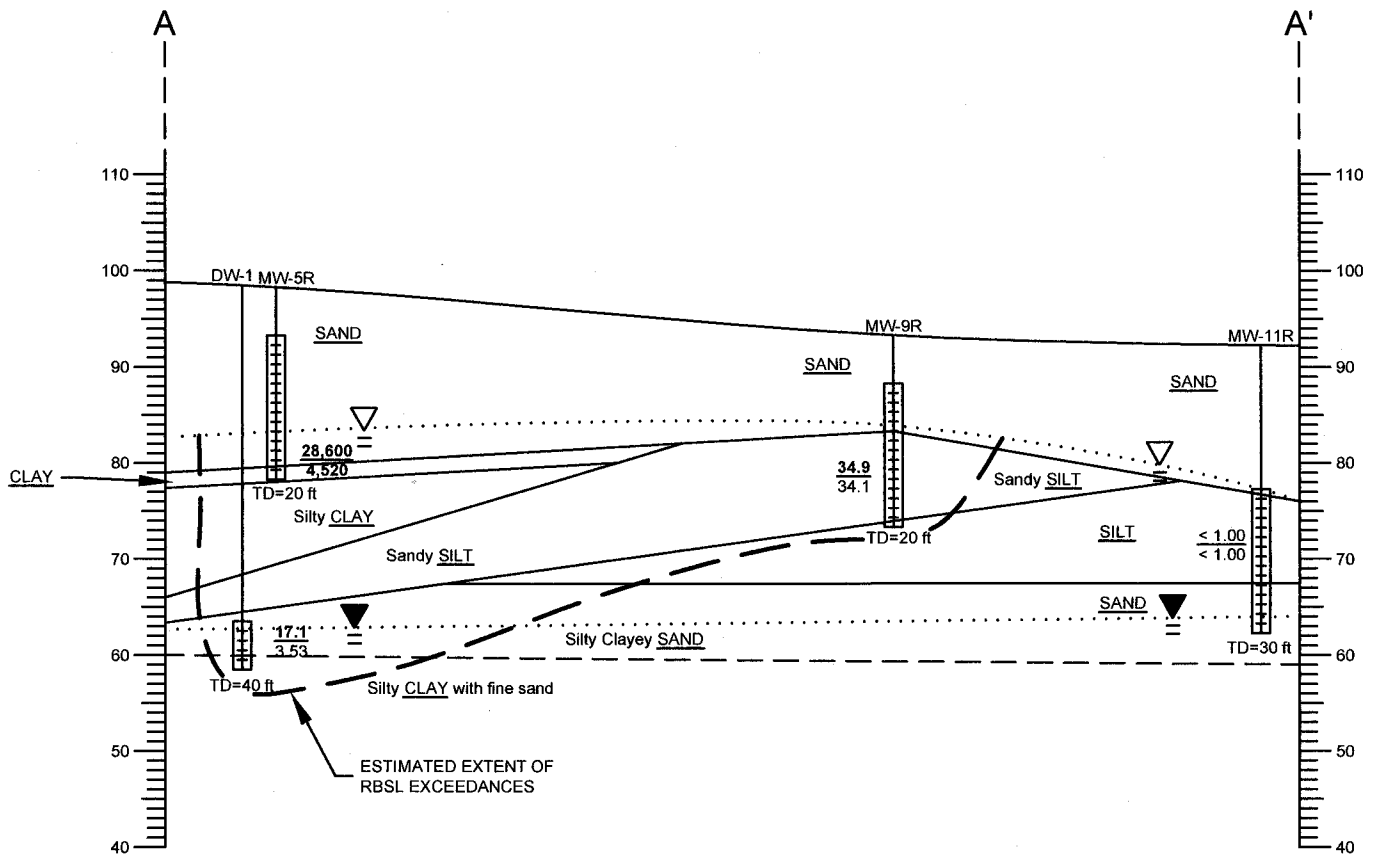
(FEET)

EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- A——A' CROSS SECTION TRANSECTS
- APPROXIMATE PROPERTY BOUNDARY

SITE MAP WITH CROSS SECTION TRANSECTS
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 7-10-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 6



EXPLANATION

MW-7
(MONITORING WELL)

WATER LEVEL

SCREEN INTERVAL

TD = TOTAL DEPTH (in feet)

35,300 BENZENE CONCENTRATION
7,100 MTBE CONCENTRATION

CONCENTRATIONS IN BOLD EXCEED RBSLs

HORIZONTAL GRAPHIC SCALE

40 0 40

(FEET)

VERTICAL GRAPHIC SCALE

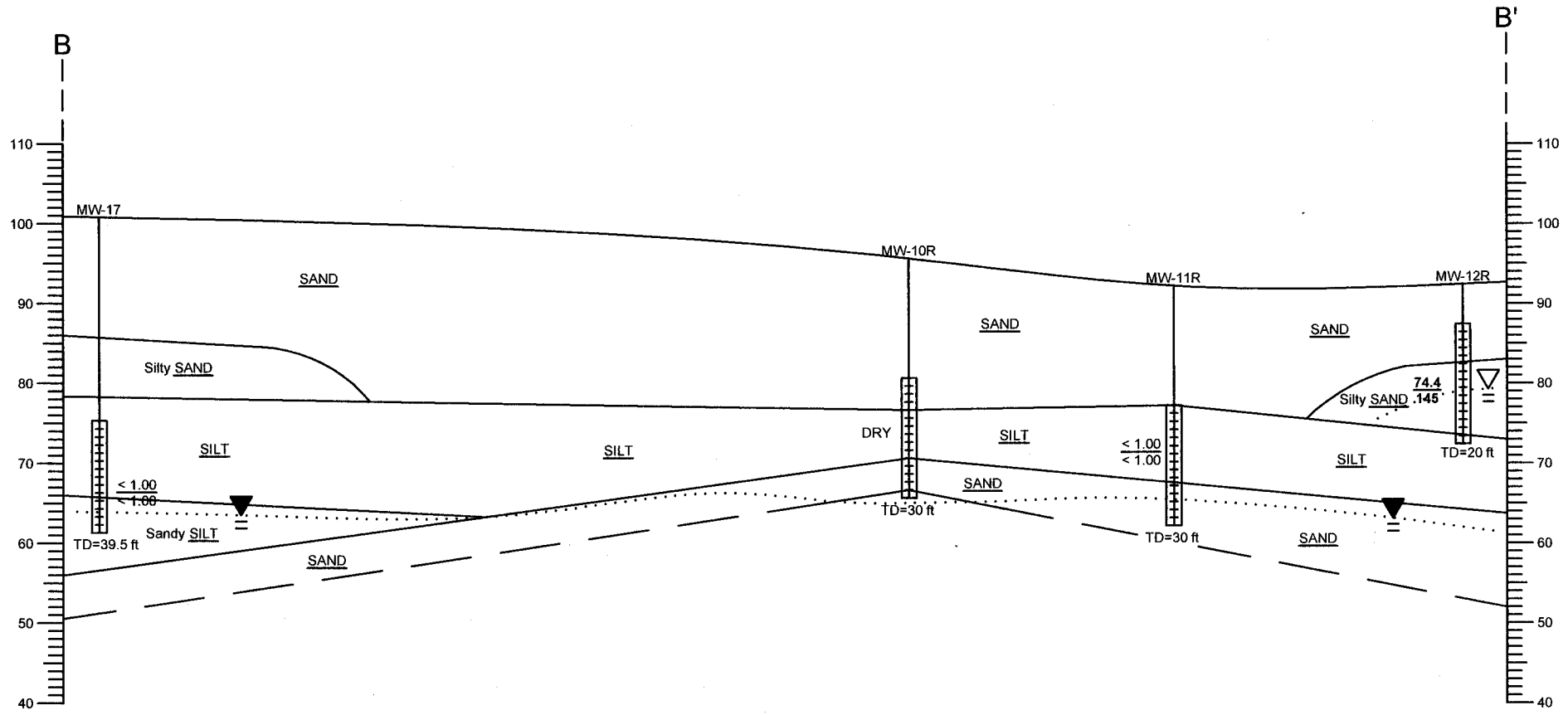
20 0 20

(FEET)

GEOLOGIC CROSS SECTION A-A'
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: AS SHOWN
Checked By:	PMH	521 Clemson Road	Date: 7-21-08
Approved By:	CRC	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 7



EXPLANATION

MW-7
(MONITORING WELL)

WATER LEVEL

SCREEN INTERVAL

TD = TOTAL DEPTH (in feet)

35,300 BENZENE CONCENTRATION
7,100 MTBE CONCENTRATION

CONCENTRATIONS IN BOLD EXCEED RBSLs

HORIZONTAL GRAPHIC SCALE

40 0 40

(FEET)

VERTICAL GRAPHIC SCALE

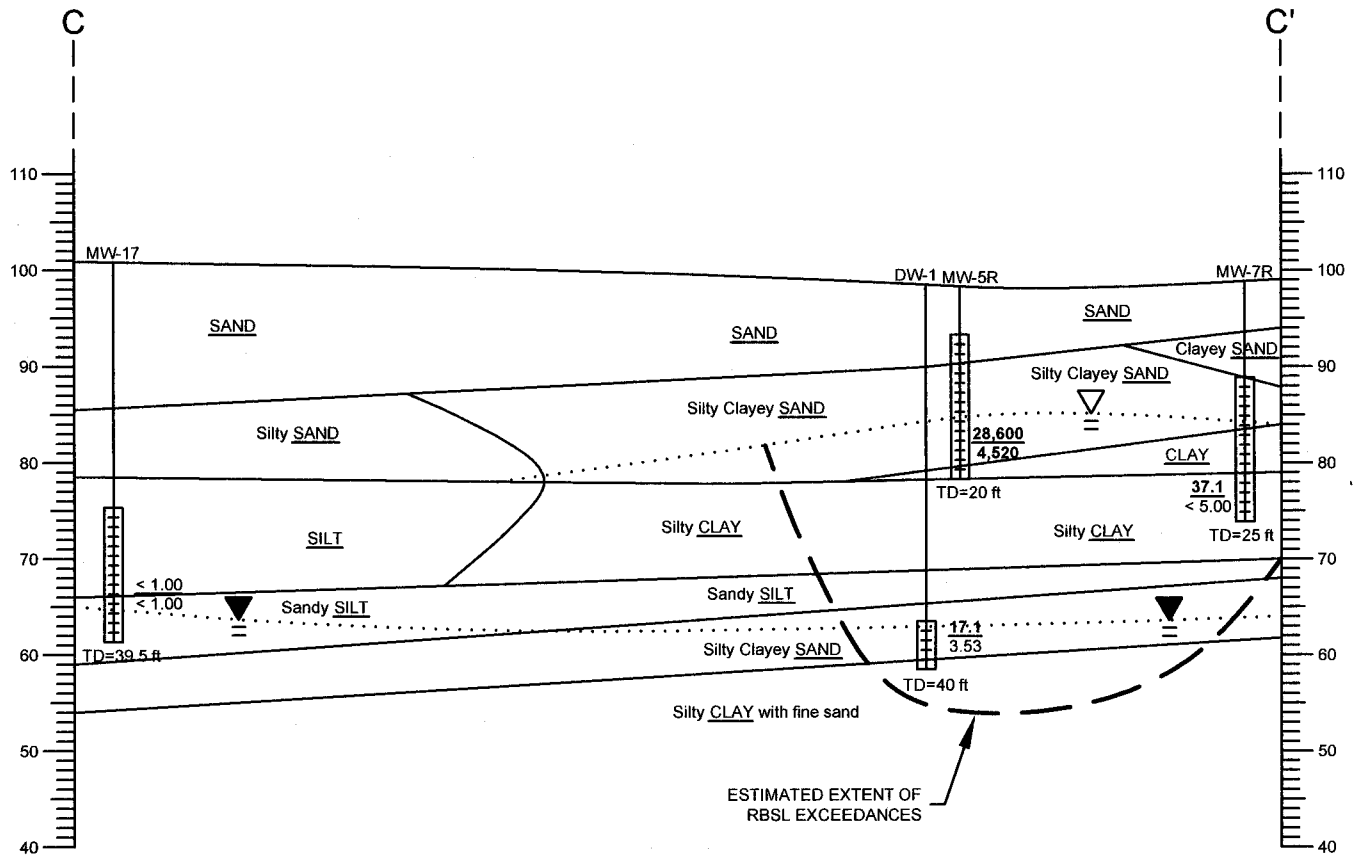
20 0 20

(FEET)

GEOLOGIC CROSS SECTION B-B'
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR	521 Clemson Road	Scale: AS SHOWN
Checked By:	PMH	Columbia, South Carolina 29229	Date: 7-14-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 8



EXPLANATION

MW-7
(MONITORING WELL)

WATER LEVEL

SCREEN INTERVAL

TD = TOTAL DEPTH (in feet)

35,300 BENZENE CONCENTRATION
7,100 MTBE CONCENTRATION

CONCENTRATIONS IN BOLD EXCEED RBSLs

HORIZONTAL GRAPHIC SCALE

40 0 40

(FEET)

VERTICAL GRAPHIC SCALE

20 0 20

(FEET)

GEOLOGIC CROSS SECTION C-C'
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR	521 Clemson Road	Scale: AS SHOWN
Checked By:	PMH	Columbia, South Carolina 29229	Date: 7-21-08
Approved By:	CRC		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 9

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

OCT 21 2008

MR JIM JANSEN
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21201-1168

Re: Assessment Report Directive
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 34014; MWA #UMW-22130
Release Reported August 15, 1989
Groundwater Assessment Report received July 9, 2008
Richland County

Dear Mr. Jansen:

The Underground Storage Tank (UST) Program of the South Carolina Department of Health and Environmental Control has reviewed the referenced report submitted by Terracon Consultants Incorporated on your behalf. The report documents the plume is not defined vertically and several monitoring wells no longer have sufficient water to be sampled. To define the current risk to human health and in accordance with Section 280.65 of the South Carolina Underground Storage Tank Regulations, additional assessment activities must be conducted as petroleum Chemicals of Concern (CoC) are above the risk-based-screening levels.

Assessment activities at the site should begin immediately upon receipt of this letter. Cost agreement 34014 has been approved in the amount shown on the enclosed cost agreement for installation of three shallow screening points across Kilborne Road, three deep screening points to determine the vertical extent or the plume, installation of six shallow and three deep pit cased monitoring wells, groundwater sampling event of the monitoring well network, and preparation of a report of findings. A map is enclosed that shows the approximate locations of the screening areas and monitoring wells is enclosed for your information. Laboratory analyses for six groundwater samples for BTEX, naphthalene, and MtBE has been approved for the shallow and deep screening points to ensure the plume is defined. Shallow monitoring wells should be installed with a fifteen-foot screen that brackets the water table. Monitoring well approval has been provided to your site rehabilitation contractor. A copy of the monitoring well approval is enclosed for your records. Laboratory analyses for BTEX and naphthalene has been provided for a soil sample with the highest screening value above the water table for each new permanent monitoring well. Please collect a soil sample from the screen interval of the new shallow and adjacent deep wells installed across Kilbourne Road and have percent sand, silt, and clay reported. Previously installed monitoring wells with screens that bracket the water table do not need to be purged before a groundwater sample is collected. If any wells contain product, a groundwater sample should be collected from below the product and analyzed. Groundwater samples from all monitoring wells associated with the release should be collected and analyzed for BTEX, naphthalene, MtBE, EDB, 1,2 DCA 8 oxygenates, lead, nitrates, sulfates, methane, and ferrous iron in accordance with *Analytical Methodology for Groundwater and Soil Assessment Guidelines* dated August 24, 2005. A copy of this publication is available on line at http://www.scdhec.gov/eqc/admin/html/.. %5C..ust%5Cpubs% 5Canalmet.

UST DOCKET
5tech

The Assessment Report and invoice are due within 90 days from the date of this letter. The

report submitted at the completion of these activities should include as a minimum the following:

- Revised geological cross sections that include the new shallow and deep monitoring wells.
- Boring logs and well logs (DHEC form 1903) signed by a well driller licensed in the state of South Carolina for each new well.
- A narrative portion documenting current site conditions during the groundwater sampling event noting the names of field personnel, date, time, ambient air temperature, and general weather conditions during the sampling event. The report shall also contain well purging data, pH, specific conductivity, water temperature, PID readings (where applicable) and turbidity comments.
- Groundwater elevations, depth to groundwater, measurable free product thickness (where applicable), total well depth and screened interval for all monitoring wells associated with the site, unless otherwise directed by the Program, shall be presented in tabular form. Groundwater laboratory analytical data for all monitoring wells for this and all previous sampling events shall be presented in tabular format.
- A CoC map based on current groundwater laboratory analytical data. The groundwater data should be adjacent to the relevant monitoring well location.
- A groundwater elevation contour map of the site based on current groundwater potentiometric data.
- Manifests for any contaminated soil and/or groundwater removed from the site for treatment and/or disposal.
- Signature and seal by a professional geologist or engineer registered in the State of South Carolina.

Terracon Consulting Engineers and Scientists, Incorporated can submit an invoice for direct billing from the State Underground Petroleum Environmental Response Bank (SUPERB) Account for approved costs. An interim well drilling invoice may be submitted for well installation. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available. Please be advised if the time frame exceeds 45 days between the date when groundwater samples are collected and the date the report of findings is received, the analytical data will not be considered current and Terracon Consulting Engineers and Scientists, Incorporated will not be reimbursed for a personnel mobilization to collect the groundwater samples, laboratory analyses, or associated disposal costs.

Please be advised that all applicable South Carolina certification requirements apply to the laboratory services, well installation, and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor. The UST Program, because of unnecessary dilution, cannot make decisions if the reporting limit of individual CoC exceeds RBSLs. Note that the Program may deny payment for any non-detect analysis where the reporting limit exceeds the RBSL. The UST Program encourages the use of 'J' values as necessary so the appropriate action can be determined for a release. Beginning in 2009, the UST Program will begin requiring that laboratories be certified through the SCDHEC Office of Environmental Laboratory Certification for the oxygenate compounds. The UST Program will require that laboratories submit the application for certification no later than December 31, 2008. Beginning April 1, 2009, the UST Program will no longer reimburse costs for oxygenate analysis for any laboratory that is not certified. Detailed information regarding the oxygenate certification can be found on the UST Guidance Documents webpage. (http://www.scdhec.net/environment/lwm/forms/Oxygenate Certification.pdf). Any laboratory with questions regarding the certification requirements, should contact the Office of Environmental Laboratory Certification at (803) 896-0970.

Please note that you and/or your contractor are responsible for obtaining all off-site access agreements and/or encroachment permits necessary for this scope of work.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Program is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be preapproved by the Program for the cost to be paid. The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Department grants pre-approval for transportation of virgin petroleum impacted soil and groundwater from the referenced site to a permitted treatment facility. There can be no spillage or leakage in transport. All investigation-derived waste (IDW) must be properly contained and labeled prior to disposal. IDW should not be stored on-site longer than ninety (90) days. A copy of the disposal manifest and/or acceptance letter from the receiving facility that clearly designates the quantity received must be included as an appendix to the report. If the CoC concentrations, based on laboratory analysis, are below RBSLs, please contact the project manager for approval to dispose of soil and/or groundwater on site. The SUPERB Account will not reimburse for transportation or treatment of soil and/or groundwater with concentrations below RBSLs.

On all correspondence or inquiries regarding these contracts, please reference UST Permit number 07680. If you have any questions, please contact me at (803) 896-6669, or fax me at (803) 896-6245.

Sincerely,

Arthur Shrader, Hydrogeologist
Assessment Section
Assessment and Corrective Action Division
Underground Storage Tank Program
Bureau of Land and Waste Management

Enc: Site Map with Proposed Monitoring Well Locations
Approved Cost Agreement (ACA)
Monitoring Well Approval (ACA)

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (with enc.)
Technical File (with enc.)

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Monitoring Well Installation Approval Form

Approval is hereby granted to: Terracon Consultants, Incorporated
(on behalf of): Crown Central Petroleum
Facility: Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit Number: 07680
County: Richland

This approval is for the installation of six temporary, six shallow, and three deep pit cased monitoring wells. The monitoring wells are to be installed in the approved locations. Monitoring wells are to be installed following the South Carolina Well Standards, R.61-71, and the applicable guidance documents.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.

2. All monitoring wells shall be labeled as required by R.61-71.H.2.c.

3. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted to the Department within 30 days after well completion or abandonment unless another schedule has been approved by the Department. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f

4. All analytical data and water levels obtained from each monitoring well shall be submitted to the Department within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.

5. If any of the information provided to the Department changes, notification to Arthur Shrader (tel: (803) 896-6669 or e-mail: shradeaa@dhec.sc.gov) shall be provided a minimum of twenty-four (24) hours prior to well construction as required by R.61-71.H.1.a.

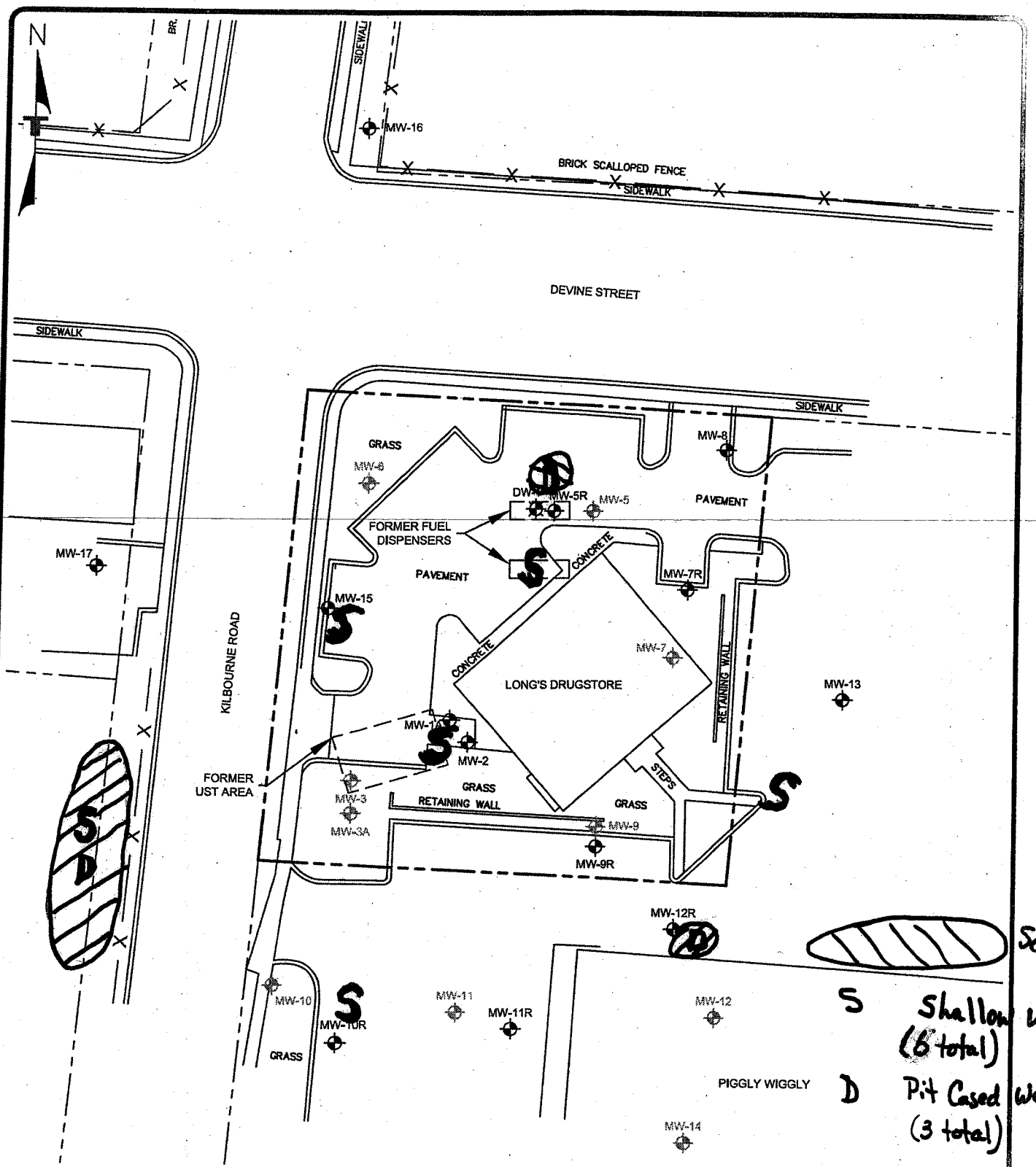
6. All temporary monitoring wells shall be abandoned within 5 days of borehole completion using appropriate methods as required by R.61-71.H.4.c. All other wells shall be properly developed per R.61-71.H.2.d.

7. Departmental approval is required prior to abandonment of all monitoring wells as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002. A copy of this approval should be on the site during well installation.

Date of Issuance: **October 9, 2008** **Approval #:** **UMW-22130**

Arthur Shrader, Hydrogeologist
Assessment Section
Division of Assessment and Corrective Action
Bureau of Land and Waste Management



EXPLANATION

- MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	MDR	Terracon	Project No. 73078012
Designed By:	MDR		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road	Date: 7-1-08
Approved By:	CRC	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 3

Approved Cost Agreement 34014

Facility: 07680 SC015
SHRADEAA
PO Number:

Task / Description	Categories	Item Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB					
		A EQUIPMENT	2.0000	575.00	1,150.00
		B PERSONNEL	4.0000	290.00	1,160.00
06 SOIL BORINGS (DRILLED)					
		A SOIL BORINGS & FLD SCREENING	500.0000	17.00	8,500.00
08 ABANDONMENT					
		ABANDONMENT	500.0000	5.00	2,500.00
09 WELL INSTALLATION					
		B WATER TABLE (DRILLED)	300.0000	38.00	11,400.00
		C TELESCOPING	195.0000	58.00	11,310.00
10 SAMPLE COLLECTION					
		A GROUND WATER	9.0000	55.00	495.00
		D GROUNDWATER NO-PURGE	10.0000	35.00	350.00
11 ANALYSES					
	GW GROUNDWATER	A BTEX+NAPTH+MTBE	25.0000	100.00	2,500.00
		BB 1,2-DCA	19.0000	10.75	204.25
		E LEAD	19.0000	20.00	380.00
		F EDB	19.0000	55.00	1,045.00
		K NITRATE	19.0000	20.00	380.00
		L SULFATE	19.0000	20.00	380.00
		M FERROUS IRON	19.0000	20.00	380.00
		P 8 OXYGENATES	19.0000	85.00	1,615.00
	SOIL SOIL	Q BTEX+NAPTH	9.0000	100.00	900.00
		W GRAIN SIZE/HYDROMETER	2.0000	75.00	150.00
16 SUBSEQUENT SURVEY					
		SUBSEQUENT SURVEY	1.0000	260.00	260.00
17 DISPOSAL					
		A1 WASTEWATER - PURGING/SAMPLING	3.0000	90.00	270.00
		C SOIL (TREATMENT/DISPOSAL)	25.0000	50.00	1,250.00
19 RPT/PROJECT MNGT & COORDINATIO					
		PCT PERCENT	0.1500	46,579.25	6,986.89
				Total Amount	53,566.14

D H E C

PROMOTE PROTECT PROSPER

~~Amen~~ Addendum

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

Monitoring Well Installation Approval Form

Approval is hereby granted to: Terracon Consultants, Incorporated
(on behalf of): Crown Central Petroleum
Facility: Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit Number: 07680
County: Richland

This approval is for the installation of six temporary, six shallow, and four deep pit cased monitoring wells. The monitoring wells are to be installed in the approved locations. Monitoring wells are to be installed following the South Carolina Well Standards, R.61-71, and the applicable guidance documents.

Please note that R.61-71 requires the following:

1. All wells shall be drilled, constructed, and abandoned by a South Carolina certified well driller per R.61-71.D.1.
2. All monitoring wells shall be labeled as required by R.61-71.H.2.c.
3. A Water Well Record Form or other form provided or approved by the Department shall be completed and submitted to the Department within 30 days after well completion or abandonment unless another schedule has been approved by the Department. The form should contain the "as-built" construction details and all other information required by R.61-71.H.1.f
4. All analytical data and water levels obtained from each monitoring well shall be submitted to the Department within 30 days of receipt of laboratory results unless another schedule has been approved by the Department as required by R.61-71.H.1.d.
5. If any of the information provided to the Department changes, notification to Arthur Shrader (tel: (803) 896-6669 or e-mail: shradeaa@dhec.sc.gov) shall be provided a minimum of twenty-four (24) hours prior to well construction as required by R.61-71.H.1.a.
6. All temporary monitoring wells shall be abandoned within 5 days of borehole completion using appropriate methods as required by R.61-71.H.4.c. All other wells shall be properly developed per R.61-71.H.2.d.
7. Departmental approval is required prior to abandonment of all monitoring wells as required by R.61-71.H.1.a.

This approval is pursuant to the provisions of Section 44-55-40 of the 1976 South Carolina Code of Laws and R.61-71 of the South Carolina Well Standards and Regulations, dated April 26, 2002. A copy of this approval should be on the site during well installation.

Date of Issuance: **February 3, 2009** **Approval #:** **UMW-22130**

Arthur Shrader, Hydrogeologist
Assessment Section
Division of Assessment and Corrective Action
Bureau of Land and Waste Management

UST DOCKET
6tec

ADDITIONAL ASSESSMENT REPORT
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST PERMIT # 07680

Prepared for:

Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:

Terracon Consultants, Inc.
521 Clemson Road
Columbia, South Carolina 29229

May 1, 2009
Terracon Project No. 73078012

Terracon

Consulting Engineers & Scientists

Terracon Consultants, Inc.
521 Clemson Road
Columbia, SC 29229
Phone (803) 741-9000
Fax (803) 741-9900
www.terracon.com

May 1, 2009

Mr. Arthur Shrader
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: **Additional Assessment Report**
Former SC-015
3800 Devine Street, Columbia, South Carolina
UST Permit # 07680, CA # 34014
Terracon Project No. 73078012

Dear Mr. Shrader:

On behalf of Crown Central LLC, **Terracon Consultants, Inc.** is pleased to submit this Additional Assessment Report for the Former SC-015 facility located at 3800 Devine Street in Columbia, South Carolina. This report summarizes the monitoring well installations, ground water sampling activities, and our findings, conclusions, and recommendations.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.

Charles K. Suddeth for

Regan Norris
Environmental Scientist

P. Michael Hudgins

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

Attachment

cc: Jim Janson/Crown Central, LLC

TABLE OF CONTENTS

ADDITIONAL ASSESSMENT REPORT
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT # 07680

Cover Letter

TABLE OF CONTENTS ..... **i**

1.0 INTRODUCTION **1**
1.1 Site Description and History 1

2.0 INVESTIGATIVE METHODS **2**
2.1 Ground Water Screening 2
2.2 Monitoring Well Installation 3
2.3 Soil Sampling 4
2.4 Groundwater Sampling **5**

3.0 ASSESSMENT RESULTS **6**
3.1 Soil Screening and Analytical Results **6**
3.2 Site Geology and Hydrogeology **6**
3.3 Groundwater Screening Results **7**
3.4 Groundwater Analytical Results **8**

4.0 CONCLUSIONS AND RECOMMENDATIONS **8**

FIGURES

1 Topographic Map
2 Surrounding Land Use Map
3 Site Map
4 Ground Water Screening Results
5 Site Map with Cross-Section Transects
6 Geologic Cross Section C-C'
7 Geologic Cross Section D-D'
8 Potentiometric Surface Map of the Upper Portion of the Shallow Aquifer
9 Potentiometric Surface Map of the Intermediate Portion of the Shallow Aquifer
10 Potentiometric Surface Map of the Lower Portion of the Shallow Aquifer
11 Benzene / MTBE Concentration Map of the Upper Portion of the Shallow Aquifer

TABLE OF CONTENTS (Cont.)

ADDITIONAL ASSESSMENT REPORT
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT # 07680

TABLES

1 Ground Water Screening Data – Petroleum Compounds
2 Soil Analytical Data – Petroleum Compounds
3 Ground Water Elevation Data
4 Ground Water Analytical Data – Petroleum Compounds
5 Ground Water Analytical Data – Petroleum Additives (Oxygenates)
6 Ground Water Analytical Data – Natural Attenuation Indicator Parameters

APPENDICES

A Geologist Logs and Water Well Forms
B Ground Water Sampling Logs
C Chemical Analytical Data
D Waste Disposal Manifest
E Grain Size Analyses

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the monitoring well installation and ground water sampling and analysis at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement # 34014 and the Risk Based Corrective Action (RBCA) guidance document prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1). A site vicinity map showing surrounding land usage is included as Figure 2.

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed in July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

Since 1989, assessment activities have included installation of fifteen permanent monitoring wells on the property and adjacent properties. A site map showing the former and existing monitoring well locations is presented as Figure 3. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water was identified in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow

is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

Redevelopment of the site in 2001 included construction of the Long's Drugstore and the expansion of the adjacent Piggly Wiggly grocery store. Despite Crown's efforts to protect the existing wells, nine monitoring wells (MW-3, MW-5, MW-6, MW-7, MW-9, MW-10, MW-11, MW-12, and MW-14) were destroyed during construction.

In May 2008, Terracon replaced six shallow monitoring wells (MW-5, MW-7, MW-9 through MW-12); installed a new shallow well to the west of the site (MW-17); and installed a new deep well in the vicinity of the former dispenser islands (DW-1). Significant shallow soil contamination was identified in the dispenser island area. Also, petroleum hydrocarbons were detected at concentrations above RBSLs in ground water samples from four shallow monitoring wells (MW-5R, MW-7R, MW-9R, and MW-12) and one deep monitoring well (DW-1). Terracon recommended Aggressive Fluid Vapor Recovery (AFVR) be performed on monitoring well MW-5R in order to remove the petroleum compounds from the source area soils and to decrease the high dissolved concentrations in ground water.

In October 2008, the SCDHEC issued a directive to replace monitoring wells to further define the horizontal and vertical extent of the hydrocarbon plume, and to evaluate the current ground water quality conditions. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 INVESTIGATIVE METHODS

2.1 Ground Water Screening

In order to evaluate the extent ground water impact, Terracon conducted ground water screening on the St. Joseph's Church and School property, located to the southwest of the site across Kilbourne Road, at the source area (DW-1), and downgradient from the site (MW-12R.

Terracon mobilized to the St. Joseph's property on November 26, 2008, to perform the ground water screening. Three temporary monitoring wells (TW-1, TW-2, and TW-4) were installed as a single-cased, Type II wells using 1-inch schedule 40 PVC casing and 10 feet of 0.010-inch slotted screen. An appropriately graded sand filter pack was placed within the

annulus opposite each well screen to a height of approximately five feet above the top of the well screen. Ground water samples were collected from the temporary wells using dedicated, disposable tubing and a check valve and submitted for laboratory analysis for BTEX, MtBE, and naphthalene.

Upon sample collection, the three temporary wells were abandoned in accordance with state regulations. Ground water screening to determine the vertical extent of impact at monitoring wells MW-5D and MW-12D is described in Section 2.2 and 3.3, below.

Soil cuttings generated during well installation were contained in 55-gallon drums and disposed by A&D Environmental Services (SC), LLC, Lexington, South Carolina. The disposal manifest is included in Appendix D.

2.2 Monitoring Well Installation

Ten monitoring wells were constructed as part of this assessment as follows:

Shallow

MW-1R – shallow well installed in former UST area
MW-15R - installed as a replacement well for MW-15 (normally dry)
MW-18D – shallow well installed to evaluate the vertical extent offsite
MW-19 - installed as a replacement well for MW-10R (normally dry)
MW-20 - installed as a downgradient shallow well
MW-21 - installed as a source area (dispenser) well

Deep

MW-5D - installed as a deep well for vertical extent at the dispenser island
MW-5DD - installed as a deeper vertical extent well, based on results of MW-5D sample
MW-12D - installed as a downgradient deep well
MW-18D - installed as a single-cased deep well to evaluate the vertical extent offsite

Each shallow monitoring well was installed as a single-cased, Type II well using 2-inch schedule 40 PVC casing and 15 feet of 0.010-inch slotted screen. The deep wells were installed with 5 feet of 0.010-inch slotted screen. An appropriately graded sand filter pack was placed within the annulus opposite each well screen to a height of approximately two feet above the top of the well screen. A minimum one-foot bentonite pellet layer was placed above the sand filter pack in each well and hydrated. The remaining annulus of each well was grouted to land surface with cement grout. The wells were completed below-grade within steel protective manhole covers, and a 2x2 foot concrete pad was constructed around each well. Well construction details are included on the Geologist Logs and on Table 3.

Deep monitoring wells MW-12D and MW-5D were installed as a double-cased, Type III wells using 5-inch schedule 40 PVC outer casing set to 35 and 45 feet (respectively) and 2-inch schedule 40 PVC inner casing and 5 feet of 0.010-inch slotted screen initially set to 60 feet and 70 feet, respectively. After the bentonite seal was hydrated, the wells were developed and sampled with a dedicated disposable bailer as a groundwater screening. The ground water samples were submitted for rush analysis of BTEX, naphthalene, and MTBE per EPA Method 8260B. The analytical results indicated BTEX compounds exceeded RBSLs, therefore the inner casings and screens were extracted and discarded, the boring was advanced to depths of 75/85 feet (respectively) via mud rotary drilling, and the wells were reconstructed.

Monitoring well MW-5DD was installed with 5-inch PVC outer casing to 85 feet, and drilled with air rotary methods to a depth of 120 feet; however, the borehole collapsed three feet during well installation and the well was screened between 112 and 117 feet. Well construction details are included on the Geologist Logs and on Table 3.

All drilling and well installation was performed by a South Carolina Certified Well Driller per the South Carolina Well Standards R.61-71. The geologist logs for the borings and water well records (SCDHEC 1903 form), as compiled by the certified driller, are included in Appendix A.

After installation, the wells were developed by bailing until the pH and specific conductivity of the water stabilized and the wells were producing relatively clear water. Soil cuttings and water generated during well drilling and development were collected in 55-gallon drums and disposed by A&D Environmental Services (SC), LLC, Lexington, South Carolina. The disposal manifest is included in Appendix D.

The location of each well and vertical elevation of the top of each well casing were surveyed by Terracon personnel relative to DW-1, MW-12R, or MW-5R. The top of casing (TOC) elevation data are included in Table 3.

2.3 Soil Sampling

The soil sample with the greatest organic vapor screening concentration was collected from each of the new well areas. These soil samples were collected into laboratory prepared containers, placed in cooler refrigerated with ice, and delivered with chain-of-custody documentation to Access Analytical, Inc. for benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds and naphthalene per EPA Method SW-846 8260B. The laboratory analytical report and chain-of-custody information for these soil samples is included in Appendix C. A summary of the soil analytical data is presented in Table 2.

2.4 Groundwater Sampling

Ground water sampling of monitoring wells was performed at the former SC-015 site on January 20 and 23, 2008. Water levels were measured in the monitoring wells using an electric water level indicator and converted to elevations relative to TOC elevations. A summary of the water level data is presented on Table 2. Potentiometric surface maps of the upper, intermediate, and lower portions of the shallow aquifer are included as Figures 8, 9, and 10, respectively.

19 site monitoring wells were sampled as part of this assessment. Nine newly-installed monitoring wells (shallow wells MW-18 through MW-21 and deep wells MW-18D, MW-5D, MW-12D, and MW-5DD) were purged with a dedicated disposable polyethylene bailer prior to sampling. Newly-installed monitoring well MW-19 was sampled without purging due to the small volume of water available. Nine pre-existing monitoring wells that bracketed the water table were not purged prior to sampling. Five wells (MW-1A, MW-2, MW-10R, MW-13, and MW-15) were dry at the time of sampling or contained an insufficient volume of water for sample collection.

Ground water samples were collected using disposable polyethylene bailers dedicated to each well. Dissolved oxygen, specific conductance, pH, and temperature measurements were taken prior to sampling and were recorded on Ground Water Sampling Logs, included in Appendix B. Samples were placed in an iced cooler and delivered along with chain of custody documentation to Access Analytical, Inc. in Irmo, South Carolina for analysis of the following parameters:

Analysis	Method
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Methyl-tert-butyl-ether (MTBE) Naphthalene 1,2-dichloroethane (1,2-DCA) 8 Oxygenates	EPA Method 8260B
Total lead	EPA Method 6010B
1,2-dibromoethane (EDB)	EPA Method 8011
Nitrate/Nitrite	EPA Method 353.2 N+N
Sulfate	EPA Method 375.4 Sulfate
Ferrous Iron	SM 3500—Fe D

Ground water analytical results are included in Table 4 (Petroleum Compounds), Table 5 (Petroleum Additives), and Table 6 (Natural Attenuation Indicator Parameters). Copies of the laboratory analytical reports are included in Appendix C.

3.0 ASSESSMENT RESULTS

3.1 Soil Screening and Analytical Results

Screening of organic vapor concentrations in soils was conducted during installation of the monitoring wells. Elevated (> 1,000 ppm) organic vapor concentrations were noted from 13 to 15 feet depth at monitoring well MW-21. Below 20 feet, the organic vapor concentrations decreased rapidly with depth.

A total of six soil samples were submitted for laboratory analysis, selected based on the highest organic vapor screening result above the water table. Soil analytical results are included in Table 1.

Inspection of Table 1 indicates concentrations of BTEX and naphthalene in the soil sample collected from 13.5 to 15 feet depth in monitoring well MW-21 significantly exceeded RBSLs. The contaminants of concern (COCs) were below detection limits or RBSLs in the soil samples collected from all other monitoring wells installed for this assessment.

3.2 Site Geology and Hydrogeology

Based on the geologist logs of monitoring wells installed at the site, the site is underlain by sands and silty/clayey sands approximately 10 to 19 feet thick, overlying very fine-grained materials including sandy silts, silts, and clays. This silt/clay unit is of variable thickness, ranging from 6 to more than 25 feet across the site. Based upon the lithology data collected from monitoring wells MW-5D, MW-18, and MW-21, this silt/clay unit is underlain by a sand layer of unknown thickness and extent.

Soil samples collected from 13.5-15 feet depth at monitoring well MW-5R and from 33.5-35 feet and 38.5-40 feet at deep monitoring well DW-1 were submitted for grain-size analysis and hydrometer testing. The grain-size analysis results are summarized below and are included with the hydraulic conductivity data in Appendix E:

	MW-5R	DW-1	DW-1
Depth (ft)	60-65	25-27	50-52
Sand (%)	47	13	68
Silt (%)	31	20	13
Clay (%)	22	67	55
Description	Tan silty clayey fine to medium Clayey Silt	Tan silty clayey fine to medium Silty Clay	Light tan silty CLAY with fine sand

Two geologic cross-sections (C-C' and D-D') were constructed using data obtained from the monitoring wells installed during this assessment and from previous data (Figures 6 and 7, respectively). The cross-section transects are indicated on Figure 5.

The hydrogeology of the shallow aquifer site can be classified into three distinct intervals; shallow, intermediate and deep, described as follows:

Shallow - 25 to 35 feet depth; measured in shallow wells installed to bracket the water table. The potentiometric surface of this unit indicates ground water flows to the southwest, and southeast (Figure 8).

Intermediate - 55-70 feet depth; most intermediate wells installed on top of low permeability sediments or interbedded sand and clay units. Ground water in this zone flows to the east (Figure 9).

Deep - 80-120 feet depth: installed in clayey sand and silty sand. Ground water measurements recorded in the four deep wells (excluding MW-5DD) indicates ground water in this zone flows to the north east (Figure 10).

The water level separation in the shallow/deep well pairs MW-5R/DW-1, MW-12/12R, and MW-5R/5D were recorded to be approximately 27 to 34 feet from the shallow and deep portions of the shallow aquifer, indicating a downward vertical hydraulic gradient exists between the perched and semi-confined units.

3.3 Groundwater Screening Results

Shallow ground water screening points TW-1, TW-2, and TW-4 were installed to define the western portion of the shallow plume. No water was encountered at the shallow (10 – 20 ft.) interval at TW-1 and TW-2, however water was encountered at TW-4 above 20 feet. TW-1 and TW-2 were extended to 40 feet in order to bracket the intermediate depth water, encountered between 40 and 45 feet. No petroleum compounds were detected in any of the samples collected from these temporary wells.

Screening was conducted on the intermediate portion of the shallow aquifer (45 - 60 ft.) during of installation of MW-5D and MW-12D, as described in Section 2.2. The analytical results indicated BTEX compounds exceeded RBSLs, therefore the inner casings and screens were extracted and discarded, the boring was advanced to depths of 75/85 feet (respectively) via mud rotary drilling, and the wells were reconstructed.

The field screening boring locations and results are indicated on Figure 4 and Table 1. Field screening results were submitted to the SCDHEC project manger for review prior to installation of the permanent monitoring wells.

3.4 Groundwater Analytical Results

Free product was not measured in any of the monitoring wells during this assessment. BTEX, MTBE, and EDB RBSLs were exceeded in the groundwater samples from monitoring wells MW-5R and MW-21, located at the former dispenser island area. Benzene, MTBE or naphthalene concentrations also were detected in excess of the RBSL in shallow downgradient monitoring wells MW-1R, MW-15R, and MW-12R.

Benzene concentrations exceeded the RBSLs in the groundwater samples from intermediate and deep wells DW-1 and MW-5D (respectively).

1,2-dichloroethane (1,2-DCA) was detected above the SCDHEC Action Levels (ALs) in monitoring well MW-1R only. ALs for oxygenates as t-butanol (TBA) and t-amyl methyl ether (TAME) were greatly exceeded in monitoring well MW-5R. Petroleum oxygenates are listed as Table 5.

Natural attenuation indicator parameters, including nitrate/nitrite, sulfate, and ferrous iron concentrations, were analyzed as part of the Tier II Assessment, and are listed in Table 6. Comparison of this data to the contaminant concentrations indicates nitrates and sulfate concentrations within the plume do not correlate to expected relative distributions produced during intrinsic biodegradation processes. However, ferrous iron concentrations were relatively high within the plume as compared to background concentrations. It appears that biodegradation via ferric iron reduction is the dominant biodegradation process acting within the plume at this time.

A groundwater Benzene/MTBE concentration map is included as Figure 11. The zone of RBSL exceedance appears to be approximately 240 feet long from the upgradient edge northwest of MW-5R to the downgradient edge southeast of monitoring well MW-12R and is approximately 90 feet wide. Inspection of Figure 11 indicates the zone of RBSL exceedances does not extend beyond the adjacent Piggly Wiggly property.

4.0 CONCLUSIONS AND RECOMMENDATIONS

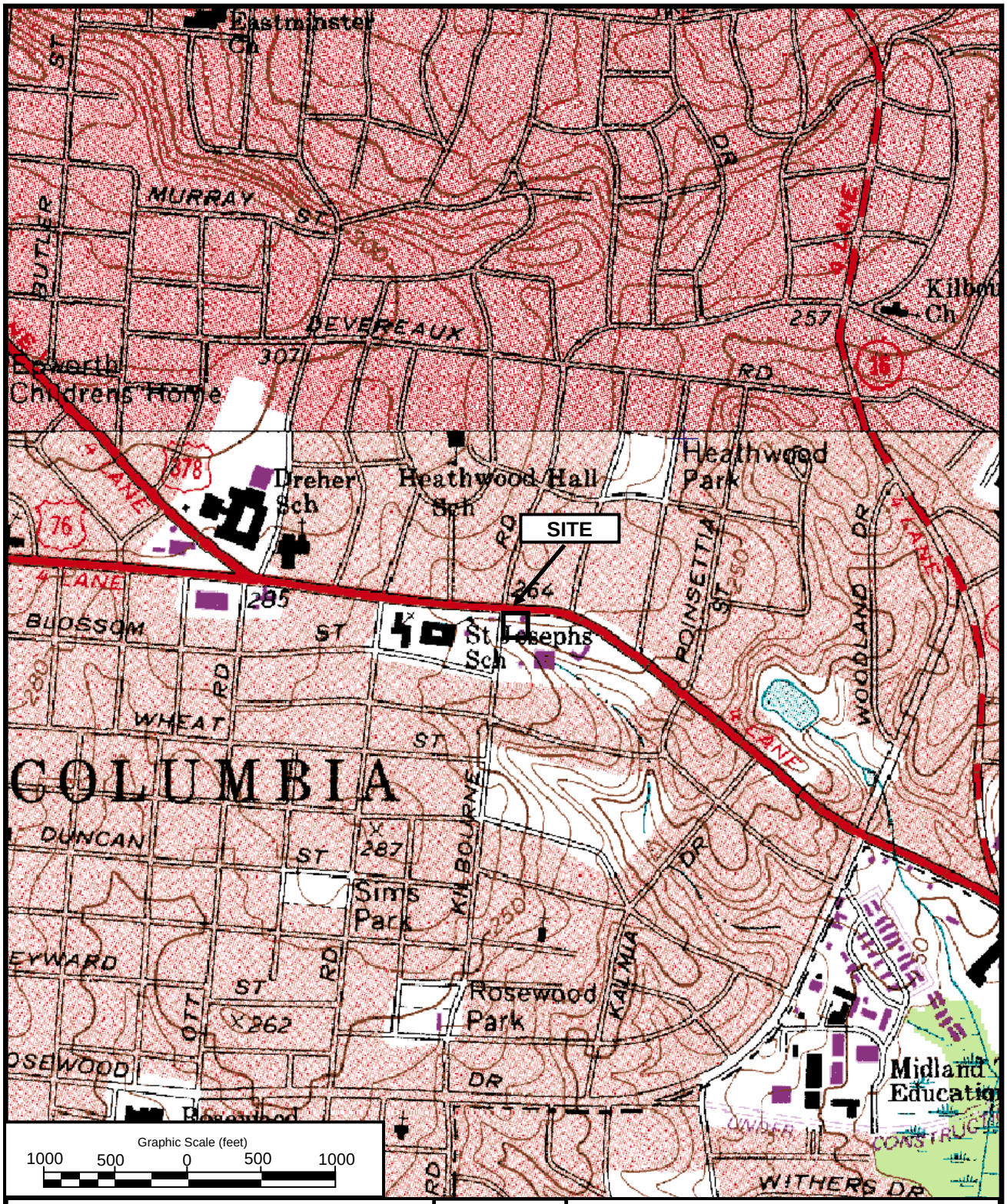
Based upon the results of our site assessment activities, the ground water beneath the site and the adjacent property has been impacted by dissolved-phase hydrocarbons at concentrations above allowable levels. The horizontal and vertical extent of the contaminants in the upper, intermediate, and lower portions of the shallow aquifer downgradient from the UST system has been defined by the field screening and monitoring well network.

Inspection of the historical ground water quality data indicates the contaminants in ground water are being reduced by natural attenuation processes. Based on the date of reported

release, it is apparent that the contaminant plume movement in the shallow aquifer is effectively impeded by degradation of the contaminants through physical, biological, and chemical degradation processes.

Although measurable thicknesses of free-product were not observed in any of the site monitoring wells, the contaminant concentrations observed in samples from monitoring wells MW-5R indicate the potential for free product development in this vicinity. Terracon recommends Aggressive Fluid Vapor Recovery (AFVR) be performed on monitoring well MW-5R in order to remove the petroleum compounds from the source area soils and to decrease the high dissolved concentrations in groundwater. Once the high concentrations have been reduced, this site may be an appropriate candidate for remediation by monitored natural attenuation.

FIGURES



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

DATE: 1982
SCALE: 1 INCH = 1000 FEET

PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



GRAPHIC SCALE

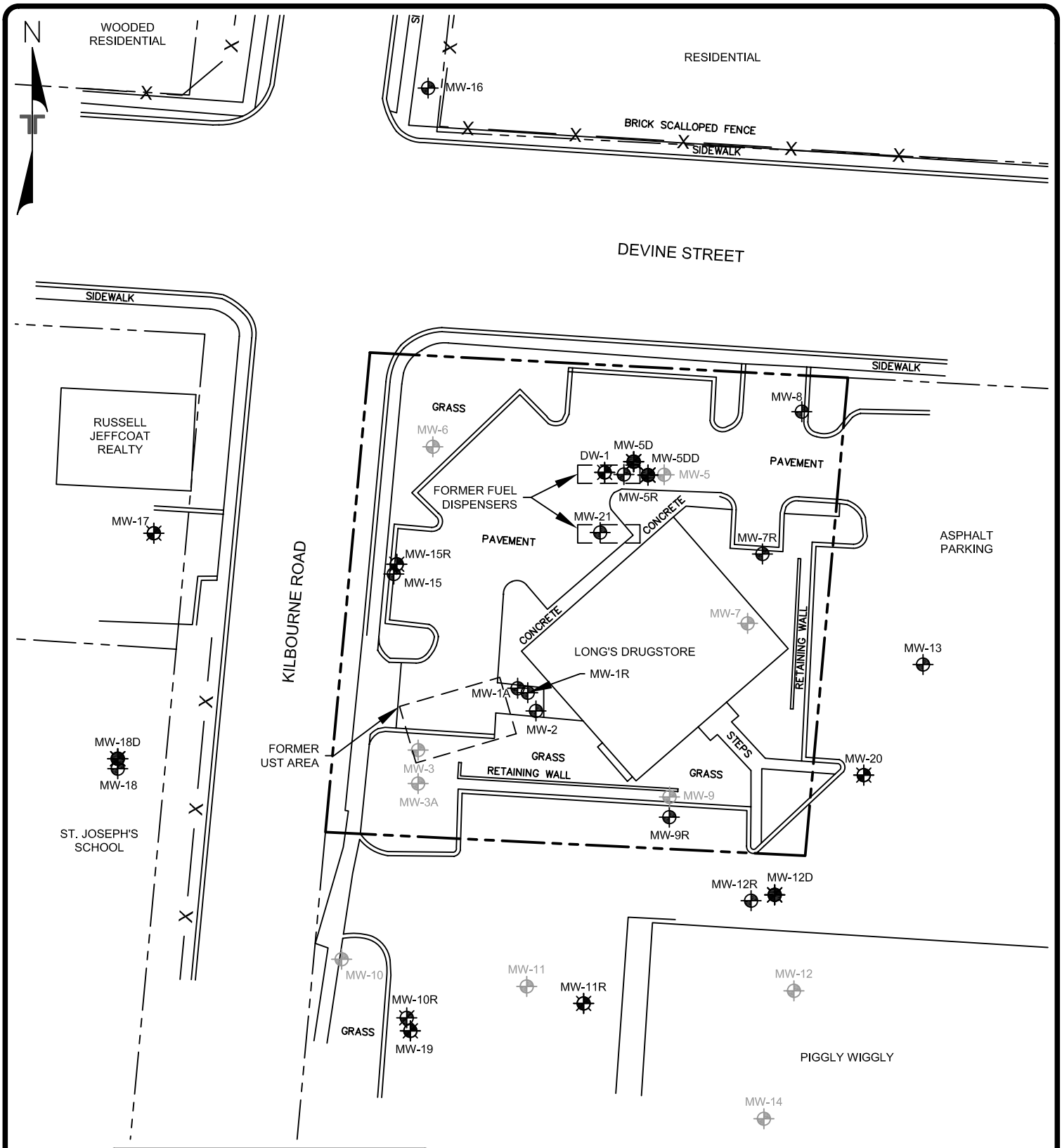
100 0 100

(FEET)

DIAGRAM IS FOR GENERAL LOCATION ONLY,
AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE VICINITY MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 100 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

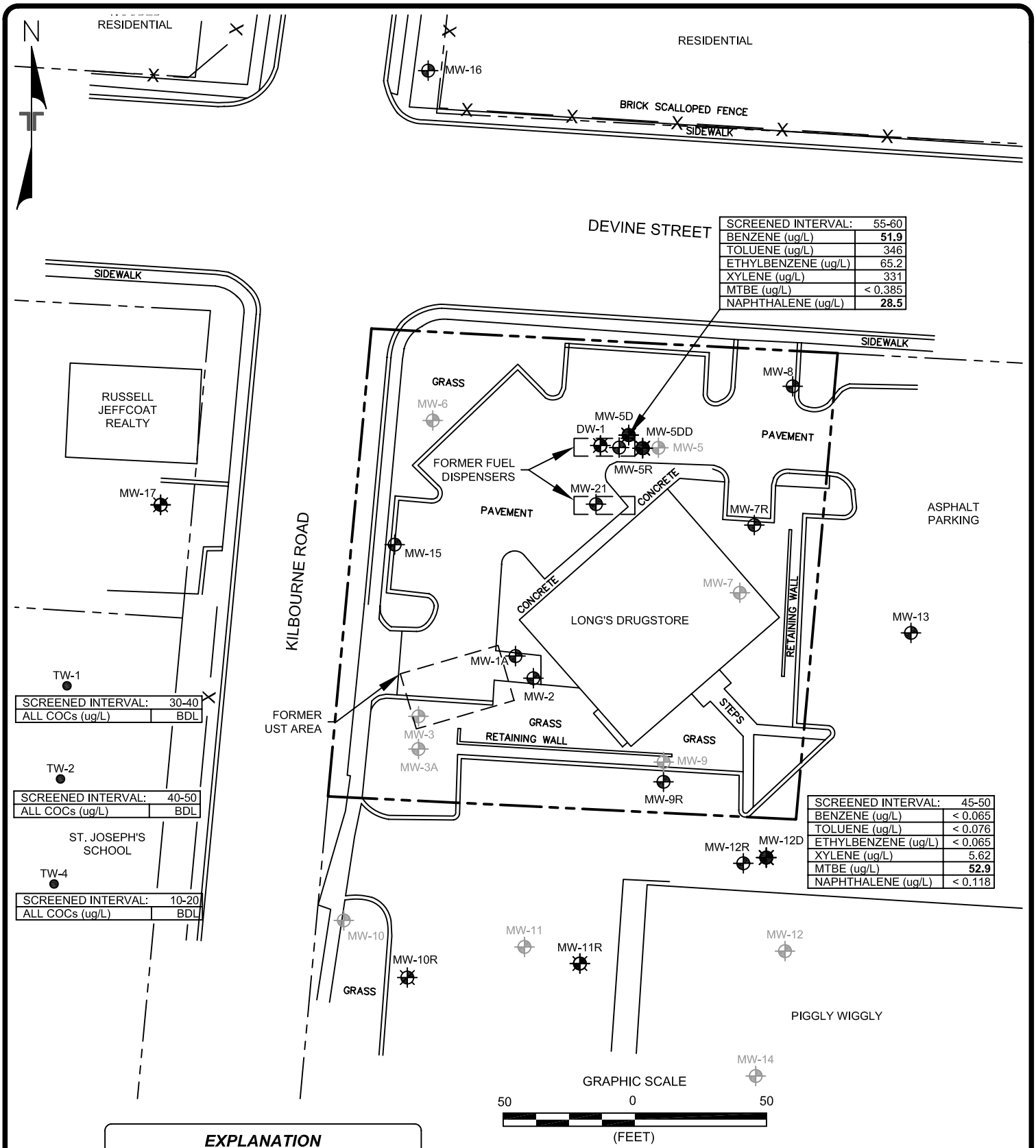
GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 3



EXPLANATION

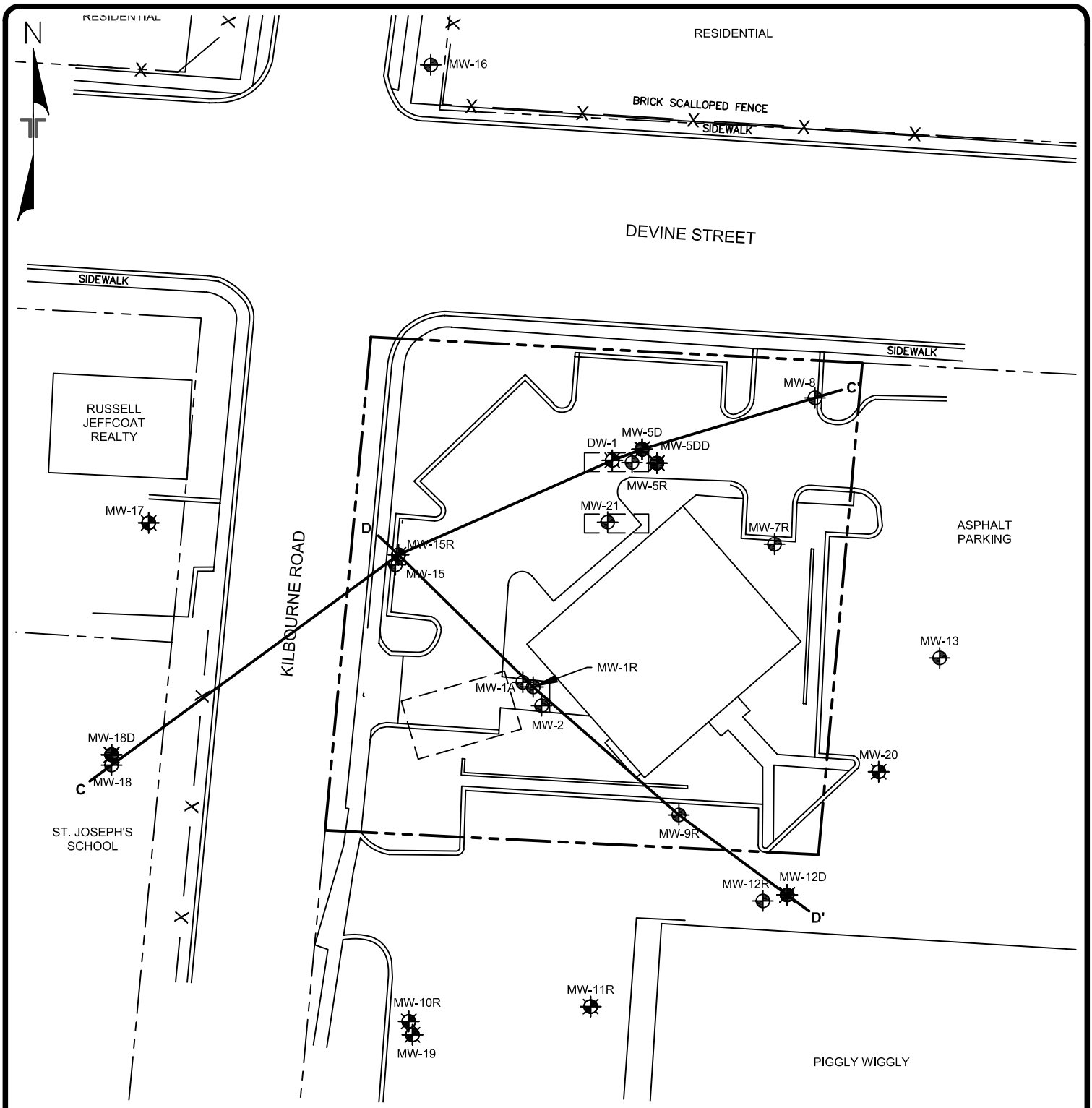
- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL
- TEMPORARY MONITORING WELL
- ug/L — MICROGRAMS PER LITER
- BDL — BELOW DETENTION LIMITS

CONCENTRATIONS IN BOLD EXCEED RBSLs.

GROUNDWATER SCREENING RESULTS
FORMER SC-015

3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 4



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- A——A' CROSS SECTION TRANSECTS
- APPROXIMATE PROPERTY BOUNDARY

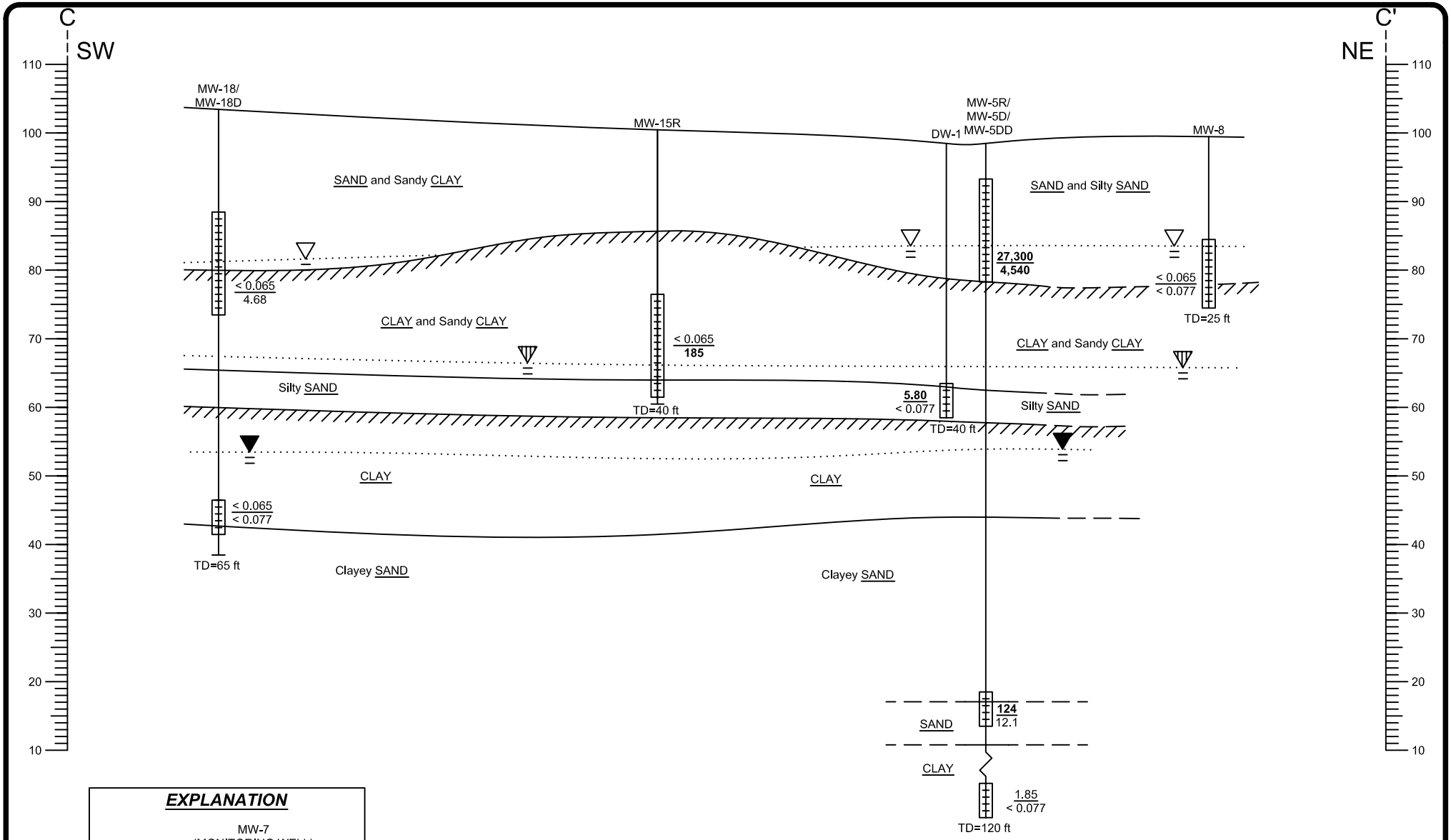
GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP WITH CROSS SECTION TRANSECTS
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road	Date: 4-23-09
Approved By:	PMH	Columbia, South Carolina 29229	Drawn By: PTK
File Name: \73078012.dwg			Figure No. 5



EXPLANATION

MW-7 (MONITORING WELL)

SHALLOW WATER LEVEL

INTERMEDIATE WATER LEVEL

DEEP WATER LEVEL

SCREEN INTERVAL

TD = TOTAL DEPTH (in feet)

35,300 BENZENE CONCENTRATION
7,100 MTBE CONCENTRATION

CONCENTRATIONS IN BOLD EXCEED RBSLs

HORIZONTAL GRAPHIC SCALE

40 0 40

(FEET)

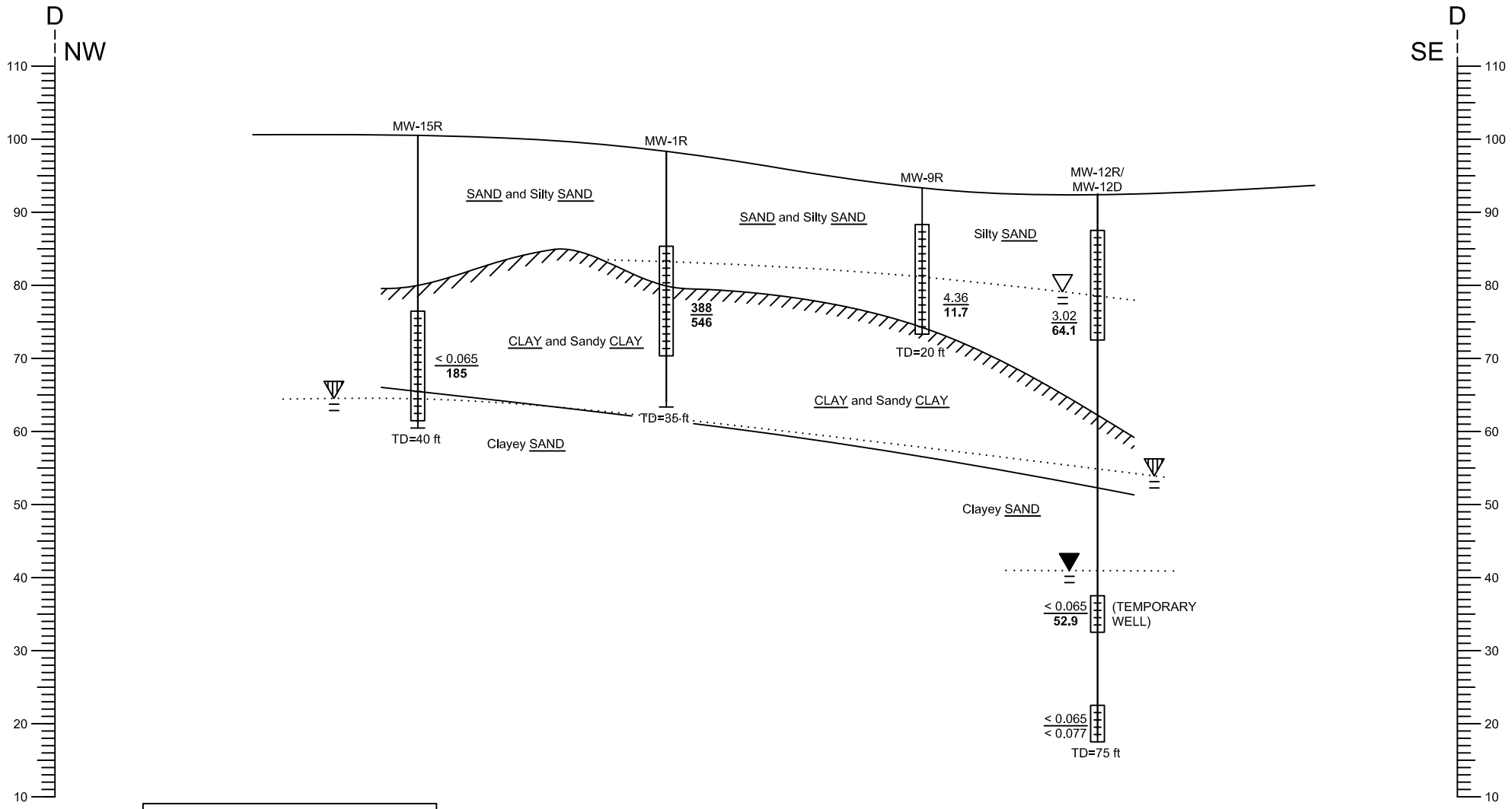
VERTICAL GRAPHIC SCALE

20 0 20

(FEET)

GEOLOGIC CROSS SECTION C-C'
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH	521 Clemson Road	Scale: AS SHOWN
Checked By:	PMH	Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 6



EXPLANATION

MW-7
(MONITORING WELL)

SHALLOW WATER LEVEL

INTERMEDIATE WATER LEVEL

DEEP WATER LEVEL

SCREEN INTERVAL

TD = TOTAL DEPTH (in feet)

35,300 / 7,100 BENZENE CONCENTRATION / MTBE CONCENTRATION

CONCENTRATIONS IN BOLD EXCEED RBSLs

HORIZONTAL GRAPHIC SCALE

40 0 40

(FEET)

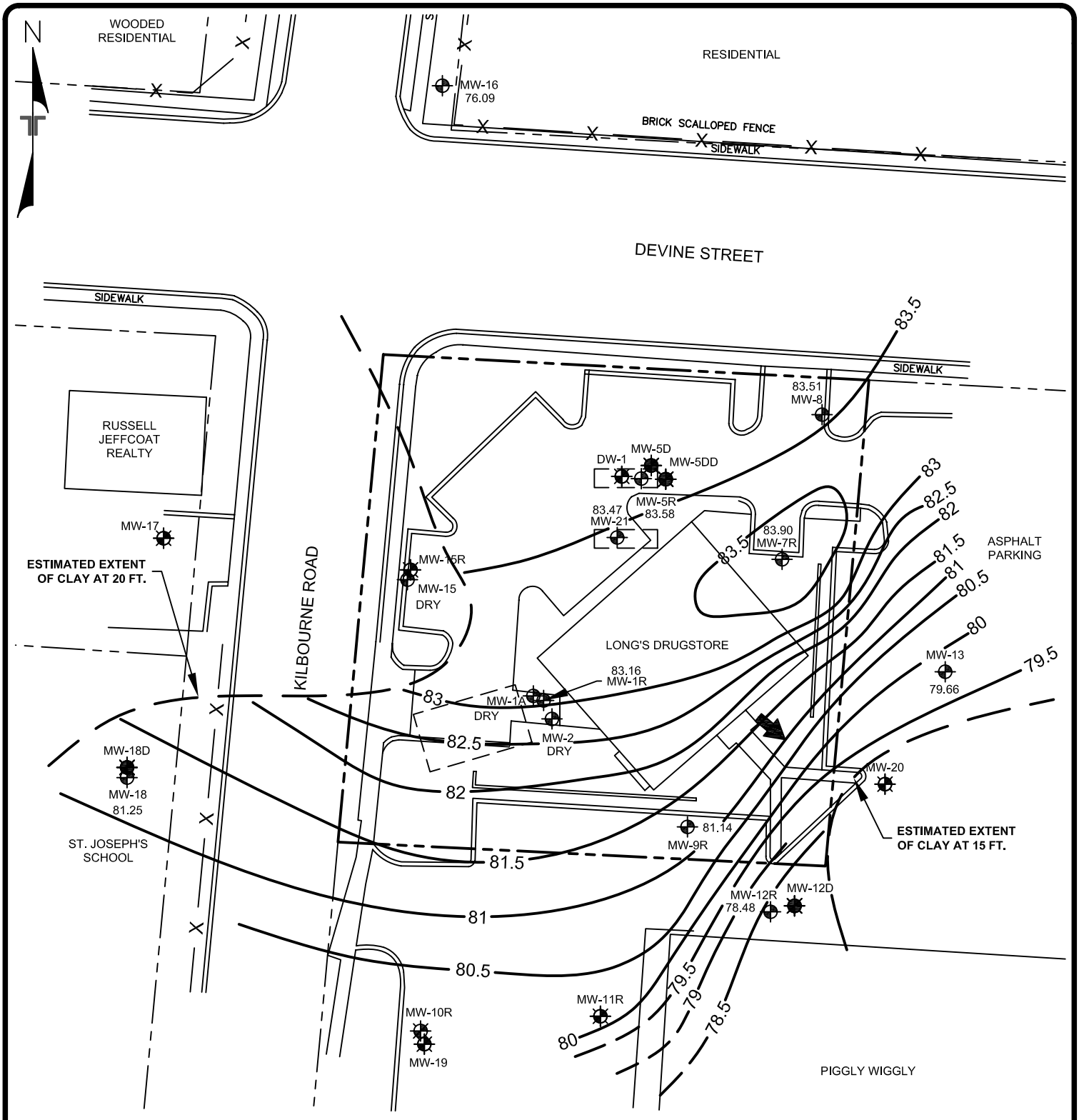
VERTICAL GRAPHIC SCALE

20 0 20

(FEET)

GEOLOGIC CROSS SECTION D-D'
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH	521 Clemson Road	Scale:	AS SHOWN
Checked By: PMH	Columbia, South Carolina 29229	Date:	4-23-09
Approved By: PMH		Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	7



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

NOTE: GROUND WATER ELEVATIONS WERE RECORDED ON JANNUARY 20, 2009.

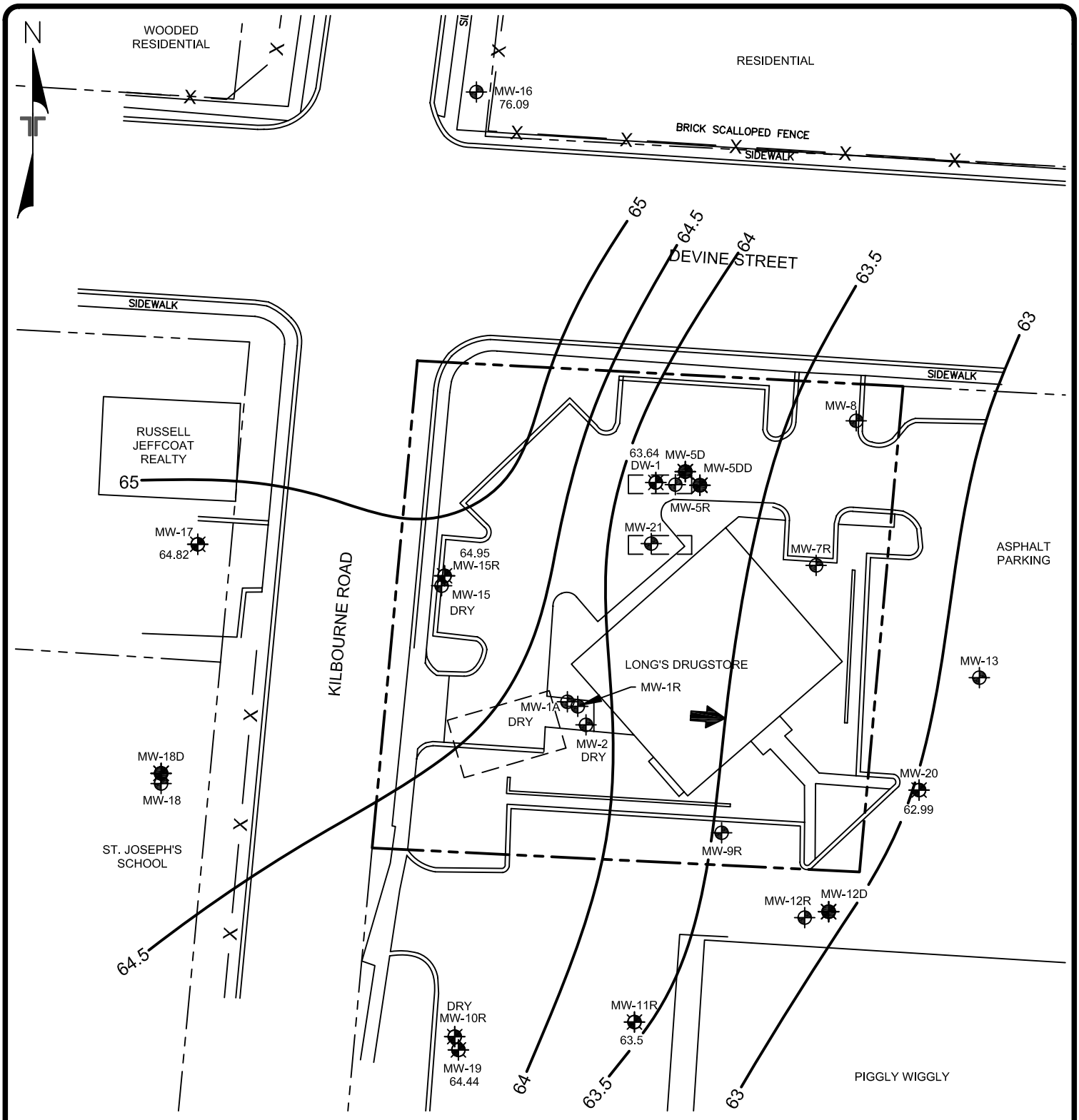
GRAPHIC SCALE

50 0 50

(FEET)

SHALLOW POTENTIOMETRIC SURFACE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH		Scale:	1 IN = 50 FT
Checked By: PMH	521 Clemson Road	Date:	4-23-09
Approved By: PMH	Columbia, South Carolina 29229	Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	8



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

GRAPHIC SCALE

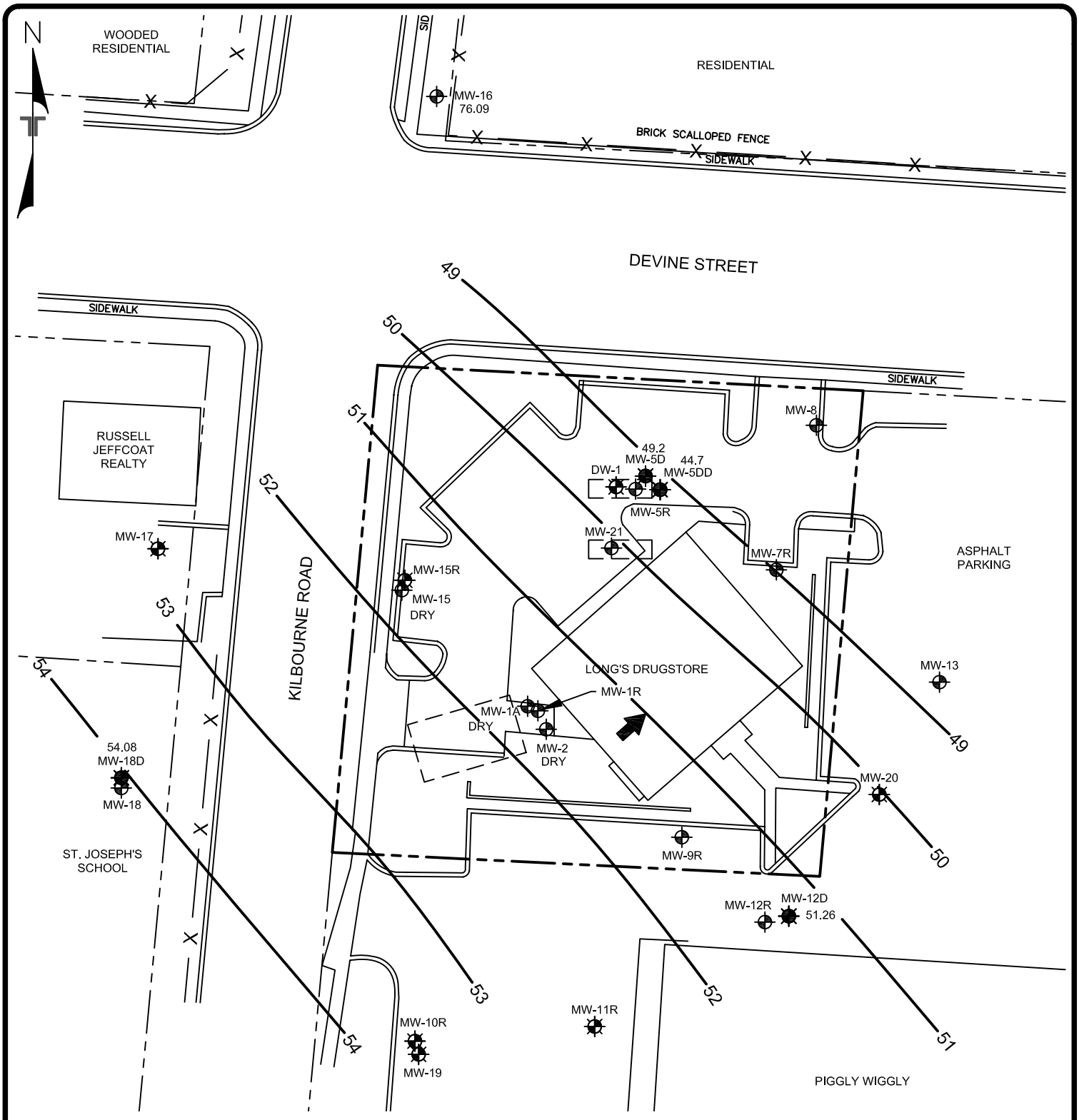
50 0 50

(FEET)

NOTE: GROUND WATER ELEVATIONS WERE RECORDED ON JANUARY 20, 2009.

INTERMEDIATE POTENTIOMETRIC SURFACE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 9



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

GRAPHIC SCALE

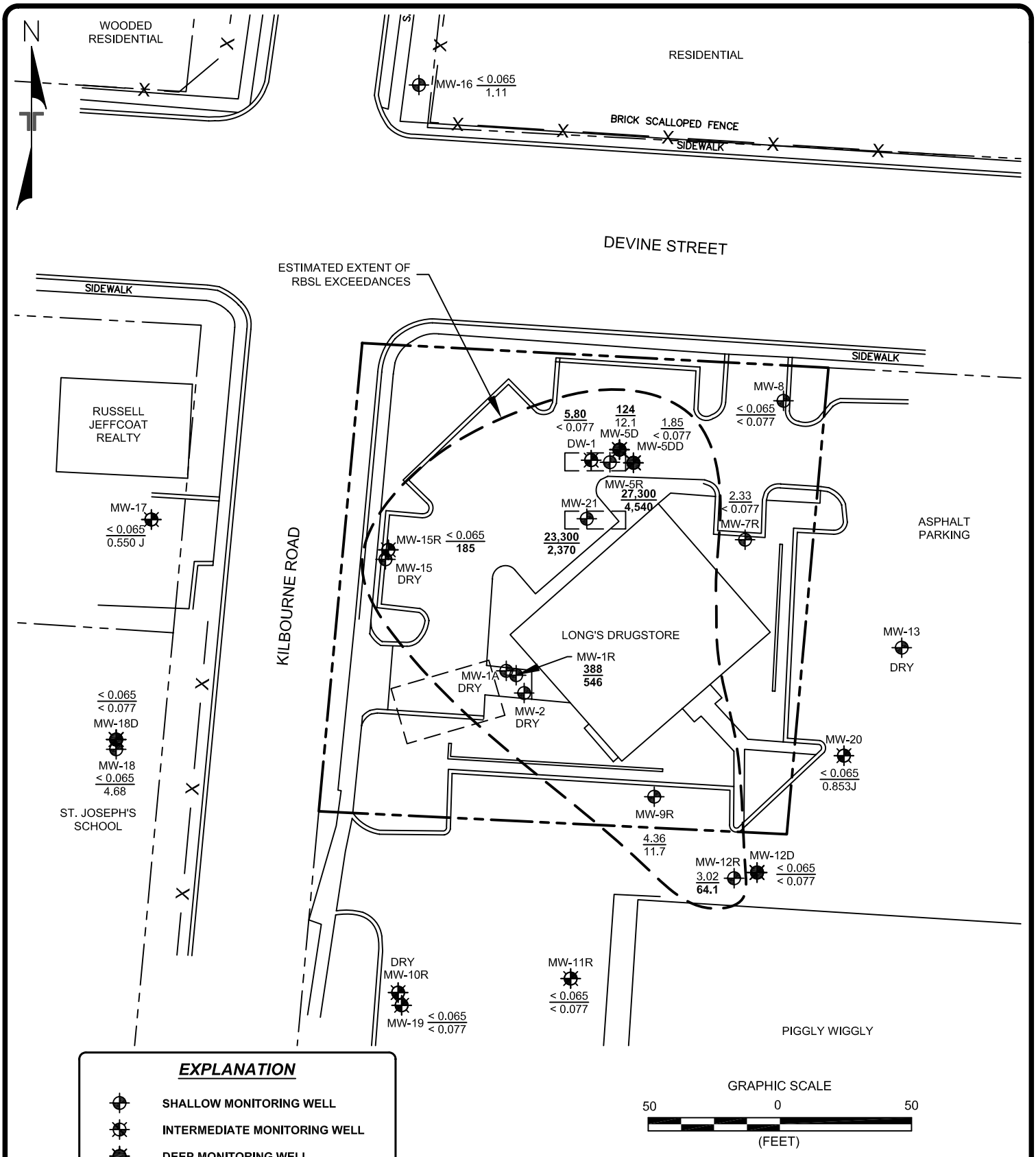
50 0 50

(FEET)

NOTE: GROUND WATER ELEVATIONS WERE RECORDED ON JANUARY 20, 2009.

DEEP POTENTIOMETRIC SURFACE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH		Scale:	1 IN = 50 FT
Checked By: PMH	521 Clemson Road Columbia, South Carolina 29229	Date:	4-23-09
Approved By: PMH		Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	10



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- 58.5 / 29.5 — BENZENE CONCENTRATION IN ug/L / MTBE CONCENTRATION IN ug/L
- MTBE — METHYL TERT-BUTYL ETHER
- ug/L — MICROGRAMS PER LITER
- APPROXIMATE PROPERTY BOUNDARY

CONCENTRATIONS IN BOLD EXCEED RBSLs

GRAPHIC SCALE
50 0 50
(FEET)

NOTE: GROUND WATER SAMPLES WERE COLLECTED ON JANUARY 20-23, 2009.

BENZENE / MTBE CONCENTRATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH		Scale:	1 IN = 50 FT
Checked By: PMH	521 Clemson Road	Date:	4-23-09
Approved By: PMH	Columbia, South Carolina 29229	Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	11

TABLES

TABLE 1
GROUND WATER SCREENING DATA

Former SC-015
3800 Devine Street, Columbia, SC
UST PERMIT NO. 07680

WELL NO.	SAMPLE DATE	SCREEN INTERVAL (ft)	OVA (ppm)	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	NAPHTH-ALENE (ug/l)
TW-1	12/1/08	30-40	25	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.118
TW-2	12/1/08	40-50	25	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.118
TW-4	12/1/08	10-20	49	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.118
MW-5D	1/12/09	55-60	13	**51.9**	346	65.2	331	< 0.385	**28.5**
MW-12D	1/7/09	45-50	1	< 0.065	< 0.076	< 0.065	5.62	**52.9**	< 0.118
RBSL				*5*	*1,000*	*700*	*10,000*	*40*	*25*

Total Screening Footage = 110

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) OVA - Maximum soil organic vapor concentration in the soils from the screened interval as screened using a TVA-1000 FID
3) VOC - volatile organic carbon compound
4) ppm - parts per million
5) ug/l - micrograms per liter
6) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
7) NM - not measured
8) BDL - below detection limits

TABLE 2
SOIL ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	DEPTH (ft)	OVA (ppm)	BENZENE (ug/kg)	TOLUENE (ug/kg)	ETHYL-BENZENE (ug/kg)	XYLENES (ug/kg)	NAPHTH-ALENE (ug/kg)
MW-1R	1/9/09	13-15	8	< 10.6	< 15.2	< 17.1	146 J	**127 J**
MW-15R	1/12/09	20-25	26	1.54 J	< 0.236	< 0.265	< 0.987	< 0.698
MW-18	1/6/09	13-15	2	<7.78	<11.1	<12.5	<46.5	<32.9
MW-19	1/6/09	13-15	2	< 0.198	< 0.284	< 0.318	< 1.19	< 0.839
MW-20	1/6/09	20-25	1.7	< 0.186	< 0.267	< 0.299	< 1.12	< 0.788
MW-21	1/22/09	3.5-5	1,586	**366 J**	574 J	**8,520**	**15,500**	**9,620**
RBSLs				*7*	*1,450*	*1,150*	*14,500*	*36*

Notes:

1) Results shown in boldface type indicate concentrations exceeding the RBSL for that compound
2) ug/kg = micrograms per kilogram dry soil
3) NA = Not Analyzed
4) RBSL = Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NE = Soil concentration not established in the SCDHEC RBCA Document
6) J = indicates an estimated value

TABLE 3
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	216.56
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
	6/3/08		98.41	DRY		
MW-1R	1/8/09	13 - 28	98.35	15.19	ND	83.16
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
	6/3/08		98.45	DRY	ND	DRY
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-5R	5/14/08	5-20	98.29	15.19	ND	83.1
	1/20/09			14.71	ND	83.58
MW-5D	1/23/09	80-85	98.49	49.32	ND	49.17
MW-5DD	3/23/09	112 - 117	98.83	54.16	ND	44.67
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		

TABLE 3
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		
MW-7R	5/14/08	10-25	98.85	15.46	ND	83.39
	1/20/09			14.95	ND	83.90
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
	5/15/08		99.48	16.21	ND	83.27
	1/20/09			15.97	ND	83.51
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-9R	5/14/08	5-20	93.32	12.79	ND	80.53
	1/20/09			12.18	ND	81.14
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-10R	5/14/08	15-30	95.71	DRY	ND	DRY
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		
MW-11R	5/14/08	15-30	92.26	29.28	ND	62.98
	1/20/09			28.76	ND	63.50
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		

TABLE 3
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-12R	5/14/08	5-20	92.43	14.34	ND	78.09
	1/20/09			13.95	ND	78.48
MW-12D	1/23/09	60-75	92.51	41.25	ND	51.26
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
	6/3/08		94.26	13.70	ND	80.56
	1/20/09			14.60	ND	79.66
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		
MW-15	1/14/97	20-35	249.43	DRY		
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
	5/15/08		99.70	DRY		
MW-15R	1/20/09	24.2-39.2	100.47	35.52	ND	64.95
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85
	5/15/08		102.85	26.96	ND	75.89
	1/20/09			26.76	ND	76.09
MW-17	5/14/08	25.5-39.5	100.84	36.70	ND	64.14
	1/20/09			36.02	ND	64.82
MW-18	1/20/09	15-30	103.46	22.21	ND	81.25
MW-18D	1/23/09	57-62	103.28	49.20	ND	54.08
MW-19	1/20/09	19.6-34.6	95.74	31.30	ND	64.44
MW-20	1/20/09	18.7-33.7	92.93	29.94	ND	62.99

TABLE 3
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-21	4/16/09	5-20	98.89	15.42	ND	83.47
DW-1	5/15/08	35-40	98.48	35.31	ND	63.17
	1/20/09			34.84	ND	63.64

NOTES:

1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded. Water levels had not stabilized during sampling (rising in well)
5) * = Top-of-casing elevations were altered during site redevelopment. A new survey was conducted in 2008 by Jay Joshi, PLS #14811, as part of the additional assessment event.

TABLE 4
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (mg/l)
MW-1A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	2	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
MW-1R	1/20/09	**388**	113	310	786	**546**	< 0.00350	**89.3**	< 0.0027
MW-2	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
MW-3	7/16/93	5	13	1	5	< 1.00	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-3A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA	NA
	1/14/97	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	DESTROYED							
MW-5	7/26/93	**19,000**	**86,000**	**3,500**	**22,000**	**4,000**	NA	**6,000**	NA
	9/19/03	DESTROYED							
MW-5R	5/15/08	**28,600**	**64,500**	**3,620**	**17,300**	**4,520**	**4.84**	< 2,500	< 0.015
	1/20/09	**27,300**	**55,100**	**3,100**	**14,100**	**4,540**	**0.741**	**1,310 J**	**0.019**
MW-5D	1/12/09	**51.9**	346	65.2	331	< 0.385	NA	**28.5**	NA
	1/24/09	**124**	624	88.8	333	12.1	< 0.0035	**33.5 J**	0.42
MW-5DD	3/23/09	1.85	11.1	3.98	18.0	< 0.077	< 0.0035	7.24	< 0.003
MW-6	7/26/93	**9,600**	**2,200**	**1,900**	9,300	< 1.00	NA	NA	NA
	9/19/03	DESTROYED							

TABLE 4
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (mg/l)
MW-7	7/16/93	**19,000**	**86,000**	3,500	2,200	**4,000**	NA	NA	NA
	1/14/97	**7,000**	**8,900**	**1,700**	3,200	**4,300**	NA	**150**	NA
	9/19/03	DESTROYED							
MW-7R	5/14/08	**37.1**	355	68.1	91.8	< 5.00	< 0.010	**29.7**	**0.023**
	1/20/09	2.33	78.5	126	106	< 0.077	< 0.003	15.7	< 0.003
MW-8	7/16/93	**130**	**1,100**	73	730	< 5.00	NA	NA	NA
	1/14/97	**40**	1.70	1.60	32	< 1.00	NA	31	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.003	2.44 J	< 0.003
MW-9	7/16/93	< 10	< 10	< 10	< 10	**10,000**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	**3,800**	NA	**500**	NA
	12/3/07	WELL NOT LOCATED							
MW-9R	5/14/08	**34.9**	11.9	126	249	34.1	< 0.010	**175**	< 0.015
	1/20/09	4.36	< 0.076	16.6	< 0.183	11.7	< 0.003	8.86	< 0.003
MW-10	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	**970**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	32	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-10R	6/3/08	DRY							
	1/20/09	DRY							
MW-11	7/16/93	3	< 1.00	< 1.00	< 1.00	**56**	NA	NA	NA
	1/14/97	**13**	< 1.00	< 1.00	< 1.00	**190**	NA	**500**	NA
	9/19/03	DESTROYED							
MW-11R	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.003	2.50 J	0.0086 B
MW-12	7/26/93	**1,200**	29	150	110	**1,000**	NA	NA	NA
	1/14/97	4.90	< 1.00	1.20	< 1.00	**74**	NA	< 1.00	NA
	9/19/03	DESTROYED							

TABLE 4
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (ug/l)	TOLUENE (ug/l)	ETHYL-BENZENE (ug/l)	XYLENES (ug/l)	MTBE (ug/l)	EDB (ug/l)	NAPHTH-ALENE (ug/l)	LEAD (mg/l)
MW-12R	5/14/08	**74.4**	2.46	52.3	25.2	**145**	< 0.010	**138**	**34**
	1/20/09	3.02	< 0.076	< 0.065	< 0.183	**64.1**	< 0.003	< 0.118	< 0.003
MW-12D	1/7/09	< 0.065	< 0.076	< 0.065	5.62	**52.9**	NA	< 0.118	NA
	1/23/09	< 0.065	1.17	< 0.065	2.29J	< 0.077	< 0.0035	2.36 J	< 0.003
MW-13	7/26/93	< 1.00	4.00	< 1.00	5.00	< 1.00	NA	NA	NA
	1/14/97	**18**	< 1.00	< 1.00	< 1.00	28	NA	1.20	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	NA	< 5.00	NA
	12/3/07	1.33	< 1.00	< 1.00	< 3.00	5.99	NA	< 5.00	NA
	6/3/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 0.010	< 5.00	**0.037**
	1/20/09	DRY							
MW-14	10/1/93	< 1.00	< 1.00	< 1.00	< 1.00	**270**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	14	NA	< 1.00	NA
	9/19/03	DESTROYED							
MW-15	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	**300**	NA	< 5.00	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	**160**	NA	< 5.00	NA
	5/15/08	DRY							
MW-15R	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	**185**	< 0.003	2.59 J	**0.075**
MW-16	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	NA
	9/19/03	2.60	< 1.00	< 1.00	< 3.00	5.66	NA	< 5.00	NA
	12/3/07	**58.5**	< 1.00	< 1.00	4.06	29.5	NA	5.23	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 1.00	1.75	NA	< 1.00	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	1.11	< 0.003	< 0.118	< 0.003
MW-17	5/14/08	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 1.00	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.550 J	< 0.003	< 0.118	< 0.003
MW-18	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	4.68	< 0.003	< 0.118	0.0074 B
MW-18D	1/23/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.035	2.47 J	0.0088 B
MW-19	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.003	< 0.118	0.034
MW-20	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.853J	< 0.003	< 0.118	0.069
MW-21	1/23/09	**23,300**	**62,900**	**4,780**	**21,600**	**2,370**	0.405	**1,650 J**	0.018
DW-1	5/15/08	**17.1**	96.6	19.2	104	3.53	< 0.010	**43.8**	< 0.015
	1/20/09	**5.80**	< 0.076	3.68	12.5	< 0.077	< 0.003	7.22	**0.036**
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*5*	*25*	*0.015*

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) ug/l - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) < 1.00 = below detection levels
8) J - indicates an estimated value
7) B - indicates a result between the Reporting Detection Limit and the Method Detection Limit

TABLE 5
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (ug/L)	Ethanol (ug/L)	ETBE (ug/L)	DIPE (ug/L)	ETBA (ug/L)	TBA (ug/L)	TAME (ug/L)	TAA (ug/L)	TBF (ug/L)
MW-1A	5/14/08	DRY								
MW-1R	1/20/09	**12.9 J**	< 202	< 1.30	8.40 J	< 21.8	911	< 1.74	280	< 1.79
MW-2	5/14/08	DRY								
MW-5R	5/15/08	< 2,500	< 10,000	< 500	< 500	< 1,000	**6,880**	< 500	**46,900**	< 1,000
	1/20/09	< 44.9	< 20,200	< 130	< 265	< 2,180	**6,230**	< 174	**39,500**	< 179
MW-5D	1/24/09	< 0.89	<403	< 2.59	< 5.29	<43.6	<4.12	< 3.48	<15.6	<0.357
MW-5DD	3/23/09	< 0.89	<40.3	< 0.259	< 0.529	<4.36	<4.12	<0.348	<15.6	< 0.357
MW-7R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	125	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-8	5/15/08	< 5.00	< 20.0	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-9R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	< 50.0	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	6.93 J	< 0.348	< 15.6	< 0.357
MW-10R	5/14/08	DRY								
MW-11R	5/15/08	< 5.00	71.6	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-12R	5/14/08	< 5.00	59.2	< 1.00	< 1.00	< 2.00	89.6	5.28	141	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	27.0	< 0.348	47.8	< 0.357
MW-12D	1/23/09	< 0.09	<403	< 2.59	< 5.29	<43.6	<41.2	<3.48	<156	<3.57
MW-13	6/3/08	< 5.00	49.4	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
MW-15	5/15/08	DRY								
MW-15R	1/20/09	0.924 J	< 40.3	< 0.259	6.08	< 4.36	155	< 0.348	44.6	< 0.357
MW-16	5/15/08	< 5.00	43.9	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-17	5/14/08	< 5.00	47.1	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-18	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-18D	1/23/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
MW-19	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357

TABLE 5
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (ug/L)	Ethanol (ug/L)	ETBE (ug/L)	DIPE (ug/L)	ETBA (ug/L)	TBA (ug/L)	TAME (ug/L)	TAA (ug/L)	TBF (ug/L)
MW-20	1/20/09	< 0.091	< 40.4	< 0.259	< 0.529	< 4.36	< 4.12	< 0.349	< 15.7	< 0.358
MW-21	1/23/09	< 45	< 20200	< 130	<265	<2180	<2060	<174	<7800	<179
DW-1	5/15/08	< 5.00	45.7	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	35.5	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
ALs	*-*	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*

Notes:
1) Results shown in boldface type indicate detected compounds.
2) ug/l - micrograms per liter or parts per billion
3) ALs- SCDHEC Action Levels
4) NE - Not Established
5) 1,2-DCA = 1,2-dichloroethane
6) 8 Oxygenates abbreviated as:
   - ETBE = ethyl tert-butyl ether
   - DIPE = diisopropyl ether
   - ETBA = ethyl tert-butanol
   - TBA = t-butanol
   - TAME = t-amyl methyl ether
   - TAA = tert-amyl alcohol
   - TBF = tert-butyl formate

TABLE 6
GROUND WATER ANALYTICAL DATA
Natural Attenuation Indicator Parameters

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	DISSOLVED OXYGEN (mg/l)	NITRATE (mg/l)	SULFATE (mg/l)	FERROUS IRON (mg/l)	pH (SU)
MW-1A	6/3/08	DRY				
MW-1R	1/20/09	3.61	0.023	< 0.41	32.6	6.11
MW-2	6/3/08	DRY				
MW-5R	5/15/08	5.14	0.126	11.8	4.0	NM
	1/20/09		0.457	3.4 B	55.6	
MW-5D	1/24/09	4.56	0.37	30.9	3.2	4.61
MW-5DD	3/23/09	4.92	1.350	13	0.5	9.9
MW-7R	5/14/08	3.61	0.044	102	19.0	5.87
	1/20/09	4.23	0.040	73.9	38.7	6.19
MW-8	5/15/08	3.81	5.26	< 5.0	< 0.10	5.29
	1/20/09	6.08	5.45	< 0.41	0.032 B	6.14
MW-9R	5/14/08	3.64	< 0.010	< 5.0	19.0	6.03
	1/20/09	3.61	0.010	15.1	31.0	6.34
MW-10R	6/3/08	DRY				
MW-11R	5/15/08	2.23	0.246	< 5.0	0.437*	5.27
	1/20/09	8.97	1.58	< 0.41	0.318	6.36
MW-12R	5/14/08	2.13	< 0.010	< 5.0	38.8	6.02
	1/20/09	4.55	0.034	0.62 B	44.1	6.34
MW-12D	6/3/08	7.38	2.23	< 0.41	0.39	6.33
MW-13	6/3/08	2.08	0.019	< 5.0	0.361	6.21
MW-15	5/15/08	DRY				
MW-15R	1/20/09	10.22	0.021	20.4	0.261	6.39
MW-16	5/15/08	6.57	1.22	< 5.0	< 0.10	6.64
	1/20/09	8.62	2.11	< 0.41	< 0.005	5.91
MW-17	5/14/08	7.57	1.56	< 5.0	0.088	5.77
	1/20/09	8.65	1.12	< 0.41	0.293	6.37
MW-18	1/20/09	3.93	0.254	< 0.41	0.077	6.55
MW-18D	1/23/09	6.42	2.4	< 0.41	0.92	6.68
MW-19	1/20/09	6.92	2.37	< 0.41	1.22	6.07
MW-20	1/20/09	7.52	1.2	< 0.41	1.86	6.1
MW-21	1/23/09	3.66	2.4	< 0.41	0.92	6.37
DW-1	5/15/08	4.75	0.047	< 5.0	< 0.10	7.63
	1/20/09	4.63	0.023	< 0.41	11.2	6.09

Notes:
1) mg/l = milligrams per liter or parts per million
2) SU = standard units

APPENDIX A

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **TW-1**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 11/26/08	Date Completed: 11/26/08	Screen: 2" (0.010) Slotted PVC	From: 30 - To: 40
Logged By: W. Walker	Coordinates:	Pack: #2 Filter Sand	From: 25 - To: 40
Drilling Co.: Land Probe	Driller: Kevin Thomas	Seal:	From: - To:
Method: HSA	Equipment: Mobile B-59	Grout:	From: - To:
Boring Depth (ft.): 40.0	TOC Elevation:	Inner Casing:	
Boring Diameter (in): 4.25	GW Level: Time/Date:	Outer Casing/Stick Up:	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		4.8		**SAND**, with sub-angular quartz, brown, medium grained, no petroleum odor.		2
4								4
6		2		21.6				6
8								8
10						Silty **SAND**, brown, no petroleum odor.		10
12		3		25.59				12
14								14
16						Clayey **SILT**, brown, no petroleum odor.		16
18		4		45.67				18
20						Silty **CLAY**, with well rounded quartz, brown, no petroleum odor.		20
22		5		61.6				22
24								24
26						**SILT**, pink, dry, no petroleum odor.		26
28		6		10.66				28
30								30
32		7		24.90				32
34								34
36						Sandy **SILT**, with medium size quartz, pink, no petroleum odor.		36
38		8		11.0				38
40						**Boring Terminated at 40 ft.** Borehole abandoned upon sample collection.		40

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **TW-2**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 11/26/08	Date Completed: 11/26/08	Screen: 2" (0.010) Slotted PVC	From: 40 - To: 50
Logged By: W. Walker	Coordinates:	Pack: #2 Filter Sand	From: 35 - To: 50
Drilling Co.: Land Probe	Driller: Kevin Thomas	Seal:	From: - To:
Method: HSA	Equipment: Mobile B-59	Grout:	From: - To:
Boring Depth (ft.): 60.0	TOC Elevation:	Inner Casing:	
Boring Diameter (in): 4.25	GW Level: Time/Date:	Outer Casing/Stick Up:	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		3.50		**SAND**, brown, damp, no petroleum odor.		2
4								4
6		2		6.80				6
8								8
10								10
12		3		17.04				12
14								14
16		4		77.21		**SAND**, brown, no petroleum odor.		16
18								18
20						**SAND**, with medium size quartz, brown, moist, no petroleum odor.		20
22		5		59.70				22
24								24
26								26
28		6		116.0				28
30						**SILT**, with quartz grains, pink, dry, no petroleum odor.		30
32		7		15.71				32
34								34
36						Sandy **SILT**, dark pink, saturated, no petroleum odor.		36
38		8		22.95				38
40								40
42		9		25.30				42
44								44
46								46
48								48
50						**Boring Terminated at 50 ft.**		50
52								52
54								54
56								56
58								58
60								60

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **TW-3**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 11/26/08	Date Completed: 11/26/08	Screen: 2" (0.010) Slotted PVC	From: 10 - To: 20
Logged By: W. Walker	Coordinates:	Pack: #2 Filter Sand	From: 5 - To: 20
Drilling Co.: Land Probe	Driller: Kevin Thomas	Seal:	From: - To:
Method: HSA	Equipment: Mobile B-59	Grout:	From: - To:
Boring Depth (ft.): 20.0	TOC Elevation:	Inner Casing:	
Boring Diameter (in): 4.25	GW Level: Time/Date:	Outer Casing/Stick Up:	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		3.63		**SAND**, brown, damp, no petroleum odor.		2
4								4
6								6
8		2		5.80				8
10						Silty **SAND**, brown, no petroleum odor.		10
12		3		36.28				12
14								14
16						Sandy **SILT**, with medium size quartz, light brown, saturated, no petroleum odor.		16
18		4		48.53				18
20						**Boring Terminated at 20 ft.**		20

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-1R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/12/09	Date Completed: 1/12/09	Screen: 2" (0.010) Slotted PVC	From: 13 - To: 28
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 11 - To: 28
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 10 - To: 11
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 10
Boring Depth (ft.): 35.0	TOC Elevation: 98.35	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 2.75	GW Level: ▼ 15.61 / Time/Date: 1/13/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Description
0					**ASPHALT**
2					Silty **SAND**, orange, fine to medium grained, loose, moist.
4		1		1.3	
6					Silty **SAND**, with wood debris, black, fine to medium grained, loose, moist, no petroleum odor.
8		2		4.6	
10					Silty **SAND**, brown, fine to medium grained, medium dense, no petroleum odor.
12		3		8.1	
14					
16		4		6.3	Silty **SAND**, brown, fine to medium grained, medium dense. ▼
18					
20					Silty **SAND**, with quartz, brown, fine to medium grained, medium dense. / **CLAY**, white and pink, dense, plastic, dry. / Silty **CLAY**, dense, medium plastic, moist, no petroleum odor.
22		5		880	
24					**SILT**, white and pink, dense, plastic, dry, slight petroleum odor.
26					Silty **CLAY**, rose, dense, semi plastic, moist to wet, high petroleum odor.
28					
30					**CLAY**, white, dense, dry.
32					**SAND**, tan, coarse grained, no petroleum odor.
34					
					Boring Terminated at 35 ft.

Well Detail

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surrounding
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ___ ft. to ___ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-1R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 35 ft. Date Started: 1/12/09 Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 13 ft. depth
___ in. to ___ ft. depth
Height: Above ☐ Below ☐
Surface ___ ft.
Weight ___ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 13 ft. and 28 ft.
___ ft. and ___ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL 15.19 ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
___ ft. after ___ hrs. Pumping ___ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ___

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 11 ft. to 35 ft.
Effective size #2 Uniformity Coefficient ___

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ___
Depth: From 0 ft. to 11 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ___ ft. ___ direction
Type ___
Well Disinfected ☐ Yes ☒ No Type: ___ Amount: ___

18. PUMP: Date installed: ___ Not installed ☒
Mfr. Name: ___ Model No.: ___
H.P. ___ Volts ___ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph L. Smith Well Driller Date: ___

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-5D**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/6/09	Date Completed: 1/22/09	Screen: 2" (0.010) Slotted PVC	From: 80 - To: 85
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 78 - To: 85
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 77 - To: 78
Method: HSA / Mud Rotary	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 77
Boring Depth (ft.): 86.0	TOC Elevation: 98.49	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 10/6	GW Level: Time/Date:	Outer Casing/Stick Up: 5" Threaded PVC Sch 40 0 to 45 ft	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2						**SAND**, with wood debris, black, coarse grained, loose, poorly sorted, moist, petroleum odor, (Fill).		2
4								4
6						**SAND**, black, medium to coarse grained, loose, poorly sorted, moist, petroleum odor.		6
8						**SAND**, some silt, orange, medium to coarse grained, loose, poorly sorted, petroleum odor.		8
10						Clayey **SAND**, orange and brown, fine to medium grained, dense, poorly sorted, moist, petroleum odor.		10
12						Clayey **SAND**, with quartz fragments, orange and brown, fine to medium grained, dense, poorly sorted, moist, petroleum odor.		12
14								14
16						Clayey **SAND**, with quartz fragments, fine to coarse grained, dense, poorly sorted, petroleum odor.		16
18								18
20						**CLAY**, white, dense, plastic, petroleum odor.		20
22						**CLAY**, gray and purple, dense, plastic, petroleum odor.		22
24						Sandy **CLAY**, dense, semi plastic, moist.		24
26						**CLAY**, purple, fine grained, plastic, high petroleum odor.		26
28								28
30						**CLAY**, purple, fine grained, plastic, wet, high petroleum odor.		30
32						**CLAY**, purple and white, plastic, nodules, high petroleum odor.		32
34								34
36						Silty **SAND**, pink, medium grained, saturated, high petroleum odor.		36
38		1		1.81				38
40						**CLAY**, white and pink, dense, plastic, dry, petroleum odor.		40
42		2		2760		Sandy **CLAY**		42
44		3		324		**CLAY**		44

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015	Project Number: 73078012	Boring/Well: **MW-5D**
Client: CROWN CENTRAL LLC	***Well Construction Data***	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
46						**CLAY**, some sand, white and pink, dense, plastic.		46
48		4		65				48
50						Sandy **CLAY**, white, dense to medium dense, saturated, sand is medium grained.		50
52		5		30				52
54								54
56						Clayey **SAND**, medium grained, medium dense, saturated.		56
58		6		7.1				58
60						Clayey **SAND**, with large angular quartz fragments, mottled (tan, pink, and gray), fine to medium grained, medium dense, saturated, no petroleum odor.		60
62								62
64								64
66						**SAND**, mottled (tan, pink, and gray), coarse grained, loose, saturated, slight petroleum odor.		66
68								68
70						**SAND**, tannish pink, coarse grained, loose to medium loose, saturated, no petroleum odor.		70
72								72
74								74
76						Clayey **SAND**, light tan, coarse grained, very dense, stiff, dry, no petroleum odor.		76
78								78
80						Clayey **SAND**, with small quartz fragments, grayish orange, coarse grained, very dense, stiff, moist, no petroleum odor.		80
82								82
84								84
86						**Boring Terminated at 86 ft.**		86

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surrounding
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-5D

6. TYPE: ☒ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 86 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in, 5 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
5 in. to 45 ft. depth
2 in. to 80 ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 5 ft
Set Between: 80 ft. and 85 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 78 ft. to 85 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 78 ft. to 0 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A B ☒ C D (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph L. Smith Well Driller Date: ____
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-5DD**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 3/18/09	Date Completed: 3/18/09	Screen: 2" (0.010) Slotted PVC	From: 112 - To: 117
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 110 - To: 117
Drilling Co.: Land Probe	Driller: Kevin Thomas	Seal: Bentonite Pellets	From: 108 - To: 110
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 108
Boring Depth (ft.): 120.0	TOC Elevation:	Inner Casing: 2" Threaded PVC Sch 40 100 to 117 ft	
Boring Diameter (in):	GW Level: Time/Date:	Outer Casing/Stick Up: 5" Threaded PVC Sch 40 0 to 100 ft	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2						**SAND**, with wood debris, black, coarse grained, loose, poorly sorted, moist, petroleum odor, (Fill).		2
4								4
6						**SAND**, black, medium to coarse grained, loose, poorly sorted, moist, petroleum odor.		6
8						**SAND**, some silt, orange, medium to coarse grained, loose, poorly sorted, petroleum odor.		8
10						Clayey **SAND**, orange and brown, fine to medium grained, dense, poorly sorted, moist, petroleum odor.		10
12						Clayey **SAND**, with quartz fragments, orange and brown, fine to medium grained, dense, poorly sorted, moist, petroleum odor.		12
14								14
16						Clayey **SAND**, with quartz fragments, fine to coarse grained, dense, poorly sorted, petroleum odor.		16
18								18
20						**CLAY**, white, dense, plastic, petroleum odor.		20
22						**CLAY**, gray and purple, dense, plastic, petroleum odor.		22
24						Sandy **CLAY**, dense, semi plastic, moist.		24
26						**CLAY**, purple, fine grained, plastic, high petroleum odor.		26
28								28
30						**CLAY**, purple, fine grained, plastic, wet, high petroleum odor.		30
32						**CLAY**, purple and white, plastic, nodules, high petroleum odor.		32
34								34
36						Silty **SAND**, pink, medium grained, saturated, high petroleum odor.		36
38								38
40						**CLAY**, white and pink, dense, plastic, dry, petroleum odor.		40
42						Sandy **CLAY**		42
44						**CLAY**		44

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015	Project Number: 73078012	Boring/Well: **MW-5DD**
Client: CROWN CENTRAL LLC	***Well Construction Data***	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
46						**CLAY**, some sand, white and pink, dense, plastic.		46
48								48
50						Sandy **CLAY**, white, dense to medium dense, saturated, sand is medium grained.		50
52								52
54								54
56						Clayey **SAND**, some angular quartz fragments, gray with some tan, fine grained, medium dense, moist, slight petroleum odor.		56
58	X	1		4.8				58
60						Clayey **SAND**, with large angular quartz fragments, mottled (tan, pink, and gray), fine to medium grained, medium dense, saturated, no petroleum odor.		60
62								62
64	X	2		14				64
66						**SAND**, mottled (tan, pink, and gray), coarse grained, loose, saturated, slight petroleum odor.		66
68								68
70	X	3		1.3				70
72						**SAND**, tannish pink, coarse grained, loose to medium loose, saturated, no petroleum odor.		72
74	X	4		1.2				74
76						Clayey **SAND**, light tan, coarse grained, very dense, stiff, dry, no petroleum odor. Hard Drilling		76
78								78
80	X	5		1.9				80
82						Clayey **SAND**, with small quartz fragments, grayish orange, coarse grained, very dense, stiff, moist, no petroleum odor.		82
84	X	6		2.4				84
86						Clayey **SAND**, mottled (gray, orange, and purple), coarse grained, medium dense, heavy iron oxidation, saturated, no petroleum odor. Softer Drilling at 85 to 90 ft.		86
88								88
90	X	7		0.7		Clayey **SAND**, mottled (gray, purple, and tan), coarse grained, dense, heavy iron oxidation, saturated, no petroleum odor.		90
92								92
94	X	8		0.8				94
96						**SAND**, tan, coarse grained, loose, saturated, no petroleum odor.		96
98						**CLAY**, mottled (tan, gray, white, and purple), very dense, very stiff, dry, no petroleum odor.		98
100	X	9		0				100

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015	Project Number: 73078012	Boring/Well: **MW-5DD**
Client: CROWN CENTRAL LLC	***Well Construction Data***	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
102						Clayey **SAND**, mottled, fine to coarse grained, firm, saturated, no petroleum odor.		102
104								104
106								106
108								108
110								110
112								112
114								114
116								116
118								118
120						**Boring Terminated at 120 ft.**		120

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: P.O. Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015
Street Address: 3800 Devine St.
City: Columbia SC Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from _____ ft. to _____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs.		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: BENT. SEAL 105'-110'
MW-5 DD

6. TYPE: ☒ Mud Rotary ☐ Jetted ☐ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST # 07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started: 3/19/09
~~120~~ 117 ft. Date Completed: 3/20/09

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2"
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
5" in. to 99 ft. depth
2" in. to 117 ft. depth
Height: Above ☐ Below ☒
Surface .5 ft.
Weight _____ lb./ft.
Drive Shoe? ☐ Yes ☒ No

11. SCREEN:
Type: PVC Diam.: 2"
Slot/Gauge: .010 Length: 5'
Set Between: 117 ft. and 119 ft.
_____ ft. and _____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL _____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
_____ ft. after _____ hrs. Pumping _____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: _____

14. WATER QUALITY
Chemical Analysis ☐ Yes ☒ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 117 ft. to 110 ft.
Effective size 20-40 Uniformity Coefficient _____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other _____
Depth: From 105 ft. to Ø ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type _____
Well Disinfected ☐ Yes ☒ No Type: _____ Amount: _____

18. PUMP: Date installed: _____ Not installed ☒
Mfr. Name: _____ Model No.: _____
H.P. _____ Volts _____ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: Kevin Thomas CERT. NO.: 1155
Address: (Print) 6004 Ponders Ct Level: A ☒ B ☐ C ☐ D ☐ (circle one)
Greenville SC
Telephone No.: 864 527 9324 Fax No.: 864 288 4430

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Kevin Thomas Date: 4/27/09
Well Driller

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-12D**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/6/09	Date Completed: 1/20/09	Screen: 2" (0.010) Slotted PVC	From: 70 - To: 75
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 68 - To: 75
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 67 - To: 68
Method: HSA / Mud Rotary	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 67
Boring Depth (ft.): 75.0	TOC Elevation: 92.51	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 10/6	GW Level: ▼ 13.95 Time/Date: 1/20/2009	Outer Casing/Stick Up: 5' Threaded PVC Sch 40 0-35 ft.	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2						Silty **SAND**, brown, fine to coarse grained, dry, no petroleum odor.		2
4						Silty **SAND**, with wood debris, brown, fine to coarse grained, moist, no petroleum odor.		4
6						Silty **SAND**, with rock, black, fine to coarse grained, dry, used oil odor.		6
8						Silty **SAND**, some quartz fill, black, fine to coarse grained, dense, large soil nodules, wet, slight petroleum odor.		8
10						**SAND**, some clay, black, loose, well sorted, saturated, no petroleum odor.		10
12								12
14							▼	14
16						Silty **SAND**, coarse grained, loose, poorly sorted, saturated, no petroleum odor.		16
18								18
20						Silty **SAND**, tan and gray, coarse grained, loose, poorly sorted, saturated, slight petroleum odor.		20
22						Silty **SAND**, light tan, medium to coarse grained, loose, poorly sorted, saturated, petroleum odor.		22
24						Clayey **SAND**, tan, medium grained, dense, saturated, petroleum odor.		24
26						Clayey **SAND**, tan, dense, plastic, saturated, petroleum odor.		26
28								28
30						**CLAY**, light pink, dense, saturated, petroleum odor.		30
32								32
34								34
36						**CLAY**, white, dense, plastic.		36
38								38
	⊠	1		1.1		**SAND**, some silt, white, coarse grained, loose, saturated, no petroleum		

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015	Project Number: 73078012	Boring/Well: **MW-12D**
Client: CROWN CENTRAL LLC	***Well Construction Data***	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
42						odor.		42
44	X	2		0.3				44
46								46
48	X	3		0				48
50						Presumed **SAND**, (Mud Rotary drilling)		50
52								52
54								54
56								56
58								58
60								60
62								62
64								64
66								66
68								68
70								70
72								72
74								74
						Boring Terminated at 75 ft.		

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surroundings
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
MW-12D

6. TYPE: ☒ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER:
UST #07680; MW-22130

8. USE:
☐ Residential ☐ Public Supply ☐ Process
☐ Irrigation ☐ Air Conditioning ☐ Emergency
☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 75 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in, 5 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
5 in. to 35 ft. depth
2 in. to 70 ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 5 ft
Set Between: 70 ft. and 75 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 68 ft. to 75 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 68 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER:
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
CERT. NO.: 1648
Level: A B C D (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith (Well Driller) Date: ____
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-15R**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/12/09	Date Completed: 1/12/09	Screen: 2" (0.010) Slotted PVC	From: 24 - To: 39
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 22 - To: 39
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 21 - To: 22
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 21
Boring Depth (ft.): 40.0	TOC Elevation: 100.47	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6	GW Level: ▼ 35.55 Time/Date: 0800 1/13/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2						**ASPHALT**		2
4		1		1.49		Silty **SAND**, orange, loose, poorly sorted, dry, no petroleum odor.		4
6						**SAND**, with rock and brick, fill debris, dry.		6
8		2		3.27				8
10						Clayey **SAND**, some rock and brick, orange and brown, fine to medium grained, dense, moist, no petroleum odor.		10
12		3		13.69		Silty **SAND**, dark brown, fine to medium grained, medium dense, moist, no petroleum odor.		12
14								14
16						Clayey **SAND**, brown, dense, semi plastic, moist, no petroleum odor.		16
18		4		18.86				18
20								20
22						**CLAY**, some sand, white and purple, plastic, dry, no petroleum odor.		22
24		5		26.35				24
26						Sandy **CLAY**, pink, dense, poorly sorted, moist, no petroleum odor.		26
28		6		5.72				28
30						**CLAY**, some sand, pink, dense, plastic, no petroleum odor.		30
32		7		21.57				32
34						Clayey **SAND**, medium to coarse grained, dense, moist, no petroleum odor.		34
36						Clayey **SAND**, medium to coarse grained, dense to medium dense, no petroleum odor. ▼		36
38		8		13.15				38
40						**Boring Terminated at 40 ft.**		40

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surroundings
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
MW-15R

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 40 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 24 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 24 ft. and 39 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 22 ft. to 39 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 22 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph L. Smith (Well Driller) Date: ____
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-18**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 12/22/08	Date Completed: 12/23/08	Screen: 2" (0.010) Slotted PVC	From: 15 - To: 30
Logged By: W. Walker	Coordinates:	Pack: #2 Filter Sand	From: 13 - To: 30
Drilling Co.: Land Probe	Driller: Kevin Smith	Seal: Bentonite Pellets	From: 12 - To: 13
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 12
Boring Depth (ft.): 30.0	TOC Elevation: 103.46	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6	GW Level: ▼ 22.21 Time/Date: 1/20/2009	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**SAND**, dark brown, fine grained, moist, no petroleum odor.		0
2								2
4								4
6						**SAND**, light brown to orange, moist, no petroleum odor.		6
8								8
10								10
12								12
14								14
16						**SAND**, orange and gray, fine grained, dry, no petroleum odor.		16
18						**SAND**, with quartz, orange and gray, fine grained, dry, no petroleum odor.		18
20						**SAND**, light brown, fine grained.		20
22						**SAND**, pink, fine grained. ▼		22
24						**SILT**, pink and white, hard, no petroleum odor.		24
26								26
28								28
30						**Boring Terminated at 30 ft.**		30

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surrounding
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS:
MW-18

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) Date Started:
____ ft. Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
____ in. to ____ ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: ____
Set Between: 15 ft. and 30 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from ____ ft. to ____ ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From ____ ft. to ____ ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph L. Smith (Well Driller) Date: ____
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-18D**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/22/09	Date Completed: 1/21/09	Screen: 2" (0.010) Slotted PVC	From: 57 - To: 62
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 55 - To: 65
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 54 - To: 55
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 54
Boring Depth (ft.): 65.0	TOC Elevation: 103.28	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6	GW Level: ▼ 49.20 Time/Date: 1/23/2009	Outer Casing/Stick Up: 5" Threaded PVC Sch 40	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**SAND**, brown, fine to medium grained, loose, dry, no petroleum odor.		0
4						**SAND**, black, fine to medium grained, loose, dry, no petroleum odor.		4
5						**SAND**, orange, fine to medium grained, loose, dry, no petroleum odor.		5
6						**SAND**, orange, fine to medium grained, medium dense, moist, no petroleum odor.		6
10						**SAND**, brown, fine to medium grained, dense, poorly sorted, moist, no petroleum odor.		10
15						Silty **SAND**, brown, fine to medium grained, dense, poorly sorted, dry, no petroleum odor.		15
17						hard drilling - rounded quartz fragments.		17
20						Silty **SAND**, some rounded quartz fragments, brown, fine to medium grained, dense, poorly sorted, moist.		20
26						**SAND**, with rounded quartz fragments, brown, medium to coarse grained, wet, no petroleum odor.		26
28						**CLAY**, whitish pink, dense, plastic, dry.		28
30						**CLAY**, mottled (white, pink, and purple), dense, plastic.		30

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

GEOLOGIST LOG

Project: SC-015	Project Number: 73078012	Boring/Well: **MW-18D**
Client: CROWN CENTRAL LLC	***Well Construction Data***	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
36						**CLAY**, some coarse sand, mottled (white, purple, and pink), dense, plastic, no petroleum odor.		36
38								38
40						Clayey **SAND**, whitish purple, medium to coarse grained, dense, moist to wet.		40
42						Clayey **SAND**, whitish purple, fine to medium grained, dense, wet.		42
44	X	1		0.1		**CLAY**, whitish tan, dense.		44
46						**CLAY**, whitish tan, dense, plastic.		46
48							▼	48
50	X	2		4.51		**CLAY**, whitish gray, dense, plastic.		50
52								52
54	X	3		4.2				54
56								56
58						Clayey **SAND**, coarse grained, dense, wet, no petroleum odor.		58
60	X	4		0.1		Clayey **SAND**, purplish gray, coarse grained, dense, saturated.		60
62								62
64	X	5		0.7				64
						Boring Terminated at 65 ft.		

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surroundings
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-18D

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 65 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 57 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 5 ft
Set Between: 57 ft. and 62 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☐ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 55 ft. to 62 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 55 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A B C D (circle one) — B
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.

Signed: Joseph G. Smith (Well Driller) Date: ____

If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-19**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/6/09	Date Completed: 1/6/09	Screen: 2" (0.010) Slotted PVC	From: 20 - To: 35
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 18 - To: 35
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 17 - To: 18
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 17
Boring Depth (ft.): 36.0	TOC Elevation: 95.74	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 2.75	GW Level: ▼ 31.60 / Time/Date: 0900 1/6/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2						**ASPHALT**		2
4	X	1		0		**SAND**, orange to tan, medium to coarse grained, dense, poorly sorted, moist, no petroleum odor.		4
6						**SAND**, some clay, light tan, coarse grained, dense, poorly sorted, no petroleum odor.		6
8								8
10	X	2		1.2				10
12						**QUARTZ** Clayey **SAND**, some quartz, pink, fine to coarse grained, very dense, poorly sorted, no petroleum odor.		12
14	X	3	50/2"	2.1				14
16						**CLAY**, mottled (pink, white, and purple), dense, well sorted, no petroleum odor.		16
18								18
20	X	4		0				20
22						**CLAY**, mottled (pink, white, and purple), fine grained, dense, well sorted.		22
24	X	5		1.5		Clayey **SAND**, mottled (pink, white, and purple), fine to coarse grained, dense, iron oxidation, moist, no petroleum odor.		24
26						**CLAY**, some coarse grained, sand, mottled (pink, white, and purple), dense, fine grained, no petroleum odor.		26
28								28
30	X	6		2.3		**SAND**, tan, coarse grained, loose, poorly sorted, moist, no petroleum odor.		30
32						**SAND**, tan, coarse grained, loose, poorly sorted, saturated, no petroleum odor. ▼		32
34	X	7		4.25				34
36						**SILT**, gray, dense, fine grained, dry. **Boring Terminated at 36 ft.**		36

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surroundings
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-19

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 36 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 20 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN: Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 20 ft. and 35 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 18 ft. to 35 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 18 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A B C D (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith (Well Driller) Date: ____
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-20**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/6/09	Date Completed: 1/6/09	Screen: 2" (0.010) Slotted PVC	From: 20 - To: 35
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 18 - To: 35
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 17 - To: 18
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 17
Boring Depth (ft.): 35.0	TOC Elevation: 92.93	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 2.75	GW Level: ▼ 29.95 / Time/Date: 0800 1/7/2008	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
2		1		0		**ASPHALT** / Silty **SAND**, dark brown, fine to medium grained, dense, semi plastic, dry, no petroleum odor.		2
4						Silty **SAND**, with wood debris, black, fine to medium grained, dense, semi plastic, moist, no petroleum odor.		4
6		2		0.2		**SAND**, some quartz fragments, brown, fine to medium grained, loose, moist.		6
8						**QUARTZ**		8
10						**SAND**, with large quartz fragments, medium to coarse grained, dense, iron oxidation, moist.		10
12		3		1.3				12
14						**CLAY**, white and orange, dense, plastic, dry, no petroleum odor.		14
16						**CLAY**, mottled (white, orange, and purple), dense, plastic, moist, no petroleum odor.		16
18		4		0.1				18
20								20
22		5		1.7				22
24						**SAND**, coarse grained, loose, poorly sorted, heavy iron oxidation, moist.		24
26						**SAND**, with coarse quartz gravel, mottled (white, purple, and tan), medium to coarse grained, medium dense, heavy iron oxidation, wet, no petroleum odor.		26
28		6		1.5				28
30						▼ **SAND**, white, coarse grained, loose, well sorted, saturated, no petroleum odor.		30
32		7		14.7				32
34						**Boring Terminated at 35 ft.**		34

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surrounding
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: PUBLIC SYSTEM NUMBER:

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ____ ft. to ____ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		

5. REMARKS: MW-20

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 35 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 20 ft. depth
____ in. to ____ ft. depth
Height: Above ☐ Below ☐
Surface ____ ft.
Weight ____ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 20 ft. and 35 ft.
____ ft. and ____ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ____ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
____ ft. after ____ hrs. Pumping ____ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ____

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 18 ft. to 35 ft.
Effective size #2 Uniformity Coefficient ____

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ____
Depth: From 0 ft. to 18 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ____ ft. ____ direction
Type ____
Well Disinfected ☐ Yes ☒ No Type: ____ Amount: ____

18. PUMP: Date installed: ____ Not installed ☒
Mfr. Name: ____ Model No.: ____
H.P. ____ Volts ____ Length of drop pipe ____ ft. Capacity ____ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A B C D (circle one) ☐ ☒ ☐ ☐
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph L. Smith (Well Driller) Date:
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

GEOLOGIST LOG

Project: SC-015		Project Number: 73078012	Boring/Well: **MW-21**
Client: CROWN CENTRAL LLC		***Well Construction Data***	
Date Started: 1/22/09	Date Completed: 1/22/09	Screen: 2" (0.010) Slotted PVC	From: 5 - To: 20
Logged By: R. Norris	Coordinates:	Pack: #2 Filter Sand	From: 3 - To: 20
Drilling Co.: Land Probe	Driller: Joe Smith	Seal: Bentonite Pellets	From: 1 - To: 3
Method: HSA	Equipment: Mobile B-59	Grout: Portland Cement Type I	From: 0 - To: 1
Boring Depth (ft.): 20.0	TOC Elevation: 98.89	Inner Casing: 2" Threaded PVC Sch 40	
Boring Diameter (in): 6	GW Level: ▼ 18.59 Time/Date: 1000 1/22/2009	Outer Casing/Stick Up: Flush-mounted	

Depth	Sample	Sample Number	Blows/ 6 inches	PID (ppm)	Lithology	Description	Well Detail	Depth
0						**ASPHALT**		0
2						**SAND**, with wood debris (Fill), black, medium grained, loose, poorly sorted, moist, high petroleum odor.		2
4	X	1		1,586				4
6						Clayey **SAND**, mottled (black, gray, and orange), fine to medium grained, medium loose, moist, high petroleum odor.		6
8								8
10	X	2		180				10
12								12
14	X	3		14.10%		**SAND**, with large angular quartz, orangish white, coarse grained, dense.		14
16						Silty **SAND**, with quartz fragments, brown, fine to medium grained, loose, wet, very high petroleum odor.		16
18						Sandy **CLAY**, mottled (pink, gray, and purple), medium dense, wet. ▼		18
20	X	4		956		**CLAY**, mottled (white, pink, and purple), dense, petroleum odor.		20
						Boring Terminated at 20 ft.		

Terracon
521 Clemson Road, Columbia, South Carolina 29229
Phone: 803-741-9000, Fax: 803-741-9900

LOG OF BORING WELL 73078012.GPJ GAGE_GRP.GDT 5/1/09

Water Well Record
Bureau of Water
2600 Bull Street, Columbia, SC 29201-1708; (803) 898-4300

DHEC — PROMOTE PROTECT PROSPER

1. WELL OWNER INFORMATION:
Name: Crown Central LLC (last) (first)
Address: PO Box 1168
City: Baltimore State: MD Zip: 21203
Telephone: Work: Home:

2. LOCATION OF WELL: COUNTY: Richland
Name: Former SC-015 Site
Street Address: 3800 Devine Street + surroundings
City: Columbia Zip: 29205
Latitude: Longitude:

3. PUBLIC SYSTEM NAME: **PUBLIC SYSTEM NUMBER:**

4. ABANDONMENT: ☐ Yes ☒ No
Grouted Depth: from ___ ft. to ___ ft.

Formation Description	*Thickness of Stratum	Depth to Bottom of Stratum
See geologist's logs		
*Indicate Water Bearing Zones (Use a 2nd sheet if needed)		
5. REMARKS: MW-21		

6. TYPE: ☐ Mud Rotary ☐ Jetted ☒ Bored ☐ Dug ☐ Air Rotary ☐ Driven ☐ Cable tool ☐ Other

7. PERMIT NUMBER: UST #07680; UMW-22130

8. USE: ☐ Residential ☐ Public Supply ☐ Process ☐ Irrigation ☐ Air Conditioning ☐ Emergency ☐ Test Well ☒ Monitor Well ☐ Replacement

9. WELL DEPTH (completed) 20 ft. Date Started: Date Completed:

10. CASING: ☒ Threaded ☐ Welded
Diam.: 2 in
Type: ☒ PVC ☐ Galvanized ☐ Steel ☐ Other
2 in. to 5 ft. depth
___ in. to ___ ft. depth
Height: Above ☐ Below ☐
Surface ___ ft.
Weight ___ lb./ft.
Drive Shoe? ☐ Yes ☐ No

11. SCREEN:
Type: PVC Diam.: 2 in
Slot/Gauge: 0.010 in Length: 15 ft
Set Between: 5 ft. and 20 ft.
___ ft. and ___ ft.
NOTE: MULTIPLE SCREENS USE SECOND SHEET
Sieve Analysis ☐ Yes (please enclose) ☒ No

12. STATIC WATER LEVEL ___ ft. below land surface after 24 hours

13. PUMPING LEVEL Below Land Surface.
___ ft. after ___ hrs. Pumping ___ G.P.M.
Pumping Test: ☐ Yes (please enclose) ☒ No
Yield: ___

14. WATER QUALITY
Chemical Analysis ☒ Yes ☐ No Bacterial Analysis ☐ Yes ☒ No
Please enclose lab results.

15. ARTIFICIAL FILTER (filter pack) ☒ Yes ☐ No
Installed from 3 ft. to 20 ft.
Effective size #2 Uniformity Coefficient ___

16. WELL GROUTED? ☒ Yes ☐ No
☐ Neat Cement ☐ Bentonite ☒ Bentonite/Cement ☐ Other ___
Depth: From 0 ft. to 3 ft.

17. NEAREST SOURCE OF POSSIBLE CONTAMINATION: ___ ft. ___ direction
Type ___
Well Disinfected ☐ Yes ☒ No Type: ___ Amount: ___

18. PUMP: Date installed: ___ Not installed ☒
Mfr. Name: ___ Model No.: ___
H.P. ___ Volts ___ Length of drop pipe ___ ft. Capacity ___ gpm
TYPE: ☐ Submersible ☐ Jet (shallow) ☐ Turbine ☐ Jet (deep) ☐ Reciprocating ☐ Centrifugal

19. WELL DRILLER: CERT. NO.: 1648
Address: (Print) 1528 Hwy 138 Monroe, GA 30655
Level: A ☐ B ☒ C ☐ D ☐ (circle one)
Telephone No.: 770-207-9722 Fax No.: 770-207-9729

20. WATER WELL DRILLER'S CERTIFICATION: This well was drilled under my direction and this report is true to the best of my knowledge and belief.
Signed: Joseph G. Smith (Well Driller) Date: ___
If D Level Driller, provide supervising driller's name:

DHEC 1903 (07/2003) COPY 1 MAIL TO: S.C. DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL (ADDRESS ABOVE)

APPENDIX B

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-11R	Total Well Depth:	28.38 ft. BTOC
Date:	1/20/2009	Depth to water:	15.19 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	13.19 ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	~~13.02~~ 2.21 gal.
Weather Conditions:	sunny	3 Casing Volumes:	6.64 gal.
Air Temperature:	40	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1330		

Field Analyses

Volume Purged (gal.)	2.21	4.4	6.64				
Time							
pH	6.33	6.27	6.11				
Specific Conductivity (umhos/cm)	12.25	47.7	10.07				
Water Temperature ©	10.1	14.3	12.8				
Turbidity	low	—	—				
Dissolved Oxygen (mg/L)			3.61				

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-5R
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1430

Total Well Depth:	5-20	ft. BTOC
Depth to water:	14.71	ft. BTOC
Length of Water Column (LWC):	5.29	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	0.899	gal.
3 Casing Volumes:	2.69	gal.

Remarks: ~~Dull~~ sample

Field Analyses

Volume Purged (gal.)	0.899	1.6	2.69				
Time							
pH	4.61	4.65					
Specific Conductivity (umhos/cm)	10.79	10.64					
Water Temperature ©	9.9	14.3					
Turbidity	low	—					
Dissolved Oxygen (mg/L)		4.65					

Terracon

Groundwater Sampling Log

Well ID:	MW-5D
Date:	1/23/09
Site Name:	SC-553
Project No.:	73048002
Field Personnel:	W. Walker
Weather Conditions:	Sunny
Air Temperature:	45
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1240

Total Well Depth:	85.00 ft. BTOC
Depth to water:	Just developed ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH	7.33						
Specific Conductivity (umhos/cm)	1801.4						
Water Temperature ©	15.2						
Turbidity	High						
Dissolved Oxygen (mg/L)	9.23						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-7R	Total Well Depth:	10.25 ft. BTOC
Date:	1/20/2009	Depth to water:	14.95 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	10.65 ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	1.7 gal.
Weather Conditions:	sunny	3 Casing Volumes:	gal.
Air Temperature:	40	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1530		

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.19						
Specific Conductivity (umhos/cm)	6.41						
Water Temperature ©	12.9						
Turbidity	low						
Dissolved Oxygen (mg/L)	4.23						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-8	Total Well Depth:	15.25 ft. BTOC
Date:	1/20/2009	Depth to water:	15.97 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	9.03 ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	1.53 gal.
Weather Conditions:	sunny	3 Casing Volumes:	gal.
Air Temperature:	40	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1600		

Field Analyses

Volume Purged (gal.)							
Time							
pH	8.14						
Specific Conductivity (umhos/cm)	85.6						
Water Temperature ©	11.8						
Turbidity	low						
Dissolved Oxygen (mg/L)	6.08						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-
741-9000

Well ID:	MW-9R	Total Well Depth:	5-20 ft. BTOC
Date:	1/20/2009	Depth to water:	12.18 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	7.82 ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	1.32 gal.
Weather Conditions:	sunny	3 Casing Volumes:	gal.
Air Temperature:	40	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1620		

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.34						
Specific Conductivity (umhos/cm)	8.67						
Water Temperature ©	9.1						
Turbidity	low						
Dissolved Oxygen (mg/L)	3.91						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-10R	Total Well Depth:	30.15 ft. BTOC
Date:	1/20/2009	Depth to water:	30.00 ft. BTOC
Site Name:	**SC-015**	Length of Water Column (LWC):	ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	gal.
Weather Conditions:	sunny	3 Casing Volumes:	gal.
Air Temperature:	40	Remarks:	no H_2O
Well Evacuation Method:	Bailer		no sample
Sample Collection Method:	Bailer		
Sampled at (time):			

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Well ID:	MW-11 R
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1710

Total Well Depth:	15-30 ft. BTOC
Depth to water:	28.76 ft. BTOC
Length of Water Column (LWC):	1.24 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	0.21 gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.36						
Specific Conductivity (umhos/cm)	10.92 ms						
Water Temperature ©	9.5						
Turbidity	low						
Dissolved Oxygen (mg/L)	8.97						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-
741-9000

Well ID:	MW-12R
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1650

Total Well Depth:	20.00 ft. BTOC
Depth to water:	13.95 ft. BTOC
Length of Water Column (LWC):	6.05 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.02 gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.34						
Specific Conductivity (umhos/cm)	56.5						
Water Temperature ©	11.7						
Turbidity	1.0						
Dissolved Oxygen (mg/L)	4.55						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-17D
Date:	1/23/09
Site Name:	SC-553
Project No.:	73048002
Field Personnel:	W.W.
Weather Conditions:	Sunny
Air Temperature:	45
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1145

Total Well Depth:	75.2	ft. BTOC
Depth to water:	41.20	ft. BTOC
Length of Water Column (LWC):	34.00	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	5.78	gal.
3 Casing Volumes:	17.34	gal.

Remarks:

Field Analyses

Volume Purged (gal.)	5.78	11.4	17.34				
Time							
pH	6.46	6.63	6.33				
Specific Conductivity (umhos/cm)	82.5	72.1	70.1				
Water Temperature ©	15.0	16.1	14.7				
Turbidity	low	—	—				
Dissolved Oxygen (mg/L)			7.38				

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-
741-9000

Well ID:	MW-13
Date:	1/20/2009
Site Name:	**SC-015**
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	14.70 ft. BTOC
Depth to water:	14.60 ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	____ gal.
3 Casing Volumes:	____ gal.

Remarks: no H_2O
no Sample

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Well ID:	MW-15R
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1400

Total Well Depth:	39.20	ft. BTOC
Depth to water:	35.52	ft. BTOC
Length of Water Column (LWC):	3.68	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	0.62	gal.
3 Casing Volumes:	1.87	gal.

Remarks: full sample taken

Field Analyses

Volume Purged (gal.)	0.62	1.2	1.87				
Time							
pH	5.99	6.39					
Specific Conductivity (umhos/cm)	6.12	5.68					
Water Temperature ©		7.1					
Turbidity	High	High					
Dissolved Oxygen (mg/L)		10.22					

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-16	Total Well Depth:	30-30 ft. BTOC
Date:	1/20/2009	Depth to water:	26.76 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	3.24 ft.
Project No.:	7307-8012	Casing Diameter:	~~2~~ 2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	0.55 gal.
Weather Conditions:	~~sunny~~ overcast	3 Casing Volumes:	gal.
Air Temperature:	40	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1140		

Field Analyses

Volume Purged (gal.)							
Time							
pH	5.91						
Specific Conductivity (umhos/cm)	10.96						
Water Temperature ©	9.7						
Turbidity	low						
Dissolved Oxygen (mg/L)	8.67						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-
741-9000

Well ID:	MW-17
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	~~sunny~~ Overcast
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1100

Total Well Depth:	35.5-39.5	ft. BTOC
Depth to water:	36.02	ft. BTOC
Length of Water Column (LWC):	3.48	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	0.59	gal.
3 Casing Volumes:		gal.
Remarks:		

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.37						
Specific Conductivity (umhos/cm)	6.02						
Water Temperature ©	8.0						
Turbidity	low						
Dissolved Oxygen (mg/L)	8.65						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Page ____ of ____

Well ID:	MW-18	Total Well Depth:	29.80 ft. BTOC
Date:	1/20/2009	Depth to water:	22.21 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	7.59 ft.
Project No.:	7307-8012	Casing Diameter:	2.0 in.
Field Personnel:	W.Walker	1 Casing Volume = LWC x 0.17 =	1.29 gal.
Weather Conditions:	~~sunny~~ overcast	3 Casing Volumes:	3.87 gal.
Air Temperature:	40	Remarks:	well bailed dry
Well Evacuation Method:	Bailer		All Sample
Sample Collection Method:	Bailer		
Sampled at (time):	1030		

Field Analyses

Volume Purged (gal.)	1.29	2.6	3.87				
Time							
pH	6.55	6.95					
Specific Conductivity (umhos/cm)	6.64	7.28					
Water Temperature ©		9.3					
Turbidity	low	—					
Dissolved Oxygen (mg/L)		3.93					

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-18D
Date:	1/23/09
Site Name:	SC-553
Project No.:	73048002
Field Personnel:	L.L
Weather Conditions:	Sunny
Air Temperature:	45°F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	11:00

Total Well Depth:	61.6	ft. BTOC
Depth to water:	49.20	ft. BTOC
Length of Water Column (LWC):	12.4	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	2.108	gal.
3 Casing Volumes:	6.3	gal.
Remarks:		

Field Analyses

Volume Purged (gal.)	2.108	4.2	6.3				
Time							
pH	7.55	7.12	6.98				
Specific Conductivity (umhos/cm)	264.9	213.1	102.4				
Water Temperature ©	14.5	14.6	14.8				
Turbidity	Mod	—	H.L				
Dissolved Oxygen (mg/L)			6.42				

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Well ID:	MW-19
Date:	1/20/2009
Site Name:	SC-015
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1730

Total Well Depth:	34.65	ft. BTOC
Depth to water:	31.30	ft. BTOC
Length of Water Column (LWC):	3.35	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	0.57	gal.
3 Casing Volumes:		gal.

Remarks:

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.07						
Specific Conductivity (umhos/cm)	11.32						
Water Temperature ©	6.1						
Turbidity	44.4						
Dissolved Oxygen (mg/L)	6.92						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Well ID:	MW-20
Date:	1/20/2009
Site Name:	**SC-015**
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1640

Total Well Depth:	33.70 ft. BTOC
Depth to water:	29.94 ft. BTOC
Length of Water Column (LWC):	3.76 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	0.63 gal.
3 Casing Volumes:	1.91 gal.
Remarks:	

Field Analyses

Volume Purged (gal.)	0.63	1.2	1.91				
Time							
pH	6.10						
Specific Conductivity (umhos/cm)	8.19						
Water Temperature ©	7.6						
Turbidity	low						
Dissolved Oxygen (mg/L)	7.52						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-21
Date:	1/23/09
Site Name:	SC-553
Project No.:	73048002
Field Personnel:	M. Miller
Weather Conditions:	Sunny
Air Temperature:	45
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1300

Total Well Depth:	20.11 ft. BTOC
Depth to water:	Dust shield ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	____ in.
1 Casing Volume = LWC x ____ =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH	6.37						
Specific Conductivity (umhos/cm)	2259						
Water Temperature ©	17.2						
Turbidity	Mod						
Dissolved Oxygen (mg/L)	3.69						

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-741-9000

Well ID:	~~AL-SD~~ DW-1 (MW-1)
Date:	1/20/2009
Site Name:	**SC-015**
Project No.:	7307-8012
Field Personnel:	W.Walker
Weather Conditions:	sunny
Air Temperature:	40
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1510

Total Well Depth:	38.90 ft. BTOC
Depth to water:	34.84 ft. BTOC
Length of Water Column (LWC):	4.06 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	0.69 gal.
3 Casing Volumes:	2.09 gal.
Remarks:	~~full sample~~

Field Analyses

Volume Purged (gal.)	0.69	1.3	2.09				
Time							
pH	6.09	6.33					
Specific Conductivity (umhos/cm)	9.64	7.99					
Water Temperature ©	9.1	10.7					
Turbidity	M	—					
Dissolved Oxygen (mg/L)		4.63					

Groundwater Sampling Log

Terracon
521 Clemson Road
Columbia, SC (803)-
741-9000

Well ID:	MW-5DD
Date:	3/23/09
Site Name:	SC-015
Project No.:	7307 8012
Field Personnel:	W. Walker
Weather Conditions:	Sunny
Air Temperature:	70 F
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1630

Total Well Depth:	117.55	ft. BTOC
Depth to water:	91.86	ft. BTOC
Length of Water Column (LWC):	25.69	ft.
Casing Diameter:	2	in.
1 Casing Volume = LWC x .17 =	12.86	gal.
3 Casing Volumes:	38.60	gal.

Remarks: well bosch is plan dry @ 30gal
full sample taken

Field Analyses

Volume Purged (gal.)	12.86	25	38.60				
Time							
pH	9.44	9.26	9.90				
Specific Conductivity (umhos/cm)	450.3	292.4	249.8				
Water Temperature ©	28.1	22.1	21.0				
Turbidity	High	low	low				
Dissolved Oxygen (mg/L)			9.92				

APPENDIX C

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC 015

LABORATORY REPORT NUMBER
208120219

DATE
12/09/2008

Primary Data Review By

Curtis Ekker
Tue Dec 09 16:14:06 2008

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 12/09/2008

GCAL Report 208120219

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC 015

CASE NARRATIVE

Client: Terracon **Report:** 208120219

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 402163, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

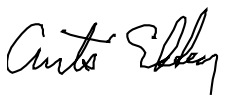
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Tue Dec 09 16:14:30 2008

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208120219

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812021901	TW-1	Water	12/01/2008 09:40	12/02/2008 09:00
20812021902	TW-2	Water	12/01/2008 10:00	12/02/2008 09:00
20812021903	TW-4	Water	12/01/2008 10:10	12/02/2008 09:00

Summary of Compounds Detected

There were no detects

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812021901	**TW-1**	Water	12/01/2008 09:40	12/02/2008 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/05/2008 19:23	RJU	402163

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.4	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	54.7	ug/L	109	77 - 127
2037-26-5	Toluene d8	50	49	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	53.7	ug/L	107	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812021902	**TW-2**	Water	12/01/2008 10:00	12/02/2008 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/05/2008 19:46	RJU	402163

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.6	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	55.1	ug/L	110	77 - 127
2037-26-5	Toluene d8	50	49	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.5	ug/L	103	71 - 127

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812021903	**TW-4**	Water	12/01/2008 10:10	12/02/2008 09:00

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	12/05/2008 20:09	RJU	402163

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	48.3	ug/L	97	78 - 130
1868-53-7	Dibromofluoromethane	50	58.4	ug/L	117	77 - 127
2037-26-5	Toluene d8	50	48.3	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	52.5	ug/L	105	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch	402163	**Client ID**	MB402163		LCS402163				LCSD402163			
Prep Batch	N/A	**GCAL ID**	674333		674334				674335			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	12/05/2008 13:28		12/05/2008 11:32				12/05/2008 12:16			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	0.090U	0.090	50.0	54.2	108	76 - 123		55.5	111	2	30
100-41-4	Ethylbenzene	0.065U	0.065	50.0	53.7	107	74 - 126		55.2	110	3	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	0.077	50.0	51.3	103	76 - 122		54.8	110	7	30
1330-20-7	Xylene (total)	0.183U	0.183	150	143	95	76 - 123		145	97	1	30
91-20-3	Naphthalene	0.118U	0.118	50.0	46.2	92	64 - 127		51.6	103	11	35
71-43-2	Benzene	0.065U	0.065	50.0	50.7	101	78 - 121		50.1	100	1	20
108-88-3	Toluene	0.076U	0.076	50.0	47.6	95	78 - 121		47.9	96	0.6	20
Surrogate												
460-00-4	4-Bromofluorobenzene	44.4	89	50	48.7	97	78 - 130		49.3	99		
1868-53-7	Dibromofluoromethane	57.2	114	50	59.6	119	77 - 127		54.4	109		
2037-26-5	Toluene d8	46.5	93	50	48.2	96	76 - 134		48.7	97		
17060-07-0	1,2-Dichloroethane-d4	55.9	112	50	55.5	111	71 - 127		56.7	113		

Access Analytical - Chain of Custody Record

Access/4565/20612219/12-9-8

Project Submission # _____ **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon

Report To: Melissa Roberts

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: Fax:

Email:

Project Name:

Sampled By (print):

Preservative (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

BTEX, MTBE

Sample Label	Date Collected	Time Collected	Matrix	# of Cont							
TW-1	12/1/08	940	L	2	2						1
TW-2	12/1/08	1000	L	2	2						2
TW-4	12/1/08	1010	L	2	2						3

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.

Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

✓ Std. (5-7 Bus. days)

___ RUSH*

*Date Required:_____

(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?

✓ Yes

___ No

Project Location:

✓ SC

___ NC

___ Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
	12/1/08	1400	April P
April P	12/1/08	1700	FEDEX
FedX	12-1-8	1700	

Access Analytical, Inc.

See Reverse for Terms and Conditions

24

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
208122429

DATE
12/30/2008

Primary Data Review By

Curtis Ekker
Tue Dec 30 11:20:32 2008

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 12/30/2008

GCAL Report 208122429

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 208122429

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, sample 20812242901 (MW-18) had to be diluted due to the presence of non-target background. This dilution is reflected in the elevated reporting limits.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 208122429

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812242901	MW-18	Solid	12/22/2008 15:00	12/24/2008 12:30

Summary of Compounds Detected

There were no detects

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20812242901	**MW-18**	Solid	12/22/2008 15:00	12/24/2008 12:30

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	12/26/2008 15:14	JCK	403430

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	7.78U	14.4	7.78	ug/Kg
108-88-3	Toluene	11.1U	14.4	11.1	ug/Kg
100-41-4	Ethylbenzene	12.5U	14.4	12.5	ug/Kg
1330-20-7	Xylene (total)	46.5U	71.9	46.5	ug/Kg
91-20-3	Naphthalene	32.9U	36.0	32.9	ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	1620	1750	ug/Kg	108	62 - 127
1868-53-7	Dibromofluoromethane	1620	1660	ug/Kg	102	65 - 130
2037-26-5	Toluene d8	1620	1740	ug/Kg	107	71 - 132
17060-07-0	1,2-Dichloroethane-d4	1620	1670	ug/Kg	103	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	403430	**Client ID**	MB403430			LCS403430				LCSD403430		
Prep Batch	N/A	**GCAL ID**	680956			680957				680958		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	12/26/2008 12:33			12/26/2008 11:20				12/26/2008 11:44		
		Matrix	Solid			Solid				Solid		
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
100-41-4	Ethylbenzene		17.3U	17.3	2500	2570	103	80 - 123		2600	104	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)		8.90U	8.90	2500	2360	94	69 - 131		2440	98	3	30
1330-20-7	Xylene (total)		64.7U	64.7	7500	7600	101	80 - 120		7710	103	1	30
91-20-3	Naphthalene		45.7U	45.7	2500	2480	99	58 - 137		2680	107	8	30
71-43-2	Benzene		10.8U	10.8	2500	2250	90	78 - 120		2280	91	1	21
108-88-3	Toluene		15.5U	15.5	2500	2290	92	78 - 122		2380	95	4	21
Surrogate													
460-00-4	4-Bromofluorobenzene		2330	93	2500	2650	106	62 - 127		2630	105		
1868-53-7	Dibromofluoromethane		2530	101	2500	2660	106	65 - 130		2600	104		
2037-26-5	Toluene d8		2600	104	2500	2560	102	71 - 132		2540	102		
17060-07-0	1,2-Dichloroethane-d4		2540	102	2500	2560	102	62 - 125		2540	102		

Analytical Batch	403430	**Client ID**	SB-4J (4.5-5.5)			680667MS				680667MSD		
Prep Batch	N/A	**GCAL ID**	20812186729			681051				681052		
		Sample Type	SAMPLE			MS				MSD		
		Analytical Date	12/26/2008 13:13			12/26/2008 19:34				12/26/2008 19:58		
		Matrix	Solid			Solid				Solid		
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
71-43-2	Benzene		0.00	11.8	2720	2400	88	78 - 120		2450	90	2	21
108-88-3	Toluene		0.00	16.8	2720	2440	90	78 - 122		2500	92	2	21
Surrogate													
460-00-4	4-Bromofluorobenzene				2720	2750	101	62 - 127		2800	103		
1868-53-7	Dibromofluoromethane				2720	2720	100	65 - 130		2760	102		
2037-26-5	Toluene d8				2720	2660	98	71 - 132		2700	99		
17060-07-0	1,2-Dichloroethane-d4				2720	2650	98	62 - 125		2680	99		

Access Analytical - Chain of Custody Record

Access/4565/20812242911.2.9

Project Submission #_____ **PO #**_____ **Laboratory ID:**_____

Company Name: Terracon
Report To: Melissa Roberts
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-015
Sampled By (print): William Waller

Preservative: (*see codes below)

→ REQUESTED LAB ANALYSIS: →

BTEX, Naph

Sample Label	Date Collected	Time Collected	Matrix	# of Cont								NOTES / COMMENTS
MW-18	12/22/08	1500	S	4		4						1

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
✓ Std. (5-7 Bus. days)
___RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___No

Project Location:
✓ SC
___NC
___Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	12/23/08	0830	Christy Russ
Christy Russ	12/23/08	1700	FedEx
FedEx	12/24/08	1230	[signature]

Access Analytical, Inc.
See Reverse for Terms and Conditions

4.1

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209010935

DATE
01/14/2009

Primary Data Review By

Curtis Ekker
Wed Jan 14 13:08:44 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/14/2009

GCAL Report 209010935

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209010935

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 404232, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

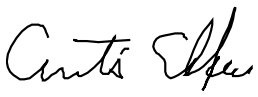
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Wed Jan 14 13:09:03 2009

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209010935

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093501	MW-19	Solid	01/06/2009 16:30	01/09/2009 09:45
20901093502	MW-20	Solid	01/06/2009 16:00	01/09/2009 09:45

Summary of Compounds Detected

There were no detects

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093501	**MW-19**	Solid	01/06/2009 16:30	01/09/2009 09:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/12/2009 18:06	RJU	404232

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.198U	4.59	0.198	ug/Kg
108-88-3	Toluene	0.284U	4.59	0.284	ug/Kg
100-41-4	Ethylbenzene	0.318U	4.59	0.318	ug/Kg
1330-20-7	Xylene (total)	1.19U	9.17	1.19	ug/Kg
91-20-3	Naphthalene	0.839U	4.59	0.839	ug/Kg
1634-04-4	tert-Butyl methyl ether (MTBE)	0.163U	4.59	0.163	ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	41.7	46.5	ug/Kg	111	62 - 127
1868-53-7	Dibromofluoromethane	41.7	43.3	ug/Kg	104	65 - 130
2037-26-5	Toluene d8	41.7	42.7	ug/Kg	102	71 - 132
17060-07-0	1,2-Dichloroethane-d4	41.7	43.3	ug/Kg	104	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093502	**MW-20**	Solid	01/06/2009 16:00	01/09/2009 09:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/12/2009 18:28	RJU	404232

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.186U	4.31	0.186	ug/Kg
108-88-3	Toluene	0.267U	4.31	0.267	ug/Kg
100-41-4	Ethylbenzene	0.299U	4.31	0.299	ug/Kg
1330-20-7	Xylene (total)	1.12U	8.62	1.12	ug/Kg
91-20-3	Naphthalene	0.788U	4.31	0.788	ug/Kg
1634-04-4	tert-Butyl methyl ether (MTBE)	0.153U	4.31	0.153	ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	39.7	45.1	ug/Kg	114	62 - 127
1868-53-7	Dibromofluoromethane	39.7	40.4	ug/Kg	102	65 - 130
2037-26-5	Toluene d8	39.7	42.3	ug/Kg	107	71 - 132
17060-07-0	1,2-Dichloroethane-d4	39.7	42.9	ug/Kg	108	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	404232	**Client ID**	MB404232		LCS404232				LCSD404232			
Prep Batch	N/A	**GCAL ID**	684827		684828				684829			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/12/2009 16:00		01/12/2009 14:53				01/12/2009 15:16			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
100-41-4	Ethylbenzene	0.347U	0.347	50.0	42.5	85	80 - 123		44.3	89	4	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.178U	0.178	50.0	46.7	93	69 - 131		45.8	92	2	30
1330-20-7	Xylene (total)	1.29U	1.29	150	141	94	80 - 120		145	97	3	30
91-20-3	Naphthalene	0.915U	0.915	50.0	44.5	89	58 - 137		48.8	98	9	30
71-43-2	Benzene	0.216U	0.216	50.0	44.9	90	78 - 120		41.8	84	7	21
108-88-3	Toluene	0.310U	0.310	50.0	46.6	93	78 - 122		48.4	97	4	21
Surrogate												
460-00-4	4-Bromofluorobenzene	51.9	104	50	49.5	99	62 - 127		50.7	101		
1868-53-7	Dibromofluoromethane	51.5	103	50	51.9	104	65 - 130		50.2	100		
2037-26-5	Toluene d8	51.3	103	50	51	102	71 - 132		51.3	103		
17060-07-0	1,2-Dichloroethane-d4	52.7	105	50	50.3	101	62 - 125		48.4	97		

Access/4565/20090925/1-16-9

Access Analytical - Chain of Custody Record

Project Submission # 73078012 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon
Report To: Melissa Roberts
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax: 803-741-9900
Email:
Project Name: SC-015
Sampled By (print): Regan Norris

Preservative: (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont		BTEX, Naph, MTBE							NOTES / COMMENTS
MW-19	1-6-09	16:30	S	4		X							1
MW-20	1-6-09	16:00	S	4		X							2

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
___ Yes
___ No

Project Location:
✓ SC
___ NC
___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	1/8/09	1430	[signature]
[signature] Fedex	1/8/09	1700	FEDEX
	1-9-9	945	[signature]

Access Analytical, Inc.
See Reverse for Terms and Conditions

4.2

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209010937

DATE
01/14/2009

Primary Data Review By

Curtis Ekker
Wed Jan 14 16:38:31 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/14/2009

GCAL Report 209010937

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209010937

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 404295, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

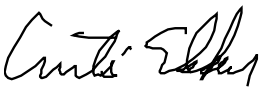
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209010937

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093701	MW-12D	Water	01/07/2009 14:30	01/09/2009 09:45

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093701	**MW-12D**	Water	01/07/2009 14:30	01/09/2009 09:45

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1330-20-7	**Xylene (total)**	**5.62**	**3.00**	**0.183**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**52.9**	**1.00**	**0.077**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901093701	**MW-12D**	Water	01/07/2009 14:30	01/09/2009 09:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/13/2009 09:48	AGC	404295

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	**Xylene (total)**	**5.62**	**3.00**	**0.183**	**ug/L**
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**52.9**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.1	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	52.9	ug/L	106	77 - 127
2037-26-5	Toluene d8	50	48.2	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	55.3	ug/L	111	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch 404295		**Client ID**	MB404295		LCS404295				LCSD404295			
Prep Batch N/A		**GCAL ID**	685108		685109				685110			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/13/2009 09:25		01/13/2009 08:16				01/13/2009 08:39			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	0.090U	0.090	50.0	57.6	115	76 - 123		56.6	113	2	30
100-41-4	Ethylbenzene	0.065U	0.065	50.0	46.7	93	74 - 126		47.5	95	2	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	0.077	50.0	60.0	120	76 - 122		53.2	106	12	30
1330-20-7	Xylene (total)	0.183U	0.183	150	135	90	76 - 123		136	91	0.7	30
91-20-3	Naphthalene	0.118U	0.118	50.0	43.2	86	64 - 127		42.9	86	0.7	35
71-43-2	Benzene	0.065U	0.065	50.0	50.7	101	78 - 121		51.0	102	0.6	20
108-88-3	Toluene	0.076U	0.076	50.0	46.8	94	78 - 121		45.1	90	4	20
Surrogate												
460-00-4	4-Bromofluorobenzene	49	98	50	46.6	93	78 - 130		48.2	96		
1868-53-7	Dibromofluoromethane	52.3	105	50	52.9	106	77 - 127		53.6	107		
2037-26-5	Toluene d8	47.6	95	50	44.9	90	76 - 134		43.6	87		
17060-07-0	1,2-Dichloroethane-d4	54.6	109	50	57	114	71 - 127		57.5	115		

Access Analytical - Chain of Custody Record

Access/4565/20090937/1169

Project Submission # 7307801Z **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon
Report To: Melissa Roberts
Address: 521 Clemson
City: Columbia State: SC Zip: 29224
Phone: 803-741-9000 Fax: 803-741-9900
Email:
Project Name: SC-015
Sampled By (print): Regan Norris

* REQUESTED LAB ANALYSIS: *

Preservative (*see codes below): 1

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	BTEX, Naph, MTBE	NOTES / COMMENTS
MW-12D	1-7-09	1430	L	2	X	1

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
- ✓ Std. (5-7 Bus. days)
- ___ RUSH*

*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
- ✓ Yes
- ___ No

Project Location:
- ___ SC
- ___ NC
- ___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	1/8/09	1430	[signature]
[signature] Faly	1/8/09	1700	FEDEX
	1-9-9	945	[signature]

Pg 1 of 1

Access Analytical, Inc.
See Reverse for Terms and Conditions

42

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209011318

DATE
01/15/2009

Primary Data Review By

Curtis Ekker

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/15/2009

GCAL Report 209011318

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209011318

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 404384, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review. The LCS/LCSD recovery was above the upper control limit for tert-Butyl methyl ether (MTBE); however, tert-Butyl methyl ether (MTBE) was not detected above the reporting limit for samples associated with this QC; therefore, the data is reportable.

In the SW-846 8260B analysis, sample 20901131801 (MW-5D) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209011318

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901131801	MW-5D	Water	01/12/2009 16:30	01/13/2009 09:30

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901131801	**MW-5D**	Water	01/12/2009 16:30	01/13/2009 09:30

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**51.9**	**5.00**	**0.325**	**ug/L**
108-88-3	**Toluene**	**346**	**5.00**	**0.378**	**ug/L**
100-41-4	**Ethylbenzene**	**65.2**	**5.00**	**0.326**	**ug/L**
1330-20-7	**Xylene (total)**	**331**	**15.0**	**0.917**	**ug/L**
91-20-3	**Naphthalene**	**28.5**	**25.0**	**0.591**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901131801	**MW-5D**	Water	01/12/2009 16:30	01/13/2009 09:30

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/14/2009 13:29	AGC	404384

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**51.9**	**5.00**	**0.325**	**ug/L**
108-88-3	**Toluene**	**346**	**5.00**	**0.378**	**ug/L**
100-41-4	**Ethylbenzene**	**65.2**	**5.00**	**0.326**	**ug/L**
1330-20-7	**Xylene (total)**	**331**	**15.0**	**0.917**	**ug/L**
91-20-3	**Naphthalene**	**28.5**	**25.0**	**0.591**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.385U	5.00	0.385	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	277	ug/L	111	78 - 130
1868-53-7	Dibromofluoromethane	250	257	ug/L	103	77 - 127
2037-26-5	Toluene d8	250	261	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	239	ug/L	96	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch	404384	**Client ID**	MB404384			LCS404384				LCSD404384		
Prep Batch	N/A	**GCAL ID**	685485			685486				685487		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	01/14/2009 11:19			01/14/2009 10:12				01/14/2009 10:34		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.090U	0.090	50.0	46.4	93	76 - 123		47.3	95	2	30
100-41-4	Ethylbenzene		0.065U	0.065	50.0	57.2	114	74 - 126		55.4	111	3	30
1634-04-4	tert-Butyl methyl ether (MTBE)		0.077U	0.077	50.0	55.7	111	76 - 122		61.5	123*	10	30
1330-20-7	Xylene (total)		0.183U	0.183	150	171	114	76 - 123		164	109	4	30
91-20-3	Naphthalene		0.118U	0.118	50.0	55.0	110	64 - 127		54.8	110	0.4	35
71-43-2	Benzene		0.065U	0.065	50.0	55.4	111	78 - 121		55.3	111	0.2	20
108-88-3	Toluene		0.076U	0.076	50.0	55.8	112	78 - 121		55.4	111	0.7	20
Surrogate													
460-00-4	4-Bromofluorobenzene		52	104	50	58.2	116	78 - 130		58.2	116		
1868-53-7	Dibromofluoromethane		53.4	107	50	52.2	104	77 - 127		52.1	104		
2037-26-5	Toluene d8		52.3	105	50	52.8	106	76 - 134		52.8	106		
17060-07-0	1,2-Dichloroethane-d4		48.8	98	50	46.5	93	71 - 127		47.1	94		

ACCESS / 4565 / 209011318 / 1-20-9

Access Analytical - Chain of Custody Record

Project Submission # 7307802 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon | Preservative: (*see codes below) | 1

Report To: Melissa Roberts

Address: 521 clemson rd

City: Cola State: SC Zip: 29224

Phone: 803-741-9000 Fax: 803-741-1900

Email:

Project Name: SC-015

Sampled By (print): Regan Norris

↓ REQUESTED LAB ANALYSIS: ↓ — BTEX, MNaphthalene

Sample Label	Date Collected	Time Collected	Matrix	# of Cont			NOTES / COMMENTS
MW-5D	1-12-09	16:30	L	2		X	-1

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.

Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:

~~RN~~ ~~Std~~ (5-7 Bus. days)

RUSH*

*Date Required: _____

(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice? ✓ Yes ___ No

52°

Project Location: ✓ SC ___ NC ___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
Christ Ross	1/12/09	1700	Christ Ross
Christ Ross	1/12/09		FEDEX
FEDEX	1-13-9	0930	A. Mamb

Access Analytical, Inc.

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209011320

DATE
01/16/2009

Primary Data Review By

Curtis Ekker
Fri Jan 16 15:46:29 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/16/2009

GCAL Report 209011320

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209011320

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis for analytical batch 404442, no MS/MSD was performed due to insufficient sample volume. The LCS/LCSD is included for review.

In the SW-846 8260B analysis, sample 20901132002 (MW-1R) was analyzed at a 50 (Methanol extract) dilution.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

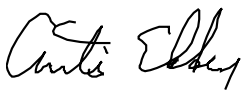
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Fri Jan 16 14:44:49 2009

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209011320

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901132001	MW-15R	Solid	01/12/2009 15:30	01/13/2009 09:30
20901132002	MW-1R	Solid	01/09/2009 15:30	01/13/2009 09:30

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901132001	**MW-15R**	Solid	01/12/2009 15:30	01/13/2009 09:30

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.54J**	**3.82**	**0.165**	**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901132002	**MW-1R**	Solid	01/09/2009 15:30	01/13/2009 09:30

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1330-20-7	**Xylene (total)**	**146J**	**492**	**63.6**	**ug/Kg**
91-20-3	**Naphthalene**	**127J**	**246**	**45.0**	**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901132001	**MW-15R**	Solid	01/12/2009 15:30	01/13/2009 09:30

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/15/2009 10:14	WAS	404442

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.54J**	**3.82**	**0.165**	**ug/Kg**
108-88-3	Toluene	0.236U	3.82	0.236	ug/Kg
100-41-4	Ethylbenzene	0.265U	3.82	0.265	ug/Kg
1330-20-7	Xylene (total)	0.987U	7.63	0.987	ug/Kg
91-20-3	Naphthalene	0.698U	3.82	0.698	ug/Kg

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	32.7	32.3	ug/Kg	99	62 - 127
1868-53-7	Dibromofluoromethane	32.7	31.7	ug/Kg	97	65 - 130
2037-26-5	Toluene d8	32.7	31.8	ug/Kg	97	71 - 132
17060-07-0	1,2-Dichloroethane-d4	32.7	39.9	ug/Kg	122	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901132002	**MW-1R**	Solid	01/09/2009 15:30	01/13/2009 09:30

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/15/2009 16:47	JCK	404475

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	10.6U	246	10.6	ug/Kg
108-88-3	Toluene	15.2U	246	15.2	ug/Kg
100-41-4	Ethylbenzene	17.1U	246	17.1	ug/Kg
1330-20-7	**Xylene (total)**	**146J**	**492**	**63.6**	**ug/Kg**
91-20-3	**Naphthalene**	**127J**	**246**	**45.0**	**ug/Kg**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	2050	2020	ug/Kg	98	62 - 127
1868-53-7	Dibromofluoromethane	2050	2190	ug/Kg	107	65 - 130
2037-26-5	Toluene d8	2050	1930	ug/Kg	94	71 - 132
17060-07-0	1,2-Dichloroethane-d4	2050	2100	ug/Kg	102	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	404442	**Client ID**	MB404442		LCS404442				LCSD404442			
Prep Batch	N/A	**GCAL ID**	685928		685929				685930			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/15/2009 09:14		01/15/2009 07:49				01/15/2009 08:28			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	0.244U	0.244	50.0	46.9	94	73 - 128	48.8	98	4	30	
100-41-4	Ethylbenzene	0.347U	0.347	50.0	50.8	102	80 - 123	50.1	100	1	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	0.178U	0.178	50.0	48.3	97	69 - 131	47.0	94	3	30	
1330-20-7	Xylene (total)	1.29U	1.29	150	166	111	80 - 120	164	109	1	30	
91-20-3	Naphthalene	0.915U	0.915	50.0	44.5	89	58 - 137	46.7	93	5	30	
71-43-2	Benzene	0.216U	0.216	50.0	49.5	99	78 - 120	49.8	100	0.6	21	
108-88-3	Toluene	0.310U	0.310	50.0	55.0	110	78 - 122	52.6	105	4	21	
Surrogate												
460-00-4	4-Bromofluorobenzene	50.9	102	50	52.6	105	62 - 127	50.5	101			
1868-53-7	Dibromofluoromethane	52.4	105	50	51.1	102	65 - 130	50.8	102			
2037-26-5	Toluene d8	49.4	99	50	51	102	71 - 132	49.7	99			
17060-07-0	1,2-Dichloroethane-d4	59.3	119	50	49.7	99	62 - 125	49.2	98			

Analytical Batch	404475	**Client ID**	MB404475		LCS404475				LCSD404475			
Prep Batch	N/A	**GCAL ID**	686078		686079				686080			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/15/2009 13:20		01/15/2009 12:11				01/15/2009 12:34			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	12.2U	12.2	2500	2740	110	73 - 128	2660	106	3	30	
100-41-4	Ethylbenzene	17.3U	17.3	2500	2560	102	80 - 123	2500	100	2	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	8.90U	8.90	2500	2840	114	69 - 131	2480	99	14	30	
1330-20-7	Xylene (total)	64.7U	64.7	7500	7730	103	80 - 120	7290	97	6	30	
91-20-3	Naphthalene	45.7U	45.7	2500	2590	104	58 - 137	2690	108	4	30	
71-43-2	Benzene	10.8U	10.8	2500	2950	118	78 - 120	2760	110	7	21	
108-88-3	Toluene	15.5U	15.5	2500	2590	104	78 - 122	2480	99	4	21	
Surrogate												
460-00-4	4-Bromofluorobenzene	2410	96	2500	2530	101	62 - 127	2460	98			
1868-53-7	Dibromofluoromethane	2430	97	2500	2600	104	65 - 130	2620	105			
2037-26-5	Toluene d8	2460	98	2500	2520	101	71 - 132	2480	99			
17060-07-0	1,2-Dichloroethane-d4	2470	99	2500	2670	107	62 - 125	2660	106			

ACCESS / 4565 / 209011320 / 1-20-9

Access Analytical - Chain of Custody Record

Project Submission # 7308012 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon

Report To: Melissa Roberts

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: 803-741-9000 Fax: 803-741-9900

Email:

Project Name: SC-015

Sampled By (print): Regan Norris

* REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	Preservative (*see codes below)	BTEX, Naph						
MW-15R	1-12-09	1530	S	4		X						-1
MW-1R	1-9-09	1530	S	4		X						-2

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.

Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___ No

Project Location:
✓ SC
___ NC
___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
Chuck Ross	1/12/09	0900	Chuck Ross
Chuck Ross	1/10/09		

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209012248

DATE
01/28/2009

Primary Data Review By

Curtis Ekker
Wed Jan 28 15:57:03 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/28/2009

GCAL Report 209012248

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209012248

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, samples 20901224801 (MW-1R) and 20901224802 (MW-5R) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument.

In the SW-846 8260B - Gas Additives analysis, samples 20901224801 (MW-1R) and 20901224802 (MW-5R) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument.

In the SW-846 8260B analysis for analytical batch 404930, the MS/MSD exhibited recovery failures.

CONVENTIONALS

In the EPA 375.4 analysis, sample 20901224804 (MW-7R) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the EPA 353.2 analysis, samples 20901224805 (MW-8), 20901224807 (MW-11R), 20901224810 (MW-16), 20901224811 (MW-17), 20901224813 (MW-19) and 20901224814 (MW-20) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the SM 3500 Fe D analysis, samples 20901224801 (MW-1R), 20901224802 (MW-5R), 20901224803 (DW-1), 20901224804 (MW-7R), 20901224806 (MW-9R) and 20901224808 (MW-12R) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209012248

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224801	MW-1R	Water	01/20/2009 13:30	01/22/2009 09:40
20901224802	MW-5R	Water	01/20/2009 14:30	01/22/2009 09:40
20901224803	DW-1	Water	01/20/2009 15:10	01/22/2009 09:40
20901224804	MW-7R	Water	01/20/2009 15:30	01/22/2009 09:40
20901224805	MW-8	Water	01/20/2009 16:00	01/22/2009 09:40
20901224806	MW-9R	Water	01/20/2009 16:20	01/22/2009 09:40
20901224807	MW-11R	Water	01/20/2009 17:10	01/22/2009 09:40
20901224808	MW-12R	Water	01/20/2009 16:50	01/22/2009 09:40
20901224809	MW-15R	Water	01/20/2009 14:00	01/22/2009 09:40
20901224810	MW-16	Water	01/20/2009 11:40	01/22/2009 09:40
20901224811	MW-17	Water	01/20/2009 11:00	01/22/2009 09:40
20901224812	MW-18	Water	01/20/2009 10:30	01/22/2009 09:40
20901224813	MW-19	Water	01/20/2009 17:30	01/22/2009 09:40
20901224814	MW-20	Water	01/20/2009 16:40	01/22/2009 09:40

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224801	**MW-1R**	Water	01/20/2009 13:30	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	388	5.00	0.325	ug/L
108-88-3	Toluene	113	5.00	0.378	ug/L
100-41-4	Ethylbenzene	310	5.00	0.326	ug/L
1330-20-7	Xylene (total)	786	15.0	0.917	ug/L
91-20-3	Naphthalene	89.3	25.0	0.591	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	546	5.00	0.385	ug/L
107-06-2	1,2-Dichloroethane	12.9J	25.0	0.449	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	911	50.0	20.6	ug/L
108-20-3	diisopropyl Ether (DIPE)	8.40J	25.0	2.65	ug/L
75-85-4	tert-amyl alcohol (TAA)	280	100	78.0	ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	32.6	2.50	0.265	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.023	0.010	0.001	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224802	**MW-5R**	Water	01/20/2009 14:30	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	27300	500	32.5	ug/L
100-41-4	Ethylbenzene	3100	500	32.6	ug/L
91-20-3	Naphthalene	1310J	2500	59.1	ug/L
108-88-3	Toluene	55100	500	37.8	ug/L
1330-20-7	Xylene (total)	14100	1500	91.7	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	4540	500	38.5	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	6230	5000	2060	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224802	**MW-5R**	Water	01/20/2009 14:30	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-85-4	tert-amyl alcohol (TAA)	39500	10000	7800	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.457	0.010	0.001	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.019	0.015	0.0027	mg/L

SW-846 8011

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.741	0.010	0.00350	ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	55.6	5.00	0.530	mg/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	3.4B	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224803	**DW-1**	Water	1/20/2009 15:10	1/22/2009 09:40

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.036	0.015	0.0027	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224803	**DW-1**	Water	1/20/2009 15:10	1/22/2009 09:40

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	11.2	0.500	0.053	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	5.80	1.00	0.065	ug/L
100-41-4	Ethylbenzene	3.68	1.00	0.065	ug/L
91-20-3	Naphthalene	7.22	5.00	0.118	ug/L
1330-20-7	Xylene (total)	12.5	3.00	0.183	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.023	0.010	0.001	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224804	**MW-7R**	Water	01/20/2009 15:30	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	2.33	1.00	0.065	ug/L
100-41-4	Ethylbenzene	126	1.00	0.065	ug/L
91-20-3	Naphthalene	15.7	5.00	0.118	ug/L
108-88-3	Toluene	78.5	1.00	0.076	ug/L
1330-20-7	Xylene (total)	106	3.00	0.183	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.040	0.010	0.001	mg/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	73.9	25.0	2.1	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	38.7	2.50	0.265	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224805	MW-8	Water	01/20/2009 16:00	01/22/2009 09:40

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	5.45	0.100	0.010	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.032B	0.050	0.005	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
91-20-3	Naphthalene	2.44J	5.00	0.118	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224806	MW-9R	Water	01/20/2009 16:20	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	6.93J	10.0	4.12	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.010	0.010	0.001	mg/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	15.1	5.0	0.41	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	4.36	1.00	0.065	ug/L
100-41-4	Ethylbenzene	16.6	1.00	0.065	ug/L
91-20-3	Naphthalene	8.86	5.00	0.118	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	11.7	1.00	0.077	ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	31.0	2.50	0.265	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224807	**MW-11R**	Water	01/20/2009 17:10	01/22/2009 09:40

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.318	0.050	0.005	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	1.58	0.020	0.002	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0086B	0.015	0.0027	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
91-20-3	Naphthalene	2.50J	5.00	0.118	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224808	**MW-12R**	Water	01/20/2009 16:50	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	27.0	10.0	4.12	ug/L
75-85-4	tert-amyl alcohol (TAA)	47.8	20.0	15.6	ug/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.62B	5.0	0.41	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	3.02	1.00	0.065	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	64.1	1.00	0.077	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.034	0.010	0.001	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224808	**MW-12R**	Water	01/20/2009 16:50	01/22/2009 09:40

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	44.1	2.50	0.265	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224809	**MW-15R**	Water	01/20/2009 14:00	01/22/2009 09:40

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.075	0.015	0.0027	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.924J	5.00	0.090	ug/L
91-20-3	Naphthalene	2.59J	5.00	0.118	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	185	1.00	0.077	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.021	0.010	0.001	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.261	0.050	0.005	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
108-20-3	diisopropyl Ether (DIPE)	6.08	5.00	0.529	ug/L
75-65-0	t-Butanol (TBA)	155	10.0	4.12	ug/L
75-85-4	tert-amyl alcohol (TAA)	44.6	20.0	15.6	ug/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	20.4	5.0	0.41	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224810	**MW-16**	Water	01/20/2009 11:40	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.11	1.00	0.077	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	2.11	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224811	**MW-17**	Water	01/20/2009 11:00	01/22/2009 09:40

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.293	0.050	0.005	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	1.12	0.020	0.002	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	0.550J	1.00	0.077	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224812	**MW-18**	Water	01/20/2009 10:30	01/22/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	4.68	1.00	0.077	ug/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.254	0.010	0.001	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0074B	0.015	0.0027	mg/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224812	**MW-18**	Water	01/20/2009 10:30	01/22/2009 09:40

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.077	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224813	**MW-19**	Water	01/20/2009 17:30	01/22/2009 09:40

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	2.37	0.050	0.005	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.034	0.015	0.0027	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	1.22	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224814	**MW-20**	Water	01/20/2009 16:40	01/22/2009 09:40

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	1.20	0.020	0.002	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.069	0.015	0.0027	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	0.853J	1.00	0.077	ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	1.86	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224801	**MW-1R**	Water	01/20/2009 13:30	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/22/2009 20:32	ADI	404825

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**388**	**5.00**	**0.325**	**ug/L**
108-88-3	**Toluene**	**113**	**5.00**	**0.378**	**ug/L**
100-41-4	**Ethylbenzene**	**310**	**5.00**	**0.326**	**ug/L**
1330-20-7	**Xylene (total)**	**786**	**15.0**	**0.917**	**ug/L**
91-20-3	**Naphthalene**	**89.3**	**25.0**	**0.591**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**546**	**5.00**	**0.385**	**ug/L**
107-06-2	**1,2-Dichloroethane**	**12.9J**	**25.0**	**0.449**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	266	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	250	263	ug/L	105	77 - 127
2037-26-5	Toluene d8	250	251	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	250	238	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/22/2009 20:32	ADI	404824

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	1.74U	25.0	1.74	ug/L
75-65-0	**t-Butanol (TBA)**	**911**	**50.0**	**20.6**	**ug/L**
108-20-3	**diisopropyl Ether (DIPE)**	**8.40J**	**25.0**	**2.65**	**ug/L**
637-92-3	Ethyl tert-butyl ether (ETBE)	1.30U	25.0	1.30	ug/L
624-95-3	ethyl tert-butanol (ETBA)	21.8U	50.0	21.8	ug/L
64-17-5	Ethanol	202U	500	202	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**280**	**100**	**78.0**	**ug/L**
762-75-4	tert-butyl formate (TBF)	1.79U	25.0	1.79	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	250	266	ug/L	106	50 - 150
1868-53-7	Dibromofluoromethane	250	263	ug/L	105	50 - 150
2037-26-5	Toluene d8	250	251	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	250	238	ug/L	95	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 13:28	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224801	**MW-1R**	Water	01/20/2009 13:30	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 12:31	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:21	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.023**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/22/2009 15:31	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**32.6**	**2.50**	**0.265**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 11:47	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224802	**MW-5R**	Water	01/20/2009 14:30	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	01/23/2009 10:06	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	44.9U	2500	44.9	ug/L
71-43-2	**Benzene**	**27300**	**500**	**32.5**	**ug/L**
100-41-4	**Ethylbenzene**	**3100**	**500**	**32.6**	**ug/L**
91-20-3	**Naphthalene**	**1310J**	**2500**	**59.1**	**ug/L**
108-88-3	**Toluene**	**55100**	**500**	**37.8**	**ug/L**
1330-20-7	**Xylene (total)**	**14100**	**1500**	**91.7**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**4540**	**500**	**38.5**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	27300	ug/L	109	78 - 130
1868-53-7	Dibromofluoromethane	25000	28100	ug/L	112	77 - 127
2037-26-5	Toluene d8	25000	24900	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	25000	24600	ug/L	98	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	01/23/2009 10:06	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	20200U	50000	20200	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	130U	2500	130	ug/L
108-20-3	diisopropyl Ether (DIPE)	265U	2500	265	ug/L
624-95-3	ethyl tert-butanol (ETBA)	2180U	5000	2180	ug/L
75-65-0	**t-Butanol (TBA)**	**6230**	**5000**	**2060**	**ug/L**
994-05-8	t-amyl methyl ether (TAME)	174U	2500	174	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**39500**	**10000**	**7800**	**ug/L**
762-75-4	tert-butyl formate (TBF)	179U	2500	179	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	27300	ug/L	109	50 - 150
1868-53-7	Dibromofluoromethane	25000	28100	ug/L	112	50 - 150
2037-26-5	Toluene d8	25000	24900	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	25000	24600	ug/L	98	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 13:50	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	**1,2-Dibromoethane**	**0.741**	**0.010**	**0.00350**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224802	**MW-5R**	Water	01/20/2009 14:30	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 11:15	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.019**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 10:11	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.457**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			100	01/22/2009 15:38	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**55.6**	**5.00**	**0.530**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 11:49	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**3.4B**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224803	**DW-1**	Water	1/20/2009 15:10	1/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 10:28	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	**Benzene**	**5.80**	**1.00**	**0.065**	**ug/L**
100-41-4	**Ethylbenzene**	**3.68**	**1.00**	**0.065**	**ug/L**
91-20-3	**Naphthalene**	**7.22**	**5.00**	**0.118**	**ug/L**
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	**Xylene (total)**	**12.5**	**3.00**	**0.183**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	52.4	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	50.6	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	52.4	ug/L	105	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 10:28	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	50 - 150
1868-53-7	Dibromofluoromethane	50	52.4	ug/L	105	50 - 150
2037-26-5	Toluene d8	50	50.6	ug/L	101	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	52.4	ug/L	105	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 14:11	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224803	**DW-1**	**W**ater	1/20/2009 15:10	1/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 12:37	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.036**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:23	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.023**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	01/22/2009 15:45	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**11.2**	**0.500**	**0.053**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 11:53	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224804	**MW-7R**	Water	01/20/2009 15:30	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 10:50	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	**Benzene**	**2.33**	**1.00**	**0.065**	**ug/L**
100-41-4	**Ethylbenzene**	**126**	**1.00**	**0.065**	**ug/L**
91-20-3	**Naphthalene**	**15.7**	**5.00**	**0.118**	**ug/L**
108-88-3	**Toluene**	**78.5**	**1.00**	**0.076**	**ug/L**
1330-20-7	**Xylene (total)**	**106**	**3.00**	**0.183**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	49.5	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	51.1	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	45	ug/L	90	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 10:50	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	50 - 150
1868-53-7	Dibromofluoromethane	50	49.5	ug/L	99	50 - 150
2037-26-5	Toluene d8	50	51.1	ug/L	102	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	45	ug/L	90	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 14:32	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224804	**MW-7R**	Water	01/20/2009 15:30	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 12:44	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:24	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.040**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/22/2009 15:53	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**38.7**	**2.50**	**0.265**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/23/2009 12:04	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**73.9**	**25.0**	**2.1**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224805	**MW-8**	Water	01/20/2009 16:00	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:06	ADI	404825

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	**Naphthalene**	**2.44J**	**5.00**	**0.118**	**ug/L**
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.3	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	53.8	ug/L	108	77 - 127
2037-26-5	Toluene d8	50	51.8	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.4	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:06	ADI	404824

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.3	ug/L	101	50 - 150
1868-53-7	Dibromofluoromethane	50	53.8	ug/L	108	50 - 150
2037-26-5	Toluene d8	50	51.8	ug/L	104	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	47.4	ug/L	95	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 14:53	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224805	**MW-8**	Water	01/20/2009 16:00	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 12:50	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	01/26/2009 11:25	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**5.45**	**0.100**	**0.010**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 15:56	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.032B**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:07	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224806	**MW-9R**	Water	01/20/2009 16:20	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:28	ADI	404825

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	**Benzene**	**4.36**	**1.00**	**0.065**	**ug/L**
100-41-4	**Ethylbenzene**	**16.6**	**1.00**	**0.065**	**ug/L**
91-20-3	**Naphthalene**	**8.86**	**5.00**	**0.118**	**ug/L**
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**11.7**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.5	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	54.3	ug/L	109	77 - 127
2037-26-5	Toluene d8	50	48.1	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.9	ug/L	98	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:28	ADI	404824

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	**t-Butanol (TBA)**	**6.93J**	**10.0**	**4.12**	**ug/L**
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.5	ug/L	101	50 - 150
1868-53-7	Dibromofluoromethane	50	54.3	ug/L	109	50 - 150
2037-26-5	Toluene d8	50	48.1	ug/L	96	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.9	ug/L	98	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 15:36	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224806	**MW-9R**	Water	01/20/2009 16:20	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 12:56	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:26	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.010**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/22/2009 16:02	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**31.0**	**2.50**	**0.265**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:08	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**15.1**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224807	**MW-11R**	Water	01/20/2009 17:10	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:05	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	**Naphthalene**	**2.50J**	**5.00**	**0.118**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.1	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	53.5	ug/L	107	77 - 127
2037-26-5	Toluene d8	50	51.7	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.9	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:05	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
64-17-5	Ethanol	40.3U	100	40.3	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.1	ug/L	102	50 - 150
1868-53-7	Dibromofluoromethane	50	53.5	ug/L	107	50 - 150
2037-26-5	Toluene d8	50	51.7	ug/L	103	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	47.9	ug/L	96	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 15:57	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224807	**MW-11R**	Water	01/20/2009 17:10	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 13:36	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.0086B**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	01/26/2009 11:28	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**1.58**	**0.020**	**0.002**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:21	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.318**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:09	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224808	**MW-12R**	Water	01/20/2009 16:50	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:51	ADI	404825

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	**Benzene**	**3.02**	**1.00**	**0.065**	**ug/L**
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**64.1**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	50.8	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	51.7	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.6	ug/L	93	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 22:51	ADI	404824

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	**t-Butanol (TBA)**	**27.0**	**10.0**	**4.12**	**ug/L**
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**47.8**	**20.0**	**15.6**	**ug/L**
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	50 - 150
1868-53-7	Dibromofluoromethane	50	50.8	ug/L	102	50 - 150
2037-26-5	Toluene d8	50	51.7	ug/L	103	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	46.6	ug/L	93	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 16:18	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224808	**MW-12R**	Water	01/20/2009 16:50	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 13:42	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:29	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.034**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/22/2009 16:24	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**44.1**	**2.50**	**0.265**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:11	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**0.62B**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224809	**MW-15R**	Water	01/20/2009 14:00	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:28	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	**1,2-Dichloroethane**	**0.924J**	**5.00**	**0.090**	**ug/L**
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	**Naphthalene**	**2.59J**	**5.00**	**0.118**	**ug/L**
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**185**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	57.7	ug/L	115	77 - 127
2037-26-5	Toluene d8	50	50	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.7	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:28	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	**diisopropyl Ether (DIPE)**	**6.08**	**5.00**	**0.529**	**ug/L**
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	**t-Butanol (TBA)**	**155**	**10.0**	**4.12**	**ug/L**
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**44.6**	**20.0**	**15.6**	**ug/L**
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	50 - 150
1868-53-7	Dibromofluoromethane	50	57.7	ug/L	115	50 - 150
2037-26-5	Toluene d8	50	50	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.7	ug/L	97	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 16:39	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224809	**MW-15R**	Water	01/20/2009 14:00	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 13:49	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.075**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 10:22	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.021**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:27	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.261**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:12	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**20.4**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224810	**MW-16**	Water	01/20/2009 11:40	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:50	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.11**	**1.00**	**0.077**	**ug/L**
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	60.4	ug/L	121	77 - 127
2037-26-5	Toluene d8	50	51.3	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.5	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 13:50	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
64-17-5	Ethanol	40.3U	100	40.3	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	50 - 150
1868-53-7	Dibromofluoromethane	50	60.4	ug/L	121	50 - 150
2037-26-5	Toluene d8	50	51.3	ug/L	103	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.5	ug/L	97	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 17:00	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224810	**MW-16**	Water	01/20/2009 11:40	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 13:55	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/26/2009 11:30	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**2.11**	**0.050**	**0.005**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:30	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.005U	0.050	0.005	mg/L

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:12	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224811	**MW-17**	Water	01/20/2009 11:00	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 14:12	AGC	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**0.550J**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.6	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	60.6	ug/L	121	77 - 127
2037-26-5	Toluene d8	50	51.1	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.9	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 14:12	AGC	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.6	ug/L	103	50 - 150
1868-53-7	Dibromofluoromethane	50	60.6	ug/L	121	50 - 150
2037-26-5	Toluene d8	50	51.1	ug/L	102	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	49.9	ug/L	100	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 17:21	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224811	**MW-17**	Water	01/20/2009 11:00	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 14:01	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	01/26/2009 11:34	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**1.12**	**0.020**	**0.002**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:32	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.293**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:13	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224812	**MW-18**	Water	01/20/2009 10:30	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 14:38	ADI	404930

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**4.68**	**1.00**	**0.077**	**ug/L**
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.3	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	50	58.6	ug/L	117	77 - 127
2037-26-5	Toluene d8	50	51.9	ug/L	104	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 14:38	ADI	404929

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
64-17-5	Ethanol	40.3U	100	40.3	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.3	ug/L	105	50 - 150
1868-53-7	Dibromofluoromethane	50	58.6	ug/L	117	50 - 150
2037-26-5	Toluene d8	50	51.9	ug/L	104	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 17:42	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224812	**MW-18**	Water	01/20/2009 10:30	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 14:07	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.0074B**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 10:26	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.254**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:33	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.077**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:13	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224813	**MW-19**	Water	01/20/2009 17:30	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 15:00	ADI	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.7	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	56.1	ug/L	112	77 - 127
2037-26-5	Toluene d8	50	50.7	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 15:00	ADI	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.7	ug/L	101	50 - 150
1868-53-7	Dibromofluoromethane	50	56.1	ug/L	112	50 - 150
2037-26-5	Toluene d8	50	50.7	ug/L	101	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 18:03	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224813	**MW-19**	Water	01/20/2009 17:30	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 14:13	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.034**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/26/2009 11:35	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**2.37**	**0.050**	**0.005**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:34	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**1.22**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:14	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224814	**MW-20**	Water	01/20/2009 16:40	01/22/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 15:23	ADI	404930

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	Naphthalene	0.118U	5.00	0.118	ug/L
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**0.853J**	**1.00**	**0.077**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.3	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	61.5	ug/L	123	77 - 127
2037-26-5	Toluene d8	50	50.8	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.7	ug/L	99	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 15:23	ADI	404929

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.3	ug/L	103	50 - 150
1868-53-7	Dibromofluoromethane	50	61.5	ug/L	123	50 - 150
2037-26-5	Toluene d8	50	50.8	ug/L	102	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	49.7	ug/L	99	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/23/2009 13:00	404922	SW-846 8011	1	01/26/2009 18:25	TLS	405199

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901224814	**MW-20**	Water	01/20/2009 16:40	01/22/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/22/2009 12:30	404888	SW-846 3010A	1	01/23/2009 14:19	DJH	404961

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.069**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	01/26/2009 11:36	AEL	405053

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**1.20**	**0.020**	**0.002**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/22/2009 16:36	BMC	404904

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**1.86**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/23/2009 12:15	JEM	404964

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GC/MS Volatiles Quality Control Summary

Analytical Batch	404825	**Client ID**	MB404825		LCS404825				LCSD404825			
Prep Batch	N/A	**GCAL ID**	687954		687955				687956			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/22/2009 14:03		01/22/2009 12:55				01/22/2009 13:18			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	0.090U	0.090	50.0	46.0	92	76 - 123		46.2	92	0.4	30
100-41-4	Ethylbenzene	0.065U	0.065	50.0	48.2	96	74 - 126		47.8	96	0.8	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	0.077	50.0	44.5	89	76 - 122		46.6	93	5	30
1330-20-7	Xylene (total)	0.183U	0.183	100	90.5	91	76 - 123		89.4	89	1	30
91-20-3	Naphthalene	0.118U	0.118	50.0	45.4	91	64 - 127		45.8	92	0.9	35
71-43-2	Benzene	0.065U	0.065	50.0	46.2	92	78 - 121		46.6	93	0.9	20
108-88-3	Toluene	0.076U	0.076	50.0	49.6	99	78 - 121		48.3	97	3	20
Surrogate												
460-00-4	4-Bromofluorobenzene	48.7	97	50	50.6	101	78 - 130		51.1	102		
1868-53-7	Dibromofluoromethane	57.9	116	50	42.3	85	77 - 127		52	104		
2037-26-5	Toluene d8	51.6	103	50	49.1	98	76 - 134		48.9	98		
17060-07-0	1,2-Dichloroethane-d4	50.1	100	50	49.9	100	71 - 127		49.8	100		

Analytical Batch	404825	**Client ID**	MW-13		687832MS				687832MSD			
Prep Batch	N/A	**GCAL ID**	20901212908		688419				688420			
		Sample Type	SAMPLE		MS				MSD			
		Analytical Date	01/22/2009 14:25		01/22/2009 15:10				01/22/2009 15:36			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane	0.00	44.9	25000	24200	97	76 - 123		23300	93	4	30
100-41-4	Ethylbenzene	2210	32.6	25000	27300	100	74 - 126		26600	98	3	30
1634-04-4	tert-Butyl methyl ether (MTBE)	836	38.5	25000	24300	94	76 - 122		24000	93	1	30
1330-20-7	Xylene (total)	13800	91.7	50000	62200	97	76 - 123		60900	94	2	30
91-20-3	Naphthalene	1690	59.1	25000	23500	87	64 - 127		23600	88	0.4	30
71-43-2	Benzene	10200	32.5	25000	34500	97	78 - 121		33300	92	4	30
108-88-3	Toluene	33600	37.8	25000	56800	93	78 - 121		55500	88	2	30
Surrogate												
460-00-4	4-Bromofluorobenzene			25000	26100	104	78 - 130		25700	103		
1868-53-7	Dibromofluoromethane			25000	26100	104	77 - 127		25300	101		
2037-26-5	Toluene d8			25000	24600	98	76 - 134		24700	99		
17060-07-0	1,2-Dichloroethane-d4			25000	25300	101	71 - 127		24600	98		

GC/MS Volatiles Quality Control Summary

Analytical Batch 404930	**Client ID**	MB404930	LCS404930	LCSD404930	
Prep Batch N/A	**GCAL ID**	688501	688502	688503	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	01/23/2009 09:43	01/23/2009 08:22	01/23/2009 08:45	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.090U	0.090	50.0	48.5	97	76 - 123		48.8	98	0.6	30
100-41-4	Ethylbenzene		0.065U	0.065	50.0	49.0	98	74 - 126		49.6	99	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)		0.077U	0.077	50.0	49.0	98	76 - 122		48.7	97	0.6	30
1330-20-7	Xylene (total)		0.183U	0.183	100	91.1	91	76 - 123		93.3	93	2	30
91-20-3	Naphthalene		0.118U	0.118	50.0	46.6	93	64 - 127		47.5	95	2	35
71-43-2	Benzene		0.065U	0.065	50.0	47.8	96	78 - 121		47.1	94	1	20
108-88-3	Toluene		0.076U	0.076	50.0	48.8	98	78 - 121		49.4	99	1	20
Surrogate													
460-00-4	4-Bromofluorobenzene		50.9	102	50	52.7	105	78 - 130		53.3	107		
1868-53-7	Dibromofluoromethane		60.6	121	50	55	110	77 - 127		54.6	109		
2037-26-5	Toluene d8		51.3	103	50	48.3	97	76 - 134		48.6	97		
17060-07-0	1,2-Dichloroethane-d4		50.4	101	50	51.9	104	71 - 127		50.5	101		

Analytical Batch 404930	**Client ID**	MW-5R	688289MS	688289MSD	
Prep Batch N/A	**GCAL ID**	20901224802	688661	688662	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	01/23/2009 10:06	01/23/2009 11:58	01/23/2009 12:20	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.00	44.9	25000	21400	86	76 - 123		22800	91	6	30
100-41-4	Ethylbenzene		3100	32.6	25000	27300	97	74 - 126		26900	95	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)		4540	38.5	25000	28200	95	76 - 122		29200	99	3	30
1330-20-7	Xylene (total)		14100	91.7	50000	60900	94	76 - 123		59800	91	2	30
91-20-3	Naphthalene		1310	59.1	25000	23600	89	64 - 127		24200	92	3	30
71-43-2	Benzene		27300	32.5	25000	49000	87	78 - 121		50600	93	3	30
108-88-3	Toluene		55100	37.8	25000	65000	**40***	78 - 121		67800	**51***	4	30
Surrogate													
460-00-4	4-Bromofluorobenzene		27300	109	25000	27400	110	78 - 130		26500	106		
1868-53-7	Dibromofluoromethane		28100	112	25000	20900	84	77 - 127		25000	100		
2037-26-5	Toluene d8		24900	100	25000	25100	100	76 - 134		25000	100		
17060-07-0	1,2-Dichloroethane-d4		24600	98	25000	22900	92	71 - 127		23400	94		

GC/MS Volatiles Quality Control Summary

Analytical Batch	404824	**Client ID**	MB404824		LCS404824				LCSD404824			
Prep Batch	N/A	**GCAL ID**	687950		687951				687952			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/22/2009 14:03		01/22/2009 12:55				01/22/2009 13:18			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		0.348U	0.348	50.0	45.7	91	50 - 150		46.9	94	3	50
75-65-0	t-Butanol (TBA)		4.12U	4.12	50.0	43.0	86	50 - 150		48.0	96	11	50
108-20-3	diisopropyl Ether (DIPE)		0.529U	0.529	50.0	45.0	90	50 - 150		45.8	92	2	50
637-92-3	Ethyl tert-butyl ether (ETBE)		0.259U	0.259	50.0	45.4	91	50 - 150		46.6	93	3	50
624-95-3	ethyl tert-butanol (ETBA)		4.36U	4.36	50.0	39.1	78	50 - 150		40.4	81	3	50
64-17-5	Ethanol		40.3U	40.3	200	193	97	50 - 150		207	104	7	50
75-85-4	tert-amyl alcohol (TAA)		15.6U	15.6	200	164	82	50 - 150		179	90	9	50
762-75-4	tert-butyl formate (TBF)		0.357U	0.357	50.0	41.2	82	50 - 150		43.9	88	6	50
Surrogate													
460-00-4	4-Bromofluorobenzene		48.7	97	50	50.6	101	50 - 150		51.1	102		
1868-53-7	Dibromofluoromethane		57.9	116	50	42.3	85	50 - 150		52	104		
2037-26-5	Toluene d8		51.6	103	50	49.1	98	50 - 150		48.9	98		
17060-07-0	1,2-Dichloroethane-d4		50.1	100	50	49.9	100	50 - 150		49.8	100		

Analytical Batch	404824	**Client ID**	MW-13		687832MS				687832MSD			
Prep Batch	N/A	**GCAL ID**	20901212908		688421				688422			
		Sample Type	SAMPLE		MS				MSD			
		Analytical Date	01/22/2009 14:25		01/22/2009 15:10				01/22/2009 15:36			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		0.00	174	25000	23700	95	50 - 150		23400	94	1	50
75-65-0	t-Butanol (TBA)		0.00	2060	25000	22200	89	50 - 150		23400	94	5	50
108-20-3	diisopropyl Ether (DIPE)		0.00	265	25000	22600	90	50 - 150		22800	91	0.9	50
637-92-3	Ethyl tert-butyl ether (ETBE)		0.00	130	25000	23000	92	50 - 150		23100	92	0.4	50
624-95-3	ethyl tert-butanol (ETBA)		0.00	2180	25000	20600	82	50 - 150		22600	90	9	50
64-17-5	Ethanol		0.00	20200	100000	96200	96	50 - 150		95200	95	1	50
75-85-4	tert-amyl alcohol (TAA)		0.00	7800	100000	88900	89	50 - 150		81500	82	9	50
762-75-4	tert-butyl formate (TBF)		0.00	179	25000	21800	87	50 - 150		19600	78	11	50
Surrogate													
460-00-4	4-Bromofluorobenzene				25000	26100	104	50 - 150		25700	103		
1868-53-7	Dibromofluoromethane				25000	26100	104	50 - 150		25300	101		

GC/MS Volatiles Quality Control Summary

Analytical Batch 404824	**Client ID**	MW-13	687832MS	687832MSD	
Prep Batch N/A	**GCAL ID**	20901212908	688421	688422	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	01/22/2009 14:25	01/22/2009 15:10	01/22/2009 15:36	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8			25000	24600	98	50 - 150	24700	99		
17060-07-0	1,2-Dichloroethane-d4			25000	25300	101	50 - 150	24600	98		

Analytical Batch 404929	**Client ID**	MB404929	LCS404929	LCSD404929	
Prep Batch N/A	**GCAL ID**	688498	688499	688500	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	01/23/2009 09:43	01/23/2009 08:22	01/23/2009 08:45	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	0.348U	0.348	50.0	57.5	115	50 - 150	47.2	94	20	50
75-65-0	t-Butanol (TBA)	4.12U	4.12	50.0	59.7	119	50 - 150	48.7	97	20	50
108-20-3	diisopropyl Ether (DIPE)	0.529U	0.529	50.0	56.6	113	50 - 150	47.0	94	19	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	0.259	50.0	57.8	116	50 - 150	48.2	96	18	50
624-95-3	ethyl tert-butanol (ETBA)	4.36U	4.36	50.0	46.8	94	50 - 150	40.1	80	15	50
64-17-5	Ethanol	40.3U	40.3	200	202	101	50 - 150	165	83	20	50
75-85-4	tert-amyl alcohol (TAA)	15.6U	15.6	200	233	117	50 - 150	190	95	20	50
762-75-4	tert-butyl formate (TBF)	0.357U	0.357	50.0	47.3	95	50 - 150	43.6	87	8	50
Surrogate											
460-00-4	4-Bromofluorobenzene	50.9	102	50	52.7	105	50 - 150	53.3	107		
1868-53-7	Dibromofluoromethane	60.6	121	50	55	110	50 - 150	54.6	109		
2037-26-5	Toluene d8	51.3	103	50	48.3	97	50 - 150	48.6	97		
17060-07-0	1,2-Dichloroethane-d4	50.4	101	50	51.9	104	50 - 150	50.5	101		

GC/MS Volatiles Quality Control Summary

Analytical Batch	404929	**Client ID**	MW-5R		688289MS			688289MSD			
Prep Batch	N/A	**GCAL ID**	20901224802		688663			688664			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	01/23/2009 10:06		01/23/2009 11:58			01/23/2009 12:20			
		Matrix	Water		Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	0.00	174	25000	22800	91	50 - 150	24800	99	8	50
75-65-0	t-Butanol (TBA)	6230	2060	25000	29400	93	50 - 150	32800	106	11	50
108-20-3	diisopropyl Ether (DIPE)	0.00	265	25000	22000	88	50 - 150	23700	95	7	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.00	130	25000	22500	90	50 - 150	24800	99	10	50
624-95-3	ethyl tert-butanol (ETBA)	0.00	2180	25000	24600	98	50 - 150	25500	102	4	50
64-17-5	Ethanol	0.00	20200	100000	76200	76	50 - 150	84400	84	10	50
75-85-4	tert-amyl alcohol (TAA)	39500	7800	100000	145000	106	50 - 150	170000	131	16	50
762-75-4	tert-butyl formate (TBF)	0.00	179	25000	15700	63	50 - 150	18100	72	14	50
Surrogate											
460-00-4	4-Bromofluorobenzene	27300	109	25000	27400	110	50 - 150	26500	106		
1868-53-7	Dibromofluoromethane	28100	112	25000	20900	84	50 - 150	25000	100		
2037-26-5	Toluene d8	24900	100	25000	25100	100	50 - 150	25000	100		
17060-07-0	1,2-Dichloroethane-d4	24600	98	25000	22900	92	50 - 150	23400	94		

General Chromatography Quality Control Summary

Analytical Batch	405199	**Client ID**	MB404922	LCS404922	LCSD404922
Prep Batch	404922	**GCAL ID**	688468	688469	688470
Prep Method	SW-846 8011	**Sample Type**	Method Blank	LCS	LCSD
		Prep Date	01/23/2009 13:00	01/23/2009 13:00	01/23/2009 13:00
		Analytical Date	01/26/2009 11:41	01/26/2009 12:02	01/26/2009 12:24
		Matrix	Water	Water	Water

SW-846 8011		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane	0.00350U	0.00350	1.01	1.25	123	62 - 140	1.16	118	7	40

Inorganics Quality Control Summary

Analytical Batch	404961	**Client ID**	MB404888		LCS404888		
Prep Batch	404888	**GCAL ID**	688307		688308		
Prep Method	SW-846 3010A	**Sample Type**	Method Blank		LCS		
		Prep Date	01/22/2009 12:30		01/22/2009 12:30		
		Analytical Date	01/23/2009 11:02		01/23/2009 11:09		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**		**Control Limits % R**
		Result	**RDL**			**% R**	
7439-92-1	Lead	0.0027U	0.0027	0.50	0.54	108	80 - 120

Analytical Batch	404961	**Client ID**	MW-5R		688289MS		
Prep Batch	404888	**GCAL ID**	20901224802		688310		
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE		MS		
		Prep Date	01/22/2009 12:30		01/22/2009 12:30		
		Analytical Date	01/23/2009 11:15		01/23/2009 11:27		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L	**Spike Added**	**Result**		**Control Limits % R**
		Result	**RDL**			**% R**	
7439-92-1	Lead	0.019	0.0027	0.50	0.54	105	75 - 125

Analytical Batch	404961	**Client ID**	MW-5R	688289DUP			
Prep Batch	404888	**GCAL ID**	20901224802	688309			
Prep Method	SW-846 3010A	**Sample Type**	SAMPLE	DUP			
		Prep Date	01/22/2009 12:30	01/22/2009 12:30			
		Analytical Date	01/23/2009 11:15	01/23/2009 11:21			
		Matrix	Water	Water			
SW-846 6010B		**Units**	mg/L	**Result**		**RPD**	
		Result	**RDL**		**RPD**	**Limit**	
7439-92-1	Lead	0.019	0.0027	0.019	0	20	

General Chemistry Quality Control Summary

Analytical Batch	405053	Client ID	MB405053		LCS405053		
Prep Batch	N/A	GCAL ID	689041		689042		
		Sample Type	Method Blank		LCS		
		Analytical Date	01/26/2009 10:00		01/26/2009 10:01		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
C-005	Nitrate/Nitrite	0.001U	0.001	0.500	0.507	101	90 - 110

Analytical Batch	405053	Client ID	U31EPHW (N+N)		688189MS			688189MSD			
Prep Batch	N/A	GCAL ID	20901223501		689044			689045			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	01/26/2009 10:04		01/26/2009 10:06			01/26/2009 10:07			
		Matrix	Water		Water			Water			
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R	Result	% R	RPD	RPD Limit
		Result	RDL		Result		RDL				
C-005	Nitrate/Nitrite	46.8	0.100	50.0	98.8	104	89.5 -110.4	98.4	103	0.41	25

Analytical Batch	405053	Client ID	BROAD RIVER		688582MS		
Prep Batch	N/A	GCAL ID	20901231402		689047		
		Sample Type	SAMPLE		MS		
		Analytical Date	01/26/2009 11:39		01/26/2009 10:37		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
C-005	Nitrate/Nitrite	0.064	0.001	0.500	0.561	99.4	89.5 -110.4

Analytical Batch	405053	Client ID	U31EPHW (N+N)	688189DUP		
Prep Batch	N/A	GCAL ID	20901223501	689043		
		Sample Type	SAMPLE	DUP		
		Analytical Date	01/26/2009 10:04	01/26/2009 10:05		
		Matrix	Water	Water		
EPA 353.2 N+N		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
C-005	Nitrate/Nitrite	46.8	0.100	47.4	1.3	25

General Chemistry Quality Control Summary

Analytical Batch 405053	**Client ID**	BROAD RIVER		688582DUP		
Prep Batch N/A	**GCAL ID**	20901231402		689046		
	Sample Type	SAMPLE		DUP		
	Analytical Date	01/26/2009 11:39		01/26/2009 10:36		
	Matrix	Water		Water		
EPA 353.2 N+N	**Units**	mg/L		**Result**	**RPD**	**RPD Limit**
	Result		**RDL**			
C-005 Nitrate/Nitrite		0.064	0.001	0.064	0	25

General Chemistry Quality Control Summary

Analytical Batch	404904	Client ID	MB404904		LCS404904		
Prep Batch	N/A	GCAL ID	688406		688407		
		Sample Type	Method Blank		LCS		
		Analytical Date	01/22/2009 15:03		01/22/2009 15:04		
		Matrix	Water		Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
WET-045	Ferrous Iron	0.005U	0.005	1.00	1.10	110	80 - 120

Analytical Batch	404904	Client ID	MW-5R		688289MS			688289MSD			
Prep Batch	N/A	GCAL ID	20901224802		688409			688410			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	01/22/2009 15:38		01/22/2009 15:38			01/22/2009 15:39			
		Matrix	Water		Water			Water			
SM 3500 Fe D Ferrous Iron		Units	mg/L	Spike Added	Result	% R	Control Limits % R	Result	% R	RPD	RPD Limit
		Result	RDL								
WET-045	Ferrous Iron	55.6	0.530	100	165	109	75 - 125	166	110	0.6	25

Analytical Batch	404904	Client ID	MW-1R	688288DUP		
Prep Batch	N/A	GCAL ID	20901224801	688408		
		Sample Type	SAMPLE	DUP		
		Analytical Date	01/22/2009 15:31	01/22/2009 15:32		
		Matrix	Water	Water		
SM 3500 Fe D Ferrous Iron		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
WET-045	Ferrous Iron	32.6	0.265	34.7	6.2	25

General Chemistry Quality Control Summary

Analytical Batch	404964	Client ID	MB404964			LCS404964		
Prep Batch	N/A	GCAL ID	688633			688634		
		Sample Type	Method Blank			LCS		
		Analytical Date	01/23/2009 11:37			01/23/2009 11:38		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike Added	Result	% R	Control Limits % R	
		Result	RDL					
14808-79-8	Sulfate	0.41U	0.41	20.0	19.8	99	80 - 120	

Analytical Batch	404964	Client ID	MW-1R			688288MS		
Prep Batch	N/A	GCAL ID	20901224801			688636		
		Sample Type	SAMPLE			MS		
		Analytical Date	01/23/2009 11:47			01/23/2009 11:48		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike Added	Result	% R	Control Limits % R	
		Result	RDL					
14808-79-8	Sulfate	0.00	0.41	20.0	22.6	113	75 - 125	

Analytical Batch	404964	Client ID	MW-5R			688289MS		
Prep Batch	N/A	GCAL ID	20901224802			688637		
		Sample Type	SAMPLE			MS		
		Analytical Date	01/23/2009 11:49			01/23/2009 11:49		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike Added	Result	% R	Control Limits % R	
		Result	RDL					
14808-79-8	Sulfate	3.4	0.41	20.0	25.9	112	75 - 125	

Analytical Batch	404964	Client ID	MW-1R	688288DUP		
Prep Batch	N/A	GCAL ID	20901224801	688635		
		Sample Type	SAMPLE	DUP		
		Analytical Date	01/23/2009 11:47	01/23/2009 11:47		
		Matrix	Water	Water		
EPA 375.4 Sulfate		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
14808-79-8	Sulfate	0.00	0.41	0.00	0	25

Access Analytical - Chain of Custody Record

Access #565 / 1090124981-249

Project Submission # 7307-8012 **PO #** **Laboratory ID:**

Company Name:	Terracon
Report To:	Melissa Roberts
Address:	521 Clemson Rd
City:	Columbia State: SC Zip: 29229
Phone:	803-741-9000 Fax:
Email:	
Project Name:	SC-015
Sampled By (print):	William Walker

Preservative (See codes below)

* REQUESTED LAB ANALYSIS: *

Sample Label	Time Collected	Date Collected	Matrix	# of Cont	BTEX, MTBE, 1,2-DCA	8 Oxygenates	EDB	Ferrous Iron	Nitrate / Sulfate	Lead	
MW-1R	1330	1/20/09	L	11	2	2	2	2	2	1	1
MW-5R	1430										2
~~MW-5R~~ DW-1	1510										3
MW-7R	1530										4
MW-8	1600										5
MW-9R	1620										6
MW-11R	1710										7
MW-12R	1650										8
MW-15R	1400										9
MW-16	1140										10

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

Access Analytical, Inc.
7470 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

- ✓ Std. (5-7 Bus. days)
- ___ RUSH*

*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Rec'd on Ice?
- ✓ Yes
- ___ No

Project Location:
- ✓ SC
- ___ NC
- ___ Other_____ (specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	1/21/09	1510	Chuck, Rus
Chuck, Rus	1/21/09	1710	fed Ex
Fed Ex	1-22-09	900	[signature]

Access Analytical, Inc.
See Reverse for Terms and Conditions

2.8

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Access Analytical - Chain of Custody Record

Access/4565/20612249/1.2.09

Project Submission # 7307-8012 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon | Preservative (See codes below)

Report To: Melissa Roberts

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: 803-741-9000 Fax:

Email:

Project Name: SC-015

Sampled By (print): William Walker

REQUESTED LAB ANALYSES

Sample Label	Date Collected	Time Collected	Matrix	# of Cont.	BTEX, MtBE, TMB, 1,2-DCA	EDB & Oxygenates	Ferrous Iron	Methane / Sulfide	Lead	
MW-17	1/20/09	1100	L	11	2	2	2	2	2	1	11
MW-18		1030									12
MW-19		1730									13
MW-20		1640									14

* Preservative Codes (place corresponding # in block above analysis field): 0=None, 1=HCL, 2=HNO3, 3=H2SO4, 4=NaOH, 5=Na2S2O3, 6=NaHSO4, Other=Specify

Access Analytical, Inc.
7478 Cinsdale Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

✓ Std. (5-7 Bus. days)

___ RUSH*

*Date Required: _____

(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice? ✓ Yes ___ No

Project Location: ✓ SC ___ NC ___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	1/21/09	1510	Chuck Ross
Chuck Ross	1/21/09	1710	FedEx
FedEx	1-22-09	940	[signature]

Access Analytical, Inc.

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209012319

DATE
01/28/2009

Primary Data Review By

Curtis Ekker
Wed Jan 28 15:58:33 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/28/2009

GCAL Report 209012319

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209012319

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B analysis, sample 20901231901 (MW-21) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument.

In the SW-846 8260B analysis for analytical batch 405085, the MS/MSD exhibited recovery failures.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

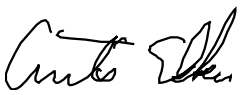
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



Curtis Ekker
Wed Jan 28 15:58:51 2009

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209012319

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901231901	MW-21	Solid	01/22/2009 11:00	01/23/2009 09:40

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901231901	**MW-21**	Solid	01/22/2009 11:00	01/23/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**366J**	**961**	**41.6**	**ug/Kg**
108-88-3	**Toluene**	**574J**	**961**	**59.6**	**ug/Kg**
100-41-4	**Ethylbenzene**	**8520**	**961**	**66.7**	**ug/Kg**
1330-20-7	**Xylene (total)**	**15500**	**1920**	**249**	**ug/Kg**
91-20-3	**Naphthalene**	**9620**	**961**	**176**	**ug/Kg**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901231901	**MW-21**	Solid	01/22/2009 11:00	01/23/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			250	01/26/2009 23:16	JCK	405085

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**366J**	**961**	**41.6**	**ug/Kg**
108-88-3	**Toluene**	**574J**	**961**	**59.6**	**ug/Kg**
100-41-4	**Ethylbenzene**	**8520**	**961**	**66.7**	**ug/Kg**
1330-20-7	**Xylene (total)**	**15500**	**1920**	**249**	**ug/Kg**
91-20-3	**Naphthalene**	**9620**	**961**	**176**	**ug/Kg**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	8590	9460	ug/Kg	110	62 - 127
1868-53-7	Dibromofluoromethane	8590	7580	ug/Kg	88	65 - 130
2037-26-5	Toluene d8	8590	8570	ug/Kg	100	71 - 132
17060-07-0	1,2-Dichloroethane-d4	8590	7360	ug/Kg	86	62 - 125

RESULTS REPORTED ON A DRY WEIGHT BASIS

GC/MS Volatiles Quality Control Summary

Analytical Batch	405085	**Client ID**	MB405085		LCS405085				LCSD405085			
Prep Batch	N/A	**GCAL ID**	689169		689170				689171			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/26/2009 15:49		01/26/2009 14:42				01/26/2009 15:05			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
100-41-4	Ethylbenzene		17.3U	17.3	2500	2830	113	80 - 123	2760	110	3	30
1634-04-4	tert-Butyl methyl ether (MTBE)		8.90U	8.90	2500	2790	112	69 - 131	2880	115	3	30
1330-20-7	Xylene (total)		64.7U	64.7	7500	8380	112	80 - 120	8190	109	2	30
91-20-3	Naphthalene		45.7U	45.7	2500	2620	105	58 - 137	2580	103	2	30
71-43-2	Benzene		10.8U	10.8	2500	2760	110	78 - 120	2680	107	3	21
108-88-3	Toluene		15.5U	15.5	2500	2580	103	78 - 122	2550	102	1	21
Surrogate												
460-00-4	4-Bromofluorobenzene		2310	92	2500	2380	95	62 - 127	2410	96		
1868-53-7	Dibromofluoromethane		2470	99	2500	2480	99	65 - 130	2410	96		
2037-26-5	Toluene d8		2530	101	2500	2350	94	71 - 132	2370	95		
17060-07-0	1,2-Dichloroethane-d4		2540	102	2500	2580	103	62 - 125	2540	102		

Analytical Batch	405085	**Client ID**	3979 INSIDE		688645MS				688645MSD			
Prep Batch	N/A	**GCAL ID**	20901232901		689635				689636			
		Sample Type	SAMPLE		MS				MSD			
		Analytical Date	01/26/2009 19:13		01/26/2009 21:03				01/26/2009 21:26			
		Matrix	Solid		Solid				Solid			
SW-846 8260B		**Units**	ug/Kg	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
100-41-4	Ethylbenzene		13100	32.2	4650	15600	**54***	80 - 123	15100	**43***	3	30
1330-20-7	Xylene (total)		0.00	120	13900	15200	109	80 - 120	14700	105	3	30
71-43-2	Benzene		0.00	20.1	4650	4470	96	78 - 120	4260	92	5	21
108-88-3	Toluene		0.00	28.8	4650	4760	102	78 - 122	4590	99	4	21
Surrogate												
460-00-4	4-Bromofluorobenzene				4650	5460	117	62 - 127	5460	117		
1868-53-7	Dibromofluoromethane				4650	4350	94	65 - 130	4190	90		
2037-26-5	Toluene d8				4650	4770	103	71 - 132	4750	102		
17060-07-0	1,2-Dichloroethane-d4				4650	4160	90	62 - 125	4090	88		

Access/4565/209012319/1-30-9

Access Analytical - Chain of Custody Record

Project Submission # 7307 80 12 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon

Report To: Melissa Roberts

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: 803-741-9000 Fax: 803-741-9900

Email:

Project Name: SC-015

Sampled By (print): Regan W. Norris

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	Preservative (*see codes below)	↓ REQUESTED LAB ANALYSIS: ↓ BTEX, Naph						
MW-21	1-22-09	11:00	S	4		X						1

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.

Phone: (803) 781-4243
7478 Carlisle Street Fax: 781-4303
Irmo, SC 29063 Toll Free (888) 315-4243
www.accessanalyticalinc.com

NOTES / COMMENTS

Turnaround Time:

✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required: _____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___ No

Project Location:
✓ SC
___ NC
___ Other _____ (specify)

Relinquished By:	Date:	Time:	Received By:
Regan	1-22-09	1300	Chris Russ
Chris Russ	1/22/09	1700	FedEx
FedEx	1-23-9	940	AK

Pg 1 of 1

Access Analytical, Inc.
See Reverse for Terms and Conditions

8.3

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Road
Columbia, SC 29229

ATTENTION
Melissa Roberts

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209012404

DATE
01/30/2009

Primary Data Review By

Curtis Ekker
Fri Jan 30 16:39:25 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 01/30/2009

GCAL Report 209012404

Deliver To	Terracon 521 Clemson Road Columbia, SC 29229 803-741-9000
Attn	Melissa Roberts

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209012404

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B - Gas Additives analysis, samples 20901240404 (MW-21) and 20901240401 (MW-5D) had to be diluted due to the presence of non-target background. This dilution is reflected in the elevated reporting limits.

In the SW-846 8260B analysis, samples 20901240404 (MW-21) and 20901240401 (MW-5D) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument.

In the SW-846 8260B analysis for analytical batch 405048, the MS/MSD exhibited recovery failures.

CONVENTIONALS

In the SM 3500 Fe D analysis, sample 20901240404 (MW-21) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the EPA 353.2 analysis, samples 20901240402 (MW-12D) and 20901240403 (MW-18D) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

In the SM 3500 Fe D analysis, a chemical or physical interference necessitated a dilution for sample 20901240401 (MW-5D). This is reflected in the elevated reporting limit.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

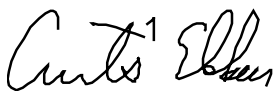
Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.



CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209012404

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240401	MW-5D	Water	01/23/2009 12:40	01/24/2009 09:16
20901240402	MW-12D	Water	01/23/2009 11:45	01/24/2009 09:16
20901240403	MW-18D	Water	01/23/2009 11:00	01/24/2009 09:16
20901240404	MW-21	Water	01/23/2009 13:00	01/24/2009 09:16

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240401	**MW-5D**	Water	01/23/2009 12:40	01/24/2009 09:16

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	124	10.0	0.649	ug/L
100-41-4	Ethylbenzene	88.8	10.0	0.652	ug/L
91-20-3	Naphthalene	33.5J	50.0	1.18	ug/L
108-88-3	Toluene	624	10.0	0.755	ug/L
1330-20-7	Xylene (total)	333	30.0	1.83	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	12.1	10.0	0.769	ug/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	30.9	5.0	0.41	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	3.20	2.50	0.265	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.42	0.015	0.0027	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.371	0.010	0.001	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240402	**MW-12D**	Water	01/23/2009 11:45	01/24/2009 09:16

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
91-20-3	Naphthalene	2.36J	5.00	0.118	ug/L
108-88-3	Toluene	1.17	1.00	0.076	ug/L
1330-20-7	Xylene (total)	2.29J	3.00	0.183	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240402	**MW-12D**	Water	01/23/2009 11:45	01/24/2009 09:16

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	2.23	0.050	0.005	mg/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.389	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240403	**MW-18D**	Water	01/23/2009 11:00	01/24/2009 09:16

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	0.916	0.050	0.005	mg/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
91-20-3	Naphthalene	2.47J	5.00	0.118	ug/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0088B	0.015	0.0027	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	2.40	0.050	0.005	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240404	**MW-21**	Water	01/23/2009 13:00	01/24/2009 09:16

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	23300	500	32.5	ug/L
100-41-4	Ethylbenzene	4780	500	32.6	ug/L
91-20-3	Naphthalene	1650J	2500	59.1	ug/L
108-88-3	Toluene	62900	500	37.8	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240404	**MW-21**	Water	01/23/2009 13:00	01/24/2009 09:16

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1330-20-7	Xylene (total)	21600	1500	91.7	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	2370	500	38.5	ug/L

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	11.9	5.0	0.41	mg/L

SW-846 6010B

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.018	0.015	0.0027	mg/L

SW-846 8011

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.405	0.010	0.00350	ug/L

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	Ferrous Iron	10.2	0.500	0.053	mg/L

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	Nitrate/Nitrite	0.099	0.010	0.001	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240401	**MW-5D**	Water	01/23/2009 12:40	01/24/2009 09:16

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	01/26/2009 10:20	AGC	405048

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.898U	50.0	0.898	ug/L
71-43-2	**Benzene**	**124**	**10.0**	**0.649**	**ug/L**
100-41-4	**Ethylbenzene**	**88.8**	**10.0**	**0.652**	**ug/L**
91-20-3	**Naphthalene**	**33.5J**	**50.0**	**1.18**	**ug/L**
108-88-3	**Toluene**	**624**	**10.0**	**0.755**	**ug/L**
1330-20-7	**Xylene (total)**	**333**	**30.0**	**1.83**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**12.1**	**10.0**	**0.769**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	568	ug/L	114	78 - 130
1868-53-7	Dibromofluoromethane	500	581	ug/L	116	77 - 127
2037-26-5	Toluene d8	500	498	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	500	500	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	01/26/2009 10:20	AGC	405046

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	403U	1000	403	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	2.59U	50.0	2.59	ug/L
108-20-3	diisopropyl Ether (DIPE)	5.29U	50.0	5.29	ug/L
624-95-3	ethyl tert-butanol (ETBA)	43.6U	100	43.6	ug/L
75-65-0	t-Butanol (TBA)	41.2U	100	41.2	ug/L
994-05-8	t-amyl methyl ether (TAME)	3.48U	50.0	3.48	ug/L
75-85-4	tert-amyl alcohol (TAA)	156U	200	156	ug/L
762-75-4	tert-butyl formate (TBF)	3.57U	50.0	3.57	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	500	568	ug/L	114	50 - 150
1868-53-7	Dibromofluoromethane	500	581	ug/L	116	50 - 150
2037-26-5	Toluene d8	500	498	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	500	500	ug/L	100	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/27/2009 15:15	405148	SW-846 8011	1	01/28/2009 16:36	TLS	405271

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240401	**MW-5D**	Water	01/23/2009 12:40	01/24/2009 09:16

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/26/2009 10:10	405050	SW-846 3010A	1	01/26/2009 16:24	CNB	405062

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.42**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:54	AEL	405055

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.371**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			50	01/24/2009 18:50	MDT	405030

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**3.20**	**2.50**	**0.265**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/30/2009 09:30	JEM	405321

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**30.9**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240402	**MW-12D**	Water	01/23/2009 11:45	01/24/2009 09:16

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 10:43	AGC	405048

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	**Naphthalene**	**2.36J**	**5.00**	**0.118**	**ug/L**
108-88-3	**Toluene**	**1.17**	**1.00**	**0.076**	**ug/L**
1330-20-7	**Xylene (total)**	**2.29J**	**3.00**	**0.183**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	60.7	ug/L	121	77 - 127
2037-26-5	Toluene d8	50	49.5	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.6	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 10:43	AGC	405046

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	50 - 150
1868-53-7	Dibromofluoromethane	50	60.7	ug/L	121	50 - 150
2037-26-5	Toluene d8	50	49.5	ug/L	99	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.6	ug/L	97	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/27/2009 15:15	405148	SW-846 8011	1	01/28/2009 16:57	TLS	405271

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240402	**MW-12D**	Water	01/23/2009 11:45	01/24/2009 09:16

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/26/2009 10:10	405050	SW-846 3010A	1	01/26/2009 15:01	CNB	405062

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/26/2009 11:50	AEL	405055

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**2.23**	**0.050**	**0.005**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/24/2009 18:53	MDT	405030

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.389**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/30/2009 09:41	JEM	405321

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240403	**MW-18D**	Water	01/23/2009 11:00	01/24/2009 09:16

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 12:13	AGC	405048

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L
71-43-2	Benzene	0.065U	1.00	0.065	ug/L
100-41-4	Ethylbenzene	0.065U	1.00	0.065	ug/L
91-20-3	**Naphthalene**	**2.47J**	**5.00**	**0.118**	**ug/L**
108-88-3	Toluene	0.076U	1.00	0.076	ug/L
1330-20-7	Xylene (total)	0.183U	3.00	0.183	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	54.3	ug/L	109	78 - 130
1868-53-7	Dibromofluoromethane	50	61.9	ug/L	124	77 - 127
2037-26-5	Toluene d8	50	50.4	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.5	ug/L	101	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 12:13	AGC	405046

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	40.3U	100	40.3	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	54.3	ug/L	109	50 - 150
1868-53-7	Dibromofluoromethane	50	61.9	ug/L	124	50 - 150
2037-26-5	Toluene d8	50	50.4	ug/L	101	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	50.5	ug/L	101	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/27/2009 15:15	405148	SW-846 8011	1	01/28/2009 17:18	TLS	405271

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240403	**MW-18D**	Water	01/23/2009 11:00	01/24/2009 09:16

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/26/2009 10:10	405050	SW-846 3010A	1	01/26/2009 16:30	CNB	405062

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.0088B**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			5	01/26/2009 11:51	AEL	405055

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**2.40**	**0.050**	**0.005**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/24/2009 18:53	MDT	405030

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.916**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/30/2009 09:42	JEM	405321

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	Sulfate	0.41U	5.0	0.41	mg/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240404	**MW-21**	Water	01/23/2009 13:00	01/24/2009 09:16

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	01/26/2009 09:56	AGC	405048

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	44.9U	2500	44.9	ug/L
71-43-2	**Benzene**	**23300**	**500**	**32.5**	**ug/L**
100-41-4	**Ethylbenzene**	**4780**	**500**	**32.6**	**ug/L**
91-20-3	**Naphthalene**	**1650J**	**2500**	**59.1**	**ug/L**
108-88-3	**Toluene**	**62900**	**500**	**37.8**	**ug/L**
1330-20-7	**Xylene (total)**	**21600**	**1500**	**91.7**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**2370**	**500**	**38.5**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	28100	ug/L	112	78 - 130
1868-53-7	Dibromofluoromethane	25000	29200	ug/L	117	77 - 127
2037-26-5	Toluene d8	25000	25100	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	25000	25200	ug/L	101	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	01/26/2009 09:56	AGC	405046

CAS#	Parameter	Result	RDL	MDL	Units
64-17-5	Ethanol	20200U	50000	20200	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	130U	2500	130	ug/L
108-20-3	diisopropyl Ether (DIPE)	265U	2500	265	ug/L
624-95-3	ethyl tert-butanol (ETBA)	2180U	5000	2180	ug/L
75-65-0	t-Butanol (TBA)	2060U	5000	2060	ug/L
994-05-8	t-amyl methyl ether (TAME)	174U	2500	174	ug/L
75-85-4	tert-amyl alcohol (TAA)	7800U	10000	7800	ug/L
762-75-4	tert-butyl formate (TBF)	179U	2500	179	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	28100	ug/L	112	50 - 150
1868-53-7	Dibromofluoromethane	25000	29200	ug/L	117	50 - 150
2037-26-5	Toluene d8	25000	25100	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	25000	25200	ug/L	101	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/27/2009 15:15	405148	SW-846 8011	1	01/28/2009 17:40	TLS	405271

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	**1,2-Dibromoethane**	**0.405**	**0.010**	**0.00350**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20901240404	**MW-21**	Water	01/23/2009 13:00	01/24/2009 09:16

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
01/26/2009 10:10	405050	SW-846 3010A	1	01/26/2009 16:35	CNB	405062

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	**Lead**	**0.018**	**0.015**	**0.0027**	**mg/L**

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/26/2009 11:55	AEL	405055

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**0.099**	**0.010**	**0.001**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			10	01/24/2009 18:53	MDT	405030

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**10.2**	**0.500**	**0.053**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	01/30/2009 09:43	JEM	405321

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**11.9**	**5.0**	**0.41**	**mg/L**

GC/MS Volatiles Quality Control Summary

Analytical Batch 405048	**Client ID**	MB405048	LCS405048	LCSD405048	
Prep Batch N/A	**GCAL ID**	688982	688983	688984	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	01/26/2009 09:34	01/26/2009 08:25	01/26/2009 08:47	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.090U	0.090	50.0	55.3	111	76 - 123		54.5	109	1	30
100-41-4	Ethylbenzene		0.065U	0.065	50.0	58.4	117	74 - 126		56.9	114	3	30
1634-04-4	tert-Butyl methyl ether (MTBE)		0.077U	0.077	50.0	58.5	117	76 - 122		57.4	115	2	30
1330-20-7	Xylene (total)		0.183U	0.183	100	110	110	76 - 123		105	105	5	30
91-20-3	Naphthalene		0.118U	0.118	50.0	55.9	112	64 - 127		54.2	108	3	35
71-43-2	Benzene		0.065U	0.065	50.0	55.8	112	78 - 121		53.9	108	3	20
108-88-3	Toluene		0.076U	0.076	50.0	58.3	117	78 - 121		56.1	112	4	20
Surrogate													
460-00-4	4-Bromofluorobenzene		53.7	107	50	57.3	115	78 - 130		56.2	112		
1868-53-7	Dibromofluoromethane		60.6	121	50	52.2	104	77 - 127		53.8	108		
2037-26-5	Toluene d8		51.3	103	50	48.9	98	76 - 134		48.7	97		
17060-07-0	1,2-Dichloroethane-d4		49.7	99	50	48.6	97	71 - 127		49.5	99		

Analytical Batch 405048	**Client ID**	MW-21	688855MS	688855MSD	
Prep Batch N/A	**GCAL ID**	20901240404	689095	689096	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	01/26/2009 09:56	01/26/2009 11:05	01/26/2009 11:28	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.00	44.9	25000	27400	110	76 - 123		27900	112	2	30
100-41-4	Ethylbenzene		4780	32.6	25000	33000	113	74 - 126		33100	113	0.3	30
1634-04-4	tert-Butyl methyl ether (MTBE)		2370	38.5	25000	29200	107	76 - 122		31200	115	7	30
1330-20-7	Xylene (total)		21600	91.7	50000	73300	103	76 - 123		72900	103	0.5	30
91-20-3	Naphthalene		1650	59.1	25000	26000	97	64 - 127		28100	106	8	30
71-43-2	Benzene		23300	32.5	25000	47700	98	78 - 121		49500	105	4	30
108-88-3	Toluene		62900	37.8	25000	77400	**58***	78 - 121		77100	**57***	0.4	30
Surrogate													
460-00-4	4-Bromofluorobenzene		28100	112	25000	28300	113	78 - 130		28000	112		
1868-53-7	Dibromofluoromethane		29200	117	25000	25400	102	77 - 127		23500	94		
2037-26-5	Toluene d8		25100	100	25000	24300	97	76 - 134		24500	98		
17060-07-0	1,2-Dichloroethane-d4		25200	101	25000	24700	99	71 - 127		24900	100		

GC/MS Volatiles Quality Control Summary

Analytical Batch	405046	**Client ID**	MB405046		LCS405046				LCSD405046			
Prep Batch	N/A	**GCAL ID**	688977		688978				688979			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	01/26/2009 09:34		01/26/2009 08:25				01/26/2009 08:47			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		0.348U	0.348	50.0	54.8	110	50 - 150	46.4	93	17	50
75-65-0	t-Butanol (TBA)		4.12U	4.12	50.0	52.9	106	50 - 150	45.2	90	16	50
108-20-3	diisopropyl Ether (DIPE)		0.529U	0.529	50.0	53.2	106	50 - 150	44.4	89	18	50
637-92-3	Ethyl tert-butyl ether (ETBE)		0.259U	0.259	50.0	55.6	111	50 - 150	46.6	93	18	50
624-95-3	ethyl tert-butanol (ETBA)		4.36U	4.36	50.0	55.0	110	50 - 150	41.3	83	28	50
64-17-5	Ethanol		40.3U	40.3	200	190	95	50 - 150	223	112	16	50
75-85-4	tert-amyl alcohol (TAA)		15.6U	15.6	200	241	121	50 - 150	200	100	19	50
762-75-4	tert-butyl formate (TBF)		0.357U	0.357	50.0	56.4	113	50 - 150	49.9	100	12	50
Surrogate												
460-00-4	4-Bromofluorobenzene		53.7	107	50	57.3	115	50 - 150	56.2	112		
1868-53-7	Dibromofluoromethane		60.6	121	50	52.2	104	50 - 150	53.8	108		
2037-26-5	Toluene d8		51.3	103	50	48.9	98	50 - 150	48.7	97		
17060-07-0	1,2-Dichloroethane-d4		49.7	99	50	48.6	97	50 - 150	49.5	99		

Analytical Batch	405046	**Client ID**	MW-21		688855MS				688855MSD			
Prep Batch	N/A	**GCAL ID**	20901240404		689097				689098			
		Sample Type	SAMPLE		MS				MSD			
		Analytical Date	01/26/2009 09:56		01/26/2009 11:05				01/26/2009 11:28			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)		0.00	174	25000	22200	89	50 - 150	27300	109	21	50
75-65-0	t-Butanol (TBA)		0.00	2060	25000	21300	85	50 - 150	25400	102	18	50
108-20-3	diisopropyl Ether (DIPE)		0.00	265	25000	20700	83	50 - 150	25800	103	22	50
637-92-3	Ethyl tert-butyl ether (ETBE)		0.00	130	25000	21600	86	50 - 150	26700	107	21	50
624-95-3	ethyl tert-butanol (ETBA)		0.00	2180	25000	20300	81	50 - 150	25500	102	23	50
64-17-5	Ethanol		0.00	20200	100000	92200	92	50 - 150	115000	115	22	50
75-85-4	tert-amyl alcohol (TAA)		0.00	7800	100000	103000	103	50 - 150	124000	124	19	50
762-75-4	tert-butyl formate (TBF)		0.00	179	25000	21200	85	50 - 150	25500	102	18	50
Surrogate												
460-00-4	4-Bromofluorobenzene		28100	112	25000	28300	113	50 - 150	28000	112		
1868-53-7	Dibromofluoromethane		29200	117	25000	25400	102	50 - 150	23500	94		

GC/MS Volatiles Quality Control Summary

Analytical Batch	405046	**Client ID**	MW-21		688855MS			688855MSD			
Prep Batch	N/A	**GCAL ID**	20901240404		689097			689098			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	01/26/2009 09:56		01/26/2009 11:05			01/26/2009 11:28			
		Matrix	Water		Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8	25100	100	25000	24300	97	50 - 150	24500	98		
17060-07-0	1,2-Dichloroethane-d4	25200	101	25000	24700	99	50 - 150	24900	100		

General Chromatography Quality Control Summary

Analytical Batch	405271	**Client ID**	MB405148	LCS405148	LCSD405148
Prep Batch	405148	**GCAL ID**	689429	689430	689431
Prep Method	SW-846 8011	**Sample Type**	Method Blank	LCS	LCSD
		Prep Date	01/27/2009 15:15	01/27/2009 15:15	01/27/2009 15:15
		Analytical Date	01/28/2009 14:51	01/28/2009 15:12	01/28/2009 15:33
		Matrix	Water	Water	Water

SW-846 8011		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane	0.00350U	0.00350	1.22	1.03	84	62 - 140	1.01	94	2	40

Inorganics Quality Control Summary

Analytical Batch	405062	**Client ID**	MB405050			LCS405050		
Prep Batch	405050	**GCAL ID**	688990			688991		
Prep Method	SW-846	**Sample Type**	Method Blank			LCS		
	3010A	**Prep Date**	01/26/2009 10:10			01/26/2009 10:10		
		Analytical Date	01/26/2009 14:49			01/26/2009 14:56		
		Matrix	Water			Water		
SW-846 6010B		**Units**	mg/L	**Spike**		**Result**		**Control**
		Result		**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	0.0027U	0.0027	0.50	0.50	0.50	101	80 - 120

Analytical Batch	405062	**Client ID**	MW-12D			688853MS		
Prep Batch	405050	**GCAL ID**	20901240402			688993		
Prep Method	SW-846	**Sample Type**	SAMPLE			MS		
	3010A	**Prep Date**	01/26/2009 10:10			01/26/2009 10:10		
		Analytical Date	01/26/2009 15:01			01/26/2009 15:14		
		Matrix	Water			Water		
SW-846 6010B		**Units**	mg/L	**Spike**		**Result**		**Control**
		Result		**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	0.0	0.0027	0.50	0.50	0.52	104	75 - 125

Analytical Batch	405062	**Client ID**	MW-12D		688853DUP		
Prep Batch	405050	**GCAL ID**	20901240402		688992		
Prep Method	SW-846	**Sample Type**	SAMPLE		DUP		
	3010A	**Prep Date**	01/26/2009 10:10		01/26/2009 10:10		
		Analytical Date	01/26/2009 15:01		01/26/2009 15:07		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L		**Result**	**RPD**	**RPD**
		Result		**RDL**			**Limit**
7439-92-1	Lead	0.0	0.0027		0.0	0	20

General Chemistry Quality Control Summary

Analytical Batch	405055	Client ID	MB405055			LCS405055		
Prep Batch	N/A	GCAL ID	689048			689049		
		Sample Type	Method Blank			LCS		
		Analytical Date	01/26/2009 10:38			01/26/2009 10:39		
		Matrix	Water			Water		
EPA 353.2 N+N		Units	mg/L	Spike		Result		Control
		Result	RDL	Added			% R	Limits % R
C-005	Nitrate/Nitrite	0.001U	0.001	0.500		0.511	102	90 - 110

Analytical Batch	405055	Client ID	KIU-F EFF			688583MS				688583MSD			
Prep Batch	N/A	GCAL ID	20901231501			689051				689052			
		Sample Type	SAMPLE			MS				MSD			
		Analytical Date	01/26/2009 11:40			01/26/2009 11:43				01/26/2009 11:44			
		Matrix	Water			Water				Water			
EPA 353.2 N+N		Units	mg/L	Spike		Result		Control		Result		RPD	RPD
		Result	RDL	Added		Result	% R	Limits	RDL % R		% R		Limit
C-005	Nitrate/Nitrite	7.95	0.020	10.0		18.2	102	89.5	-110.4	18.1	102	0.55	25

Analytical Batch	405055	Client ID	KIU-F EFF		688583DUP		
Prep Batch	N/A	GCAL ID	20901231501		689050		
		Sample Type	SAMPLE		DUP		
		Analytical Date	01/26/2009 11:40		01/26/2009 11:41		
		Matrix	Water		Water		
EPA 353.2 N+N		Units	mg/L		Result		RPD
		Result	RDL			RPD	Limit
C-005	Nitrate/Nitrite	7.95	0.020		8.02	0.88	25

General Chemistry Quality Control Summary

Analytical Batch 405030	**Client ID**	MB405030			LCS405030		
Prep Batch N/A	**GCAL ID**	688942			688943		
	Sample Type	Method Blank			LCS		
	Analytical Date	01/24/2009 18:43			01/24/2009 18:43		
	Matrix	Water			Water		
SM 3500 Fe D Ferrous Iron	**Units**	mg/L	**Spike**		**Result**		**Control**
	Result		**RDL**	**Added**		**% R**	**Limits % R**
WET-045 Ferrous Iron	0.005U	0.005		1.00	1.01	101	80 - 120

Analytical Batch 405030	**Client ID**	MW-5D	688852DUP			
Prep Batch N/A	**GCAL ID**	20901240401	688944			
	Sample Type	SAMPLE	DUP			
	Analytical Date	01/24/2009 18:50	01/24/2009 18:52			
	Matrix	Water	Water			
SM 3500 Fe D Ferrous Iron	**Units**	mg/L	**Result**		**RPD**	
	Result	**RDL**		**RPD**	**Limit**	
WET-045 Ferrous Iron	3.20	0.265	4.00	22.2	25	

General Chemistry Quality Control Summary

Analytical Batch	405321	Client ID	MB405321		LCS405321		
Prep Batch	N/A	GCAL ID	690303		690304		
		Sample Type	Method Blank		LCS		
		Analytical Date	01/30/2009 08:57		01/30/2009 08:58		
		Matrix	Water		Water		
EPA 375.4 Sulfate		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
14808-79-8	Sulfate	0.41U	0.41	20.0	20.3	101	80 - 120

Analytical Batch	405321	Client ID	296038 UP1		296038 UP1 LAB SPIKE		
Prep Batch	N/A	GCAL ID	20901213813		20901213815		
		Sample Type	SAMPLE		MS		
		Analytical Date	01/30/2009 09:28		01/30/2009 09:28		
		Matrix	Water		Water		
EPA 375.4 Sulfate		Units	mg/L	Spike Added	Result	% R	Control Limits % R
		Result	RDL				
14808-79-8	Sulfate	0.00	0.41	20.0	22.5	112	75 - 125

Analytical Batch	405321	Client ID	296038 UP1	296038 UP1 LAB DUP		
Prep Batch	N/A	GCAL ID	20901213813	20901213814		
		Sample Type	SAMPLE	DUP		
		Analytical Date	01/30/2009 09:28	01/30/2009 09:28		
		Matrix	Water	Water		
EPA 375.4 Sulfate		Units	mg/L	Result	RPD	RPD Limit
		Result	RDL			
14808-79-8	Sulfate	0.00	0.41	0.00	0	25

ACCESS/ 4565/ ~~208~~ 209012404 / 1-30-9

Access Analytical - Chain of Custody Record

Project Submission # 7304-8002 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon
Report To: Melissa Robertson
Address: 571 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803-741-9000 Fax:
Email:
Project Name: SC-015
Sampled By (print): William Walker

Preservative: (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	BTEX, Naph, MTBE, 1,2-DCA	EDB	Oxygenates	Ferrous Iron	Nitrate / Sulfate	Lead	NOTES / COMMENTS
MW-5D	1/23/09	1240	L	11	2	2	2	2	2	1	-1
MW-12D	"	1145	"	"	"	"	"	"	"	"	-2
MW-18D	"	1100	"	"	"	"	"	"	"	"	-3
MW-21	"	1300	"	"	"	"	"	"	"	"	-4

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:
✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice? ✓ Yes ___ No
4.5°

Project Location: ✓ SC ___ NC ___ Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	1/23/09	2:20	M. Robertson
M. Robertson	1/23/09	1700	FEDEX
FEDEX	1-24-9	0916	A. Maston

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

ACCESS ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Rd
Columbia, SC 29205

ATTENTION
Mike Hudgins

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
209032511

DATE
03/31/2009

Primary Data Review By

Curtis Ekker
Tue Mar 31 10:15:04 2009

Curtis Ekker
Data Validation Manager, GCAL

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Rd. Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.

Report Date 03/31/2009

GCAL Report 209032511

Deliver To	Terracon 521 Clemson Rd Columbia, SC 29205 803-741-9000
Attn	Mike Hudgins

Project SC-015

CASE NARRATIVE

Client: Terracon **Report:** 209032511

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

CONVENTIONALS

In the EPA 353.2 analysis, sample 20903251101 (MW-5DD) had to be diluted in order to bracket the concentration within the calibration range of the instrument.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates an estimated value
U	Indicates the compound was analyzed for but not detected
B	(ORGANICS) Indicates the analyte was detected in the associated Method Blank
B	(INORGANICS) Indicates the result is between the RDL and MDL

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with ISO Guide 25 and NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Curtis Ekker

CURTIS EKKER
DATA VALIDATION MANAGER
GCAL REPORT 209032511

THIS REPORT CONTAINS _____ PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20903251101	MW-5DD	Water	03/23/2009 16:30	03/25/2009 09:40

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20903251101	**MW-5DD**	Water	03/23/2009 16:30	03/25/2009 09:40

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.85**	**1.00**	**0.065**	**ug/L**
108-88-3	**Toluene**	**11.1**	**1.00**	**0.076**	**ug/L**
100-41-4	**Ethylbenzene**	**3.98**	**1.00**	**0.065**	**ug/L**
1330-20-7	**Xylene (total)**	**18.0**	**3.00**	**0.183**	**ug/L**
91-20-3	**Naphthalene**	**7.24**	**5.00**	**0.118**	**ug/L**

SM 3500 Fe D Ferrous Iron

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.541**	**0.050**	**0.005**	**mg/L**

EPA 353.2 N+N

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**1.35**	**0.020**	**0.002**	**mg/L**

EPA 375.4 Sulfate

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**13.0**	**5.0**	**0.41**	**mg/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20903251101	**MW-5DD**	Water	03/23/2009 16:30	03/25/2009 09:40

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	03/26/2009 23:32	RJU	408601

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.85**	**1.00**	**0.065**	**ug/L**
108-88-3	**Toluene**	**11.1**	**1.00**	**0.076**	**ug/L**
100-41-4	**Ethylbenzene**	**3.98**	**1.00**	**0.065**	**ug/L**
1330-20-7	**Xylene (total)**	**18.0**	**3.00**	**0.183**	**ug/L**
91-20-3	**Naphthalene**	**7.24**	**5.00**	**0.118**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.077U	1.00	0.077	ug/L
107-06-2	1,2-Dichloroethane	0.090U	5.00	0.090	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	50.5	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	49.8	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.6	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	03/26/2009 23:32	RJU	408600

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.348U	5.00	0.348	ug/L
75-65-0	t-Butanol (TBA)	4.12U	10.0	4.12	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.529U	5.00	0.529	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	5.00	0.259	ug/L
624-95-3	ethyl tert-butanol (ETBA)	4.36U	10.0	4.36	ug/L
64-17-5	Ethanol	40.3U	100	40.3	ug/L
75-85-4	tert-amyl alcohol (TAA)	15.6U	20.0	15.6	ug/L
762-75-4	tert-butyl formate (TBF)	0.357U	5.00	0.357	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	50 - 150
1868-53-7	Dibromofluoromethane	50	50.5	ug/L	101	50 - 150
2037-26-5	Toluene d8	50	49.8	ug/L	100	50 - 150
17060-07-0	1,2-Dichloroethane-d4	50	48.6	ug/L	97	50 - 150

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
03/27/2009 09:45	408594	SW-846 8011	1	03/27/2009 16:37	TLS	408731

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00350U	0.010	0.00350	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
20903251101	**MW-5DD**	Water	03/23/2009 16:30	03/25/2009 09:40

SW-846 6010B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
03/25/2009 13:00	408447	SW-846 3010A	1	03/25/2009 19:54	DJH	408538

CAS#	Parameter	Result	RDL	MDL	Units
7439-92-1	Lead	0.0027U	0.015	0.0027	mg/L

EPA 353.2 N+N

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	03/25/2009 16:19	AEL	408458

CAS#	Parameter	Result	RDL	MDL	Units
C-005	**Nitrate/Nitrite**	**1.35**	**0.020**	**0.002**	**mg/L**

SM 3500 Fe D Ferrous Iron

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	03/25/2009 10:34	JEM	408444

CAS#	Parameter	Result	RDL	MDL	Units
WET-045	**Ferrous Iron**	**0.541**	**0.050**	**0.005**	**mg/L**

EPA 375.4 Sulfate

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	03/26/2009 11:44	JEM	408548

CAS#	Parameter	Result	RDL	MDL	Units
14808-79-8	**Sulfate**	**13.0**	**5.0**	**0.41**	**mg/L**

GC/MS Volatiles Quality Control Summary

Analytical Batch	408601	**Client ID**	MB408601		LCS408601				LCSD408601			
Prep Batch	N/A	**GCAL ID**	708057		708058				708059			
		Sample Type	Method Blank		LCS				LCSD			
		Analytical Date	03/26/2009 21:07		03/26/2009 19:55				03/26/2009 20:19			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.090U	0.090	50.0	48.6	97	76 - 123	51.4	103	6	30
100-41-4	Ethylbenzene		0.065U	0.065	50.0	52.8	106	74 - 126	52.8	106	0	30
1634-04-4	tert-Butyl methyl ether (MTBE)		0.077U	0.077	50.0	48.6	97	76 - 122	54.5	109	11	30
1330-20-7	Xylene (total)		0.183U	0.183	150	146	97	76 - 123	147	98	0.7	30
91-20-3	Naphthalene		0.118U	0.118	50.0	45.7	91	64 - 127	45.3	91	0.9	35
71-43-2	Benzene		0.065U	0.065	50.0	49.8	100	78 - 121	55.2	110	10	20
108-88-3	Toluene		0.076U	0.076	50.0	49.5	99	78 - 121	50.6	101	2	20
Surrogate												
460-00-4	4-Bromofluorobenzene		44.5	89	50	52.2	104	78 - 130	47.4	95		
1868-53-7	Dibromofluoromethane		50.1	100	50	49.3	99	77 - 127	50.1	100		
2037-26-5	Toluene d8		51.2	102	50	50.2	100	76 - 134	49.1	98		
17060-07-0	1,2-Dichloroethane-d4		49.9	100	50	49.7	99	71 - 127	51.8	104		

Analytical Batch	408601	**Client ID**	MW-3		707089MS				707089MSD			
Prep Batch	N/A	**GCAL ID**	20903242102		708060				708061			
		Sample Type	SAMPLE		MS				MSD			
		Analytical Date	03/26/2009 21:31		03/26/2009 21:56				03/26/2009 22:20			
		Matrix	Water		Water				Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
107-06-2	1,2-Dichloroethane		0.00	3.59	2000	1950	98	76 - 123	1990	100	2	30
100-41-4	Ethylbenzene		270	2.61	2000	2410	107	74 - 126	2460	110	2	30
1634-04-4	tert-Butyl methyl ether (MTBE)		1450	3.08	2000	3550	105	76 - 122	3350	95	6	30
1330-20-7	Xylene (total)		1430	7.33	6000	7340	99	76 - 123	7490	101	2	30
91-20-3	Naphthalene		331	4.72	2000	2050	86	64 - 127	2060	86	0.5	30
71-43-2	Benzene		4330	2.60	2000	6110	89	78 - 121	6270	97	3	30
108-88-3	Toluene		1700	3.02	2000	3600	95	78 - 121	3640	97	1	30
Surrogate												
460-00-4	4-Bromofluorobenzene				2000	2070	104	78 - 130	2050	103		
1868-53-7	Dibromofluoromethane				2000	2000	100	77 - 127	1980	99		
2037-26-5	Toluene d8				2000	2040	102	76 - 134	1960	98		
17060-07-0	1,2-Dichloroethane-d4				2000	2030	102	71 - 127	2020	101		

GC/MS Volatiles Quality Control Summary

Analytical Batch 408600	**Client ID**	MB408600	LCS408600	LCSD408600	
Prep Batch N/A	**GCAL ID**	708054	708055	708056	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	03/26/2009 21:07	03/26/2009 19:55	03/26/2009 20:19	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	0.348U	0.348	50.0	53.5	107	50 - 150		56.2	112	5	50
75-65-0	t-Butanol (TBA)	4.12U	4.12	50.0	55.2	110	50 - 150		63.2	126	14	50
108-20-3	diisopropyl Ether (DIPE)	0.529U	0.529	50.0	41.8	84	50 - 150		57.6	115	32	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.259U	0.259	50.0	50.4	101	50 - 150		52.6	105	4	50
624-95-3	ethyl tert-butanol (ETBA)	4.36U	4.36	50.0	50.6	101	50 - 150		47.9	96	5	50
64-17-5	Ethanol	40.3U	40.3	200	222	111	50 - 150		220	110	0.9	50
75-85-4	tert-amyl alcohol (TAA)	15.6U	15.6	200	203	102	50 - 150		207	104	2	50
762-75-4	tert-butyl formate (TBF)	0.357U	0.357	50.0	58.5	117	50 - 150		62.3	125	6	50
Surrogate												
460-00-4	4-Bromofluorobenzene	44.5	89	50	52.2	104	50 - 150		47.4	95		
1868-53-7	Dibromofluoromethane	50.1	100	50	49.3	99	50 - 150		50.1	100		
2037-26-5	Toluene d8	51.2	102	50	50.2	100	50 - 150		49.1	98		
17060-07-0	1,2-Dichloroethane-d4	49.9	100	50	49.7	99	50 - 150		51.8	104		

Analytical Batch 408600	**Client ID**	MW-3	707089MS	707089MSD	
Prep Batch N/A	**GCAL ID**	20903242102	708062	708063	
	Sample Type	SAMPLE	MS	MSD	
	Analytical Date	03/26/2009 21:31	03/26/2009 21:56	03/26/2009 22:20	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**Result % R**	**Control Limits**	**RPD**	**Result**	**% R**	**RPD**	**RPD Limit**
994-05-8	t-amyl methyl ether (TAME)	98.0	13.9	2000	2330	112	50 - 150		2360	113	1	50
75-65-0	t-Butanol (TBA)	0.00	165	2000	2460	123	50 - 150		2010	101	20	50
108-20-3	diisopropyl Ether (DIPE)	262	21.2	2000	2320	103	50 - 150		1910	82	19	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.00	10.4	2000	1880	94	50 - 150		1960	98	4	50
624-95-3	ethyl tert-butanol (ETBA)	0.00	174	2000	2100	105	50 - 150		1970	99	6	50
64-17-5	Ethanol	0.00	1610	8000	7480	94	50 - 150		6900	86	8	50
75-85-4	tert-amyl alcohol (TAA)	277	624	8000	10400	127	50 - 150		9630	117	8	50
762-75-4	tert-butyl formate (TBF)	0.00	14.3	2000	2620	131	50 - 150		2740	137	4	50
Surrogate												
460-00-4	4-Bromofluorobenzene			2000	2070	104	50 - 150		2050	103		
1868-53-7	Dibromofluoromethane			2000	2000	100	50 - 150		1980	99		

GC/MS Volatiles Quality Control Summary

Analytical Batch	408600	**Client ID**	MW-3		707089MS			707089MSD			
Prep Batch	N/A	**GCAL ID**	20903242102		708062			708063			
		Sample Type	SAMPLE		MS			MSD			
		Analytical Date	03/26/2009 21:31		03/26/2009 21:56			03/26/2009 22:20			
		Matrix	Water		Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8			2000	2040	102	50 - 150	1960	98		
17060-07-0	1,2-Dichloroethane-d4			2000	2030	102	50 - 150	2020	101		

General Chromatography Quality Control Summary

Analytical Batch	408731	**Client ID**	MB408594	LCS408594	LCSD408594
Prep Batch	408594	**GCAL ID**	708045	708046	708047
Prep Method	SW-846 8011	**Sample Type**	Method Blank	LCS	LCSD
		Prep Date	03/27/2009 09:45	03/27/2009 09:45	03/27/2009 09:45
		Analytical Date	03/27/2009 15:08	03/27/2009 16:59	03/27/2009 15:53
		Matrix	Water	Water	Water

SW-846 8011		**Units**	ug/L	**Spike Added**	**Result**	**% R**	**Control Limits**	**Result**	**% R**	**RPD**	**RPD Limit**
106-93-4	1,2-Dibromoethane	0.00350U	0.00350	0.926	0.799	86	62 - 140	0.778	79	3	40

Inorganics Quality Control Summary

Analytical Batch	408538	**Client ID**	MB408447			LCS408447		
Prep Batch	408447	**GCAL ID**	707333			707334		
Prep Method	SW-846	**Sample Type**	Method Blank			LCS		
	3010A	**Prep Date**	03/25/2009 13:00			03/25/2009 13:00		
		Analytical Date	03/25/2009 19:08			03/25/2009 19:15		
		Matrix	Water			Water		
SW-846 6010B		**Units**	mg/L	**Spike**		**Result**		**Control**
		Result		**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	0.0027U	0.0027		0.50	0.49	98	80 - 120

Analytical Batch	408538	**Client ID**	A/C HOTSY #3			707316MS		
Prep Batch	408447	**GCAL ID**	20903251303			707384		
Prep Method	SW-846	**Sample Type**	SAMPLE			MS		
	3010A	**Prep Date**	03/25/2009 13:00			03/25/2009 13:00		
		Analytical Date	03/25/2009 19:21			03/25/2009 19:35		
		Matrix	Water			Water		
SW-846 6010B		**Units**	mg/L	**Spike**		**Result**		**Control**
		Result		**RDL**	**Added**		**% R**	**Limits % R**
7439-92-1	Lead	0.0	0.0027		0.50	0.45	91	75 - 125

Analytical Batch	408538	**Client ID**	A/C HOTSY #3		707316DUP		
Prep Batch	408447	**GCAL ID**	20903251303		707383		
Prep Method	SW-846	**Sample Type**	SAMPLE		DUP		
	3010A	**Prep Date**	03/25/2009 13:00		03/25/2009 13:00		
		Analytical Date	03/25/2009 19:21		03/25/2009 19:28		
		Matrix	Water		Water		
SW-846 6010B		**Units**	mg/L		**Result**	**RPD**	**RPD**
		Result		**RDL**			**Limit**
7439-92-1	Lead	0.0	0.0027		0.0	0	20

General Chemistry Quality Control Summary

Analytical Batch 408458	**Client ID**	MB408458			LCS408458		
Prep Batch N/A	**GCAL ID**	707413			707414		
	Sample Type	Method Blank			LCS		
	Analytical Date	03/25/2009 14:50			03/25/2009 14:51		
	Matrix	Water			Water		
EPA 353.2 N+N	**Units**	mg/L	**Spike**		**Result**		**Control**
	Result	**RDL**	**Added**			**% R**	**Limits % R**
C-005 Nitrate/Nitrite	0.001U	0.001	0.500		0.514	103	90 - 110

Analytical Batch 408458	**Client ID**	TK-471			707069MS		
Prep Batch N/A	**GCAL ID**	20903241802			707418		
	Sample Type	SAMPLE			MS		
	Analytical Date	03/25/2009 15:15			03/25/2009 15:17		
	Matrix	Water			Water		
EPA 353.2 N+N	**Units**	mg/L	**Spike**		**Result**		**Control**
	Result	**RDL**	**Added**			**% R**	**Limits % R**
C-005 Nitrate/Nitrite	5.02	0.020	10.0		14.9	99.1	89.5 -110.4

Analytical Batch 408458	**Client ID**	TK-471	707069DUP			
Prep Batch N/A	**GCAL ID**	20903241802	707417			
	Sample Type	SAMPLE	DUP			
	Analytical Date	03/25/2009 15:15	03/25/2009 15:16			
	Matrix	Water	Water			
EPA 353.2 N+N	**Units**	mg/L	**Result**		**RPD**	
	Result	**RDL**		**RPD**	**Limit**	
C-005 Nitrate/Nitrite	5.02	0.020	4.89	2.6	25	

General Chemistry Quality Control Summary

Analytical Batch 408444	**Client ID**	MB408444			LCS408444		
Prep Batch N/A	**GCAL ID**	707307			707308		
	Sample Type	Method Blank			LCS		
	Analytical Date	03/25/2009 10:33			03/25/2009 10:33		
	Matrix	Water			Water		
SM 3500 Fe D Ferrous Iron	**Units**	mg/L	**Spike**		**Result**		**Control**
	Result		**Added**			**% R**	**Limits % R**
WET-045 Ferrous Iron	0.005U	0.005	1.00		0.957	95.7	80 - 120

General Chemistry Quality Control Summary

Analytical Batch	408548	Client ID	MB408548			LCS408548		
Prep Batch	N/A	GCAL ID	707829			707830		
		Sample Type	Method Blank			LCS		
		Analytical Date	03/26/2009 11:23			03/26/2009 11:23		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike		Result		Control
		Result	RDL	Added			% R	Limits % R
14808-79-8	Sulfate	0.41U	0.41	20.0		19.9	100	80 - 120

Analytical Batch	408548	Client ID	MW-30			706164MS		
Prep Batch	N/A	GCAL ID	20903201927			707832		
		Sample Type	SAMPLE			MS		
		Analytical Date	03/26/2009 11:26			03/26/2009 11:27		
		Matrix	Water			Water		
EPA 375.4 Sulfate		Units	mg/L	Spike		Result		Control
		Result	RDL	Added			% R	Limits % R
14808-79-8	Sulfate	4.6	0.41	20.0		26.9	112	75 - 125

Analytical Batch	408548	Client ID	MW-30	706164DUP		
Prep Batch	N/A	GCAL ID	20903201927	707831		
		Sample Type	SAMPLE	DUP		
		Analytical Date	03/26/2009 11:26	03/26/2009 11:26		
		Matrix	Water	Water		
EPA 375.4 Sulfate		Units	mg/L	Result	RPD	RPD
		Result	RDL			Limit
14808-79-8	Sulfate	4.6	0.41	4.9	6	25

ACCESS/4565/209032511/04-01-09

Access Analytical - Chain of Custody Record

GCAL

Project Submission # 7307-8012 **PO #** _____ **Laboratory ID:** _____

Company Name: Terracon

Report To: Mike Hudgins

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: 803-741-9000 Fax:

Email:

Project Name: SC-015

Sampled By (print): William Walker

Preservative (*see codes below)

↓ REQUESTED LAB ANALYSIS: ↓

Sample Label	Date Collected	Time Collected	Matrix	# of Cont	BTEX, Naph, MTBE, 1,2-DCA	EDB	8 Oxygenates	Ferrous Iron	Lead	Nitrate	Sulfate	NOTES / COMMENTS
MW-5DD	3/23/09	1630	GW	11	2	2	2	2	1	1	1	-1

* Preservative Codes (*place corresponding # in block above analysis field*): 0=None, 1=HCL, 2=HNO_3, 3=H_2SO_4, 4=NaOH, 5=$Na_2S_2O_3$, 6=$NaHSO_4$, Other=Specify

ACCESS ANALYTICAL, INC.

7478 Carlisle Street
Irmo, SC 29063

Phone: (803) 781-4243
Fax: 781-4303
Toll Free (888) 315-4243
www.accessanalyticalinc.com

Turnaround Time:

✓ Std. (5-7 Bus. days)
___ RUSH*
*Date Required:_____
(For rush work, results faxed by end of business day on date required)

Samples Recd. on Ice?
✓ Yes
___ No
4.6°

Project Location:
✓ SC
___ NC
___ Other_____(specify)

Relinquished By:	Date:	Time:	Received By:
[signature]	3/24/09	1615	Christy Russ
Christy Russ	3/24/09	1700	FedEx
FEDEX	3-25-09	0940	[signature]

Access Analytical, Inc.
See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

APPENDIX D

RECEIVED FEB 2 6 2009

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	~~803-957-9175~~	28358

5. Generator's Name and Mailing Address: Crown Central LLC c/o Terracon, 521 Clemson Rd. Columbia, SC

Generator's Site Address (if different than mailing address): SC-015 (Piggly Wiggly site) 3818 Devine St. Columbia, SC

Generator's Phone: 803-741-9000

6. Transporter 1 Company Name: A&D Environmental Services (SC) LLC (fka Nulway Environmental Services LLC) — U.S. EPA ID Number: SCD987598331

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: **VLS, 305 South Main Street, Mauldin, SC 29662** — U.S. EPA ID Number: SCR000762468

Facility's Phone: ~~864-962-9953~~

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
1.	NON-HAZARDOUS/NON-REGULATED MATERIAL ~~8914~~ 8916 Soil cuttings Profile # ~~8914~~	020	DM	12000	P
2.	Non-Hazardous/Non Regulated Material Wellwater, etc. Profile # ~~8914~~ ~~8916~~	002	DM	900	P
3.	Non-Hazardous/Non-Regulated Material Soil/water mix Profile # ~~8917~~ 8915	008	DM	4000	P
4.					

13. Special Handling Instructions and Additional Information

JOB # 2009-076
PO# 11658

Contact at Terracon: Melissa Roberts 803-741-9000

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Melissa Roberts signatory agent Crown Central — Signature: Melissa Roberts — Month: 1 Day: 28 Year: 09

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Cory Lewis SR. — Signature: Cory Lewis SR. — Month: 1 Day: 28 Year: 09

Transporter 2 Printed/Typed Name: Gilbert T. Wood Jr. — Signature: — Month: 1 Day: 29 Year: 09

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Marty Eslick — Signature: — Month: 1 Day: 29 Year: 09

GENERATOR | INT'L | TRANSPORTER | DESIGNATED FACILITY

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number

2. Page 1 of 1 5

3. Emergency Response Phone: 800-535-5053

4. Waste Tracking Number: 002034

5. Generator's Name and Mailing Address: SC 015
3800 Devine St. Columbia SC 29203
Generator's Phone: 803 741-9000

Generator's Site Address (if different than mailing address): 73078016

6. Transporter 1 Company Name: DIVERSIFIED RECYCLING INC.
877-682-0234
U.S. EPA ID Number: SCR000766048

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address: DIVERSIFIED Recycli
132 Gardners Terrace West Columbia SC 29172
Facility's Phone: 8776820234
U.S. EPA ID Number: SCR000748127

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON RCRA NON Regulated Liquid	01	V/T	55	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: As Signatory Agent Regan W. Norris For Crown Petroleum
Signature
Month 3 Day 30 Year 09

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: James Smith
Signature
Month 3 Day 30 Year 09

Transporter 2 Printed/Typed Name
Signature
Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Donald G Bonnette
Signature
Month 4 Day 3 Year 09

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

169-BLS-C 5 11979 (Rev. 8/06)

DESIGNATED FACILITY TO GENERATOR

10260

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of 1	3. Emergency Response Phone 803-957-9175	4. Waste Tracking Number 28582

GENERATOR

5. Generator's Name and Mailing Address: Crown Central LLC, c/o Terracon, 521 Clemson Rd., Columbia, SC 29229
Generator's Phone: 803-741-9000
Generator's Site Address (if different than mailing address): SC-015, 3818 Devine St., Columbia, SC 29205

6. Transporter 1 Company Name: A&D Environmental Services (SC), LLC (fka NuWay Environmental Services, LLC) — U.S. EPA ID Number: SCD987598331

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: VLS, 305 South Main Street, Mauldin, SC 29662 — U.S. EPA ID Number: SCR000762466
Facility's Phone: 864-952-9953

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-HAZARDOUS NON-REGULATED MATERIAL Soil cuttings Profile# 8716	017	DM	10260	P	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information
JOB# 88343
PO# 1210
Mike Hudgins
Contact at Terracon: Melissa Roberts 803-741-9000

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: P. Michael Hudgins as Signatory agent for Crown LLC — Signature: P. Michael Hudgins — Month 4 Day 19 Year 09

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit: Date leaving U.S.:
Transporter Signature (for exports only):

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Cory Lewis — Signature: Cory Lewis — Month 4 Day 19 Year 09
Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Tommy — Signature — Month 4 Day 15 Year 09

169-BLC-O 6 10498 (Rev. 8/06)

DESIGNATED FACILITY'S COPY

APPENDIX E

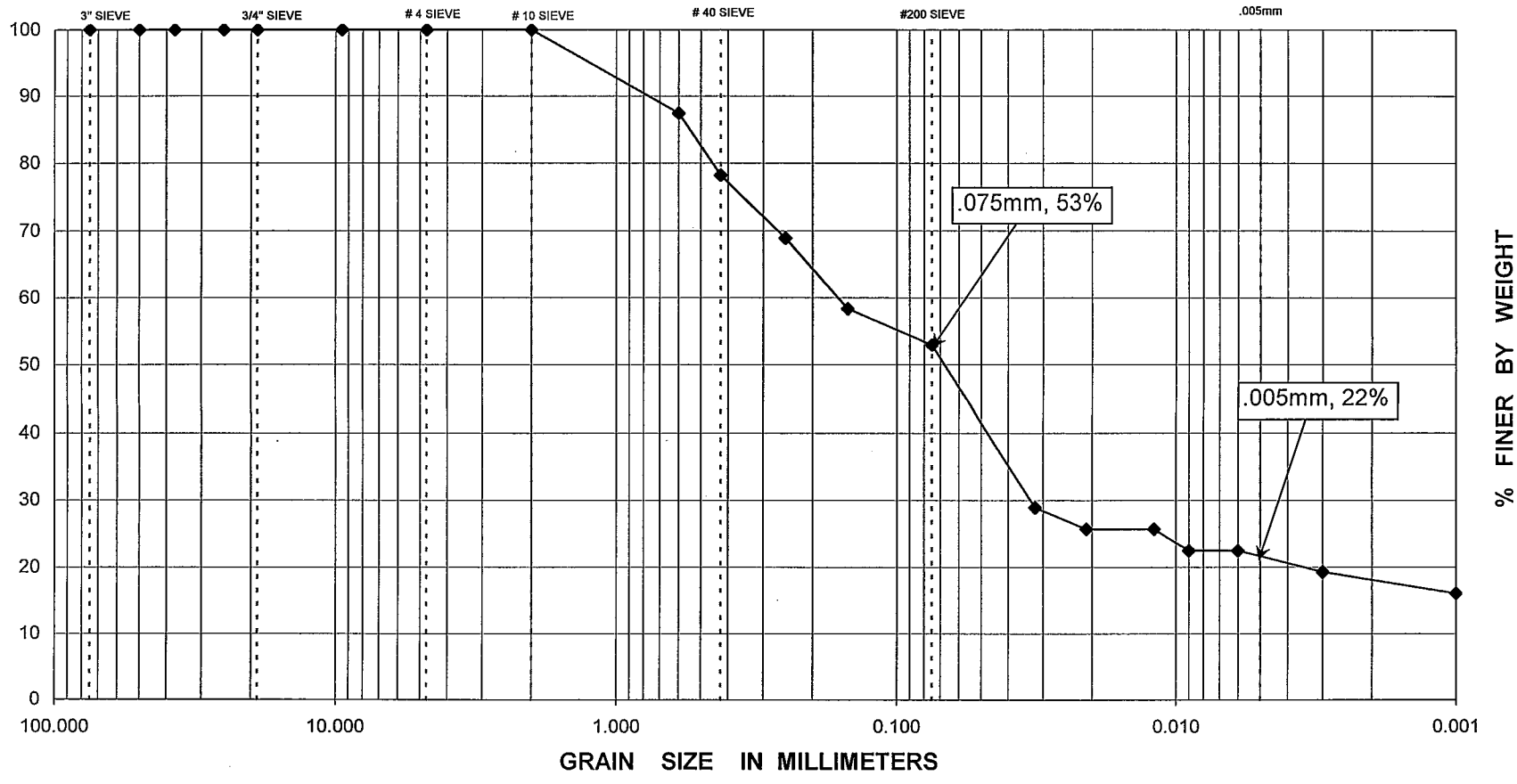
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	**DATE:**	02/13/09	**TESTED BY :**	RGS	**REVIEWED BY :**	*MH*
BORING / PIT NO. :	MW-5D	**DEPTH, ft.:**	60-65	**SAMPLE NO. :**	*0.001*	**SAMPLE TYPE :**	*Bulk*
ACCESS SAMPLE ID:	-						
SOIL DESCRIPTION :	White tan fine to medium clayey SILT					**SP. GRAVITY, Gs :**	-
LIQUID LIMIT, %:		**PLASTICITY INDEX, %:**		**MOISTURE, %:**	-	**FINES, %:**	*53*
D10, MM:	-	**D30, MM:**	-	**D60, MM:**	-	**COEFF. OF CURVATURE, C_C:**	-
CLASSIFICATION		**UNIFIED:**	-	**AASHTO:**	-	**COEFF. OF UNIFORMITY, C_U:**	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur Ma

GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)

Rev. Jan 2006

PROJECT	SC-015							
JOB NO.	73078012	DATE		2/13/2009	TESTED BY RGS	REVIEWED BY	MH	
BORING / PIT NO.	MW-5D		DEPTH	60-65	SAMPLE TYPE	Bulk	SAMPLE NO.	0.001
LOCATION	-							
SOIL DESCRIPTION	White tan fine to medium clayey SILT							
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines		SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012

AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
3"	0.00	0.0	75.00	100.00
2"	0.00	0.00	50.00	100.00
1 1/2"	0.00	0.00	37.50	100.00
1"	0.00	0.00	25.00	100.00
3/4"	0.00	0.00	19.00	100.00
3/8"	0.00	0.00	9.50	100.00
# 4	0.00	0.00	4.75	100.00
#10	0.00	0.00	2.000	100.00
#30	6.29	12.58	0.600	87.42
#40	10.89	21.78	0.425	78.22
#60	15.56	31.12	0.250	68.88
# 100	20.83	41.66	0.150	58.34
# 200	23.55	47.10	0.075	52.90
			0.032	28.91
			0.021	25.70
			0.012	25.70
			0.009	22.48
			0.006	22.48
			0.003	19.27
			0.001	16.06

COARSER THAN # 4 SIEVE

FINER THAN # 4 SIEVE

HYDROMETER DATA

Date & Time	Zero CORR.	Temp °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)

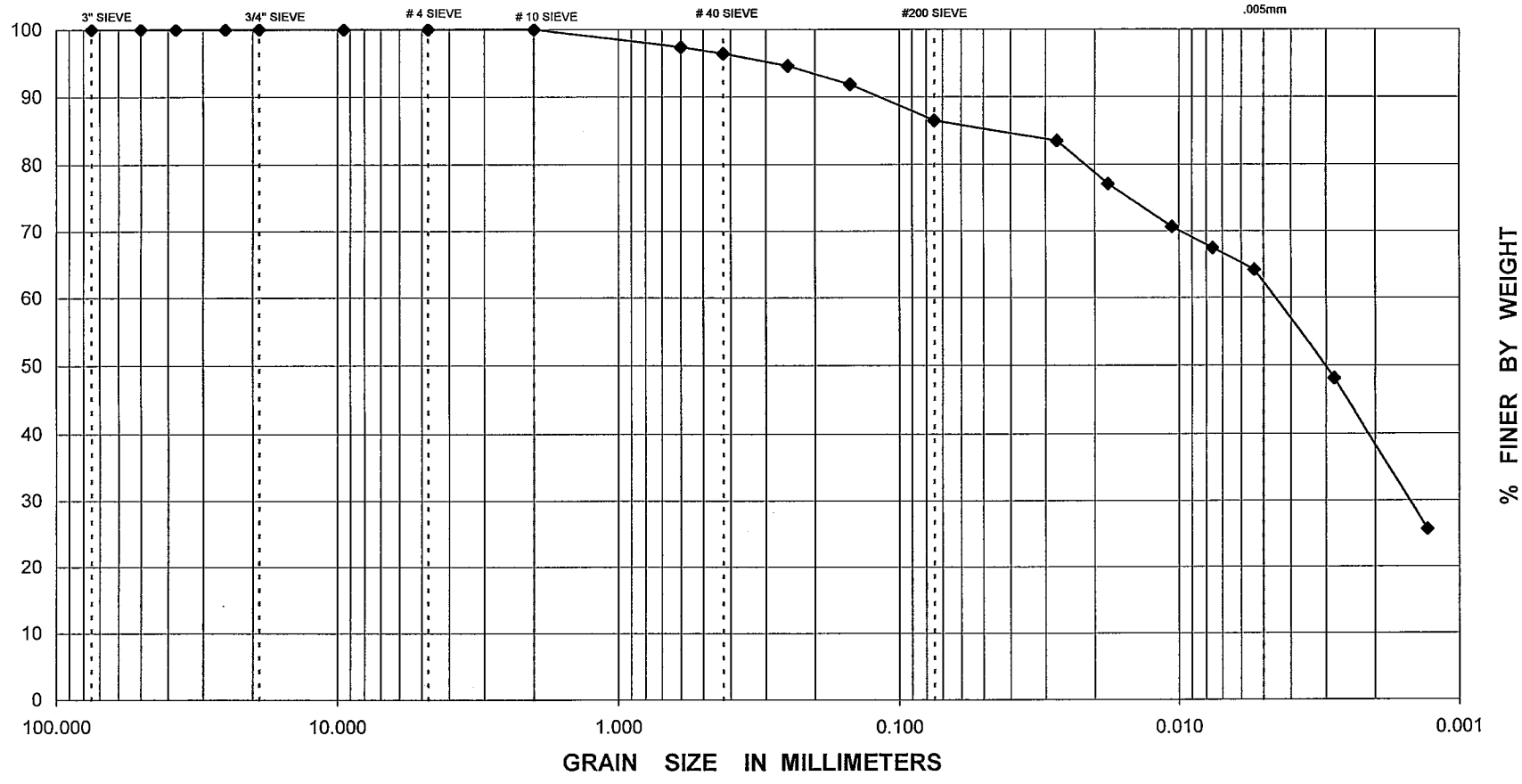
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	DATE:	01/07/09	TESTED BY :	KB	REVIEWED BY :	*MR*
BORING / PIT NO. :	MW-18	DEPTH, ft.:	25 - 27	SAMPLE NO. :	*0.001*	SAMPLE TYPE :	*Bulk*
SAMPLE LOCATION:							
SOIL DESCRIPTION :	Pink SILTY CLAY trace of sand					SP. GRAVITY, Gs :	-
LIQUID LIMIT, %:		PLASTICITY INDEX, %:		MOISTURE, %:	-	FINES, %:	*86.5*
D10, MM:	-	D30, MM:	-	D60, MM:	-	COEFF. OF CURVATURE, C_C:	-
CLASSIFICATION		UNIFIED:	-	AASHTO:	-	COEFF. OF UNIFORMITY, C_U:	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur Ma **GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)**
Rev. Jan 2006

PROJECT	SC-015							
JOB NO.	73078012	DATE		1/7/2009	TESTED BY KB	REVIEWED BY	MR	
BORING / PIT NO.	MW-18		DEPTH	25 - 27	SAMPLE TYPE	Bulk	SAMPLE NO.	0.001
LOCATION								
SOIL DESCRIPTION	Pink SILTY CLAY trace of sand							
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines		SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012

AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

	SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
COARSER THAN # 4 SIEVE	3"	0.00	0.0	75.00	100.00
	2"	0.00	0.00	50.00	100.00
	1 1/2"	0.00	0.00	37.50	100.00
	1"	0.00	0.00	25.00	100.00
	3/4"	0.00	0.00	19.00	100.00
	3/8"	0.00	0.00	9.50	100.00
	# 4	0.00	0.00	4.75	100.00
FINER THAN # 4 SIEVE	#10	0.00	0.00	2.000	100.00
	#30	1.33	2.66	0.600	97.34
	#40	1.82	3.64	0.425	96.36
	#60	2.72	5.44	0.250	94.56
	# 100	4.09	8.18	0.150	91.82
	# 200	6.76	13.52	0.075	86.48

HYDROMETER DATA

Date & Time	Zero CORR.	Temp °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)			
						0.027	83.52
						0.018	77.09
						0.011	70.67
						0.008	67.45
						0.005	64.24
						0.003	48.18
						0.001	25.70

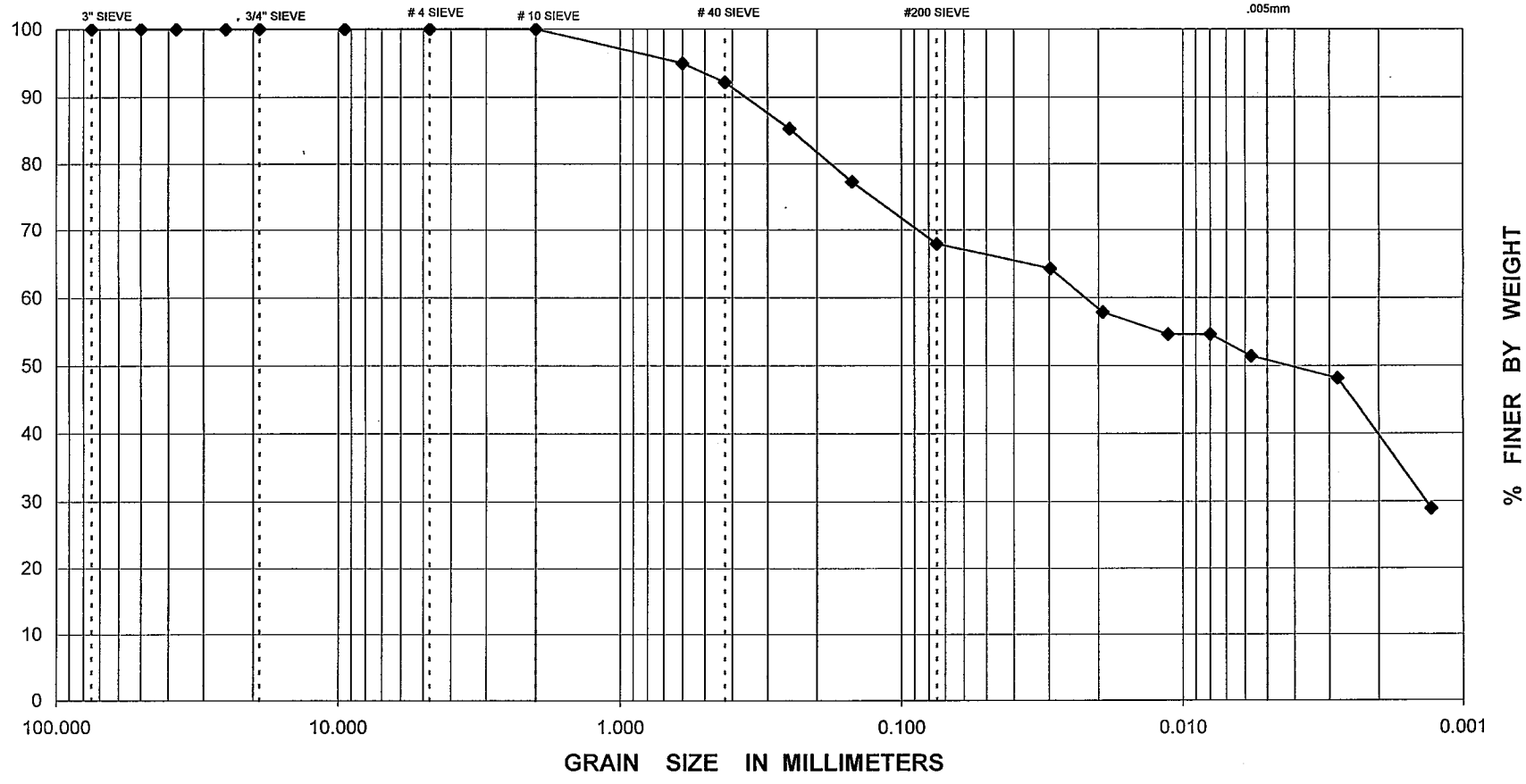
Terracon

GRAIN SIZE DISTRIBUTION TEST REPORT

(ASTM D422)

JOB NAME :	SC-015						
JOB NO. :	73078012	DATE:	01/07/09	TESTED BY :	KB	REVIEWED BY :	*MR*
BORING / PIT NO. :	MW-18D	DEPTH, ft.:	50 - 52	SAMPLE NO. :	*0.002*	SAMPLE TYPE :	*Bulk*
SAMPLE LOCATION:							
SOIL DESCRIPTION :	Light tan fine sandy SILTY CLAY					SP. GRAVITY, Gs :	-
LIQUID LIMIT, %:		PLASTICITY INDEX, %:		MOISTURE, %:	-	FINES, %:	*67.9*
D10, MM:	-	D30, MM:	-	D60, MM:	-	COEFF. OF CURVATURE, C_C:	-
CLASSIFICATION		UNIFIED:	-	AASHTO:	-	COEFF. OF UNIFORMITY, C_U:	-

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY



Orig. Issur Ma **GRAIN SIZE DISTRIBUTION TEST DATA SHEET (ASTM D422)**
Rev. Jan 2006

PROJECT	SC-015							
JOB NO.	73078012	DATE		1/7/2009	TESTED BY KB	REVIEWED BY	MR	
BORING / PIT NO.	MW-18D		DEPTH	50 - 52	SAMPLE TYPE	Bulk	SAMPLE NO.	0.002
LOCATION								
SOIL DESCRIPTION	Light tan fine sandy SILTY CLAY							
LIQUID LIMIT	-	PLASTICITY INDEX		-	% Fines		SPECIFIC GRAVITY	-

SPLITTING AIR DRIED MATERIAL ON # 4 SIEVE

AIR DRIED WEIGHT OF TOTAL SAMPLE	0	GRAMS
AIR DRIED WEIGHT RETAINED ON # 4 SIEVE	0	GRAMS
(WASHED)OVEN DRIED WT. RETAINED ON # 4	0	GRAMS
AIR DRIED WEIGHT PASSING ON # 4 SIEVE	0	GRAMS
EQUAVALENT OVEN DRIED WT. PASSING # 4	50.00	GRAMS

MOISTURE ON AIR DRIED MATERIAL PASSING # 4

PAN NO.		
AIR DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
OVEN DRIED SOIL+ PAN (GRAMS)	0.00	GRAMS
WT. OF PAN (GRAMS)	0.00	GRAMS
% MOISTURE	0.00	%

MATERIAL FOR SIEVE & HYDROMETER ANALYSIS

PAN NO 5012

AIR DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MATERIAL PASSING # 4	0	GRAMS
OVEN DRIED MAT. REPRESENTING THE WHOLE SAMLPLE	50.00	GRAMS

SIEVE ANALYSIS DATA

	SIEVE SIZE	WEIGHT RETAINED (GRAMS)	MATERIAL RETIANED %	PARTICAL DIAMETER (MM)	MATERIAL PASSING %
COARSER THAN # 4 SIEVE	3"	0.00	0.0	75.00	100.00
	2"	0.00	0.00	50.00	100.00
	1 1/2"	0.00	0.00	37.50	100.00
	1"	0.00	0.00	25.00	100.00
	3/4"	0.00	0.00	19.00	100.00
	3/8"	0.00	0.00	9.50	100.00
	# 4	0.00	0.00	4.75	100.00
FINER THAN # 4 SIEVE	#10	0.00	0.00	2.000	100.00
	#30	2.50	5.00	0.600	95.00
	#40	3.90	7.80	0.425	92.20
	#60	7.37	14.74	0.250	85.26
	# 100	11.38	22.76	0.150	77.24
	# 200	16.06	32.12	0.075	67.88

HYDROMETER DATA

Date & Time	Zero CORR.	Temp. °C	ELAPSED TIME (MINTUES)	READING (Uncorrted)		
					0.030	64.24
					0.019	57.82
					0.011	54.61
					0.008	54.61
					0.006	51.39
					0.003	48.18
					0.001	28.91

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

APR 16 2010

UST DOCKET 8tech

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21201-1168

Re: **AFVR Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 36432
Release Reported August 15, 1989
Assessment Report received May 6, 2009
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (SCDHEC) has reviewed the referenced report and determined the next necessary scope of work to be an Aggressive Fluid Vapor Recovery (AFVR) event on monitoring wells MW-5R and MW-21 in an attempt to reduce dissolved concentrations of chemicals of concern.

Cost Agreement # 36432 has been approved in the amount shown on the enclosed cost agreement form for the aforementioned scope of work. The AFVR activities may proceed immediately upon receipt of this letter. The report submitted at the completion of these activities should include the following:

- A narrative portion documenting the AFVR event noting site conditions, the name of the AFVR contractor, field personnel, date, time the AFVR event started and ended, ambient air temperature, and general weather conditions during the AFVR event.
- A brief description of the completed work scope and any relevant descriptions pertaining to the data tables.
- A table summarizing the airflow (in CFM) and volatile air emissions concentrations collected from the stack of the truck every thirty minutes through the duration of the event. The table shall also document which well(s) were being recovered from during that time interval.
- A table summarizing the magnehelic gauge measurements from all applicable wells on a thirty-minute time interval.
- The total volume of water recovered (gallons).
- The total volume of free phase product recovered (typically measured with a product/water interface device inserted into the top of the tanker at the completion of the event and then converted to an approximate volume).
- The total weight of petroleum removed as vapor. This is calculated based on the airflow rate and the concentration of vapor.
- A table documenting the free product thickness (in feet) in each well before and after the recovery event.
- Scaled base map depicting the location of the extraction wells and the surrounding wells equipped with magnehelic gauges.
- Recovered free phase petroleum and groundwater must be accepted by a permitted treatment facility. There can be no spillage or leakage in transport. A copy of the disposal manifest from the receiving facility that clearly designates the quantity received must be included as an appendix to the final report.

Terracon Consultants, Inc. can submit an invoice for direct billing from the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Please note that all applicable South Carolina certification requirements apply to the laboratory services, well installation, and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

An AFVR report and invoice are due within 60 days from the date of this letter. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Division is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Division for the cost to be paid. The SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Department grants pre-approval for transportation of virgin petroleum impacted groundwater from the referenced site to a permitted treatment facility. There can be no spillage or leakage in transport. All investigation derived waste (IDW) must be properly contained and labeled prior to disposal. IDW should not be stored on-site longer than ninety (90) days. A copy of the disposal manifest and/or acceptance letter from the receiving facility that clearly designates the quantity received must be included as an appendix to the report.

On all correspondence concerning this site, please reference **UST Permit # 07680 and CA # 36432.** If there are any questions concerning this project, please contact me at (803) 896-6676 or by email at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
UST Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc)
Technical File (w/ enc)

Approved Cost Agreement 36432

Facility: 07680 SC015

FULMERSB

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB						
		A	EQUIPMENT	1.0000	575.00	575.00
		B	PERSONNEL	1.0000	290.00	290.00
17 DISPOSAL						
		A2	WASTEWATER - PUMPING TEST	1,000.0000	0.60	600.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PCT	PERCENT	0.1500	4,745.00	711.75
23 EFR						
		A	8 HOUR EVENT	1.0000	3,000.00	3,000.00
		C	OFF GAS TREATMENT	8.0000	35.00	280.00
				Total Amount		5,456.75

REPORT OF AGGRESSIVE FLUID VAPOR RECOVERY

FORMER SC-015

3800 DEVINE STREET

COLUMBIA, SOUTH CAROLINA

UST PERMIT # 07680

Prepared for:

Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:

Terracon Consultants, Inc.
521 Clemson Road
Columbia, South Carolina 29229

June 16, 2010
Terracon Project No. 73078012

Terracon

June 16, 2010

Ms. Susan B. Fulmer
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: **Report of Aggressive Fluid Vapor Recovery**
Former SC-015
3800 Devine Street, Columbia, South Carolina
UST Permit # 07680, CA # 36432
Terracon Project No. 73078012

Dear Ms. Fulmer:

On behalf of Crown Central LLC, **Terracon Consultants, Inc.** is pleased to submit this Report of Aggressive Fluid Vapor Recovery for the Former SC-015 facility located at 3800 Devine Street in Columbia, South Carolina.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

Regan Norris
Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist

Attachment

cc: Jim Janson/Crown Central, LLC

TABLE OF CONTENTS

REPORT OF AGGRESSIVE FLUID VAPOR RECOVERY
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT # 07680

Cover Letter

TABLE OF CONTENTS ..... **i**
1.0 INTRODUCTION **1**
1.1 Site Description and History 1
2.0 AGGRESSIVE FLUID VAPOR RECOVERY **2**
3.0 CONCLUSIONS AND RECOMMENDATIONS **3**

FIGURES
1 Topographic Map
2 Site Map

APPENDICES

A AFVR Field Data Sheets
B Waste Disposal Manifest

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the monitoring well installation and ground water sampling and analysis at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement # 34014 and the Risk Based Corrective Action (RBCA) guidance document prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed on previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water was identified in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land

surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

On April 16, 2010 SCDHEC issued a directive for Aggressive Fluid Vapor Recovery (AFVR) from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

AFVR was utilized to extract free product and dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site in the area of MW-5R and MW-21. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface.

On April 29, 2009, an eight-hour AFVR event (Event # 1) was performed on monitoring wells MW-5R and MW-21. The AFVR was performed over an eight-hour period using trailer-mounted vacuum extraction rig equipped with a DEKKER oil-sealed liquid rig pump and an air-water separator unit. The two extraction wells were connected by a manfold between the pump and the wells. One-inch diameter PVC stinger tubes were set approximately six-inches into the water table, and were adjusted according to water level changes during the event to minimize water production and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. Vacuum pressures were monitored at each wellhead during the events, and were adjusted to optimize the flow to the system.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an anemometer at the system exhaust stack. The concentrations were recorded on Field Data Sheet, included Appendix A.

Differential pressures (vacuum) measurements were recorded with a magnehelic gauge at monitoring wells MW-1R, MW-7R, MW-8, and MW-15R. The zone of sustained influence extended to the farthest monitoring well MW-15R (75 feet from MW-21).

Approximately 3.3 gallons (19.60 pounds) of volatile organic compounds were removed from the subsurface and emitted to the atmosphere as vapors. Off-gas VOC concentrating averaged to a range of 3,000 to 4,000 parts per million (ppm) initially, and were sustained at this level throughout the extraction event. A total of 75 gallons of ground water were extracted from the monitoring well and disposed by a licensed disposal contractor. The waste disposal manifests for the ground water generated during the AFVR event is included in Appendix B.

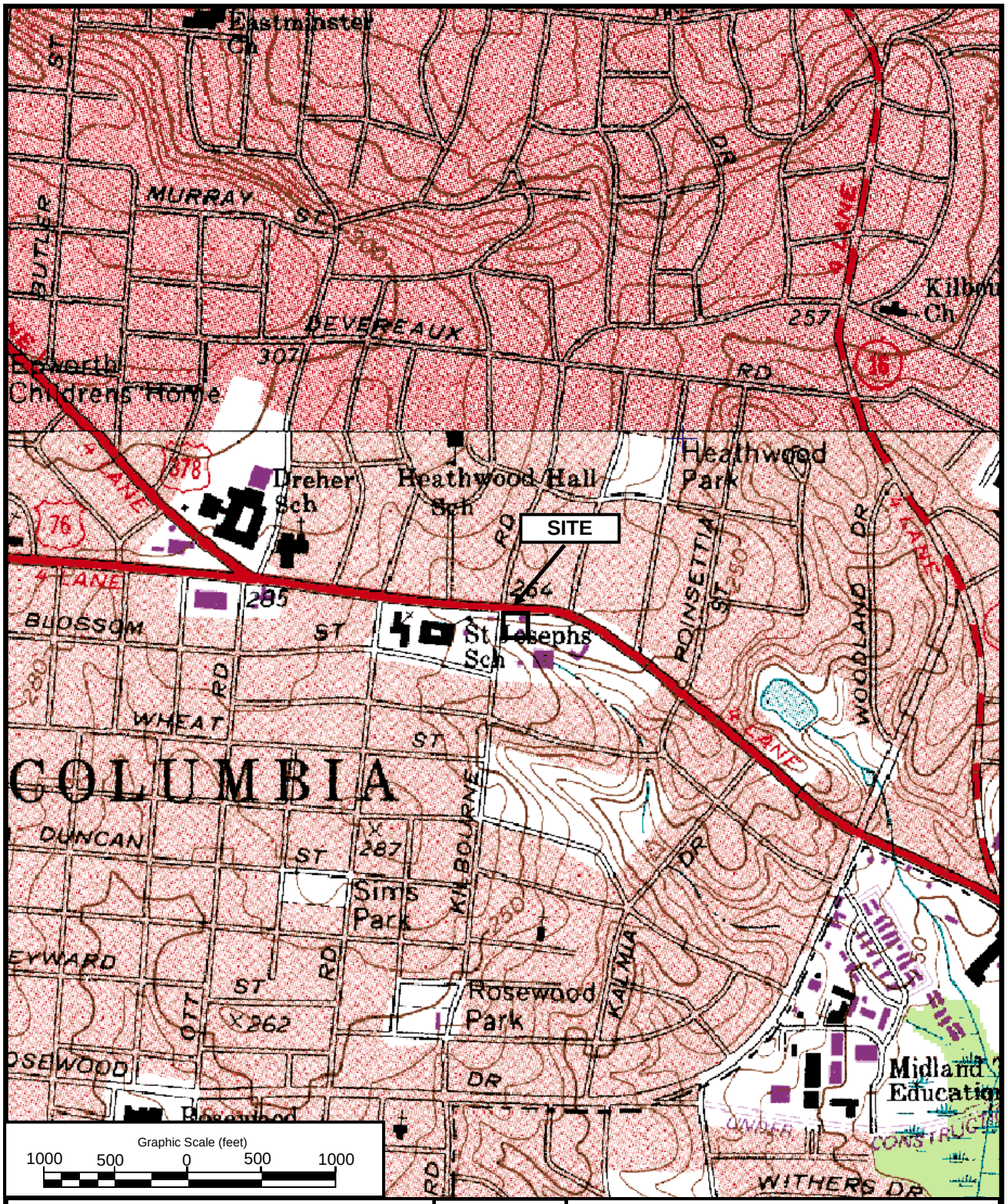
No free product was detected in monitoring wells MW-5R and MW-21 before or after the event. Water levels recorded before and after the events are included on the Field Data Sheet in Appendix A.

3.0 CONCLUSIONS AND RECOMMENDATIONS

AFVR appears to be effective at removing petroleum hydrocarbons from the soils and ground water at this site. Additional AFVR events are recommended. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

FIGURES

Figure 1 – Topographic Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

DATE: 1982
SCALE: 1 INCH = 1000 FEET

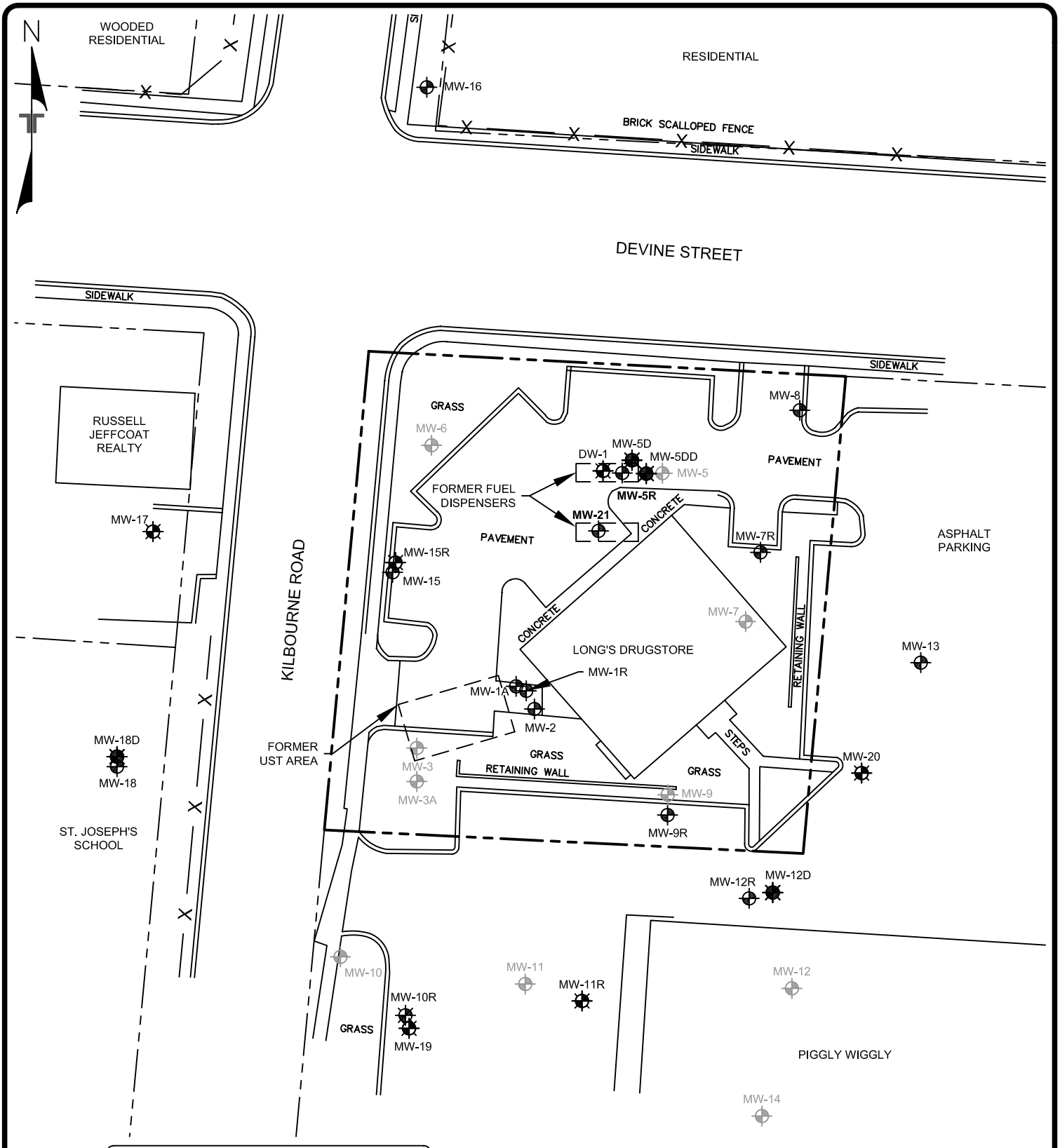
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2

APPENDIX A

AFVR Field Data Sheets

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			4/29/2010 Temp: 55˚F				Event #: 1		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	6:30	7:00	30	2,200	4,000	3,100	2,265	1,698	1,982	43.20	1.58	0.79	0.79
	7:00	7:30	30	4,000	3,600	3,800	1,698	3,345	2,522	54.97	2.46	1.23	2.02
	7:30	8:00	30	3,600	3,300	3,450	3,345	2,225	2,785	60.71	2.47	1.24	3.26
	8:00	8:30	30	3,300	4,000	3,650	2,225	2,225	2,225	48.51	2.09	1.04	4.30
	8:30	9:00	30	4,000	3,600	3,800	2,225	2,467	2,346	51.14	2.29	1.15	5.45
	9:00	9:30	30	3,600	3,600	3,600	2,467	2,353	2,410	52.54	2.23	1.12	6.57
	9:30	10:00	30	3,600	3,600	3,600	2,353	2,516	2,435	53.07	2.25	1.13	7.69
	10:00	10:30	30	3,600	3,600	3,600	2,516	2,933	2,725	59.39	2.52	1.26	8.95
	10:30	11:00	30	3,600	3,400	3,500	2,933	2,981	2,957	64.46	2.66	1.33	10.29
	11:00	11:30	30	3,400	3,400	3,400	2,981	2,927	2,954	64.40	2.58	1.29	11.58
	11:30	12:00	30	3,400	3,000	3,200	2,927	3,113	3,020	65.84	2.49	1.24	12.82
	12:00	12:30	30	3,000	3,000	3,000	3,113	3,372	3,243	70.69	2.50	1.25	14.07
	12:30	13:00	30	3,000	3,000	3,000	3,372	3,426	3,399	74.10	2.62	1.31	15.38
	13:00	13:30	30	3,000	3,000	3,000	3,426	3,519	3,473	75.70	2.68	1.34	16.72
	13:30	14:00	30	3,000	3,200	3,100	3,519	3,537	3,528	76.91	2.81	1.41	18.13
	14:00	14:30	30	3,200	3,200	3,200	3,537	3,610	3,574	77.90	2.94	1.47	19.60

Total Extraction Time..... **8.0** **hours**

Total Liquid Volume..... **75** **gallons**

Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **3.3** **gallons**

Total Hydrocarbon Recovery:..... **3.3** **gallons**

TOTAL lbs of VOC emissions = 19.60

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	14.85	--	--
MW-21	15.05	--	--

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	17.15	--	--
MW-21	18.09	--	--

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012
Event # 1 Date: 4-29-10

Well No.	MW-1A	MW-7R	MW-8	MW-15R
Distance to Nearest Pumped Well	65 ft	60 ft	70 ft	75 ft
Time				
6:30	0	0	0	0
7:00	0.05	0	0	0
7:30	0.05	0	0	0.5
8:00	0.05	0	0	0
8:30	0	0.05	0	0.05
9:00	0.05	0	0	0.05
9:30	0.05	0	0	0.05
10:00	0.05	0	0	0.05
10:30	0.05	0	0	0.05
11:00	0.05	0	0	0.05
11:30	0.05	0	0	0.05
12:00	0.05	0	0	0.05
12:30	0.05	0	0	0.05
13:00	0.05	0	0	0.05
13:30	0.05	0	0	0.05
14:00	0.05	0	0	0.05
14:30	0.05	0	0	0.05

Notes: 1. Measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.

APPENDIX B

Waste Disposal Manifest

7307-8012

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
		800-535-5053	001311

GENERATOR

5. Generator's Name and Mailing Address: Crown Petroleum LLC
P.O. Box 1168
Baltimore, MD 21203
Generator's Phone:

Generator's Site Address (if different than mailing address)
former SC-015
3800 Devine St
Columbia, SC 29205

6. Transporter 1 Company Name: DIVERSIFIED RECYCLING INC. — 877-682-0234 — U.S. EPA ID Number: SCR000766045

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address: Diversified Recycling
132 Gardners Terrace West Columbia SC
Facility's Phone: 877 682 0234 — U.S. EPA ID Number: SCR000768127

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	Non RCRA Non Regulated	01	YT	75	G	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: As Signatory Agent Regan D. Harris for Crown Petroleum LLC — Signature — Month 5 Day 19 Year 10

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Jamie Smith — Signature — Month 5 Day 19 Year 10

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month Day Year

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

MR RON ROE CEO
RUSSELL & JEFFCOAT
1022 CALHOUN ST
COLUMBIA SC 29201

MAR 30 2011

10tech
UST
DOCKET

Re: **Concern Letter**
Former SC-015, 3800 Devine St., Columbia, SC
UST Permit # 07680
Request received March 28, 2011
Richland County

Dear Mr. Roe:

In response to your request for information about environmental conditions and liability associated with the referenced facility and adjacent property, the following is provided.

Our records indicate that three Underground Storage Tanks (USTs) were registered with the UST Management Division by Crown Central, LLC. The registered tanks were removed in July 1991. An assessment report received in August 1989 documented a release of petroleum products in the vicinity of the UST system. Our records indicate that Crown Central, LLC complied with the regulatory requirements and stopped the leak from the tanks. Additionally, they pursued the extent and severity of contamination under our direction. Aggressive fluid vapor recovery (AFVR) events have been conducted to remove free phase product and reduce concentrations of chemicals of concern. Periodic groundwater sampling is conducted.

Monitoring well MW-17 was installed on the adjacent Russell & Jeffcoat property (Tax Map # R13808-11-03) as part of the assessment investigation. Samples from MW-17 were collected in May 2008 and January 2009 and analyzed for dissolved petroleum constituents such as BTEX (benzene, toluene, ethylbenzene, xylene), naphthalene, MTBE, EDB, lead, 1,2-DCA, and the oxygenates (TAME, TBA, TAA, ETBA, TBF, DIPE, ethanol, and ETBE). No petroleum chemicals of concern were detected above the South Carolina Risk-Based Screening Levels in MW-17.

This release of petroleum products from the USTs is qualified to receive funding under the conditions of the State Underground Petroleum Environmental Response Bank (SUPERB) Act. This means that reasonable costs up to $1,000,000 can be paid by the SUPERB Account for site rehabilitation actions associated with this release. Should cleanup costs exceed $1,000,000, Crown Central, LLC, under state and federal law, retains responsibility for any additional actions and associated costs.

Should the potential exist for petroleum contamination to migrate onto an adjacent property, the UST owner/operator and the UST Management Division may require access during reasonable hours to perform necessary rehabilitation activities. In such cases, all rehabilitation activities remain the responsibility of the Crown Central, LLC. You should be aware that there are currently no laws or regulations that prohibit the use or development of adjacent properties and properties where a petroleum release has occurred.

If you have any questions regarding this correspondence, please do not hesitate to contact me at (803) 896-6676 or fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
UST Management Division
Bureau of Land and Waste Management

cc: Mr. Jim Janson, Crown Central Marketing Corporation, PO Box 1168, Baltimore, MD 21203-1168
Technical File

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.

MR RON ROE CEO
RUSSELL & JEFFCOAT
1022 CALHOUN ST
COLUMBIA SC 29201

MAR 3 1 2011

UST DOCKET 11tech

Re: **Concern Letter**
Former SC-015, 3800 Devine St., Columbia, SC
UST Permit # 07680
Request received March 28, 2011
Adjacent Property Located at 3722 Devine St.
Richland County

Dear Mr. Roe:

In response to your request for information about environmental conditions and liability associated with the referenced facility and adjacent property, the following is provided.

Our records indicate that three Underground Storage Tanks (USTs) were registered with the UST Management Division by Crown Central, LLC. The registered tanks were removed in July 1991. An assessment report received in August 1989 documented a release of petroleum products in the vicinity of the UST system. Our records indicate that Crown Central, LLC complied with the regulatory requirements and stopped the leak from the tanks. Additionally, they pursued the extent and severity of contamination under our direction. Aggressive fluid vapor recovery (AFVR) events have been conducted to remove free phase product and reduce concentrations of chemicals of concern. Periodic groundwater sampling is conducted.

Monitoring well MW-17 was installed on the adjacent Russell & Jeffcoat property located at 3722 Devine Street (Tax Map # R13808-11-03) as part of the assessment investigation. Samples from MW-17 were collected in May 2008 and January 2009 and analyzed for dissolved petroleum constituents such as BTEX (benzene, toluene, ethylbenzene, xylene), naphthalene, MTBE, EDB, lead, 1,2-DCA, and the oxygenates (TAME, TBA, TAA, ETBA, TBF, DIPE, ethanol, and ETBE). No petroleum chemicals of concern were detected above the South Carolina Risk-Based Screening Levels in MW-17.

This release of petroleum products from the USTs is qualified to receive funding under the conditions of the State Underground Petroleum Environmental Response Bank (SUPERB) Act. This means that reasonable costs up to $1,000,000 can be paid by the SUPERB Account for site rehabilitation actions associated with this release. Should cleanup costs exceed $1,000,000, Crown Central, LLC, under state and federal law, retains responsibility for any additional actions and associated costs.

Should the potential exist for petroleum contamination to migrate onto an adjacent property, the UST owner/operator and the UST Management Division may require access during reasonable hours to perform necessary rehabilitation activities. In such cases, all rehabilitation activities remain the responsibility of the Crown Central, LLC. You should be aware that there are currently no laws or regulations that prohibit the use or development of adjacent properties and properties where a petroleum release has occurred.

If you have any questions regarding this correspondence, please do not hesitate to contact me at (803) 896-6676 or fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
UST Management Division
Bureau of Land and Waste Management

cc: Mr. Jim Janson, Crown Central Marketing Corporation, PO Box 1168, Baltimore, MD 21203-1168
Technical File

D H E C

PROMOTE PROTECT PROSPER

C. Earl Hunter, Commissioner

Promoting and protecting the health of the public and the environment.



DEC 14 2011

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21203-1168

Re: **AFVR Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 39330
Release Reported August 15, 1989
AFVR Report received June 21, 2010
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (SCDHEC) recognizes your commitment to continue work at this site using Terracon as your contractor. The next appropriate scope of work is to continue aggressive fluid and vapor recovery (AFVR) events to remove residual free-phase product and reduce concentrations of chemicals of concern (CoC). Please have your contractor conduct two events on MW-5R and MW-21. The events should be spaced a minimum of one-month apart to allow equilibrium conditions to reestablish, and must be conducted in accordance with the UST Quality Assurance Program Plan (QAPP). A copy of the QAPP is available at http://www.dhec.sc.gov/environment/lwm/html/ust.htm.

Cost Agreement #39330 has been approved in the amount shown on the enclosed cost agreement form for the AFVR events. AFVR activities may proceed immediately upon receipt of this letter, and must be performed by a South Carolina-Certified Underground Storage Tank Site Rehabilitation Contractor. All applicable South Carolina certification requirements apply to preparation of an AFVR report.

An AFVR report and invoice must be submitted to the Division within 90 days from the date of this letter. Your contractor may directly bill the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the SCDHEC is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Department for the cost to be paid. SCDHEC reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, SCDHEC reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Division grants pre-approval for transportation of up to 5,000 gallons of free-phase product and petroleum-contaminated groundwater from the referenced facility to a permitted treatment facility for disposal. The transport and disposal must be conducted in accordance with the QAPP.

On all correspondence concerning this facility, please reference UST Permit # 07680. If there are any questions concerning this project, feel free to contact me by telephone at (803) 896-6676, by fax at (803) 896-6245, or by e-mail at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc)
Technical File (w/ enc)

Approved Cost Agreement 39330

Facility: 07680 SC015

FULMERSB

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB						
		A	EQUIPMENT	2.0000	575.00	1,150.00
		B	PERSONNEL	2.0000	290.00	580.00
17 DISPOSAL						
		A	WASTEWATER	1,000.0000	0.80	800.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PCT	PERCENT	0.1500	9,090.00	1,363.50
23 EFR						
		A	8 HOUR EVENT	2.0000	3,000.00	6,000.00
		C	OFF GAS TREATMENT	16.0000	35.00	560.00
				Total Amount		10,453.50

Terracon

April 3, 2012



Ms. Susan Fulmer
Underground Storage Tank Program
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: **Aggressive Fluid Vapor Recovery Report**
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 39330
Terracon Project No. 730780012

Dear Ms. Fulmer:

On behalf of Crown Central LLC, **Terracon Consultants, Inc. (Terracon)** is pleased to submit this Aggressive Fluid Vapor Recovery (AFVR) report for the Former SC-015 site located in Columbia, South Carolina.

If you have any questions regarding the contents of this report, or if there is a need for further information, please contact us.

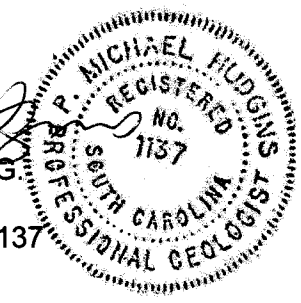
Respectfully submitted,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

for

Regan W. Norris
Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137



Enclosures

cc: Jim Janson / Crown Central LLC

TABLE OF CONTENTS

Aggressive Fluid Vapor Recovery Report
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680, CA # 39330
Terracon Project No. 73078012

SECTION PAGE NO.

Cover Letter

1.0 INTRODUCTION 1
1.1 Facility Information 1
1.2 Site History 1
2.0 AGGRESSIVE FLUID VAPOR RECOVERY 2
3.0 CONCLUSIONS AND RECOMMENDATIONS 3

FIGURES

1 Site Location Map
2 Site Map

APPENDICES

A AFVR Field Data
B Waste Disposal Manifest

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the Aggressive Fluid Vapor Recovery (AFVR) at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #39330, the Risk Based Corrective Action (RBCA) guidance document, and in accordance with the UST Quality Assurance Program Plan QAPP) prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

1.2 Site History

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed in previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, one AFVR event was performed in April 2010 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 16.6 pounds of pounds of volatile organic compounds (VOCs) were removed from the subsurface.

On December 14, 2011 SCDHEC issued a directive for two Aggressive Fluid Vapor Recovery (AFVR) from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

Aggressive Fluid Vapor Recovery (AFVR) was utilized to extract dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface. Figure 2 is a site map showing monitoring well locations.

The AFVR events were performed using trailer-mounted vacuum extraction rig equipped with a DEKKER oil-sealed liquid rig pump and an air-water separator unit. Prior to system start up the trailer mounted unit was grounded with a cooper grounding rod connected to the trailer by a metal ground cable to reduce the potential of an explosion hazard due to static electricity.

One-inch diameter PVC stinger tubes with airtight 2-inch by 1-inch well seals were set approximately six-inches into the water table, and were adjusted according to water level changes during the event to minimize water production and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. Vacuum pressures were monitored at each wellhead during the events, and were adjusted to optimize the flow to the system.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an anemometer at the system exhaust stack. The concentrations were recorded on Field Data Sheet, included Appendix A.

On February 15, 2012, Event #2 was performed on monitoring wells MW-5R and MW-21. No free product was not detected in either monitoring well prior to or after the AFVR event. The velocity and VOC concentration of off-gas from the vacuum rig were measured using an anemometer and a TLV Sniffer with a 10X dilution probe. Approximately 32 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

On March 14, 2012, Event #3 was performed on monitoring wells MW-5R and MW-21. No free product was detected in either monitoring well prior to or after the AFVR event. Approximately 153 pounds of VOCs were removed from the subsurface which is noticeably higher than the first two events. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 63 feet to monitoring well MW-1R. Vacuum measurements indicated a smaller radius of influence compared to the radius of influence produced by AFVR Event #2.

Approximately 55 gallons of groundwater were extracted during Event #2, and 25 gallons of groundwater were extracted during Event #3. Petroleum-impacted groundwater generated during the AFVR events was disposed by Advanced Environmental Options, Spartanburg, South Carolina. The disposal manifests for the extracted ground water generated are included in Appendix B.

3.0 CONCLUSIONS AND RECOMMENDATIONS

AFVR appears to be effective at removing petroleum hydrocarbons from the soils and ground water at this site. Over the past three events the vacuum extraction has mobilized high dissolved phase hydrocarbons from the surrounding area toward the two extraction wells. This may be the cause of increased off gas concentrations observed for Event #3.

Additional AFVR events are recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No.

2. Page 1 of

3. Generator's Name and Mailing Address

4. Generator's Phone ( )

5. Transporter 1 Company Name: Advanced Environmental Systems, Inc

6. US EPA ID Number

A. State Transporter's ID

B. Transporter 1 Phone: (864) 486-9111

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address:
Advanced Environmental Systems,
23 Stan Perkins Road
Easonsburg, SC 29617

10. US EPA ID Number: SCR000074578

E. State Facility's ID

F. Facility's Phone: (864) 486-9111

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-DOT/NON-RCRA Regulated Materials (Contains Hydrocarbons & Water)	1		00055	G
b.	0			
c.	0			
d.	0			

G. Additional Descriptions for Materials Listed Above

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
JOB #8578
Emergency Contact: David Mitchens 864-486-9111, Cell 864-590-4643

GENERATOR

16. **GENERATOR'S CERTIFICATION:** I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Neil AKRE — Signature — Date: Month 2 Day 17 Year 12

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month 2 Day 17 Year 12

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Kim Garrett — Signature — Date: Month 2 Day 17 Year 12

NON-HAZARDOUS WASTE

PRINTED ON RECYCLED PAPER USING SOYBEAN INK PRINTED WITH SOY INK

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.

Manifest Document No. 0 3 4 7 2

2. Page 1 of 1

3. Generator's Name and Mailing Address
SC-015 3850 Devine St.
Columbia, SC

4. Generator's Phone ( )

5. Transporter 1 Company Name
Advanced Environmental Options, Inc

6. US EPA ID Number
S C R 0 0 0 0 7 4 5 7 5

A. State Transporter's ID

B. Transporter 1 Phone (864) 488-9111

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Advanced Environmental Options,
25 Stan Perkins Road
Spartanburg, SC 29307

10. US EPA ID Number
S C R 0 0 0 0 7 4 5 7 5

E. State Facility's ID

F. Facility's Phone (864) 488-9111

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
Non-DOT/NON-RCRA Regulated Materials (Contains Water and Hydrocarbons)	1	T T	25 gallon	G
b.	0			
c.	0			
d.	0			

G. Additional Descriptions for Materials Listed Above
a) L/-

H. Handling Codes for Wastes Listed Above
S. 10

15. Special Handling Instructions and Additional Information
JOB#8695
Emergency Contact: David Hitchens 864-488-9111, Cell 864-590-4648

GENERATOR

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date (Month Day Year)
Neil Akre		3 16 12

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)
Chris Ricklighter		3 16 12

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.

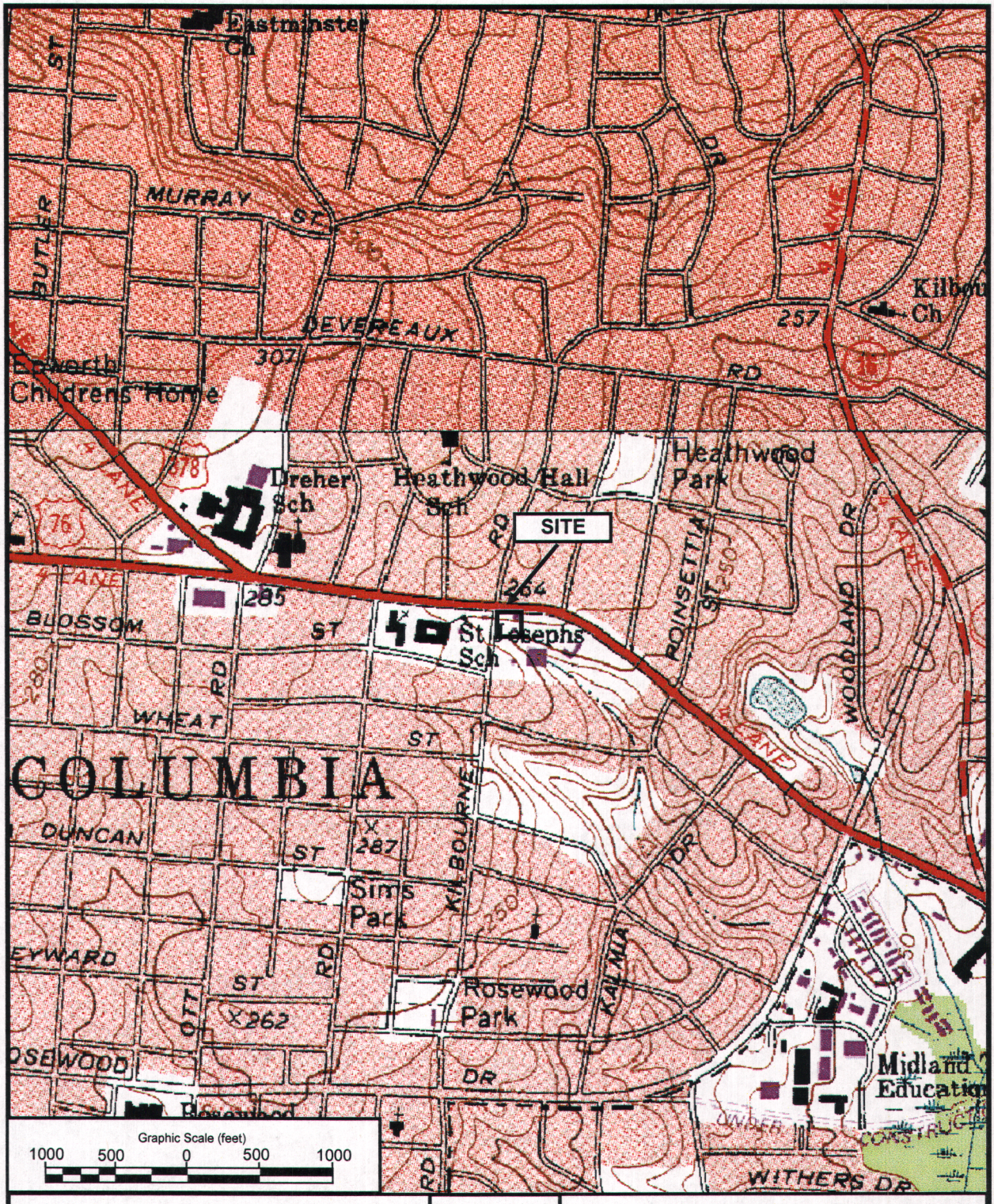
Printed/Typed Name	Signature	Date (Month Day Year)
Kim Garrett		3 16 12

NON-HAZARDOUS WASTE

CF14 © 2002 LABELMASTER® (800) 621-5808 www.labelmaster.com
PRINTED ON RECYCLED PAPER USING SOYBEAN INK
PRINTED WITH SOY INK

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

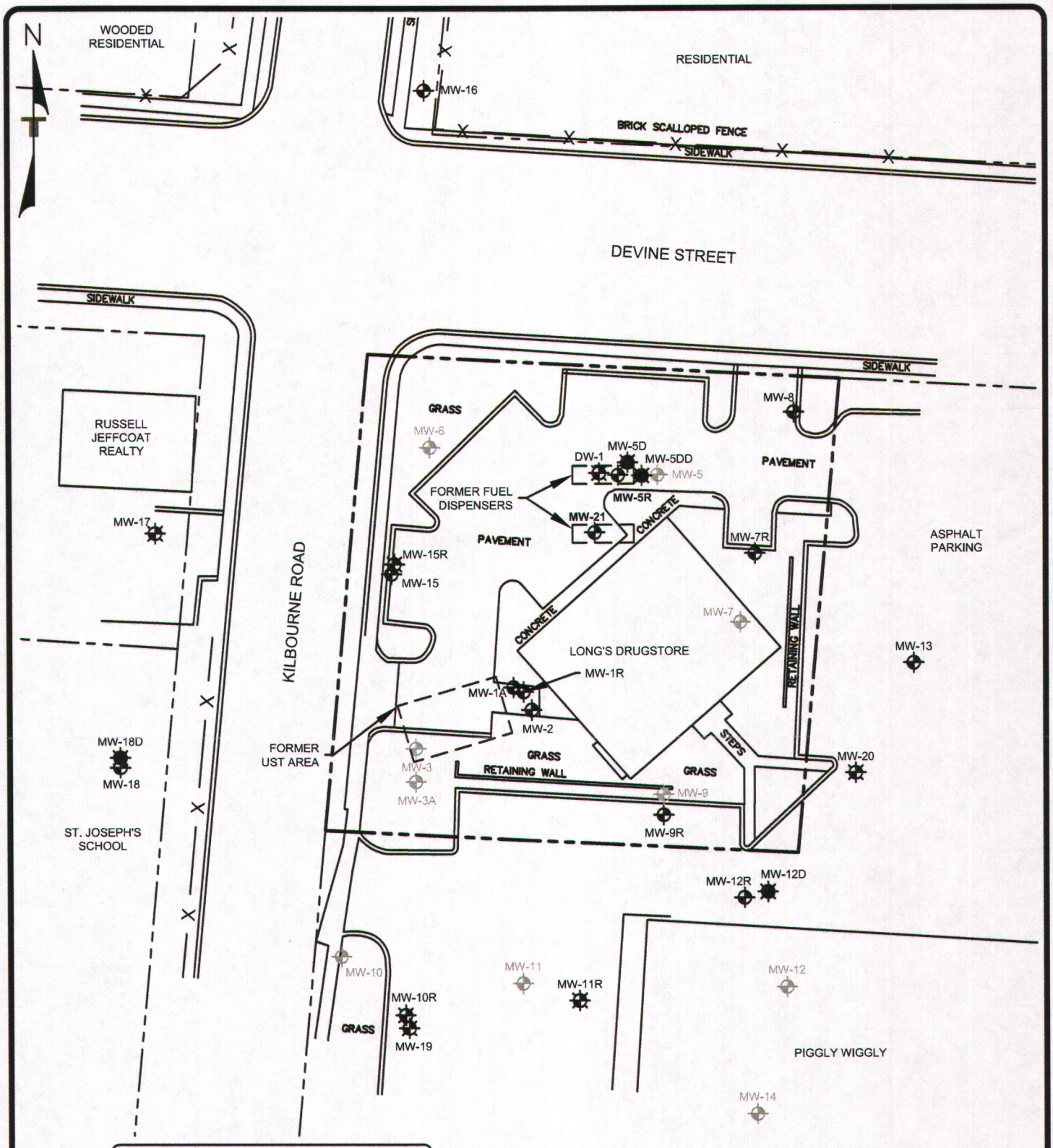
DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2

APPENDIX A

AFVR Field Data

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			2/15/2012 Temp: 53				Event #: 2		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	6:30	7:00	30	3,600	5,000	4,300	2,202	2,155	2,179	47.49	2.41	1.20	1.20
	7:00	7:30	30	5,000	5,202	5,101	2,155	2,181	2,168	47.26	2.84	1.42	2.63
	7:30	8:00	30	5,202	5,800	5,501	2,181	2,177	2,179	47.50	3.08	1.54	4.17
	8:00	8:30	30	5,800	5,800	5,800	2,177	2,633	2,405	52.43	3.59	1.79	5.96
	8:30	9:00	30	5,800	6,000	5,900	2,633	2,878	2,756	60.07	4.18	2.09	8.05
	9:00	9:30	30	6,000	6,000	6,000	2,878	3,174	3,026	65.97	4.67	2.34	10.39
	9:30	10:00	30	6,000	6,000	6,000	3,174	3,218	3,196	69.67	4.93	2.47	12.86
	10:00	10:30	30	6,000	6,000	6,000	3,218	3,046	3,132	68.28	4.83	2.42	15.27
	10:30	11:00	30	6,000	5,800	5,900	3,046	2,519	2,783	60.66	4.22	2.11	17.38
	11:00	11:30	30	5,800	6,000	5,900	2,519	2,259	2,389	52.08	3.63	1.81	19.20
	11:30	12:00	30	6,000	6,000	6,000	2,259	3,137	2,698	58.82	4.16	2.08	21.28
	12:00	12:30	30	6,000	5,800	5,900	3,137	2,647	2,892	63.05	4.39	2.19	23.47
	12:30	13:00	30	5,800	6,200	6,000	2,647	2,811	2,729	59.49	4.21	2.11	25.58
	13:00	13:30	30	6,200	6,000	6,100	2,811	2,863	2,837	61.85	4.45	2.23	27.81
	13:30	14:00	30	6,000	6,200	6,100	2,863	2,566	2,715	59.18	4.26	2.13	29.94
	14:00	14:30	30	6,200	6,200	6,200	2,566	2,612	2,589	56.44	4.13	2.06	32.00

Total Extraction Time..... **8.0** **hours**
Total Liquid Volume..... **55** **gallons**
Total Liquid-phase Hydrocarbon..... **gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **5.4** **gallons**
Total Hydrocarbon Recovery:..... **5.4** **gallons**

TOTAL lbs of VOC emissions = 32.00

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.97	--	--
MW-21	15.95	--	--

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.7	--	--
MW-21	16.43	--	--

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 2 Date: 2-15-12

	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
Time	Vacuum (Inches of Mercury Hg)			Vacuum (inches of water)				
6:30	16	8	11	0	0	0.5	0	0
7:00	14	8	10.5	0.10	0	0.5	0	0
7:30	14	8	10.5	0.10	0	0.5	0	0
8:00	15	7.5	10	0.15	0	0.5	0	0
8:30	15	7	10	0.5	0	0.5	0.5	0
9:00	15	7	10	0.5	0	0.5	0.5	0
9:30	15	7	10	0.5	0	0.5	0	0
10:00	15	7	10	0.5	0	0.5	0	0
10:30	15	7	10	0.5	0	0.5	0	0
11:00	15	7	10	0.5	0	0.5	0	0
11:30	15	7	10	0.5	0	0.5	0	0
12:00	15	7	10	0.5	0	0.5	0	0
12:30	15	7	10	0.5	0	0.5	0	0
13:00	15	7	10	0.5	0	0.5	0	0
13:30	15	7	10	0.5	0	0.5	0	0
14:00	15	7	10	0.5	0	0.5	0	0
14:30	15	7	10	0.5	0	0.5	0	0

Notes: 1. Radius of influence measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.
3. Stinger Head Vacuum Measurements recorded in inches of mercury

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			3/14/2012 Temp: 52				Event #: 3		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	5:00	5:30	30	22,000	20,000	21,000	2,341	2,566	2,454	53.49	13.25	6.63	6.63
	5:30	6:00	30	20,000	22,000	21,000	2,566	2,579	2,573	56.08	13.90	6.95	13.58
	6:00	6:30	30	22,000	24,000	23,000	2,579	2,663	2,621	57.14	15.51	7.75	21.33
	6:30	7:00	30	24,000	24,000	24,000	2,663	2,726	2,695	58.74	16.64	8.32	29.65
	7:00	7:30	30	24,000	24,000	24,000	2,726	2,801	2,764	60.24	17.06	8.53	38.18
	7:30	8:00	30	24,000	26,000	25,000	2,801	2,720	2,761	60.18	17.75	8.88	47.05
	8:00	8:30	30	26,000	26,000	26,000	2,720	2,886	2,803	61.11	18.75	9.37	56.43
	8:30	9:00	30	26,000	26,000	26,000	2,886	2,945	2,916	63.56	19.50	9.75	66.18
	9:00	9:30	30	26,000	30,000	28,000	2,945	2,901	2,923	63.72	21.05	10.53	76.70
	9:30	10:00	30	30,000	28,000	29,000	2,901	3,014	2,958	64.47	22.06	11.03	87.74
	10:00	10:30	30	28,000	26,000	27,000	3,014	3,209	3,112	67.83	21.61	10.81	98.54
	10:30	11:00	30	26,000	26,000	26,000	3,209	3,212	3,211	69.99	21.47	10.74	109.28
	11:00	11:30	30	26,000	26,000	26,000	3,212	3,307	3,260	71.06	21.80	10.90	120.18
	11:30	12:00	30	26,000	26,000	26,000	3,307	3,339	3,323	72.44	22.23	11.11	131.29
	12:00	12:30	30	26,000	26,000	26,000	3,339	3,276	3,308	72.10	22.12	11.06	142.35
	12:30	13:00	30	26,000	26,000	26,000	3,276	3,291	3,284	71.58	21.96	10.98	153.33

Total Extraction Time..... **8.0** **hours**
Total Liquid Volume..... **25** **gallons**
Total Liquid-phase Hydrocarbon..... **gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **26.0** **gallons**
Total Hydrocarbon Recovery:..... **26.0** **gallons**

TOTAL lbs of VOC emissions = 153.33

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.99	--	--
MW-21	15.92	--	--

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	18.67	--	--
MW-21	19.51	--	--

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 3 Date: 3-14-12

	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
Time	Vacuum (Inches of Mercury Hg)			Vacuum (inches of water)				
5:00	9	15	10	0	0	0.5	0	0
5:30	9	15	10.0	0	0	0.5	0	0
6:00	9	15	10.0	0	0	0.5	0	0
6:30	9	15.0	10	0.05	0	0.5	0	0
7:00	9	15	10	0.15	0	0.1	0	0
7:30	9	15	10	0.15	0	0.15	0	0
8:00	9	15	10	0.05	0	0.15	0	0
8:30	8	14	10	0.05	0	0.2	0	0
9:00	8	14	10	0.05	0	0.2	0	0
9:30	8	14	10	0.05	0	0.15	0	0
10:00	8	16	10	0.05	0	0.15	0	0
10:30	8	14	10	0.05	0	0.2	0	0
11:00	8	14	10	0.05	0	0.2	0	0
11:30	8	14	10	0.05	0	0.2	0	0
12:00	8	14	10	0.05	0	0.2	0	0
12:30	8	14	10	0.05	0	0.2	0	0
13:00	8	14	10	0.05	0	0.2	0	0

Notes: 1. Radius of influence measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.
3. Stinger Head Vacuum Measurements recorded in inches of mercury

APPENDIX B

Waste Disposal Manifes

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No. [illegible]

Manifest Document No. [illegible]

2. Page 1 of 1

3. Generator's Name and Mailing Address
Crown Central Petroleum
4900 Dutura Street
Columbia SC 29203
4. Generator's Phone (803) 518-8828

5. Transporter 1 Company Name
Advanced Environmental Options, Inc

6. US EPA ID Number
S C R 0 0 0 3 7 4 3 7 5

A. State Transporter's ID

B. Transporter 1 Phone (864)486-9111

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Advanced Environmental Options,
25 Bram Peckins Road
Spartanburg, SC 29307

10. US EPA ID Number
S C R 0 0 0 6 2 4 5 7 8

E. State Facility's ID

F. Facility's Phone (864)488-9111

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-DOT/NON-RCRA Regulated Materials (Contains Hydrocarbons & Water)	1		00055	G
b.	0			
c.	0			
d.	0			

G. Additional Descriptions for Materials Listed Above
a) D/-

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
JOB #8576
Emergency Contact: David Ritchens 864-488-9111, Cell 864-590-4648

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Neil Akre — Signature — Date: Month 2 Day 17 Year 12

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month 2 Day 17 Year 12

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month Day Year

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Kim Garrett — Signature — Date: Month 2 Day 17 Year 12

NON-HAZARDOUS WASTE — GENERATOR — TRANSPORTER — FACILITY

PRINTED ON RECYCLED PAPER USING SOYBEAN INK — PRINTED WITH SOY INK

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

GENERATOR

NON-HAZARDOUS WASTE MANIFEST	1. Generator's US EPA ID No.	Manifest Document No. 03472	2. Page 1 of 1

3. Generator's Name and Mailing Address: SC-615 3860 Devine St. Columbia, SC

4. Generator's Phone ( )

5. Transporter 1 Company Name	6. US EPA ID Number	A. State Transporter's ID
Advanced Environmental Options, Inc	SCR000074575	B. Transporter 1 Phone (864) 488-9111
7. Transporter 2 Company Name	8. US EPA ID Number	C. State Transporter's ID
		D. Transporter 2 Phone
9. Designated Facility Name and Site Address	10. US EPA ID Number	E. State Facility's ID
Advanced Environmental Options, 25 Stan Perkins Road Spartanburg, SC 29307	SCR000074575	F. Facility's Phone (864) 488-9111

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
Non-DOT/NON-RCRA Regulated Materials (Contains Water and Hydrocarbons)	1	TT	25 gallon	G
b.	0			
c.	0			
d.	0			

G. Additional Descriptions for Materials Listed Above: a) L/--

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
JOB#8695
Emergency Contact: David Hitchens 864-488-9111, Cell 864-590-4648

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name	Signature	Date (Month Day Year)
Neil Akre		3 16 12

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials		
Printed/Typed Name: Chris Ricklighter	Signature	Date (Month Day Year): 3 16 12
18. Transporter 2 Acknowledgement of Receipt of Materials		
Printed/Typed Name	Signature	Date (Month Day Year)

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in Item 19.

Printed/Typed Name	Signature	Date (Month Day Year)
Kim Garrett		3 16 12

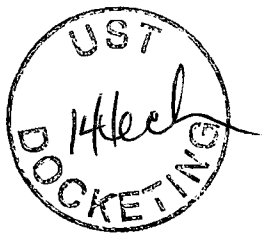
CF14 © 2002 LABELMASTER® (800) 621-5808 www.labelmaster.com

D H E C

PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment



JUN 1 3 2012

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21203-1168

Re: **AFVR Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 43818
Release Reported August 15, 1989
AFVR Report received April 5, 2012
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) recognizes your commitment to continue work at this site using Terracon as your contractor. The next appropriate scope of work is to continue aggressive fluid and vapor recovery (AFVR) events to remove residual free-phase product and reduce concentrations of chemicals of concern (CoC). Please have your contractor conduct two events on MW-5R and MW-21. The events should be spaced a minimum of one-month apart to allow equilibrium conditions to reestablish, and must be conducted in accordance with the UST Quality Assurance Program Plan (QAPP). A copy of the QAPP is available at http://www.dhec.sc.gov/environment/lwm/html/ust.htm.

Cost Agreement #43818 has been approved in the amount shown on the enclosed cost agreement form for the AFVR events. AFVR activities may proceed immediately upon receipt of this letter, and must be performed by a South Carolina-Certified Underground Storage Tank Site Rehabilitation Contractor. All applicable South Carolina certification requirements apply to preparation of an AFVR report.

An AFVR report and invoice must be submitted to the Division within 90 days from the date of this letter. Your contractor may directly bill the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Agency is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Agency grants pre-approval for transportation of up to 5,000 gallons of free-phase product and petroleum-contaminated groundwater from the referenced facility to a permitted treatment facility for disposal. The transport and disposal must be conducted in accordance with the QAPP.

On all correspondence concerning this facility, please reference UST Permit # 07680. If there are any questions concerning this project, feel free to contact me by telephone at (803) 896-6676, by fax at (803) 896-6245, or by e-mail at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc)
Technical File (w/ enc)

Approved Cost Agreement 43818

Facility: 07680 SC015

FULMERSB

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB						
		A	EQUIPMENT	2.0000	575.00	1,150.00
		B	PERSONNEL	2.0000	290.00	580.00
17 DISPOSAL						
		A	WASTEWATER	1,000.0000	0.80	800.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PCT	PERCENT	0.1500	9,090.00	1,363.50
23 EFR						
		A	8 HOUR EVENT	2.0000	3,000.00	6,000.00
		C	OFF GAS TREATMENT	16.0000	35.00	560.00
				Total Amount		10,453.50

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health
and Environmental Control

BUREAU OF
BUSINESS MANAGEMENT
DIVISION OF PROCUREMENT SERVICES
2600 Bull Street
Columbia, SC 29201-1708
Telephone (803) 898-3501 Fax (803) 898-3505

Statement of Award

Posting Date: June 7, 2012

Solicitation Number: IFB-5400004355-5/31/12-EMW
Description: UST Corrective Action, Site #00411 – Honea Path, South Carolina
Agency: South Carolina Department of Health and Environmental Control

The State awards contract(s) noted below. This document becomes the final Statement of Award, effective 5:00 pm June 8, 2012. Unless otherwise provided in the solicitation, the final statement of award serves as acceptance of your offer.

Contractor should not perform work on or incur any costs associated with the contract prior to the effective date of the contract. Contractor should not perform any work prior to the receipt of a purchase order from the South Carolina Department of Health and Environmental Control (DHEC). The State assumes no liability for any expenses incurred prior to the effective date of the contract and issuance of a purchase order.

Awarded To:

Emerald, Inc.
2520 Tahoe Drive
Sumter, SC 29150

Contract period: From June 7, 2012 to June 6, 2017 or until completion of work

Total Potential Value: $128,259.00

Item Description	Total
UST Corrective Action at Site 00411	**$128,259.00**

This award is being released pursuant to South Carolina's statutes and regulations as outlined in Title 44, Chapter 2 of the 1976 SC Code of Laws as amended. The South Carolina Department of Health and Environmental Control (DHEC) oversees and manages the state's Underground Storage Tank (UST) Management Division in accordance with State Regulation 61-92, Part 280. The South Carolina State Budget and Control Board granted an exemption for the UST Management Division from the South Carolina Consolidated Procurement Code on October 24, 1995, and amended on March 4, 1996 and March 15, 2007.

E. Madison Winslow, CPPB
Procurement Officer

LETTER OF TRANSMITTAL

Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

UST
OCT 0 4 2012
PROGRAM

TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 10/3/12 | JOB NO. 73078012

RE: Former SC-015, Columbia
UST Permit No. 07680

AFVR Report

UST
DOCKETING

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	10/2/12	AFVR Report

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS: **Susan,**

Enclosed is the Report of AFVR for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

Aggressive Fluid Vapor Recovery (AFVR) Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680

October 2, 2012
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide Established in 1965
Employee-Owned terracon.com

Terracon

Geotechnical ● Environmental ● Construction Materials ● Facilities

Terracon

October 2, 2012

Ms. Susan Fulmer
Underground Storage Tank Program
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: **Aggressive Fluid Vapor Recovery Report**
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 39330
Terracon Project No. 730780012

Dear Ms. Fulmer:

On behalf of Crown Central LLC, **Terracon Consultants, Inc. (Terracon)** is pleased to submit this Aggressive Fluid Vapor Recovery (AFVR) report for the Former SC-015 site located in Columbia, South Carolina.

If you have any questions regarding the contents of this report, or if there is a need for further information, please contact us.

Respectfully submitted,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

Regan W. Norris
Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

P. MICHAEL HUDGINS REGISTERED NO. 1137 SOUTH CAROLINA PROFESSIONAL GEOLOGIST

Enclosures

cc: Jim Janson / Crown Central LLC

TABLE OF CONTENTS

Aggressive Fluid Vapor Recovery Report
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680, CA # 39330
Terracon Project No. 73078012

SECTION PAGE NO.

Cover Letter

1.0 INTRODUCTION 1
1.1 Facility Information 1
1.2 Site History 1
2.0 AGGRESSIVE FLUID VAPOR RECOVERY 2
3.0 CONCLUSIONS AND RECOMMENDATIONS 3

FIGURES

1 Site Location Map
2 Site Map

APPENDICES

A AFVR Field Data
B Waste Disposal Manifest

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the Aggressive Fluid Vapor Recovery (AFVR) at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #39330, the Risk Based Corrective Action (RBCA) guidance document, and in accordance with the UST Quality Assurance Program Plan QAPP) prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

1.2 Site History

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed in previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total ot three AFVR events were was performed in April 2010 and February - March 2012 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 201 pounds of pounds of volatile organic compounds (VOCs) were removed from the subsurface.

In June 2012, SCDHEC issued a directive for two Aggressive Fluid Vapor Recovery (AFVR) from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

Aggressive Fluid Vapor Recovery (AFVR) was utilized to extract dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface. Figure 2 is a site map showing monitoring well locations.

The AFVR events were performed using trailer-mounted vacuum extraction rig equipped with a DEKKER oil-sealed liquid rig pump and an air-water separator unit. Prior to system start up the trailer mounted unit was grounded with a cooper grounding rod connected to the trailer by a metal ground cable to reduce the potential of an explosion hazard due to static electricity.

One-inch diameter PVC stinger tubes with airtight 2-inch by 1-inch well seals were set approximately six-inches into the water table, and were adjusted according to water level changes during the event to minimize water production and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. Vacuum pressures were monitored at each wellhead during the events, and were adjusted to optimize the flow to the system.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an anemometer at the system exhaust stack. The concentrations were recorded on Field Data Sheet, included Appendix A.

On July 11, 2012, Event #4 was performed on monitoring wells MW-5R and MW-21. No free product was not detected in either monitoring well prior to or after the AFVR event. The velocity and VOC concentration of off-gas from the vacuum rig were measured using an anemometer and a TLV Sniffer with a 10X dilution probe. Approximately 49 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

On August 30, 2012, Event #5 was performed on monitoring wells MW-5R and MW-21. No free product was detected in either monitoring well prior to or after the AFVR event. Approximately 50 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 63 feet to monitoring well MW-1R.

Approximately 50 gallons of groundwater were extracted during each event. Petroleum-impacted groundwater generated during the AFVR events was disposed by Advanced Environmental Options, Spartanburg, South Carolina. The ground water extracted during Event #4 was combined with water generated from a SUPERB site and disposed appropriately. The disposal manifest for the extracted ground water generated from Event # 5 is included in Appendix B.

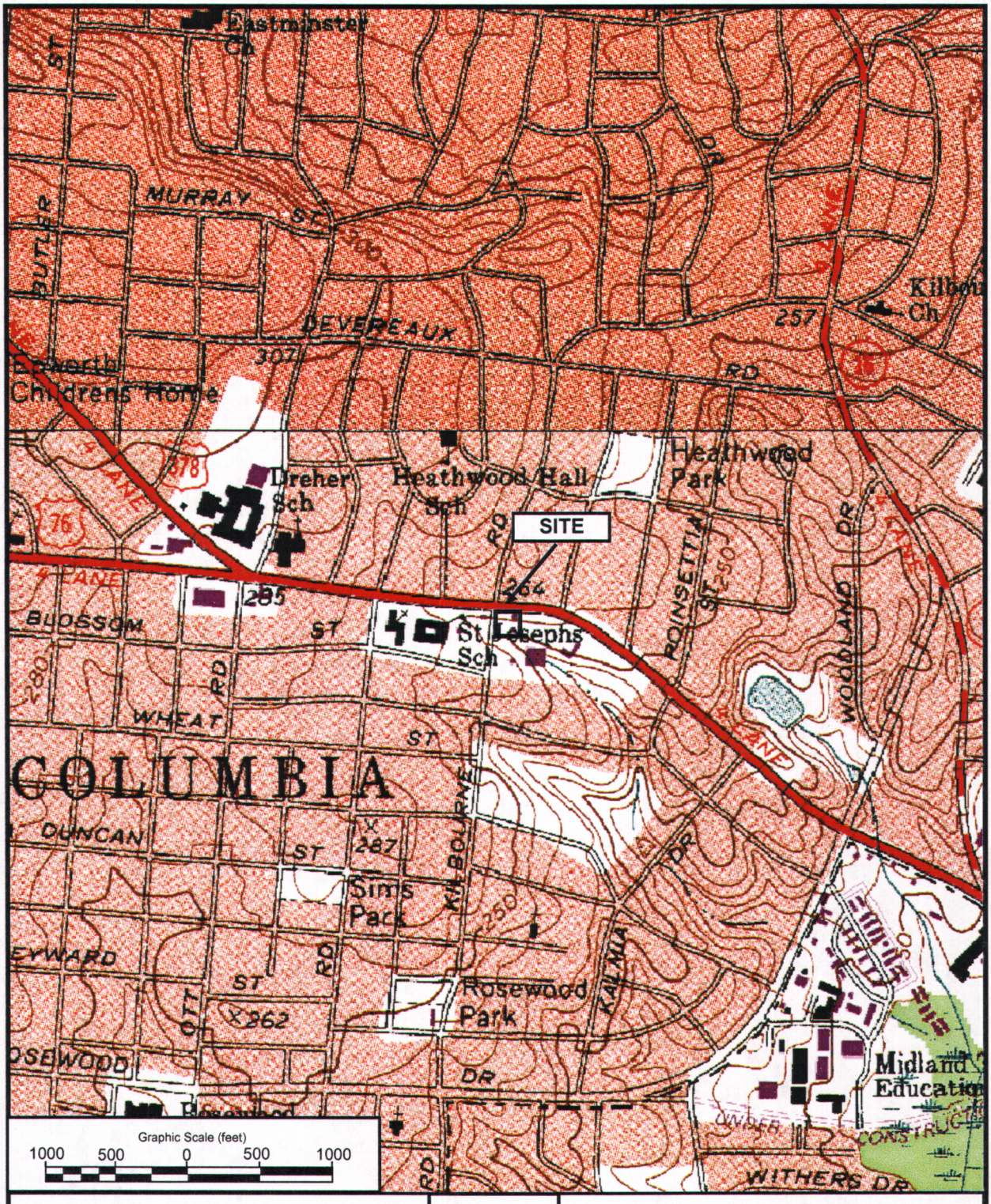
3.0 CONCLUSIONS AND RECOMMENDATIONS

AFVR appears to be effective at removing petroleum hydrocarbons from the soils and ground water at this site. Over the past three events the vacuum extraction has mobilized high dissolved phase hydrocarbons from the surrounding area toward the two extraction wells. This may be the cause of increased off gas concentrations observed for Event #3.

Additional AFVR events are recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

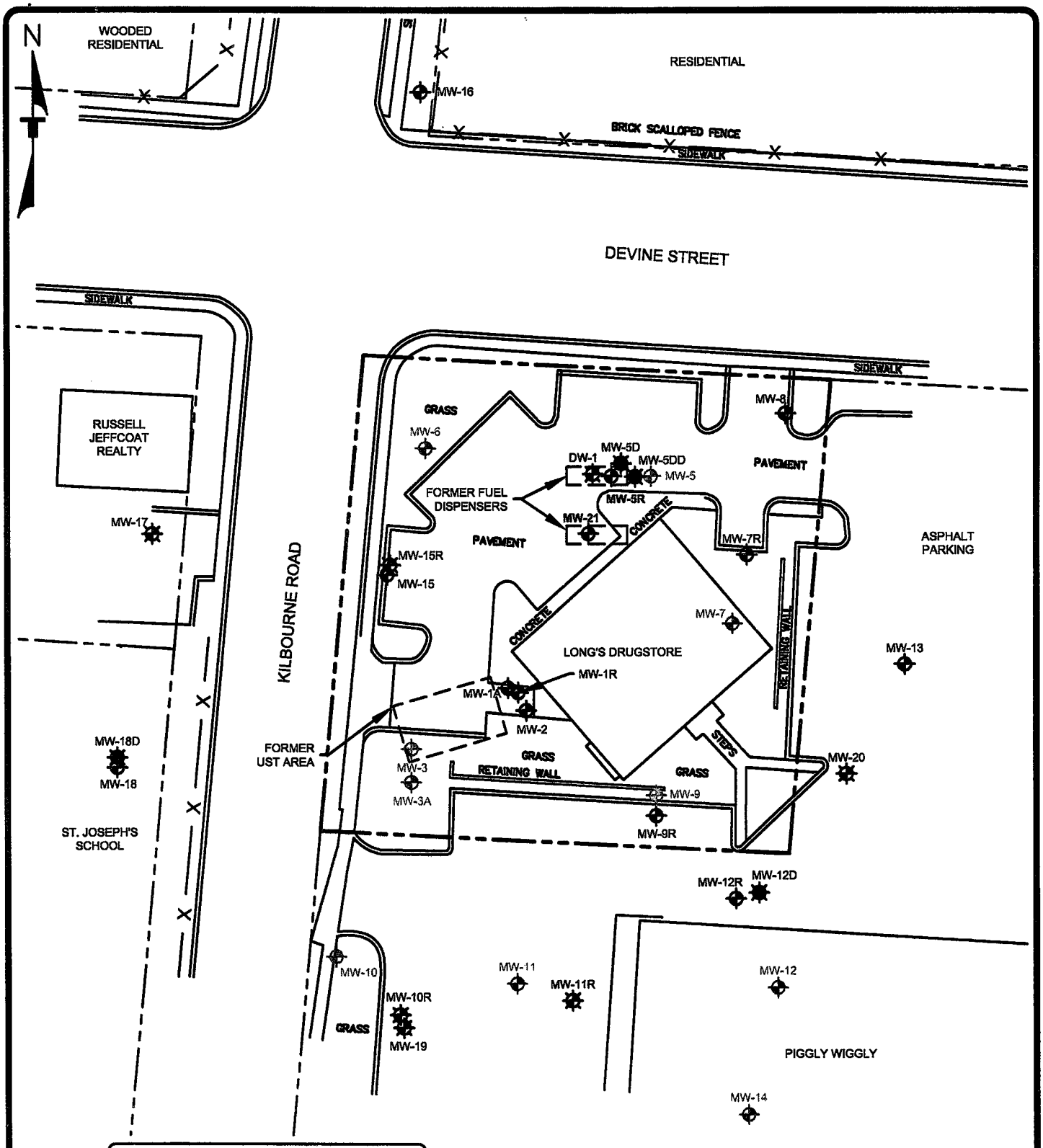
DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH		Scale:	1 IN = 50 FT
Checked By: PMH	521 Clemson Road	Date:	4-23-09
Approved By: PMH	Columbia, South Carolina 29229	Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	2

APPENDIX A

AFVR Field Data

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			7/11/2012 Temp: 90				Event #: 4		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	7:00	7:30	30	2,000	3,600	2,800	2,679	2,622	2,651	57.78	1.91	0.95	0.95
	7:30	8:00	30	3,600	5,200	4,400	2,622	2,925	2,774	60.46	3.14	1.57	2.52
	8:00	8:30	30	5,200	5,400	5,300	2,925	2,643	2,784	60.69	3.80	1.90	4.42
	8:30	9:00	30	5,400	5,800	5,600	2,643	2,991	2,817	61.41	4.06	2.03	6.45
	9:00	9:30	30	5,800	6,200	6,000	2,991	3,257	3,124	68.10	4.82	2.41	8.86
	9:30	10:00	30	6,200	6,200	6,200	3,257	3,825	3,541	77.19	5.65	2.82	11.69
	10:00	10:30	30	6,200	6,400	6,300	3,825	3,814	3,820	83.27	6.19	3.09	14.78
	10:30	11:00	30	6,400	6,400	6,400	3,814	4,065	3,940	85.88	6.49	3.24	18.02
	11:00	11:30	30	6,400	6,400	6,400	4,065	4,584	4,325	94.27	7.12	3.56	21.58
	11:30	12:00	30	6,400	6,400	6,400	4,584	4,536	4,560	99.41	7.51	3.75	25.34
	12:00	12:30	30	6,400	6,400	6,400	4,536	4,519	4,528	98.70	7.45	3.73	29.06
	12:30	13:00	30	6,400	6,600	6,500	4,519	4,756	4,638	101.10	7.75	3.88	32.94
	13:00	13:30	30	6,600	6,600	6,600	4,756	4,800	4,778	104.16	8.11	4.06	37.00
	13:30	14:00	30	6,600	6,400	6,500	4,800	4,951	4,876	106.29	8.15	4.08	41.07
	14:00	14:30	30	6,400	6,400	6,400	4,951	4,850	4,901	106.83	8.07	4.03	45.11
	14:30	15:00	30	6,400	6,400	6,400	4,850	4,716	4,783	104.27	7.87	3.94	49.04

Total Extraction Time..... **8.0** **hours**
Total Liquid Volume..... **50** **gallons**
Total Liquid-phase Hydrocarbon..... **gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **8.3** **gallons**
Total Hydrocarbon Recovery:..... **8.3** **gallons**

TOTAL lbs of VOC emissions = 49.04

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.89	--	--
MW-21	15.97	--	--

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.62	--	--
MW-21	16.39	--	--

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 4 Date: 7-11-12

Time	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
7:00	204	102	150	0.05	0	0.05	0	0
7:30	211	109	143	0.1	0	0.05	0	0
8:00	218	116	136	0.1	0	0.1	0	0
8:30	204	109	1482	0.15	0	0.15	0.05	0
9:00	204	109	122	0.1	0	0.2	0.1	0
9:30	204	109	122	0.1	0	0.2	0.2	0
10:00	204	109	122	0.1	0	0.2	0.2	0
10:30	204	116	122	0.1	0	0.2	0.25	0
11:00	204	109	122	0.1	0	0.2	0.25	0
11:30	204	109	122	0.1	0	0.2	0.25	0
12:00	204	109	122	0.1	0	0.2	0.25	0
12:30	204	109	122	0.1	0	0.2	0.2	0
13:00	204	109	116	0.1	0	0.2	0.2	0
13:30	204	109	116	0.1	0	0.2	0.2	0
14:00	204	109	116	0.1	0	0.2	0.2	0
14:30	204	109	116	0.1	0	0.2	0.2	0
15:00	204	109	116	0.1	0	0.2	0.2	0

Notes: 1. Radius of influence measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			8/30/2012 Temp: 76				Event #: 5		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	5:00	5:30	30	4,400	5,000	4,700	3,016	3,421	3,219	70.16	3.89	1.95	1.95
	5:30	6:00	30	5,000	5,200	5,100	3,421	3,655	3,538	77.13	4.64	2.32	4.27
	6:00	6:30	30	5,200	5,200	5,200	3,655	3,740	3,698	80.61	4.95	2.47	6.74
	6:30	7:00	30	5,200	5,400	5,300	3,740	3,960	3,850	83.93	5.25	2.62	9.36
	7:00	7:30	30	5,400	5,200	5,300	3,960	4,156	4,058	88.46	5.53	2.77	12.13
	7:30	8:00	30	5,200	5,600	5,400	4,156	4,201	4,179	91.09	5.80	2.90	15.03
	8:00	8:30	30	5,600	5,600	5,600	4,201	4,381	4,291	93.54	6.18	3.09	18.12
	8:30	9:00	30	5,600	5,400	5,500	4,381	4,830	4,606	100.40	6.52	3.26	21.38
	9:00	9:30	30	5,400	5,600	5,500	4,830	4,752	4,791	104.44	6.78	3.39	24.77
	9:30	10:00	30	5,600	5,600	5,600	4,752	4,786	4,769	103.96	6.87	3.43	28.21
	10:00	10:30	30	5,600	5,800	5,700	4,786	4,907	4,847	105.65	7.11	3.55	31.76
	10:30	11:00	30	5,800	5,800	5,800	4,907	4,955	4,931	107.50	7.36	3.68	35.44
	11:00	11:30	30	5,800	5,800	5,800	4,955	4,979	4,967	108.28	7.41	3.71	39.14
	11:30	12:00	30	5,800	5,800	5,800	4,979	5,127	5,053	110.16	7.54	3.77	42.91
	12:00	12:30	30	5,800	5,800	5,800	5,127	5,044	5,086	110.86	7.59	3.79	46.71
	12:30	13:00	30	5,800	5,800	5,800	5,044	5,116	5,080	110.74	7.58	3.79	50.50

Total Extraction Time..... **8.0** **hours**
Total Liquid Volume..... **50** **gallons**
Total Liquid-phase Hydrocarbon..... **gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **8.6** **gallons**
Total Hydrocarbon Recovery:..... **8.6** **gallons**

TOTAL lbs of VOC emissions = 50.50

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.36	--	--
MW-21	15.35	--	--

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	15.11	--	--
MW-21	15.76	--	--

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 5 Date: 8-30-12

Time	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
5:00	211	95	150	0.05	0	0.05	0	0
5:30	218	116	150	0.1	0	0.1	0	0
6:00	211	116	150	0.1	0	0.15	0.05	0
6:30	204	109	143	0.15	0	0.2	0.1	0
7:00	204	109	136	0.1	0	0.25	0.15	0
7:30	204	109	129	0.1	0	0.2	0.2	0
8:00	204	109	122	0.1	0	0.2	0.25	0
8:30	204	109	129	0.1	0	0.2	0.25	0
9:00	204	109	122	0.1	0	0.2	0.25	0
9:30	204	109	122	0.1	0	0.2	0.25	0
10:00	204	109	122	0.1	0	0.2	0.25	0
10:30	204	109	122	0.1	0	0.2	0.25	0
11:00	204	109	122	0.1	0	0.2	0.25	0
11:30	204	109	122	0.1	0	0.2	0.25	0
12:00	204	109	122	0.1	0	0.2	0.25	0
12:30	204	109	122	0.1	0	0.2	0.25	0
13:00	204	109	122	0.1	0	0.2	0.25	0

Notes: 1. Radius of influence measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.

APPENDIX B

Waste Disposal Manifes

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address: Crown Central, LLC, PO Box 1168, Baltimore, MD 21203
Generator's Phone:
Generator's Site Address (if different than mailing address): SC-015, 3800 Devine St, Columbia, SC

6. Transporter 1 Company Name: VERU — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: R&D Environmental, 1741 Calks Ferry Rd, Lexington SC — U.S. EPA ID Number:
Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.
	1. Non Haz Wste				55Gal
	2.				
	3.				
	4.				

13. Special Handling Instructions and Additional Information

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.
Generator's/Offeror's Printed/Typed Name: Neil Akre — Signature: [signature] — Month: 8 — Day: 3 — Year: 12

INT'L

15. International Shipments: ☐ Import to U.S. ☐ Export from U.S. — Port of entry/exit: — Transporter signature (for exports only): — Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials
Transporter 1 Printed/Typed Name: Robert Freem — Signature: [signature] — Month: 8 — Day: 3 — Year: 12
Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy
17a. Discrepancy Indication Space: ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection
Manifest Reference Number:
17b. Alternate Facility (or Generator) — U.S. EPA ID Number
Facility's Phone:
17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a
Printed/Typed Name: Bill Arthur — Signature: [signature] — Month: 8 — Day: 3 — Year: 12

6-NHM-C-SO-1198

1-DESIGNATED FACILITY TO DESTINATION

D H E C

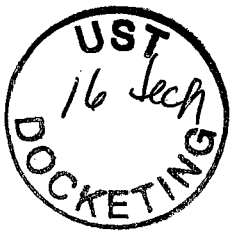
PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment

NOV 0 2 2012

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21203-1168



Re: **AFVR Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680, CA # 44747
Release Reported August 15, 1989
AFVR Report received October 4, 2012
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) recognizes your commitment to continue work at this site using Terracon as your contractor. The next appropriate scope of work is to continue aggressive fluid and vapor recovery (AFVR) events to remove residual free-phase product and reduce concentrations of chemicals of concern (CoC). Please have your contractor conduct two events on MW-5R and MW-21. The events should be spaced a minimum of one-month apart to allow equilibrium conditions to re-establish, and must be conducted in accordance with the UST Quality Assurance Program Plan (QAPP). A copy of the QAPP is available at http://www.scdhec.gov/environment/lwm/usthome/Qapp.htm.

Cost Agreement #44747 has been approved in the amount shown on the enclosed cost agreement form for the AFVR events. AFVR activities may proceed immediately upon receipt of this letter, and must be performed by a South Carolina-Certified Underground Storage Tank Site Rehabilitation Contractor. All applicable South Carolina certification requirements apply to preparation of an AFVR report.

An AFVR report and invoice must be submitted to the Division within 90 days from the date of this letter. Your contractor may directly bill the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Agency is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Agency grants pre-approval for transportation of up to 5,000 gallons of free-phase product and petroleum-contaminated groundwater from the referenced facility to a permitted treatment facility for disposal. The transport and disposal must be conducted in accordance with the QAPP.

On all correspondence concerning this facility, please reference UST Permit # 07680. If there are any questions concerning this project, feel free to contact me by telephone at (803) 896-6676, by fax at (803) 896-6245, or by e-mail at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc)
Technical File (w/ enc)

Approved Cost Agreement 44747

Facility: 07680 SC015

FULMERSB

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB						
		A	EQUIPMENT	2.0000	575.00	1,150.00
		B	PERSONNEL	2.0000	290.00	580.00
17 DISPOSAL						
		A	WASTEWATER	1,000.0000	0.80	800.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PCT	PERCENT	0.1500	9,090.00	1,363.50
23 EFR						
		A	8 HOUR EVENT	2.0000	3,000.00	6,000.00
		C	OFF GAS TREATMENT	16.0000	35.00	560.00
				Total Amount		10,453.50

Letter of Transmittal

GS2
ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
350 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

UST DOCKETING 18tech

Attention: Ms. Susan Fulmer

SCDHEC
Bureau of Land & Waste Management
Underground Storage Tank Division

UST FEB 27 2013 PROGRAM

From: GS2 Engineering & Environmental Consultants, Inc.

Reference: **Crown Central SC15**
UST Facility #: 07680
3800 Devine Street
Columbia, South Carolina
GS2 Project No.: 10-20212-E

Date: February 19, 2013

Comments:

Please find attached to this letter of Transmittal is a copy of a groundwater sampling and analysis report performed in conjunction with due diligence of the Piggly Wiggly property. As the monitoring wells were installed for monitoring of the Crown Central SC15 site, formerly adjoining the Piggly Wiggly site, GS2 is forwarding this report for your files. A copy of this report has been submitted to SCDHEC BoW for their consideration.

If there are any questions concerning this submittal, or if additional information is required, please contact me at *(803) 776-2105 or plowery@gs2engineering.com*.

Sincerely,
GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Patrick W. Lowery, P.G.
Chief Technical Officer, AVP

January 29, 2013

A-C Development Club, LLC
P.O. Box 1058
Columbia, SC 29202

Attention: Mr. Jim Christopher

Reference: Limited Groundwater Sampling and Analysis
3818 Devine Street
Columbia, South Carolina
GS2 Project No.: 13-20212-E

GS2
ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
350 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

Dear Mr. Christopher,

GS2 is pleased to present the results of the groundwater sampling performed on the Piggly Wiggly Tract, located at 3818 Devine Street, Columbia, South Carolina. Based on information provided, GS2 understands that a total of seven (7) monitoring wells are known to exist on the subject site associated with a release of petroleum products from the northern adjoining SCDHEC UST ID 07680 property. Monitoring wells located on the northern adjoining property (Longs Drugs) were not sampled.

On January 23, 2013, GS2 mobilized personnel to the subject site in order to complete the groundwater sampling services. GS2 personnel walked the subject site and located all existing monitoring wells on the Piggly Wiggly Tract as outlined on the provided site sketch, completed by others, dated 2009. All seven locations were present as outlined.

Following the limited inspection, each existing monitoring well was gauged and purged three to five times the well volume of groundwater from the well in accordance with US EPA Field Branches Quality System and Technical Procedures manual. Water quality readings were recorded for the initial and final purge interval. Purge water was collected in a approved steel 55-gallon drum for future disposal. A sampling log is attached to this letter.

A total of five (5) monitoring wells were successfully sampled for the required analysis of Volatile Organic Compounds (VOCs) by EPA methods 8260. Monitoring well MW-10R was dry, while MW-13 contained insufficient amount of water for sampling. Collected groundwater samples were collected in the laboratory provided vials, placed on ice and shipped to a South Carolina approved laboratory for analysis.

Laboratory results received on January 29, 2013 indicate two detections above regulatory established thresholds. Benzene was detected in MW-12R at a concentration of 71.5 ug/L, which is above the SCDHEC established UST Risk Based Screening Level of 5 ug/L. Tetrachloroethylene was detected in MW-12D at 63.5 ug/L, which is above the established Maximum Contaminant Level (MCL) of 5 ug/L. A laboratory provided summary table and analytical report is attached to this letter for your review.

A disposal manifest for the collected purge water will be provided for your records upon disposal.

GS2 appreciates the opportunity to provide our services for your consulting needs. If there are any questions in this regard, or if additional information is required, please contact us at (803) 776-2105.

Sincerely,
GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Patrick W. Lowery, P.G.
Chief Technical Officer

Lyle H. Lee, P.G.
Field Services Manager

Piggly Wiggly Tract — **SITE ID: N/A**

GS2 Project # 13-20212-E — **Groundwater Sampling Log** — **Sampled by: L. Lee, P. Lowery**

							Initial					1st Volume					2nd Volume					Final					
Well ID	Date	Time	Depth to Product	Depth to Water (Feet)	Product Thickness	Total Depth (Feet)	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Total Purge Volume (gal)
MW-13	1/23	-	NA	13.82	NA	14.0	Insufficient Water																				Dry @ 0.1
MW-20	1/23	1330	NA	30.02	NA	33.7	21.0	6.13	100.4	4.45	NA											20.5	7.05	10.07	4.47	NA	2.0
MW-11R	1/23	1359	NA	28.80	NA	30.0	21.4	7.49	57.2	5.06	NA											BD	BD	BD	BD	BD	Dry @ 0.5
MW-10R	1/23	-	NA	Dry	NA	30.0	DRY																				Dry @ 0
MW-19	1/23	1520	NA	31.6	NA	35.0	20.5	7.57	49.2	5.23	NA											BD	BD	BD	BD	BD	Dry @ 1.5
MW-12R	1/23	1430	NA	14.3	NA	20.0	20.1	6.62	591.0	1.80	NA											20.0	6.59	618.0	1.21	NA	3
MW-12D	1/23	1505	NA	42.5	NA	75.0	19.4	6.28	59.3	3.90	NA											15.9	6.08	56.8	5.27	NA	15

Notes:

1) Depth to product and water measured from top of casing
2) Cond. = Conductivity
3) DO= Dissolved Oxygen
4) Total Purge Volume is estimated in gallons
5) mg/L =milligrams per liter
6) PR = Product
7) BD= Bailed Dry

Accutest Laboratories Southeast, Inc.								1/29/2013 11:27
Job Number:	FA1130							
Account:	GS2 Engineering							
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC							
Project Number:	13-20212-E							
Results flagged as "Exceed" if any of the selected criteria exceeded (most stringent).							Legend:	Exceed

Client Sample ID:		SC Risk Based Screening Levels (DHEC 61/98)[1]	National Drinking Water Standards (40 CFR 141)	MW-11R	MW-12D	MW-12R	MW-19	MW-20
Lab Sample ID:				FA1130-2	FA1130-4	FA1130-3	FA1130-5	FA1130-1
Date Sampled:				1/23/2013	1/23/2013	1/23/2013	1/23/2013	1/23/2013
Matrix:				Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC/MS Volatiles (SW846 8260B)								
Benzene	ug/l	5	5	ND	ND	71.5	ND	ND
Chloroform	ug/l	-	-	0.65 J	1.2	ND	ND	2.9
1,2-Dichloroethane	ug/l	-	5	ND	ND	0.26 J	ND	ND
cis-1,2-Dichloroethylene	ug/l	-	70	ND	1.6	ND	ND	ND
Ethylbenzene	ug/l	700	700	ND	ND	12.6	ND	ND
Tetrachloroethylene	ug/l	-	5	ND	63.5	ND	ND	ND
Toluene	ug/l	1000	1000	ND	ND	1.4	ND	ND
Trichloroethylene	ug/l	-	5	ND	1.4	ND	ND	ND
Xylene (total)	ug/l	10000	10000	ND	ND	3.6	ND	ND

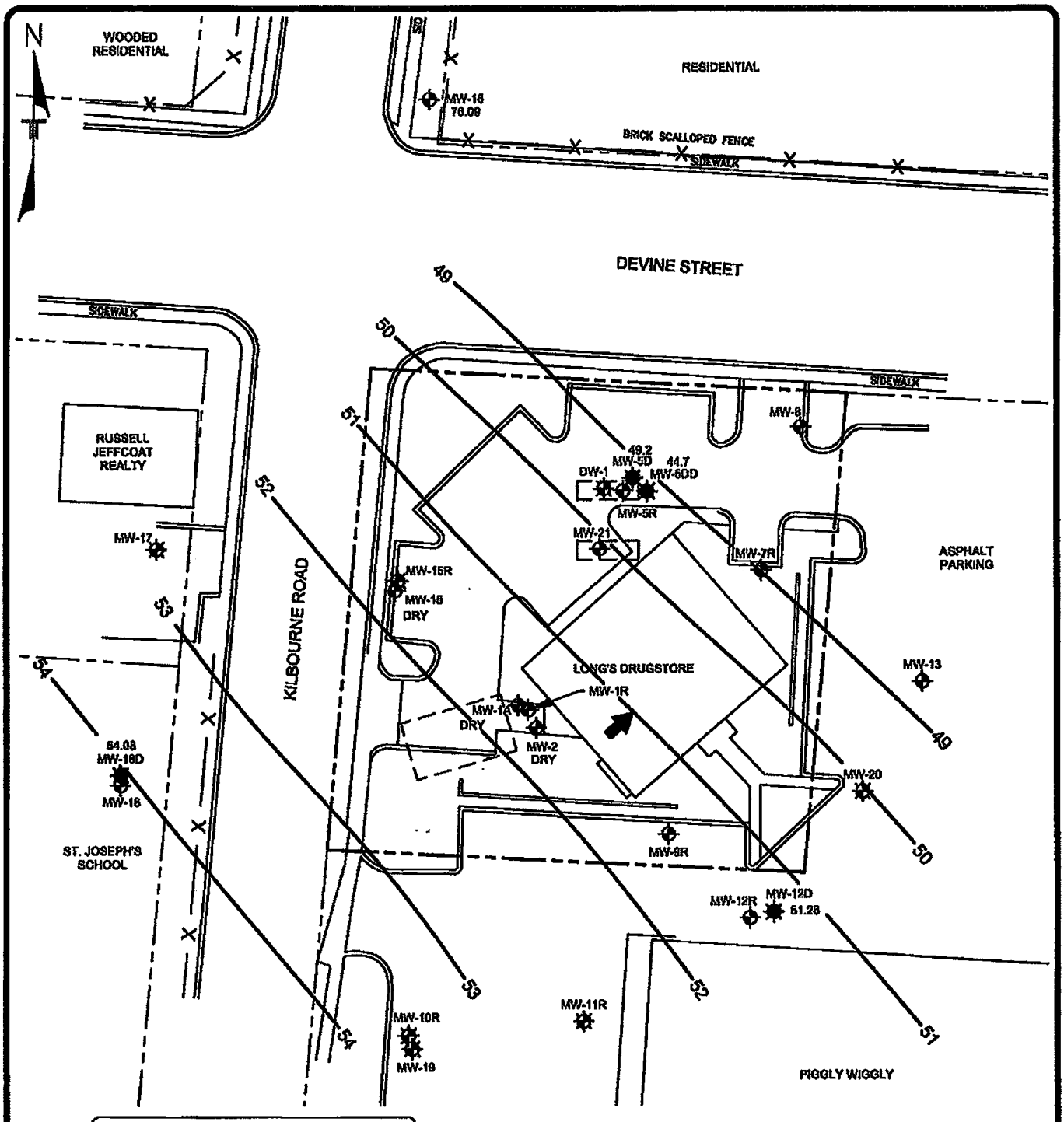
Footnotes:

[a] Associated BS recovery outside control limits.

Regulatory limits listed in this document have been obtained from the latest version of the regulations cited and are used for advisory purposes only. Accutest assumes no responsibility for errors in regulatory documents or changes to criteria detailed in later versions of the referenced regulation. It is the responsibility of the user to verify these limits before using or reporting any data.

2 results exceeded regulatory criteria.

HITS ONLY. Only parameters detected in at least one sample are shown.



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

GRAPHIC SCALE

50 0 50

(FEET)

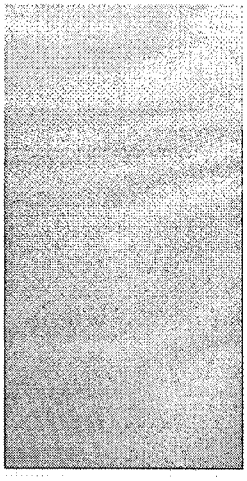
NOTE: GROUND WATER ELEVATIONS WERE RECORDED ON JANUARY 20, 2009.

DEEP POTENTIOMETRIC SURFACE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 10

Southeast ACCUTEST LABORATORIES

01/28/13





Technical Report for

GS2 Engineering

Piggly Wiggly; 3818 Devine St, Columbia, SC

Accutest Job Number: FA1130

Sampling Date: 01/23/13

Report to:

GS2 Engineering
1200 Veterans Rd Suite A
Columbia, SC
plowery@gs2engineering.com

ATTN: Patrick Lowery

Total number of pages in report: 25

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Client Service contact: Muna Mohammed 407-425-6700

Certifications: FL (E83510), LA (03051), KS (E-10327), IA (366), IL (200063), NC (573), NJ (FL002), SC (96038001) DoD ELAP (L-A-B L2229), CA (04226CA), TX (T104704404), AK, AR, GA, KY, MA, NV, OK, UT, VA, WA, WI

This report shall not be reproduced, except in its entirety, without the written approval of Accutest Laboratories.
Test results relate only to samples analyzed.

Accutest Laboratories is the sole authority for authorizing edits or modifications to this document. Unauthorized modification of this report is strictly prohibited.

Table of Contents

Sections: 1 2 3 4 5

-1-

Section 1: Sample Summary **3**
Section 2: Summary of Hits **4**
Section 3: Sample Results 5
3.1: FA1130-1: MW-20 6
3.2: FA1130-2: MW-11R 8
3.3: FA1130-3: MW-12R 10
3.4: FA1130-4: MW-12D 12
3.5: FA1130-5: MW-19 14
Section 4: Misc. Forms **16**
4.1: Chain of Custody 17
Section 5: GC/MS Volatiles - QC Data Summaries **19**
5.1: Method Blank Summary 20
5.2: Blank Spike Summary 22
5.3: Matrix Spike/Matrix Spike Duplicate Summary 24

Sample Summary

GS2 Engineering

Job No: FA1130

Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample Number	Collected Date	Time	By	Received	Matrix Code	Matrix Type	Client Sample ID
FA1130-1	01/23/13	13:30	LLPL	01/24/13	AQ	Ground Water	MW-20
FA1130-2	01/23/13	13:59	LLPL	01/24/13	AQ	Ground Water	MW-11R
FA1130-3	01/23/13	14:30	LLPL	01/24/13	AQ	Ground Water	MW-12R
FA1130-4	01/23/13	15:05	LLPL	01/24/13	AQ	Ground Water	MW-12D
FA1130-5	01/23/13	15:20	LLPL	01/24/13	AQ	Ground Water	MW-19

Summary of Hits

Job Number: FA1130
Account: GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC
Collected: 01/23/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA1130-1	**MW-20**					
Chloroform		2.9	1.0	0.26	ug/l	SW846 8260B
FA1130-2	**MW-11R**					
Chloroform		0.65 J	1.0	0.26	ug/l	SW846 8260B
FA1130-3	**MW-12R**					
Benzene		71.5	1.0	0.21	ug/l	SW846 8260B
1,2-Dichloroethane		0.26 J	1.0	0.22	ug/l	SW846 8260B
Ethylbenzene		12.6	1.0	0.29	ug/l	SW846 8260B
Toluene		1.4	1.0	0.20	ug/l	SW846 8260B
Xylene (total)		3.6	3.0	0.50	ug/l	SW846 8260B
FA1130-4	**MW-12D**					
Chloroform		1.2	1.0	0.26	ug/l	SW846 8260B
cis-1,2-Dichloroethylene		1.6	1.0	0.24	ug/l	SW846 8260B
Tetrachloroethylene		63.5	1.0	0.32	ug/l	SW846 8260B
Trichloroethylene		1.4	1.0	0.31	ug/l	SW846 8260B
FA1130-5	**MW-19**					

No hits reported in this sample.

Southeast ACCUTEST LABORATORIES

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-20		
Lab Sample ID:	FA1130-1	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	2.9	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-20		
Lab Sample ID:	FA1130-1	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	97%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-11R		
Lab Sample ID:	FA1130-2	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13161.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	0.65	1.0	0.26	ug/l	J
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-11R		
Lab Sample ID:	FA1130-2	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	93%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-12R		
Lab Sample ID:	FA1130-3	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13162.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	71.5	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	0.26	1.0	0.22	ug/l	J
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	12.6	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	1.4	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12R		
Lab Sample ID:	FA1130-3	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	3.6	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	95%		86-112%
460-00-4	4-Bromofluorobenzene	93%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-12D		
Lab Sample ID:	FA1130-4	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13163.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	1.2	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	1.6	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	63.5	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	1.4	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12D		
Lab Sample ID:	FA1130-4	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	105%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	104%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-19		
Lab Sample ID:	FA1130-5	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13164.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-19		
Lab Sample ID:	FA1130-5	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	101%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Southeast ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

Accutest JOB # FA1130 PAGE 1 OF 1

Accutest Quote # | SKIFF#

Client / Reporting Information

Company Name: GS2 Engineering
Address: 1200 Parkwood Rd
City: Columbia State: SC Zip: 29209
Project Contact: Pedrick Lowery E-mail: plowery@gs2engineering.com
Phone: 803-518-3849
Sampler(s) Name(s) (Printed): Lyle Lee / Pedrick Lowery

Project Information

Project Name: Piggly Wiggly
Street: 7819 Dunbar St
City: Columbia State: SC
Project #
Fax #
Client Purchase Order #

Analytical Information

TCL VOCs 8260

Matrix Codes

DW - Drinking Water
GW - Ground Water
WW - Water
SW - Surface Water
SO - Soil
SL - Sludge
OI - Oil
LIQ - Other Liquid
AIR - Air
SOL - Other Solid
WP - Wipe

Accutest Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	Total # of Bottles	Other	None	HCl	MeOH	NaHSO4	H2SO4	Ascorbic	DI Water	MeOH	LAB USE ONLY
1	MW-2D	1/23	1330	LL	GW	3			✓							
2	MW-11R	1/23	1359	LL	GW	3			✓							
3	MW-12R	1/23	1470	PL	GW	3			✓							
4	MW-12D	1/23	1505	LL	GW	3			✓							
5	MW-19	1/23	1528	LL	GW	3			✓							

TURNAROUND TIME (Business Days)

Approved By: / Rush Code

- ☐ 10 Days Standard
- ☐ 7 Day RUSH
- ☐ 5 Day RUSH
- ☐ 3 Day EMERGENCY
- ☒ 2 Day EMERGENCY
- ☐ 1 Day EMERGENCY
- ☐ OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- ☐ COMMERCIAL "A" (RESULTS ONLY)
- ☐ COMMERCIAL "B" (RESULTS PLUS QC)
- ☐ REDT[illegible] LEVEL C)
- ☐ FULT1 (EPA LEVEL
- ☐ EDD'S

ACCUTEST 2828 G QUEEN CITY DR CLT NC 28203

Comments / Remarks

MW-12R Petro Odor

Sample Custody

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
1	1/23 1830	2 Fed Ex	3 FX	1-24-13	4 J. Cooper (ARS) 0933
Relinquished by:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
5		6	7		8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 3.0

4.1

FA1130: Chain of Custody
Page 1 of 2

SAMPLE CONDITION INFORMATION

ACCUTEST'S JOB NUMBER: FA1130

DATE/TIME RECEIVED: 1-24-13 09:30 (MM/DD/YY 24:00)

CLIENT: GSE ENG PROJECT: PIGGLY WIGGLY

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

NUMBER OF COOLERS RECEIVED: 1

AIRBILL NUMBERS: 8994 9312 0768

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [X] TRIP BLANK NOT PROVIDED
- [X] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES? 25-GRAM ____ 5-GRAM ____

NUMBER OF 5035 FIELD KITS? ____

NUMBER OF LAB FILTERED METALS? ____

TEMPERATURE INFORMATION

- [ ] IR THERM ID 3 CORR. FACTOR +0.4
- [ ] OBSERVED TEMPS: 26
- [ ] CORRECTED TEMPS: 30

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPLICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

SUMMARY OF COMMENTS: ____

TECHNICIAN SIGNATURE/DATE: JC 1-24-13 REVIEWER SIGNATURE/DATE: 01/24/13

NF 12/10

receipt confirmation 122810.xls

FA1130: Chain of Custody
Page 2 of 2

Southeast ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-MB	Z13153.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

Method Blank Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-MB	Z13153.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	87-116%
17060-07-0	1,2-Dichloroethane-D4	104%	76-127%
2037-26-5	Toluene-D8	101%	86-112%
460-00-4	4-Bromofluorobenzene	102%	84-120%

Blank Spike Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-BS	Z13152.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	219	175*	59-134
71-43-2	Benzene	25	28.9	116	83-124
75-27-4	Bromodichloromethane	25	26.9	108	76-116
75-25-2	Bromoform	25	26.4	106	68-128
108-90-7	Chlorobenzene	25	28.3	113	87-115
75-00-3	Chloroethane	25	27.7	111	54-166
67-66-3	Chloroform	25	28.5	114	85-123
75-15-0	Carbon disulfide	25	29.8	119	67-147
56-23-5	Carbon tetrachloride	25	27.9	112	74-139
75-34-3	1,1-Dichloroethane	25	28.5	114	82-127
75-35-4	1,1-Dichloroethylene	25	30.0	120	75-133
107-06-2	1,2-Dichloroethane	25	27.2	109	76-122
78-87-5	1,2-Dichloropropane	25	27.5	110	81-120
124-48-1	Dibromochloromethane	25	26.3	105	74-116
156-59-2	cis-1,2-Dichloroethylene	25	27.3	109	81-114
10061-01-5	cis-1,3-Dichloropropene	25	26.7	107	83-119
156-60-5	trans-1,2-Dichloroethylene	25	28.3	113	82-126
10061-02-6	trans-1,3-Dichloropropene	25	27.6	110	87-123
100-41-4	Ethylbenzene	25	27.0	108	87-118
591-78-6	2-Hexanone	125	143	114	58-125
108-10-1	4-Methyl-2-pentanone	125	143	114	62-125
74-83-9	Methyl bromide	25	30.8	123	55-151
74-87-3	Methyl chloride	25	26.2	105	55-173
75-09-2	Methylene chloride	25	27.1	108	69-125
78-93-3	Methyl ethyl ketone	125	176	141*	61-127
100-42-5	Styrene	25	24.5	98	78-118
71-55-6	1,1,1-Trichloroethane	25	29.0	116	79-133
79-34-5	1,1,2,2-Tetrachloroethane	25	26.3	105	71-120
79-00-5	1,1,2-Trichloroethane	25	26.1	104	80-114
127-18-4	Tetrachloroethylene	25	27.7	111	80-131
108-88-3	Toluene	25	27.1	108	86-116
79-01-6	Trichloroethylene	25	28.8	115	85-124
75-01-4	Vinyl chloride	25	29.9	120	57-153
1330-20-7	Xylene (total)	75	79.9	107	86-120

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-BS	Z13152.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	100%	87-116%
17060-07-0	1,2-Dichloroethane-D4	103%	76-127%
2037-26-5	Toluene-D8	98%	86-112%
460-00-4	4-Bromofluorobenzene	94%	84-120%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA1130-1MS	Z13175.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1MSD	Z13176.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	FA1130-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	109	87	128	102	16*	59-134/14
71-43-2	Benzene	ND		25	26.4	106	23.3	93	12*	83-124/11
75-27-4	Bromodichloromethane	ND		25	25.1	100	17.4	70*	36*	76-116/10
75-25-2	Bromoform	ND		25	22.3	89	13.0	52*	53*	68-128/11
108-90-7	Chlorobenzene	ND		25	26.6	106	23.6	94	12*	87-115/9
75-00-3	Chloroethane	ND		25	26.1	104	21.2	85	21*	54-166/20
67-66-3	Chloroform	2.9		25	29.1	105	25.1	89	15*	85-123/10
75-15-0	Carbon disulfide	ND		25	24.0	96	11.0	44*	74*	67-147/12
56-23-5	Carbon tetrachloride	ND		25	25.1	100	15.1	60*	50*	74-139/13
75-34-3	1,1-Dichloroethane	ND		25	26.3	105	22.2	89	17*	82-127/10
75-35-4	1,1-Dichloroethylene	ND		25	28.1	112	23.3	93	19*	75-133/13
107-06-2	1,2-Dichloroethane	ND		25	24.6	98	23.9	96	3	76-122/11
78-87-5	1,2-Dichloropropane	ND		25	25.6	102	23.1	92	10	81-120/11
124-48-1	Dibromochloromethane	ND		25	23.1	92	14.2	57*	48*	74-116/11
156-59-2	cis-1,2-Dichloroethylene	ND		25	24.8	99	21.9	88	12*	81-114/10
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.6	86	11.5	46*	61*	83-119/10
156-60-5	trans-1,2-Dichloroethylene	ND		25	26.1	104	20.6	82	24*	82-126/10
10061-02-6	trans-1,3-Dichloropropene	ND		25	24.5	98	14.5	58*	51*	87-123/10
100-41-4	Ethylbenzene	ND		25	25.2	101	21.5	86*	16*	87-118/10
591-78-6	2-Hexanone	ND		125	96.7	77	111	89	14	58-125/14
108-10-1	4-Methyl-2-pentanone	ND		125	120	96	131	105	9	62-125/13
74-83-9	Methyl bromide	ND		25	28.0	112	22.5	90	22*	55-151/21
74-87-3	Methyl chloride	ND		25	24.8	99	20.7	83	18	55-173/22
75-09-2	Methylene chloride	ND		25	25.3	101	23.2	93	9	69-125/11
78-93-3	Methyl ethyl ketone	ND		125	109	87	125	100	14*	61-127/13
100-42-5	Styrene	ND		25	20.9	84	18.1	72*	14*	78-118/11
71-55-6	1,1,1-Trichloroethane	ND		25	25.8	103	22.5	90	14*	79-133/11
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	22.5	90	24.2	97	7	71-120/11
79-00-5	1,1,2-Trichloroethane	ND		25	23.4	94	23.3	93	0	80-114/11
127-18-4	Tetrachloroethylene	ND		25	26.3	105	21.2	85	21*	80-131/12
108-88-3	Toluene	ND		25	25.3	101	21.8	87	15*	86-116/10
79-01-6	Trichloroethylene	ND		25	26.5	106	22.1	88	18*	85-124/10
75-01-4	Vinyl chloride	ND		25	28.1	112	22.0	88	24*	57-153/22
1330-20-7	Xylene (total)	ND		75	74.8	100	65.0	87	14*	86-120/10

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA1130-1MS	Z13175.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1MSD	Z13176.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries	MS	MSD	FA1130-1	Limits
1868-53-7	Dibromofluoromethane	103%	100%	102%	87-116%
17060-07-0	1,2-Dichloroethane-D4	98%	102%	102%	76-127%
2037-26-5	Toluene-D8	98%	98%	101%	86-112%
460-00-4	4-Bromofluorobenzene	92%	96%	97%	84-120%

* = Outside of Control Limits.

February 18, 2013

FEB 26 2013

SITE ASSESSMENT, REMEDIATION & REVITALIZATION

SCDHEC Bureau of Water
2600 Bull Street
Columbia, SC 29201

UST PROGRAM FEB 27 2013 17Tech DOCKETING

GS2
ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
150 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

Attention: **Mr. Jonathan McInnis**

Reference: **Letter of Groundwater Sampling Results**
Piggly Wiggly Tract
3818 Devine Street
Columbia, South Carolina
GS2 Project No.: 12-20212-E

Dear Mr. McInnis;

GS2 Engineering and Environmental Consultants, Inc (GS2) is please to present this letter of groundwater sampling results completed on behalf of our client A-C Development Club, LLC for the Piggly Wiggly property located at 3818 Devine Street, Columbia, South Carolina.

While this report was not specifically requested by your department, nor were monitoring wells installed as part of this project, per SCDHEC Regulation R.61-71/H.1.d, a copy of analytical reports should be submitted to SCDHEC within 30 days of receipt of all analytical data. Therefore, GS2 is submitting this information for your department's consideration. The following information pertaining to the site history and sampling activities is provided below.

As part of Due Diligence related to financing of this property, a Phase I ESA report was prepared by AEI Consultants on January 10, 2013. This Phase I ESA identified multiple monitoring wells on the subject site which includes the Longs Drug Store (Richland TMS R13807-03-01) and the Piggly Wiggly (Richland TMS R13807-03-02). These wells were installed to monitor a release from a former service station, located in the current location of the Longs Drug Store. This facility can be defined by UST ID#07680 Crown Central SC15.

The Phase I ESA further identified the historical presence of Dry Cleaning facilities on the subject site. More specifically, the site was developed with Campbells Drugstore, Simpsons Grocery and Doughty Dry Cleaner from 1943 to ~1967. Additionally Masters Cleaners and Dry Clean was noted to operate within the former service station from ~1993 to ~1997. No other information is presently available pertaining to these two dry cleaning facilities. Previously a Phase II was conducted by EMG at the location of the former service station and dry cleaner operation in order to assess if dry cleaning solvents have impacted the property. All groundwater borings encountered shallow refusal and no groundwater samples were collected. All soil samples did not detect dry cleaning solvent contamination.

Based on the groundwater samples related to the UST facility only being analyzed for petroleum compounds, and the lack of groundwater assessment in the Phase II completed by others, AEI Consultants recommended sampling and analysis of the groundwater from on-site monitoring wells for Volatile Organic Compounds via EPA 8260.

On behalf of our client A-C Development Club, LLC, GS2 mobilized to the subject site and attempted to sample seven (7) monitoring wells located on the Piggly Wiggly property (Richland TMS R13807-03-02).

At the time of sampling GS2 was not aware that the Longs Drug Store (Richland TMS R13807-03-01) parcel was included as part of the subject site in the due diligence. A copy of our sampling report is attached to this submittal. Laboratory results received on January 29, 2013 indicate two detections above regulatory established thresholds. Benzene was detected in MW-12R at a concentration of 71.5 ug/L, above the SCDHEC established UST Risk Based Screening Level of 5 ug/L. Tetrachloroethylene was detected in MW-12D at 63.5 ug/L, above the established Maximum Contaminant Level (MCL) of 5 ug/L.

According to Richland County Assessors information, the subject site parcels are currently owned by;

Niggel Family Partnership
PO Box 6573
Columbia, SC 29260

GS2 can provide copies of the due diligence reports (Phase I ESA, Phase II ESA) upon your departments request. Additionally a copy of the analytical results have been forwarded to Ms. Susan Fulmer with the UST Program as the sampled monitoring wells were installed for monitoring a release from UST 07680, Crown Central SC15.

Once again we appreciate your department's review of our findings. If there are any questions concerning the results, or if additional information is required, please contact us at *(803) 776-2105.*

Sincerely,
GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Patrick W. Lowery, P.G.
Chief Technical Officer

Lyle H. Lee, P.G.
Field Services Manager

CC: James E Christopher, Jr. - A-C Development Club LLC
JCACDI@aol.com

January 29, 2013

FEB 2 6 2013

SITE ASSESSMENT, REMEDIATION & REVITALIZATION

A-C Development Club, LLC
P.O. Box 1058
Columbia, SC 29202

Attention: Mr. Jim Christopher

Reference: Limited Groundwater Sampling and Analysis
3818 Devine Street
Columbia, South Carolina
GS2 Project No.: 13-20212-E

GS2
ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Corporate Headquarters
1200 Veterans Road, Suite A
Columbia, South Carolina 29209

Columbia Office
241 Business Park Boulevard
Columbia, South Carolina 29203

Charleston Office
4301 Dorchester Road, Suite 12A
North Charleston, South Carolina 29405

Greenville Office
350 Feaster Road, Suite A
Greenville, South Carolina 29615

Florence Office
2353-D Walker Swinton Road
Timmonsville, South Carolina 29161

www.gs2engineering.com

Dear Mr. Christopher,

GS2 is pleased to present the results of the groundwater sampling performed on the Piggly Wiggly Tract, located at 3818 Devine Street, Columbia, South Carolina. Based on information provided, GS2 understands that a total of seven (7) monitoring wells are known to exist on the subject site associated with a release of petroleum products from the northern adjoining SCDHEC UST ID 07680 property. Monitoring wells located on the northern adjoining property (Longs Drugs) were not sampled.

On January 23, 2013, GS2 mobilized personnel to the subject site in order to complete the groundwater sampling services. GS2 personnel walked the subject site and located all existing monitoring wells on the Piggly Wiggly Tract as outlined on the provided site sketch, completed by others, dated 2009. All seven locations were present as outlined.

Following the limited inspection, each existing monitoring well was gauged and purged three to five times the well volume of groundwater from the well in accordance with US EPA Field Branches Quality System and Technical Procedures manual. Water quality readings were recorded for the initial and final purge interval. Purge water was collected in a approved steel 55-gallon drum for future disposal. A sampling log is attached to this letter.

A total of five (5) monitoring wells were successfully sampled for the required analysis of Volatile Organic Compounds (VOCs) by EPA methods 8260. Monitoring well MW-10R was dry, while MW-13 contained insufficient amount of water for sampling. Collected groundwater samples were collected in the laboratory provided vials, placed on ice and shipped to a South Carolina approved laboratory for analysis.

Laboratory results received on January 29, 2013 indicate two detections above regulatory established thresholds. Benzene was detected in MW-12R at a concentration of 71.5 ug/L, which is above the SCDHEC established UST Risk Based Screening Level of 5 ug/L. Tetrachloroethylene was detected in MW-12D at 63.5 ug/L, which is above the established Maximum Contaminant Level (MCL) of 5 ug/L. A laboratory provided summary table and analytical report is attached to this letter for your review.

A disposal manifest for the collected purge water will be provided for your records upon disposal.

GS2 appreciates the opportunity to provide our services for your consulting needs. If there are any questions in this regard, or if additional information is required, please contact us at (803) 776-2105.

Sincerely,
GS2 ENGINEERING & ENVIRONMENTAL CONSULTANTS, INC.

Patrick W. Lowery, P.G.
Chief Technical Officer

Lyle H. Lee, P.G.
Field Services Manager

Piggly Wiggly Tract
GS2 Project # 13-20212-E

SITE ID: N/A
Sampled by: L. Lee, P. Lowery

Groundwater Sampling Log

							Initial					1st Volume					2nd Volume					Final					
Well ID	Date	Time	Depth to Product	Depth to Water (Feet)	Product Thickness	Total Depth (Feet)	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Temp	pH	Cond	DO	Turbidity	Total Purge Volume (gal)
MW-13	1/23	-	NA	13.82	NA	14.0	Insufficient Water																				Dry @ 0.1
MW-20	1/23	1330	NA	30.02	NA	33.7	21.0	6.13	100.4	4.45	NA											20.5	7.05	10.07	4.47	NA	2.0
MW-11R	1/23	1359	NA	28.80	NA	30.0	21.4	7.49	57.2	5.06	NA											BD	BD	BD	BD	BD	Dry @ 0.5
MW-10R	1/23	-	NA	Dry	NA	30.0	DRY																				Dry @ 0
MW-19	1/23	1520	NA	31.6	NA	35.0	20.5	7.57	49.2	5.23	NA											BD	BD	BD	BD	BD	Dry @ 1.5
MW-12R	1/23	1430	NA	14.3	NA	20.0	20.1	6.62	591.0	1.80	NA											20.0	6.59	618.0	1.21	NA	3
MW-12D	1/23	1505	NA	42.5	NA	75.0	19.4	6.28	59.3	3.90	NA											15.9	6.08	56.8	5.27	NA	15

Notes:
1) Depth to product and water measured from top of casing
2) Cond. = Conductivity
3) DO= Dissolved Oxygen

4) Total Purge Volume is estimated in gallons
5) mg/L =milligrams per liter
6) PR = Product
7) BD= Bailed Dry

Accutest Laboratories Southeast, Inc.								1/29/2013 11:27
Job Number:	FA1130							
Account:	GS2 Engineering							
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC							
Project Number:	13-20212-E							
Results flagged as "Exceed" if any of the selected criteria exceeded (most stringent).							Legend:	Exceed

Client Sample ID:		SC Risk Based Screening Levels (DHEC 61/98)[1]	National Drinking Water Standards (40 CFR 141)	MW-11R	MW-12D	MW-12R	MW-19	MW-20
Lab Sample ID:				FA1130-2	FA1130-4	FA1130-3	FA1130-5	FA1130-1
Date Sampled:				1/23/2013	1/23/2013	1/23/2013	1/23/2013	1/23/2013
Matrix:				Ground Water	Ground Water	Ground Water	Ground Water	Ground Water
GC/MS Volatiles (SW846 8260B)								
Benzene	ug/l	5	5	ND	ND	71.5	ND	ND
Chloroform	ug/l	-	-	0.65 J	1.2	ND	ND	2.9
1,2-Dichloroethane	ug/l	-	5	ND	ND	0.26 J	ND	ND
cis-1,2-Dichloroethylene	ug/l	-	70	ND	1.6	ND	ND	ND
Ethylbenzene	ug/l	700	700	ND	ND	12.6	ND	ND
Tetrachloroethylene	ug/l	-	5	ND	63.5	ND	ND	ND
Toluene	ug/l	1000	1000	ND	ND	1.4	ND	ND
Trichloroethylene	ug/l	-	5	ND	1.4	ND	ND	ND
Xylene (total)	ug/l	10000	10000	ND	ND	3.6	ND	ND

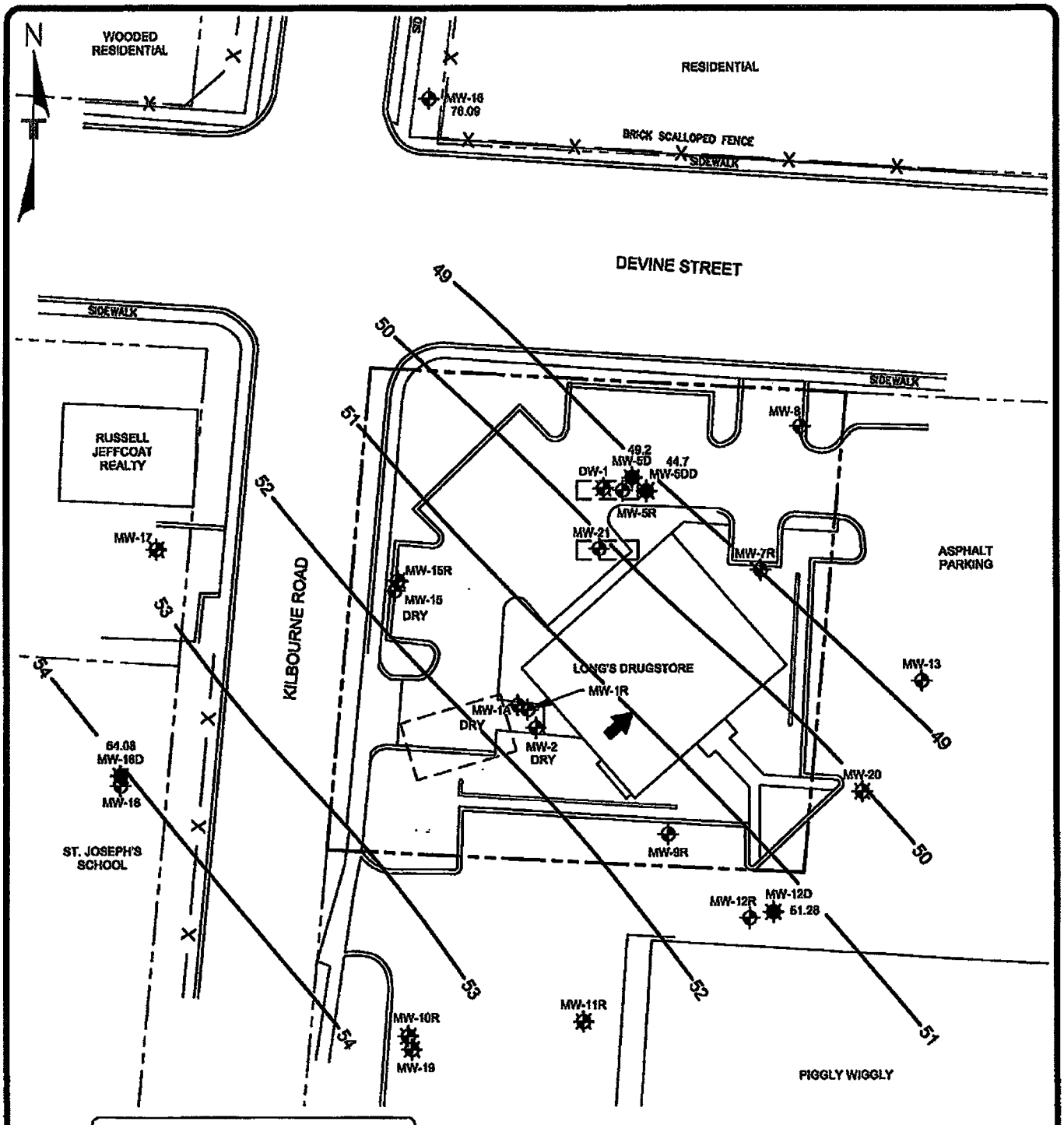
Footnotes:

[a] Associated BS recovery outside control limits.

Regulatory limits listed in this document have been obtained from the latest version of the regulations cited and are used for advisory purposes only. Accutest assumes no responsibility for errors in regulatory documents or changes to criteria detailed in later versions of the referenced regulation. It is the responsibility of the user to verify these limits before using or reporting any data.

2 results exceeded regulatory criteria.

HITS ONLY. Only parameters detected in at least one sample are shown.



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- GROUND WATER SURFACE CONTOUR
- GROUND WATER FLOW DIRECTION
- APPROXIMATE PROPERTY BOUNDARY

GRAPHIC SCALE

50 0 50

(FEET)

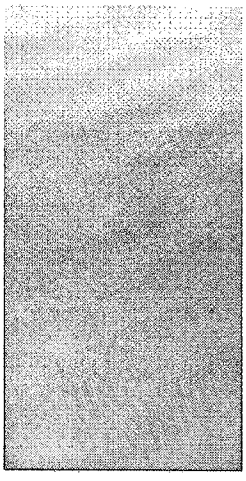
NOTE: GROUND WATER ELEVATIONS WERE RECORDED ON JANUARY 20, 2009.

DEEP POTENTIOMETRIC SURFACE MAP
FORMER SC-016
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: 173078012.dwg			Figure No. 10

Southeast ACCUTEST LABORATORIES

01/28/13





Technical Report for

GS2 Engineering

Piggly Wiggly; 3818 Devine St, Columbia, SC

Accutest Job Number: FA1130

Sampling Date: 01/23/13

Report to:

GS2 Engineering
1200 Veterans Rd Suite A
Columbia, SC
plowery@gs2engineering.com

ATTN: Patrick Lowery

Total number of pages in report: **25**

ACCREDITED IN ACCORDANCE WITH nelac

Test results contained within this data package meet the requirements of the National Environmental Laboratory Accreditation Conference and/or state specific certification programs as applicable.

Harry Behzadi, Ph.D.
Laboratory Director

Client Service contact: Muna Mohammed 407-425-6700

Certifications: FL (E83510), LA (03051), KS (E-10327), IA (366), IL (200063), NC (573), NJ (FL002), SC (96038001) DoD ELAP (L-A-B L2229), CA (04226CA), TX (T104704404), AK, AR, GA, KY, MA, NV, OK, UT, VA, WA, WI

This report shall not be reproduced, except in its entirety, without the written approval of Accutest Laboratories. Test results relate only to samples analyzed.

Accutest Laboratories is the sole authority for authorizing edits or modifications to this document. Unauthorized modification of this report is strictly prohibited.

Sections: 1 2 3 4 5

Table of Contents

-1-

Section 1: Sample Summary **3**
Section 2: Summary of Hits **4**
Section 3: Sample Results 5
3.1: FA1130-1: MW-20 6
3.2: FA1130-2: MW-11R 8
3.3: FA1130-3: MW-12R 10
3.4: FA1130-4: MW-12D 12
3.5: FA1130-5: MW-19 14
Section 4: Misc. Forms **16**
4.1: Chain of Custody 17
Section 5: GC/MS Volatiles - QC Data Summaries 19
5.1: Method Blank Summary 20
5.2: Blank Spike Summary 22
5.3: Matrix Spike/Matrix Spike Duplicate Summary 24

Sample Summary

GS2 Engineering

Job No: FA1130

Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample Number	Collected Date	Time By	Received	Matrix Code	Matrix Type	Client Sample ID
FA1130-1	01/23/13	13:30 LLPL	01/24/13	AQ	Ground Water	MW-20
FA1130-2	01/23/13	13:59 LLPL	01/24/13	AQ	Ground Water	MW-11R
FA1130-3	01/23/13	14:30 LLPL	01/24/13	AQ	Ground Water	MW-12R
FA1130-4	01/23/13	15:05 LLPL	01/24/13	AQ	Ground Water	MW-12D
FA1130-5	01/23/13	15:20 LLPL	01/24/13	AQ	Ground Water	MW-19

Summary of Hits

Job Number: FA1130
Account: GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC
Collected: 01/23/13

Lab Sample ID / Analyte	Client Sample ID	Result/ Qual	RL	MDL	Units	Method
FA1130-1	**MW-20**					
Chloroform		2.9	1.0	0.26	ug/l	SW846 8260B
FA1130-2	**MW-11R**					
Chloroform		0.65 J	1.0	0.26	ug/l	SW846 8260B
FA1130-3	**MW-12R**					
Benzene		71.5	1.0	0.21	ug/l	SW846 8260B
1,2-Dichloroethane		0.26 J	1.0	0.22	ug/l	SW846 8260B
Ethylbenzene		12.6	1.0	0.29	ug/l	SW846 8260B
Toluene		1.4	1.0	0.20	ug/l	SW846 8260B
Xylene (total)		3.6	3.0	0.50	ug/l	SW846 8260B
FA1130-4	**MW-12D**					
Chloroform		1.2	1.0	0.26	ug/l	SW846 8260B
cis-1,2-Dichloroethylene		1.6	1.0	0.24	ug/l	SW846 8260B
Tetrachloroethylene		63.5	1.0	0.32	ug/l	SW846 8260B
Trichloroethylene		1.4	1.0	0.31	ug/l	SW846 8260B
FA1130-5	**MW-19**					

No hits reported in this sample.

Sample Results

Report of Analysis

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-20		
Lab Sample ID:	FA1130-1	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	2.9	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-20		
Lab Sample ID:	FA1130-1	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	101%		86-112%
460-00-4	4-Bromofluorobenzene	97%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-11R		
Lab Sample ID:	FA1130-2	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13161.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	0.65	1.0	0.26	ug/l	J
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-11R		
Lab Sample ID:	FA1130-2	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	101%		87-116%
17060-07-0	1,2-Dichloroethane-D4	101%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	93%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-12R		
Lab Sample ID:	FA1130-3	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13162.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	71.5	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	0.26	1.0	0.22	ug/l	J
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	12.6	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	1.4	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12R		
Lab Sample ID:	FA1130-3	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	3.6	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	98%		87-116%
17060-07-0	1,2-Dichloroethane-D4	102%		76-127%
2037-26-5	Toluene-D8	95%		86-112%
460-00-4	4-Bromofluorobenzene	93%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-12D		
Lab Sample ID:	FA1130-4	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13163.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	1.2	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	1.6	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	63.5	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	1.4	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-12D		
Lab Sample ID:	FA1130-4	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	105%		76-127%
2037-26-5	Toluene-D8	98%		86-112%
460-00-4	4-Bromofluorobenzene	104%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Accutest Laboratories

Report of Analysis

Client Sample ID:	MW-19		
Lab Sample ID:	FA1130-5	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
Run #1	Z13164.D	1	01/25/13	KW	n/a	n/a	VZ566
Run #2							

	Purge Volume
Run #1	5.0 ml
Run #2	

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone [a]	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone [a]	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Report of Analysis

Client Sample ID:	MW-19		
Lab Sample ID:	FA1130-5	**Date Sampled:**	01/23/13
Matrix:	AQ - Ground Water	**Date Received:**	01/24/13
Method:	SW846 8260B	**Percent Solids:**	n/a
Project:	Piggly Wiggly; 3818 Devine St, Columbia, SC		

VOA TCL List

CAS No.	Compound	Result	RL	MDL	Units	Q
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

CAS No.	Surrogate Recoveries	Run# 1	Run# 2	Limits
1868-53-7	Dibromofluoromethane	102%		87-116%
17060-07-0	1,2-Dichloroethane-D4	106%		76-127%
2037-26-5	Toluene-D8	100%		86-112%
460-00-4	4-Bromofluorobenzene	101%		84-120%

(a) Associated BS recovery outside control limits.

ND = Not detected MDL - Method Detection Limit
RL = Reporting Limit
E = Indicates value exceeds calibration range
J = Indicates an estimated value
B = Indicates analyte found in associated method blank
N = Indicates presumptive evidence of a compound

Southeast ACCUTEST LABORATORIES

Misc. Forms

Custody Documents and Other Forms

Includes the following where applicable:

- Chain of Custody

Accutest Laboratories Southeast
Chain of Custody

ACCUTEST LABORATORIES

4405 Vineland Road, Suite C-15 Orlando, Fl 32811
TEL. 407-425-6700 • FAX: 407-425-0707
www.accutest.com

Accutest JOB # FA1130 PAGE 1 OF 1

Accutest Quote # | SKIFF#

Client / Reporting Information

Company Name: GS2 Engineering
Address: 1200 Pickens Rd
City: Columbia State: SC Zip: 29209
Project Contact: Patrick Lowery E-mail: plowery@gs2engineering.com
Phone#: 803-513-3897
Sampler(s) Name(s) (Printed): Lyle Lee / Patrick Lowery

Project Information

Project Name: Piggly Wiggly
Street: 3819 Decker St
City: Columbia State: SC
Project #:
Fax #:
Client Purchase Order #:

Analytical Information

Accutest Sample #	Field ID / Point of Collection	Date	Time	Sampled By	Matrix	Total # of Bottles	Other	None	HCl	MeOH	NaOH	H2SO4	HNO3/HCl	DI Water	MeOH	TCL VOCs 8260	Matrix Codes / Lab Use Only
1	MW-20	1/23	1330	LL	GW	3			✓							X	
2	MW-11R	1/23	1359	LL	GW	3			✓							X	
3	MW-12R	1/23	1470	PL	GW	3			✓							X	
4	MW-12D	1/23	1505	LL	GW	3			✓							X	
5	MW-19	1/23	1520	LL	GW	3			✓							X	

Matrix Codes: DW - Drinking Water; GW - Ground Water; WW - Water; SW - Surface Water; SD - Soil; SL - Sludge; OI - Oil; LIQ - Other Liquid; AIR - Air; SOL - Other Solid; WP - Wipe

TURNAROUND TIME (Business Days) — Approved By: / Rush Code

- [ ] 10 Days Standard
- [ ] 7 Day RUSH
- [ ] 5 Day RUSH
- [ ] 3 Day EMERGENCY
- [x] 2 Day EMERGENCY
- [ ] 1 Day EMERGENCY
- [ ] OTHER

Emergency or Rush T/A Data Available VIA Email or Lablink

Data Deliverable Information

- [ ] COMMERCIAL "A" (RESULTS ONLY)
- [ ] COMMERCIAL "B" (RESULTS PLUS QC)
- [ ] REDT[illegible] (LEVEL[illegible])
- [ ] FULT1 (EPA LEVEL[illegible])
- [ ] EDD'S

ACCUTEST
2828 C QUEEN CITY DR
CLT NC 28203

Comments / Remarks

MW-12R Retro Odor

Sample Custody must be documented below each time samples change possession, including courier delivery.

Relinquished by Sampler:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
1	1/23 1830	2 Fed Ex	3 FK	1-24-13	4 J. Cooper (ARS) 09:3
Relinquished by:	Date Time:	Received By:	Relinquished by:	Date Time:	Received By:
5		6	7		8

Lab Use Only: Custody Seal in Place: Y N Temp Blank Provided: Y N Preserved where Applicable: Y N Total # of Coolers: 1 Cooler Temperature (s) Celsius: 3.0

4.1

FA1130: Chain of Custody
Page 1 of 2

RECEIPT CONFIRMATION

ACCUTEST'S JOB NUMBER: FA1130

CLIENT: GSE ENG PROJECT: PIGGLY WIGGLY

DATE/TIME RECEIVED: 1-24-13 09:30 (MM/DD/YY 24:00)

METHOD OF DELIVERY: (FEDEX) UPS ACCUTEST COURIER GREYHOUND DELIVERY OTHER

NUMBER OF COOLERS RECEIVED: 1

AIRBILL NUMBERS: 8994 9312 0768

COOLER INFORMATION

- [ ] CUSTODY SEAL NOT PRESENT OR NOT INTACT
- [ ] CHAIN OF CUSTODY NOT RECEIVED (COC)
- [ ] ANALYSIS REQUESTED IS UNCLEAR OR MISSING
- [ ] SAMPLE DATES OR TIMES UNCLEAR OR MISSING
- [ ] TEMPERATURE CRITERIA NOT MET
- [ ] WET ICE PRESENT

TRIP BLANK INFORMATION

- [ ] TRIP BLANK PROVIDED
- [X] TRIP BLANK NOT PROVIDED
- [X] TRIP BLANK NOT ON COC
- [ ] TRIP BLANK INTACT
- [ ] TRIP BLANK NOT INTACT
- [ ] RECEIVED WATER TRIP BLANK
- [ ] RECEIVED SOIL TRIP BLANK

MISC. INFORMATION

NUMBER OF ENCORES? 25-GRAM____ 5-GRAM____

NUMBER OF 5035 FIELD KITS?

NUMBER OF LAB FILTERED METALS?

TEMPERATURE INFORMATION

- [ ] IR THERM ID 3 CORR. FACTOR +0.4
- [ ] OBSERVED TEMPS: 26
- [ ] CORRECTED TEMPS: 30

SAMPLE INFORMATION

- [ ] SAMPLE LABELS PRESENT ON ALL BOTTLES
- [ ] INCORRECT NUMBER OF CONTAINERS USED
- [ ] SAMPLE RECEIVED IMPROPERLY PRESERVED
- [ ] INSUFFICIENT VOLUME FOR ANALYSIS
- [ ] DATES/TIMES ON COC DO NOT MATCH SAMPLE LABEL
- [ ] ID'S ON COC DO NOT MATCH LABEL
- [ ] VOC VIALS HAVE HEADSPACE (MACRO BUBBLES)
- [ ] BOTTLES RECEIVED BUT ANALYSIS NOT REQUESTED
- [ ] NO BOTTLES RECEIVED FOR ANALYSIS REQUESTED
- [ ] UNCLEAR FILTERING OR COMPOSITING INSTRUCTIONS
- [ ] SAMPLE CONTAINER(S) RECEIVED BROKEN
- [ ] % SOLIDS JAR NOT RECEIVED
- [ ] 5035 FIELD KIT FROZEN WITHIN 48 HOUR'S
- [ ] RESIDUAL CHLORINE PRESENT

(APPICABLE TO EPA 600 SERIES OR NORTH CAROLINA ORGANICS)

SUMMARY OF COMMENTS:

TECHNICIAN SIGNATURE/DATE JC 1-24-13 REVIEWER SIGNATURE/DATE 01/24/13

NF 12/10

receipt confirmation 122910.xls

4.1

FA1130: Chain of Custody
Page 2 of 2

Southeast ACCUTEST LABORATORIES

GC/MS Volatiles

QC Data Summaries

Includes the following where applicable:

- Method Blank Summaries
- Blank Spike Summaries
- Matrix Spike and Duplicate Summaries

Method Blank Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-MB	Z13153.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	Result	RL	MDL	Units	Q
67-64-1	Acetone	ND	25	10	ug/l	
71-43-2	Benzene	ND	1.0	0.21	ug/l	
75-27-4	Bromodichloromethane	ND	1.0	0.20	ug/l	
75-25-2	Bromoform	ND	1.0	0.34	ug/l	
108-90-7	Chlorobenzene	ND	1.0	0.20	ug/l	
75-00-3	Chloroethane	ND	2.0	0.50	ug/l	
67-66-3	Chloroform	ND	1.0	0.26	ug/l	
75-15-0	Carbon disulfide	ND	2.0	0.49	ug/l	
56-23-5	Carbon tetrachloride	ND	1.0	0.31	ug/l	
75-34-3	1,1-Dichloroethane	ND	1.0	0.21	ug/l	
75-35-4	1,1-Dichloroethylene	ND	1.0	0.20	ug/l	
107-06-2	1,2-Dichloroethane	ND	1.0	0.22	ug/l	
78-87-5	1,2-Dichloropropane	ND	1.0	0.26	ug/l	
124-48-1	Dibromochloromethane	ND	1.0	0.20	ug/l	
156-59-2	cis-1,2-Dichloroethylene	ND	1.0	0.24	ug/l	
10061-01-5	cis-1,3-Dichloropropene	ND	1.0	0.22	ug/l	
156-60-5	trans-1,2-Dichloroethylene	ND	1.0	0.23	ug/l	
10061-02-6	trans-1,3-Dichloropropene	ND	1.0	0.21	ug/l	
100-41-4	Ethylbenzene	ND	1.0	0.29	ug/l	
591-78-6	2-Hexanone	ND	10	2.0	ug/l	
108-10-1	4-Methyl-2-pentanone	ND	5.0	2.3	ug/l	
74-83-9	Methyl bromide	ND	2.0	0.79	ug/l	
74-87-3	Methyl chloride	ND	2.0	0.50	ug/l	
75-09-2	Methylene chloride	ND	5.0	2.0	ug/l	
78-93-3	Methyl ethyl ketone	ND	5.0	3.1	ug/l	
100-42-5	Styrene	ND	1.0	0.20	ug/l	
71-55-6	1,1,1-Trichloroethane	ND	1.0	0.20	ug/l	
79-34-5	1,1,2,2-Tetrachloroethane	ND	1.0	0.24	ug/l	
79-00-5	1,1,2-Trichloroethane	ND	1.0	0.20	ug/l	
127-18-4	Tetrachloroethylene	ND	1.0	0.32	ug/l	
108-88-3	Toluene	ND	1.0	0.20	ug/l	
79-01-6	Trichloroethylene	ND	1.0	0.31	ug/l	
75-01-4	Vinyl chloride	ND	1.0	0.44	ug/l	
1330-20-7	Xylene (total)	ND	3.0	0.50	ug/l	

Method Blank Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-MB	Z13153.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries		Limits
1868-53-7	Dibromofluoromethane	100%	87-116%
17060-07-0	1,2-Dichloroethane-D4	104%	76-127%
2037-26-5	Toluene-D8	101%	86-112%
460-00-4	4-Bromofluorobenzene	102%	84-120%

Blank Spike Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-BS	Z13152.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	Spike ug/l	BSP ug/l	BSP %	Limits
67-64-1	Acetone	125	219	175*	59-134
71-43-2	Benzene	25	28.9	116	83-124
75-27-4	Bromodichloromethane	25	26.9	108	76-116
75-25-2	Bromoform	25	26.4	106	68-128
108-90-7	Chlorobenzene	25	28.3	113	87-115
75-00-3	Chloroethane	25	27.7	111	54-166
67-66-3	Chloroform	25	28.5	114	85-123
75-15-0	Carbon disulfide	25	29.8	119	67-147
56-23-5	Carbon tetrachloride	25	27.9	112	74-139
75-34-3	1,1-Dichloroethane	25	28.5	114	82-127
75-35-4	1,1-Dichloroethylene	25	30.0	120	75-133
107-06-2	1,2-Dichloroethane	25	27.2	109	76-122
78-87-5	1,2-Dichloropropane	25	27.5	110	81-120
124-48-1	Dibromochloromethane	25	26.3	105	74-116
156-59-2	cis-1,2-Dichloroethylene	25	27.3	109	81-114
10061-01-5	cis-1,3-Dichloropropene	25	26.7	107	83-119
156-60-5	trans-1,2-Dichloroethylene	25	28.3	113	82-126
10061-02-6	trans-1,3-Dichloropropene	25	27.6	110	87-123
100-41-4	Ethylbenzene	25	27.0	108	87-118
591-78-6	2-Hexanone	125	143	114	58-125
108-10-1	4-Methyl-2-pentanone	125	143	114	62-125
74-83-9	Methyl bromide	25	30.8	123	55-151
74-87-3	Methyl chloride	25	26.2	105	55-173
75-09-2	Methylene chloride	25	27.1	108	69-125
78-93-3	Methyl ethyl ketone	125	176	141*	61-127
100-42-5	Styrene	25	24.5	98	78-118
71-55-6	1,1,1-Trichloroethane	25	29.0	116	79-133
79-34-5	1,1,2,2-Tetrachloroethane	25	26.3	105	71-120
79-00-5	1,1,2-Trichloroethane	25	26.1	104	80-114
127-18-4	Tetrachloroethylene	25	27.7	111	80-131
108-88-3	Toluene	25	27.1	108	86-116
79-01-6	Trichloroethylene	25	28.8	115	85-124
75-01-4	Vinyl chloride	25	29.9	120	57-153
1330-20-7	Xylene (total)	75	79.9	107	86-120

* = Outside of Control Limits.

Blank Spike Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
VZ566-BS	Z13152.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries	BSP	Limits
1868-53-7	Dibromofluoromethane	100%	87-116%
17060-07-0	1,2-Dichloroethane-D4	103%	76-127%
2037-26-5	Toluene-D8	98%	86-112%
460-00-4	4-Bromofluorobenzene	94%	84-120%

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA1130-1MS	Z13175.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1MSD	Z13176.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Compound	FA1130-1 ug/l	Q	Spike ug/l	MS ug/l	MS %	MSD ug/l	MSD %	RPD	Limits Rec/RPD
67-64-1	Acetone	ND		125	109	87	128	102	16*	59-134/14
71-43-2	Benzene	ND		25	26.4	106	23.3	93	12*	83-124/11
75-27-4	Bromodichloromethane	ND		25	25.1	100	17.4	70*	36*	76-116/10
75-25-2	Bromoform	ND		25	22.3	89	13.0	52*	53*	68-128/11
108-90-7	Chlorobenzene	ND		25	26.6	106	23.6	94	12*	87-115/9
75-00-3	Chloroethane	ND		25	26.1	104	21.2	85	21*	54-166/20
67-66-3	Chloroform	2.9		25	29.1	105	25.1	89	15*	85-123/10
75-15-0	Carbon disulfide	ND		25	24.0	96	11.0	44*	74*	67-147/12
56-23-5	Carbon tetrachloride	ND		25	25.1	100	15.1	60*	50*	74-139/13
75-34-3	1,1-Dichloroethane	ND		25	26.3	105	22.2	89	17*	82-127/10
75-35-4	1,1-Dichloroethylene	ND		25	28.1	112	23.3	93	19*	75-133/13
107-06-2	1,2-Dichloroethane	ND		25	24.6	98	23.9	96	3	76-122/11
78-87-5	1,2-Dichloropropane	ND		25	25.6	102	23.1	92	10	81-120/11
124-48-1	Dibromochloromethane	ND		25	23.1	92	14.2	57*	48*	74-116/11
156-59-2	cis-1,2-Dichloroethylene	ND		25	24.8	99	21.9	88	12*	81-114/10
10061-01-5	cis-1,3-Dichloropropene	ND		25	21.6	86	11.5	46*	61*	83-119/10
156-60-5	trans-1,2-Dichloroethylene	ND		25	26.1	104	20.6	82	24*	82-126/10
10061-02-6	trans-1,3-Dichloropropene	ND		25	24.5	98	14.5	58*	51*	87-123/10
100-41-4	Ethylbenzene	ND		25	25.2	101	21.5	86*	16*	87-118/10
591-78-6	2-Hexanone	ND		125	96.7	77	111	89	14	58-125/14
108-10-1	4-Methyl-2-pentanone	ND		125	120	96	131	105	9	62-125/13
74-83-9	Methyl bromide	ND		25	28.0	112	22.5	90	22*	55-151/21
74-87-3	Methyl chloride	ND		25	24.8	99	20.7	83	18	55-173/22
75-09-2	Methylene chloride	ND		25	25.3	101	23.2	93	9	69-125/11
78-93-3	Methyl ethyl ketone	ND		125	109	87	125	100	14*	61-127/13
100-42-5	Styrene	ND		25	20.9	84	18.1	72*	14*	78-118/11
71-55-6	1,1,1-Trichloroethane	ND		25	25.8	103	22.5	90	14*	79-133/11
79-34-5	1,1,2,2-Tetrachloroethane	ND		25	22.5	90	24.2	97	7	71-120/11
79-00-5	1,1,2-Trichloroethane	ND		25	23.4	94	23.3	93	0	80-114/11
127-18-4	Tetrachloroethylene	ND		25	26.3	105	21.2	85	21*	80-131/12
108-88-3	Toluene	ND		25	25.3	101	21.8	87	15*	86-116/10
79-01-6	Trichloroethylene	ND		25	26.5	106	22.1	88	18*	85-124/10
75-01-4	Vinyl chloride	ND		25	28.1	112	22.0	88	24*	57-153/22
1330-20-7	Xylene (total)	ND		75	74.8	100	65.0	87	14*	86-120/10

* = Outside of Control Limits.

Matrix Spike/Matrix Spike Duplicate Summary

Job Number: FA1130
Account: GSESCC GS2 Engineering
Project: Piggly Wiggly; 3818 Devine St, Columbia, SC

Sample	File ID	DF	Analyzed	By	Prep Date	Prep Batch	Analytical Batch
FA1130-1MS	Z13175.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1MSD	Z13176.D	1	01/25/13	KW	n/a	n/a	VZ566
FA1130-1	Z13160.D	1	01/25/13	KW	n/a	n/a	VZ566

The QC reported here applies to the following samples: **Method:** SW846 8260B

FA1130-1, FA1130-2, FA1130-3, FA1130-4, FA1130-5

CAS No.	Surrogate Recoveries	MS	MSD	FA1130-1	Limits
1868-53-7	Dibromofluoromethane	103%	100%	102%	87-116%
17060-07-0	1,2-Dichloroethane-D4	98%	102%	102%	76-127%
2037-26-5	Toluene-D8	98%	98%	101%	86-112%
460-00-4	4-Bromofluorobenzene	92%	96%	97%	84-120%

* = Outside of Control Limits.

Assessor Data View

The information provided on this page reflects data as of **December 31, 2010** and should be used for reference only. For official assessment information, please contact the Richland County Assessor's Office.

Information presented on the Assessor's Database is collected, organized and provided for the convenience of the user and is intended solely for informational purposes. **ANY USER THEREOF OR RELIANCE THEREON IS AT THE SOLE DISCRETION, RISK AND RESPONSIBILITY OF THE USER.** While every attempt is made to provide information that is accurate at the date of publication, portions of such information may be incorrect or not current. **RICHLAND COUNTY HEREBY DISCLAIMS ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, AS TO ITS ACCURACY, COMPLETENESS OR FITNESS FOR ANY PARTICULAR PURPOSE.** All official records of the County and the countywide elected officials are on file in their respective offices and may be viewed by the public at those offices.

Owner Information

Tax Map Number:	R13807-03-02
Owner:	NIGGEL FAMILY PARTNERSHIP
Address 1:	PO BOX 6573
Address 2:	
Address 3	
City/State/Zip:	COLUMBIA SC 29260
Property Location/Code:	3818 DEVINE ST

Tax Information

Year:	2012
Property Tax Relief:	$0.00
Local Option Sales Tax Credit:	($4,198.34)
Tax Amount:	$36,302.11
Paid:	Yes
Homestead:	No
Assessed:	$80,630.00

Assessment Information

Year Of Assessment:	2012	Legal Residence:	No
Tax District:	1CC	Sewer Connection:	CITY
Acreage Of Parcel:	0.00	Water Connection:	CITY
Non-Agriculture Value:	$517,300.00	Agriculture Value:	$0.00
Building Value:	$859,300.00	Improvements:	$0.00
Taxable Value:	$1,343,900.0		
Zoning:	C-3	GENERAL COMMERCIAL	

Property Information

Legal Description:	182X397X275X105&ETC	#SU
	ETC	#PR
Land Type:	COMMERCIAL LAND	

Sales History

Current Owner Name	Sale Date	V/I	Book/Page	Sale Price	Qual Code
NIGGEL FAMILY PARTNERSHIP	00/00/1974		D319 / 781	$0.00	

Qualification Code Definitions

Structure Information

Building Number	Year Structure Was Assessed	Building Description	Actual Year Built	Number Of Bathrooms	Number Of Bedrooms	Total Number Of Stories	Heated Square Footage	Total Square Footage
1	2009	SUPERMARKET - WALL GROUP 3	1975	1.0	0	1.0	33366	35298

Structure Details

Structure Type	Structure Description	Building Number
Building Element	AC TYPE...CENTRAL	1
Building Element	ARCHITECTURAL STYLE...MISCELLANEOUS	1
Building Element	BUILDING SHAPE...RECTANGLE	1
Building Element	ELECTRICAL...AVERAGE	1
Building Element	EXTERIOR WALL 1...FACE BRICK VENEER	1
Building Element	EXTERIOR WALL 2...CONCRETE OR CINDER	1
Building Element	FOUNDATION...CONTINUOUS FOOTING	1
Building Element	HEAT TYPE/FUEL...FORCED AIR DUC/ELEC	1
Building Element	INSULATION...AVERAGE	1
Building Element	INTERIOR FLOOR 1...ASPHALT TILE	1
Building Element	INTERIOR WALL 1...1-M/M SUSPENDED	1
Building Element	INTERIOR WALL 2	1
Building Element	ROOF COVER...TAR AND GRAVEL	1
Building Element	ROOF STRUCTURE...FLAT	1
Building Element	STRUCTURAL FRAME...MASONRY	1

Exemptions

Exemption Year	Exemption Description

Assessor Data View

The information provided on this page reflects data as of **December 31, 2010** and should be used for reference only. For official assessment information, please contact the Richland County Assessor's Office.

Information presented on the Assessor's Database is collected, organized and provided for the convenience of the user and is intended solely for informational purposes. **ANY USER THEREOF OR RELIANCE THEREON IS AT THE SOLE DISCRETION, RISK AND RESPONSIBILITY OF THE USER.** While every attempt is made to provide information that is accurate at the date of publication, portions of such information may be incorrect or not current. **RICHLAND COUNTY HEREBY DISCLAIMS ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, AS TO ITS ACCURACY, COMPLETENESS OR FITNESS FOR ANY PARTICULAR PURPOSE.** All official records of the County and the countywide elected officials are on file in their respective offices and may be viewed by the public at those offices.

Owner Information

Tax Map Number:	R13807-03-01
Owner:	NIGGEL FAMILY PARTNERSHIP
Address 1:	THE
Address 2:	PO BOX 6573
Address 3	
City/State/Zip:	COLUMBIA SC 29260
Property Location/Code:	630 KILBOURNE RD

Tax Information

Year:	2012
Property Tax Relief:	$0.00
Local Option Sales Tax Credit:	($1,330.20)
Tax Amount:	$11,503.57
Paid:	Yes
Homestead:	No
Assessed:	$25,550.00

Assessment Information

Year Of Assessment:	2012	Legal Residence:	No
Tax District:	1CC	Sewer Connection:	CITY
Acreage Of Parcel:	0.00	Water Connection:	CITY
Non-Agriculture Value:	$245,000.00	Agriculture Value:	$0.00
Building Value:	$180,800.00	Improvements:	$0.00
Taxable Value:	$425,800.00		
Zoning:	C-3	GENERAL COMMERCIAL	

Property Information

Legal Description:	175X175	#PR
	#SU	#OM 0081-05-01A
Land Type:	COMMERCIAL LAND	

Sales History

Current Owner Name	Sale Date	V/I	Book/Page	Sale Price	Qual Code
NIGGEL FAMILY PARTNERSHIP	00/00/1974		D310 / 757	$0.00	

Qualification Code Definitions

Structure Information

Building Number	Year Structure Was Assessed	Building Description	Actual Year Built	Number Of Bathrooms	Number Of Bedrooms	Total Number Of Stories	Heated Square Footage	Total Square Footage
1	2009	STORE/1 STORY - WALL GROUP 3	2001	0.5	0	1.0	4200	4200

Structure Details

Structure Type	Structure Description	Building Number
Building Element	AC TYPE...CENTRAL	1
Building Element	ALARM/SMOKE...ALARM/SMOKE	1
Building Element	ARCHITECTURAL STYLE...MISCELLANEOUS	1
Building Element	BUILDING SHAPE...RECTANGLE	1
Building Element	ELECTRICAL...AVERAGE	1
Building Element	EXTERIOR WALL 1...FACE BRICK VENEER	1
Building Element	FOUNDATION...CONTINUOUS FOOTING	1
Building Element	HEAT TYPE/FUEL...FORCED AIR DUC/ELEC	1
Building Element	INSULATION...AVERAGE	1
Building Element	INTERIOR FLOOR 1...CARPET	1
Building Element	INTERIOR FLOOR 2...CORK OR VINYL TILE	1
Building Element	INTERIOR WALL 1...3-P/D SUSPENDED	1
Building Element	ROOF COVER...ASPHALT SHINGLE	1
Building Element	ROOF STRUCTURE...GABLE OR HIP	1
Building Element	STRUCTURAL FRAME...WOOD FRAME	1

Exemptions

Exemption Year	Exemption Description

LETTER OF TRANSMITTAL

Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

UST 19466 DOCKETING

UST MAR 2 5 2013 PROGRAM

TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 3/22/13	JOB NO. 73078012
RE: Former SC-015, Columbia UST Permit No. 07680	
AFVR Report	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	3/22/13	AFVR Report

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS: **Susan,**

Enclosed is the Report of AFVR for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

Aggressive Fluid Vapor Recovery (AFVR) Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680



March 22, 2013
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide Established in 1965
Employee-Owned terracon.com

Terracon

Geotechnical ● Environmental ● Construction Materials ● Facilities

Terracon

March 22, 2013

Ms. Susan Fulmer
Underground Storage Tank Program
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: **Aggressive Fluid Vapor Recovery Report**
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 44747
Terracon Project No. 73078012

Dear Ms. Fulmer:

On behalf of Crown Central LLC, **Terracon Consultants, Inc. (Terracon)** is pleased to submit this Aggressive Fluid Vapor Recovery (AFVR) report for the Former SC-015 site located in Columbia, South Carolina.

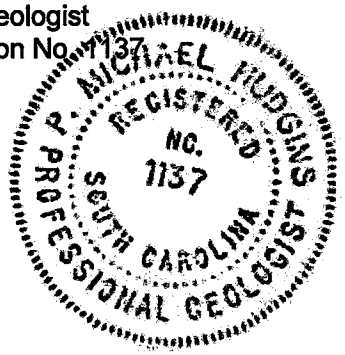
If you have any questions regarding the contents of this report, or if there is a need for further information, please contact us.

Respectfully submitted,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

Regan W. Norris
Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137



Enclosures

cc: Jim Janson / Crown Central LLC

TABLE OF CONTENTS

Aggressive Fluid Vapor Recovery Report
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680, CA # 44747
Terracon Project No. 73078012

SECTION PAGE NO.

Cover Letter

1.0 INTRODUCTION **1**
1.1 Facility Information 1
1.2 Site History 1
2.0 AGGRESSIVE FLUID VAPOR RECOVERY **2**
3.0 CONCLUSIONS AND RECOMMENDATIONS **3**

FIGURES

1 Site Location Map
2 Site Map

APPENDICES

A AFVR Field Data
B Waste Disposal Manifests

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed the Aggressive Fluid Vapor Recovery (AFVR) at the former SC-015 site located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #44747, the Risk Based Corrective Action (RBCA) guidance document, and in accordance with the UST Quality Assurance Program Plan QAPP) prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders to the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

1.2 Site History

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed in previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total of five AFVR events were performed in April 2010 and February - August 2012 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 305 pounds of pounds of volatile organic compounds (VOCs) were removed from the subsurface.

In November 2012, SCDHEC issued a directive for two Aggressive Fluid Vapor Recovery (AFVR) from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

Aggressive Fluid Vapor Recovery (AFVR) was utilized to extract dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface. Figure 2 is a site map showing monitoring well locations.

The AFVR events were performed using trailer-mounted vacuum extraction rig equipped with a DEKKER oil-sealed liquid rig pump and an air-water separator unit. Prior to system start up the trailer mounted unit was grounded with a cooper grounding rod connected to the trailer by a metal ground cable to reduce the potential of an explosion hazard due to static electricity.

One-inch diameter PVC stinger tubes with airtight 2-inch by 1-inch well seals were set approximately six-inches into the water table, and were adjusted according to water level changes during the event to minimize water production and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. Vacuum pressures were monitored at each wellhead during the events, and were adjusted to optimize the flow to the system.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an anemometer at the system exhaust stack. The concentrations were recorded on Field Data Sheet, included Appendix A.

On November 13, 2012, Event #6 was performed on monitoring wells MW-5R and MW-21. No free product was not detected in either monitoring well prior to or after the AFVR event. The velocity and VOC concentration of off-gas from the vacuum rig were measured using an anemometer and a TLV Sniffer with a 10X dilution probe. Approximately 57.2 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

On December 10, 2012, Event #7 was performed on monitoring wells MW-5R and MW-21. No free product was detected in either monitoring well prior to or after the AFVR event. Approximately 58 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a magnehelic gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

Approximately 30 gallons of petroleum-impacted groundwater was extracted during the Event #6 event and was disposed by A&D Environmental, Lexington, South Carolina. The ground water extracted during Event #7 was disposed by Crandall Corporation; Lexington, South Carolina The disposal manifests for the extracted ground water generated from Events # 6 and 7 are included in Appendix B.

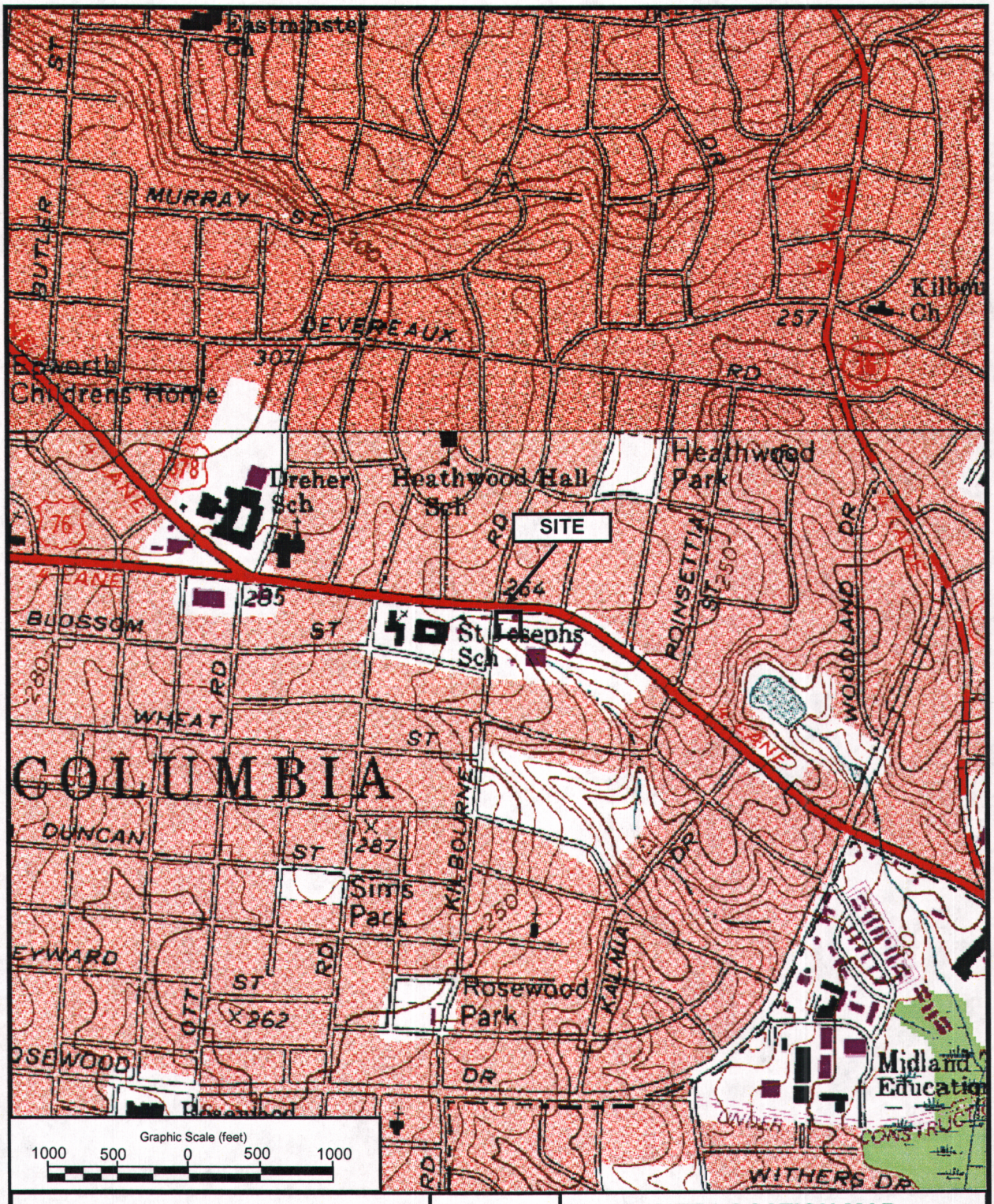
3.0 CONCLUSIONS AND RECOMMENDATIONS

AFVR appears to be effective at removing petroleum hydrocarbons from the soils and ground water at this site. Over the past seven events the vacuum extraction has mobilized high dissolved phase hydrocarbons from the surrounding area toward the two extraction wells.

Additional AFVR events are recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

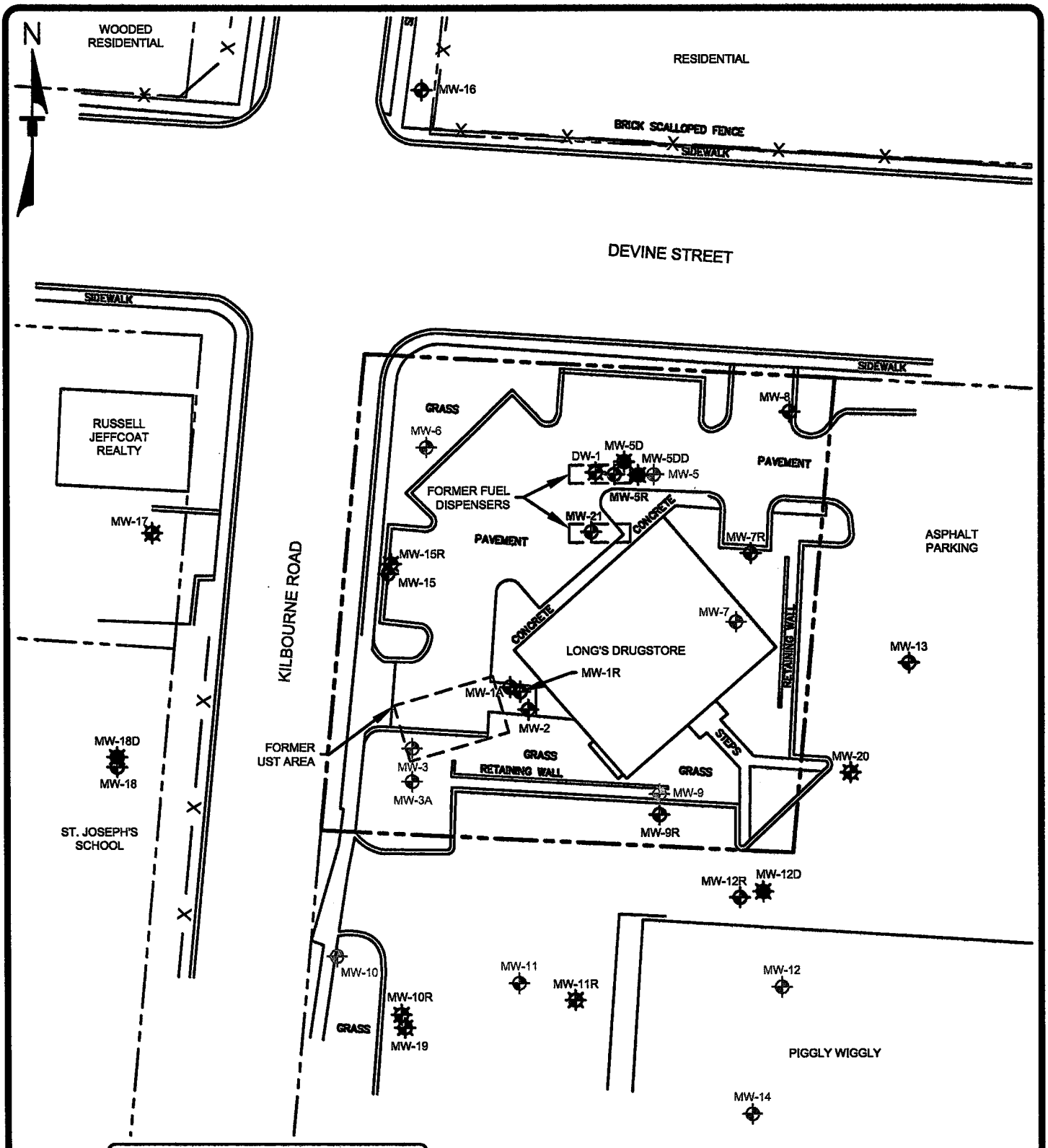
DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr:	PMH	Terracon	Project No. 73078012
Designed By:	PMH		Scale: 1 IN = 50 FT
Checked By:	PMH	521 Clemson Road Columbia, South Carolina 29229	Date: 4-23-09
Approved By:	PMH		Drawn By: PTK
File Name: \73078012.dwg			Figure No. 2

APPENDIX A

AFVR Field Data

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			11/13/2012 Temp: 62				Event #: 6		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	6:00	6:30	30	3,600	4,000	3,800	2,971	2,912	2,942	64.12	2.88	1.44	1.44
	6:30	7:00	30	4,000	6,400	5,200	2,912	3,347	3,130	68.22	4.19	2.09	3.53
	7:00	7:30	30	6,400	6,800	6,600	3,347	3,305	3,326	72.51	5.65	2.82	6.35
	7:30	8:00	30	6,800	6,800	6,800	3,305	3,999	3,652	79.61	6.39	3.19	9.55
	8:00	8:30	30	6,800	7,000	6,900	3,999	3,977	3,988	86.94	7.08	3.54	13.09
	8:30	9:00	30	7,000	7,200	7,100	3,977	3,952	3,965	86.43	7.24	3.62	16.71
	9:00	9:30	30	7,200	7,200	7,200	3,952	3,994	3,973	86.61	7.36	3.68	20.39
	9:30	10:00	30	7,200	7,200	7,200	3,994	4,062	4,028	87.81	7.46	3.73	24.12
	10:00	10:30	30	7,200	7,200	7,200	4,062	4,462	4,262	92.91	7.89	3.95	28.06
	10:30	11:00	30	7,200	7,400	7,300	4,462	4,630	4,546	99.10	8.54	4.27	32.33
	11:00	11:30	30	7,400	7,400	7,400	4,630	4,816	4,723	102.96	8.99	4.50	36.83
	11:30	12:00	30	7,400	7,400	7,400	4,816	4,602	4,709	102.66	8.96	4.48	41.31
	12:00	12:30	30	7,400	7,400	7,400	4,602	4,412	4,507	98.25	8.58	4.29	45.60
	12:30	13:00	30	7,400	7,400	7,400	4,412	4,321	4,367	95.19	8.31	4.16	49.76
	13:00	13:30	30	7,400	7,600	7,500	4,321	3,657	3,989	86.96	7.70	3.85	53.60
	13:30	14:00	30	7,600	7,600	7,600	3,657	3,704	3,681	80.23	7.20	3.60	57.20

Total Extraction Time..... 8.0 hours

Total Liquid Volume..... 30 gallons

Total Liquid-phase Hydrocarbon..... gallons

Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. 9.7 gallons

Total Hydrocarbon Recovery:..... 9.7 gallons

TOTAL lbs of VOC emissions = 57.20

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	16.65	–	–
MW-21	16.75	–	–

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	16.5	–	–
MW-21	17.2	–	–

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 6 Date: 11-13-12

Time	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
6:00	211	109	150	0.05	0	0.05	0	0
6:30	211	109	150	0.1	0	0.05	0	0
7:00	211	109	143	0.1	0	0.1	0.05	0
7:30	204	109	136	0.1	0	0.15	0.05	0
8:00	204	109	143	0.15	0	0.2	0.1	0
8:30	197	109	136	0.1	0	0.15	0.15	0
9:00	197	109	122	0.1	0	0.1	0.2	0
9:30	197	109	122	0.1	0	0.15	0.2	0
10:00	197	109	122	0.1	0	0.15	0.2	0
10:30	197	109	122	0.1	0	0.15	0.1	0
11:00	190	109	122	0.05	0	0.1	0.1	0
11:30	190	109	122	0.05	0	0	0.1	0
12:00	190	109	122	0.05	0	0	0.05	0
12:30	190	109	122	0.05	0	0	0.05	0
13:00	190	109	122	0.05	0	0	0.05	0
13:30	190	109	122	0.05	0	0	0.05	0
14:00	190	109	122	0.05	0	0	0.05	0

Notes: 1. All measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.

AVFR FIELD DATA SHEET

Terracon		Site: SC-015		Project No.: 73078012			12/10/2012 Temp: 55				Event #: 7		
				VOC Concentrations			Off-Gas Velocity (FPM)				VOC Emissions		
	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)	Total Flow (CFM)	Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	8:00	8:30	30	6,200	7,400	6,800	2,592	2,524	2,558	55.76	4.47	2.24	2.24
	8:30	9:00	30	7,400	7,200	7,300	2,524	3,986	3,255	70.96	6.11	3.06	5.29
	9:00	9:30	30	7,200	7,000	7,100	3,986	4,112	4,049	88.27	7.40	3.70	8.99
	9:30	10:00	30	7,000	7,000	7,000	4,112	4,349	4,231	92.22	7.62	3.81	12.80
	10:00	10:30	30	7,000	7,000	7,000	4,349	4,266	4,308	93.90	7.76	3.88	16.68
	10:30	11:00	30	7,000	7,200	7,100	4,266	4,150	4,208	91.73	7.69	3.84	20.52
	11:00	11:30	30	7,200	7,200	7,200	4,150	3,914	4,032	87.90	7.47	3.73	24.25
	11:30	12:00	30	7,200	7,200	7,200	3,914	3,432	3,673	80.07	6.80	3.40	27.66
	12:00	12:30	30	7,200	7,400	7,300	3,432	3,561	3,497	76.22	6.57	3.28	30.94
	12:30	13:00	30	7,400	7,400	7,400	3,561	3,593	3,577	77.98	6.81	3.40	34.34
	13:00	13:30	30	7,400	7,400	7,400	3,593	3,886	3,740	81.52	7.12	3.56	37.90
	13:30	14:00	30	7,400	7,400	7,400	3,886	4,140	4,013	87.48	7.64	3.82	41.72
	14:00	14:30	30	7,400	7,400	7,400	4,140	4,233	4,187	91.27	7.97	3.98	45.71
	14:30	15:00	30	7,400	7,200	7,300	4,233	4,412	4,323	94.23	8.12	4.06	49.77
	15:00	15:30	30	7,200	7,400	7,300	4,412	4,409	4,411	96.15	8.28	4.14	53.91
	15:30	16:00	30	7,400	7,200	7,300	4,409	4,426	4,418	96.30	8.30	4.15	58.05

Total Extraction Time..... **8.0** **hours**
Total Liquid Volume..... **50** **gallons**
Total Liquid-phase Hydrocarbon..... **gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **9.8** **gallons**
Total Hydrocarbon Recovery:..... **9.8** **gallons**

TOTAL lbs of VOC emissions = 58.05

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack radius = 2 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.0218 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Radius = 2 in.

Water / Product Levels

Pre Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	16.82	–	–
MW-21	16.87	–	–

Post Event

Well No.	Depth to Water	Depth to Product	Product Thickness
MW-5R	16.71	–	–
MW-21	17.4	–	–

VACUUM RADIUS OF INFLUENCE

SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 7 Date: 12-10-12

Time	Stinger Head Vacuum			MW-1R	DW-1	MW-7R	MW-8	MW-15R
	MW-5R	MW-21	System Vacuum	Distance to Nearest Pumped Well				
				63 ft	5 ft	62 ft	68 ft	75 ft
8:00	204	109	143	0.05	0	0.05	0	0
8:30	204	116	150	0.1	0	0.05	0	0
9:00	204	116	143	0.05	0	0.15	0	0
9:30	204	109	136	0.1	0	0.15	0.1	0
10:00	204	109	143	0.1	0	0.15	0.1	0
10:30	204	109	136	0.1	0	0.15	0.1	0
11:00	204	109	136	0.1	0	0.15	0.1	0
11:30	204	109	136	0.1	0	0.15	0.05	0
12:00	204	109	136	0.1	0	0.15	0.05	0
12:30	204	109	136	0.1	0	0.15	0.05	0
13:00	204	109	136	0.1	0	0.15	0.05	0
13:30	204	109	143	0.1	0	0.15	0.05	0
14:00	204	109	143	0.1	0	0.15	0.05	0
14:30	204	109	143	0.1	0	0.15	0.05	0
15:00	204	109	136	0.1	0	0.1	0.05	0
15:30	204	109	136	0.1	0	0.1	0.05	0
16:00	204	109	143	0.1	0	0.15	0.05	0

Notes: 1. All measurements recorded in inches of water.
2. Vacuum radius of influence is denoted as negative pressure.

APPENDIX B

Waste Disposal Manifests

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address
Crown Petroleum LLC
PO Box 1163
Baltimore, Md 21203
Generator's Phone:

Generator's Site Address (if different than mailing address)
SC-015

6. Transporter 1 Company Name: VERG — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address
ADD Environmental
1741 Calks Ferry Rd
Lexington SC
Facility's Phone: — U.S. EPA ID Number:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Non Haz Wste	1	St	30	GAL	30
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Officer's Printed/Typed Name: Neil Acre — Signature — Month: 11 Day: 16 Year: 12

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Robert Green — Signature — Month: 11 Day: 16 Year: 12

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Bill Hilton — Signature — Month: 11 Day: 16 Year: 12

6-NHM-C-SO-1158

2-DESIGNATED FACILITY TO GENERATOR

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST	1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address: CROWN CENTRAL, LLC, PO Box 1168, Baltimore, MD 21201-1168
Generator's Phone:

Generator's Site Address (if different than mailing address): SCE&G, 3900 Devine St, Columbia SC, UST# 07680

6. Transporter 1 Company Name: VREED — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address: CRANDALL, 100 Rick Lee Dr, Lexington SC — U.S. EPA ID Number:
Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. NON HAZ EFR H2O	1	VT	50	GAL	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information

14. GENERATOR'S CERTIFICATION: I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Neil Akre — Signature — Month: 1 — Day: 31 — Year: 13

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Robert Frelin — Signature — Month: 1 — Day: 31 — Year: 13

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number:
Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Eddie Caldwell — Signature — Month: 10 — Day: 13 — Year: 13

6-NHM-C-SO-1158

2-DESIGNATED FACILITY TO GENERATOR

D H E C

PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director

Promoting and protecting the health of the public and the environment

APR 01 2013

UST DOCKETING 20kch

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21203-1168

Re: **QAPP Contractor Addendum Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680
Release Reported August 15, 1989
AFVR Report received March 25, 2013
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control recognizes your commitment to continue work at this site using Terracon as your contractor. The next scope of work is a groundwater sampling event as outlined in the UST Quality Assurance Program Plan (QAPP). Please have your contractor plan to conduct a comprehensive sampling event in accordance with the QAPP and in compliance with all applicable regulations. The wells should be sampled for BTEX, naphthalene, MTBE, 1,2-DCA, ethanol, the oxygenates, and EDB. A copy of the QAPP is available at http://www.scdhec.gov/environment/lwm/usthome/Qapp.htm.

Your contractor must complete and submit a QAPP Contractor Addendum and cost agreement for the aforementioned scope of work within 30 days of the date of this letter. Upon review and approval of the Addendum and cost agreement, the Division will issue a directive to you for the work.

On all correspondence concerning this site, please reference UST Permit # 07680. If there are any questions, feel free to contact me by telephone at (803) 896-6676, by fax at (803) 896-6245, or by e-mail at fulmersb@dhec.sc.gov.

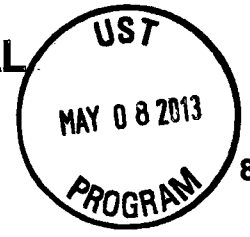
Sincerely,

Susan B. Fulmer

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229
Technical File

LETTER OF TRANSMITTAL



Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

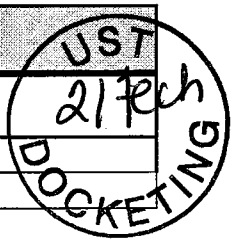
TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 5/6/13	JOB NO. 73078012
RE: Former SC-015, Columbia UST Permit No. 07680	
QAPP Addendum	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	5/6/13	QAPP Addendum



THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment

☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections

☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS: **Susan,**

Enclosed is the QAPP Addendum for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

Appendix B: Contractor Addendum

Section A: Project Management

A1 Title and Approval Page

Quality Assurance Project Plan
Addendum to the SC DHEC UST Programmatic QAPP
for
Former SC-015
3800 Devine Street, Columbia, South Carolina

UST Permit # 07680

Prepared by:
Mike Hudgins / Terracon Project Manager

Terracon

521 Clemson Road
Columbia, South Carolina

Date: 3 May 2013

Terracon Consultants, Inc.
UST Contractor Certification # 246

Approvals

Susan Fulmer SC DHEC Project Manager	_____ Signature	Date	_____
Mike Hudgins Terracon Project Manager	P. Michael Hudgins Signature	Date	5/6/13
Chuck Clymer Terracon QA Manager	Chuck Clymer Signature	Date	5/6/13
Ashley Amick Laboratory Director	aa Signature	Date	5/3/13
Scott Bailey GCAL Laboratory Director	Signed by: Shannon Gautreau Date: Fri May 3 2013 15:57:45 Signature	Date	Signed by: Shannon Gautreau Date: Fri May 3 2013 16:58:03 5/3/13

A2 Table of Contents

A1 Title and Approval Page 2
A2 Table of Contents 3
A3 Distribution List 5
Table 1A Addendum Distribution List 5
A4 Project Organization 5
Figure 1A Organizational Chart 9
A5 Problem Definition/Background 9
A6 Project/Task Description 10
A8 Training and Certificates 11
Table 3A Required Training and Licenses 11
A9 Documents and Records 12
Table 4A Record Identification, Storage, and Disposal 13

SECTION B MEASUREMENT/DATA ACQUISITION **13**
B1 Sampling Process/Experimental Design 13
Table 5A Sampling Activities 13
B2 Sampling Methods 13
Table 6A Field Corrective Action 16
B3 Sample Handling and Custody 17
B4 Analytical Methods 18
Table 7A Analytical SOPs and Referenced Methods 19
Table 8A SOP Abbreviation Key 19
B5 Quality Control Requirements: 20
B6 Field Instrument and Equipment Testing, Inspection and Maintenance 20
Table 11A Instrument and Equipment Maintenance 21
Table 12A Instrument and Equipment Inspection 22
Table 13A Instrument Calibration Criteria and Corrective Action 23
B8 Inspection/Acceptance Requirements for Supplies and Consumables 23
Table 14A List of Consumables and Acceptance Criteria 24
B9 Data Acquisition Requirements (Non-Direct Measurements) 24
B10 Data Management 25

SECTION C ASSESSMENT AND OVERSIGHT **28**
C1 Assessment and Response Actions **28**
C2 Reports to Management 29

SECTION D DATA VALIDATION AND USABILITY **29**

ATTACHMENTS

Attachment A - Sample Chain of Custody

Attachment B - Sample Equipment Calibration Sheet

Attachment C – UST QAPP Appendix H, Standard Field Cleaning Procedures

Attachment D - Figures

Figure 1 - Site Location Map (USGS Topographic Map)

Figure 2 - Site Map

A3 Distribution List

Name	Title	Organization/ Address	Telephone Number	Fax Number	Email Address
Susan Fulmer	SC DHEC Technical Project Manager	SCDHEC, UST Management Division, 2600 Bull St., Columbia, SC, 29201	803-896-6676	803-896-6245	fulmersb@dhec.sc.gov
Mike Hudgins	Site Rehabilitation Contractor	Terracon 521 Clemson Rd. Columbia, SC 29229	803-741-9000	803-741-9900	pmhudgins@terracon.com
Regan Norris	Project Coordinator				ranorris@terracon.com
Ashley Amick	Laboratory Director	Access Analytical 7478 Carlisle St. Irmo, SC 29063	803-781-4243	803-781-4303	aamick@axs-inc.com
Scott Bailey	Laboratory Director	Gulf Coast Analytical Laboratories (GCAL)	225-769-4900	225-765-5717	scott.bailey@gcal.com
Neil Akre	Field Technician	Terracon 521 Clemson Rd. Columbia, SC 29229	803-741-9000	803-741-9900	rnacre@terracon.com

Table 1A Addendum Distribution List

A4 Project Organization

Role from the UST Master QAPP	Name of person in this Role for this Project	Organization/ Address	Telephone Number	Fax Number	Email Address
Technical Project Manager	Susan Fulmer	SCDHEC, UST Management Division, 2600 Bull St., Columbia, SC, 29201	803-896-6676	803-896-6245	fulmersb@dhec.sc.gov
Site Rehabilitation Contractor	Mike Hudgins	Terracon 521 Clemson Road Columbia, SC 29229	803-741-9000	803-741-9900	pmhudgins@terracon.com
Project Coordination	Regan Norris				ranorris@terracon.com
Analytical Laboratory Director	Ashley Amick	Access Analytical 7478 Carlisle St. Irmo, SC 29063	803-781-4243	803-781-4303	aamick@axs-inc.com
Laboratory Director	Scott Bailey	Gulf Coast Analytical Laboratories (GCAL)	225-769-4900	225-765-5717	scott.bailey@gcal.com
Project QA Manager	Chuck Clymer	Terracon 521 Clemson Road Columbia, SC 29229	803-741-9000	803-741-9900	crclymer@terracon.com

Table 2A Addendum Role Identification and Contact Information

Project activities will be organized and conducted in accordance with the UST Master QAPP, and this Site-Specific QAPP Addendum. Assessment activities will be performed using various Terracon resources, relevant subcontractor resources, and management guidance and oversight from both Terracon and the SCDHEC. The local project office for this assessment is Terracon's Columbia, South Carolina, office, a Class I UST Site Rehabilitation Contractor (UST Contractor Certification No. 246).

Site Rehabilitation Contractor / Terracon Project Manager

Mike Hudgins, PG, Terracon Project Manager will be responsible and completing assessments and evaluations. **This individual will be the primary point of contact for project-specific concerns.** The Project Manager will be the primary decision maker for the project and the primary user of the data to determine whether or not further action is required at the site. He will also coordinate the project activities and specific responsibilities to include:

- Development of the QAPP and subsequent revisions in terms of project- specific requirements.
- Overall responsibility of the investigation.
- Conducting project activities in accordance with the QAPP and work order.
- Validating field data.
- Reporting to the SCDHEC Project Manager and the UST Owner Operator – Crown Central, LLC (Crown), regarding the project status per the work order and preparing interim and final reports to SCDHEC and Crown.
- Making final project decisions with the authority to commit the necessary resources to conduct the project.
- Instituting corrective actions for problems encountered in the field sampling activities.
- Communicating corrective actions to the Project Manager, and Project Coordinator and field personnel to remedy problems encountered in the field and coordinating with the lab director to correct any corresponding problems encountered in the chemical analyses.
- Compiling documentation detailing any corrective actions and providing them to the SCDHEC Project Manager.

The Terracon Project Manager has "stop work" authority if compromised QC and/or safety procedures are observed.

Terracon Project Coordinator

The Terracon Project Coordinator will be ***Mr. Regan Norris***, a Terracon environmental scientist with more than nine years of relevant UST assessment and remediation experience. The project coordinator will schedule field staff and subcontractor activities, and Terracon field staff and subcontractors will report directly to this person as the Field Team Leader. Additionally this position will include:

- Coordinating and scheduling field and laboratory activities and personnel;
- Setup of project to include obtaining legal property access and highway department encroachment authorization;
- Notification of site personnel and property owners of site activities and schedule;
- Equipment access and utility clearance;
- Sampling supplies and laboratory kits and equipment needed for compliance with the project Health and Safety plan;
- Field documentation and verification of data from each field team to be delivered from the field.

Terracon Field Staff - The Project Manager will draw field staff resources from the Columbia, South Carolina Terracon office. These individuals will be identified once field activities are scheduled. These individuals will perform the actual fieldwork per the QAPP and at the direction of the Project Manager and Coordinator. The field team typically consists of one to two personnel and will be assigned by the field team leader for each project.

Terracon Project QA/QC Manager

The Terracon QA/QC Manager provides documentation audits and technical review to assist in promoting, implementing, and documenting QA compliance. The Terracon QA/QC Manager is isolated from the implementation chain-of-command. This allows lateral support as a peer to the Project Manager without introducing unintentional biases from conducting the work. The Terracon QA/QC Manager must have extensive environmental and regulatory assessment experience at both the state and federal levels.

Mr. Charles R. Clymer, Jr., P.G. fills this role with more than 32 years of relevant experience and is an Authorized Project Reviewer under the Terracon Corporate Quality Program. He will support general QA/QC efforts and provide input on key technical issues, as well as provide project steering and evaluation of each assessment versus project-specific data quality objectives and goals.

The Terracon QA/QC review will also request field data sheets, calibration documentation for field instruments, and the field-derived data appropriate for QA compliance evaluation directly from the Terracon Project Manager directly on an as needed basis. Mr. Clymer will communicate directly with the contract laboratory, Access Analytical, Inc., to obtain pertinent deliverables concerning fixed-laboratory derived data. These data, including instrument calibrations, duplicate readings, and other quality checks, will be supplied directly to the Terracon QA/QC Manager in the form of electronic "raw data". The Terracon QA/QC Manager will then conduct data validation procedures as outlined in Sections D-1 and D-3 of this document.

The QA/QC Review will independently produce and review data validation deliverables. These findings will then be incorporated into the final report by the Terracon Project Manager. The findings will then be subject to a secondary review by the UST Program Support staff.

Contract Laboratory Manager

Mr. Ashley Amick, Senior Project Manager with Access Analytical the Contract Laboratory Manager is the local analytical laboratory contact for this project and will serve as the Contract Laboratory Manager. All requests for sample containers will be reviewed by the Contract Laboratory Manager prior to the initiation of data collection for fixed-laboratory analyses. Subsequent to analyses, but before data deliverables are generated, the Contract Laboratory Manager will conduct second-tier data review as described in the Access Analytical, Inc. & Gulf Coast Analytical Labs Comprehensive Quality Assurance Plan, Section I: Partnership Overview. The Contract Laboratory Manager will communicate directly with the Terracon QA/QC Manager during QA/QC review.

Mr. Amick and his direct report, Ms. Angela Martin, will communicate directly with the Terracon QA/QC Manager to provide pertinent deliverables.

Mr. Scott Bailey, serves as the Laboratory Director for GCAL, who will ensure all analyses are conducted in accordance with the requested methods. Additionally, this individual will coordinate with the GCAL's Data Validation Manager and QA Director for maintaining compliance with the GCAL QAP. The roles of the GCAL personnel are defined further in the GCAL QAP.

The lab director will be responsible for the following:

1. Providing sample kits with appropriate QA/QC blanks to Terracon personnel, initiating the Chain of Custody for the samples;
2. Distribute the applicable sections of the QAPP and subsequent revisions to members of the analytical team;
3. Coordinating the analysis of the samples and the laboratory validation of the data;
4. Coordinate the receipt of the samples at the laboratory, select the analytical team, ensure internal laboratory audits are conducted per the GCAL Quality Assurance Manual (QAM),
5. Instituting corrective actions for problems encountered in the chemical analyses and reporting laboratory problems affecting the project data to the Terracon project manager, the GCAL Laboratory Director, GCAL QC Director, and project QA/QC officer. Corrective actions for chemical analyses will be detailed in a QA report that will be provided via electronic and conventional mail.

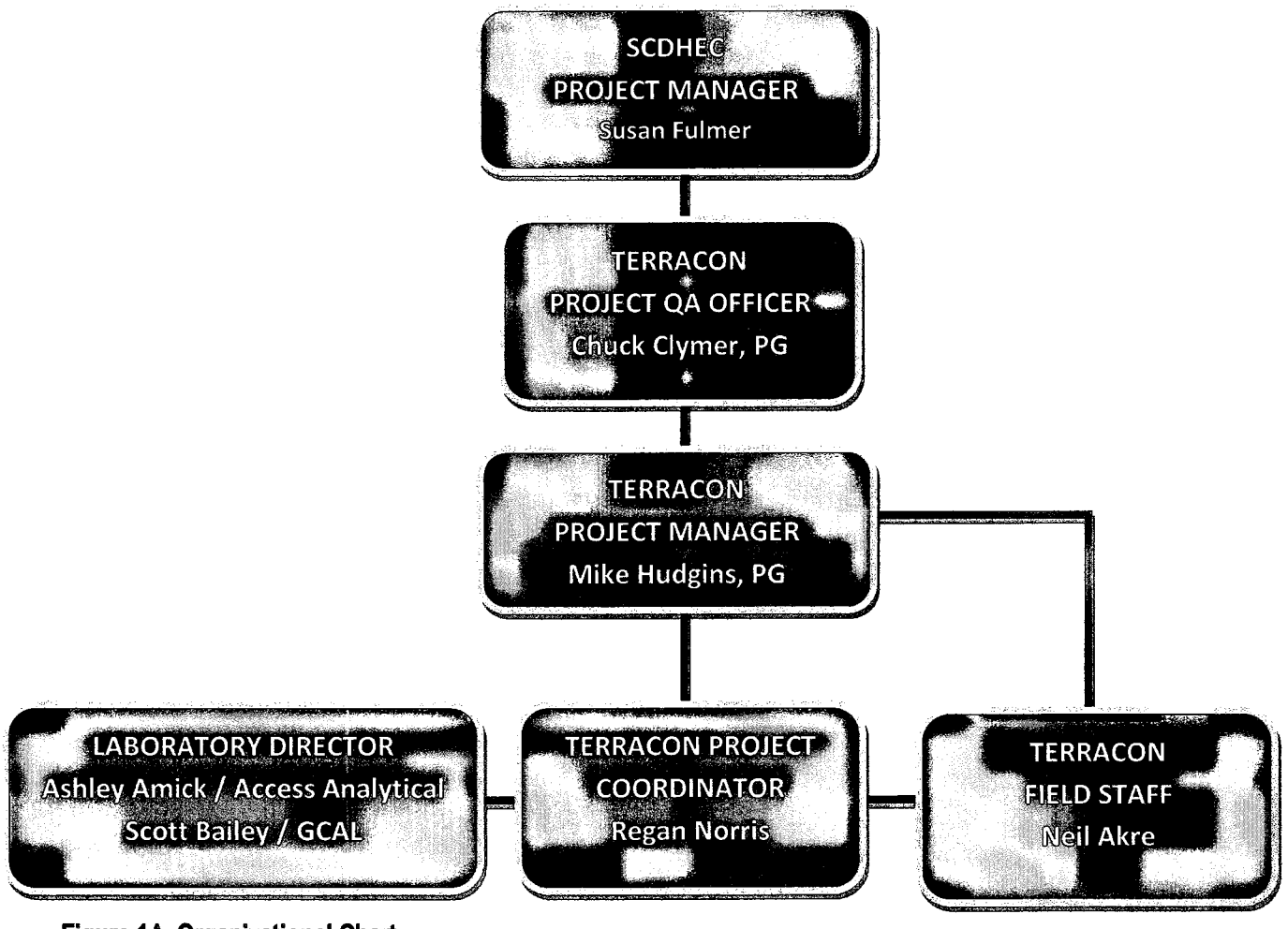


Figure 1A Organizational Chart

A5 Problem Definition/Background

Discuss the background (as much as is known) of the site and appropriate historical information, and why this site is being assessed.

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

Site History

Assessments by Terracon have been performed to define the plume and remove free product. The salient points of these assessments are summarized below:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total of five AFVR events were performed in April 2010 and February - March 2012, and July 2012 and August 2012 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 300 pounds of volatile organic compounds (VOCs) were removed from the subsurface.

Additional AFVR events are recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

Please answer the following: Does this project fall under UST or Brownfields area? UST

A6 Project/Task Description

1. ***Summarize what is known about the work to be done. This can be a short sentence indicating what the Scope of this project is (see Master QAPP Section A6).***

The purpose of this assessment is to conduct a comprehensive ground water sampling event to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site.

2. **The work will begin within 15 days after cost approval and sampling should be complete by June 4, 2013.**

3. **Are there are time or resource constraints? Include those factors that may interfere with the tentative schedule.**

   There are no known constraints that would alter the proposed schedule.

A7 Data Quality Objectives (DQOs) and Data Quality Indicators (DQIs)

See Attachment D:
Figure 1 - Site Location Map (USGS Topographic Map)
Figure 2 - Site Map

A8 Training and Certificates

Required training and licenses:

Title/Job	Name	Training Required	Date training/ certification received	Type of License	License Number
Site Rehabilitation Contractor	Terracon	n/a	2000	Class I UST Site Rehabilitation Contractor	246
Analytical Laboratory	Access Analytical	Annual Certification	2004	SC Laboratory Certification	32575001
Analytical Laboratory	GCAL	Annual Certification	1999	SC Laboratory Certification	73006
Terracon Project Manager	Mike Hudgins	Annual Continuing Education Requirements	Ongoing	Professional Geologist	1137
Analytical Laboratory Director	Ashley B. Amick	BS – Biology	1991	n/a	n/a
Analytical Laboratory Director	Scott Bailey / GCAL	BS – Environmental Health	1991	n/a	n/a
Project QA Manager	Chuck Clymer	Terracon Authorized Project Reviewer Program	Semi-annually 2007- 2011	Professional Geologist	236
Terracon Project Coordinator	Regan Norris	OSHA 40-hour Hazwoper 8-hour update	1/28/2005 02/16/2013	n/a	n/a
Environmental Technician / Ground Water Sampling	Neil Akre	OSHA 40-hour Hazwoper 8-hour update	12/07/07 02/28/2013	n/a	n/a

Table 3A Required Training and Licenses

Mike Hudgins of Terracon is responsible for ensuring that personnel participating in this project receive the proper training. All Terracon personnel training records are stored in the following location: 521 Clemson Road, Columbia, South Carolina. Laboratory personnel training records are available in accordance with Section 3.3 of the *GCAL Quality Assurance Program Plan.*

It is understood that training records will be produced if requested by SC DHEC.

The Following Laboratory(ies) will be used for this Project:
Access Analytical, Inc., 7478 Carlisle Street, Irmo, SC 29063
Gulf Coast Analytical Laboratories, 7979 GSRI Avenue, Baton Rouge, LA 70820

Commercial Lab(s)

Full Name of the Laboratory: Access Analytical, Inc
Name of Lab Director: Ashley Amick
SC DHEC Certification Number: 32575001
Parameters this Lab will analyze for this project: Data validation for accuracy and precision

Full Name of the Laboratory: Gulf Coast Analytical Laboratories
Name of Lab Director: Scott Bailey
SC DHEC Certification Number: 73006

Parameters this Lab will analyze for this project:

Parameter	SOP ID*	Method Referenced	Equipment
VOC's (BTEX/Napth/MTBE/DCA)	Method 8260B GCMSV-003 r22	8260B	GC/MS
Oxygenates	Oxygenates GCMSV-004 r1	8260B	GC/MS
EDB	Method 8011 GC-034 r6	8011	GC

A9 Documents and Records

Personnel will receive the most current version of the QAPP Addendum via:
(Check all that apply)
__X__US Mail ____Courier __X__ Hand delivered

Other (please specify): e-mailed as PDF

Record	Produced By	Hardcopy/ Electronic	Storage Location For how long?	Archival
Programmatic QAPP	SCDHEC UST	Hard copy & Electronic copy	Indefinitely	Terracon 521 Clemson Rd.

Record	Produced By	Hardcopy/ Electronic	Storage Location For how long?	Archival
QAPP Addendum	Terracon	Hard copy & Electronic copy	Indefinitely	Columbia, SC
Assessment Report (including field data and laboratory reports)	Terracon	Hard copy & Electronic copy	Indefinitely	
Laboratory Notes	GCAL	Hard copy & Electronic copy	10 Years	GCAL 7979 GSRI Ave. Baton Rouge, LA 70820

Table 4A Record Identification, Storage, and Disposal

Section B Measurement/Data Acquisition

B1 Sampling Process/Experimental Design

Item	Start Date	End Date	Comments
QAPP Preparation and Approval	4-May-13	19-May-13	Within 15 days after QAPP submittal
Monitoring Well Sampling	19-May-13	21-May-13	Within two weeks of QAPP approval
Laboratory Analysis	21-May-13	1-Jun-13	Standard turnaround
Report Submittal	1-Jun-13	15-Jun-13	Within two weeks after receipt of Laboratory Data

Table 5A Sampling Activities

B2 Sampling Methods

Please note: The contractor must follow sampling protocols as given in the UST QAPP.

***Estimate* the number of samples of each matrix that are expected to be collected:**

Soil	**0**
Ground Water from monitoring wells*	20
Drinking/Irrigation water wells*	0
Surface water features*	0
Trip Blank**	2
Field Blank**	2
Field Duplicate**	2
Total number of Water samples	**26**

* - critical sample data
** - non-critical sample data

Since it has been over 12 months since the wells have been sampled, all monitoring wells will be purged prior to sample collection in accordance with the UST QAPP. Field monitoring parameters will be recorded during purging on the Ground water Sampling Logs and included in the report Appendix. Purge water will be treated as investigative derived waste (IDW) and will be containerized in 55-gallon drums, labeled with their contents, and temporarily stored on-site. Subsequent to the analytical data review, drums of IDW will be disposed of properly at licensed waste disposal facility or disposed of on-site per approval by the SCDHEC project manager.

The samples will be (check as many as apply): ___Homogenized ____Split

The ground water samples will not be homogenized or split. Grab samples will be collected with disposable bailers.

If any of the above are circled please indicate how will it be done and the equipment needed.

Disposable nylon string will be tied to the top of the bailer and used to lower the bailer into the well. Ground water will enter the bottom of the bailer. The bailer will be retrieved and a ground water sample will poured into laboratory prepared bottles.

Will Sampling Equipment have to be cleaned and decontaminated or is everything disposable?

Field Equipment for Disposal

Disposable Bailers
String

Field Equipment that will be cleaned and decontaminated

YSI Model 63 (pH, SC, & Temp.)
YSI Model 55 (Dissolved Oxygen)
LaMotte Turbidimeter (Turbidity)
Heron Dipper T (Water Levels)
ORS Interface Probe (Product Levels)

If sampling equipment must be cleaned please give a detailed description of how this is done and the disposal of by-products from the cleaning and decontamination.

Field equipment will be cleaned in accordance with the UST QAPP Appendix H, Standard Field Cleaning Procedures. A copy of these procedures is included as Attachment C. Specifically, field monitoring equipment will be cleaned prior to field use as follows:

- Wash with soap and water
- Rinse with tap water
- Rinse with deionized water.

Field monitoring equipment will be cleaned between wells as follows:

- Rinse with tap water using a Nalgene® spray bottle or pressurized polyethylene sprayer
- Rinse with deionized water using a Nalgene® spray bottle or pressurized polyethylene sprayer
- Rinse with isopropanol and repeat rinse with D.I. water.

All rinse water and methanol will be collected in a 5-gallon bucket and combined with IDW purge water generated during sampling.

Rinse water will be treated as investigative derived waste (IDW) and will be containerized in 55-gallon drums, labeled with their contents, and temporarily stored on-site. Subsequent to the analytical data review, drums of IDW will be disposed of properly at licensed waste disposal facility or disposed of on-site per approval by the SCDHEC project manager.

Identify any equipment and support facilities needed. This may include such things as Fed-ex to ship the samples, a Geoprobe, field analysis done by another contractor (who must be certified), and electricity to run sampling equipment.

Samples will be driven from the field by Terracon field personnel and hand delivered to Access Analytical offices at 7478 Carlisle St., Irmo, South Carolina, where they will be logged in and secured temporarily prior to shipment by commercial courier (such as Fed Ex), as described in Section B3, below. No other support equipment or facilities are anticipated for this scope of work.

Address the actions to be taken when problems occur in the field, and the person responsible for taking corrective action and how the corrective action will be documented.

Failure	Response	Documentation	Individual Responsible
Field meter fails to read or calibrate; (See Table 11A for specific meters to be used)	Clean sensors and/or replace batteries. Recalibrate meter. If problem persists, use backup meter. Notify project Coordinator of equipment failure.	Document in Field Report, Field Sampling log, and Equipment Calibration Sheet	Field Personnel
Lost well	Attempt to locate using field measurements from known points and/or a metal detector	Document measures taken to locate in field report; Contact Terracon Project Manager for further instruction	Field Personnel
Field variance requiring routine corrective measure	Consult QAPPs and SOPs to resolve the issue	Document in field report, geologist log, and/or ground water sampling log, where appropriate	Field Personnel
Field variance requiring non-routine corrective measure	Contact Terracon Project Manager for further instruction	Document in field report; Discuss in the final assessment report	Terracon Project Coordinator
Additional work is necessary outside the project scope	Stop work on that task; Contact Terracon Project Manager for further instruction; Discuss with DHEC PM	e-mail summary of discussions; Document in field report and final assessment report	Terracon Project Manager
Any aspect of the project scope cannot be performed	Contact Terracon Project Manager; Discuss with DHEC PM	e-mail summary of discussions; Document in field report and final assessment report	Terracon Project Manager

Table 6A Field Corrective Action

All corrective action measures will be effectively communicated to field personnel for implementation.

Even with the best planning, data collection activities are always subject to field variances which may require deviations from the planned approach. The linchpin of data quality is the ability of field staff to make sound decisions with regard to routine corrective measures. However, difficulties arise when issues are encountered and decisions on corrective actions move "beyond the routine." Non-routine and routine field corrective measures are needed when there is a deviation from the sampling plan that could adversely affect data quality and/or resulting decisions affecting future response actions pertaining to each site.

Non-routine corrective measures are defined as actions taken to resolve deficiencies in collecting critical sample data, defined in Table 12, Section D3 of the DHEC UST QAPP. Critical sample data include samples or data collected at a specific location or laboratory analyzed for a target analyses.

Routine corrective measures are defined as actions taken to resolve deficiencies in collecting non-critical sample data. These data include QA/QC blanks, referenced above, and field water quality parameters, referenced in Table 7A, below.

Routine corrective measures during sampling activities will be taken at the discretion of the Phase II Coordinator. All corrective measures will be thoroughly documented in field logs.

Once field data collection has been completed and all corrective measures have been documented, analytical data validation will be performed by the laboratory to evaluate any corrective actions reported for the analyses. The laboratory will render judgment on the data usability. Terracon will conduct a secondary review of data usability for verification purposes.

B3 Sample Handling and Custody

1. ***How will the samples get from the Site to the Lab to ensure holding requirements are met?***

   Once samples are received from the client by Access they are kept on ice until they are shipped out by commercial courier (such as Fed Ex) for overnight delivery on the same day they are received by Access, or on the following day if received by Access after normal business hours (5:00 pm).

2. ***How will the contractors cool the samples and keep the samples cool?***

   Samples will be placed in plastic bags and the bags containing the samples will be immersed in natural ice immediately after collection and kept surrounded in ice at all times until delivery to Access. If samples are to be stored they will be placed in a temperature controlled refrigerator at 4 degrees C.

3. ***How will the lab determine the temperature of the samples upon receipt? Will they be using a temperature blank?***

   Upon receipt by Access, a temperature blank included with each cooler will be checked for temperature compliance using a NIST traceable thermometer and the temperature is recorded on the COC. Sample temperatures are checked by Access staff when samples are received and checked again at the receiving laboratory once they arrive.

Further details of these procedures are detailed in Section III of the Access Analytical/GCAL Comprehensive Quality Assurance Plan. This SOP addresses temperature control issues and specifies how samples are to be packed so that they remain between 0-6 degrees C while in transit to the lab.

Where will the samples be stored in the Lab once they are received?

Once samples arrive at the lab they are logged in and subsequently moved to dedicated, temperature controlled coolers within the lab until ready for analysis.

4. ***Describe the chain of custody procedure and attach a copy of each chain of custody that will be used. If a Chain of Custody SOP exists from the Lab and the Contractor is willing to adhere to it, then this may be attached.***

Chain of Custody records are kept for all projects. Once Chain of Custody associated with a given project is completed it is relinquished to laboratory (or courier if samples are being shipped). When samples are relinquished they are signed over from contractor to receiving party with a date and time of transaction also being recorded. A sample copy of the Chain of Custody to be used for all sample handling is attached.

Further details of these procedures are detailed in Section III of the Access Analytical/GCAL Comprehensive Quality Assurance Plan (QAP). A copy of this plan is maintained at Terracon's offices and can be provided upon request. The procedures outlined in this QAP will be followed by Terracon field personnel. A sample Chain of Custody is provided as Attachment A.

B4 Analytical Methods

1. ***Identify the SOPs which will be used to analyze the samples, the method which the SOP references and the equipment or instrumentation that is needed:***

Parameter	SOP ID*	Method Referenced	Equipment
Volatile Organics*	GCAL QAPP	8260B	GC/MS
1,2-Dibromoethane*	GCAL QAPP	8011	GC
Lead*	GCAL QAPP	6010B	ICP
pH**	YSI Model 63 Operations Manual	EPA 150.1	YSI Model 63
Temp**		EPA 170.1	
Specific Conductance**		EPA 120.1	
Dissolved Oxygen**	YSI Model 55 Operations Manual	EPA 360.1	YSI Model 55

Table 7A Analytical SOPs and Referenced Methods

* - critical sample data
** - non-critical sample data

- **This can be a full name of a SOP, an abbreviation, or a number. In the latter two cases, the abbreviation or number must be associated with the full name of the SOP. See also Table 8A SOP Abbreviation Key.**

Abbreviation	Lab Identification of this SOP	Full Name of the SOP
Access/GCAL QAPP	na	Access Analytical/GCAL Comprehensive Quality Assurance Plan
GCAL QAPP	na	GCAL Quality Assurance Program Plan
GCMSV-003	Method 8260B GCMSV-003 r22	Standard Operating Procedure for the Analysis of Volatile Mass Spec Samples Method 8260B
GCMSV-004	Oxygenates GCMSV-004 r1	Standard Operating Procedure for the Analysis of Oxygenates by Method 8260B
GC-034	Method 8011 GC-034 r6	Standard Operating Procedure for Method 8011
GCMSSV-004	Method 8270D GCMSSV-004 r3	Standard Operating Procedure for the Analysis Of Semi-Volatile Mas Spec Sample by Method 8270D
ICP Met-010	ICP Met-010 r18	Standard Operating Procedure for Analysis of Metals By ICP
IC WL-042	IC WL-042 r15	Standard Operating Procedure for IC
GC-024	Dissolved Gas GC-024 r6	Standard Operating Procedure For The Analysis Of Dissolved Gas In Groundwater
YSI Model 63 Operations Manual	na	YSI Model 63 Handheld pH, Conductivity, Salinity and Temperature System Operations Manual
YSI Model 55 Operations Manual	na	YSI Model 55 Handheld Dissolved Oxygen and Temperature System Operations Manual

Table 8A SOP Abbreviation Key

2. **Identify procedures to follow when failures occur, identify the individual responsible for corrective action and appropriate documentation:**

Failure	Response	Documented Where?	Individual Responsible
Various sample matrix or equipment related failures in the field	Corrective Action Initiated (see Table 6A, Field Corrective Action, above)	Field Sampling Logs to include with report	Field Personnel
Various sample matrix or equipment related failures at laboratory	Corrective Action Initiated (see section 4.7 of GCAL QAPP for detailed info)	Non-Conformance / Corrective Action Form kept at lab in controlled logbook	Laboratory QC/QA Manager

Table 9A Corrective Action Procedures

3. **Identify sample disposal procedures.**

Analysis	Matrix	Schedule for disposal	Method for disposal	Comments
**See Note Below	Soil & Water	Approx. 60 days after receipt	Various, see lab QAP	**See Note Below

Table 10A Sample Disposal
**The details of these procedures are detailed in Section 10.1 of the GCAL Quality Assurance Project Plan (QAPP).

4. **Provide SOPs for the Kerr Method or the Ferrous Iron Method if these are parameters for this study. This can be attached or written here. If attached please note that it is an attachment and where it is located (if applicable).**

Ferrous iron is not expected to be analyzed for this assessment.

B5 Quality Control Requirements:

All QC will follow the requirements laid out in Section B5 of the UST Programmatic QAPP.

B6 Field Instrument and Equipment Testing, Inspection and Maintenance

1. **Identify all field and laboratory equipment needing periodic maintenance, the schedule for this, and the person responsible. Note the availability and location of spare parts.**

Instrument	Serial Number	Type of Maintenance	Frequency	Parts needed/Location	Person responsible
YSI Model 63 (pH, SC, & Temp.)	IF 101551	Cleaning of pH, and conductivity sensors	Each day of operation	Eastern Equipment Solutions Ft. Mill, SC	Regan Norris
YSI Model 55 (Dissolved Oxygen)	06G1604	Cleaning of probe tip assembly	Each day of operation		
Heron Dipper T (Water Levels)	16231	Cleaning of probe tip assembly	Each day of operation		
ORS Interface Probe (Product Levels)	98140813	Cleaning of probe tip assembly	Each day of operation		
GC/MS for VOCs	Various	Cleaning and Calibration	Daily	Various / most at lab	Laboratory Manager
GC for EDB	Various	Cleaning and Calibration	Daily	Various / most at lab	Laboratory Manager

Table 11A Instrument and Equipment Maintenance

2. **Identify the testing criteria for each lab or field instrument that is used to ensure the equipment is performing properly. Indicate how deficiencies, if found, will be resolved, re-inspections performed, and effectiveness of corrective action determined and documented. Give the person responsible for this.**

Instrument/Equipment & Serial Number	Type of Inspection	Requirement	Individual Responsible	Resolution of Deficiencies
YSI Model 63 / IF 101551	Daily calibration checks	Calibrates within acceptable range	Regan Norris	Troubleshoot according to manufacturer procedures and/or field repair. Recalibrate prior to returning to operation
YSI Model 55 /06G1604 (Dissolved Oxygen)	Daily calibration checks	Calibrates within acceptable range		
Heron Dipper T /16231 (Water Levels)	Check for proper operation	Audible alarm sounds		
ORS Interface Probe / 98140813 (Product Levels)	Check for proper operation	Audible alarm sounds		
HP or Agilent GC/MS for VOC's (See appendix C of lab QAP for individual serial numbers)	Daily calibration checks	Calibrates within acceptable range	Laboratory department supervisor	Repair & Recalibrate as needed

Instrument/Equipment & Serial Number	Type of Inspection	Requirement	Individual Responsible	Resolution of Deficiencies
Agilent GC for EDB via 8011 (See appendix C of lab QAP for individual serial numbers)	Daily calibration checks	Calibrates within acceptable range	Laboratory department supervisor	Repair & Recalibrate as needed

Table 12A Instrument and Equipment Inspection

**NOTE: There is an extensive list of equipment used at the GCAL laboratory. All equipment used is listed Appendix C of the *GCAL Quality Assurance Program Plan (QAPP).*

B7 Instrument Calibration and Frequency

1. **Identify equipment, tools, and instruments for field or lab work that should be calibrated and the frequency.**

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference*
YSI Model 63 IF 101551 (ph, Temp., Conductivity)	Three point calibration (see Operations Manual)	Each day of operation	Calibrates within acceptable range	Replace battery Replace Probe	Regan Norris	YSI 63 Operations Manual
YSI Model 55 06G1604 (Dissolved Oxygen)	Internal instrument calibration (see Operations Manual)	Each day of operation	Calibrates within acceptable range	Replace battery; Replace membrane and solution; Clean anode & cathode	Regan Norris	YSI 55 Operations Manual
LaMotte Model 2020 Turbidimeter 4018-0703 (Turbidity)	Three point calibration (see Operations Manual)	CCV performed at beginning, after every 10 samples and at closing	Calibrates within acceptable range	If the CCV fails criteria, it can be reanalyzed once prior to a new calibration being performed	Laboratory Department Supervisor/ Analyst	Lamotte 2000 Operations Manual
HP or Agilent GC/MS for VOC's	Once a BFB Tune and initial calibration meet criteria then a BFB Tune and continuing calibration verification (CCV) is performed every 12hrs.	CCV performed every 12 hours	Calibrates within Acceptable Range (See GCAL QAPP for specific info)	If the CCV fails criteria a new initial calibration is performed. Also, see section 4.7 of lab QAP for detailed corrective action procedures.	Laboratory Department Supervisor	Method 8260B GCMSV-003 r22

Instrument	Calibration Procedure	Frequency of Calibration	Acceptance Criteria	Corrective Action (CA)	Person Responsible for CA	SOP Reference*
Agilent GC for EDB via 8011	Once an initial calibration meets criteria then a CCV is performed at the beginning of analysis and every 10 samples.	Daily, at beginning of analysis and then every 10 samples.	Calibrates within Acceptable Range (See GCAL QAPP for specific info)	If the CCV fails criteria a new initial calibration is performed. Also, see section 4.7 of lab QAP for detailed corrective action procedures.	Laboratory Department Supervisor	Method 8011 – GC 034 r6

Table 13A Instrument Calibration Criteria and Corrective Action

2. **Describe how the calibrations should be performed and documented, indicating test criteria and standards or certified equipment.**

Calibration Procedures for field equipment are detailed in the equipment Operations Manuals. A copy of these manuals will accompany the field personnel at all times and are on file at the Terracon office. Calibration logs for each instrument will be maintained and kept with the instrument. A sample calibration log is included as Attachment B. These records will be photocopied after each project for inclusion to the project file.

Calibration standards will be obtained from Eastern Environmental Solutions stored as specified by the manufacturer in labeled bottles with the date of receipt and date opened marked with permanent marker. Solutions older than 6-months will be disposed.

Laboratory equipment will be calibrated in accordance with Section 6.4 of the GCAL Quality Assurance Plan Project Plan.

3. **Identify how deficiencies should be resolved and documented. Identify the person responsible for corrective action.**

Should routine corrective action not resolve the issue, field personnel will stop work and notify the Project Coordinator and Terracon Project Manager. The issues and corrective actions taken will be reviewed, and the Terracon Project Manager will evaluate whether the issue affects the overall Data Quality Objectives. Field personnel will document the deficiencies in the Field Report, noting the data failure, actions taken to resolve, and ultimate decision regarding the corrective action.

If the deficiency affects the overall data quality, the Terracon Project Manager will discuss the issue with the DHEC project Manager to develop short-term and long-tern solutions. The results of these discussions will be documented in a written email notification of the corrective measures and will be distributed to the project team.

For analysis performed at the laboratory, please see section 6.4 of the GCAL Quality Assurance Plan Project Plan.

B8 Inspection/Acceptance Requirements for Supplies and Consumables

1. **Identify critical supplies and consumables for field and laboratory, noting supply source, acceptance criteria, and procedures for tracking, storing and retrieving these materials.**
2. **Identify the individual(s) responsible for this.**

Item	Vendor	Acceptance criteria	Handling/Storage Conditions	Person responsible for inspection and tracking.
Disposable bailers	Eon Products, Inc. 3230 Industrial Way, Snellville, GA 30039 (800) 474-2490	Sealed plastic bags	Climate controlled storage prior to field use	Regan Norris
Nitrile gloves		Unopened, undamaged original containers		
Sample containers	Daniels Scientific PO Box 19022 Greenville, SC 29602 864-277-1309	Accompanied by laboratory chain of custody		Ashley Amick Access Analytical
Alconox Laboratory Grade Detergent	Eon Products, Inc. 3230 Industrial Way, Snellville, GA 30039 (800) 474-2490	Unopened, undamaged original containers		Regan Norris
Isopropyl Alcohol		Unopened, undamaged original containers.	Climate controlled storage prior to field use; Transferred to nalgene spray bottles for field use	

Table 14A List of Consumables and Acceptance Criteria

B9 Data Acquisition Requirements (Non-Direct Measurements)

1. **Identify data sources, for example, computer databases or literature files, or models that should be accessed or used.**
2. **Describe the intended use of this information and the rationale for their selection, i.e., its relevance to project.**
3. **Indicate the acceptance criteria for these data sources and/or models.**

Data Source	Used for	Justification for use in this project	Comments
Previous assessment reports	Historical site information, site maps	To develop a Conceptual Site Model (CSM)	Historical data was obtained from available files. Other assessment or information regarding release may be available from the DHEC files or other sources.

Table 15A Non-Direct Measurements

4. Identify key resources/support facilities needed.

SCDHEC Freedom of Information (FOI) file review.

B10 Data Management

Describe the data management scheme from field to final use and storage.

Data will be generated either in the field or in the laboratory. Field personnel will maintain a field log to record all pertinent activities associated with all sampling activities. Sample documentation will follow EPA Region 4 Field Branches Quality System and Technical Procedures for information pertaining to all samples collected during each event. Any photographic documentation will also be recorded in the field log.

Field documents will include sketch maps, field reports, chain of custody, and boring logs. A field sheet will be completed for each soil and ground water sample location. The field sheets will include the following information where applicable: odors, soil descriptions, well construction details, water quality parameters, purge times, estimated purge volumes, property ownership information, exact sample locations, and analyses to be performed. All original field documents will be saved in the project file. Digital photographic documentation will also be stored in the electronic project file.

All collected data will be reviewed for accuracy, entered into an electronic Excel worksheet, and stored in the electronic project file. Data tables summarizing collected data will be included in the final project report. Copies of field and laboratory data will be included as appendices to the final report. Electronic data files will be checked against original laboratory reports for transcription/import errors.

A list of information to be supplied with laboratory data deliverables is as follows:

- Standard QC Data Package Provided by the analytical laboratory, with final analytical report with qualifiers (where necessary) and case narrative
- Chain of Custody Form
- Method Blank
- Matrix Spike/Spike Duplicate Summary (MS/MSD)-with control limits

- Laboratory Control Sample Summary (LCS)-with control limits
- Reporting Limits listed on all reports
- Surrogate Recoveries for GC and GC/MS analyses (on final report)

Data reporting and management will be directed in accordance with the following Data Management Scheme:

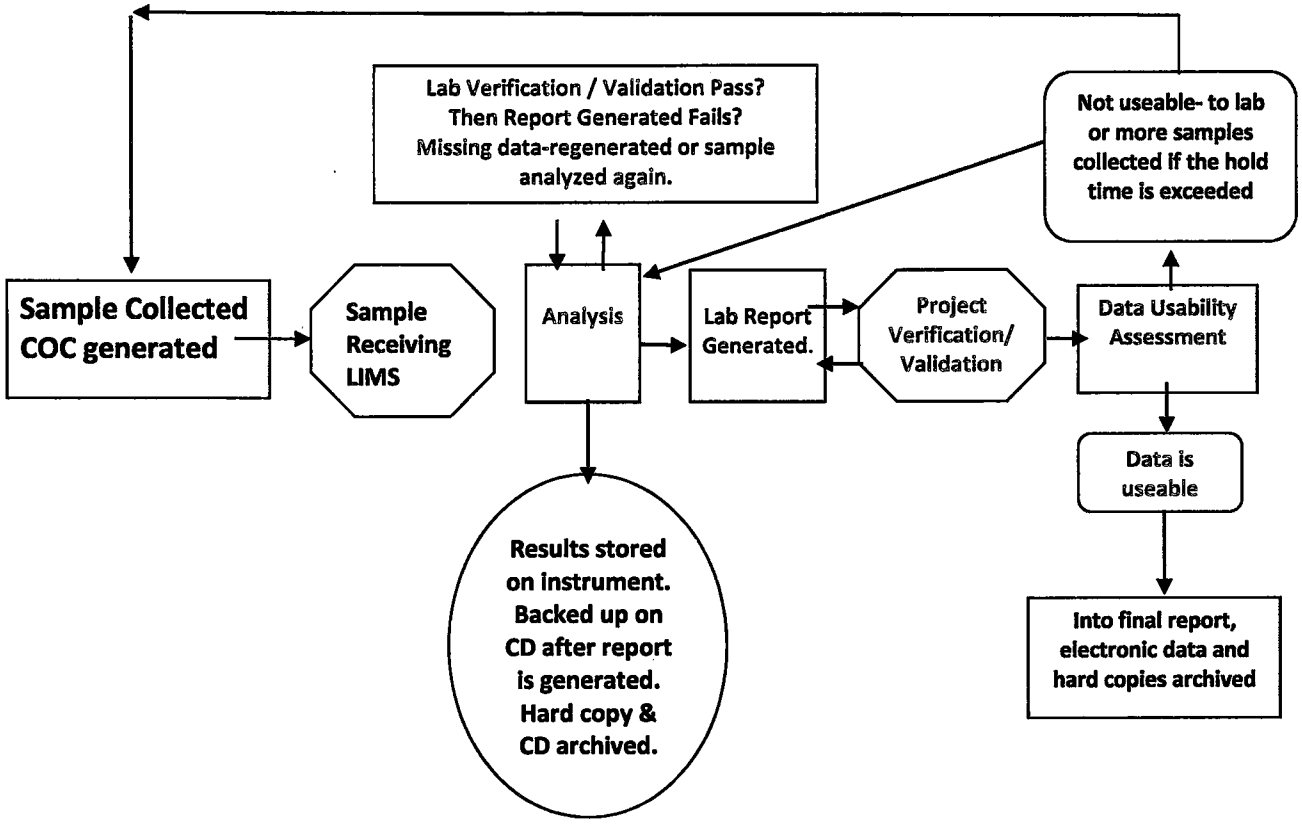


Figure 2. Data Management Scheme

Laboratory reporting quality will be enhanced through a formalized process and management system applied to ensure data quality within standard method requirements. Laboratory reporting will occur consistent with the laboratory QA Manuals for each data report generated. In addition, laboratory reports will include a data quality documentation package for all analyses.

All collected data will be reviewed for accuracy, entered into an electronic Excel worksheet, and stored in the electronic project file. Data tables summarizing collected data will be included in the final project report. Copies of field and laboratory data will be included as appendices to the final report. Electronic data files will be checked against original laboratory reports for transcription/import errors.

Laboratory data management, review and verification will be performed by a qualified laboratory analyst and the laboratory's section manager, in accordance with Section 1 of the Access/GCAL Comprehensive Quality Assurance Plan (CQAP) and Section 5.3 of the GCAL Quality Assurance Program Plan (QAPP).

After validation of each laboratory package is completed by the laboratory and second-tier review has been conducted by the Contract Laboratory Manager, data will be provided to the Terracon QA/QC Manager for data validation. Subsequent to data validation, selected laboratory results will be summarized in tabular form. The data summary report will include tabular summaries of analytical testing results, laboratory reports, and a summary of data validation conclusions. In addition to the data summary report, data collected during the project will be summarized in the final report. The final report will be submitted to DHEC as a hard copy and electronically on a CD.

1. **How does the lab and field staff ensure that no unauthorized changes are made to the chain of custody, sampling notebooks, laboratory notebooks and computer records?**

   All data is recorded in bound books and/or by instrument printout. If data is recorded by hand, it must be done in ink. It is inappropriate to have pencils, erasers, or correction fluid at the bench. Data is kept either as a hardcopy, electronically, or both. All data must be protected by the use of audit trails, passwords, and controlled logbooks. If changes or corrections are necessary, it must be performed in a way that maintains the integrity of the data. Changes must be initialed and dated and corrections made using a single line strikeout. If the record does not allow space to clearly show the change, write it in the comments or at the bottom of the page. If electronic files must be changed, the file must be renamed so original information is not lost. If an entire batch of data must be reprocessed all files must be renamed. Reasons for doing so must be written in the comments and/or fully documented using a correction form. At no time shall data be obliterated for any reasons.

2. **How does the lab ensure that there are no errors in sample records including times when sample information is compiled, data calculated and/or transmitted.**

   All data reported includes three levels of data review including calculations used to generate the reported analytical results. This review is performed by the analyst performing the test, the supervisor, and report generation manager or designee. Data reduction includes all activities that convert instrument/computer responses into reportable results. Manually entered information is reviewed for accuracy in the Laboratory Information Management System (LIMS) and in the signed copy of the client report.

3. **How will the data be archived once the report is produced? How can it be retrieved? (This applies to both electronic and hard copies).**

   The laboratory will retain all records related to sample analysis including raw test data, calculations, derived data, calibrations and copies of test reports including chain of custodies. These records are archived in accordance with regulatory requirements for a minimum of ten years or as required by specific client contracts. Software/hardware permitting the access of electronic data must be maintained. The copy of client reports is stored in a room requiring key-card access. All reports must be signed out using the archived reports logbook. Client reports and chain of custodies are also scanned for electronic storage. Written and printed data records (bench sheets, logbooks, electronic printouts, etc.) are scanned before being boxed and placed in storage. Electronic data is stored on a dedicated server, which is backed-up daily. The safety officer keeps safety and disposal information. Archived data is stored on-site until capacity is met. The oldest archived data is then moved to a secure storage facility. The storage and on-site facility are monitored and protected from fire and theft. Electronic data storage is free from magnetic sources. It is the goal of the lab to have redundant copies (hard and electronic) to prevent loss of records due to being misplaced or environmental deterioration or catastrophe.

   All field records and final reports will be stored in the project file located at the Terracon project manager's office. Terracon maintains electronic files on the local office server. This information is backed up daily from Terracon's Corporate Data Center. Final reports and documents provided to the client or third parties will be retained at the local office indefinitely, and are available upon request.

Section C Assessment and Oversight

C1 Assessment and Response Actions

1. ***The Contractor is supposed to observe field personnel daily during sampling activities to ensure samples are collected and handled properly and report problems to DHEC within 24 hours. Please state who is responsible for doing this and what observations will be made. Will this person have the authority to stop work if severe problems are seen?***

   Because of the relatively short duration of each on-site sampling event, no field audits of sampling procedures will be performed. Field analytical procedures performed by Terracon or subcontractor personnel will be documented through development of field analytical reports and/or field analysis reporting documents. These reports will document field methods, results, and any necessary deviations, in addition to any corrective measures taken. All information provided through field analysis reports will be

incorporated accordingly into the assessment reports. The significance of deviations and actions requiring corrective action will be evaluated by the Terracon Project Manager before report development.

The Terracon Project Manager will be responsible for ensuring that field procedures are conducted in accordance with the QAPP and state and federal guidance. It will be the responsibility of this individual to ensure implementation of field methods according to relevant QC documents, and to coordinate QA/QC efforts with other project subcontractors. This individual is also the representative directing and documenting field method quality control and health and safety procedures during field operations. This individual has "stop work" authority if compromised QC and/or safety procedures are observed. Terracon and subcontractor field staff will report directly to this person as the Project Manager. This position is also responsible for field documentation and management of data from each field team to be delivered from the field.

2. ***The SCDHEC UST QAPP states that the Lab will receive an Offsite Technical System Audit. For this project, what assessments will be done on the Commercial Lab(s) that are being used—other than their certification audit? When or how often are these done? Who will the results be given to and who has the ability to stop work if problems are severe?***

Internal technical audits are conducted by GCAL, as described in Section 4.6 of the GCAL QAPP. These audits consist of Analytical Systems Audits, Method Audits, Monthly Support System Audits, External Audits, and Annual Management Reviews. Laboratory audit and associated corrective action records will be maintained within laboratory QC records. The results of these internal audits are reviewed and maintained by Ashley Amick, Access Analytical Laboratory. Copies of the audit records are and are kept on file at Access Analytical and are accessible to the Terracon Project Manager.

Individual records may be reviewed as determined relevant to ensure QC on a project-by-project basis. Corrective actions taken in response to audit or QC data review findings will be evaluated by the Terracon Project Manager and discussed accordingly in the corresponding assessment reports. The Terracon Project Manager has "stop work" authority if compromised QC procedures are observed.

C2 Reports to Management

See the SC DHEC UST Programmatic QAPP (UST Master QAPP).

Section D Data Validation and Usability

See the SC DHEC UST Programmatic QAPP (UST Master QAPP).

ATTACHMENTS

Attachment A - Sample Chain of Custody

Attachment B - Sample Equipment Calibration Sheet

Attachment C - UST QAPP Appendix H, Standard Field Cleaning Procedures

Attachment D - Figures

Figure 1 - Site Location Map (USGS Topographic Map)
Figure 2 – Site Map

Attachment A - Sample Chain of Custody

Access Analytical - Chain of Custody Record

LAB USE ONLY — Project Work Order #: _____ PO #: _____ Access Quote #: _____ LAB USE ONLY — Laboratory ID: _____

Company Name: | Preservative (*see codes) | Container Type (*see codes)

Report To:

Address:

City: State: Zip:

Phone: Fax:

Email:

Project ID:

Sampled By:

REQUESTED ANALYSIS *

Sample ID/Description	Date Collected:	Time Collected:	Type (grab or composite)	Matrix (see codes)	Preserved (Yes or No)	Area (see codes)	Total # of containers

ACCESS ANALYTICAL, INC.

7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
www.axs-inc.com

*Preservative Codes (place corresponding # in block above analysis field): 0 = None, 1 = HCL, 2 = HNO3, 3 = H2SO4, 4 = NaOH, 5 = Na2S2O3, 6 = Method 5035 set w/ NaHSO4 & CH3OH, 7 = NaOH/ZnOAC, 8 = H3PO4

*Matrix Codes (place corresponding code in matrix column): GW = ground water, WW = waste water, DW = drinking water, S = soil, SL = sludge, A = air, IW = industrial waste, WO = waste oil, OT = other (specify in comments section)

*Program Area Codes: CWA = Clean Water Act (for wastewater), SDWA = Safe Drinking Water Act (for drinking water), SHW = Solid and Hazardous Wastes (for soils, ground waters and waste samples)

*Container Type: G = Glass, P = Plastic

NOTES / COMMENTS
(if sample is a composite please use space below to note start/finish times & date)

Turnaround Time:

___ Standard
___ RUSH*
*Date Required: _____
(For rush work, results emailed/faxed by end of business day on date required)

Project Location:
___SC
___NC
___Other
(specify) _____

Relinquished By:	Received By:	Date (mm-dd-yy)	Time (24HR)	Sample Temp. Upon Receipt (°C):	
				____(°C)	____(N/A)
				____(°C)	____(N/A)
				____(°C)	____(N/A)
				____(°C)	____(N/A)

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Pg____of____

Attachment B - Sample Equipment Calibration Sheet

EQUIPMENT CALIBRATION LOG

INSTRUMENT: _____

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	one point	yes		
	two point			
	three point		SIGNATURE	
	other (specify):	no		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	one point	yes		
	two point			
	three point		SIGNATURE	
	other (specify):	no		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	one point	yes		
	two point			
	three point		SIGNATURE	
	other (specify):	no		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	one point	yes		
	two point			
	three point		SIGNATURE	
	other (specify):	no		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	one point	yes		
	two point			
	three point		SIGNATURE	
	other (specify):	no		

Attachment C

UST QAPP Appendix H, Standard Field Cleaning Procedures

APPENDIX A
STANDARD FIELD CLEANING (DECONTAMINATION) PROCEDURES

PERFORMANCE OBJECTIVE:

- To remove contaminants of concern from sampling, drilling and other field equipment to concentrations that do not impact study objectives using a standard cleaning procedure.

Introduction

Sufficient clean equipment should be transported to the field so that an entire study can be conducted without the need for decontamination. However, this is not possible for some items such as portable power augers, well drilling rigs, soil coring rigs, and other large pieces of field equipment. This Appendix describes the materials, methods, and procedures to be used when cleaning sampling and other equipment in the field. Deviations from these procedures should be documented in field logbooks, inspection records and investigative reports.

Cleaning and decontamination of all equipment should occur at a designated area or decontamination pad on the site. The decontamination pad should meet the specifications of Section A.2.

Potable tap water brought on the site for drilling and cleaning purposes should be from a municipal water treatment system and contained in a pre-cleaned tank.

A steam cleaner and/or high-pressure hot water washer used should be capable of generating a pressure of at least 2500 PSI and producing hot water and/or steam (200 degrees F plus), and have a soap compartment.

Caution-Exercise care when working with flammable materials! Avoid any activities that would produce sparks or excess heat. Avoid hazardous atmospheres.

A.1 Specifications For Cleaning Materials:

A.1.1 The specifications for standard cleaning materials referred to in this appendix are as follows:

Soap shall be a standard brand of phosphate-free laboratory detergent (e.g., Liquinox.) Use of other detergent must be justified and documented in the field logbooks and inspection or investigative report. The use of Liquinox detergent may remove the need to rinse with pesticide-grade isopropanol.

Solvent shall be pesticide-grade isopropanol or isopropyl alcohol. Use of a solvent other than pesticide-grade isopropanol for equipment cleaning purposes must be justified and documented in the field logbook.

Tap water may be used from any municipal water treatment system.

Analyte free water (deionized water) is tap water that has been treated by passing it through a standard deionizing resin column and followed by an activated carbon column.

Solvents, nitric acid solution, laboratory detergent, and rinse waters used to clean equipment cannot be reused.

A.1.2 Handling and Containers for Cleaning Solutions:

Improperly handled cleaning solutions may easily become contaminated. Storage and application containers must be constructed of the proper materials to ensure their integrity. Following are acceptable materials used for containing the specified cleaning materials:

Soap must be kept in clean containers until use. It should be poured directly from the container.

Solvents must be stored in the unopened original containers until used. Solvents may be applied using a Teflon nozzle, or by using Teflon squeeze bottles.

Tap water may be kept in clean tanks, hand pressure sprayers, squeeze bottles, or applied directly from a hose.

Analyte free water should be stored in cleaned containers that can be closed when not being used. It may be applied from squeeze bottles.

Organic/analyte free water should be stored in cleaned glass, Teflon®, or stainless steel containers prior to use. It may be applied using Teflon® squeeze bottles, or directly from the system.

Nitric acid should be kept in the glass container it is received in, and placed in squeeze bottles prior to application.

A.1.3 Disposal of Spent Cleaning Solutions:

All spent cleaning solutions, including wash water, rinse water, spent acid solutions, and spent solvents, should be properly disposed.

A.2 Safety Procedures for Cleaning Operations:

All appropriate safety procedures should be implemented.

A.3 Specifications for Decontamination Pads

If the site has a designated area for decontamination of equipment it should be used. If there is no decontamination area at the site, decontamination pads constructed for field cleaning of sampling and drilling equipment should meet the following minimum specifications:

- The pad should be constructed in an area believed to be free of surface contamination.
- The pad should not leak.
- If possible, the pad should be constructed on a level, paved surface and should facilitate the removal of wastewater. This may be accomplished by either constructing the pad with one corner lower than the rest, or by creating a sump or pit in one corner or along one side. Any sump or pit should also be lined.
- Sawhorses or racks constructed to hold equipment while being cleaned should be high enough above ground to prevent equipment from being splashed.

- Water should be removed from the decontamination pad frequently.

- A temporary pad should be lined with a water impermeable material with no seams within the pad. This material should be disposable or repairable.

At the completion of site activities, the decontamination pad should be deactivated. All waste/rinse water should be pumped into containers and properly managed as Investigative Derived Waste. The pit or sump should be backfilled with the appropriate material designated by the project leader. If the decontamination pad has leaked excessively, soil disposal may be required.

A.4 Downhole Drilling Equipment

These procedures are to be used for drilling activities involving the collection of soil samples and for the construction of monitoring wells to be used for the collection of groundwater samples.

A.4.1 Preliminary Cleaning and Inspection

The drill rig and drilling equipment should be clean of any contaminants that may have been transported from off-site to minimize the potential for cross-contamination. The drilling equipment should not serve as a source of contaminants. Associated drilling and decontamination equipment, well construction materials, and equipment handling procedures should meet these minimum specified criteria:

- All downhole augering, drilling, and sampling equipment should be sandblasted before use if painted, and/or there is a buildup of rust, hard or caked matter, etc., that cannot be removed by steam cleaning (soap and high pressure hot water), or wire brushing. Sandblasting should be performed prior to arrival on site, or well away from the decontamination pad and areas to be sampled.

- Any portion of the drilling equipment that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) should be steam cleaned (soap and high pressure hot water) and wire brushed (as needed) to remove all rust, soil, and other material which may have come from other sites before being brought on site.

- Printing and/or writing on well casing, tremie tubing, etc., should be removed before use. Emery cloth or sand paper can be used to remove the printing and/or writing. Most well material suppliers can provide materials without the printing and/or writing if specified when ordered. Items that cannot be cleaned are not acceptable and should be discarded.

- The drill rig and equipment associated with the drilling and sampling activities should be inspected to insure that all oils, greases, hydraulic fluids, etc., on the surface of the equipment have been removed, and all seals and gaskets are intact with no fluid leaks.

- PVC or plastic materials such as tremie tubes should be inspected. Items that cannot be cleaned are not acceptable and should be discarded.

A.4.2 Drill Rig Field Cleaning Procedure

Any portion of the drill rig, backhoe, etc., that is over the borehole (kelly bar or mast, backhoe buckets, drilling platform, hoist or chain pulldowns, spindles, cathead, etc.) should be steam cleaned (soap and high pressure hot water) between boreholes.

A.4.3 Field Decontamination Procedure for Drilling Equipment

The following is the standard procedure for field cleaning augers, drill stems, rods, tools, and associated equipment. This procedure does not apply to well casings, well screens, or split-spoon samplers used to obtain samples for chemical analyses, which should be decontaminated as outlined in Section A.3.6 of this appendix.

1. Clean with tap water and soap, using a brush if necessary, to remove particulate matter and surface films. Steam cleaning (high pressure hot water with soap) may be necessary to remove matter that is difficult to remove with the brush. Drilling equipment that is steam cleaned should be placed on racks or sawhorses at least two feet above the floor of the decontamination pad. Hollow-stem augers, drill rods, etc., that are hollow or have holes that transmit water or drilling fluids, should be cleaned on the inside with vigorous brushing.

2. Rinse thoroughly with tap water.

3. Remove from the decontamination pad and cover with clean, unused plastic. If stored overnight, the plastic should be secured to ensure that it stays in place.

When there is concern for low-level contaminants it may be necessary to clean this equipment between borehole drilling and/or monitoring well installation using the procedure outlined in Section A.3.6.

A.4.4 Field Decontamination Procedure for Drill Rig, Grout Mixer, and Associated Equipment:

1. A thorough exterior cleaning of the drill rig is required at the end of each study. The exterior (including undercarriage) should be washed with soap and tap water and then rinsed with tap water. The steam generator may be used.

2. The pump on the drill rig should be flushed with tap water until clear, and then drained.

3. The grout and pump mixer should be washed with tap water. The steam generator may be used.

A.4.5 Drilling equipment (tools, rods, augers, etc.) should be cleaned as follows:

1. Clean with tap water and soap, using a brush if necessary, to remove particulate matter and surface films. Steam cleaning (high pressure hot water with soap) may be necessary to remove matter that is difficult to remove with the brush. Drilling equipment that has been steam cleaned should be placed on racks or sawhorses at least two feet above ground. Hollow-stem augers, drill rods, etc., that are hollow or have holes that transmit water or drilling fluids, should be cleaned on the inside and outside.

2. Rinse thoroughly with tap water.

3. Cleaning of this equipment following procedures as specified in Section A.5.2 may be required based on characteristics of the suspected contaminants.

A.5 Field Equipment Cleaning Procedures

A.5.1 Well Sounders or Tapes

The following procedures are recommended for decontaminating well sounders, water level indicators,

interface probes, and tapes:

1. Wash with soap and tap water.

2. Rinse with tap water.

3. Rinse with de-ionized water. (Do not solvent rinse PVC or plastic items.)

Interface probe alternative procedures:

1. Wash with isopropyl alcohol.

2. Rinse with de-ionized water.

A.5.2 Sampling Equipment

1. Clean with tap water and soap using a brush if necessary to remove particulate matter and surface films. Equipment may be steam cleaned (soap and high pressure hot water as an alternative to brushing. Sampling Equipment that is steam cleaned should be placed on racks or sawhorses at least two feet above the floor of the decontamination pad. PVC or plastic items should not be steam cleaned.

2. Rinse thoroughly with tap water.

3. Rinse thoroughly with analyte-free water.

4. Rinse thoroughly with solvent. Do not solvent rinse PVC or plastic items.

5. Allow to air-dry overnight, if not to be reused immediately.

A.6 Handling of Decontaminated Equipment

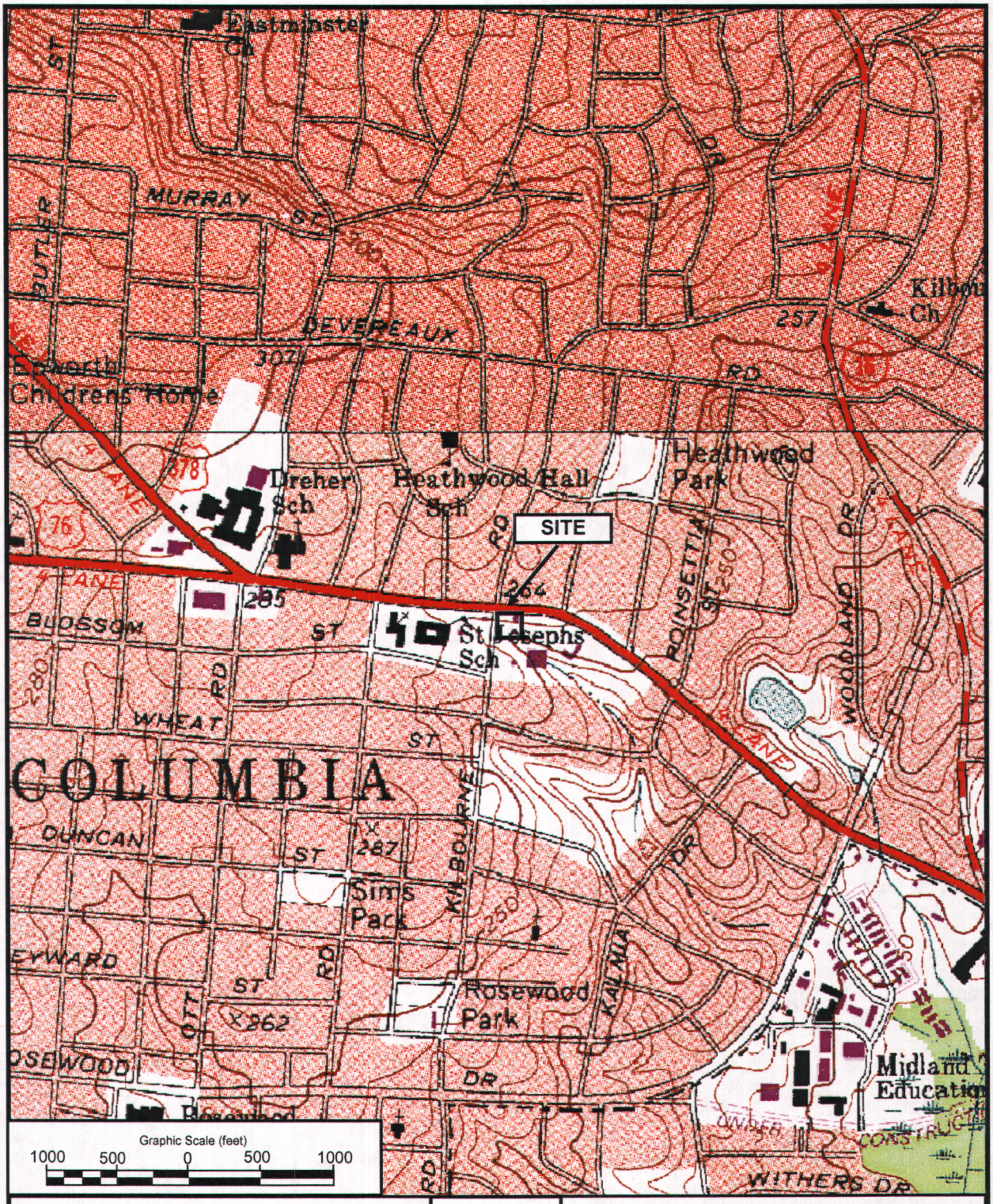
After decontamination, to prevent re-contamination, only personnel wearing clean nitrile gloves should handle equipment. In addition, the equipment should be moved away (preferably upwind) from the decontamination area to prevent re-contamination. If the equipment is not to be immediately re-used it should be covered with plastic sheeting or wrapped in aluminum foil to prevent re-contamination. The area where the equipment is kept prior to re-use must be free of contaminants.

References

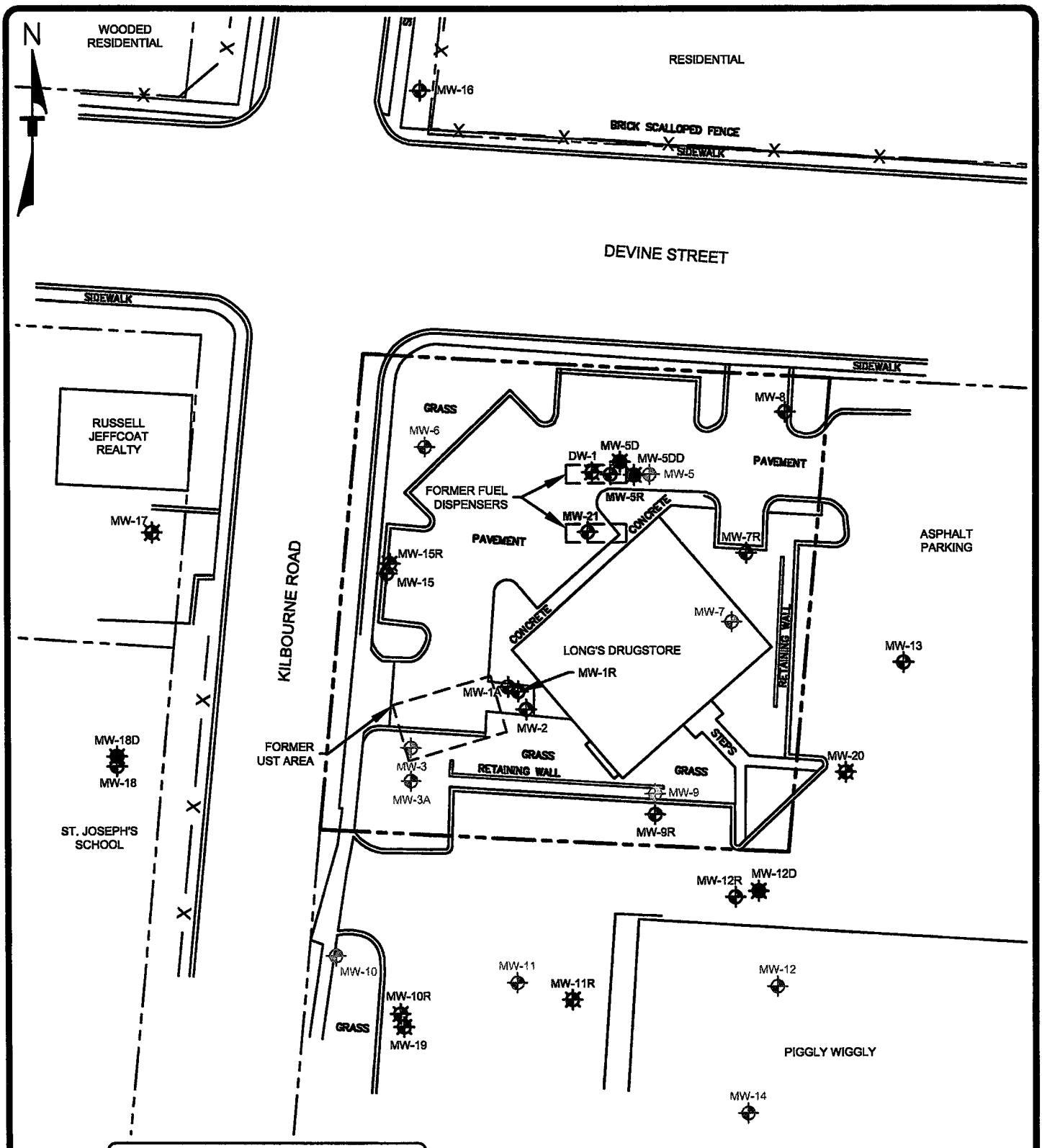
1. U.S. Environmental Protection Agency, Region IV, Science and Ecosystem Support Division, Field Equipment Cleaning and Decontamination, November 2007, (SESDPROC-205-R1).
2. U.S. Environmental Protection Agency, Region IV, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, November 2001.
3. S.C. Department of Health and Environmental Control, Environmental Quality Control, Environmental Investigations Standard Operating Procedures and Quality Assurance Manual, 2006.

Attachment D – Figures

Figure 1 - Site Location Map (USGS Topographic Map)
Figure 2 - Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP FORT JACKSON SOUTH, SOUTH CAROLINA		**SITE LOCATION MAP** FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT NO. 07680
DATE: 1982 SCALE: 1 INCH = 1000 FEET	N	Terracon
PROJECT NO. 73078012		**FIGURE 1: TOPOGRAPHIC MAP**



EXPLANATION

- SHALLOW MONITORING WELL
- INTERMEDIATE MONITORING WELL
- DEEP MONITORING WELL
- DESTROYED MONITORING WELL

GRAPHIC SCALE

50 0 50

(FEET)

SITE MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

Project Mngr: PMH	Terracon	Project No.	73078012
Designed By: PMH		Scale:	1 IN = 50 FT
Checked By: PMH	521 Clemson Road	Date:	4-23-09
Approved By: PMH	Columbia, South Carolina 29229	Drawn By:	PTK
File Name: \73078012.dwg		Figure No.	2

ASSESSMENT COMPONENT COST AGREEMENT
SOUTH CAROLINA
Department of Health and Environmental Control
Underground Storage Tank Program
State Underground Petroleum Environmental Response Bank

Facility SC-015

UST Permit # 07680 **CA#** _____

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Plan*				
	A. Tier II or Comp. Plan / QAPP App. B	1	x	$525.00	**$525.00**
	B. Tax Maps		x	$50.00	**$0.00**
2.	Receptor Survey*		x	$500.00	**$0.00**
3.	Comprehensive Survey		x	$1,000.00	**$0.00**
4.	Mob/Demob				
	A. Equipment		x	$575.00	**$0.00**
	B. Personnel	2	x	$290.00	**$580.00**
	C. Adverse Terrain Vehicle		x	$575.00	**$0.00**
5.	Soil Borings (hand augered)*		feet x	$14.00	**$0.00**
6.	Soil Borings (drilled) & Field Screening	(includes collection and quantification)			
	A. Standard		feet x	$17.00	**$0.00**
	B. Fractured Rock		feet x	$27.50	**$0.00**
7.	Soil Leachability Model		x	$200.00	**$0.00**
8.	Abandonment*				
	A. 2" or less		feet x	$5.00	**$0.00**
	B. 2+" to 6"		feet x	$5.50	**$0.00**
	C. Dug/bored well		feet x	$18.00	**$0.00**
9.	Well Installation*	(includes drilling costs)			
	A. Water Table (hand auger)		feet x	$20.00	**$0.00**
	B. Water Table		feet x	$38.00	**$0.00**
	C. Telescoping		feet x	$58.00	**$0.00**
	D. Rock Drilling		feet x	$58.00	**$0.00**
	E. 2" Rock Coring		feet x	$45.00	**$0.00**
	F. 4" Rock Coring		feet x	$50.40	**$0.00**
	G. Multi Sampling Ports/screen intervals		feet x	$47.20	**$0.00**
10.	Sample collection				
	A. Groundwater	20	samples x	$55.00	**$1,100.00**
	B. Air Vapor		samples x	$90.00	**$0.00**
	C. Water Supply		samples x	$30.00	**$0.00**
	D. Groundwater No Purge (Duplicate)	2	samples x	$35.00	**$70.00**
	E. Gauge Well Only		samples x	$20.00	**$0.00**
	F. Sample Below Product		samples x	$50.00	**$0.00**
	G. Passive Diffusion Bag		samples x	$40.00	**$0.00**
	H. Field Blank	2	samples x	$5.00	**$10.00**
11.	Analyses-Groundwater	(See Analytical Methodology for site specific analyses)			
	A. BTEXNM+Oxygs+1,2 DCA+Eth	26	samples x	$100.00	**$2,600.00**
	B. 8260B **RUSH Analysis**		samples x	$143.00	**$0.00**
	C. Trimethyl, Butyl, and Isopropolbenzenes		samples x	$40.00	**$0.00**
	D. PAH's		samples x	$120.00	**$0.00**
	E. Lead		samples x	$20.00	**$0.00**
	F. EDB	24	samples x	$55.00	**$1,320.00**
	G. EDB (RUSH)		samples x	$75.00	**$0.00**
	H. 8 RCRA Metals		samples x	$140.00	**$0.00**
	I.TPH (9070)		samples x	$55.00	**$0.00**
	J. pH		samples x	$10.00	**$0.00**
	K. BOD		samples x	$40.00	**$0.00**
	L. Filtered Lead		samples x	$46.00	**$0.00**
	M. Ethanol		samples x	$21.50	**$0.00**
11.	Analyses-Soil				
	N. BTEX + Napth.		samples x	$100.00	**$0.00**
	O. PAH's		samples x	$120.00	**$0.00**
	P. 8 RCRA Metals		samples x	$150.00	**$0.00**

Facility SC-015

UST Permit # 07680 **CA#** _____

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
	Q. Oil & Grease(9071)	_____	samples x	$60.00	$0.00
	R. TPH DRO(3550)	_____	samples x	$65.00	$0.00
	S. TPH GRO(5035)	_____	samples x	$65.00	$0.00
	T. Grain size / hydrometer	_____	samples x	$99.00	$0.00
	U. Total Organic Carbon	_____	samples x	$35.00	$0.00
11.	Analyses-Air				
	V. BTEX + Naphthalene	_____	samples x	$247.50	$0.00
	W. Hydrocarbon Fuel Identification	_____	samples x	$620.00	$0.00
12.	Aquifer Characterization*				
	A. Pumping Test	_____	hours x	$120.00	$0.00
	B. Slug test	_____	tests x	$150.00	$0.00
	C. Fractured Rock	_____	tests x	$500.00	$0.00
13.	Free Product Recovery Rate Test*	_____	tests x	$120.00	$0.00
14.	Fate & Transport Modeling				
	A. Mathematical Model	_____	models x	$300.00	$0.00
	B. Computer Model	_____	models x	$500.00	$0.00
15.	Risk Evaluation				
	A. Tier I	_____	x	$300.00	$0.00
	B. Tier II	_____	x	$500.00	$0.00
16.	Subsequent Survey*	_____	x	$300.00	$0.00
17.	Disposal				
	A. Wastewater	200	gallons x	$0.80	$160.00
	B. Free Product	_____	gallons x	$0.85	$0.00
	C. Soil (Treatment/Disposal)*	_____	tons	$72.50	$0.00
	D. Drilling Fluids *	_____	gallons x	$0.80	$0.00
18.	Miscellaneous Attach paid invoice receipts				
	_____	_____	x _____		$0.00
	_____	_____	x _____		$0.00
23.	AFVR				
	A. 8-Hour Event*	_____	x	$3,000.00	$0.00
	B. Additional Hour	_____	x	$204.00	$0.00
	C. Off-Gas Treatment	_____	x	$35.00	$0.00
24.	Granular Activated Carbon (GAC) filter System installation/service				
	A. New GAC System Installation	_____	x	$2,500.00	$0.00
	B. Refurbished GAC System Installation	_____	x	$1,180.00	$0.00
	C. Filter Replacement/removal*	_____	x	$450.00	$0.00
	D. GAC System Removal, cleaning & refurbishment	_____	x	$720.00	$0.00
	E. GAC System housing	_____	x	$450.00	$0.00
	F. In-line particulate filter	_____	x	$150.00	$0.00
	G. Additional piping & fittings	_____	x	$4.00	$0.00
25.	Well Repair				
	A. Repair 2x2 monitoring well pad	_____	each x	$100.00	$0.00
	B. Repair 4x4 monitoring well pad	_____	each x	$150.00	$0.00
	C. Replace well vault	_____	each x	$225.00	$0.00
	D. Replace well cover and gasket	_____	each x	$30.00	$0.00
	E. Replace well cover bolts	_____	each x	$10.00	$0.00
	F. Replace locking well cap & lock	_____	each x	$15.00	$0.00
19.	Report/Project Management			(SUBTOTAL)	
	A. Additional Copies of Report	_____	each x	$32.50	$0.00
	Project Coordination	15%	x	$6,365.00	$954.75
25.	**Total**				**$7,319.75**

DHEC 3664 (12/2005)

*** The appropriate Mobilization cost can be added to this cost**

D H E C
PROMOTE PROTECT PROSPER

Catherine B. Templeton, Director
Promoting and protecting the health of the public and the environment

MR JIM JANSON
CROWN CENTRAL MARKETING CORPORATION
PO BOX 1168
BALTIMORE MARYLAND 21203-1168

JUN 14 2013



Re: **Groundwater Sampling Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680; CA # 45685
Release Reported August 15, 1989
QAPP Contractor Addendum and Associated Cost Agreement received May 8, 2013
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) has reviewed the referenced addendum submitted on your behalf by Terracon. The next appropriate scope of work at the site is a comprehensive groundwater sampling event. All work should be conducted in accordance with the UST Quality Assurance Program Plan (QAPP) and must be conducted in compliance with all applicable regulations. A copy of the QAPP for the UST Management Division is available online at http://www.scdhec.gov/environment/lwm/usthome/Qapp.htm.

Groundwater sampling activities at the site should begin immediately upon receipt of this letter. Cost agreement # 45685 has been approved for the amount shown on the enclosed cost agreement form to sample all monitoring wells associated with the referenced release. Groundwater samples should be collected and analyzed for BTEX, naphthalene, MTBE, the oxygenates, ethanol, 1,2-DCA, and EDB. Analyses should be in accordance with Appendix E of the QAPP to include duplicate samples, field and trip blanks.

In accordance with the QAPP, a weekly status report of the project should be provided via e-mail. If any quality assurance problems arise, your contractor must contact the Division within 24 hours via phone or e-mail. In addition, a discussion of the problem(s) encountered, including quality assurance problems, the actions taken, and the results must be included in the final report submitted to the UST Management Division.

The Monitoring Report, contractor checklist (QAPP Appendix K), and invoice are due within 60 days from the date of this letter. The report submitted at the completion of these activities should include the required information outlined in the QAPP. Please note that all applicable South Carolina certification requirements apply to the services and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

Terracon may submit an invoice for direct payment from State Underground Petroleum Environmental Response Bank (SUPERB) Account for pre-approved costs. By law, the SUPERB Account cannot compensate any costs that are not pre-approved. Please note that applicable South Carolina certification requirements regarding laboratory services and report preparation must be satisfied. If the invoice is not submitted within 120 days from the date of

this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Agency is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

Please note, if unnecessary dilutions are completed resulting in reporting limits of individual chemical of concern (CoC) in excess of Risk-Based Screening Levels (RBSLs), the data cannot be used. In those cases, the Division may deny payment for any non-detect analysis where the reporting limit exceeds the RBSL. The UST Management Division encourages the use of 'J' values as necessary so the appropriate action can be determined for a release.

The Agency grants pre-approval for transportation of virgin petroleum impacted soil and groundwater from the referenced site to a permitted treatment facility. The transport and disposal must be conducted in accordance with the QAPP. If the CoC concentrations based on laboratory analysis are below RBSLs, please contact the project manager for approval to dispose of soil and/or groundwater on site. The SUPERB Account will not reimburse for transportation or treatment of soil and/or groundwater with concentrations below RBSLs.

On all correspondence regarding this site, please reference UST Permit #07680. If you have any questions regarding this correspondence, please contact me by telephone at (803) 898-0614, by fax at (803) 898-0673, or by e-mail at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement
QAPP Contractor Addendum Signature Page (copy)

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc, original signature page)
Technical File (w/ enc)

Approved Cost Agreement 45685

Facility 07680 SC015
FULMERSB
PO Number

Task / Description	Categories	Item Description	Qty / Pct	Unit Price	Amount
01 PLAN					
		C TIER II/COMP PLAN/QAPP APP B	1.0000	525 00	525 00
04 MOB/DEMOB					
		B PERSONNEL	2.0000	290 00	580 00
10 SAMPLE COLLECTION					
		A GROUND WATER	24.0000	55 00	1,320 00
		D GROUNDWATER NO-PURGE	2 0000	35 00	70.00
		H FIELD BLANK	2.0000	5.00	10 00
11 ANALYSES					
	GW GROUNDWATER	A1 BTEXNM+OXYGS+1.2-DCA+ETH-8260B	30 0000	100 00	3,000 00
		F EDB	30 0000	55.00	1,650.00
17 DISPOSAL					
		A WASTEWATER	200 0000	0 80	160 00
19 RPT/PROJECT MNGT & COORDINATIO					
		PCT PERCENT	0 1500	7,315 00	1 097 25
			Total Amount		8,412.25

Section A: Project Management

A1 Title and Approval Page

Quality Assurance Project Plan
Addendum to the SC DHEC UST Programmatic QAPP
for
Former SC-015
3800 Devine Street, Columbia, South Carolina

UST Permit # 07680

Prepared by:
Mike Hudgins / Terracon Project Manager

Terracon

521 Clemson Road
Columbia, South Carolina

Date: 3 May 2013

Terracon Consultants, Inc.
UST Contractor Certification # 246

Approvals

Susan Fulmer SC DHEC Project Manager	Signature	Date 6/11/13
Mike Hudgins Terracon Project Manager	Signature	Date 5/6/13
Chuck Clymer Terracon QA Manager	Signature	Date 5/6/13
Ashley Amick Laboratory Director	aa Signature	Date 5/3/13
Scott Bailey GCAL Laboratory Director	Signed by: Shannon Gautreau Date: Fri May 3 2013 15:57:45 Signature	Date 5/3/13 Signed by: Shannon Gautreau Date: Fri May 3 2013 15:58:03

LETTER OF TRANSMITTAL

Terracon

521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 8/30/13	JOB NO. 73078012
RE: Former SC-015, Columbia, SC UST Site No. 07680; CA # 45685	
Assessment Report	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	8/30/13	Assessment Report - Former SC-510 (CD)
1	8/30/13	SUPERB Invoice (Copy)

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS:

Enclosed is the referenced report.

Please feel free to call me if you have any questions.

COPY TO: Jim Janson/ Crown Central, LLC (email)

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

Ground Water Assessment Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680



August 30, 2013
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide Established in 1965
Employee-Owned terracon.com
Terracon
Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

Terracon

August 30, 2013

Ms. Susan Fulmer
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: ***Ground Water Assessment Report***
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 45685
Terracon Project No. 73078012

Dear Ms. Fulmer:

On behalf of Crown Central LLC., **Terracon Consultants, Inc.** is pleased to submit this Ground Water Assessment Report for Former SC-015 facility located at 3800 Devine Street, in Columbia, South Carolina. This report summarizes the ground water sampling activities and our findings, conclusions, and recommendations.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

John Skowronek, P.G.
Senior Staff Geologist
S.C. Registration No. 2389

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137



Attachment
cc: Jim Janson/Crown Central, LLC

TABLE OF CONTENTS

Ground Water Assessment Report
Former SC-015
3800 Devine Street
Columbia, South Carolina

UST Permit # 07680

SECTION	PAGE NO.
Cover Letter	i
1.0 INTRODUCTION	1
2.0 GROUND WATER SAMPLING	3
3.0 ASSESSMENT RESULTS	5
4.0 CONCLUSIONS AND RECOMMENDATIONS	5

FIGURES

1	Site Location Map
2	Site Map
4	Shallow COC Concentration Map
4A	Intermediate/Deep COC Concentration Map
5	Shallow Potentiometric Surface Map
5A	Intermediate Potentiometric Surface Map
5B	Deep Potentiometric Surface Map

TABLES

2	Ground Water Elevation Data
3	Ground Water Analytical Data, Petroleum Compounds
3	Ground Water Analytical Data, Gasoline Additives

APPENDICES

B	Ground Water Sampling Logs and Laboratory Analytical Report
G	Disposal Manifest
K	SCDHEC QAPP Contractors Checklist

Note: *Figure 3, Table 1, and select Appendices were omitted intentionally to adhere to the reporting format as required by the QAPP.*

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed a Ground Water Assessment at the former SC-015 facility located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #45685 dated June 14, 2013, and the SCDHEC Programmatic Quality Assurance Project Plan (QAPP) and QAPP Appendix B document approved by SCDHEC on June 11, 2013. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

Site Use

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

Facility History

Assessments by Terracon and others have been performed to define the plume and remove free product. The salient points of these assessments are summarized below:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land

surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total of five AFVR events were performed in April 2010 and February - March 2012, and July 2012 and August 2012 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 300 pounds of volatile organic compounds (VOCs) were removed from the subsurface.

Additional AFVR events were recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

1.2 Regional Geology and Hydrogeology

The site is located within the Upper Coastal Plain physiographic province near the Fall Line. The Upper Coastal Plain province consists of sediments deposited in fluvial (river), estuarine (tidal), and near-shore (marine) depositional environments. The Upper Coastal Plain sediments, which were deposited over Piedmont basement rocks, consist of quartz sand, interlayered with varying amounts of kaolinitic clay.

Ground water within the shallow sediments of the Upper Coastal Plain and Piedmont provinces typically occurs under water table (unconfined) and semi-confined conditions. Ground water flow directions are a subtle reflection of the local topography. Local recharge of the shallow aquifer occurs by the direct infiltration by precipitation. The ground water discharges into streams and rivers.

1.3 Site Geology and Hydrogeology

Based on the geologist's logs of monitoring wells installed at the site, the site is underlain by sands and silty/clayey sands approximately 10 to 19 feet thick, overlying very fine-grained materials including sandy silts, silts, and clays. This silt/clay unit is of variable thickness, ranging from 6 to more than 25 feet across the site. Based upon the lithology data collected from monitoring wells MW-10R, MW-11R, and DW-1, this silt/clay unit is underlain by a sand layer of unknown thickness and extent.

Groundwater occurs both as the surficial perched water layer on the upper silt/clay unit and as the intermediate semiconfined layer below the perched layer. The depth to groundwater in the surficial perched layer as measured in monitoring wells MW-5R, MW-7R, MW-8, MW-9R, MW-12R, and MW-13 ranged from approximately 9.8 feet to 13.3 feet below ground surface (bgs). The potentiometric surface of the perched layer indicates ground water flows to the northwest and south in this layer (Figure 5).

The depth to ground water in the intermediate semiconfined layer of the shallow aquifer as measured in monitoring wells MW-11R, MW-17, MW-19, MW-20 and DW-1 ranged from approximately 30.0 feet to 36.0 feet bgs. The potentiometric surface of the intermediate layer indicates ground water flows to the northeast (Figure 5A). The water level in the well DW-1 (34.65 feet bgs) was recorded to be approximately 22.0 feet lower than in companion shallow well MW-5R (12.67 feet bgs), indicating a downward vertical hydraulic gradient exists between the surficial perched layer and the intermediate semiconfined layer of the shallow aquifer.

The depth to ground water in the deep layer of the shallow aquifer as measured in monitoring wells MW-5D, MW-12D and MW-18D ranged from approximately 40.8 feet to 47.9 feet bgs. The potentiometric surface of the deep layer of the shallow aquifer indicates ground water flows to the northeast (Figure 5B).

2.0 GROUND WATER SAMPLING

Water level measurements from site monitoring wells were collected on July 22, 2013, and ground water samples were collected from site monitoring wells on July 22-23, and August 9, 2013. Water levels were measured using an electric water level indicator. A summary of the water level data is presented on Table 2.

Ground water samples were collected from 18 monitoring wells. The monitoring wells were purged prior to sampling, and grab samples were collected from them using disposable polyethylene bailers dedicated to each well. Purge water generated during sampling was disposed of by Verco, Inc., Lexington, South Carolina. A copy of the disposal manifest is included in Appendix G.

Dissolved oxygen, specific conductance, pH, turbidity and temperature measurements were measured with calibrated field meters during purging and recorded on Ground Water Sampling Logs, included in Appendix B. Copies of the equipment calibration sheets are included with Appendix B. The samples were placed in iced coolers and delivered along with chain of custody documentation to Access Analytical, Inc. in Irmo, South Carolina for analysis. The samples were analyzed for the following analytes:

Analysis	Method
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Methyl-tert-butyl-ether (MTBE) Naphthalene 1,2 Dichloroethane (1,2 DCA) 8 Oxygenates	EPA Method 8260B
1,2 –Dibromoethane (EDB)	EPA Method 8011

Monitoring well DW-1 was not sampled with the network wells on July 22 and 23, 2013. DW-1 was sampled on August 9, 2013, including collection of a duplicate sample, field blank and trip blank. Field duplicates were taken from monitoring wells MW-18, MW-21 and DW-1. On July 22, 23 and August 9, 2013, field blanks were collected, one each day, using deionized water to fill the laboratory provided sample containers. The trip blanks were provided by Access Analytical Inc. with the sample coolers. The QA/QC blanks were analyzed for VOCs.

Ground water analytical results are included in Table 3. Copies of the laboratory analytical reports and chain-of-custody forms are included in Appendix B.

Discrepancies were noted in the trip blank QA/QC sample analyzed for this assessment. The parameter t-butanol (TBA) was detected in Trip Blank 1 at a concentration of 5.32J ug/L. The concentration is low and is an estimated value below the normal reporting limit of10 ug/L. The majority of TBA analyses for the July 22 and 23, 2013 sampling were non-detect. Therefore, the potential effect of the Trip Blank 1 TBA detection has no impact on the TBA data from the samples collected from the monitoring wells.

Field Blank 3 and Trip Blank 2 were associated with the August 9, 2013 sampling of intermediate monitoring well DW-1 only. None of the analyticals detected in the monitoring well DW-1 primary or duplicate samples were detected in the Field Blank 3 or Trip Blank 2 sample analyses. The parameter TBA was detected in the Field Blank 3 sample at a concentration of 7.47J ug/L, and 1,2-Dichloroethane (1,2 DCA) was detected in trip blank 2 at a concentration of 5.42 ug/L. These two parameters were not detected in the primary or duplicate samples. Therefore, the individual detections in the respective blanks do not affect the data quality reported for the DW-1 primary or duplicate analyses.

From accessing the monitoring wells, it was observed that well hardware and identification tags are missing from some of the monitoring wells. Details of what is needed per each well are listed in the comments section of the Water/Product Level Measurement Log included in Appendix B.

3.0 ASSESSMENT RESULTS

Ground water occurs within the surficial perched layer under unconfined conditions, and in the intermediate semiconfined layer of the shallow aquifer under semiconfined conditions. The depth to ground water in the study area ranges from approximately 9.8 feet bgs in the perched layer to 47.9 feet bgs in the deep layer of the shallow aquifer. None of the site monitoring wells were measured to have product in any of the wells gauged.

The average change in ground water elevation between the last two sampling dates of January 2009 and July 2013 for the monitoring wells: in the surficial perched layer was +2.65 feet, in the intermediate semi-confined layer was -0.01 feet, and in the deep layer was +2.13 feet. Monitoring well MW-19 (from the intermediate layer) had the greatest drop in water level for the period at -0.17 feet. Monitoring well MW-13 (from the surficial perched layer) had the greatest increase in water level of +4.79 feet.

A review of Table 3 indicates that ground water samples were collected from eighteen monitoring wells. From the surficial perched layer, four of the wells sampled (MW-1R, MW-5R, MW-9R, and MW-21) contained more than one Chemical of Concern (COC) above Risk Based Screening Levels (RBSLs) or Action Levels (ALs). The remaining six surficial perched wells (MW-7R, MW-8, MW-12R, MW-13, MW-16, and MW-18) contained COCs below RBSLs and ALs. A shallow COC concentration map is included as Figure 4. Review of Figure 4 indicates the dissolved hydrocarbon plume in the perched portion of the shallow aquifer extends approximately 140 feet to the south, sourced from the former UST dispenser area. The contaminant plume does not appear to migrate off-site.

From the intermediate semiconfined layer of the shallow aquifer, one of the wells sampled (DW-1) contained more than one COC above RBSLs or ALs. The remaining four intermediate semiconfined layer wells (MW-11R, MW-17, MW-19, MW-20) contained COCs below RBSLs and ALs.

From the deep layer of the shallow aquifer, the four deep monitoring wells (5D, 5DD, 12D and 18D) all contained COCs below detection limits. The results of the intermediate and deep well sampling are shown on Figure 4A.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our site assessment activities, the ground water beneath the site has been impacted by dissolved-phase hydrocarbons at concentrations above allowable levels.
The horizontal and vertical extent of the contaminants in the upper, intermediate, and lower portions of the shallow aquifer downgradient from the UST system has been defined by the monitoring well network. Inspection of the historical ground water quality data indicates the contaminants in ground water are being reduced by natural attenuation processes. Based on

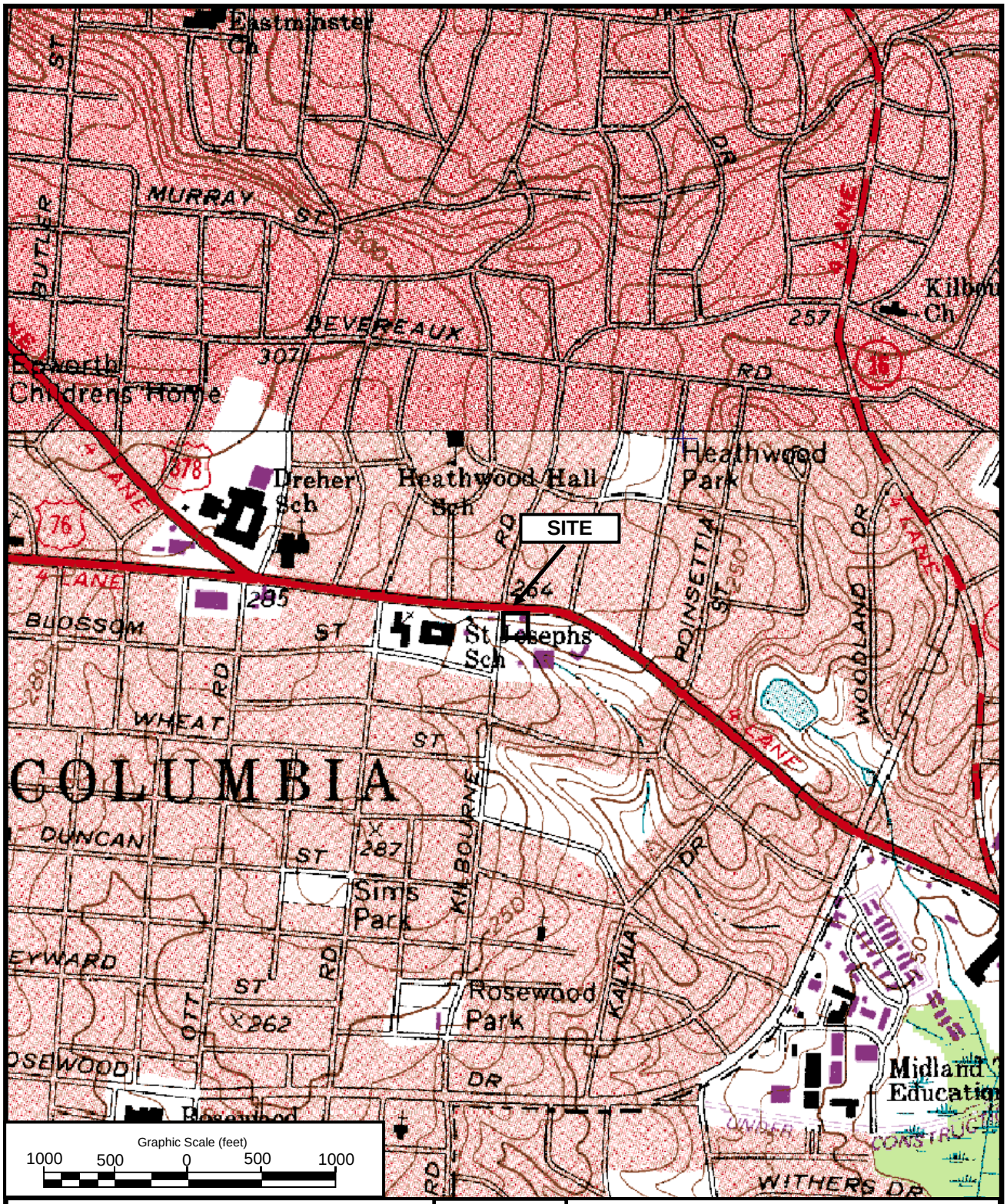
the date of reported release, the contaminant plume movement in the shallow aquifer is effectively impeded by degradation of the contaminants through physical, biological, and chemical degradation processes.

Items for replacement are necessary for the monitoring well network. Twenty-four locks, three sets of bolts, twelve well identification tags, one well cap and one well vault will be required to properly secure the monitoring well hardware. Details of what is needed per each well are listed in the comments section of the Water/Product Level Measurement Log included in Appendix B.

AFVR has been an effective remediation mechanism at this site. Terracon recommends quarterly AFVR events on monitoring wells MW-5R and MW-21, where there are high dissolved –phase hydrocarbons. Comprehensive semiannual sampling is recommended at this site. Upon confirmation of removal of the bulk of the hydrocarbon mass, this site may be a candidate for monitored natural attenuation.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 4 – Shallow COC Concentration Map
Figure 4A – Intermediate/Deep COC Concentration Map
Figure 5 – Shallow Potentiometric Surface Map
Figure 5A – Intermediate Potentiometric Surface Map
Figure 5B – Deep Potentiometric Surface Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

DATE: 1982
SCALE: 1 INCH = 1000 FEET

PROJECT NO. 73078012

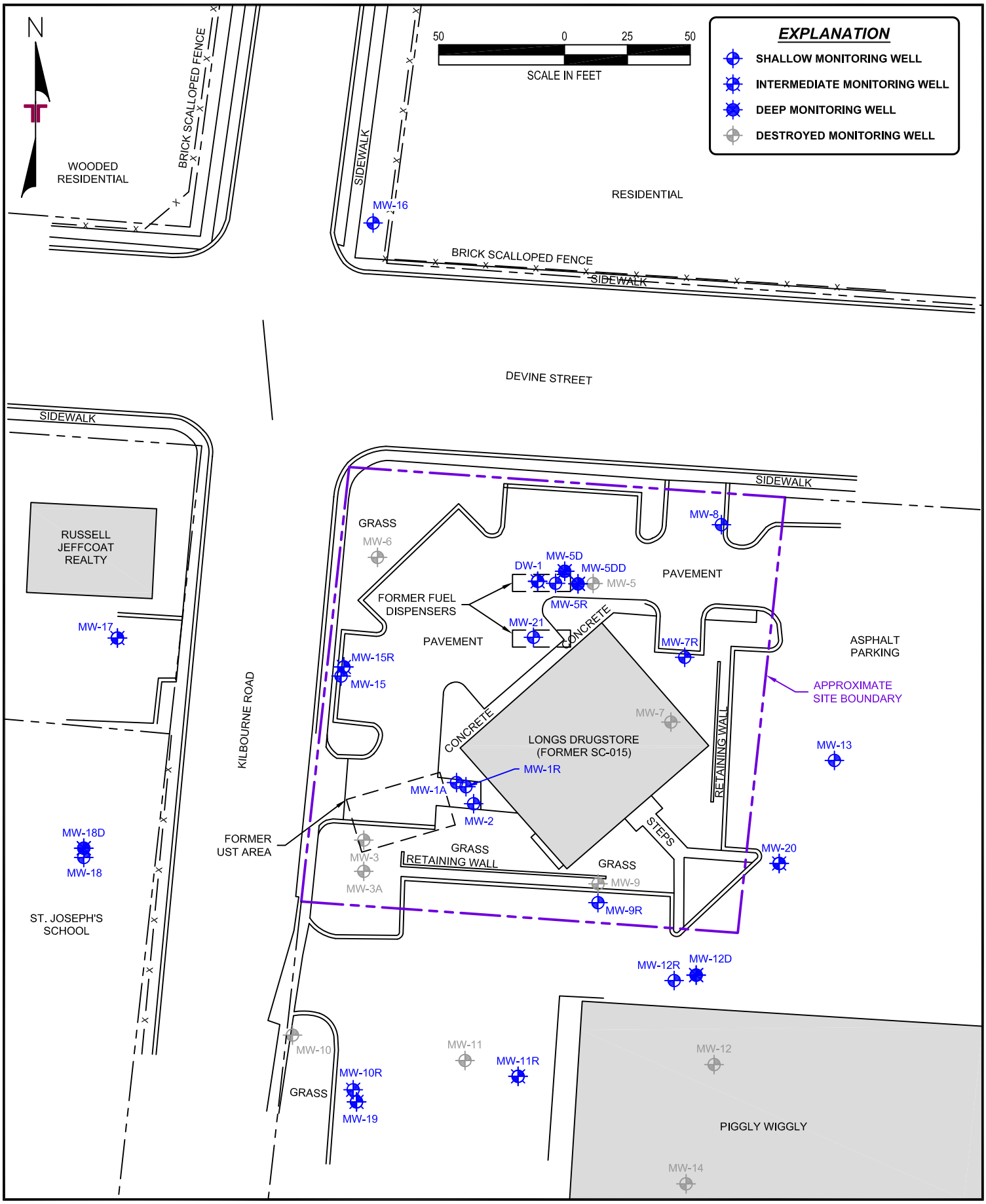
N

Terracon

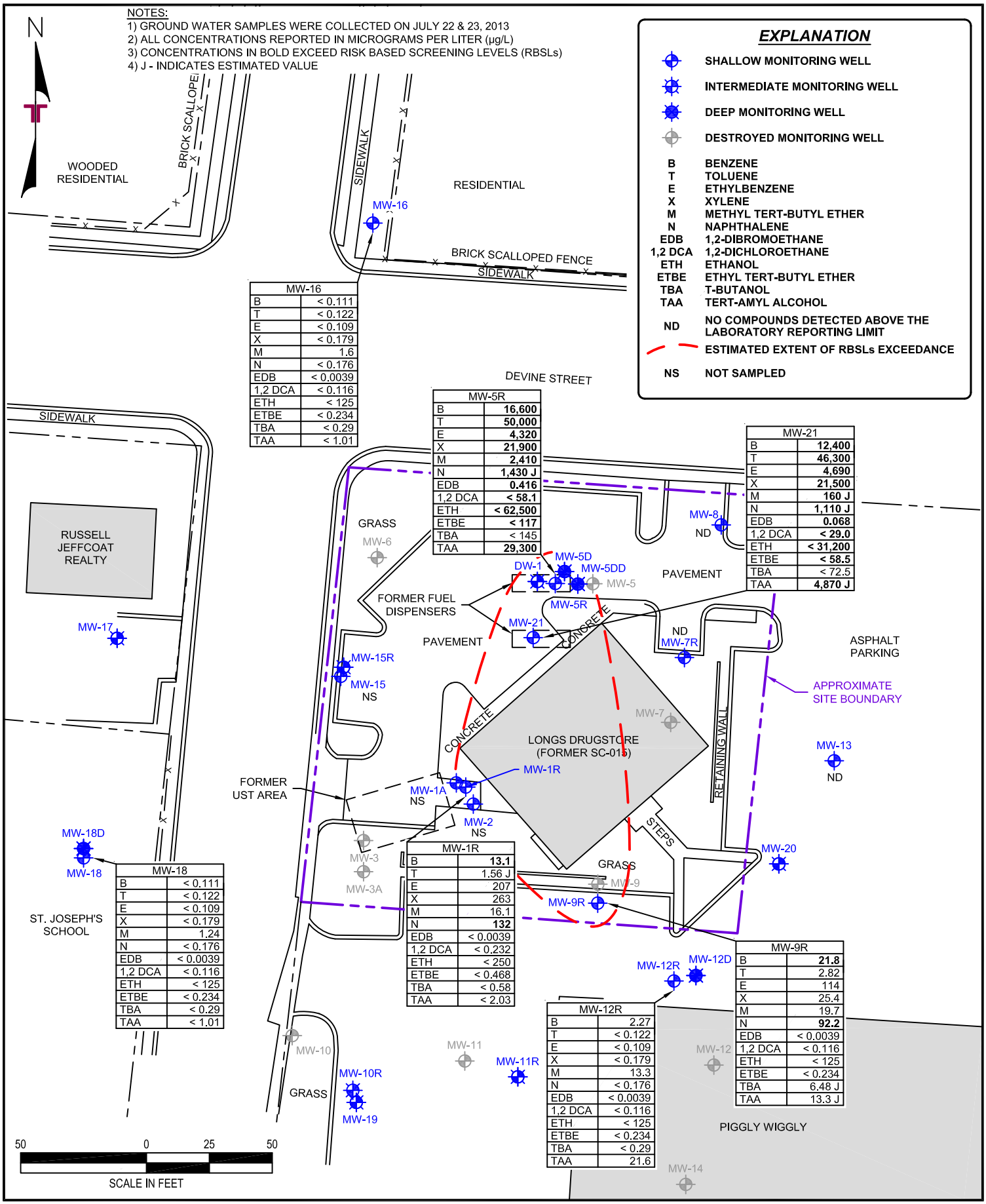
SITE LOCATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



Project Mngr: RWN	Project No. 73078012	Terracon Consulting Engineers and Scientists	SITE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 2
Approved By: PMH	Date: AUGUST 2013		



MW-16	
B	< 0.111
T	< 0.122
E	< 0.109
X	< 0.179
M	1.6
N	< 0.176
EDB	< 0.0039
1,2 DCA	< 0.116
ETH	< 125
ETBE	< 0.234
TBA	< 0.29
TAA	< 1.01

MW-5R	
B	**16,600**
T	**50,000**
E	**4,320**
X	**21,900**
M	**2,410**
N	**1,430 J**
EDB	**0.416**
1,2 DCA	**< 58.1**
ETH	**< 62,500**
ETBE	**< 117**
TBA	< 145
TAA	**29,300**

MW-21	
B	**12,400**
T	**46,300**
E	**4,690**
X	**21,500**
M	**160 J**
N	**1,110 J**
EDB	**0.068**
1,2 DCA	**< 29.0**
ETH	**< 31,200**
ETBE	**< 58.5**
TBA	< 72.5
TAA	**4,870 J**

MW-18	
B	< 0.111
T	< 0.122
E	< 0.109
X	< 0.179
M	1.24
N	< 0.176
EDB	< 0.0039
1,2 DCA	< 0.116
ETH	< 125
ETBE	< 0.234
TBA	< 0.29
TAA	< 1.01

MW-1R	
B	**13.1**
T	1.56 J
E	207
X	263
M	16.1
N	**132**
EDB	< 0.0039
1,2 DCA	< 0.232
ETH	< 250
ETBE	< 0.468
TBA	< 0.58
TAA	< 2.03

MW-12R	
B	2.27
T	< 0.122
E	< 0.109
X	< 0.179
M	13.3
N	< 0.176
EDB	< 0.0039
1,2 DCA	< 0.116
ETH	< 125
ETBE	< 0.234
TBA	< 0.29
TAA	21.6

MW-9R	
B	**21.8**
T	2.82
E	114
X	25.4
M	19.7
N	**92.2**
EDB	< 0.0039
1,2 DCA	< 0.116
ETH	< 125
ETBE	< 0.234
TBA	6.48 J
TAA	13.3 J

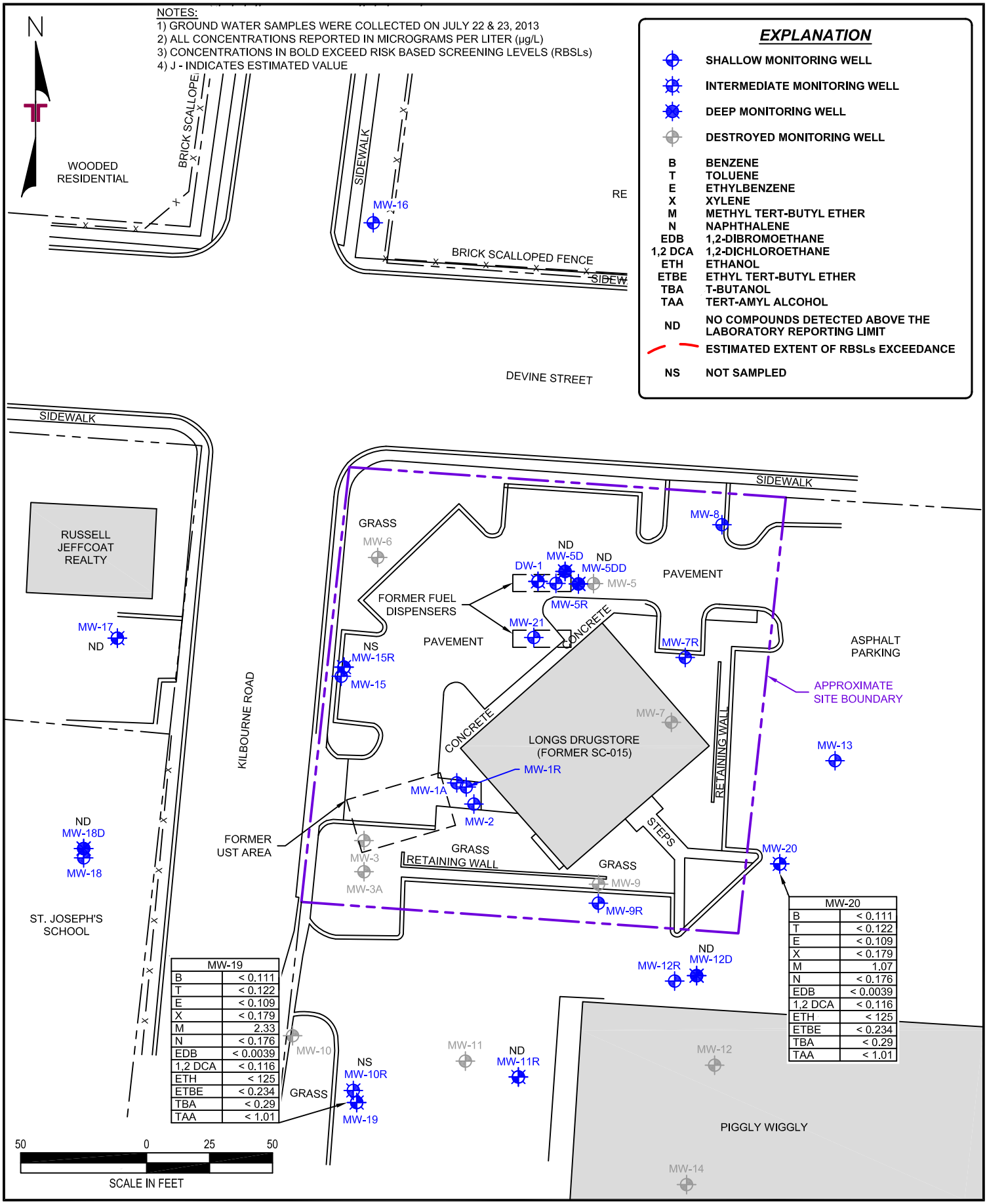
Project Mngr:	RWN
Drawn By:	PTK
Checked By:	RWN
Approved By:	PMH
Project No.	73078012
Scale:	AS SHOWN
File No.	73078012
Date:	AUGUST 2013

Terracon
Consulting Engineers and Scientists
521 CLEMSON ROAD COLUMBIA, SC 29229
PH. (803) 741-9000 FAX. (803) 741-9900

SHALLOW COC CONCENTRATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT #07680

Fig No. 4



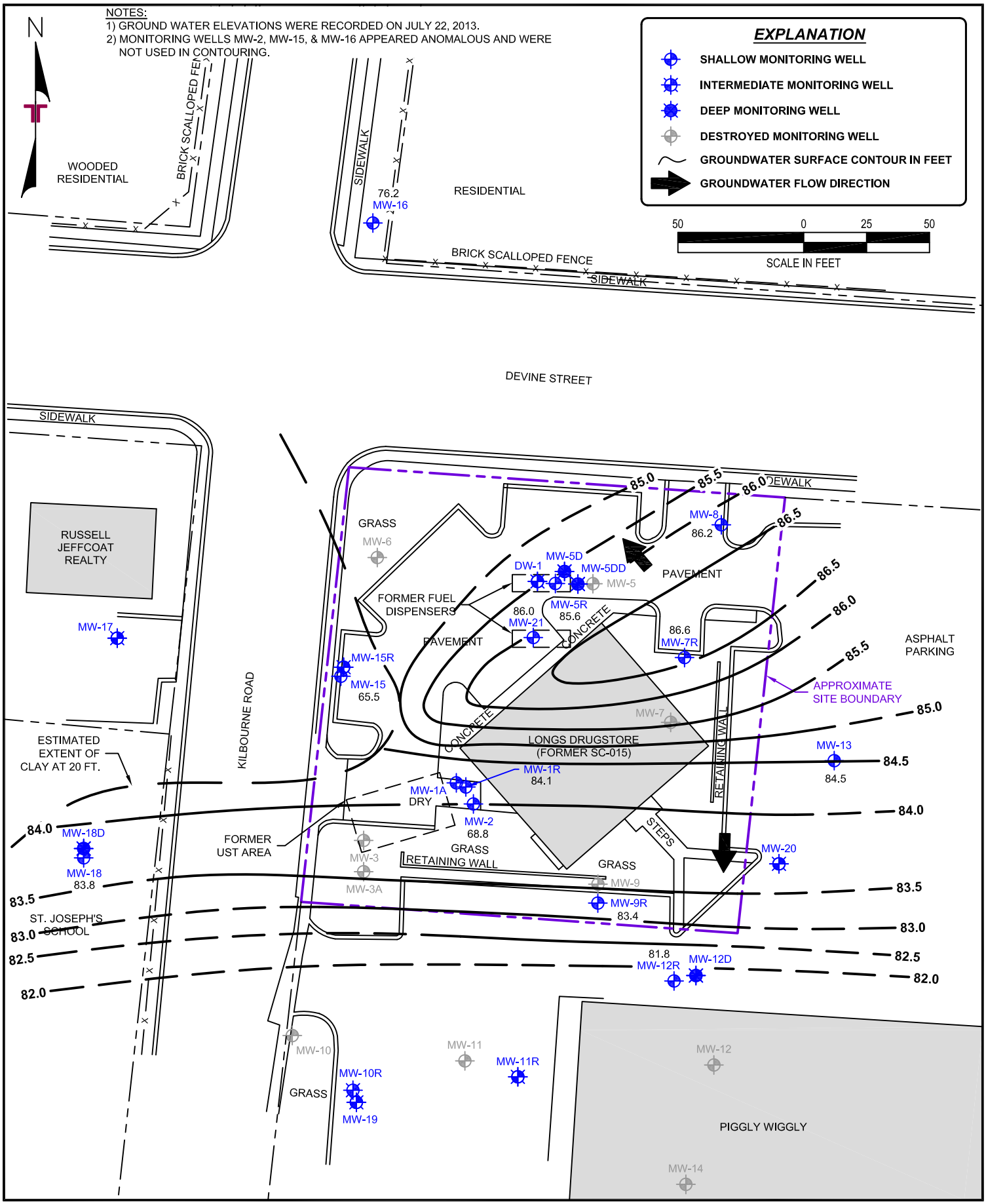
Project Mngr:	RWN
Drawn By:	PTK
Checked By:	RWN
Approved By:	PMH
Project No.	73078012
Scale:	AS SHOWN
File No.	73078012
Date:	AUGUST 2013

Terracon
Consulting Engineers and Scientists
521 CLEMSON ROAD COLUMBIA, SC 29229
PH. (803) 741-9000 FAX. (803) 741-9900

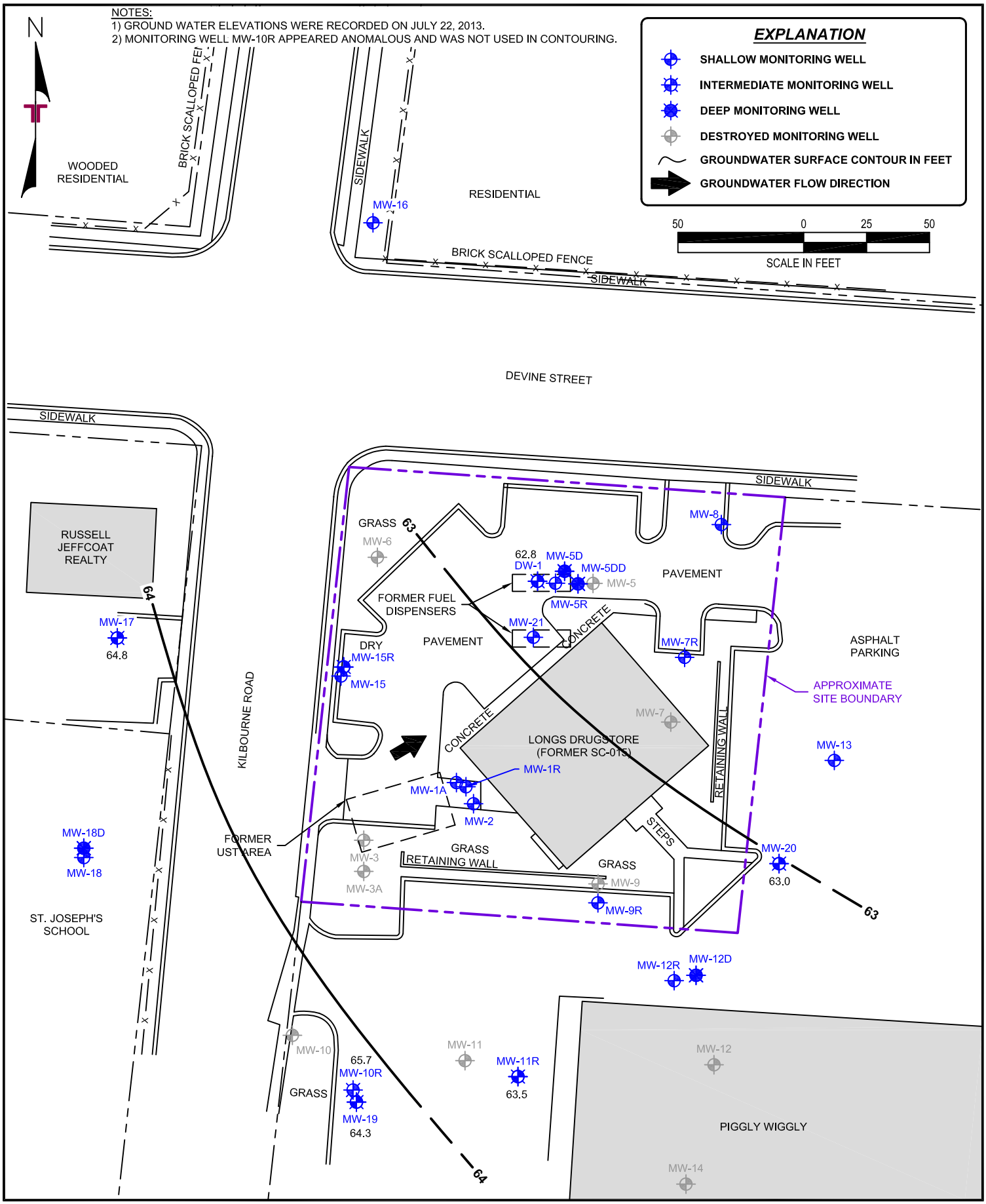
INTERMEDIATE / DEEP COC CONCENTRATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT #07680

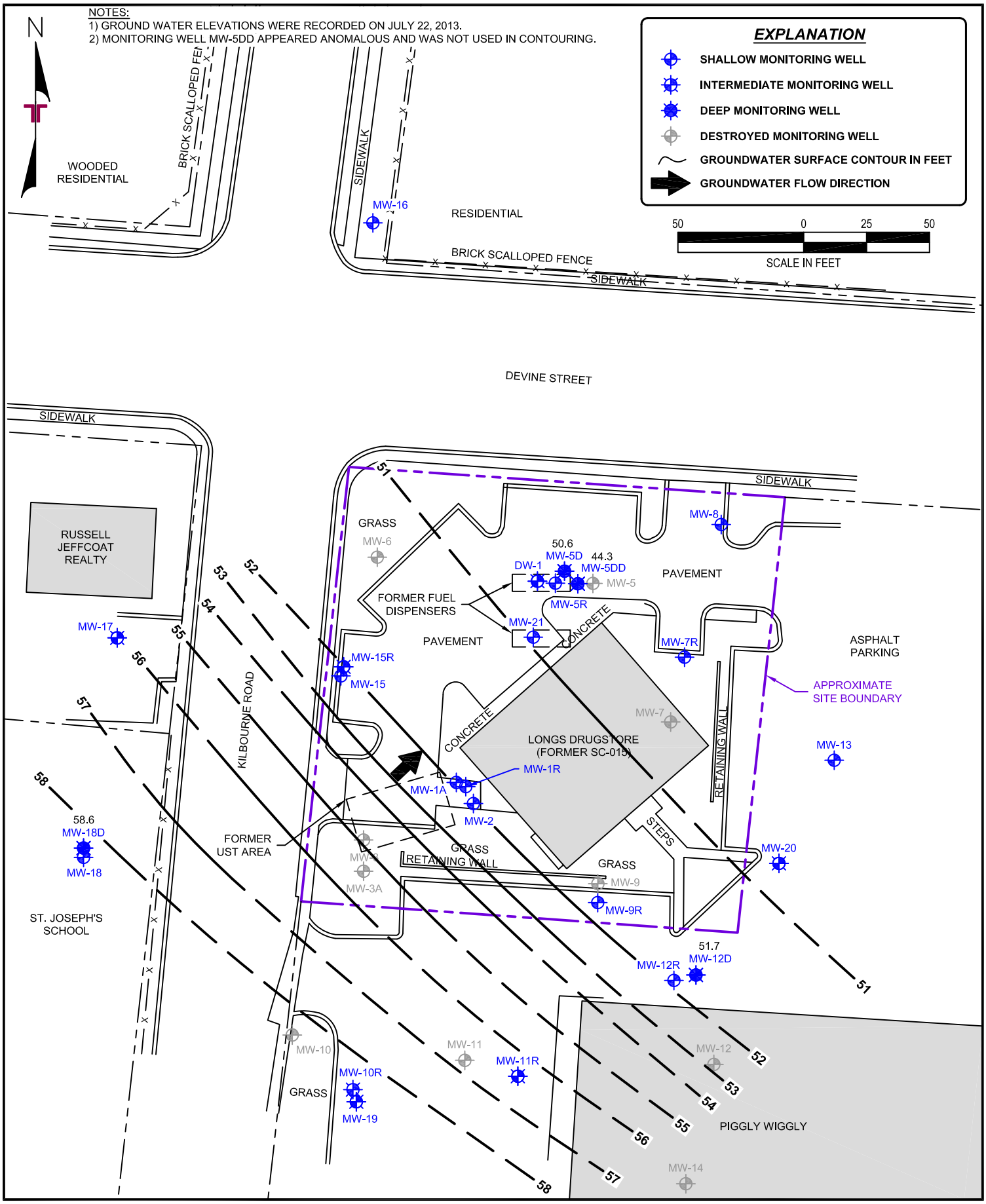
Fig No. 4A



Project Mngr: RWN	Project No. 73078012	Terracon Consulting Engineers and Scientists	SHALLOW POTENTIOMETRIC SURFACE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 5
Approved By: PMH	Date: AUGUST 2013		



Project Mngr: RWN	Project No. 73078012	Terracon Consulting Engineers and Scientists	INTERMEDIATE POTENTIOMETRIC SURFACE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 5A
Approved By: PMH	Date: AUGUST 2013		



Project Mngr: RWN	Project No. 73078012	Terracon Consulting Engineers and Scientists	DEEP POTENTIOMETRIC SURFACE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015
Checked By: RWN	File No. 73078012	PH. (803) 741-9000 FAX. (803) 741-9900	3800 DEVINE STREET
Approved By: PMH	Date: AUGUST 2013		COLUMBIA, SOUTH CAROLINA
			UST PERMIT #07680

Fig No. 5B

TABLES

Table 2 – Ground Water Elevation Data
Table 3 – Ground Water Analytical Data, Petroleum Compounds
Table 3 – Ground Water Analytical Data, Gasoline Additives

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	216.56
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
	6/3/08		98.41	DRY		
	7/22/13			DRY		
MW-1R	1/8/09	13 - 28	98.35	15.19	ND	83.16
	7/22/13			14.28	ND	84.07
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
	6/3/08		98.45	DRY	ND	DRY
	7/22/13			29.67	ND	68.78
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-5R	5/14/08	5-20	98.29	15.19	ND	83.1
	1/20/09			14.71	ND	83.58
	7/22/13			12.67	ND	85.62
MW-5D	1/23/09	80-85	98.49	49.32	ND	49.17
	7/22/13			47.90	ND	50.59
MW-5DD	3/23/09	112 - 117	98.83	54.16	ND	44.67
	7/22/13			54.57	ND	44.26

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		
MW-7R	5/14/08	10-25	98.85	15.46	ND	83.39
	1/20/09			14.95	ND	83.90
	7/22/13			12.25	ND	86.60
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
	5/15/08		99.48	16.21	ND	83.27
	1/20/09			15.97	ND	83.51
	7/22/13			13.28	ND	86.20
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-9R	5/14/08	5-20	93.32	12.79	ND	80.53
	1/20/09			12.18	ND	81.14
	7/22/13			9.90	ND	83.42
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-10R	5/14/08	15-30	95.71	DRY		
	7/22/13			29.99	ND	65.72
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-11R	5/14/08	15-30	92.26	29.28	ND	62.98
	1/20/09			28.76	ND	63.50
	7/22/13			28.80	ND	63.46
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		
MW-12R	5/14/08	5-20	92.43	14.34	ND	78.09
	1/20/09			13.95	ND	78.48
	7/22/13			10.62	ND	81.81
MW-12D	1/23/09	60-75	92.51	41.25	ND	51.26
	7/22/13			40.84	ND	51.67
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
	6/3/08		94.26	13.70	ND	80.56
	1/20/09			14.60	ND	79.66
	7/22/13			9.81	ND	84.45
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		
MW-15	1/14/97	20-35	249.43	DRY		
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
	5/15/08		99.70	DRY		
	7/22/13			34.18	ND	65.52
MW-15R	1/20/09	24.2-39.2	100.47	35.52	ND	64.95
	7/22/13			DRY		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85
	5/15/08		102.85	26.96	ND	75.89
	1/20/09			26.76	ND	76.09
	7/22/13			26.68	ND	76.17
MW-17	5/14/08	25.5-39.5	100.84	36.70	ND	64.14
	1/20/09			36.02	ND	64.82
	7/22/13			36.04	ND	64.80
MW-18	1/20/09	15-30	103.46	22.21	ND	81.25
	7/22/13			19.69	ND	83.77
MW-18D	1/23/09	57-62	103.28	49.20	ND	54.08
	7/22/13			44.64	ND	58.64
MW-19	1/20/09	19.6-34.6	95.74	31.30	ND	64.44
	7/22/13			31.47	ND	64.27
MW-20	1/20/09	18.7-33.7	92.93	29.94	ND	62.99
	7/22/13			29.97	ND	62.96
MW-21	4/16/09	5-20	98.89	15.42	ND	83.47
	7/22/13			12.86	ND	86.03
DW-1	5/15/08	35-40	98.48	35.31	ND	63.17
	1/20/09			34.84	ND	63.64
	7/11/11		97.48	NR	NR	NR
	7/22/13			34.65	ND	62.83

NOTES:

1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded. Water levels had not stabilized during sampling (rising in well)
5) * = Top-of-casing elevations were altered during site redevelopment. A new survey was conducted in 2008 by Jay Joshi, PLS #14811, as part of the additional assessment event.

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-1A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	2	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
	7/22/13	DRY							
MW-1R	1/20/09	**388**	113	310	786	**546**	**89.3**	< 0.00350	< 0.0027
	7/22/13	**13.1**	1.56 J	207	263	16.1	**132**	< 0.0039	NA
MW-2	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
	7/22/13	NOT SAMPLED*							
MW-3	7/16/93	5	13	1	5	< 1.00	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-3A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA	NA
	1/14/97	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	DESTROYED							
MW-5	7/26/93	**19,000**	**86,000**	**3,500**	**22,000**	**4,000**	**6,000**	NA	NA
	9/19/03	DESTROYED							
MW-5R	5/15/08	**28,600**	**64,500**	**3,620**	**17,300**	**4,520**	< 2,500	**4.84**	< 0.015
	1/20/09	**27,300**	**55,100**	**3,100**	**14,100**	**4,540**	**1,310 J**	**0.741**	**0.019**
	7/23/13	**16,600**	**50,000**	**4,320**	**21,900**	**2,410**	**1,430 J**	**0.416**	NA
MW-5D	1/12/09	**51.9**	346	65.2	331	< 0.385	**28.5**	NA	NA
	1/24/09	**124**	624	88.8	333	12.1	**33.5 J**	< 0.0035	0.42
	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-5DD	3/23/09	1.85	11.1	3.98	18.0	< 0.077	7.24	< 0.0035	< 0.003
	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-6	7/26/93	**9,600**	**2,200**	**1,900**	9,300	< 1.00	NA	NA	NA
	9/19/03	DESTROYED							
MW-7	7/16/93	**19,000**	**86,000**	3,500	2,200	**4,000**	NA	NA	NA
	1/14/97	**7,000**	**8,900**	**1,700**	3,200	**4,300**	**150**	NA	NA
	9/19/03	DESTROYED							
MW-7R	5/14/08	**37.1**	355	68.1	91.8	< 5.00	**29.7**	< 0.010	**0.023**
	1/20/09	2.33	78.5	126	106	< 0.077	15.7	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-8	7/16/93	**130**	**1,100**	73	730	< 5.00	NA	NA	NA
	1/14/97	**40**	1.70	1.60	32	< 1.00	31	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.44 J	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-9	7/16/93	< 10	< 10	< 10	< 10	**10,000**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	**3,800**	**500**	NA	NA
	12/3/07	WELL NOT LOCATED							
MW-9R	5/14/08	**34.9**	11.9	126	249	34.1	**175**	< 0.010	< 0.015
	1/20/09	4.36	< 0.076	16.6	< 0.183	11.7	8.86	< 0.003	< 0.003
	7/22/13	**21.8**	2.82	114	25.4	19.7	**92.2**	< 0.0039	NA
MW-10	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	**970**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	32	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-10R	6/3/08	DRY							
	1/20/09	DRY							
	7/22/13	NOT SAMPLED*							
MW-11	7/16/93	3	< 1.00	< 1.00	< 1.00	**56**	NA	NA	NA
	1/14/97	**13**	< 1.00	< 1.00	< 1.00	**190**	**500**	NA	NA
	9/19/03	DESTROYED							

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-11R	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.50 J	< 0.003	0.0086 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-12	7/26/93	**1,200**	29	150	110	**1,000**	NA	NA	NA
	1/14/97	4.90	< 1.00	1.20	< 1.00	**74**	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-12R	5/14/08	**74.4**	2.46	52.3	25.2	**145**	**138**	< 0.010	**34**
	1/20/09	3.02	< 0.076	< 0.065	< 0.183	**64.1**	< 0.118	< 0.003	< 0.003
	7/22/13	2.27	< 0.122	< 0.109	< 0.179	13.3	< 0.176	< 0.0039	NA
MW-12D	1/7/09	< 0.065	< 0.076	< 0.065	5.62	**52.9**	< 0.118	NA	NA
	1/23/09	< 0.065	1.17	< 0.065	2.29J	< 0.077	2.36 J	< 0.0035	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-13	7/26/93	< 1.00	4.00	< 1.00	5.00	< 1.00	NA	NA	NA
	1/14/97	**18**	< 1.00	< 1.00	< 1.00	28	1.20	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	1.33	< 1.00	< 1.00	< 3.00	5.99	< 5.00	NA	NA
	6/3/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	**0.037**
	1/20/09	DRY							
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-14	10/1/93	< 1.00	< 1.00	< 1.00	< 1.00	**270**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	14	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-15	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	**300**	< 5.00	NA	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	**160**	< 5.00	NA	NA
	5/15/08	DRY							
	7/22/13	NOT SAMPLED*							
MW-15R	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	**185**	2.59 J	< 0.003	**0.075**
	7/22/13	DRY							

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-16	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	2.60	< 1.00	< 1.00	< 3.00	5.66	< 5.00	NA	NA
	12/3/07	**58.5**	< 1.00	< 1.00	4.06	29.5	5.23	NA	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 1.00	1.75	< 1.00	NA	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	1.11	< 0.118	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.6	< 0.176	< 0.0039	NA
MW-17	5/14/08	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.550 J	< 0.118	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-18	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	4.68	< 0.118	< 0.003	0.0074 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.24	< 0.176	< 0.0039	NA
MW-18 DUP	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.31	< 0.176	< 0.0039	NA
MW-18D	1/23/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.47 J	< 0.035	0.0088 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
MW-19	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.118	< 0.003	0.034
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	2.33	< 0.176	< 0.0039	NA
MW-20	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.853 J	< 0.118	< 0.003	0.069
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.07	< 0.176	< 0.0039	NA
MW-21	1/23/09	**23,300**	**62,900**	**4,780**	**21,600**	**2,370**	**1,650 J**	**0.405**	0.018
	7/23/13	**12,400**	**46,300**	**4,690**	**21,500**	**160 J**	**1,110 J**	**0.068**	NA
MW-21 DUP	7/23/13	**10,800**	**45,000**	**4,980**	**23,900**	**142 J**	**1,320**	**0.065**	NA
DW-1	5/15/08	**17.1**	96.6	19.2	104	3.53	**43.8**	< 0.010	< 0.015
	1/20/09	**5.80**	< 0.076	3.68	12.5	< 0.077	7.22	< 0.003	**0.036**
	8/9/13	1.97	<0.122	<0.109	0.999J	<0.078	1.03J	<0.0039	NA
DW-1 DUP	8/9/13	1.77	<0.122	0.627J	1.08J	<0.078	0.934J	<0.0039	NA
Field Blank 1	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
Field Blank 2	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
Field Blank 3	8/9/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
Trip Blank 1	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	NA	NA
Trip Blank 2	8/9/13	<0.111	<0.122	<0.109	<0.179	<0.078	<0.176	NA	NA
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) µg/L - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) < 1.00 = below detection levels
8) J - indicates an estimated value
7) B - indicates a result between the Reporting Detection Limit and the Method Detection Limit
8) * - insufficient water in well to allow representative water sample

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
MW-1A	5/14/08	DRY								
	7/22/13	DRY								
MW-1R	1/20/09	**12.9 J**	< 202	< 1.30	8.40 J	< 21.8	911	< 1.74	280	< 1.79
	7/22/13	< 0.232	< 250	< 0.468	< 0.472	< 75.2	< 0.580	< 0.480	< 2.03	< 0.974
MW-2	5/14/08	DRY								
	7/22/13	NOT SAMPLED*								
MW-5R	5/15/08	< 2,500	< 10,000	< 500	< 500	< 1,000	**6,880**	< 500	**46,900**	< 1,000
	1/20/09	< 44.9	< 20,200	< 130	< 265	< 2,180	**6,230**	< 174	**39,500**	< 179
	7/23/13	**< 58.1**	**< 62,500**	**< 117**	< 118	< 18,800	< 145	< 120	**29,300**	< 243
MW-5D	1/24/09	< 0.89	< 403	< 2.59	< 5.29	< 43.6	< 4.12	< 3.48	< 15.6	<0.357
	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-5DD	3/23/09	< 0.89	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	<0.348	< 15.6	< 0.357
	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-7R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	125	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-8	5/15/08	< 5.00	< 20.0	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-9R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	< 50.0	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	6.93 J	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	6.48 J	< 0.240	13.3 J	< 0.487
MW-10R	5/14/08	DRY								
	7/22/13	NOT SAMPLED*								
MW-11R	5/15/08	< 5.00	71.6	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-12R	5/14/08	< 5.00	59.2	< 1.00	< 1.00	< 2.00	89.6	5.28	141	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	27.0	< 0.348	47.8	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	21.6	< 0.487
MW-12D	1/23/09	< 0.09	< 403	< 2.59	< 5.29	< 43.6	< 41.2	< 3.48	< 156	< 3.57
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
MW-13	6/3/08	< 5.00	49.4	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-15	5/15/08	DRY								
	7/22/13	NOT SAMPLED*								
MW-15R	1/20/09	0.924 J	< 40.3	< 0.259	6.08	< 4.36	155	< 0.348	44.6	< 0.357
	7/22/13	DRY								
MW-16	5/15/08	< 5.00	43.9	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-17	5/14/08	< 5.00	47.1	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-18	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-18 DUP	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-18D	1/23/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-19	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-20	1/20/09	< 0.091	< 40.4	< 0.259	< 0.529	< 4.36	< 4.12	< 0.349	< 15.7	< 0.358
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-21	1/23/09	< 45	< 20200	< 130	<265	<2180	<2060	<174	<7800	<179
	7/23/13	**< 29.0**	**< 31,200**	**< 58.5**	< 59.0	< 9,400	< 72.5	< 60.0	**4,870 J**	< 122
MW-21 DUP	7/23/13	**< 29.0**	**< 31,200**	**< 58.5**	< 59.0	< 9,400	< 72.5	< 60.0	**4,430 J**	< 122
DW-1	5/15/08	< 5.00	45.7	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	35.5	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	8/9/13	<0.116	< 125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487
DW-1 DUP	8/9/13	<0.116	< 125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487
Field Blank 1	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
Field Blank 2	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
Field Blank 3	8/9/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	7.47 J	< 0.240	< 1.01	< 0.487
Trip Blank 1	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	5.32 J	< 0.240	< 1.01	< 0.487

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
Trip Blank 2	8/9/13	**5.42**	<125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487

Notes:
1) Results shown in boldface type indicate concentrations which exceed the AL for that compound
2) µg/L - micrograms per liter or parts per billion
3) ALs- SCDHEC Action Levels
4) NE - Not Established
5) 1,2-DCA = 1,2-dichloroethane 3
6) 8 Oxygenates abbreviated as:
   - ETBE = ethyl tert-butyl ether
   - DIPE = diisopropyl ether
   - ETBA = ethyl tert-butanol
   - TBA = t-butanol
   - TAME = t-amyl methyl ether
   - TAA = tert-amyl alcohol
   - TBF = tert-butyl formate
7) * - insufficient water in well to allow representative water sample

APPENDIX B

Ground Water Sampling Logs and Laboratory Analytical Report

Terracon

WATER/PRODUCT LEVEL MEASUREMENT LOG

UST # 07680

PROJECT NAME: SC-015

PROJECT NO.: 73078012

DATE: 7.22.13

EQUIPMENT USED: Elec H2o meter

FIELD PERSONNEL: AKRE

Well ID	Depth to Water	Depth to Product	Product Thickness	Total Depth	Lid	bolts	Cap	Tag	lock	
MW-18d	44.64	—			Y	Y	Y	Y	N	
MW-18	19.69	—			Y	Y	Y	Y	N	
MW-10R	29.99	—		30.20	Y	Y	Y	Y	N	
MW-19	31.47	—			Y	Y	Y	Y	N	
MW-11R	28.80	—			Y	N	Y	N	N	
MW-9R	9.90	—			Y	Y	Y	Y	N	
MW-12R	10.62	—			Y	N	Y	Y	N	
MW-12d	40.84	—			Y	Y	Y	N	N	
MW-20	29.97	—			Y	Y	Y	N	N	
MW-13	9.81				Y	Y	Y	N	N	
MW-17	36.04	—			Y	Y	Y	N	N	
MW-16	26.68	—			Y	Y	Y	Y	N	
MW-8	13.28	—			Y	Y	Y	N	N	
MW-1A	Dry @	→		18.89	Y	Y	N	N	N	4" well
MW-2	29.67	—			Y	Y	Y	N	N	30.10 TD
MW-5dd	54.57	—			Y	Y	Y	Y	N	
MW-7R	12.25	—			Y	Y	Y	N	N	
Dw-1	34.65	—			Y	N	Y	Y	N	Needs new Vault
MW-5d	47.90	—			Y	Y	Y	Y	N	
MW-15	34.18			34.30	Y	Y	Y	N	N	
MW-15R	Dry @	→		38.82	Y	Y	Y	N	N	Confirm w/ bailer
MW-21	12.86	—			Y	Y	Y	Y	N	
MW-5R	12.67	—			Y	Y	Y	Y	N	
MW-1R	14.28	—			Y	Y	Y	N	N	
	119.50	Gal	Purge	H2O						
	20.00	Gal	Decon	H2O						
	139.50									

SC-015

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55(06G1604) YSI-63(09M100557)

SER. #

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE					
		no		pH	4.0	7.1	10.0	

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV. 292
			SIGNATURE	
		no		Columbia SC PPT 0.0

SER. #

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE					
		no		pH		7.1		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
			SIGNATURE	
		no		Columbia, SC PPT 0.0

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE					
		no		pH		7.1		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
7-22-13	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
			SIGNATURE	
		no		Columbia, SC PPT 0.0

* SAME METERS USED FOR ALL CALIBRATIONS

SC-015

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55(06G1604) YSI-63(09M100557)

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 63 pH	4 4.0	7 7.1	10 10.0	SER. #
DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 55 Columbia, SC		ELEV. 292 PPT 0.0		SER. #

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 63 pH	4	7 7.1	10	
DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 55 Columbia, SC		ELEV 292 PPT 0.0		

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 63 pH	4	7 7.1	10	
DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
7-23-13	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 55 Columbia, SC		ELEV 292 PPT 0.0		

* SAME METERS USED FOR ALL CALIBRATIONS

SC-015

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55(06G1004) YSI-63(09M100557)

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
6.9.13	one point two point (three point) other (specify):	(yes) no	AKRE SIGNATURE	YSI 63 pH	4 4.1	7 7.1	10 10.0	SER. #

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
	(one point) two point three point other (specify):	(yes) no	AKRE SIGNATURE	YSI 55 Columbia SC		ELEV. 292 PPT 0.0		SER.#

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
	(one point) two point three point other (specify):	(yes) no	AKRE SIGNATURE	YSI 63 pH	4	7	10	

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
	(one point) two point three point other (specify):	(yes) no	AKRE SIGNATURE	YSI 55 ELEV

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
	one point two point (three point) other (specify):	(yes) no	AKRE SIGNATURE	YSI 63 pH	4	7 7.1	10	

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
6.9.13	(one point) two point three point other (specify):	(yes) no	AKRE SIGNATURE	YSI 55 Columbia SC PPT		ELEV 292 0.0		

* SAME METERS USED FOR ALL CALIBRATIONS

Terracon

Groundwater Sampling Log

Well ID:	MW-12
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078812
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	8.89	ft. BTOC
Depth to water:		ft. BTOC
Length of Water Column (LWC):		ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =		gal.
3 Casing Volumes:		gal.

Remarks: - DRY W/ T.D. OF 8.89
- Data on Table is inaccurate

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078017
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1200

Total Well Depth:	28	ft. BTOC	
Depth to water:	14.28	ft. BTOC	
Length of Water Column (LWC):	13.72	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	2.33	gal.
3 Casing Volumes:	6.99	gal.	
Remarks:	mod. dese. prod. odor		

Field Analyses

Volume Purged (gal.)	2.33	4.66	6.99				
Time	1145	1150	1200				
pH	4.15	5.05	4.80				
Specific Conductivity (umhos/cm)	125.7	186.4	158.7				
Water Temperature ©	25.4	25.6	24.1				
Turbidity	2.5	4.2	2.4				
Dissolved Oxygen (mg/L)	3.20						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-2
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	30.10	ft. BTOC
Depth to water:	29.67	ft. BTOC
Length of Water Column (LWC):	.43	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	0.07	gal.
3 Casing Volumes:	0.21	gal.

Remarks: Confirm w/ bailer
- low vol H2O in Cap only
- NO sample
- TD on Table is inaccurate

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	MW-5cl
Date:	7/23/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1050

Total Well Depth:	85	ft. BTOC	
Depth to water:	47.90	ft. BTOC	
Length of Water Column (LWC):	37.10	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	6.30	gal.
3 Casing Volumes:	18.90	gal.	

Remarks:

Field Analyses

Volume Purged (gal.)	6.30	12.60	18.90				
Time	0950	1020	1050				
pH	7.97	8.01	7.58				
Specific Conductivity (umhos/cm)	115.4	85.6	78.3				
Water Temperature ©	26.1	25.0	23.5				
Turbidity	16	16	16				
Dissolved Oxygen (mg/L)	4.78						

Terracon

Groundwater Sampling Log

Well ID:	MW-5dd
Date:	7/23/2013
Site Name:	SC-015
Project No.:	78078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1230

Total Well Depth:	117	ft. BTOC		
Depth to water:	54.57	ft. BTOC		
Length of Water Column (LWC):	62.43	ft.		
Casing Diameter:	2.0	in.		
1 Casing Volume = LWC x	0.17	=	10.61	gal.
3 Casing Volumes:	31.83	gal.		

Remarks: ____

Field Analyses

Volume Purged (gal.)	10.61	21.22	31.83				
Time	1110	1150	1230				
pH	7.34	7.68	7.53				
Specific Conductivity (umhos/cm)	67.5	46.8	47.9				
Water Temperature ©	25.7	24.8	23.7				
Turbidity	3.2	42	25				
Dissolved Oxygen (mg/L)	5.46						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-5R
Date:	7/23/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0835

Total Well Depth:	20	ft. BTOC	
Depth to water:	12.67	ft. BTOC	
Length of Water Column (LWC):	7.33	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.24	gal.
3 Casing Volumes:	3.73	gal.	

Remarks: HIGH Product odor
ER 2 - ABOVE RANGE: 1100 NTU

Field Analyses

Volume Purged (gal.)	1.24	2.49	3.73				
Time	0825	0830	0835				
pH	7.57	7.20	6.48				
Specific Conductivity (umhos/cm)	393.3	364.3	355.4				
Water Temperature ©	26.1	25.1	24.8				
Turbidity	1.5	29	ER 2				
Dissolved Oxygen (mg/L)	1.76						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-7R	Total Well Depth:	25 ft. BTOC
Date:	7/22/2013	Depth to water:	12.25 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	12.75 ft.
Project No.:	73078012	Casing Diameter:	2.0 in.
Field Personnel:	Akre	1 Casing Volume = LWC x 0.17 =	2.16 gal.
Weather Conditions:	cloudy	3 Casing Volumes:	6.50 gal.
Air Temperature:	80	Remarks:	
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	1235		

Field Analyses

Volume Purged (gal.)	2.16	4.34	6.50				
Time	1220	125	1235				
pH	4.26	4.59	4.94				
Specific Conductivity (umhos/cm)	592	600	582				
Water Temperature ©	26.9	24.9	24.8				
Turbidity	5.0	90	90				
Dissolved Oxygen (mg/L)	3.29						

Terracon

Groundwater Sampling Log

Well ID:	MW-8
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1415

Total Well Depth:	25.	ft. BTOC	
Depth to water:	13.28	ft. BTOC	
Length of Water Column (LWC):	11.72	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.99	gal.
3 Casing Volumes:	5.97	gal.	

Remarks:

Field Analyses

Volume Purged (gal.)	1.99	3.98	5.97				
Time	1355	1405	1415				
pH	4.58	4.86	4.85				
Specific Conductivity (umhos/cm)	151.8	431.7	130.0				
Water Temperature ©	27.9	26.1	25.8				
Turbidity	8.6	12	11				
Dissolved Oxygen (mg/L)	3.90						

Terracon

Groundwater Sampling Log

Well ID:	MW-9R
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1710

Total Well Depth:	20	ft. BTOC	
Depth to water:	9.90	ft. BTOC	
Length of Water Column (LWC):	10.10	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.71	gal.
3 Casing Volumes:	5.15	gal.	

Remarks: High dec Rapid odor

Field Analyses

Volume Purged (gal.)	1.71	3.44	5.15				
Time	1700	1705	1710				
pH	2.81	4.66	5.00				
Specific Conductivity (umhos/cm)	392.0	360.7	356.5				
Water Temperature ©	31.9	26.7	25.1				
Turbidity	13	37	32				
Dissolved Oxygen (mg/L)	2.08						

Terracon

Groundwater Sampling Log

Well ID:	MW-10R
Date:	7/ 22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	30.20 ft. BTOC
Depth to water:	29.99 ft. BTOC
Length of Water Column (LWC):	0.21 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.

Remarks: low Vol. H2O in bottom cap only
Can Pump w/ Bailer

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-11R
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1120

Total Well Depth:	30	ft. BTOC	
Depth to water:	28.80	ft. BTOC	
Length of Water Column (LWC):	1.20	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	.20	gal.
3 Casing Volumes:	.60	gal.	

Remarks: - Well going dry @ .125 gal
- take sample

Field Analyses

Volume Purged (gal.)	.20	.40	.60				
Time	1115	1120					
pH	4.39						
Specific Conductivity (umhos/cm)	829						
Water Temperature ©	24.5						
Turbidity	7.5						
Dissolved Oxygen (mg/L)	5.82						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12d
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1650

Total Well Depth:	75	ft. BTOC	
Depth to water:	40.84	ft. BTOC	
Length of Water Column (LWC):	34.16	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x 0.17 =	5.80	gal.	
3 Casing Volumes:	17.42	gal.	

Remarks:

Field Analyses

Volume Purged (gal.)	5.80	11.62	17.42				
Time	1545	1615	1650				
pH	4.15	4.90	5.22				
Specific Conductivity (umhos/cm)	62.5	58.5	54.6				
Water Temperature ©	25.4	24.6	23.4				
Turbidity	.95	6.2	10				
Dissolved Oxygen (mg/L)	5.37						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12R
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1530

Total Well Depth:	20	ft. BTOC		
Depth to water:	10.62	ft. BTOC		
Length of Water Column (LWC):	9.38	ft.		
Casing Diameter:	2.0	in.		
1 Casing Volume = LWC x	0.17	=	1.59	gal.
3 Casing Volumes:			4.78	gal.

Remarks: ER-2 Shallow Range

Field Analyses

Volume Purged (gal.)	1.59	3.19	4.78				
Time	1500	1515	1530				
pH	4.09	4.68	4.64				
Specific Conductivity (umhos/cm)	333.1	326.1	328.5				
Water Temperature ©	27.6	25.6	26.4				
Turbidity	6.4	34	ER-2				
Dissolved Oxygen (mg/L)	2.87						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-13
Date:	7/22/2013
Site Name:	SC-015
Project No.:	75078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1305

Total Well Depth:	16.5	ft. BTOC
Depth to water:	9.81	ft. BTOC
Length of Water Column (LWC):	6.69	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	1.13	gal.
3 Casing Volumes:	3.39	gal.

Remarks: - well going dry @ 1.50 gal
- Take Sample

Field Analyses

Volume Purged (gal.)	1.13	2.26	3.39				
Time	1250	1305					
pH	4.81	5.10					
Specific Conductivity (umhos/cm)	345.6	314.1					
Water Temperature ©	28.8	27.7					
Turbidity	110	850					
Dissolved Oxygen (mg/L)	1.77						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-15
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73578012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	34.30 ft. BTOC
Depth to water:	34.18 ft. BTOC
Length of Water Column (LWC):	0.12 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.

Remarks: low volume - ld bottom cap only
No Sample

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	MW-16
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1445

Total Well Depth:	35 ft. BTOC
Depth to water:	26.68 ft. BTOC
Length of Water Column (LWC):	8.32 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.41 gal.
3 Casing Volumes:	4.24 gal.
Remarks:	

Field Analyses

Volume Purged (gal.)	1.41	2.83	4.24				
Time	1430	1435	1443				
pH	4.60	4.73	4.86				
Specific Conductivity (umhos/cm)	184.8	187.6	183.5				
Water Temperature ©	23.8	24.5	22.7				
Turbidity	1.9	230	248				
Dissolved Oxygen (mg/L)	4.24						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-17
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1340

Total Well Depth:	39.5	ft. BTOC	
Depth to water:	36.04	ft. BTOC	
Length of Water Column (LWC):	3.46	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= .58	gal.
3 Casing Volumes:		1.76	gal.

Remarks: ER2 - Above Range → 1100 NTU

Field Analyses

Volume Purged (gal.)	.58	1.18	1.76				
Time	1330	1335	1340				
pH	5.15	5.66	5.46				
Specific Conductivity (umhos/cm)	93.2	81.5	77.6				
Water Temperature ©	25.7	25.3	24.3				
Turbidity	2.9	ER2	ER2				
Dissolved Oxygen (mg/L)	4.08						

Terracon

Groundwater Sampling Log

Well ID:	MW-18
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1105

Total Well Depth:	30	ft. BTOC	
Depth to water:	19.69	ft. BTOC	
Length of Water Column (LWC):	10.31	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.75	gal.
3 Casing Volumes:	5.25	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.75	3.50	5.25				
Time	1045	1050	1105				
pH	3.73	5.09	5.26				
Specific Conductivity (umhos/cm)	55.5	38.7	38.5				
Water Temperature ©	21.3	20.7	20.5				
Turbidity	40	90	86				
Dissolved Oxygen (mg/L)	6.14						

Terracon

Groundwater Sampling Log

Well ID:	mw-18 dup
Date:	7/22/2013
Site Name:	SC-015
Project No.:	
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1165

Total Well Depth:	30 ft. BTOC
Depth to water:	19.69 ft. BTOC
Length of Water Column (LWC):	10.31 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time				1105			
pH				5.22			
Specific Conductivity (umhos/cm)				38.3			
Water Temperature ©				20.5			
Turbidity				88			
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	MW-18D
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1080

Total Well Depth:	49.5	ft. BTOC	
Depth to water:	44.64	ft. BTOC	
Length of Water Column (LWC):	4.86	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	.82	gal.
3 Casing Volumes:	2.47	gal.	

Remarks: 49.20 Td
- Check DTW w/ bailer and measure
- Well Going dry @ .75 Gal
- Take Parameter and Sample

Field Analyses

Volume Purged (gal.)	.82	1.65	4.86				
Time	1025	1030					
pH	4.28	5.00					
Specific Conductivity (umhos/cm)	402.8	84.0					
Water Temperature ©	22.5	21.8					
Turbidity	60	450					
Dissolved Oxygen (mg/L)	6.26						

Terracon

Groundwater Sampling Log

Well ID:	MW-19
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1055

Total Well Depth:	34.6	ft. BTOC	
Depth to water:	31.47	ft. BTOC	
Length of Water Column (LWC):	3.13	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	.53	gal.
3 Casing Volumes:		1.59	gal.

Remarks: - well going dry @ .50 gal
- Take Sample

Field Analyses

Volume Purged (gal.)	.53	1.06	1.59				
Time	1045	1055					
pH	4.30	5.08					
Specific Conductivity (umhos/cm)	89.5	66.4					
Water Temperature ©	23.0	22.7					
Turbidity	70	310					
Dissolved Oxygen (mg/L)	6.17						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-20
Date:	7/22/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1326

Total Well Depth:	33.7	ft. BTOC	
Depth to water:	29.97	ft. BTOC	
Length of Water Column (LWC):	3.73	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	.63	gal.
3 Casing Volumes:	1.90	gal.	

Remarks: -well going dry @ .50 Gal
-Take Sample

Field Analyses

Volume Purged (gal.)	.63	1.27	1.90				
Time	1315	1320					
pH	4.87	5.70	5.82				
Specific Conductivity (umhos/cm)	153.5	102.7	94.6				
Water Temperature ©	26.5	24.8	23.8				
Turbidity	15	160	171				
Dissolved Oxygen (mg/L)	5.04						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-21
Date:	7/23/2013
Site Name:	SC-015
Project No.:	73078512
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0745

Total Well Depth:	20	ft. BTOC	
Depth to water:	12.86	ft. BTOC	
Length of Water Column (LWC):	7.14	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.21	gal.
3 Casing Volumes:	3.64	gal.	

Remarks: HIGH chem. Dead. odor
ER-2 above Range . 1100 NTU

Field Analyses

Volume Purged (gal.)	1.21	2.43	3.64				
Time	0725	0730	0745				
pH	5.97	5.27	5.01				
Specific Conductivity (umhos/cm)	269.6	324.1	320.8				
Water Temperature ©	24.9	24.0	23.8				
Turbidity	1.8	45	ER2				
Dissolved Oxygen (mg/L)	1.99						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-21 dup	Total Well Depth:	20 ft. BTOC
Date:	7/23 /2013	Depth to water:	12.86 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	7.14 ft.
Project No.:	73578012	Casing Diameter:	2.0 in.
Field Personnel:	Akre	1 Casing Volume = LWC x 0.17 =	gal.
Weather Conditions:	cloudy	3 Casing Volumes:	gal.
Air Temperature:	80	Remarks:	HIGH clay. Prod. odor
Well Evacuation Method:	Bailer		GR-2 ABOVE RANGE - 1100 NTU
Sample Collection Method:	Bailer		
Sampled at (time):	0745		

Field Analyses

Volume Purged (gal.)							
Time				0745			
pH				5.02			
Specific Conductivity (umhos/cm)				317.8			
Water Temperature ©				23.7			
Turbidity				GR-2			
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	DW-1	Total Well Depth:	39 ft. BTOC
Date:	8/9/2013	Depth to water:	34.65 ft. BTOC
Site Name:	SC-015	Length of Water Column (LWC):	4.35 ft.
Project No.:	73578012	Casing Diameter:	2.0 in.
Field Personnel:	Akre	1 Casing Volume = LWC x 0.17 =	.73 gal.
Weather Conditions:	cloudy	3 Casing Volumes:	2.21 gal.
Air Temperature:	80	Remarks:	mod. deg. prod. odor
Well Evacuation Method:	Bailer		
Sample Collection Method:	Bailer		
Sampled at (time):	0800		

Field Analyses

Volume Purged (gal.)	.73	1.46	2.21				
Time	0735	0740	0745	0750	0755	0800	
pH	4.97	6.32	6.29	6.17	6.12	5.19	
Specific Conductivity (umhos/cm)	59.3	62.0	73.3	83.7	87.3	90.0	
Water Temperature ©	24.3	23.9	24.0	23.0	23.3	23.6	
Turbidity	17	80	1100+	1100+	1100+	1100+	
Dissolved Oxygen (mg/L)	1.90						

Terracon

Groundwater Sampling Log

Well ID:	Dw-1 dup
Date:	8·9 /2013
Site Name:	SC-065
Project No.:	73078612
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0850

Total Well Depth:	39	ft. BTOC
Depth to water:	34.65	ft. BTOC
Length of Water Column (LWC):	4.35	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =		gal.
3 Casing Volumes:		gal.

Remarks:

Field Analyses

Volume Purged (gal.)							
Time							0800
pH							5.17
Specific Conductivity (umhos/cm)							91.4
Water Temperature ©							23.6
Turbidity							1100+
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Field blank
Date:	7/ 29/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1030

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Field blank
Date:	7/23/2013
Site Name:	SC-015
Project No.:	78078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1300

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	Field BLANK
Date:	8/9 /2013
Site Name:	SC-GS
Project No.:	73578012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0830

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	Trip blank
Date:	7/23/2013
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	lmb pepped
	1- BTEX NAPH MTBE DCA EDB

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Trip blank
Date:	8/9 /2013
Site Name:	7305801Z
Project No.:	SC-015
Field Personnel:	Akre
Weather Conditions:	cloudy
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	lab prepped

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

ACCESS ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Rd
Columbia, SC 29201

ATTENTION
Regan Norris

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
213072518

DATE
07/31/2013

Primary Data Review By

Curtis Ekker MGR Data Deliv

Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Avenue, Baton Rouge, LA 70820.**

- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**

- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955
DOD ELAP CERTIFICATE NUMBER ADE - 1482

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.
7979 GSRI Avenue
Baton Rouge, LA 70820

Report Date 07/31/2013

GCAL Report 213072518

Deliver To	Terracon 521 Clemson Rd Columbia, SC 29201
Attn	Regan Norris

Project SC-015

CASE NARRATIVE

Client: Access Analytical **Report:** 213072518

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

VOLATILES MASS SPECTROMETRY

In the SW-846 8260B - Gas Additives analysis, samples 21307251804 (07680 MW-5R), 21307251801 (07680 MW-1R), 21307251819 (07680 MW-21) and 21307251820 (07680 MW-21 DUP) had to be diluted due to the presence of non-target background. This dilution is reflected in the elevated reporting limits.

In the SW-846 8260B analysis, samples 21307251804 (07680 MW-5R), 21307251801 (07680 MW-1R), 21307251819 (07680 MW-21) and 21307251820 (07680 MW-21 DUP) had to be diluted to bracket the concentration of target compounds within the calibration range of the instrument. The dilution is reflected in elevated detection limits.

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates the result is between the MDL and RDL
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Curtis Ekker MGR Data Deliv

Authorized Signature

GCAL REPORT 213072518

THIS REPORT CONTAINS 40 PAGES.

Curtis Ekker MGR Data Deliv

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251801	07680 MW-1R	Water	07/22/2013 12:00	07/25/2013 09:55
21307251802	07680 MW-5D	Water	07/23/2013 10:50	07/25/2013 09:55
21307251803	07680 MW-5DD	Water	07/23/2013 12:30	07/25/2013 09:55
21307251804	07680 MW-5R	Water	07/23/2013 08:35	07/25/2013 09:55
21307251805	07680 MW-7R	Water	07/22/2013 12:35	07/25/2013 09:55
21307251806	07680 MW-8	Water	07/22/2013 14:15	07/25/2013 09:55
21307251807	07680 MW-9R	Water	07/22/2013 17:10	07/25/2013 09:55
21307251808	07680 MW-11R	Water	07/22/2013 11:20	07/25/2013 09:55
21307251809	07680 MW-12D	Water	07/22/2013 16:50	07/25/2013 09:55
21307251810	07680 MW-12R	Water	07/22/2013 15:30	07/25/2013 09:55
21307251811	07680 MW-13	Water	07/22/2013 13:05	07/25/2013 09:55
21307251812	07680 MW-16	Water	07/22/2013 14:45	07/25/2013 09:55
21307251813	07680 MW-17	Water	07/22/2013 13:40	07/25/2013 09:55
21307251814	07680 MW-18	Water	07/22/2013 11:05	07/25/2013 09:55
21307251815	07680 MW-18 DUP	Water	07/22/2013 11:05	07/25/2013 09:55
21307251816	07680 MW-18D	Water	07/22/2013 10:30	07/25/2013 09:55
21307251817	07680 MW-19	Water	07/22/2013 10:55	07/25/2013 09:55
21307251818	07680 MW-20	Water	07/22/2013 13:20	07/25/2013 09:55
21307251819	07680 MW-21	Water	07/23/2013 07:45	07/25/2013 09:55
21307251820	07680 MW-21 DUP	Water	07/23/2013 07:45	07/25/2013 09:55
21307251821	07680 FIELD BLANK	Water	07/22/2013 10:30	07/25/2013 09:55
21307251822	07680 FIELD BLANK	Water	07/23/2013 13:00	07/25/2013 09:55
21307251823	07680 TRIP BLANK	Water	07/22/2013 00:00	07/25/2013 09:55

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251801	**07680 MW-1R**	Water	07/22/2013 12:00	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	13.1	2.00	0.222	ug/L
108-88-3	Toluene	1.56J	2.00	0.244	ug/L
100-41-4	Ethylbenzene	207	2.00	0.218	ug/L
1330-20-7	Xylene (total)	263	6.00	0.358	ug/L
91-20-3	Naphthalene	132	10.0	0.352	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	16.1	2.00	0.155	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251804	**07680 MW-5R**	Water	07/23/2013 08:35	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	16600	500	55.5	ug/L
108-88-3	Toluene	50000	500	60.9	ug/L
100-41-4	Ethylbenzene	4320	500	54.5	ug/L
1330-20-7	Xylene (total)	21900	1500	89.4	ug/L
91-20-3	Naphthalene	1430J	2500	88.1	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	2410	500	38.9	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-85-4	tert-amyl alcohol (TAA)	29300	10000	507	ug/L

SW-846 8011

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.416	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251807	**07680 MW-9R**	Water	07/22/2013 17:10	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	21.8	1.00	0.111	ug/L
108-88-3	Toluene	2.82	1.00	0.122	ug/L
100-41-4	Ethylbenzene	114	1.00	0.109	ug/L
1330-20-7	Xylene (total)	25.4	3.00	0.179	ug/L
91-20-3	Naphthalene	92.2	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	19.7	1.00	0.078	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251807	**07680 MW-9R**	Water	07/22/2013 17:10	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	6.48J	10.0	0.290	ug/L
75-85-4	tert-amyl alcohol (TAA)	13.3J	20.0	1.01	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251810	**07680 MW-12R**	Water	07/22/2013 15:30	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	2.27	1.00	0.111	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	13.3	1.00	0.078	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-85-4	tert-amyl alcohol (TAA)	21.6	20.0	1.01	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251812	**07680 MW-16**	Water	07/22/2013 14:45	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.60	1.00	0.078	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251814	**07680 MW-18**	Water	07/22/2013 11:05	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.24	1.00	0.078	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251815	**07680 MW-18 DUP**	Water	07/22/2013 11:05	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.31	1.00	0.078	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251817	**07680 MW-19**	Water	07/22/2013 10:55	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	2.33	1.00	0.078	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251818	**07680 MW-20**	Water	07/22/2013 13:20	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
1634-04-4	tert-Butyl methyl ether (MTBE)	1.07	1.00	0.078	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251819	**07680 MW-21**	Water	07/23/2013 07:45	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-85-4	tert-amyl alcohol (TAA)	4870J	5000	253	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	12400	250	27.8	ug/L
108-88-3	Toluene	46300	250	30.5	ug/L
100-41-4	Ethylbenzene	4690	250	27.3	ug/L
1330-20-7	Xylene (total)	21500	750	44.7	ug/L
91-20-3	Naphthalene	1110J	1250	44.1	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	160J	250	19.4	ug/L

SW-846 8011

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.068	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251820	**07680 MW-21 DUP**	Water	07/23/2013 07:45	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-85-4	tert-amyl alcohol (TAA)	4430J	5000	253	ug/L

Summary of Compounds Detected (con't)

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251820	**07680 MW-21 DUP**	Water	07/23/2013 07:45	07/25/2013 09:55

SW-846 8011

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.065	0.010	0.00390	ug/L

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	10800	250	27.8	ug/L
108-88-3	Toluene	45000	250	30.5	ug/L
100-41-4	Ethylbenzene	4980	250	27.3	ug/L
1330-20-7	Xylene (total)	23900	750	44.7	ug/L
91-20-3	Naphthalene	1320	1250	44.1	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	142J	250	19.4	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251823	**07680 TRIP BLANK**	Water	07/22/2013 00:00	07/25/2013 09:55

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	5.32J	10.0	0.290	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251801	**07680 MW-1R**	Water	07/22/2013 12:00	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	07/26/2013 20:42	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**13.1**	**2.00**	**0.222**	**ug/L**
108-88-3	**Toluene**	**1.56J**	**2.00**	**0.244**	**ug/L**
100-41-4	**Ethylbenzene**	**207**	**2.00**	**0.218**	**ug/L**
1330-20-7	**Xylene (total)**	**263**	**6.00**	**0.358**	**ug/L**
91-20-3	**Naphthalene**	**132**	**10.0**	**0.352**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**16.1**	**2.00**	**0.155**	**ug/L**
107-06-2	1,2-Dichloroethane	0.232U	2.00	0.232	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	100	106	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	100	101	ug/L	101	77 - 127
2037-26-5	Toluene d8	100	96.7	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	100	102	ug/L	102	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			2	07/26/2013 20:42	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.480U	10.0	0.480	ug/L
75-65-0	t-Butanol (TBA)	0.580U	20.0	0.580	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.472U	10.0	0.472	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.468U	10.0	0.468	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	75.2U	200	75.2	ug/L
64-17-5	Ethanol	250U	2000	250	ug/L
75-85-4	tert-amyl alcohol (TAA)	2.03U	40.0	2.03	ug/L
762-75-4	tert-butyl formate (TBF)	0.974U	100	0.974	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	100	106	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	100	101	ug/L	101	77 - 127
2037-26-5	Toluene d8	100	96.7	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	100	102	ug/L	102	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 15:08	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251802	**07680 MW-5D**	Water	07/23/2013 10:50	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 13:30	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.3	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	48.2	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.8	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 13:30	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.3	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	48.2	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.8	ug/L	100	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 15:26	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251803	**07680 MW-5DD**	Water	07/23/2013 12:30	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 13:54	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	49.1	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.7	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 13:54	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	49.1	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.7	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.4	ug/L	99	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 15:45	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251804	**07680 MW-5R**	Water	07/23/2013 08:35	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	07/26/2013 14:18	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**16600**	**500**	**55.5**	**ug/L**
108-88-3	**Toluene**	**50000**	**500**	**60.9**	**ug/L**
100-41-4	**Ethylbenzene**	**4320**	**500**	**54.5**	**ug/L**
1330-20-7	**Xylene (total)**	**21900**	**1500**	**89.4**	**ug/L**
91-20-3	**Naphthalene**	**1430J**	**2500**	**88.1**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**2410**	**500**	**38.9**	**ug/L**
107-06-2	1,2-Dichloroethane	58.1U	500	58.1	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	26400	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	25000	23900	ug/L	96	77 - 127
2037-26-5	Toluene d8	25000	25800	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	25000	23800	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			500	07/26/2013 14:18	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	120U	2500	120	ug/L
75-65-0	t-Butanol (TBA)	145U	5000	145	ug/L
108-20-3	diisopropyl Ether (DIPE)	118U	2500	118	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	117U	2500	117	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	18800U	50000	18800	ug/L
64-17-5	Ethanol	62500U	500000	62500	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**29300**	**10000**	**507**	**ug/L**
762-75-4	tert-butyl formate (TBF)	243U	25000	243	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	25000	26400	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	25000	23900	ug/L	96	77 - 127
2037-26-5	Toluene d8	25000	25800	ug/L	103	76 - 134
17060-07-0	1,2-Dichloroethane-d4	25000	23800	ug/L	95	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 16:03	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	**1,2-Dibromoethane**	**0.416**	**0.010**	**0.00390**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251805	**07680 MW-7R**	Water	07/22/2013 12:35	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 21:06	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	50.2	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.6	ug/L	103	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 21:06	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	50.2	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.6	ug/L	103	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 16:21	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251806	**07680 MW-8**	Water	07/22/2013 14:15	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:06	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	49.5	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	50.1	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.8	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:06	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.2	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	49.5	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	50.1	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.8	ug/L	100	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 16:39	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251807	**07680 MW-9R**	Water	07/22/2013 17:10	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:31	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**21.8**	**1.00**	**0.111**	**ug/L**
108-88-3	**Toluene**	**2.82**	**1.00**	**0.122**	**ug/L**
100-41-4	**Ethylbenzene**	**114**	**1.00**	**0.109**	**ug/L**
1330-20-7	**Xylene (total)**	**25.4**	**3.00**	**0.179**	**ug/L**
91-20-3	**Naphthalene**	**92.2**	**5.00**	**0.176**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**19.7**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.1	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	51.1	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	47.5	ug/L	95	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	56.1	ug/L	112	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:31	JCK	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	**t-Butanol (TBA)**	**6.48J**	**10.0**	**0.290**	**ug/L**
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**13.3J**	**20.0**	**1.01**	**ug/L**
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.1	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	51.1	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	47.5	ug/L	95	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	56.1	ug/L	112	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 16:57	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251808	**07680 MW-11R**	Water	07/22/2013 11:20	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:54	JCK	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.5	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	48.6	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	45.4	ug/L	91	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.5	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 15:54	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.5	ug/L	99	78 - 130
1868-53-7	Dibromofluoromethane	50	48.6	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	45.4	ug/L	91	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.5	ug/L	95	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 17:33	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251809	**07680 MW-12D**	Water	07/22/2013 16:50	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 16:18	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	48.5	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.6	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 16:18	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	48.5	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.6	ug/L	95	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 17:51	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251810	**07680 MW-12R**	Water	07/22/2013 15:30	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 16:43	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**2.27**	**1.00**	**0.111**	**ug/L**
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**13.3**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.1	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	48.8	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.4	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.5	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 16:43	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**21.6**	**20.0**	**1.01**	**ug/L**
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	52.1	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	48.8	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.4	ug/L	99	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.5	ug/L	95	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 18:08	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251811	**07680 MW-13**	Water	07/22/2013 13:05	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:07	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	51	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.3	ug/L	95	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:07	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	51	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	47.3	ug/L	95	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 18:26	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251812	**07680 MW-16**	Water	07/22/2013 14:45	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:31	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.60**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.7	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.2	ug/L	92	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:31	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.7	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.9	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.2	ug/L	92	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 18:44	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251813	**07680 MW-17**	Water	07/22/2013 13:40	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:55	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.2	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	51.8	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	48.8	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 17:55	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.2	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	51.8	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	48.8	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48	ug/L	96	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 19:02	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251814	**07680 MW-18**	Water	07/22/2013 11:05	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 18:19	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.24**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.2	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	50.3	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	48.4	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.4	ug/L	97	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 18:19	CGC	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.2	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	50.3	ug/L	101	77 - 127
2037-26-5	Toluene d8	50	48.4	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.4	ug/L	97	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 19:19	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251815	**07680 MW-18 DUP**	Water	07/22/2013 11:05	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 16:47	CGC	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.31**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	51.1	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.7	ug/L	101	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 16:47	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.8	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	51.1	ug/L	102	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.7	ug/L	101	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 19:37	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251816	**07680 MW-18D**	Water	07/22/2013 10:30	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:10	CGC	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.9	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	52	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	49.8	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.2	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:10	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.9	ug/L	104	78 - 130
1868-53-7	Dibromofluoromethane	50	52	ug/L	104	77 - 127
2037-26-5	Toluene d8	50	49.8	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.2	ug/L	100	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 19:54	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251817	**07680 MW-19**	Water	07/22/2013 10:55	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:34	CGC	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**2.33**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.1	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	48	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49	ug/L	98	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:34	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.1	ug/L	100	78 - 130
1868-53-7	Dibromofluoromethane	50	49.3	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	48	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49	ug/L	98	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 20:12	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251818	**07680 MW-20**	Water	07/22/2013 13:20	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:57	CGC	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**1.07**	**1.00**	**0.078**	**ug/L**
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.5	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	52.5	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	46.7	ug/L	93	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.6	ug/L	103	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 17:57	JCK	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.5	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	52.5	ug/L	105	77 - 127
2037-26-5	Toluene d8	50	46.7	ug/L	93	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.6	ug/L	103	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 20:46	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251819	**07680 MW-21**	Water	07/23/2013 07:45	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			250	07/27/2013 18:20	JCK	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**12400**	**250**	**27.8**	**ug/L**
108-88-3	**Toluene**	**46300**	**250**	**30.5**	**ug/L**
100-41-4	**Ethylbenzene**	**4690**	**250**	**27.3**	**ug/L**
1330-20-7	**Xylene (total)**	**21500**	**750**	**44.7**	**ug/L**
91-20-3	**Naphthalene**	**1110J**	**1250**	**44.1**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**160J**	**250**	**19.4**	**ug/L**
107-06-2	1,2-Dichloroethane	29.0U	250	29.0	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	12500	12700	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	12500	13100	ug/L	105	77 - 127
2037-26-5	Toluene d8	12500	11900	ug/L	95	76 - 134
17060-07-0	1,2-Dichloroethane-d4	12500	12700	ug/L	102	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			250	07/27/2013 18:20	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	60.0U	1250	60.0	ug/L
75-65-0	t-Butanol (TBA)	72.5U	2500	72.5	ug/L
108-20-3	diisopropyl Ether (DIPE)	59.0U	1250	59.0	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	58.5U	1250	58.5	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	9400U	25000	9400	ug/L
64-17-5	Ethanol	31200U	250000	31200	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**4870J**	**5000**	**253**	**ug/L**
762-75-4	tert-butyl formate (TBF)	122U	12500	122	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	12500	12700	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	12500	13100	ug/L	105	77 - 127
2037-26-5	Toluene d8	12500	11900	ug/L	95	76 - 134
17060-07-0	1,2-Dichloroethane-d4	12500	12700	ug/L	102	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 21:04	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	**1,2-Dibromoethane**	**0.068**	**0.010**	**0.00390**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251820	**07680 MW-21 DUP**	Water	07/23/2013 07:45	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			250	07/27/2013 18:43	JCK	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**10800**	**250**	**27.8**	**ug/L**
108-88-3	**Toluene**	**45000**	**250**	**30.5**	**ug/L**
100-41-4	**Ethylbenzene**	**4980**	**250**	**27.3**	**ug/L**
1330-20-7	**Xylene (total)**	**23900**	**750**	**44.7**	**ug/L**
91-20-3	**Naphthalene**	**1320**	**1250**	**44.1**	**ug/L**
1634-04-4	**tert-Butyl methyl ether (MTBE)**	**142J**	**250**	**19.4**	**ug/L**
107-06-2	1,2-Dichloroethane	29.0U	250	29.0	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	12500	13100	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	12500	12500	ug/L	100	77 - 127
2037-26-5	Toluene d8	12500	12700	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	12500	13000	ug/L	104	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			250	07/27/2013 18:43	JCK	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	60.0U	1250	60.0	ug/L
75-65-0	t-Butanol (TBA)	72.5U	2500	72.5	ug/L
108-20-3	diisopropyl Ether (DIPE)	59.0U	1250	59.0	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	58.5U	1250	58.5	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	9400U	25000	9400	ug/L
64-17-5	Ethanol	31200U	250000	31200	ug/L
75-85-4	**tert-amyl alcohol (TAA)**	**4430J**	**5000**	**253**	**ug/L**
762-75-4	tert-butyl formate (TBF)	122U	12500	122	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	12500	13100	ug/L	105	78 - 130
1868-53-7	Dibromofluoromethane	12500	12500	ug/L	100	77 - 127
2037-26-5	Toluene d8	12500	12700	ug/L	102	76 - 134
17060-07-0	1,2-Dichloroethane-d4	12500	13000	ug/L	104	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512433	SW-846 8011	1	07/29/2013 21:21	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	**1,2-Dibromoethane**	**0.065**	**0.010**	**0.00390**	**ug/L**

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251821	**07680 FIELD BLANK**	Water	07/22/2013 10:30	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 19:07	CGC	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	50.2	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.1	ug/L	100	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 19:07	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.8	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	50.2	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	49.2	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	50.1	ug/L	100	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512480	SW-846 8011	1	07/30/2013 02:58	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251822	**07680 FIELD BLANK**	Water	07/23/2013 13:00	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 19:31	JCK	512587

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.8	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	48.6	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.6	ug/L	99	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/27/2013 19:31	CGC	512588

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	48.8	ug/L	98	77 - 127
2037-26-5	Toluene d8	50	48.6	ug/L	97	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	49.6	ug/L	99	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
07/26/2013 11:00	512480	SW-846 8011	1	07/30/2013 03:15	SMH	512749

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21307251823	**07680 TRIP BLANK**	Water	07/22/2013 00:00	07/25/2013 09:55

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 18:42	CGC	512506

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	48.4	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	48	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.5	ug/L	93	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	07/26/2013 18:42	JCK	512507

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	**t-Butanol (TBA)**	**5.32J**	**10.0**	**0.290**	**ug/L**
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51	ug/L	102	78 - 130
1868-53-7	Dibromofluoromethane	50	48.4	ug/L	97	77 - 127
2037-26-5	Toluene d8	50	48	ug/L	96	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	46.5	ug/L	93	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch	512506	**Client ID**	MB512506			LCS512506				LCSD512506		
Prep Batch	N/A	**GCAL ID**	1217597			1217598				1217599		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	07/26/2013 12:01			07/26/2013 10:12				07/26/2013 10:34		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
107-06-2	1,2-Dichloroethane	0.116U	0.116	50.0	49.8	100	71 - 129	51.4	103	3	30	
100-41-4	Ethylbenzene	0.109U	0.109	50.0	51.0	102	74 - 126	47.4	95	7	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	0.078	50.0	47.5	95	71 - 125	47.6	95	0	30	
1330-20-7	Xylene (total)	0.179U	0.179	150	149	99	74 - 127	141	94	6	30	
91-20-3	Naphthalene	0.176U	0.176	50.0	47.5	95	57 - 138	48.7	97	2	35	
71-43-2	Benzene	0.111U	0.111	50.0	49.1	98	70 - 129	48.2	96	2	20	
108-88-3	Toluene	0.122U	0.122	50.0	47.8	96	72 - 120	47.2	94	1	20	
Surrogate												
460-00-4	4-Bromofluorobenzene	49.7	99	50	49.2	98	78 - 130	50.2	100			
1868-53-7	Dibromofluoromethane	49.2	98	50	51.4	103	77 - 127	50.9	102			
2037-26-5	Toluene d8	48.2	96	50	47.6	95	76 - 134	48.4	97			
17060-07-0	1,2-Dichloroethane-d4	52.3	105	50	50.5	101	71 - 127	52	104			

Analytical Batch	512587	**Client ID**	MB512587			LCS512587				LCSD512587		
Prep Batch	N/A	**GCAL ID**	1218258			1218259				1218260		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	07/27/2013 15:22			07/27/2013 13:44				07/27/2013 14:07		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
107-06-2	1,2-Dichloroethane	0.116U	0.116	50.0	48.5	97	71 - 129	50.4	101	4	30	
100-41-4	Ethylbenzene	0.109U	0.109	50.0	50.6	101	74 - 126	47.0	94	7	30	
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	0.078	50.0	48.1	96	71 - 125	47.0	94	2	30	
1330-20-7	Xylene (total)	0.179U	0.179	150	148	99	74 - 127	139	93	6	30	
91-20-3	Naphthalene	0.176U	0.176	50.0	51.7	103	57 - 138	49.8	100	4	35	
71-43-2	Benzene	0.111U	0.111	50.0	49.2	98	70 - 129	47.6	95	3	20	
108-88-3	Toluene	0.122U	0.122	50.0	49.2	98	72 - 120	45.6	91	8	20	
Surrogate												
460-00-4	4-Bromofluorobenzene	50.9	102	50	51.8	104	78 - 130	51.4	103			
1868-53-7	Dibromofluoromethane	52.3	105	50	50.1	100	77 - 127	50.9	102			
2037-26-5	Toluene d8	47.9	96	50	48.4	97	76 - 134	48.2	96			
17060-07-0	1,2-Dichloroethane-d4	51.6	103	50	51.3	103	71 - 127	49.7	99			

GC/MS Volatiles Quality Control Summary

Analytical Batch	512507	**Client ID**	MB512507			LCS512507				LCSD512507		
Prep Batch	N/A	**GCAL ID**	1217603			1217604				1217605		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	07/26/2013 12:01			07/26/2013 10:12				07/26/2013 10:34		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**		**Result**		**Control**		**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**			**% R**	**RPD**	**Limit**
994-05-8	t-amyl methyl ether (TAME)	0.240U	0.240	50.0	49.7	99	50 - 150		48.3	97	3	50
75-65-0	t-Butanol (TBA)	0.290U	0.290	50.0	53.7	107	50 - 150		53.5	107	0	50
108-20-3	diisopropyl Ether (DIPE)	0.236U	0.236	50.0	52.9	106	50 - 150		51.8	104	2	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	0.234	50.0	49.7	99	50 - 150		51.7	103	4	50
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	37.6	2550	2160	85	50 - 150		2140	84	1	50
64-17-5	Ethanol	125U	125	25200	24900	99	50 - 150		24400	97	2	50
75-85-4	tert-amyl alcohol (TAA)	1.01U	1.01	200	185	93	50 - 150		199	100	7	50
762-75-4	tert-butyl formate (TBF)	0.487U	0.487	50.0	49.3	99	50 - 150		48.8	98	1	50
Surrogate												
460-00-4	4-Bromofluorobenzene	49.7	99	50	49.2	98	78 - 130		50.2	100		
1868-53-7	Dibromofluoromethane	49.2	98	50	51.4	103	77 - 127		50.9	102		
2037-26-5	Toluene d8	48.2	96	50	47.6	95	76 - 134		48.4	97		
17060-07-0	1,2-Dichloroethane-d4	52.3	105	50	50.5	101	71 - 127		52	104		

Analytical Batch	512588	**Client ID**	MB512588			LCS512588				LCSD512588		
Prep Batch	N/A	**GCAL ID**	1218261			1218262				1218263		
		Sample Type	Method Blank			LCS				LCSD		
		Analytical Date	07/27/2013 15:22			07/27/2013 13:44				07/27/2013 14:07		
		Matrix	Water			Water				Water		
SW-846 8260B		**Units**	ug/L	**Spike**		**Result**		**Control**		**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**			**% R**	**RPD**	**Limit**
994-05-8	t-amyl methyl ether (TAME)	0.240U	0.240	50.0	50.0	100	50 - 150		50.0	100	0	50
75-65-0	t-Butanol (TBA)	0.290U	0.290	50.0	42.5	85	50 - 150		40.2	80	6	50
108-20-3	diisopropyl Ether (DIPE)	0.236U	0.236	50.0	49.6	99	50 - 150		48.7	97	2	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	0.234	50.0	50.5	101	50 - 150		50.1	100	1	50
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	37.6	2550	2350	92	50 - 150		2300	90	2	50
64-17-5	Ethanol	125U	125	25200	25000	99	50 - 150		25600	102	2	50
75-85-4	tert-amyl alcohol (TAA)	1.01U	1.01	200	199	100	50 - 150		199	100	0	50
762-75-4	tert-butyl formate (TBF)	0.487U	0.487	50.0	56.8	114	50 - 150		54.2	108	5	50
Surrogate												
460-00-4	4-Bromofluorobenzene	50.9	102	50	51.8	104	78 - 130		51.4	103		
1868-53-7	Dibromofluoromethane	52.3	105	50	50.1	100	77 - 127		50.9	102		

GC/MS Volatiles Quality Control Summary

Analytical Batch 512588	**Client ID**	MB512588	LCS512588	LCSD512588	
Prep Batch N/A	**GCAL ID**	1218261	1218262	1218263	
	Sample Type	Method Blank	LCS	LCSD	
	Analytical Date	07/27/2013 15:22	07/27/2013 13:44	07/27/2013 14:07	
	Matrix	Water	Water	Water	

SW-846 8260B		**Units**	ug/L	**Spike**						
		Result	**RDL**	**Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**
2037-26-5	Toluene d8	47.9	96	50	48.4	97	76 - 134	48.2	96		
17060-07-0	1,2-Dichloroethane-d4	51.6	103	50	51.3	103	71 - 127	49.7	99		

General Chromatography Quality Control Summary

Analytical Batch	512749	**Client ID**	MB512433			LCS512433			LCSD512433			
Prep Batch	512433	**GCAL ID**	1217256			1217257			1217258			
Prep Method	SW-846 8011	**Sample Type**	Method Blank			LCS			LCSD			
		Prep Date	07/26/2013 11:00			07/16/2013 11:00			07/26/2013 11:00			
		Analytical Date	07/29/2013 14:14			07/29/2013 14:32			07/29/2013 14:50			
		Matrix	Water			Water			Water			
SW-846 8011		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
106-93-4	1,2-Dibromoethane	0.00390U	0.00390	1.11	0.871	78	55 - 141	0.985	89	12	40	

Analytical Batch	512749	**Client ID**	MB512480			LCS512480			LCSD512480			
Prep Batch	512480	**GCAL ID**	1217469			1217470			1217471			
Prep Method	SW-846 8011	**Sample Type**	Method Blank			LCS			LCSD			
		Prep Date	07/26/2013 11:00			07/26/2013 11:00			07/26/2013 11:00			
		Analytical Date	07/30/2013 01:51			07/30/2013 02:08			07/30/2013 02:25			
		Matrix	Water			Water			Water			
SW-846 8011		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**	
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**	
106-93-4	1,2-Dibromoethane	0.00390U	0.00390	1.09	0.879	80	55 - 141	0.986	90	11	40	

LAB USE ONLY

Access Analytical - Chain of Custody Record

Sales Order #: _____ PO #: Access/4505/2130725181080113 Access Quote #: _____

Project Work Order #: _____ Laboratory ID: GEAL

Company Name: Terracon
Report To: Regan Norris
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803 741 9000 Fax: 803 741 9200
Email: RWNORRIS@TERRACON.COM
Project ID: SC-015
Sampled By: AKPE

Preservative (*see codes): 1 1
Container Type (*see codes): G G

↓ REQUESTED LAB ANALYSIS: ↓ — BTEX/MAPH/MTBE/DCA/EDB — EDB

Sample ID/Description	Date Collected:	Time Collected:	Type: (grab or composite)	Matrix: (see codes)	Program Area (see codes)	TOTAL # of containers	# of containers collected per ↓ analysis		
MW-1R 07680	7-22-13	1200	G	GW	CWA	4	2	2	1
MW-5d 07680	7-23-13	1050	G	GW	CWA	4	2	2	2
MW-5dd 07680	7-23-13	1230	G	GW	CWA	4	2	2	3
MW-5R 07680	7-23-13	0835	G	GW	CWA	4	2	2	4
MW-7R 07680	7-22-13	1235	G	GW	CWA	4	2	2	5
MW-8 07680	7-22-13	1415	G	GW	CWA	4	2	2	6
MW-9R 07680	7-22-13	1710	G	GW	CWA	4	2	2	7
MW-11R 07680	7-22-13	1120	G	GW	CWA	4	2	2	8
MW-12d 07680	7-22-13	1650	G	GW	CWA	4	2	2	9
MW-12R 07680	7-22-13	1530	G	GW	CWA	4	2	2	10

ACCESS ANALYTICAL, INC.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
www.axs-inc.com

***Preservative Codes** *(place corresponding # in block above analysis field)*: **0** = None, **1** = HCL, **2** = HNO_3, **3** = H_2SO_4, **4** = NaOH, **5** = $Na_2S_2O_3$, **6** = Method 5035 set w/ $NaHSO_4$ & CH_3OH, **7** = NaOH/ZnOAC, **8** = H_3PO_4

***Matrix Codes** *(place corresponding code in matrix column)*: **GW** = ground water, **WW** = waste water, **DW** = drinking water, **S** = soil, **SL** = sludge, **A** = air, **IW** = industrial waste, **WO** = waste oil, **OT** = other *(specify in comments section)*

***Program Area Codes:** **CWA** = Clean Water Act (for wastewaters), **SDWA** = Safe Drinking Water Act (for drinking waters), **SHW** = Solid and Hazardous Wastes (for soils, ground waters and waste samples)

***Container Type:** **G** = Glass, **P** = Plastic

NOTES / COMMENTS

(if sample is a composite please use space below to note start/finish times & dates)

Turnaround Time:
X Standard
__ RUSH*
*Date Required: _____
(for rush work, results emailed/faxed by end of business day on date required)

Project Location:
__ SC
X NC
__ Other
(specify) _____

Relinquished By:	Received By:	Date (mm-dd-yy)	Time (24HR)	Samples Rec'd on Ice	Sample Temp. Upon Receipt (°C):	
M Rebuso	M Rebuso	7/24/13	0900	__Y __N	_____(°C)	_____(N/A)
M Rebuso	FedEx	7/24/13	1700	__Y __N	_____(°C)	_____(N/A)
Fed Ex	Gauvreau	7/25/13	955	__Y __N	5.3 (°C)	E22 (N/A)
5035 7503 5926				__Y __N	_____(°C)	_____(N/A)

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Pg 1 of 3

LAB USE ONLY

Access Analytical - Chain of Custody Record

Sales Order #: _____ PO #: Access/4595/2130725187080113 Access Quote #: _____

Project Work Order #: _____ Laboratory ID: _____

Company Name: TERRACON
Report To: REGAN NORRIS
Address: 521 Clemson Rd
City: Columbia State: SC Zip: 29229
Phone: 803 7449000 Fax: 803 7449900
Email: RLNORRIS@TERRACON.com
Project ID: SC-015
Sampled By: AERE

Sample ID/Description	Date Collected:	Time Collected:	Type: (grab or composite)	Matrix: (see codes)	Program Area (see codes)	TOTAL # of containers	↓ REQUESTED LAB ANALYSIS: ↓ Preservative: (*see codes)										Container Type: (*see codes)										
							# of containers collected per analysis																				
MW-13	07680	7.22.13	1305	G	GW	EWA	4	2	2	BTEX/MTBE/DCA/DXY	EDB						G	G									
MW-16	07680	7.22.13	1445	G	GW	EWA	4	2	2																		
MW-17	07680	7.22.13	1340	G	GW	EWA	4	2	2																		
MW-18	07680	7.22.13	1105	G	GW	EWA	4	2	2																		
MW-18dup	07680	7.22.13	1105	G	GW	EWA	4	2	2																		
MW-18D	07680	7.22.13	1030	G	GW	EWA	4	2	2																		
MW-19	07680	7.22.13	1055	G	GW	EWA	4	2	2																		
MW-20	07680	7.22.13	1320	G	GW	EWA	4	2	2																		
MW-21	07680	7.23.13	0745	G	GW	EWA	4	2	2																		
MW-21dup	07680	7.23.13	0745	G	GW	EWA	4	2	2																		

ACCESS ANALYTICAL, INC.
7478 Carlisle Street
Irmo, SC 29063
Phone: (803) 781-4243
Fax: 781-4303
www.axs-inc.com

*Preservative Codes (place corresponding # in block above analysis field): 0 = None, 1 = HCL, 2 = HNO_3, 3 = H_2SO_4, 4 = NaOH, 5 = $Na_2S_2O_3$, 6 = Method 5035 set w/ $NaHSO_4$ & CH_3OH, 7 = NaOH/ZnOAC, 8 = H_3PO_4

*Matrix Codes (place corresponding code in matrix column): GW = ground water, WW = waste water, DW = drinking water, S = soil, SL = sludge, A = air, IW = industrial waste, WO = waste oil, OT = other (specify in comments section)

*Program Area Codes: CWA = Clean Water Act (for wastewaters), SDWA = Safe Drinking Water Act (for drinking waters), SHW = Solid and Hazardous Wastes (for soils, ground waters and waste samples)

*Container Type: G = Glass, P = Plastic

NOTES / COMMENTS
(if sample is a composite please use space below to note start/finish times & dates)

11
12
13
14
15
16
17
18
19
20

Turnaround Time:
X Standard
___ RUSH*
*Date Required: _____
(for rush work, results emailed/faxed by end of business day on date required)

Project Location:
X SC
___ NC
___ Other
(specify) _____

Relinquished By:	Received By:	Date (mm-dd-yy)	Time (24HR)	Samples Rec'd on Ice	Sample Temp. Upon Receipt (°C):	
[signature]	M Rebuton	7/24/13	0900	___Y ___N	_____(°C)	_____(N/A)
M Rebuton	FedEx	7/24/13	1700	___Y ___N	_____(°C)	_____(N/A)
FedEx	C Saucier	7/25/13	955	___Y ___N	_____(°C)	_____(N/A)
				___Y ___N	_____(°C)	_____(N/A)

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Pg 2 of 3

Access Analytical - Chain of Custody Record

LAB USE ONLY

Sales Order #

PO # Access 145615 / 130725 / 080113

Access Quote #

Project Work Order #

Laboratory ID:

Company Name:	TERRACON
Report To:	REGAN NORRIS
Address:	521 Clemson Rd
City:	Columbia
State:	SC
Zip:	29229
Phone:	803 741 9000
Fax:	803 741 9900
Email:	RWNORRIS@TERRACON.COM
Project ID:	SC-015
Sampled By:	BKRE

Sample ID/Description	Date Collected:	Time Collected:	Type: (grab or composite)	Matrix: (see codes)	Program Area (see codes)	TOTAL # of containers	# of containers collected per analysis	# of containers collected per analysis								
							↓ REQUESTED LAB ANALYSIS: ↓	BTEX/MTBE/Naphthalene DC8260	EDD							
Field blank 07680	7-22-13	1030	G	GW	EWA	4		2	2							
Field blank 07680	7-23-13	1300	G	GW	EWA	4		2	2							
Trip blank 07680				GW	EWA	1		1								

ACCESS ANALYTICAL, INC.

7478 Carlisle Street
Irmo, SC 29063

Phone: (803) 781-4243
Fax: 781-4303

www.axs-inc.com

***Preservative Codes** *(place corresponding # in block above analysis field)*: **0** = None, **1** = HCL, **2** = HNO_3, **3** = H_2SO_4, **4** = NaOH, **5** = $Na_2S_2O_3$, **6** = *Method 5035 set w/ $NaHSO_4$ & CH_3OH*, **7** = *NaOH/ZnOAC*, **8** = H_3PO_4

***Matrix Codes** *(place corresponding code in matrix column)*: **GW** = ground water, **WW** = waste water, **DW** = drinking water, **S** = soil, **SL** = sludge, **A** = air, **IW** = industrial waste, **WO** = waste oil, **OT** = other *(specify in comments section)*

***Program Area Codes:** **CWA** = Clean Water Act (for wastewaters), **SDWA** = Safe Drinking Water Act (for drinking waters), **SHW** = Solid and Hazardous Wastes (for soils, ground waters and waste samples)

***Container Type:** **G** = Glass, **P** = Plastic

NOTES / COMMENTS

(if sample is a composite please use space below to note start/finish times & dates)

21

22

23

lab prepped

Turnaround Time:

X Standard
__ RUSH*
*Date Required: _____
(For rush work, results emailed/faxed by end of business day on date required)

Project Location:

X SC
__ NC
__ Other
(specify) _____

Relinquished By:	Received By:	Date (mm-dd-yy)	Time (24HR)	Samples Rec'd on Ice	Sample Temp. Upon Receipt (°C):	
	M Robertson	7/24/13	0900	__Y __N	____(°C)	____(N/A)
M Robertson	FedEx	7/24/13	1700	__Y __N	____(°C)	____(N/A)
FedEx	Gaucci	7/25/13	955	__Y __N	____(°C)	____(N/A)
				__Y __N	____(°C)	____(N/A)

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Pg 3 of 3

39405

SAMPLE RECEIVING CHECKLIST

213072518

SAMPLE DELIVERY GROUP	213072518
Client 4565 - Access Analytical	**Transport Method** FEDEX
Profile Number 78454	**Received By** Law, Brittany P.
Line Item(s) 2 - Water BTEX//Naph/MTBE/1,2-DCA/PAH	**Receive Date(s)** 07/25/13

CHECKLIST

Were all samples received using proper thermal preservation?	☑ Yes	☐ No	☐ NA
When used, were all custody seals intact?	☑ Yes	☐ No	☐ NA
Were all samples received in proper containers?	☑ Yes	☐ No	☐ NA
Were all samples received using proper chemical preservation?	☑ Yes	☐ No	☐ NA
Was preservative added to any container at the lab?	☐ Yes	☑ No	☐ NA
Were all containers received in good condition?	☑ Yes	☐ No	☐ NA
Were all VOA vials received with no head space?	☑ Yes	☐ No	☐ NA
Do all sample labels match the Chain of Custody?	☑ Yes	☐ No	☐ NA
Did the Chain of Custody list the sampling technician?	☑ Yes	☐ No	☐ NA
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☑ Yes	☐ No	☐ NA

COOLERS

Airbill	Temp(oC)
5035 7503 5926	5.3 (E22)

DISCREPANCIES

None

LABORATORY PRESERVATIONS

None

NOTES

40 of 40

ACCESS
ANALYTICAL, INC.

ANALYTICAL REPORT

CLIENT
Terracon
521 Clemson Rd
Columbia, SC 29201

ATTENTION
Regan Norris

PROJECT ID
SC-015

LABORATORY REPORT NUMBER
213081009

DATE
08/14/2013

Primary Data Review By

Curtis Ekker-MQR Data Deliv
Authorized Signature

Secondary Data Review By

Ashley B. Amick
Project Manager, Access Analytical, Inc.
aamick@accessanalyticalinc.com

PLEASE NOTE:

- **Unless otherwise noted, all analysis on this report performed at Gulf Coast Analytical Labs (GCAL), 7979 GSRI Avenue, Baton Rouge, LA 70820.**
- **GCAL is SCDHEC certified laboratory # 73006, NCDENR certified lab # 618, GA certified lab # LA-01955, NELAP certified laboratory # 01955**
- Local support services for this project are provided by Access Analytical, Inc.. Access Analytical is a representative of GCAL serving clients in the SC/NC/GA areas. All questions regarding this report should be directed to your local Access Analytical representative at 803.781.4243 or toll free at 888.315.4243.

NELAP CERTIFICATE NUMBER 01955
DOD ELAP CERTIFICATE NUMBER ADE - 1482

ANALYTICAL RESULTS

PERFORMED BY

GULF COAST ANALYTICAL LABORATORIES, INC.
7979 GSRI Avenue
Baton Rouge, LA 70820

Report Date 08/14/2013

GCAL Report 213081009

Deliver To	Terracon 521 Clemson Rd Columbia, SC 29201
Attn	Regan Norris

Project SC-015

CASE NARRATIVE

Client: Access Analytical **Report:** 213081009

Gulf Coast Analytical Laboratories received and analyzed the sample(s) listed on the sample cross-reference page of this report. Receipt of the sample(s) is documented by the attached chain of custody. This applies only to the sample(s) listed in this report. No sample integrity or quality control exceptions were identified unless noted below.

No anomalies were found for the analyzed sample(s).

Laboratory Endorsement

Sample analysis was performed in accordance with approved methodologies provided by the Environmental Protection Agency or other recognized agencies. The samples and their corresponding extracts will be maintained for a period of 30 days unless otherwise arranged. Following this retention period the samples will be disposed in accordance with GCAL's Standard Operating Procedures.

Common Abbreviations Utilized in this Report

ND	Indicates the result was Not Detected at the specified RDL
DO	Indicates the result was Diluted Out
MI	Indicates the result was subject to Matrix Interference
TNTC	Indicates the result was Too Numerous To Count
SUBC	Indicates the analysis was Sub-Contracted
FLD	Indicates the analysis was performed in the Field
PQL	Practical Quantitation Limit
MDL	Method Detection Limit
RDL	Reporting Detection Limit
00:00	Reported as a time equivalent to 12:00 AM

Reporting Flags Utilized in this Report

J	Indicates the result is between the MDL and RDL
U	Indicates the compound was analyzed for but not detected
B	Indicates the analyte was detected in the associated Method Blank

Sample receipt at GCAL is documented through the attached chain of custody. In accordance with NELAC, this report shall be reproduced only in full and with the written permission of GCAL. The results contained within this report relate only to the samples reported. The documented results are presented within this report.

This report pertains only to the samples listed in the Report Sample Summary and should be retained as a permanent record thereof. The results contained within this report are intended for the use of the client. Any unauthorized use of the information contained in this report is prohibited.

I certify that this data package is in compliance with the NELAC standard and terms and conditions of the contract and Statement of Work both technically and for completeness, for other than the conditions in the case narrative. Release of the data contained in this hardcopy data package and in the computer-readable data submitted has been authorized by the Quality Assurance Manager or his/her designee, as verified by the following signature.

Estimated uncertainty of measurement is available upon request. This report is in compliance with the DOD QSM as specified in the contract if applicable.

Curtis Ekker MGR Data Deliv

Authorized Signature

GCAL REPORT 213081009

THIS REPORT CONTAINS 15 PAGES.

Report Sample Summary

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100901	7680 DW-1	Water	08/09/2013 08:00	08/10/2013 10:45
21308100902	7680 DW-1 dup	Water	08/09/2013 08:00	08/10/2013 10:45
21308100903	7680 FIELD BLANK	Water	08/09/2013 08:30	08/10/2013 10:45
21308100904	7680 TRIP BLANK	Water	08/09/2013 08:30	08/10/2013 10:45

Summary of Compounds Detected

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100901	7680 DW-1	Water	08/09/2013 08:00	08/10/2013 10:45

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	1.97	1.00	0.111	ug/L
1330-20-7	Xylene (total)	0.999J	3.00	0.179	ug/L
91-20-3	Naphthalene	1.03J	5.00	0.176	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100902	7680 DW-1 dup	Water	08/09/2013 08:00	08/10/2013 10:45

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	1.77	1.00	0.111	ug/L
100-41-4	Ethylbenzene	0.627J	1.00	0.109	ug/L
1330-20-7	Xylene (total)	1.08J	3.00	0.179	ug/L
91-20-3	Naphthalene	0.934J	5.00	0.176	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100903	7680 FIELD BLANK	Water	08/09/2013 08:30	08/10/2013 10:45

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
75-65-0	t-Butanol (TBA)	7.47J	10.0	0.290	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100904	7680 TRIP BLANK	Water	08/09/2013 08:30	08/10/2013 10:45

SW-846 8260B

CAS#	Parameter	Result	RDL	MDL	Units
107-06-2	1,2-Dichloroethane	5.42	1.00	0.116	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100901	**7680 DW-1**	Water	08/09/2013 08:00	08/10/2013 10:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 12:20	LBH	513577

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.97**	**1.00**	**0.111**	**ug/L**
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	**Xylene (total)**	**0.999J**	**3.00**	**0.179**	**ug/L**
91-20-3	**Naphthalene**	**1.03J**	**5.00**	**0.176**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	51.7	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	49.8	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	56.1	ug/L	112	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 12:20	LBH	513576

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	51.4	ug/L	103	78 - 130
1868-53-7	Dibromofluoromethane	50	51.7	ug/L	103	77 - 127
2037-26-5	Toluene d8	50	49.8	ug/L	100	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	56.1	ug/L	112	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
08/13/2013 08:30	513503	SW-846 8011	1	08/14/2013 01:33	TLS	513767

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100902	7680 DW-1 dup	Water	08/09/2013 08:00	08/10/2013 10:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 12:44	AMD	513577

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	**Benzene**	**1.77**	**1.00**	**0.111**	**ug/L**
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	**Ethylbenzene**	**0.627J**	**1.00**	**0.109**	**ug/L**
1330-20-7	**Xylene (total)**	**1.08J**	**3.00**	**0.179**	**ug/L**
91-20-3	**Naphthalene**	**0.934J**	**5.00**	**0.176**	**ug/L**
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.2	ug/L	98	78 - 130
1868-53-7	Dibromofluoromethane	50	46.7	ug/L	93	77 - 127
2037-26-5	Toluene d8	50	46.4	ug/L	93	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.4	ug/L	103	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 12:44	AMD	513576

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	49.2	ug/L	98	78 - 130
1868-53-7	Dibromofluoromethane	50	46.7	ug/L	93	77 - 127
2037-26-5	Toluene d8	50	46.4	ug/L	93	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	51.4	ug/L	103	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
08/13/2013 08:30	513503	SW-846 8011	1	08/14/2013 01:49	TLS	513767

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100903	**7680 FIELD BLANK**	Water	08/09/2013 08:30	08/10/2013 10:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 13:08	LBH	513577

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	1,2-Dichloroethane	0.116U	1.00	0.116	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	49.7	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	49	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.2	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 13:08	LBH	513576

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	**t-Butanol (TBA)**	**7.47J**	**10.0**	**0.290**	**ug/L**
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	53.1	ug/L	106	78 - 130
1868-53-7	Dibromofluoromethane	50	49.7	ug/L	99	77 - 127
2037-26-5	Toluene d8	50	49	ug/L	98	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48.2	ug/L	96	71 - 127

SW-846 8011

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
08/13/2013 08:30	513503	SW-846 8011	1	08/14/2013 02:07	TLS	513767

CAS#	Parameter	Result	RDL	MDL	Units
106-93-4	1,2-Dibromoethane	0.00390U	0.010	0.00390	ug/L

GCAL ID	Client ID	Matrix	Collect Date/Time	Receive Date/Time
21308100904	7680 TRIP BLANK	Water	08/09/2013 08:30	08/10/2013 10:45

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 13:32	LBH	513577

CAS#	Parameter	Result	RDL	MDL	Units
71-43-2	Benzene	0.111U	1.00	0.111	ug/L
108-88-3	Toluene	0.122U	1.00	0.122	ug/L
100-41-4	Ethylbenzene	0.109U	1.00	0.109	ug/L
1330-20-7	Xylene (total)	0.179U	3.00	0.179	ug/L
91-20-3	Naphthalene	0.176U	5.00	0.176	ug/L
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	1.00	0.078	ug/L
107-06-2	**1,2-Dichloroethane**	**5.42**	**1.00**	**0.116**	**ug/L**

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.4	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	49.9	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	50.7	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48	ug/L	96	71 - 127

SW-846 8260B

Prep Date	Prep Batch	Prep Method	Dilution	Analyzed	By	Analytical Batch
			1	08/12/2013 13:32	LBH	513576

CAS#	Parameter	Result	RDL	MDL	Units
994-05-8	t-amyl methyl ether (TAME)	0.240U	5.00	0.240	ug/L
75-65-0	t-Butanol (TBA)	0.290U	10.0	0.290	ug/L
108-20-3	diisopropyl Ether (DIPE)	0.236U	5.00	0.236	ug/L
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	5.00	0.234	ug/L
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	100	37.6	ug/L
64-17-5	Ethanol	125U	1000	125	ug/L
75-85-4	tert-amyl alcohol (TAA)	1.01U	20.0	1.01	ug/L
762-75-4	tert-butyl formate (TBF)	0.487U	50.0	0.487	ug/L

CAS#	Surrogate	Conc. Spiked	Conc. Rec	Units	% Recovery	Rec Limits
460-00-4	4-Bromofluorobenzene	50	50.4	ug/L	101	78 - 130
1868-53-7	Dibromofluoromethane	50	49.9	ug/L	100	77 - 127
2037-26-5	Toluene d8	50	50.7	ug/L	101	76 - 134
17060-07-0	1,2-Dichloroethane-d4	50	48	ug/L	96	71 - 127

GC/MS Volatiles Quality Control Summary

Analytical Batch 513577	Client ID	MB513577			LCS513577			LCSD513577			
Prep Batch N/A	GCAL ID	1222956			1222957			1222958			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	08/12/2013 11:57			08/12/2013 10:23			08/12/2013 10:46			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units** Result	ug/L RDL	Spike Added	Result	% R	Control Limits % R	Result	% R	RPD	RPD Limit
107-06-2	1,2-Dichloroethane	0.116U	0.116	50.0	52.2	104	71 - 129	53.4	107	2	30
100-41-4	Ethylbenzene	0.109U	0.109	50.0	50.8	102	74 - 126	51.1	102	1	30
1634-04-4	tert-Butyl methyl ether (MTBE)	0.078U	0.078	50.0	48.1	96	71 - 125	50.8	102	5	30
1330-20-7	Xylene (total)	0.179U	0.179	150	150	100	74 - 127	145	97	3	30
91-20-3	Naphthalene	0.176U	0.176	50.0	47.6	95	57 - 138	50.5	101	6	35
71-43-2	Benzene	0.111U	0.111	50.0	54.4	109	70 - 129	52.7	105	3	20
108-88-3	Toluene	0.122U	0.122	50.0	49.6	99	72 - 120	47.3	95	5	20
Surrogate											
460-00-4	4-Bromofluorobenzene	51.6	103	50	53.4	107	78 - 130	50.6	101		
1868-53-7	Dibromofluoromethane	50.1	100	50	51.3	103	77 - 127	49.1	98		
2037-26-5	Toluene d8	49.9	100	50	48.7	97	76 - 134	46.9	94		
17060-07-0	1,2-Dichloroethane-d4	50.3	101	50	50.7	101	71 - 127	49.8	100		

GC/MS Volatiles Quality Control Summary

Analytical Batch 513576	Client ID	MB513576			LCS513576			LCSD513576			
Prep Batch N/A	GCAL ID	1222953			1222954			1222955			
	Sample Type	Method Blank			LCS			LCSD			
	Analytical Date	08/12/2013 11:57			08/12/2013 10:23			08/12/2013 10:46			
	Matrix	Water			Water			Water			
SW-846 8260B		**Units**	ug/L	**Spike**	**Result**		**Control**	**Result**			**RPD**
		Result	**RDL**	**Added**		**% R**	**Limits % R**		**% R**	**RPD**	**Limit**
994-05-8	t-amyl methyl ether (TAME)	0.240U	0.240	50.0	49.1	98	50 - 150	49.7	99	1	50
75-65-0	t-Butanol (TBA)	0.290U	0.290	50.0	53.1	106	50 - 150	54.4	109	2	50
108-20-3	diisopropyl Ether (DIPE)	0.236U	0.236	50.0	53.4	107	50 - 150	52.8	106	1	50
637-92-3	Ethyl tert-butyl ether (ETBE)	0.234U	0.234	50.0	52.5	105	50 - 150	51.7	103	2	50
624-95-3	Ethyl tert-butanol (ETBA)	37.6U	37.6	2550	2270	89	50 - 150	2440	96	7	50
64-17-5	Ethanol	125U	125	25200	25000	99	50 - 150	26700	106	7	50
75-85-4	tert-amyl alcohol (TAA)	1.01U	1.01	200	181	91	50 - 150	199	100	9	50
762-75-4	tert-butyl formate (TBF)	0.487U	0.487	50.0	55.1	110	50 - 150	56.3	113	2	50
Surrogate											
460-00-4	4-Bromofluorobenzene	51.6	103	50	53.4	107	78 - 130	50.6	101		
1868-53-7	Dibromofluoromethane	50.1	100	50	51.3	103	77 - 127	49.1	98		
2037-26-5	Toluene d8	49.9	100	50	48.7	97	76 - 134	46.9	94		
17060-07-0	1,2-Dichloroethane-d4	50.3	101	50	50.7	101	71 - 127	49.8	100		

General Chromatography Quality Control Summary

Analytical Batch 513767	**Client ID**	MB513503			LCS513503			LCSD513503				
Prep Batch 513503	**GCAL ID**	1222699			1222700			1222701				
Prep Method SW-846 8011	**Sample Type**	Method Blank			LCS			LCSD				
	Prep Date	08/13/2013 08:30			08/13/2013 08:30			08/13/2013 08:30				
	Analytical Date	08/13/2013 21:07			08/13/2013 21:23			08/13/2013 21:40				
	Matrix	Water			Water			Water				
SW-846 8011		**Units** **Result**	ug/L **RDL**	**Spike Added**	**Result**	**% R**	**Control Limits % R**	**Result**	**% R**	**RPD**	**RPD Limit**	
106-93-4	1,2-Dibromoethane	0.00390U	0.00390	1.09	1.37	126	55 - 141	1.37	126	0	40	

LAB USE ONLY

Access Analytical - Chain of Custody Record

Project Work Order #

Sales Order # | PO # | Access Quote # | Laboratory ID:

Company Name: Terracon

Report To: Regan Nobles

Address: 521 Clemson Rd

City: Columbia State: SC Zip: 29229

Phone: 803 741 9000 Fax: 803 741 9900

Email: RCNobles@Terracon.com

Project ID: SC-015

Sampled By: AKM

Preservative (See codes): 1 1

Container Type (See codes): G G

REQUESTED LAB ANALYSIS: Btex 8260 by Method 8260 Oxy EDB

Sample ID/Description	Date Collected	Time Collected	Type (grab or composite)	Matrix (See codes)	Area (See codes)	TOTAL # of containers	# of containers collected	# of containers collected for analysis
DW-1 7680	8-9-13	0800	G	GW	FSA	4	2	2
DW-1dup 7680	8-9-13	0830	G	GW	FSA	4	2	2
Field blank 7680	8-9-13	0830	G	OT	FSA	4	2	2
Trip blank 7680				OT	FSA	1	1	

lab prepped

Client ID: 4565 - Access Analytical

SDG: 213081009

Due Date: 08/16/13

Turnaround Time:

___Standard

_X_RUSH*

*Date Required: _____

(For rush work, results emailed/faxed by end of business day on date required)

Project Location:

_X_SC

___NC

___Other

(specify) _____

Relinquished By:	Received By:	Date (mm-dd-yy)	Time (24HR)	Samples Rec'd on Ice	Sample Temp. upon Receipt (°C):	
M Rebuton	M Rebuton	8-9-13	1535	___Y ___N	____(°C)	____(N/A)
M Rebuton	FedEx	8-9-13	1700	___Y ___N	____(°C)	____(N/A)
FedEx	Courier	8/10/13	1045	_X_Y ___N	3.8 4.0	____(N/A)
5035 7503 6370				___Y ___N	____(°C)	____(N/A)

See Reverse for Terms and Conditions

Original Copy - Returned w/Report
Yellow Copy - Access File Copy
Pink Copy - Client Copy

Pg ____ of ____

ACCESS ANALYTICAL, INC.

7478 Carlisle Street
Irmo, SC 29063

Phone: (803) 781-4243
Fax: 781-4303

www.axs-inc.com

*Preservative Codes (place corresponding # in block above analysis field): 0 – None, 1 – HCl, 2 – HNO3, 3 – H2SO4, 4 – NaOH, 5 – Na2S2O3, 6 – Method 5035 set w/ NaHSO4 & CH3OH, 7 – NaOH/ZnOAc, 8 – H3PO4

*Matrix Codes (place corresponding code in matrix column): GW – ground water, WW – waste water, DW – drinking water, S – soil, SL – sludge, A – air, IW – industrial waste, WO – waste oil, OT – other (specify in comments section)

*Program Area Codes: CWA – Clean Water Act (for wastewater), SDWA – Safe Drinking Water Act (for drinking water), SHW – Solid and Hazardous Wastes (for soils, ground waters and waste samples)

*Container Type: G – Glass, P – Plastic

NOTES / COMMENTS

(If sample is a composite please see space below to note start/finish times & dates)

SAMPLE RECEIVING CHECKLIST

SAMPLE DELIVERY GROUP 213081009	
Client 4565 – Access Analytical	**Transport Method** FEDEX
Profile Number 78454	**Received By** Saucier, Charlotte
Line Item(s) 2 - Water BTEX//Neph/MTBE/1,2-DCA/PAH	**Receive Date(s)** 08/10/13

CHECKLIST	YES	NO	NA
Were all samples received using proper thermal preservation?	☑	☐	☐
When used, were all custody seals intact?	☑	☐	☐
Were all samples received in proper containers?	☑	☐	☐
Were all samples received using proper chemical preservation?	☑	☐	☐
Was preservative added to any container at the lab?	☐	☑	☐
Were all containers received in good condition?	☑	☐	☐
Were all VOA vials received with no head space?	☑	☐	☐
Do all sample labels match the Chain of Custody?	☑	☐	☐
Did the Chain of Custody list the sampling technician?	☑	☐	☐
Was the COC maintained i.e. all signatures, dates and time of receipt included?	☑	☐	☐

COOLERS

Airbill	Thermometer ID: E22	Temp(°C)
5035 7503 6370		5.4
		3.8
		4.0
		5.0

DISCREPANCIES

None

LAB PRESERVATIONS

None

NOTES

APPENDIX G

Disposal Manifest

Please print or type. (Form designed for use on elite (12-pitch) typewriter.)

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
			UST # 07680

GENERATOR

5. Generator's Name and Mailing Address
Crown Central, LLC
P.O Box 1168
Baltimore, MD 21203, 1168
Generator's Phone:

Generator's Site Address (if different than mailing address)
SC-015
3800 Devine St.
Columbia SC

6. Transporter 1 Company Name
VERCO
U.S. EPA ID Number

7. Transporter 2 Company Name
U.S. EPA ID Number

8. Designated Facility Name and Site Address
U.S. EPA ID Number
Facility's Phone:

9a. HM	9b. U.S. DOT Description (including Proper Shipping Name, Hazard Class, ID Number, and Packing Group (if any))	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
	1. Non Haz - Non RCRA Regulated H2O	1	VT	139	Gal	
	2.					
	3.					
	4.					

13. Special Handling Instructions and Additional Information

14. **GENERATOR'S CERTIFICATION:** I certify the materials described above on this manifest are not subject to federal regulations for reporting proper disposal of Hazardous Waste.

Generator's/Offeror's Printed/Typed Name: Regan W. Norris for Crown Central LLC
Signature
Month: 8 Day: 2 Year: 13

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter signature (for exports only):
Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Robert Fann
Signature
Month: 8 Day: 2 Year: 13

Transporter 2 Printed/Typed Name
Signature
Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)
U.S. EPA ID Number
Facility's Phone:

17c. Signature of Alternate Facility (or Generator)
Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name
Signature
Month Day Year

6-NHM-C-SO-1158

6-GENERATOR'S INITIAL COPY

APPENDIX K

SCDHEC QAPP Contractors Checklist

CONTRACTOR CHECKLIST

Item #	Item	Yes	No	N/A
1	Is Facility Name, Permit #, and address provided?	X		
2	Is UST Owner/Operator name, address, & phone number provided?	X		
3	Is name, address, & phone number of current property owner provided?	X		
4	Is the DHEC Certified UST Site Rehabilitation Contractor's Name, Address, telephone number, and certification number provided?	X		
5	Is the name, address, telephone number, and certification number of the well driller that installed borings/monitoring wells provided?			X
6	Is the name, address, telephone number, and certification number of the certified laboratory(ies) performing analytical analyses provided?	X		
7	Has the facility history been summarized?	X		
8	Has the regional geology and hydrogeology been described?	X		
9	Are the receptor survey results provided as required?			X
10	Has current use of the site and adjacent land been described?	X		
11	Has the site-specific geology and hydrogeology been described?	X		
12	Has the primary soil type been described?			X
13	Have field screening results been described?			X
14	Has a description of the soil sample collection and preservation been detailed?			X
15	Has the field screening methodology and procedure been detailed?			X
16	Has the monitoring well installation and development dates been provided?			X
17	Has the method of well development been detailed?			X
18	Has justification been provided for the locations of the monitoring wells?			X
19	Have the monitoring wells been labeled in accordance with the UST QAPP guidelines?			X
20	Has the groundwater sampling methodology been detailed?	X		
21	Have the groundwater sampling dates and groundwater measurements been provided?	X		
22	Has the purging methodology been detailed?	X		
23	Has the volume of water purged from each well been provided along with measurements to verify that purging is complete?	X		
24	If free-product is present, has the thickness been provided?			X
25	Does the report include a brief discussion of the assessment done and the results?	X		
26	Does the report include a brief discussion of the aquifer evaluation and results?			X

27	Does the report include a brief discussion of the fate & transport models used?			X
28	Are the site-conceptual model tables included? (Tier 1 Risk Evaluation)			X
29	Have the exposure pathways been analyzed? (Tier 2 Risk Evaluation)			X
30	Have the SSTLs for each compound and pathway been calculated? (Tier 2 Risk Evaluation)			X
31	Have recommendations for further action been provided and explained?	X		
32	Has the soil analytical data for the site been provided in tabular format? (Table 1)			X
33	Has the potentiometric data for the site been provided in tabular format? (Table 2)	X		
34	Has the current and historical laboratory data been provided in tabular format?	X		
35	Have the aquifer characteristics been provided and summarized on the appropriate form?			X
36	Have the Site conceptual model tables been included? (Tier 1 Risk Evaluation)			X
37	Has the topographic map been provided with all required elements? (Figure 1)	X		
38	Has the site base map been provided with all required elements? (Figure 2)	X		
39	Have the CoC site maps been provided? (Figure 3 & Figure 4)	X		
40	Has the site potentiometric map been provided? (Figure 5)	X		
41	Have the geologic cross-sections been provided? (Figure 6)			X
42	Have maps showing the predicted migration of the CoCs through time been provided? (Tier 2 Risk Evaluation)			X
43	Has the site survey been provided and include all necessary elements? (Appendix A)			X
44	Have the sampling logs, chain of custody forms, and the analytical data package been included with all required elements? (Appendix B)	X		
45	Is the laboratory performing the analyses properly certified?	X		
46	Has the tax map been included with all necessary elements? (Appendix C)			X
47	Have the soil boring/field screening logs been provided? (Appendix D)			X
48	Have the well completion logs and SCDHEC Form 1903 been provided? (Appendix E)			X
49	Have the aquifer evaluation forms, data, graphs, equations, etc. been provided? (Appendix F)			X
50	Have the disposal manifests been provided? (Appendix G)	X		
51	Has a copy of the local zoning regulations been provided? (Appendix H)			X
52	Has all fate and transport modeling been provided? (Appendix I)			X
53	Have copies of all access agreements obtained by the contractor been provided? (Appendix J)			X
54	Has a copy of this form been attached to the final report and are explanations for any missing or incomplete data been provided?	X		

Explanation for missing or incomplete information

ASSESSMENT COMPONENT INVOICE

SOUTH CAROLINA

Department of Health and Environmental Control (DHEC)

Bureau of Underground Storage Tank Management

ASSESSMENT COMPONENT INVOICE

****See back of form for instructions.****

SITE ID # 07680 COUNTY Richland

FACILITY NAME Former Crown SC-015

STREET ADDRESS 3800 Devine St., Columbia

INVOICE # T443100 **Cost Proposal #** 45685

For work performed during (specify time period) Jun 2013 to Aug 2013

I certify, under penalty of law, that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, and any other information I may be aware of, I believe that the submitted information is true, accurate, and complete. I further agree, in accordance with any DHEC demand letter, to promptly repay any overpayment received.

**Please fill out both the Contractor and the Owner/Operator (original signatures) Sections. Also, indicate the Payee by placing a check in the box next to the Contractor or the Owner/Operator. **

[X] CONTRACTOR

P. Michael Hudgins	42-1249917		
Name (Type or Print)	Federal Tax ID or Social Security Number, if Payee		
Terracon Consultants, Inc.			(803) 741-9000
Company			Phone Number
521 Clemson Rd.	Columbia	SC	29229
Address	City	State	Zip Code
P. Michael Hudgins	Senior Hydrogeologist		8-29-13
Signature (please use non-black ink), if Payee	Title		Date Signed

[ ] OWNER OR OPERATOR

Please attach copies of CANCELLED CHECKS (Front and Back)

James D. Janson	52-0550682		
Name (Type or Print)	Federal Tax ID or Social Security Number, if Payee		
Crown Central LLC			410-659-4753
Company			Phone Number
P.O. Box 1168	Baltimore	MD	21203
Address	City	State	Zip Code
James D Janson	Manager - Environmental Engineering		8/29/13
Signature (please use non-black ink)	Title		Date Signed

If payment is to be sent to an address other than above, please indicate below:

Name of Individual or Company (please print)	Federal Tax ID or Social Security Number		
Address (please print)	City	State	Zip Code

Invoice Amount: $ 6,665.63

Less Submitted/Paid Well Drilling Costs: $ -

Amount Requested : $ 6,665.63

SCDHEC USE ONLY
= $

Amount Requested is for Assessment activities as Defined in the SCDHEC Letter

INVOICE INVOICE INVOICE INVOICE

comfront2 (REV. 9/9/97)

ASSESSMENT COMPONENT COST AGREEMENT
SOUTH CAROLINA
Department of Health and Environmental Control
Underground Storage Tank Program
State Underground Petroleum Environmental Response Bank

Facility Former SC-015

UST Permit # 07680 **CA#** 45685

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Plan*				
	A. Tier II or Comp. Plan / QAPP App. B	1	x	$525.00	**$525.00**
	B. Tax Maps		x	$50.00	**$0.00**
2.	Receptor Survey*		x	$500.00	**$0.00**
3.	Comprehensive Survey		x	$1,000.00	**$0.00**
4.	Mob/Demob				
	A. Equipment		x	$575.00	**$0.00**
	B. Personnel	2	x	$290.00	**$580.00**
	C. Adverse Terrain Vehicle		x	$575.00	**$0.00**
5.	Soil Borings (hand augered)*		feet x	$14.00	**$0.00**
6.	Soil Borings (drilled) & Field Screening				
	A. Standard		feet x	$17.00	**$0.00**
	B. Fractured Rock		feet x	$27.50	**$0.00**
7.	Soil Leachability Model		x	$200.00	**$0.00**
8.	Abandonment*				
	A. 2" or less		feet x	$5.00	**$0.00**
	B. 2+" to 6"		feet x	$5.50	**$0.00**
	C. Dug/bored well		feet x	$18.00	**$0.00**
9.	Well Installation*				
	A. Water Table (hand auger)		feet x	$20.00	**$0.00**
	B. Water Table		feet x	$38.00	**$0.00**
	C. Telescoping		feet x	$58.00	**$0.00**
	D. Rock Drilling		feet x	$58.00	**$0.00**
	E. 2" Rock Coring		feet x	$45.00	**$0.00**
	F. 4" Rock Coring		feet x	$50.40	**$0.00**
	G. Multi Sampling Ports/screen intervals		feet x	$47.20	**$0.00**
10.	Sample collection				
	A. Groundwater	18	samples x	$55.00	**$990.00**
	B. Air Vapor		samples x	$90.00	**$0.00**
	C. Water Supply		samples x	$30.00	**$0.00**
	D. Groundwater No Purge (+ Duplicates)	2	samples x	$35.00	**$70.00**
	E. Gauge Well Only		samples x	$20.00	**$0.00**
	F. Sample Below Product		samples x	$50.00	**$0.00**
	G. Passive Diffusion Bag		samples x	$40.00	**$0.00**
	H. Field Blank	2	samples x	$5.00	**$10.00**
11.	Analyses-Groundwater				
	A. BTEXNM+Oxygs+1,2 DCA+Eth	23	samples x	$100.00	**$2,300.00**
	B. 8260B **RUSH Analysis**		samples x	$143.00	**$0.00**
	C. Trimethyl, Butyl, and Isopropolbenzenes		samples x	$40.00	**$0.00**
	D. PAH's		samples x	$120.00	**$0.00**
	E. Lead		samples x	$20.00	**$0.00**
	F. EDB	22	samples x	$55.00	**$1,210.00**
	FF. EDB (RUSH)		samples x	$75.00	**$0.00**
	G. 8 RCRA Metals		samples x	$140.00	**$0.00**
	H. TPH (9070)		samples x	$55.00	**$0.00**
	I.pH		samples x	$10.00	**$0.00**
	J. BOD		samples x	$40.00	**$0.00**
	K. Nitrate		samples x	$20.00	**$0.00**
	L. Sulfate		samples x	$20.00	**$0.00**
	M. Ferrous Iron		samples x	$20.00	**$0.00**
	N. Methane		samples x	$110.00	**$0.00**
	AA. Filtered Lead		samples x	$46.00	**$0.00**
	P1. Ethanol		samples x	$21.50	**$0.00**
11.	Analyses-Soil				
	N. BTEX + Napth.		samples x	$100.00	**$0.00**
	O. PAH's		samples x	$120.00	**$0.00**
	P. 8 RCRA Metals		samples x	$150.00	**$0.00**

Facility Former SC-015

UST Permit # 07680 **CA#** 45685

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
	Q. Oil & Grease(9071)	_____	samples ›	$60.00	$0.00
	R. TPH DRO(3550)	_____	samples ›	$65.00	$0.00
	S. TPH GRO(5035)	_____	samples ›	$65.00	$0.00
	T. Grain size / hydrometer	_____	samples ›	$99.00	$0.00
	U. Total Organic Carbon	_____	samples ›	$35.00	$0.00
11.	Analyses-Air				
	V. BTEX + Naphthalene	_____	samples x	$247.50	$0.00
	W. Hydrocarbon Fuel Identification	_____	samples x	$620.00	$0.00
12.	Aquifer Characterization*				
	A. Pumping Test	_____	hours x	$120.00	$0.00
	B. Slug test	_____	tests x	$150.00	$0.00
	C. Fractured Rock	_____	tests x	$500.00	$0.00
13.	Free Product Recovery Rate Test*	_____	tests x	$120.00	$0.00
14.	Fate & Transport Modeling				
	A. Mathematical Model	_____	models x	$300.00	$0.00
	B. Computer Model	_____	models x	$500.00	$0.00
15.	Risk Evaluation				
	A. Tier I	_____	x	$300.00	$0.00
	B. Tier II	_____	x	$500.00	$0.00
16.	Subsequent Survey*	_____	x	$300.00	$0.00
17.	Disposal				
	A. Wastewater	139	gallons x	$0.80	$111.20
	B. Free Product	_____	gallons x	$0.85	$0.00
	C. Soil (Treatment/Disposal)*	_____	tons	$72.50	$0.00
	D. Drilling Fluids *	_____	gallons x	$0.80	$0.00
18.	Miscellaneous Attach paid invoice receipts				
	_____	_____	x _____		$0.00
	_____	_____	x _____		$0.00
23.	AFVR				
	A. 8-Hour Event*	_____	x	$3,000.00	$0.00
	B. Additional Hour	_____	x	$204.00	$0.00
	C. Off-Gas Treatment	_____	x	$35.00	$0.00
24.	Granular Activated Carbon (GAC) filter System installation/service				
	A. New GAC System Installation	_____	x	$2,500.00	$0.00
	B. Refurbished GAC System Installation	_____	x	$1,180.00	$0.00
	C. Filter Replacement/removal*	_____	x	$450.00	$0.00
	D. GAC System Removal, cleaning & refurbishment	_____	x	$720.00	$0.00
	E. GAC System housing	_____	x	$450.00	$0.00
	F. In-line particulate filter	_____	x	$150.00	$0.00
	G. Additional piping & fittings	_____	x	$4.00	$0.00
25.	Well Repair				
	A. Repair 2x2 monitoring well pad	_____	each x	$100.00	$0.00
	B. Repair 4x4 monitoring well pad	_____	each x	$150.00	$0.00
	C. Replace well vault	_____	each x	$225.00	$0.00
	D. Replace well cover and gasket	_____	each x	$30.00	$0.00
	E. Replace well cover bolts	_____	each x	$10.00	$0.00
	F. Replace locking well cap & lock	_____	each x	$15.00	$0.00
19.	Report/Project Management			(SUBTOTAL)	
	A. Additional Copies of Report	_____	each x	$32.50	$0.00
	Project Coordination	15%	x	$5,796.20	$869.43
25.	**Total**				$6,665.63

DHEC 3664 (12/20/05)

*** The appropriate Mobilization cost can be added to this cost**

CROWN CENTRAL LLC
P. O. Box 1168, Baltimore, Maryland 21203
1 North Charles Street, Suite 2200, Baltimore, Maryland 21201
(410) 539-7400 Direct (410) 659-4841 rfritz@crowncentral.com

September 5, 2013

UST
SEP 09 2013
PROGRAM

Mr. Lee Monts
South Carolina Department of Health and Environmental Control
Bureau of Land and Waste Management - UST Program
2600 Bull Street
Columbia, SC 29201

Subject: Crown Outsource of Environmental Remediation Project Management to Quality Environmental Solutions, Inc.

Dear Mr. Monts:

Crown Central LLC (Crown) and Fast Fare LLC (Fast Fare) have been winding down operations for the past decade and are at the point where their environmental clean-up management will be outsourced to third parties. On that note, Crown has entered into a long term arrangement with Quality Environmental Solutions, Inc. (QES) to handle the management of most Crown related environmental remediation projects. I am also pleased that James (Jim) Janson, Crown's former Manager of Environmental Engineering, has accepted a position at QES to help oversee the Crown portfolio. While Jim's current Crown phone number and email will continue for a short transition period, all future correspondence and contact for Jim relating to Crown and Fast Fare sites should be to the following:

Crown Central, LLC C/O QES
40 Hudson Street, Suite 107
Annapolis, MD 21401
410-841-5552 jjanson@qualityenvironmental.net
Jim Janson's NEW Cell (410) 493-3967-old cell phone number has been deactivated.

It is important to note that Crown and Fast Fare will remain the responsible parties for the environmental work, and they remain committed to meeting their cleanup obligations under this new arrangement. QES will be handling the management of the environmental work, and will provide updates on a regular basis. The current consultants/contractors that Crown and Fast Fare use to complete the work are not expected to change. QES will notify the appropriate parties if a change occurs for reasons outside of this announcement.

This change is solely for environmental remediation projects. Trust Fund filings and reimbursement activity will remain as it is until further notice.

Please also note that Crown has a new suite number—2200 instead of 2100. All other contact information for Crown remains the same.

Thank you in advance for your cooperation, and we look forward to a seamless transition. If you have any questions or concerns please contact me at 410-659-4841.

Very truly yours,

Robert A. Fritz
General Manager

UST
07680-24 tech
07684-66 tech
07896-36 tech
DOCKETING

cc: Annie Smith-Jones, President, Quality Environmental Solutions, Inc.

D H E C
PROMOTE PROTECT PROSPER
Catherine B. Templeton, Director
Promoting and protecting the health of the public and the environment



MR JIM JANSON
CROWN CENTRAL LLC C/O QES
40 HUDSON ST STE 107
ANNAPOLIS MD 21401

OCT 2 5 2013

Re: **AFVR Directive**
Former Crown SC-015, 3800 Devine Street, Columbia, SC
UST Permit # 07680; CA # 46877
Release Reported August 15, 1989
Monitoring Report received September 3, 2013
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) recognizes your commitment to continue work at this site using Terracon as your contractor. The next appropriate scope of work is to continue aggressive fluid and vapor recovery (AFVR) events to remove residual free-phase product and reduce concentrations of chemicals of concern (CoC). Please have your contractor conduct two events on MW-5R and MW-21. The events should be spaced a minimum of one month apart to allow equilibrium conditions to re-establish, and must be conducted in accordance with the UST Quality Assurance Program Plan (QAPP), Revision 2.0. **Please note that the AFVR procedures were updated July 1, 2013.** A copy of the QAPP is available at http://www.scdhec.gov/environment/lwm/usthome/Qapp.htm.

Cost Agreement #46877 has been approved in the amount shown on the enclosed cost agreement form for the AFVR events. Costs have also been approved to repair the well vault on DW-1, replace bolts on MW-12R and DW-1, and replace well tags on MW-1A, MW-1R, MW-2, MW-7R, MW-8, MW-11R, MW-12d, MW-13, MW-15, MW-15R, MW-17, and MW-20. Site activities may proceed immediately upon receipt of this letter, and must be performed by a South Carolina-Certified Underground Storage Tank Site Rehabilitation Contractor. All applicable South Carolina certification requirements apply to preparation of an AFVR report.

An AFVR report and invoice must be submitted to the Division within 90 days from the date of this letter. Your contractor may directly bill the State Underground Petroleum Environmental Response Bank (SUPERB) Account. Interim invoices may not be submitted for this scope of work. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Agency is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

The Agency grants pre-approval for transportation of up to 5,000 gallons of free-phase product and petroleum-contaminated groundwater from the referenced facility to a permitted treatment facility for disposal. The transport and disposal must be conducted in accordance with the QAPP.

On all correspondence concerning this facility, please reference UST Permit # 07680. If there are any questions concerning this project, feel free to contact me by telephone at (803) 898-0614, by fax at (803) 898-0673, or by e-mail at fulmersb@dhec.sc.gov.

Sincerely,

Susan B. Fulmer, P.G., Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229 (w/ enc)
Technical File (w/ enc)

Approved Cost Agreement 46877

Facility: 07680 SC015
FULMERSB
PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
04 MOB/DEMOB						
		A	EQUIPMENT	2.0000	575.00	1,150.00
		B	PERSONNEL	3.0000	290.00	870.00
17 DISPOSAL						
		A	WASTEWATER	5,000.0000	0.80	4,000.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PCT	PERCENT	0.1500	13,210.00	1,981.50
23 EFR						
		A	8 HOUR EVENT	2.0000	3,000.00	6,000.00
		C	OFF GAS TREATMENT	16.0000	35.00	560.00
25 WELL REPAIR						
		B	REPAIR 2X2 MONITORING WELL PAD	1.0000	100.00	100.00
		D	REPLACE WELL VAULT	1.0000	225.00	225.00
		F	REPLACE WELL COVER BOLTS	2.0000	10.00	20.00
		G	REPLACE LOCKING WELL CAP & LOC	1.0000	15.00	15.00
		K	REPLACE MISSING WELL ID PLATE	12.0000	22.50	270.00
				Total Amount		15,191.50

LETTER OF TRANSMITTAL

UST
FEB 2 1 2014
PROGRAM

Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 02/18/14	JOB NO. 73078012
RE: Former SC-015, Columbia UST Permit No. 07680	
AFVR Report	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

UST
26 tech
DOCKETING

COPIES	DATE	DESCRIPTION
1	02/18/14	CD - AFVR Report

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS: **Susan,**

Enclosed is the Report of AFVR for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

LETTER OF TRANSMITTAL

521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

TO Ms. Susan Fulmer

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 02/18/14	JOB NO. 73078012
RE: Former SC-015, Columbia UST Permit No. 07680	
AFVR Report	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	02/18/14	CD - AFVR Report

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS: **Susan,**

Enclosed is the Report of AFVR for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

Aggressive Fluid Vapor Recovery (AFVR) Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680



February 18, 2014
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide
Employee-Owned
Established in 1965
terracon.com
Terracon
Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

Terracon

February 18, 2014

Ms. Susan Fulmer
Underground Storage Tank Program
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: **Aggressive Fluid Vapor Recovery Report**
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 46877
Terracon Project No. 73078012

Dear Ms. Fulmer:

On behalf of Crown Central LLC, **Terracon Consultants, Inc. (Terracon)** is pleased to submit this Aggressive Fluid Vapor Recovery (AFVR) report for the Former SC-015 site located in Columbia, South Carolina.

If you have any questions regarding the contents of this report, or if there is a need for further information, please contact us.

Respectfully submitted,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

John Skowronek

John Skowronek, P.G.
Senior Staff Geologist
S.C. Registration No. 2389

P. Michael Hudgins

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

Enclosures

cc: Jim Janson / Crown Central LLC

TABLE OF CONTENTS

Aggressive Fluid Vapor Recovery Report
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680, CA # 46877
Terracon Project No. 73078012

SECTION PAGE NO.

Cover Letter

1.0 INTRODUCTION 1

1.1 Facility Information 1

1.2 Site History 1

2.0 AGGRESSIVE FLUID VAPOR RECOVERY 2

3.0 MONITORING WELL MAINTENANCE 3

4.0 CONCLUSIONS AND RECOMMENDATIONS 4

FIGURES

1 Site Location Map
2 Site Map

APPENDICES

A AFVR Field Data
B Waste Disposal Manifests

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed two Aggressive Fluid Vapor Recovery (AFVR) events at the former SC-015 site located in Columbia, South Carolina. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #46877, the Risk Based Corrective Action (RBCA) guidance document, and the UST Quality Assurance Program Plan (QAPP) prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

1.2 Site History

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed in previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total of seven AFVR events were performed in April 2010, February - August 2012 and November – December 2012 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 420 pounds of pounds of volatile organic compounds (VOCs) have been removed from the subsurface**.**

In October 2013, SCDHEC issued a directive for two Aggressive Fluid Vapor Recovery (AFVR) from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

Aggressive Fluid Vapor Recovery (AFVR) was utilized to extract dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface. Figure 2 is a site map showing monitoring well locations.

The AFVR events were performed using trailer-mounted vacuum extraction rig equipped with a rotary claw pump and an air-water separator unit. Prior to system start up the trailer mounted unit was grounded with a copper grounding rod connected to the trailer by a metal ground cable to reduce the potential of an explosion hazard due to static electricity.

One-inch diameter PVC stinger tubes with airtight 2-inch by 1-inch well seals were set approximately six-inches into the water table, and were adjusted according to water level changes during the event to increase product the smear zone and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. Vacuum pressures were monitored at each wellhead during the events, and were adjusted to optimize the flow to the system. The adjustments made during the AFVR events are included with the Field Data Sheets in Appendix A.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an anemometer at the system exhaust stack. The concentrations were recorded on an AFVR Field Data Sheet, included in Appendix A.

On December 2, 2013, Event #8 was performed on monitoring wells MW-5R and MW-21. No free product was detected in either monitoring well prior to or after the AFVR event. The velocity and VOC concentration of off-gas from the vacuum rig were measured using an anemometer and a TLV Sniffer with a 10X dilution probe. Approximately 87.4 pounds of VOCs were removed from the subsurface. Differential pressure (vacuum) measurements recorded with a vacuum gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

On January 9, 2014, Event #9 was performed on monitoring wells MW-5R and MW-21. No free product was detected in either monitoring well prior to or after the AFVR event. Approximately 113 pounds of VOCs were removed from the subsurface. Differential pressures (vacuum) measurements recorded with a vacuum gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R indicated that the zone of influence extended 68 feet to monitoring well MW-8.

Approximately 132 gallons of petroleum-impacted groundwater was extracted during Event #8 event and was disposed by Advanced Environmental Options, Spartanburg, South Carolina. Approximately 55 gallons of petroleum-impacted groundwater was extracted during Event #9 and disposed by Regulatory Solutions, Gaston, South Carolina. The disposal manifests for the extracted ground water generated from Events 8 and 9 are included in Appendix B.

3.0 MONITORING WELL MAINTENANCE

Terracon observed in a previous site visit items associated with the monitoring well network requiring maintenance. Costs were approved as noted in the SCDHEC AFVR directive, October 25, 2013, for replacement and repair of the following specific monitoring well items:

- DW-1 - well vault and pad was repaired and lock was replaced,
- MW-12R - bolts were replaced,
- MW-1A - well cap and lock were replaced, and
- Well tags were replaced on twelve monitoring wells (MW-1A, MW-1R, MW-2, MW-7R, MW-8, MW-11R, MW-12D, MW-13,MW-15, MW-15R, MW-17, and MW-20).

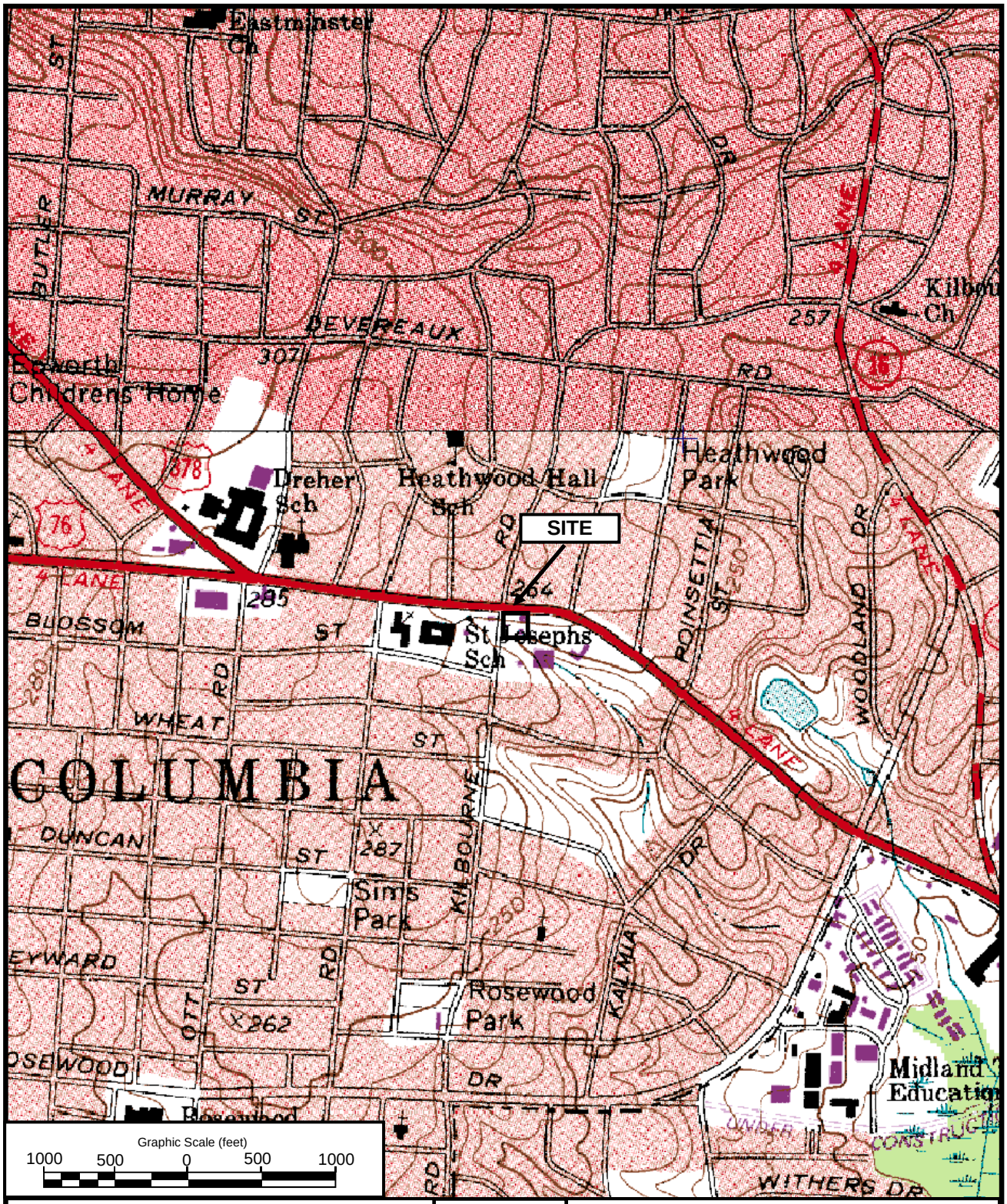
4.0 CONCLUSIONS AND RECOMMENDATIONS

AFVR appears to be effective at removing petroleum hydrocarbons from the soils and ground water at this site. Over the past nine events, the vacuum extraction has mobilized high dissolved phase hydrocarbons from the surrounding area toward the two extraction wells.

Additional AFVR events are recommended for this site. Once the high dissolved phase hydrocarbons have been removed from the source area, intrinsic corrective action may be an effective remedial method at this site.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

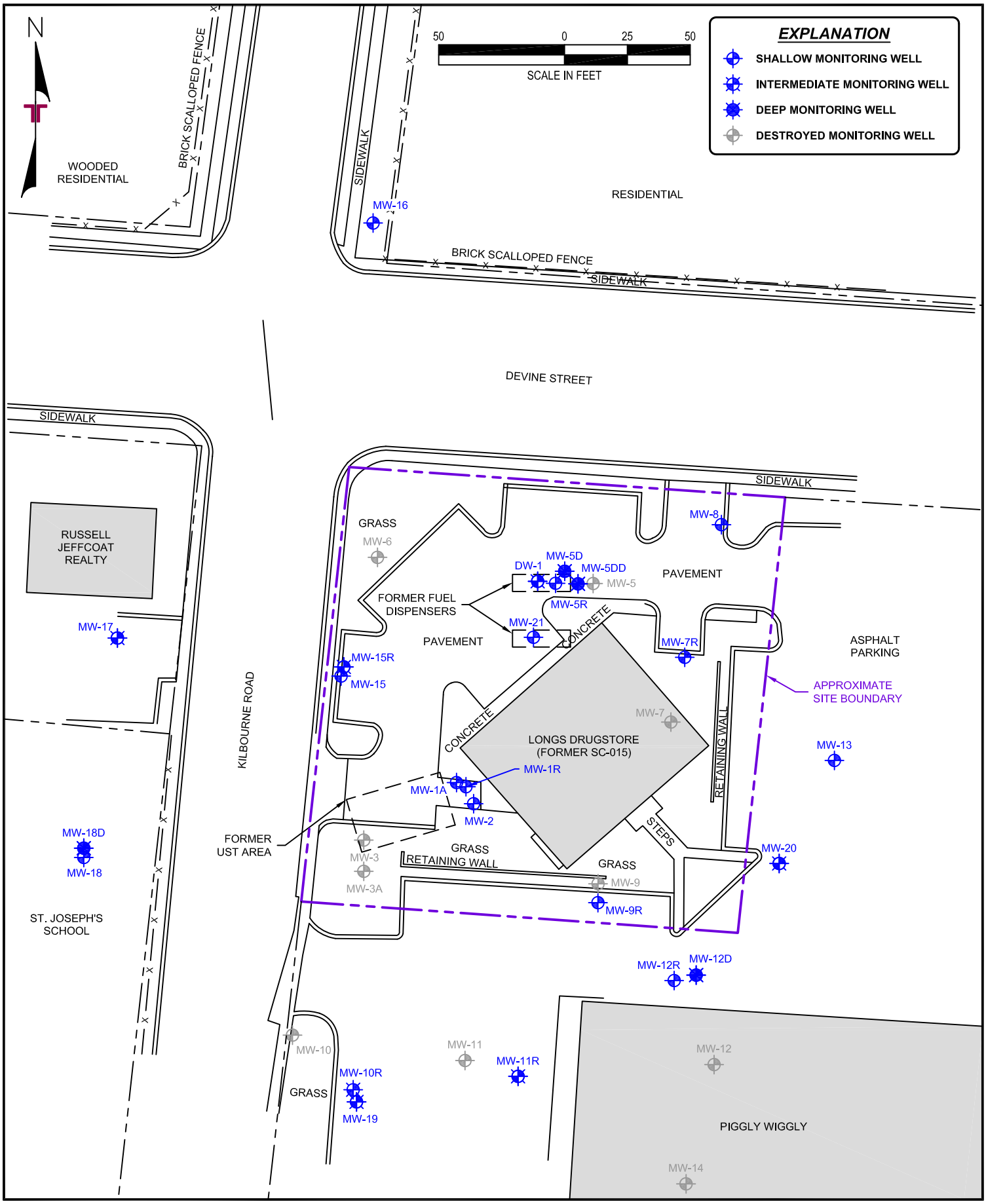
DATE: 1982
SCALE: 1 INCH = 1000 FEET

PROJECT NO. 73078012

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



Project Mngr: RWN	Project No. 73078012	Terracon Consulting Engineers and Scientists 521 CLEMSON ROAD COLUMBIA, SC 29229 PH. (803) 741-9000 FAX. (803) 741-9900	SITE MAP FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Drawn By: PTK	Scale: AS SHOWN		Fig No. 2
Checked By: RWN	File No. 73078012		
Approved By: PMH	Date: AUGUST 2013		

APPENDIX A

AFVR Field Data

AVFR FIELD DATA SHEET

Terracon	Site: SC-015	Project No.: 73078012	12-2-13 Temp: 50	Event #: 8

	Start Time hh:mm	End Time hh:mm	Time Interval (min)	VOC Concentrations			Off-Gas Velocity (FPM)			Total Flow (CFM)	VOC Emissions		
				Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)		Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	6:00	6:30	30	3,400	3,600	3,500	836	1,130	983	88.47	3.65	1.83	1.83
	6:30	7:00	30	3,600	3,600	3,600	1,130	1,149	1,140	102.56	4.36	2.18	4.01
	7:00	7:30	30	3,600	3,400	3,500	1,149	1,188	1,169	105.17	4.34	2.17	6.18
	7:30	8:00	30	3,400	3,600	3,500	1,188	2,835	2,012	181.04	7.48	3.74	9.92
	8:00	8:30	30	3,600	3,600	3,600	2,835	3,100	2,968	267.08	11.35	5.67	15.59
	8:30	9:00	30	3,600	3,600	3,600	3,100	3,186	3,143	282.87	12.02	6.01	21.60
	9:00	9:30	30	3,600	3,600	3,600	3,186	3,273	3,230	290.66	12.35	6.17	27.77
	9:30	10:00	30	3,600	3,400	3,500	3,273	3,418	3,346	301.10	12.44	6.22	33.99
	10:00	10:30	30	3,400	3,400	3,400	3,418	3,521	3,470	312.26	12.53	6.26	40.25
	10:30	11:00	30	3,400	3,400	3,400	3,521	3,665	3,593	323.37	12.97	6.49	46.74
	11:00	11:30	30	3,400	3,200	3,300	3,665	3,868	3,767	338.99	13.20	6.60	53.34
	11:30	12:00	30	3,200	3,200	3,200	3,868	3,779	3,824	344.12	12.99	6.50	59.83
	12:00	12:30	30	3,200	3,200	3,200	3,779	3,844	3,812	343.04	12.95	6.48	66.31
	12:30	13:00	30	3,200	3,200	3,200	3,844	3,890	3,867	348.03	13.14	6.57	72.88
	13:00	13:30	30	3,200	3,400	3,300	3,890	4,116	4,003	360.27	14.03	7.01	79.90
	13:30	14:00	30	3,400	3,400	3,400	4,116	4,164	4,140	372.60	14.95	7.47	87.37

Total Extraction Time..... **8.0** **hours**

Total Liquid Volume..... **132** **gallons**

Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **14.8** **gallons**

Total Hydrocarbon Recovery:..... **14.8** **gallons**

TOTAL lbs of VOC emissions = 87.37

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

Event Information

Technician:	Neil Akre
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event County:	Richland
Event City:	Columbia
UST No.:	07680
Disposal Facility:	AEO
Manifest Number:	05957

VACUUM RADIUS OF INFLUENCE

Former SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 8 Date: 12/2/13

	System Vacuum	MW-5R	MW-21	DW-1	MW-1R	MW-7R	MW-8	MW-15R
		Stinger Head Vacuum		Distance to Nearest Fluid/Vapor Recovery Well				
				5 ft	65 ft	62 ft	68 ft	75 ft
Time	Vacuum (Inches of Mercury Hg)			Vacuum (Inches of Mercury Hg) as negative pressure				
6:00	18	15	16	0	0	0.00	0.004	0
6:30	18	15	16	0	0.007	0.02	0.004	0
7:00	18	15	16	0	0.01	0.02	0.004	0
7:30	17.5	15	16	0	0.01	0.02	0.004	0
8:00	17.5	15	16	0	0.01	0.02	0.004	0
8:30	17.5	16	16	0	0	0.02	0.004	0
9:00	17.5	16	16	0	0	0.02	0.004	0
9:30	17.5	16	16	0	0	0.02	0	0
10:00	18	16.5	16	0	0.01	0.02	0	0
10:30	18.5	17	16	0	0.01	0.02	0	0
11:00	19.5	17	16	0	0.01	0.02	0	0
11:30	20	17	16	0	0.01	0.03	0	0
12:00	20	17	16	0	0.01	0.03	0	0
12:30	20	17	16	0	0.01	0.03	0	0
13:00	19	17	16	0	0.01	0.03	0	0
13:30	19	17	16	0	0.01	0.03	0	0
14:00	19	17	16	0	0.01	0.03	0	0

Notes: btoc - below top of casing

VACUUM INFLUENCE ON LOCALIZED WATER TABLE
Former SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 8 Date: 12/3/13

	MW-5R			MW-21		
	Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
Pre	14.53	ND	ND	14.6	ND	ND
Post	17.2	ND	ND	17.66	ND	ND

	Stinger Depth (feet btoc)					
Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
	Recorded in Feet			Recorded in Feet		
6:00	15.13	0	0.77	15.2	0	0.22
6:30	15.13	0	0.77	15.2	0	0.22
7:00	15.13	0	0.77	15.2	0	0.22
7:30	15.13	0	0.77	15.2	0	0.22
8:00	15.13	0	0.77	15.2	0	0.22
8:30	15.7	0.57	0.2	15.8	0.6	-0.38
9:00	16.3	1.17	-0.4	16.4	1.2	-0.98
9:30	16.3	1.17	-0.4	16.4	1.2	-0.98
10:00	16.93	1.8	-1.03	17	1.8	-1.58
10:30	16.93	1.8	-1.03	17	1.8	-1.58
11:00	16.93	1.8	-1.03	17	1.8	-1.58
11:30	16.93	1.8	-1.03	17	1.8	-1.58
12:00	16.93	1.8	-1.03	17	1.8	-1.58
12:30	16.93	1.8	-1.03	17	1.8	-1.58
13:00	16.93	1.8	-1.03	17	1.8	-1.58
13:30	16.93	1.8	-1.03	17	1.8	-1.58
14:00	16.93	1.8	-1.03	17	1.8	-1.58

Notes:
1) TOC- Top of Casing
2) BTOC-Below Top of Casing
2) Ground water and Free Phase Product Measurement Recorded from TOC
3) ND- Not Detected
4) DTW - Depth to Water Table
6) AFVR - Aggressive Fluid Vapor Recovery
7) Historical Low Water Table at Monitoring Well MW-5R was recorded at 15.9 on May 14, 2008
7a) Historical Low Water Table at Monitoring Well MW-21 was recorded at 15.42 on April 06, 2009

AVFR FIELD DATA SHEET

Terracon	Site: SC-015	Project No.: 73078012	1-9-14 Temp: 60	Event #: 9

	Start Time hh:mm	End Time hh:mm	Time Interval (min)	VOC Concentrations			Off-Gas Velocity (FPM)			Total Flow (CFM)	VOC Emissions		
				Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)		Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	6:00	6:30	30	20,000	16,000	18,000	836	683	760	68.36	14.52	7.26	7.26
	6:30	7:00	30	16,000	16,000	16,000	683	816	750	67.46	12.74	6.37	13.63
	7:00	7:30	30	16,000	16,000	16,000	816	840	828	74.52	14.07	7.03	20.66
	7:30	8:00	30	16,000	16,000	16,000	840	792	816	73.44	13.87	6.93	27.59
	8:00	8:30	30	16,000	16,000	16,000	792	886	839	75.51	14.26	7.13	34.72
	8:30	9:00	30	16,000	16,000	16,000	886	901	894	80.42	15.18	7.59	42.31
	9:00	9:30	30	16,000	16,000	16,000	901	922	912	82.04	15.49	7.74	50.06
	9:30	10:00	30	16,000	16,000	16,000	922	960	941	84.69	15.99	7.99	58.05
	10:00	10:30	30	16,000	16,000	16,000	960	928	944	84.96	16.04	8.02	66.07
	10:30	11:00	30	16,000	16,000	16,000	928	904	916	82.44	15.56	7.78	73.86
	11:00	11:30	30	16,000	16,000	16,000	904	745	825	74.21	14.01	7.00	80.86
	11:30	12:00	30	16,000	16,000	16,000	745	936	841	75.65	14.28	7.14	88.00
	12:00	12:30	30	16,000	14,000	15,000	936	877	907	81.59	14.44	7.22	95.22
	12:30	13:00	30	14,000	14,000	14,000	877	902	890	80.06	13.23	6.61	101.83
	13:00	13:30	30	14,000	12,000	13,000	902	831	867	77.99	11.96	5.98	107.82
	13:30	14:00	30	12,000	12,000	12,000	831	814	823	74.03	10.48	5.24	113.06

Total Extraction Time..... **8.0** **hours**

Total Liquid Volume..... **55** **gallons**

Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9).. **19.2** **gallons**

Total Hydrocarbon Recovery:..... **19.2** **gallons**

TOTAL lbs of VOC emissions = 113.06

Event Information

Technician:	Neil Akre
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event County:	Richland
Event City:	Columbia
UST No.:	07680
Disposal Facility:	Regulatory Solutions
Manifest Number:	19050

Notes:
1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

VACUUM RADIUS OF INFLUENCE

Former SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 9 Date: 1/9/14

	System Vacuum	MW-5R	MW-21	DW-1	MW-1R	MW-7R	MW-8	MW-15R
		Stinger Head Vacuum		Distance to Nearest Fluid/Vapor Recovery Well				
				5 ft	65 ft	62 ft	68 ft	75 ft
Time	Vacuum (Inches of Mercury Hg)			Vacuum (Inches of Mercury Hg) as negative pressure				
6:00	16	17	12	0	0	0.02	0.004	0
6:30	16.5	17.5	16	0	0.004	0.02	0.004	0
7:00	16.5	17.5	18	0	0	0.02	0	0
7:30	17	15	18	0	0	0	0	0
8:00	17	13.5	18	0	0	0	0	0
8:30	17	12	18	0	0	0	0	0
9:00	17	12	18	0	0	0	0	0
9:30	18	16	17	0	0	0	0	0
10:00	19	16	15	0	0	0	0	0
10:30	19	17	13	0	0	0	0	0
11:00	19	18.5	13	0	0	0	0	0
11:30	19	18.5	13	0	0	0	0	0
12:00	20	19	13	0	0	0	0	0
12:30	20	19	13	0	0	0	0	0
13:00	20	19.5	13	0	0	0	0	0
13:30	20	19.5	13	0	0	0	0	0
14:00	19.5	19	14.5	0	0	0	0	0

Notes: btoc - below top of casing

VACUUM INFLUENCE ON LOCALIZED WATER TABLE
Former SC-015
3800 Devine Street, Columbia, SC
UST Site # 07680
Terracon Project No. 73078012
Event # 9 Date: 1/9/14

	MW-5R			MW-21		
	Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
Pre	14.77	ND	ND	14.89	ND	ND
Post	16.85	ND	ND	17.69	ND	ND

	Stinger Depth (feet btoc)					
Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
	Recorded in Feet			Recorded in Feet		
6:00	15.37	0.24	0.53	15.47	0.27	-0.05
6:30	17	1.87	-1.1	17	1.8	-1.58
7:00	17	1.87	-1.1	17	1.8	-1.58
7:30	17	1.87	-1.1	17	1.8	-1.58
8:00	17	1.87	-1.1	17	1.8	-1.58
8:30	17	1.87	-1.1	17	1.8	-1.58
9:00	17	1.87	-1.1	17	1.8	-1.58
9:30	17	1.87	-1.1	17	1.8	-1.58
10:00	17	1.87	-1.1	17	1.8	-1.58
10:30	17	1.87	-1.1	17	1.8	-1.58
11:00	17	1.87	-1.1	17	1.8	-1.58
11:30	17	1.87	-1.1	17	1.8	-1.58
12:00	17	1.87	-1.1	17	1.8	-1.58
12:30	17	1.87	-1.1	17	1.8	-1.58
13:00	17	1.87	-1.1	17	1.8	-1.58
13:30	17	1.87	-1.1	17	1.8	-1.58
14:00	17	1.87	-1.1	17	1.8	-1.58

Notes:
1) TOC- Top of Casing
2) BTOC-Below Top of Casing
2) Ground water and Free Phase Product Measurement Recorded from TOC
3) ND- Not Detected
4) DTW - Depth to Water Table
6) AFVR - Aggressive Fluid Vapor Recovery
7) Historical Low Water Table at Monitoring Well MW-5R was recorded at 15.9 on May 14, 2008
7a) Historical Low Water Table at Monitoring Well MW-12 was recorded at 15.42 on April 06, 2009

APPENDIX B

Waste Disposal Manifests

NON-HAZARDOUS WASTE MANIFEST

Please print or type (Form designed for use on elite (12 pitch) typewriter)

NON-HAZARDOUS WASTE

NON-HAZARDOUS WASTE MANIFEST

1. Generator's US EPA ID No.: C E 3 Q G

Manifest Document No.: 0 5 9 5 7

2. Page 1 of 1

GENERATOR

3. Generator's Name and Mailing Address
Crown Central (former)
3800 Divine Street
Columbia, SC 29205

4. Generator's Phone (803) 518-6328

5. Transporter 1 Company Name: Advanced Environmental Options, Inc

6. US EPA ID Number: S C R 0 0 0 0 7 4 5 7 5

A. State Transporter's ID

B. Transporter 1 Phone: (864) 488-9111

7. Transporter 2 Company Name

8. US EPA ID Number

C. State Transporter's ID

D. Transporter 2 Phone

9. Designated Facility Name and Site Address
Advanced Environmental Options,
25 Stan Perkins Road
Spartanburg, SC 29307

10. US EPA ID Number: S C R 0 0 0 0 7 4 5 7 5

E. State Facility's ID

F. Facility's Phone: (864) 488-9111

11. WASTE DESCRIPTION	Containers No.	Containers Type	13. Total Quantity	14. Unit Wt./Vol.
a. NON-DOT/NON-RCRA Regulated Materials (Contains Hydrocarbons & Water)	1	T	0 0 0 ~~5 8~~ 132 (ST)	G
b.	0			
c.	0			
d.	0			

G. Additional Descriptions for Materials Listed Above
a) L/-

H. Handling Codes for Wastes Listed Above

15. Special Handling Instructions and Additional Information
Emergency Contact: David Hitchens 864-488-9111, Cell 864-590-4648
Job # 10211

16. GENERATOR'S CERTIFICATION: I hereby certify that the contents of this shipment are fully and accurately described and are in all respects in proper condition for transport. The materials described on this manifest are not subject to federal hazardous waste regulations.

Printed/Typed Name: Neil AKRE — Signature — Date: Month 12 Day 23 Year 13

TRANSPORTER

17. Transporter 1 Acknowledgement of Receipt of Materials

Printed/Typed Name: Cody Tackett — Signature — Date: Month 12 Day 23 Year 13

18. Transporter 2 Acknowledgement of Receipt of Materials

Printed/Typed Name — Signature — Date: Month Day Year

FACILITY

19. Discrepancy Indication Space

20. Facility Owner or Operator: Certification of receipt of the waste materials covered by this manifest, except as noted in item 19.

Printed/Typed Name: Stephanie N Hedstrom — Signature — Date: Month 12 Day 23 Year 13

PRINTED ON RECYCLED PAPER USING SOYBEAN INK PRINTED WITH SOY INK

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
		803-926-0089	1 9 0 5 0

5. Generator's Name and Mailing Address

Crown Central LLC
Terracon- 521 Clemson Road
Columbia, SC 29229-

803-741-9000
Generator's Phone:

Generator's Site Address (if different than mailing address)

3800 Devine Street
Columbia, SC

6. Transporter 1 Company Name

Terracon

U.S. EPA ID Number

7. Transporter 2 Company Name

U.S. EPA ID Number

8. Designated Facility Name and Site Address

Regulatory Solutions, In
40 Pascon Court
Gaston, SC, 29053-
803-926-0089

Facility's Phone:

U.S. EPA ID Number

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA, NON-DOT REGULATED MATERIAL 10660 - 1042	1	T T	5 5	g	455 lbs
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Regan W Nannis — BS Signatory Agent for Crown Central LLC
Signature:
Month: 1 Day: 13 Year: 14

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:
Transporter Signature (for exports only): Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Regan W Nannis
Signature:
Month: 1 Day: 13 Year: 14

Transporter 2 Printed/Typed Name:
Signature:
Month: Day: Year:

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator)

U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator)

Month: Day: Year:

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Amy McKenzie
Signature: Amy McKenzie
Month: 1 Day: 13 Year: 14

GENERATOR — INT'L — TRANSPORTER — DESIGNATED FACILITY

ASSESSMENT COMPONENT INVOICE

SOUTH CAROLINA

Department of Health and Environmental Control (DHEC)

Bureau of Underground Storage Tank Management

ASSESSMENT COMPONENT INVOICE

****See back of form for instructions.****

SITE ID # 07680 COUNTY Richland

FACILITY NAME Former Crown SC-015

STREET ADDRESS 3800 Devine St., Columbia

INVOICE # T479413 **Cost Proposal #** 46877

For work performed during (specify time period) Oct. 2013 to Jan 2014

I certify, under penalty of law, that I have personally examined and am familiar with the information submitted in this and all attached documents; and that based on my inquiry of those individuals responsible for obtaining this information, and any other information I may be aware of, I believe that the submitted information is true, accurate, and complete. I further agree, in accordance with any DHEC demand letter, to promptly repay any overpayment received.

**Please fill out both the Contractor and the Owner/Operator (original signatures) Sections. Also, indicate the Payee by placing a check in the box next to the Contractor or the Owner/Operator. **

[X] CONTRACTOR

P. Michael Hudgins	20-0350125		
Name (Type or Print)	Federal Tax ID or Social Security Number, if Payee		
Terracon Consultants, Inc.			(803) 741-9000
Company			Phone Number
521 Clemson Rd.	Columbia	SC	29229
Address	City	State	Zip Code
P. Michael Hudgins	Senior Hydrogeologist		2-18-14
Signature (please use non-black ink), if Payee	Title		Date Signed

[ ] OWNER OR OPERATOR

Please attach copies of CANCELLED CHECKS (Front and Back)

James D. Janson	52-0550682		
Name (Type or Print)	Federal Tax ID or Social Security Number, if Payee		
Crown Central LLC	410841-5552		410-659-4753
Company			Phone Number
P.O. Box 1168	Baltimore	MD	21203
Address	City	State	Zip Code
[signature]	Manager - Environmental Engineering		2/18/14
Signature (please use non-black ink)	Title		Date Signed

If payment is to be sent to an address other than above, please indicate below:

Name of Individual or Company (please print)	Federal Tax ID or Social Security Number		
Address (please print)	City	State	Zip Code

Invoice Amount: $ 10,108.04

Less Submitted/Paid Well Drilling Costs: $ -

Amount Requested : $ 10,108.04

SCDHEC USE ONLY
= $

Amount Requested is for Assessment activities as Defined in the SCDHEC Letter

INVOICE INVOICE INVOICE INVOICE

comfront2 (REV. 9/9/97)

ASSESSMENT COMPONENT COST INVOICE
SOUTH CAROLINA
Department of Health and Environmental Control
Underground Storage Tank Program
State Underground Petroleum Environmental Response Bank

Facility SC-015

UST Permit # 07680 **CA#** 46877

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
1	Plan*				
	A. Tier II or Comp. Plan / QAPP App. B		x	$525.00	**$0.00**
	B. Tax Maps		x	$50.00	**$0.00**
2.	Receptor Survey*		x	$500.00	**$0.00**
3.	Comprehensive Survey		x	$1,000.00	**$0.00**
4.	Mob/Demob				
	A. Equipment	2	x	$575.00	**$1,150.00**
	B. Personnel	3	x	$290.00	**$870.00**
	C. Adverse Terrain Vehicle		x	$575.00	**$0.00**
5.	Soil Borings (hand augered)*		feet x	$14.00	**$0.00**
6.	Soil Borings (drilled) & Field Screening	(includes collection and quantification)			
	A. Standard		feet x	$17.00	**$0.00**
	B. Fractured Rock		feet x	$27.50	**$0.00**
7.	Soil Leachability Model		x	$200.00	**$0.00**
8.	Abandonment*				
	A. 2" or less		feet x	$5.00	**$0.00**
	B. 2+" to 6"		feet x	$5.50	**$0.00**
	C. Dug/bored well		feet x	$18.00	**$0.00**
9.	Well Installation*	(includes drilling costs)			
	A. Water Table (hand auger)		feet x	$20.00	**$0.00**
	B. Water Table		feet x	$38.00	**$0.00**
	C. Telescoping		feet x	$58.00	**$0.00**
	D. Rock Drilling		feet x	$58.00	**$0.00**
	E. 2" Rock Coring		feet x	$45.00	**$0.00**
	F. 4" Rock Coring		feet x	$50.40	**$0.00**
	G. Multi Sampling Ports/screen intervals		feet x	$47.20	**$0.00**
10.	Sample collection				
	A. Groundwater		samples x	$55.00	**$0.00**
	B. Air Vapor		samples x	$90.00	**$0.00**
	C. Water Supply		samples x	$30.00	**$0.00**
	D. Groundwater No Purge		samples x	$35.00	**$0.00**
	E. Gauge Well Only		samples x	$20.00	**$0.00**
	F. Sample Below Product		samples x	$50.00	**$0.00**
	G. Passive Diffusion Bag		samples x	$40.00	**$0.00**
	H. Field Blank		samples x	$5.00	**$0.00**
11.	Analyses-Groundwater	(See Analytical Methodology for site specific analyses)			
	A. BTEXNM+Oxygs+1,2 DCA+Eth		samples x	$100.00	**$0.00**
	B. 8260B **RUSH Analysis**		samples x	$143.00	**$0.00**
	C. Trimethyl, Butyl, and Isopropolbenzenes		samples x	$40.00	**$0.00**
	D. PAH's		samples x	$120.00	**$0.00**
	E. Lead		samples x	$20.00	**$0.00**
	F. EDB		samples x	$55.00	**$0.00**
	G. EDB (RUSH)		samples x	$75.00	**$0.00**
	H. 8 RCRA Metals		samples x	$140.00	**$0.00**
	I.TPH (9070)		samples x	$55.00	**$0.00**
	J. pH		samples x	$10.00	**$0.00**
	K. BOD		samples x	$40.00	**$0.00**
	L. Filtered Lead		samples x	$46.00	**$0.00**
	M. Ethanol		samples x	$21.50	**$0.00**
11.	Analyses-Soil				
	N. BTEX + Napth.		samples x	$100.00	**$0.00**
	O. PAH's		samples x	$120.00	**$0.00**
	P. 8 RCRA Metals		samples x	$150.00	**$0.00**

Facility SC-015

UST Permit # 07680 **CA#** 46877

	ITEM	QUANTITY	UNIT		UNIT PRICE	TOTAL
	Q. Oil & Grease(9071)		samples	›	$60.00	**$0.00**
	R. TPH DRO(3550)		samples	›	$65.00	**$0.00**
	S. TPH GRO(5035)		samples	›	$65.00	**$0.00**
	T. Grain size / hydrometer		samples	›	$99.00	**$0.00**
	U. Total Organic Carbon		samples	›	$35.00	**$0.00**
11.	Analyses-Air					
	V. BTEX + Naphthalene		samples	x	$247.50	**$0.00**
	W. Hydrocarbon Fuel Identification		samples	x	$620.00	**$0.00**
12.	Aquifer Characterization*					
	A. Pumping Test		hours	x	$120.00	**$0.00**
	B. Slug test		tests	x	$150.00	**$0.00**
	C. Fractured Rock		tests	x	$500.00	**$0.00**
13.	Free Product Recovery Rate Test*		tests	x	$120.00	**$0.00**
14.	Fate & Transport Modeling					
	A. Mathematical Model		models	x	$300.00	**$0.00**
	B. Computer Model		models	x	$500.00	**$0.00**
15.	Risk Evaluation					
	A. Tier I		x		$300.00	**$0.00**
	B. Tier II		x		$500.00	**$0.00**
16.	Subsequent Survey*		x		$300.00	**$0.00**
17.	Disposal					
	A. Wastewater	187	gallons	x	$0.80	**$149.60**
	B. Free Product		gallons	x	$0.85	**$0.00**
	C. Soil (Treatment/Disposal)*		tons		$72.50	**$0.00**
	D. Drilling Fluids *		gallons	x	$0.80	**$0.00**
18.	Miscellaneous Attach paid invoice receipts					
			x			**$0.00**
			x			**$0.00**
23.	AFVR					
	A. 8-Hour Event*	2	x		$3,000.00	**$6,000.00**
	B. Additional Hour		x		$204.00	**$0.00**
	C. Off-Gas Treatment		x		$35.00	**$0.00**
24.	Granular Activated Carbon (GAC) filter System installation/service					
	A. New GAC System Installation		x		$2,500.00	**$0.00**
	B. Refurbished GAC System Installation		x		$1,180.00	**$0.00**
	C. Filter Replacement/removal*		x		$450.00	**$0.00**
	D. GAC System Removal, cleaning & refurbishment		x		$720.00	**$0.00**
	E. GAC System housing		x		$450.00	**$0.00**
	F. In-line particulate filter		x		$150.00	**$0.00**
	G. Additional piping & fittings		x		$4.00	**$0.00**
25.	Well Repair					
	A. Repair 2x2 monitoring well pad	1	each	x	$100.00	**$100.00**
	B. Repair 4x4 monitoring well pad		each	x	$150.00	**$0.00**
	C. Replace well vault	1	each	x	$225.00	**$225.00**
	D. Replace well cover and gasket		each	x	$30.00	**$0.00**
	F. Replace well cover bolts	1	each	x	$10.00	**$10.00**
	G. Replace locking well cap & lock	1	each	x	$15.00	**$15.00**
	K. Replace missing well ID plate	12	each	x	$22.50	**$270.00**
19.	Report/Project Management				(SUBTOTAL)	
	A. Additional Copies of Report		each	x	**$32.50**	**$0.00**
	Project Coordination	15%	x		**$8,789.60**	**$1,318.44**
25.	**Total**					**$10,108.04**

DHEC 3664 (12/2005)

*** The appropriate Mobilization cost can be added to this cost**

D H E C

PROMOTE PROTECT PROSPER

Catherine B Templeton, Director

Promoting and protecting the health of the public and the environment

MR JIM JANSON
CROWN CENTRAL LLC C/O QES
40 HUDSON ST STE 107
ANNAPOLIS MD 21401

DEC 1 5 2014

UST 27 tech DOCKETING

Re: **Site Specific Work Plan Request**
Former Crown SC-015, 3800 Devine St, Columbia, SC
UST Permit # 07680
Release reported August 15, 1989
AFVR report received February 21, 2014
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) recognizes your commitment to continue work at this site using Terracon as your contractor. The UST Management Division of the South Carolina Department of Health and Environmental Control (Agency) has reviewed the referenced report and the next appropriate scope of work at the site is a comprehensive groundwater sampling event.

The groundwater sampling event should be conducted in accordance with the UST Quality Assurance Program Plan (QAPP) revision 2.0 and must be conducted in compliance with all applicable regulations. Groundwater samples should be collected from all monitoring wells associated with the release and analyzed for BTEX, naphthalene, MtBE, 1,2 DCA, 8 oxygenates, and EDB. Analyses should be in accordance with Appendix E of the QAPP to include duplicate samples, field and trip blanks. **All monitoring wells will need to be purged since it has been greater than 12 months since the last sampling event in accordance with the QAPP**. A copy of the Agency QAPP for the UST Management Division is available at http://www.scdhec.gov/environment/docs/QAPP_Rev-2_April2013.pdf

Please have your contractor complete and submit the Site Specific Work Plan and Cost Agreement within thirty (30) days of the date of this letter. The Site Specific Work Plan form can be found at http://www.scdhec.gov/environment/PermitCentral/ApplicationForms/#UST. Every component may not be necessary to complete the above scope of work. The State Underground Petroleum Environmental Response Bank (SUPERB) Account allowable cost for each component is included on the Assessment Component Cost Agreement Form. **Please note that technical and financial preapproval from the Agency must be issued before work begins.**

On all correspondence regarding this site, please reference UST Permit #07680. If you have any questions regarding this correspondence, please contact me by telephone at (803) 898-0634, by fax at (803) 898-0673, or by e-mail at utzst@dhec.sc.gov.

Sincerely,

Sonya T. Utz, Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

cc: Terracon, 521 Clemson Rd., Columbia, SC 29229
Technical File

LETTER OF TRANSMITTAL

Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

UST
FEB 19 2015
PROGRAM

TO Ms. Sonya Utz

SCDHEC
Bureau of Land and Waste Management

UST Program
2600 Bull St.

Columbia, SC 29201

DATE 2/12/15	JOB NO. 73078012
RE: (Former SC-015) Site-Specific Work Plan/ GWS	
UST Permit # 07680	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	2/12/15	Site Specific Work Plan/ GWS

UST
28 Tech
DOCKETING

THESE ARE TRANSMITTED as checked below:

X For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS:

Enclosed is the SSWP for the above referenced site. Please feel free to call me if you have any questions.

COPY TO: _____

_____

SIGNED: **Mike Hudgins**

If enclosures are not as noted, kindly notify us at once.

D H E C
PROMOTE PROTECT PROSPER

Site-Specific Work Plan for Approved ACQAP
Underground Storage Tank Management Division

To: Sonya T. Utz (SCDHEC Project Manager)
From: Mike Hudgins (Contractor Project Manager)
Contractor: Terracon Consultants, Inc. UST Contractor Certification Number: 246

Facility Name: Former SC-015 UST Permit #: 07680
Facility Address: 3800 Devine St., Columbia, SC
Responsible Party: Crown Central, LLC. Phone: (410) 841-5552
RP Address: 40 Hudson Street, Suite 107, Annapolis, MD 21401
Property Owner (if different): The Niggel Family Partnership
Property Owner Address: P.O. Box 6573, Columbia, SC 29260
Current Use of Property: The site is currently a pharmacy.

Scope of Work (Please check all that apply)

- ☐ IGWA
- ☐ Tier I
- ☐ Tier II
- ☐ Monitoring Well Installation
- ☑ Groundwater Sampling
- ☐ Other
- ☐ GAC

Analyses (Please check all that apply)

Groundwater/Surface Water:

- ☑ BTEXNMDCA (8260B)
- ☑ Oxygenates (8260B)
- ☑ EDB (8011)
- ☐ PAH (8270D)
- ☐ Lead
- ☐ 8 RCRA Metals
- ☐ TPH
- ☐ pH
- ☐ BOD
- ☐ Nitrate
- ☐ Sulfate
- ☐ Other
- ☐ Methane
- ☐ Ethanol
- ☐ Dissolved Iron

Soil:

- ☐ BTEXN
- ☐ PAH
- ☐ 8 RCRA Metals
- ☐ Oil & Grease (9071)
- ☐ TPH-DRO (3550B/8015B)
- ☐ TPH-GRO (5030B/8015B)
- ☐ Grain Size
- ☐ TOC

Air:

- ☐ BTEXN

Sample Collection (Estimate the number of samples of each matrix that are expected to be collected.)

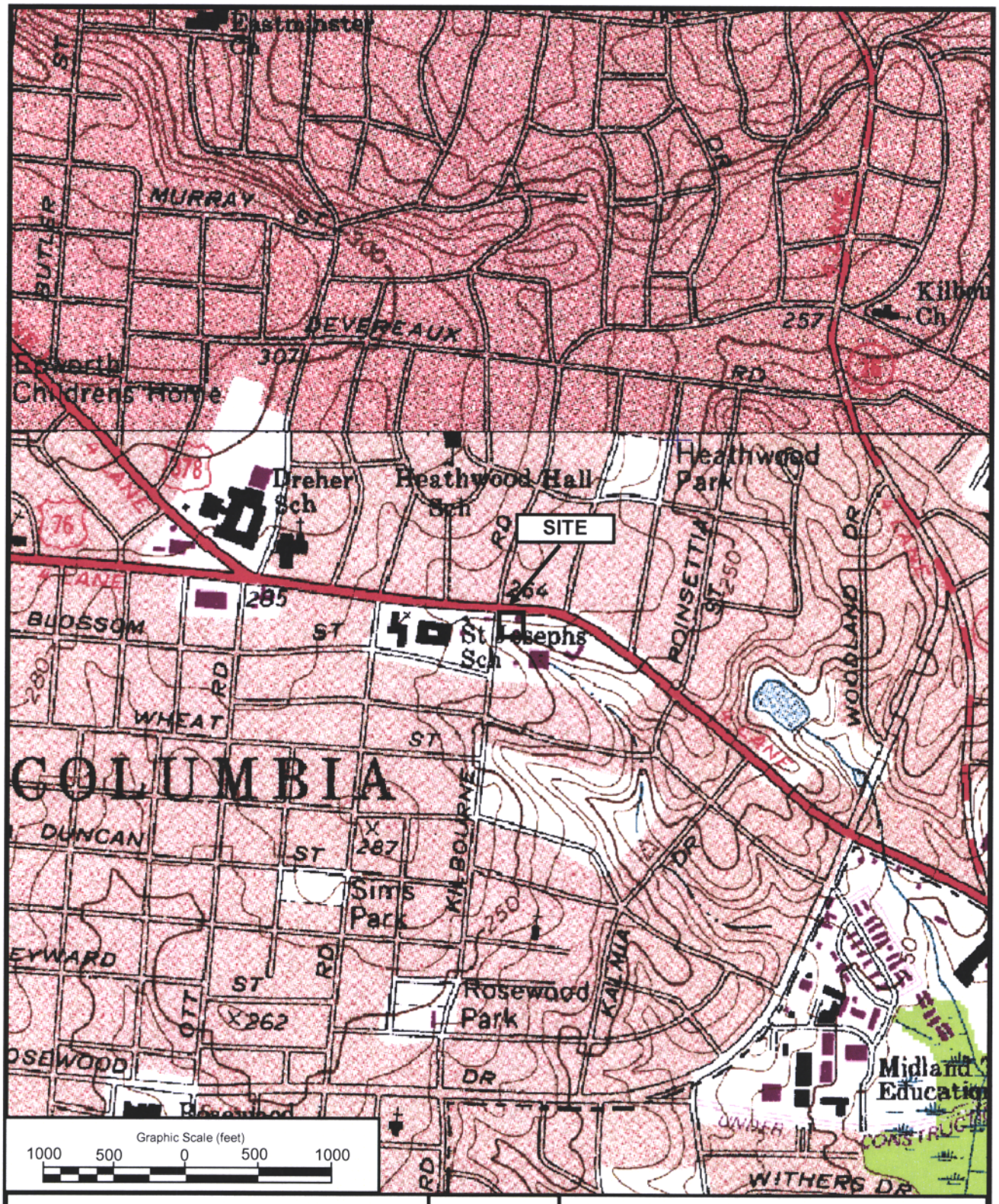
____ Soil	____ Water Supply Wells	____ Air	3 Field Blank
24 Monitoring Wells	____ Surface Water	2 Duplicate	2 Trip Blank

Field Screening Methodology

Estimate number and total completed depth for each point. and include their proposed locations on the attached map.
# of shallow points proposed: ____ Estimated Footage: ____ feet per point
# of deep points proposed: ____ Estimated Footage: ____ feet per point
Field Screening Methodology: ____

Permanent Monitoring Wells

Estimate number and total completed depth for each well. and include their proposed locations on the attached map.
# of shallow wells: ____ Estimated Footage: ____ feet per point
# of deep wells: ____ Estimated Footage: ____ feet per point
# of recovery wells: ____ Estimated Footage: ____ feet per point
Monitoring Well development method (consistent with SOP): ____
Comments. if warranted:



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP

ASSESSMENT COMPONENT COST AGREEMENT
SOUTH CAROLINA
Department of Health and Environmental Control
Underground Storage Tank Program
State Underground Petroleum Environmental Response Bank

Facility SC-015

UST Permit # 07680 **CA#** _____

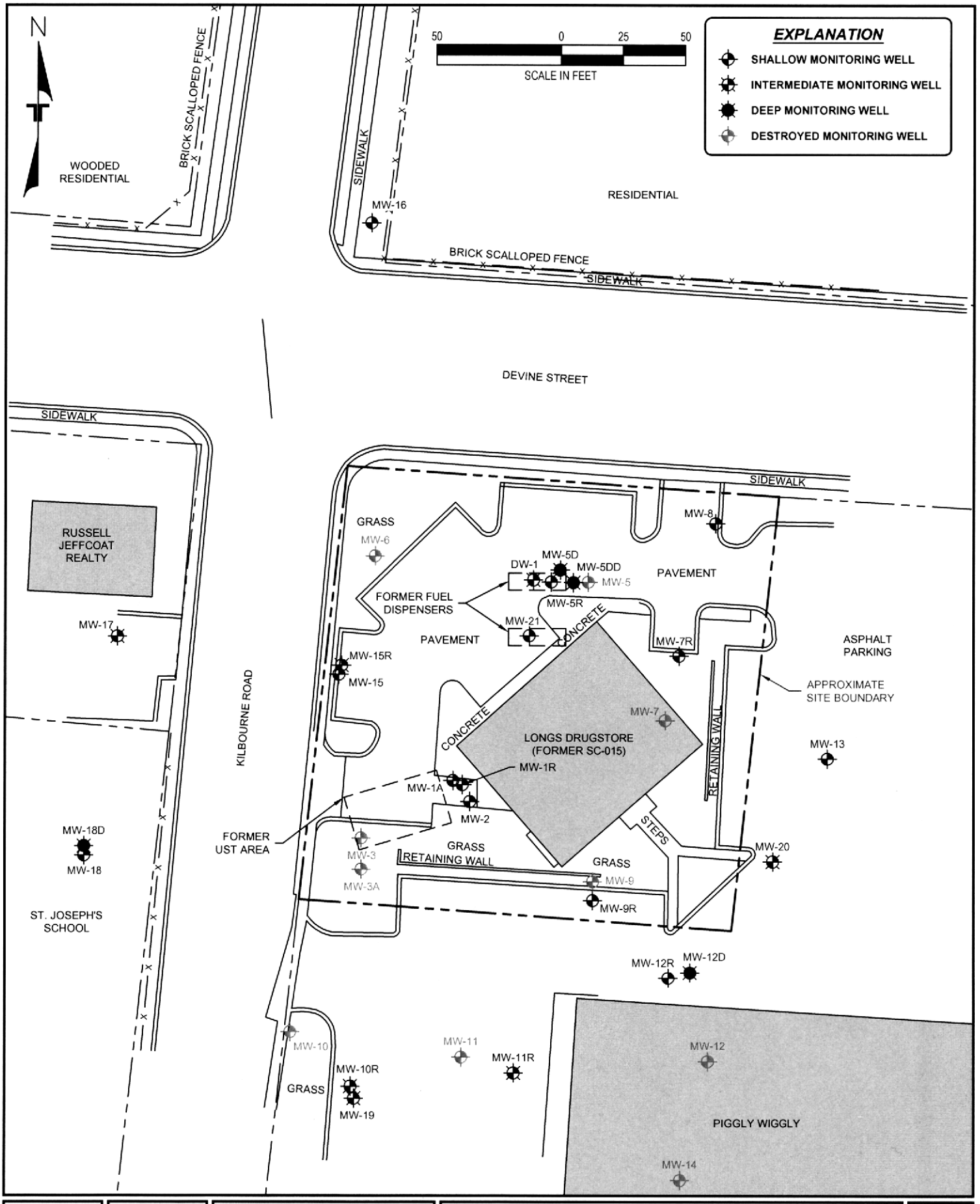
ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
1. Plan Preparation				
A1 . Site-specific Work Plan	1	x	$150.00	**$150.00**
B1. Tax Map		x	$70.00	**$0.00**
C1. Tier II or Comp. Plan / QAPP App. B		x	$250.00	**$0.00**
2. A.1 Receptor Survey*		x	$551.00	**$0.00**
3. A1 Comprehensive Survey		x	$1,040.00	**$0.00**
4. Mob/Demob				
A1. Equipment		x	$1,020.00	**$0.00**
B1. Personnel	2	x	$423.00	**$846.00**
C1. Adverse Terrain Vehicle		x	$500.00	**$0.00**
5. A1 Soil Borings (hand augered)*		feet x	$5.00	**$0.00**
6. Soil Borings (drilled) & Field Screening	(includes collection and quantification)			
A1. Standard		feet x	$15.00	**$0.00**
C1. Fractured Rock		feet x	$20.20	**$0.00**
7. A1 Soil Leachability Model		x	$60.00	**$0.00**
8. Abandonment*				
A1. 2" or less		feet x	$3.10	**$0.00**
B1. 2+" to 6"		feet x	$4.50	**$0.00**
C1. Dug/bored well		feet x	$15.00	**$0.00**
9. Well Installation*	(includes drilling costs)			
A1. Water Table (hand auger)		feet x	$10.60	**$0.00**
B1. Water Table		feet x	$38.00	**$0.00**
CC. Telescoping		feet x	$50.00	**$0.00**
DD. Rock Drilling		feet x	$58.00	**$0.00**
E1. 2" Rock Coring		feet x	$30.90	**$0.00**
G1. Milti-sampling ports/screens		feet x	$33.40	**$0.00**
HH. Recovery Well (4 " dia.)		feet x	$45.00	**$0.00**
K. Redevelop existing well		feet x	$11.00	**$0.00**
10. Sample collection				
A1. Groundwater (purge)	24	samples x	$60.00	**$1,440.00**
B1. Air or Vapors		samples x	$12.00	**$0.00**
C1. Water Supply (Surface Water)		samples x	$22.00	**$0.00**
D1. Groundwater (no purge or duplicate)	2	samples x	$28.00	**$56.00**
E1. Gauge Well Only		samples x	$7.00	**$0.00**
F1. Sample Below Product		samples x	$12.00	**$0.00**
G1. Passive Diffusion Bag		samples x	$26.00	**$0.00**
H1. Field Blank	3	samples x	$24.60	**$73.80**
11. Analyses-Groundwater				
A2. BTEXNM+Oxygs+1,2 DCA+Eth	31	samples x	$122.00	**$3,782.00**
AA1. Filtered Lead		samples x	$13.80	**$0.00**
B2. 8260B **RUSH Analysis**		samples x	$153.60	**$0.00**
C2. Trimethyl, Butyl, and Isopropolbenzenes		samples x	$36.40	**$0.00**
D1. PAHs		samples x	$60.60	**$0.00**
E1. Lead		samples x	$16.00	**$0.00**
F1. EDB by 8011	29	samples x	$45.20	**$1,310.80**
FF1. EDB by 8011 (RUSH)		samples x	$68.20	**$0.00**
G1. 8 RCRA Metals		samples x	$63.40	**$0.00**
H1. TPH (9070)		samples x	$41.00	**$0.00**
I1. pH		samples x	$5.20	**$0.00**
J1. BOD		samples x	$20.00	**$0.00**
PP. Ethanol		samples x	$14.80	**$0.00**
11. Analyses-Soil				
Q1. BTEX + Napth.		samples x	$64.00	**$0.00**
R1. PAH's		samples x	$64.04	**$0.00**
S1. 8 RCRA Metals		samples x	$56.40	**$0.00**
U1. TPH DRO(3550)		samples x	$40.00	**$0.00**
V1. TPH GRO(5035)		samples x	$35.96	**$0.00**
W1. Grain size / hydrometer		samples x	$104.00	**$0.00**
X1. Total Organic Carbon		samples x	$30.60	**$0.00**

Facility SC-015

UST Permit # 07680 **CA#**

	ITEM	QUANTITY	UNIT	UNIT PRICE	TOTAL
11.	Analyses-Air				
	Y1. BTEX + Naphthalene		samples x	$247.50	**$0.00**
12.	Aquifer Characterization*				
	A1. Pumping Test		hours x	$23.00	**$0.00**
	B1. Slug test		tests x	$191.00	**$0.00**
	C1. Fractured Rock		tests x	$100.00	**$0.00**
13.	Free Product Recovery Rate Test*		tests x	$38.00	**$0.00**
14.	Fate & Transport Modeling				
	A. Mathematical Model		models x	$100.00	**$0.00**
	B. Computer Model		models x	$100.00	**$0.00**
15.	Risk Evaluation				
	A. Tier I Risk Evaluation		x	$300.00	**$0.00**
	B. Tier II Risk Evaluation		x	$100.00	**$0.00**
16. A1	Subsequent Survey*		x	$260.00	**$0.00**
17.	Disposal				
	AA. Wastewater	150	gallons x	$0.56	**$84.00**
	BB. Free Product		gallons x	$0.50	**$0.00**
	C1. Soil (Treatment/Disposal)*		tons	$60.00	**$0.00**
	D1. Drilling Fluids *		gallons x	$0.42	**$0.00**
18.	Miscellaneous Attach paid invoice receipts				
			x		**$0.00**
			x		**$0.00**
23.	AFVR				
	A1. 8-Hour Event*		x	$1,375.00	**$0.00**
	A2. 24-Hour Event*		x	$3,825.00	**$0.00**
	A3. 48-Hour Event*		x	$6,265.00	**$0.00**
	A4. 96-Hour Event*		x	$12,567.00	**$0.00**
	C1. Off-Gas Treatment - 8 hour		x	$122.50	**$0.00**
	C2. Off-Gas Treatment - 24 hour		x	$241.50	**$0.00**
	C3. Off-Gas Treatment - 48 hour		x	$327.00	**$0.00**
	C4. Off-Gas Treatment - 96 hour		x	$780.00	**$0.00**
	D. Site Reconaissance		x	$203.25	**$0.00**
	E1. Additional Hook-ups		x	$25.75	**$0.00**
	F. Effluent Disposal.		x	$0.44	**$0.00**
	G. AFVR Moblilzation/Demobilization		x	$391.50	**$0.00**
25.	Well Repair				
	A1. Additional Copies of Report		each x	$50.00	**$0.00**
	B1. Repair 2x2 monitoring well pad		each x	$50.00	**$0.00**
	C1. Repair 4x4 monitoring well pad		each x	$88.00	**$0.00**
	D1. Replace well vault		each x	$118.00	**$0.00**
	F1. Replace well cover bolts		each x	$2.60	**$0.00**
	G. Replace locking well cap & lock		each x	$15.00	**$0.00**
	H1. Replace/Repair stick-up each		each x	$134.00	**$0.00**
	I1. Convert flush-mount to stick-up		each x	$150.00	**$0.00**
	J1. Convert stick-up to flush-mount		each x	$130.00	**$0.00**
	K1. Replace missing/illegible well ID plate		each x	$12.00	**$0.00**
	Report/Project Management			(SUBTOTAL)	
	Project Coordination		each x		**$0.00**
		12%	x	**$7,742.60**	**$929.11**
25.	**Total**				**$8,671.71**

*** The appropriate Mobilization cost can be added to this cost**



Project Mngr: RWN	Project No: 73078012	Terracon Consulting Engineers and Scientists	SITE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No: 73078012	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 2
Approved By: PMH	Date: AUGUST 2013		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	216.56
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
	6/3/08		98.41	DRY		
	7/22/13			DRY		
MW-1R	1/8/09	13 - 28	98.35	15.19	ND	83.16
	7/22/13			14.28	ND	84.07
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
	6/3/08		98.45	DRY	ND	DRY
	7/22/13			29.67	ND	68.78
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-5R	5/14/08	5-20	98.29	15.19	ND	83.1
	1/20/09			14.71	ND	83.58
	7/22/13			12.67	ND	85.62
MW-5D	1/23/09	80-85	98.49	49.32	ND	49.17
	7/22/13			47.90	ND	50.59
MW-5DD	3/23/09	112 - 117	98.83	54.16	ND	44.67
	7/22/13			54.57	ND	44.26

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		
MW-7R	5/14/08	10-25	98.85	15.46	ND	83.39
	1/20/09			14.95	ND	83.90
	7/22/13			12.25	ND	86.60
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
	5/15/08		99.48	16.21	ND	83.27
	1/20/09			15.97	ND	83.51
	7/22/13			13.28	ND	86.20
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-9R	5/14/08	5-20	93.32	12.79	ND	80.53
	1/20/09			12.18	ND	81.14
	7/22/13			9.90	ND	83.42
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-10R	5/14/08	15-30	95.71	DRY		
	7/22/13			29.99	ND	65.72
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-11R	5/14/08	15-30	92.26	29.28	ND	62.98
	1/20/09			28.76	ND	63.50
	7/22/13			28.80	ND	63.46
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		
MW-12R	5/14/08	5-20	92.43	14.34	ND	78.09
	1/20/09			13.95	ND	78.48
	7/22/13			10.62	ND	81.81
MW-12D	1/23/09	60-75	92.51	41.25	ND	51.26
	7/22/13			40.84	ND	51.67
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
	6/3/08		94.26	13.70	ND	80.56
	1/20/09			14.60	ND	79.66
	7/22/13			9.81	ND	84.45
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		
MW-15	1/14/97	20-35	249.43	DRY		
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
	5/15/08		99.70	DRY		
	7/22/13			34.18	ND	65.52
MW-15R	1/20/09	24.2-39.2	100.47	35.52	ND	64.95
	7/22/13			DRY		

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85
	5/15/08		102.85	26.96	ND	75.89
	1/20/09			26.76	ND	76.09
	7/22/13			26.68	ND	76.17
MW-17	5/14/08	25.5-39.5	100.84	36.70	ND	64.14
	1/20/09			36.02	ND	64.82
	7/22/13			36.04	ND	64.80
MW-18	1/20/09	15-30	103.46	22.21	ND	81.25
	7/22/13			19.69	ND	83.77
MW-18D	1/23/09	57-62	103.28	49.20	ND	54.08
	7/22/13			44.64	ND	58.64
MW-19	1/20/09	19.6-34.6	95.74	31.30	ND	64.44
	7/22/13			31.47	ND	64.27
MW-20	1/20/09	18.7-33.7	92.93	29.94	ND	62.99
	7/22/13			29.97	ND	62.96
MW-21	4/16/09	5-20	98.89	15.42	ND	83.47
	7/22/13			12.86	ND	86.03
DW-1	5/15/08	35-40	98.48	35.31	ND	63.17
	1/20/09			34.84	ND	63.64
	7/11/11		97.48	NR	NR	NR
	7/22/13			34.65	ND	62.83

NOTES:

1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded. Water levels had not stabilized during sampling (rising in well)
5) * = Top-of-casing elevations were altered during site redevelopment. A new survey was conducted in 2008 by Jay Joshi, PLS #14811, as part of the additional assessment event.

D H E C
PROMOTE PROTECT PROSPER
W. Marshall Taylor Jr., Acting Director
Promoting and protecting the health of the public and the environment



MS ANNIE SMITH-JONES
CROWN CENTRAL LLC C/O QES
40 HUDSON ST STE 107
ANNAPOLIS MD 21401

MAR 0 4 2015

Re: **Groundwater Sampling Directive**
Former Crown SC-015, 3800 Devine St, Columbia, SC
UST Permit # 07680; CA# 49429
Release reported August 15, 1989
Site Specific Work Plan received February 19, 2015
Richland County

Dear Ms. Smith-Jones:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) has reviewed and approved the referenced work plan submitted on your behalf by Terracon. The next appropriate scope of work at the site is a comprehensive groundwater sampling event. All work should be conducted in accordance with the UST Quality Assurance Program Plan (QAPP) Revision 2.0 and must be conducted in compliance with all applicable regulations. A copy of the Agency QAPP for the UST Management Division is available at http://www.scdhec.gov/environment/docs/QAPP_Rev-2_April2013.pdf.

Groundwater sampling activities at the site should begin immediately upon receipt of this letter. Cost agreement #49429 has been approved for the amount shown on the enclosed cost agreement form for sampling all monitoring wells associated with the referenced release. **All monitoring wells will need to be purged since it has been greater than 12 months since the last sampling event in accordance with the QAPP**. Groundwater samples should be collected and analyzed for BTEX, naphthalene, MtBE, 1,2 DCA, 8 oxygenates, and EDB. Analyses should be in accordance with Appendix E of the QAPP to include duplicate samples, field and trip blanks.

In accordance with the QAPP Revision 2.0, a weekly status report of the project should be provided via e-mail. If any quality assurance problems arise, you must contact me within 24 hours via phone or e-mail. In addition, a discussion of the problem(s) encountered, including quality assurance problems, the actions taken, and the results must be included in the final report submitted to the UST Management Division.

The Monitoring Report, contractor checklist (QAPP Appendix K), and invoice are due within 60 days from the date of this letter. The report submitted at the completion of these activities should include the required information outlined in the QAPP. Please note that all applicable South Carolina certification requirements apply to the services and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

Terracon can submit an invoice for direct payment from State Underground Petroleum Environmental Response Bank (SUPERB) Account for pre-approved costs. By law, the SUPERB Account cannot compensate any costs that are not pre-approved. Please note that applicable South Carolina certification requirements regarding laboratory services and report preparation must be satisfied. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval from the Agency is obtained. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be pre-approved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

Please note, if unnecessary dilutions are completed resulting in reporting limits of individual chemical of concerns (CoC) in excess of Risk-Based Screening Levels (RBSLs), the data cannot be used. In those cases, the Division may deny payment for any non-detect analysis where the reporting limit exceeds the RBSL. The UST Management Division encourages the use of 'J' values as necessary so the appropriate action can be determined for a release.

The Agency grants pre-approval for transportation of virgin petroleum impacted soil and groundwater from the referenced site to a permitted treatment facility. The transport and disposal must be conducted in accordance with the QAPP. If the CoC concentrations based on laboratory analysis are below RBSLs, please contact the project manager for approval to dispose of soil and/or groundwater on site. The SUPERB Account will not reimburse for transportation or treatment of soil and/or groundwater with concentrations below RBSLs.

Please notify the Agency four days prior to any environmental work being conducted so the project manager or regional personnel may attend, if available. On all correspondence regarding this site, please reference UST Permit #07680. If you have any questions regarding this correspondence, please contact me by telephone at (803) 898-0634, by fax at (803) 898-0673, or by e-mail at utzst@dhec.sc.gov.

Sincerely,

Sonya T. Utz, Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon, 521 Clemson Rd., Columbia, SC 29229(with enc.)
Technical File (with enc.)

Approved Cost Agreement 49429

Facility: 07680 SC015

UTZST

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
01 PLAN						
		A1	SITE SPECIFIC WORK PLAN	1.0000	150.00	150 00
04 MOB/DEMOB						
		B1	PERSONNEL	2.0000	423.00	846.00
10 SAMPLE COLLECTION						
		A1	GROUNDWATER (PURGE)	24.0000	60.00	1,440.00
		D1	GROUNDWATER NO PURGE/DUPLICATE	2 0000	28.00	56.00
		H1	FIELD BLANK	3 0000	24.60	73.80
11 ANALYSES	GW GROUNDWATER					
		A2	BTEXNM+OXYGS+1,2-DCA+ETH-8260B	31.0000	122.00	3,782.00
		F1	EDB BY 8011	29.0000	45.20	1,310.80
17 DISPOSAL						
		AA	WASTEWATER	150.0000	0.56	84.00
19 RPT/PROJECT MNGT & COORDINATIO						
		PRT	REPORT PREPARATION	0.1200	7,742.60	929.11
				Total Amount		8,671.71

LETTER OF TRANSMITTAL

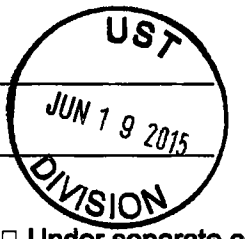
Terracon

521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax



TO Ms. Sonya Utz

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201



DATE	06/17/15	JOB NO.	73078012

RE: Former SC-015, Columbia
UST Permit No. 07680

Ground Water Sampling Report

WE ARE SENDING YOU **X Attached** ☐ **Under separate cover via** _____ the following items:

COPIES	DATE	DESCRIPTION
1	6/17/15	Ground Water Sampling Report (CD)

THESE ARE TRANSMITTED as checked below:

☐ For approval
☐ For your use
☐ As requested
☐ For review and comment
☐ Approved as submitted
☐ Approved as noted
☐ Returned for corrections
☐ Resubmit ___ copies for approval
☐ Submit ___ copies for distribution
☐ Return ___ corrected prints

REMARKS:

Enclosed is the Ground Water Sampling Report for the above referenced site. Please feel free to call me if you have any questions.

Thanks,

COPY TO: _____

SIGNED: **Katie Layfield**

If enclosures are not as noted, kindly notify us at once.

Ground Water Assessment Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680



June 17, 2015
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide Established in 1965
Employee-Owned terracon.com
Terracon
Geotechnical Environmental Construction Materials Facilities

Terracon

June 17, 2015

Ms. Sonya Utz
South Carolina Department of Health
and Environmental Control
Bureau of Land and Waste Management
UST Program
2600 Bull Street
Columbia, South Carolina 29201

Re: ***Ground Water Assessment Report***
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 49429
Terracon Project No. 73078012

Dear Ms. Utz:

On behalf of Crown Central LLC., **Terracon Consultants, Inc.** is pleased to submit this Ground Water Assessment Report for Former SC-015 facility located at 3800 Devine Street, in Columbia, South Carolina. This report summarizes the ground water sampling activities and our findings, conclusions, and recommendations.

If you have any questions regarding the contents of this report, or if you need additional information, please contact us at (803) 741-9000.

Sincerely,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

Katie H. Layfield
Project Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

P. MICHAEL HUDGINS REGISTERED NO. 1137 SOUTH CAROLINA PROFESSIONAL GEOLOGIST

Attachment
cc: Annie Smith-Jones/ Crown Central, LLC-email only

TABLE OF CONTENTS

Ground Water Assessment Report
Former SC-015
3800 Devine Street
Columbia, South Carolina

UST Permit # 07680

SECTION	PAGE NO.
Cover Letter	i
1.0 INTRODUCTION	1
2.0 GROUND WATER SAMPLING	3
3.0 ASSESSMENT RESULTS	5
4.0 CONCLUSIONS AND RECOMMENDATIONS	5

FIGURES

1	Site Location Map
2	Site Map
4	Shallow COC Concentration Map
4A	Intermediate/Deep COC Concentration Map
5	Shallow Potentiometric Surface Map
5A	Intermediate Potentiometric Surface Map
5B	Deep Potentiometric Surface Map

TABLES

2	Ground Water Elevation Data
3	Ground Water Analytical Data, Petroleum Compounds
3A	Ground Water Analytical Data, Gasoline Additives

APPENDICES

B	Ground Water Sampling Logs and Laboratory Analytical Report
G	Disposal Manifest
K	SCDHEC QAPP Contractors Checklist

Note: *Figure 3, Table 1, and select Appendices were omitted intentionally to adhere to the reporting format as required by the QAPP.*

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed a Ground Water Assessment at the former SC-015 facility located in Columbia, South Carolina. The purpose of this assessment was to determine the current ground water quality conditions from a reported underground storage tank (UST) release at the site. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #49429 dated March 04, 2015, and the SCDHEC Programmatic Quality Assurance Project Plan (QAPP) and QAPP Appendix B document approved by SCDHEC on June 11, 2013. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description and History

Site Use

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

Facility History

Assessments by Terracon and others have been performed to define the plume and remove free product. The salient points of these assessments are summarized below:

- hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- free product has previously been identified in monitoring wells MW-5 and MW-6;

- ground water was encountered at a depth of approximately 12 to 15 feet below land

surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from be 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- the nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek.

- Based on the previous assessment results, a total of nine AFVR events were performed in April 2010, February - August 2012, November – December 2012, and December 2013 – January 2014 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 620 pounds of pounds of volatile organic compounds (VOCs) have been removed from the subsurface**.**

In March 2015, SCDHEC issued a directive for a comprehensive ground water sampling event. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

1.2 Regional Geology and Hydrogeology

The site is located within the Upper Coastal Plain physiographic province near the Fall Line. The Upper Coastal Plain province consists of sediments deposited in fluvial (river), estuarine (tidal), and near-shore (marine) depositional environments. The Upper Coastal Plain sediments, which were deposited over Piedmont basement rocks, consist of quartz sand, interlayered with varying amounts of kaolinitic clay.

Ground water within the shallow sediments of the Upper Coastal Plain and Piedmont provinces typically occurs under water table (unconfined) and semi-confined conditions. Ground water flow directions are a subtle reflection of the local topography. Local recharge of the shallow aquifer occurs by the direct infiltration by precipitation. The ground water discharges into streams and rivers.

1.3 Site Geology and Hydrogeology

Based on the geologist's logs of monitoring wells installed at the site, the site is underlain by sands and silty/clayey sands approximately 10 to 19 feet thick, overlying very fine-grained materials including sandy silts, silts, and clays. This silt/clay unit is of variable thickness, ranging from 6 to more than 25 feet across the site. Based upon the lithology data collected from monitoring wells, this silt/clay unit is underlain by a sand layer of unknown thickness and extent.

Groundwater occurs both as the surficial perched water layer on the upper silt/clay unit and as the intermediate semiconfined layer below the perched layer. The depth to groundwater in the surficial perched layer as measured in monitoring wells ranged from approximately 10.0 feet to 16.0 feet below ground surface (bgs). The potentiometric surface of the perched layer indicates ground water flows to the northwest and south in this layer (Figure 5).

The depth to ground water in the intermediate semiconfined layer of the shallow aquifer as measured in monitoring wells ranged from approximately 26.0 feet to 34.0 feet bgs. The potentiometric surface of the intermediate layer indicates ground water flows to the northeast (Figure 5A). The water level in the well DW-1 (32.33 feet bgs) was recorded to be approximately 18.0 feet lower than in companion shallow well MW-5R (14.36 feet bgs), indicating a downward vertical hydraulic gradient exists between the surficial perched layer and the intermediate semiconfined layer of the shallow aquifer.

The depth to ground water in the deep layer of the shallow aquifer as measured in monitoring wells ranged from approximately 38.0 feet to 43.2 feet bgs. The potentiometric surface of the deep layer of the shallow aquifer indicates ground water flows to the northeast (Figure 5B).

2.0 GROUND WATER SAMPLING

Water level measurements from site monitoring wells were collected on April 7, 2015, and ground water samples were collected from site monitoring wells on April 7-9, 2015. Water levels were measured using an electric water level indicator. A summary of the water level data is presented on Table 2.

Ground water samples were collected from 20 of the 34 monitoring wells (the 14 monitoring wells not sampled were either destroyed, dry or had insufficient water for sampling). The monitoring wells were purged prior to sampling, and grab samples were collected from them using disposable polyethylene bailers dedicated to each well. Purge water generated during sampling was disposed of by Regulatory Solutions, Inc., Gaston, South Carolina. A copy of the disposal manifest is included in Appendix G.

Dissolved oxygen, specific conductance, pH, turbidity and temperature measurements were measured with calibrated field meters during purging and recorded on Ground Water Sampling Logs, included in Appendix B. Copies of the equipment calibration sheets are included with Appendix B. The samples were placed in iced coolers and delivered along with chain of custody documentation to Xenco Laboratories, Inc. in Irmo, South Carolina for analysis. The samples were analyzed for the following analytes:

Analysis	Method
Benzene, Toluene, Ethylbenzene, Xylenes (BTEX) Methyl-tert-butyl-ether (MTBE) Naphthalene 1,2 Dichloroethane (1,2 DCA) 8 Oxygenates	EPA Method 8260B
1,2 –Dibromoethane (EDB)	EPA Method 8011

Field duplicates were taken from monitoring wells MW-7R, and MW-21. On April 7, 8 and 9, 2015, field blanks were collected, one each day, using deionized water to fill the laboratory provided sample containers. The trip blanks were provided by Access Analytical Inc. with the sample coolers. The QA/QC blanks were analyzed for VOCs.

Ground water analytical results are included in Table 3. Copies of the laboratory analytical reports and chain-of-custody forms are included in Appendix B.

No discrepancies were noted in the trip blank QA/QC sample analyzed for this assessment.

3.0 ASSESSMENT RESULTS

Ground water occurs within the surficial perched layer under unconfined conditions, and in the intermediate semiconfined layer of the shallow aquifer under semiconfined conditions. The depth to ground water in the study area ranges from approximately 9.8 feet bgs in the perched layer to 43.15 feet bgs in the deep layer of the shallow aquifer. None of the site monitoring wells were measured to have product in any of the wells gauged.

A review of Table 3 indicates that ground water samples were collected from twenty monitoring wells. From the surficial perched layer, four of the wells sampled (MW-1R, MW-5R, and MW-21) contained more than one Chemical of Concern (COC) above Risk Based Screening Levels (RBSLs) or Action Levels (ALs). The remaining seven surficial perched wells (MW-7R, MW-8, MW-9R, MW-12R, MW-13, MW-16, and MW-18) contained COCs below RBSLs and ALs. A shallow COC concentration map is included as Figure 4. Review of Figure 4 indicates the dissolved hydrocarbon plume in the perched portion of the shallow aquifer extends approximately 130 feet to the south, sourced from the former UST dispenser area. The contaminant plume does not appear to migrate off-site.

No wells sampled from the intermediate semiconfined layer of the shallow aquifer, contained COC above RBSLs or ALs.

From the deep layer of the shallow aquifer, the four deep monitoring wells (5D, 5DD, 12D and 18D) all contained COCs below detection limits. The results of the intermediate and deep well sampling are shown on Figure 4A.

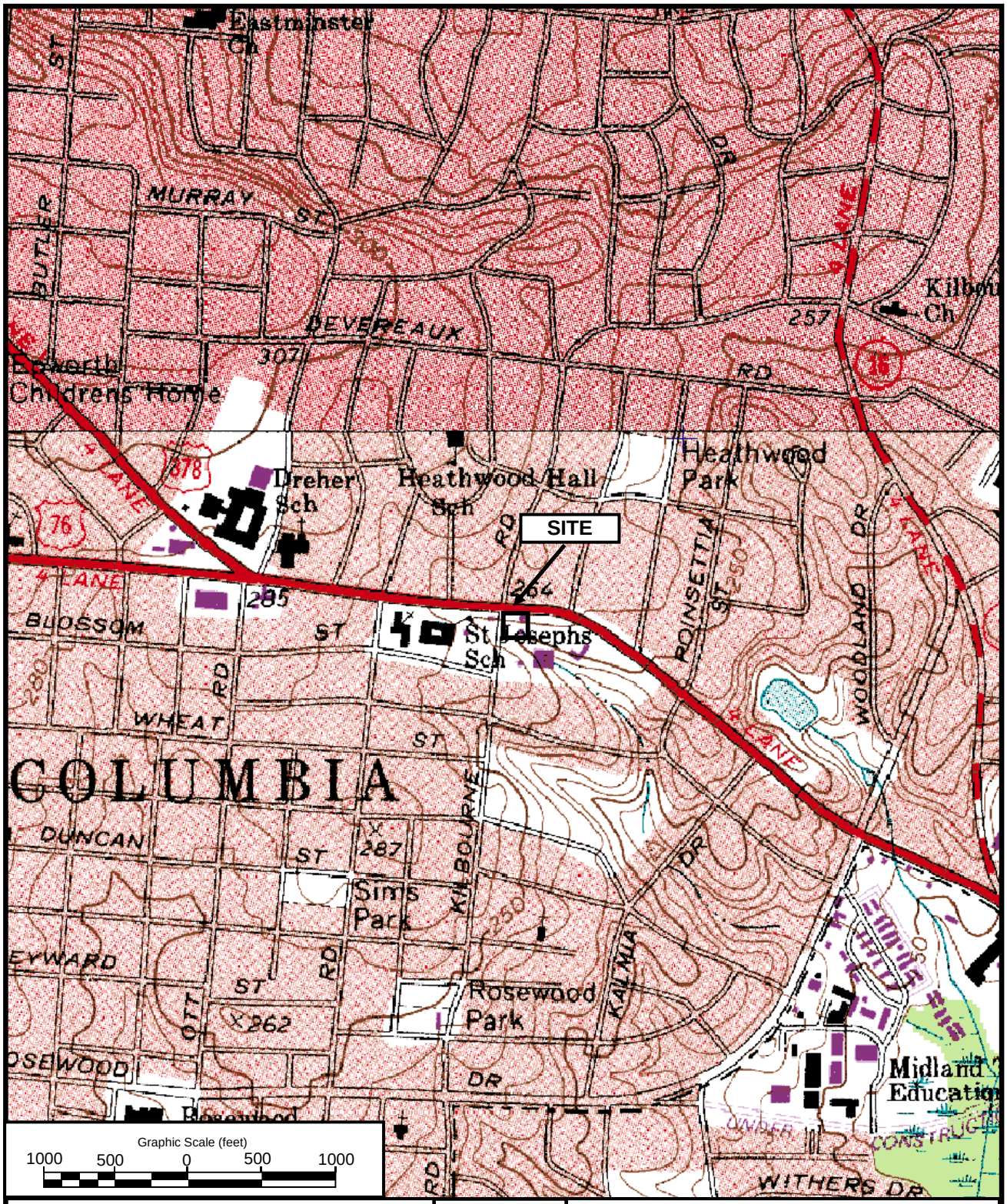
4.0 CONCLUSIONS AND RECOMMENDATIONS

Based upon the results of our site assessment activities, the ground water beneath the site has been impacted by dissolved-phase hydrocarbons at concentrations above allowable levels.
The horizontal and vertical extent of the contaminants in the upper, intermediate, and lower portions of the shallow aquifer downgradient from the UST system has been defined by the monitoring well network. Inspection of the historical ground water quality data indicates the contaminants in ground water are being reduced by natural attenuation processes. Based on the date of reported release, the contaminant plume movement in the shallow aquifer is effectively impeded by degradation of the contaminants through physical, biological, and chemical degradation processes.

AFVR has been an effective remediation mechanism at this site. Terracon recommends quarterly AFVR events on monitoring wells MW-5R and MW-21, where there are high dissolved –phase hydrocarbons. Comprehensive semiannual sampling is recommended at this site. Upon confirmation of removal of the bulk of the hydrocarbon mass, this site may be a candidate for monitored natural attenuation.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map
Figure 4 – Shallow COC Concentration Map
Figure 4A – Intermediate/Deep COC Concentration Map
Figure 5 – Shallow Potentiometric Surface Map
Figure 5A – Intermediate Potentiometric Surface Map
Figure 5B – Deep Potentiometric Surface Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

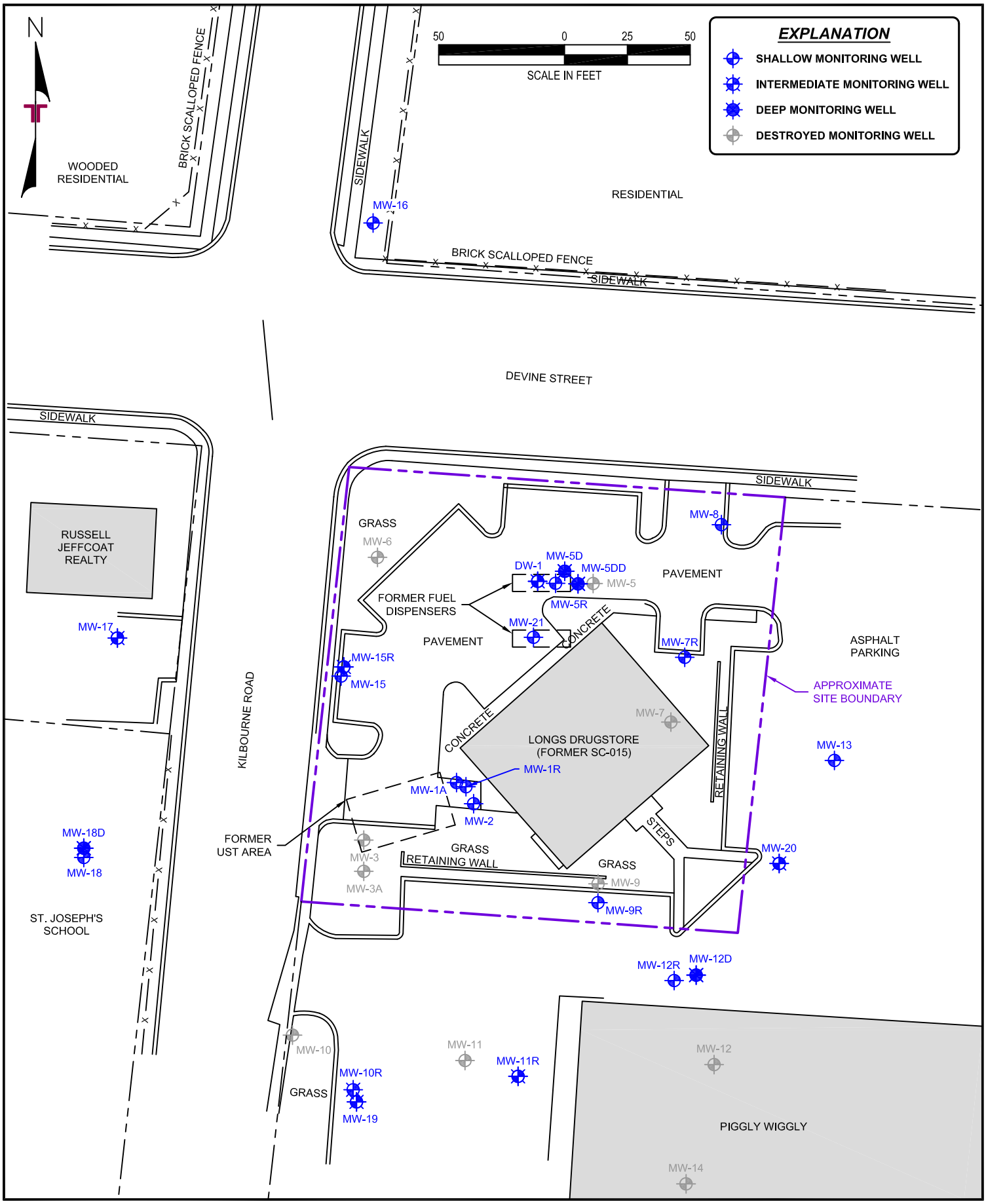
DATE: 1982
SCALE: 1 INCH = 1000 FEET

PROJECT NO. 73078012

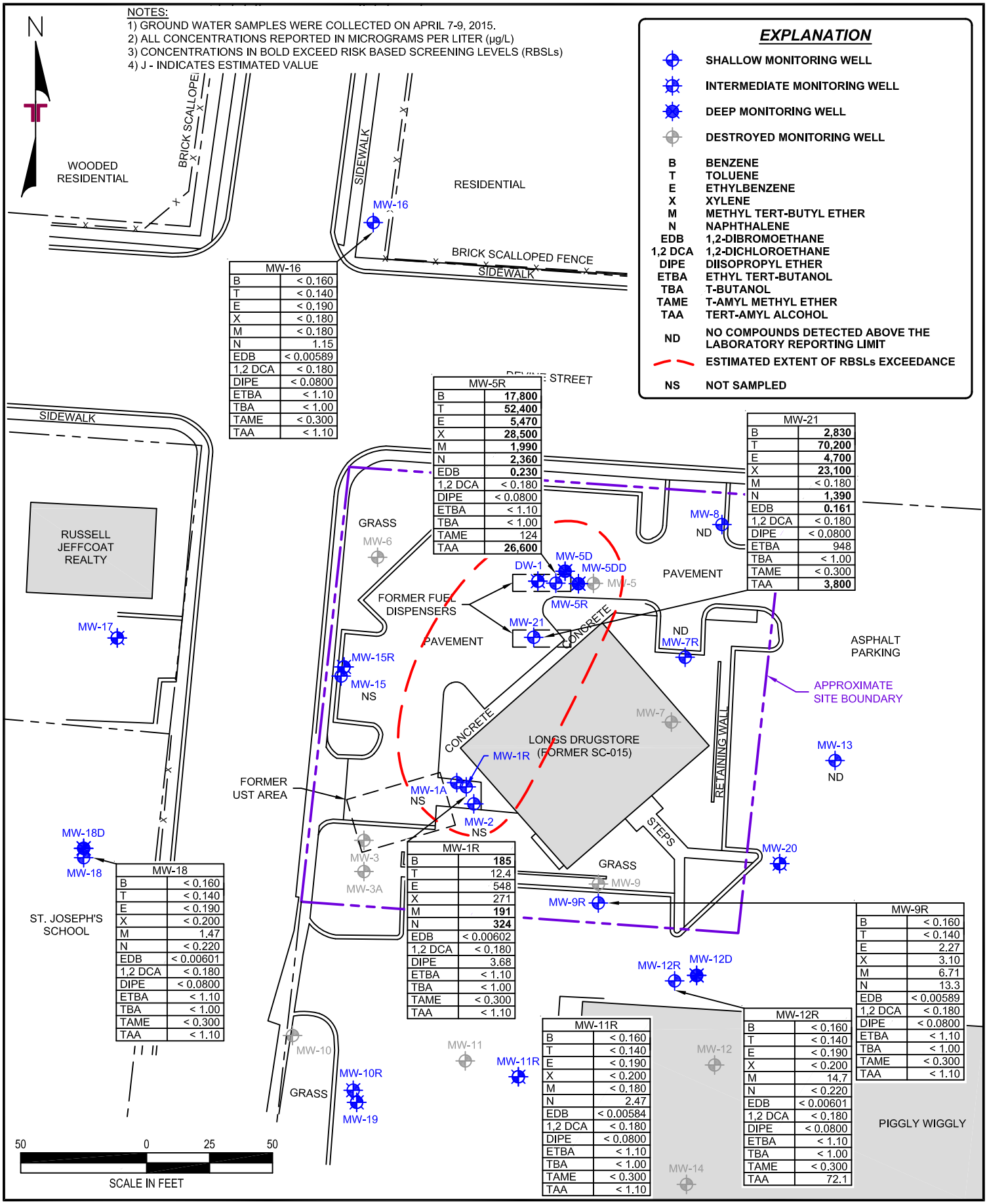
Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



Project Mngr: RWN	Project No. 73078012A	Terracon Consulting Engineers and Scientists	SITE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012A	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 2
Approved By: PMH	Date: JUNE 2015		



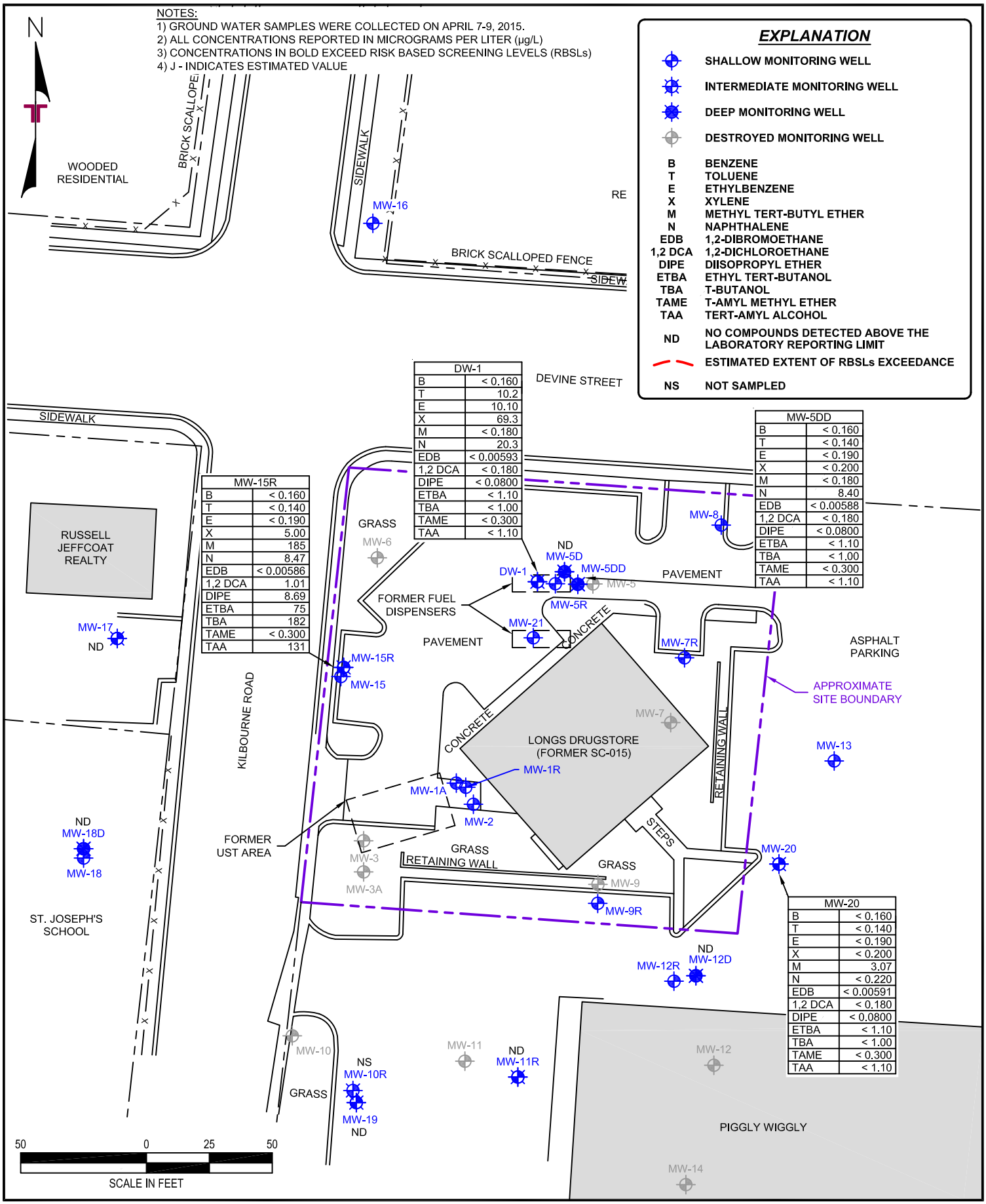
Project Mngr:	RWN
Drawn By:	PTK
Checked By:	RWN
Approved By:	PMH
Project No.	73078012A
Scale:	AS SHOWN
File No.	73078012A
Date:	JUNE 2015

Terracon
Consulting Engineers and Scientists
521 CLEMSON ROAD COLUMBIA, SC 29229
PH. (803) 741-9000 FAX. (803) 741-9900

SHALLOW COC CONCENTRATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT #07680

Fig No. 4



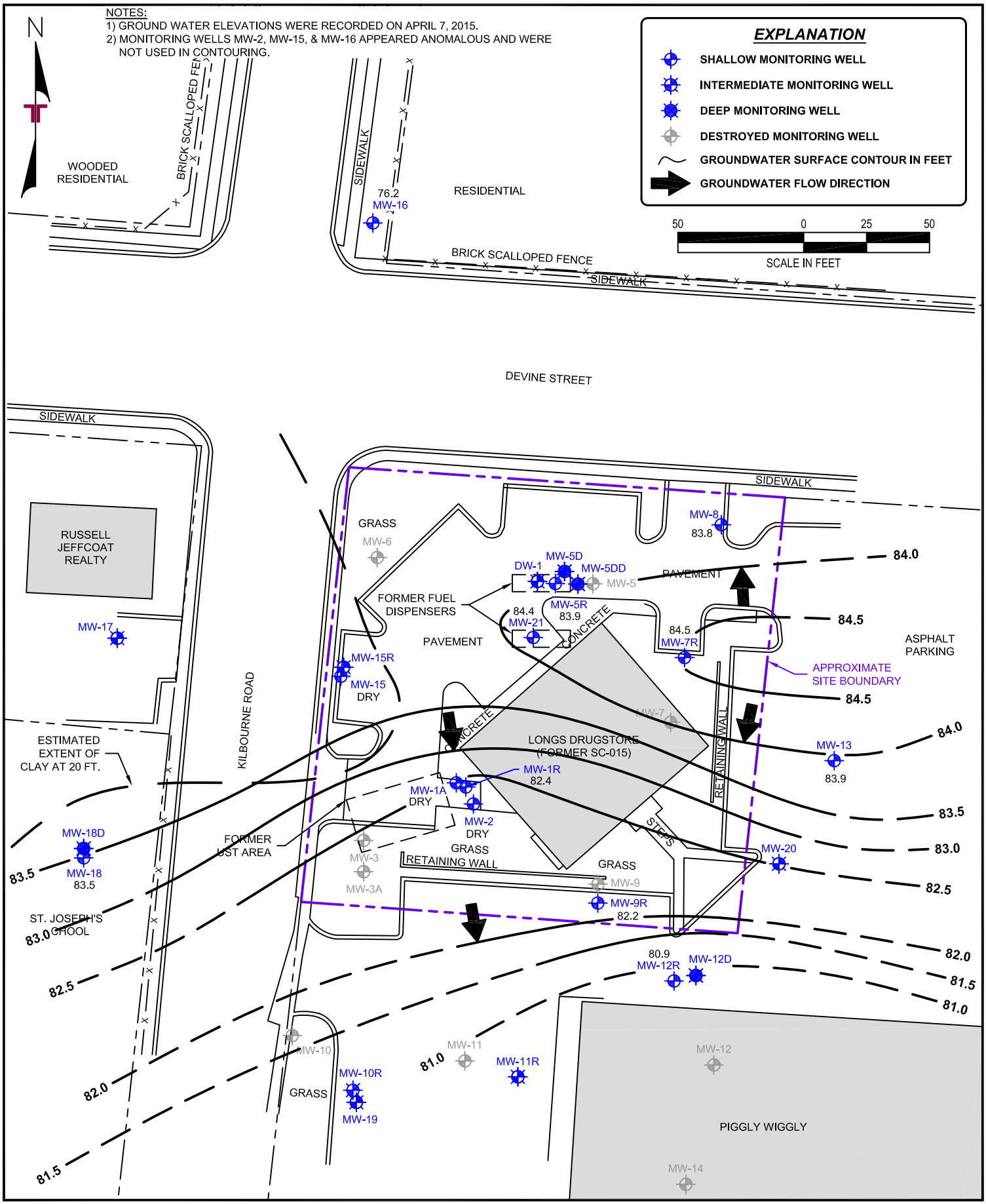
Project Mngr:	RWN
Drawn By:	PTK
Checked By:	RWN
Approved By:	PMH
Project No.	73078012A
Scale:	AS SHOWN
File No.	73078012A
Date:	JUNE 2015

Terracon
Consulting Engineers and Scientists
521 CLEMSON ROAD COLUMBIA, SC 29229
PH. (803) 741-9000 FAX. (803) 741-9900

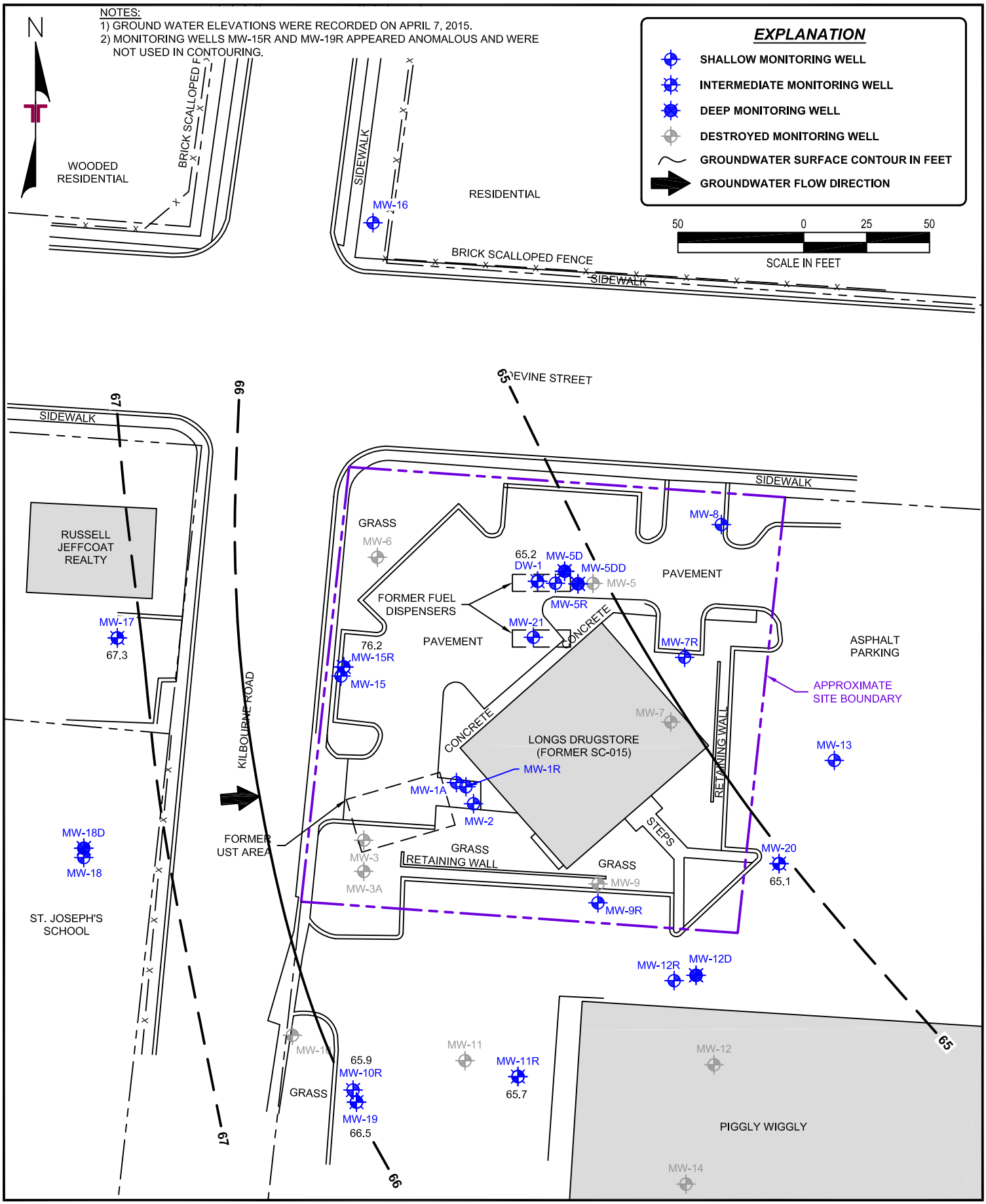
INTERMEDIATE / DEEP COC CONCENTRATION MAP

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT #07680

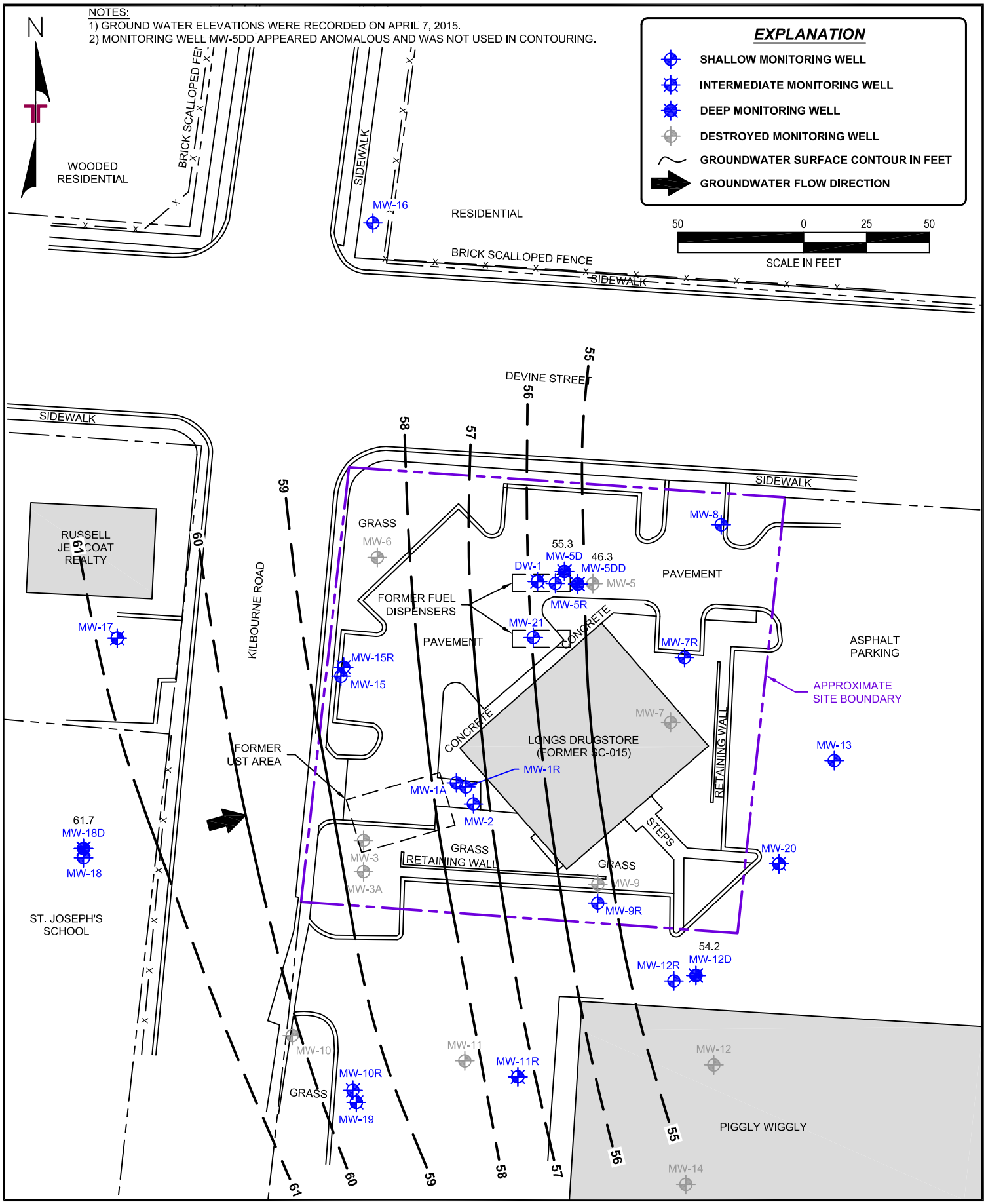
Fig No.
4A



Project Mngr: RWN	Project No. 73078012A	Terracon Consulting Engineers and Scientists	SHALLOW POTENTIOMETRIC SURFACE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012A	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 5
Approved By: PMH	Date: JUNE 2015		



Project Mngr: RWN	Project No. 73078012A	Terracon Consulting Engineers and Scientists 521 CLEMSON ROAD COLUMBIA, SC 29229 PH. (803) 741-9000 FAX. (803) 741-9900	INTERMEDIATE POTENTIOMETRIC SURFACE MAP FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Drawn By: PTK	Scale: AS SHOWN		Fig No. 5A
Checked By: RWN	File No. 73078012A		
Approved By: PMH	Date: JUNE 2015		



Project Mngr: RWN	Project No. 73078012A	Terracon Consulting Engineers and Scientists	DEEP POTENTIOMETRIC SURFACE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012A	PH. (803) 741-9000 FAX. (803) 741-9900	Fig No. 5B
Approved By: PMH	Date: JUNE 2015		

TABLES

Table 2 – Ground Water Elevation Data
Table 3 – Ground Water Analytical Data, Petroleum Compounds
Table 3A – Ground Water Analytical Data – Gasoline Additives

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-1A	10/8/93	35-45	249.98	33.42	ND	216.56
	1/14/97			34.40	ND	215.58
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	DRY
	6/3/08		98.41	DRY		
	7/22/13			DRY		
	4/7/15			DRY		
MW-1R	1/8/09	13 - 28	98.35	15.19	ND	83.16
	7/22/13			14.28	ND	84.07
	4/7/15			15.96	ND	82.39
MW-2	7/16/93	3-18	261.98	DRY	ND	ND
	1/14/97			15.90	ND	246.08
	9/19/03			DRY	ND	ND
	12/3/07			DRY	ND	ND
	6/3/08		98.45	DRY	ND	DRY
	7/22/13			29.67	ND	68.78
	4/7/15			DRY		
MW-3	10/8/93	3-18	248.72	15.94	ND	232.78
	1/14/97			16.09	ND	232.63
	9/19/03			DESTROYED		
MW-3A	10/8/93	35-45	248.63	31.77	ND	216.86
	1/14/97			32.80	ND	215.83
	9/19/03			NR	ND	ND
	12/3/07			DESTROYED		
MW-5	10/8/93	15-25	250.52	20.18	1.31	230.34
	1/14/97			DRY	ND	ND
	9/19/03			DESTROYED		
MW-5R	5/14/08	5-20	98.29	15.19	ND	83.1
	1/20/09			14.71	ND	83.58
	7/22/13			12.67	ND	85.62
	4/7/15			14.36	ND	83.93

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-5D	1/23/09	80-85	98.49	49.32	ND	49.17
	7/22/13			47.90	ND	50.59
	4/7/15			43.15	ND	55.34
MW-5DD	3/23/09	112 - 117	98.83	54.16	ND	44.67
	7/22/13			54.57	ND	44.26
	4/7/15			52.52	ND	46.31
MW-6	10/8/93	12.5-22.5	250.83	19.56	ND	231.27
	1/14/97			20.34	0.04	230.49
	9/19/03			DESTROYED		
MW-7	10/8/93	15.7-25.7	250.18	19.80	ND	230.38
	1/14/97			20.52	ND	229.66
	9/19/03			DESTROYED		
MW-7R	5/14/08	10-25	98.85	15.46	ND	83.39
	1/20/09			14.95	ND	83.90
	7/22/13			12.25	ND	86.60
	4/7/15			14.40	ND	84.45
MW-8	10/8/93	15-25	250.55	19.23	ND	231.32
	1/14/97			20.53	ND	230.02
	9/19/03			14.81	ND	235.74
	12/3/07			14.44	ND	236.11
	5/15/08		99.48	16.21	ND	83.27
	1/20/09			15.97	ND	83.51
	7/22/13			13.28	ND	86.20
	4/7/15			15.71	ND	83.77
MW-9	10/8/93	10-20	244.41	14.60	ND	229.81
	1/14/97			15.49	ND	228.92
	9/19/03			DRY	ND	ND
	12/3/07			NOT LOCATED		
MW-9R	5/14/08	5-20	93.32	12.79	ND	80.53
	1/20/09			12.18	ND	81.14
	7/22/13			9.90	ND	83.42
	4/7/15			11.13	ND	82.19

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-10	10/8/93	12.5-22.5	247.94	18.80	ND	229.14
	1/14/97			18.66	ND	229.28
	9/19/03			DESTROYED		
MW-10R	5/14/08	15-30	95.71	DRY		
	7/22/13			29.99	ND	65.72
	4/7/15			29.85	ND	65.86
MW-11	10/8/93	5.8-15.8	247.57	14.65	ND	232.92
	1/14/97			14.60	ND	232.97
	9/19/03			DESTROYED		
MW-11R	5/14/08	15-30	92.26	29.28	ND	62.98
	1/20/09			28.76	ND	63.50
	7/22/13			28.80	ND	63.46
	4/7/15			26.53	ND	65.73
MW-12	10/8/93	8.2-18.2	240.78	14.65	ND	226.13
	1/14/97			15.30	ND	225.48
	9/19/03			DESTROYED		
MW-12R	5/14/08	5-20	92.43	14.34	ND	78.09
	1/20/09			13.95	ND	78.48
	7/22/13			10.62	ND	81.81
	4/7/15			11.55	ND	80.88
MW-12D	1/23/09	60-75	92.51	41.25	ND	51.26
	7/22/13			40.84	ND	51.67
	4/7/15			38.30	ND	54.21
MW-13	10/8/93	6.5-16.5	243.12	13.73	ND	229.39
	1/14/07			14.51	ND	228.61
	9/19/03			10.85	ND	232.27
	12/3/07			10.91	ND	232.21
	6/3/08		94.26	13.70	ND	80.56
	1/20/09			14.60	ND	79.66
	7/22/13			9.81	ND	84.45
	4/7/15			10.40	ND	83.86

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-14	10/8/93	8-18	241.51	13.98	ND	227.53
	1/14/97			14.10	ND	227.41
	9/19/03			DESTROYED		
MW-15	1/14/97	20-35	249.43	DRY		
	9/19/03			33.86	ND	215.57
	12/3/07			34.09	ND	215.34
	5/15/08		99.70	DRY		
	7/22/13			34.18	ND	65.52
	4/7/15			33.85	ND	65.85
MW-15R	1/20/09	24.2-39.2	100.47	35.52	ND	64.95
	7/22/13			DRY		
	4/7/15			24.23	ND	76.24
MW-16	1/14/97	20-35	251.74	27.45	ND	224.29
	9/19/03			26.56	ND	225.18
	12/3/07			27.89	ND	223.85
	5/15/08		102.85	26.96	ND	75.89
	1/20/09			26.76	ND	76.09
	7/22/13			26.68	ND	76.17
	4/7/15			26.65	ND	76.20
MW-17	5/14/08	25.5-39.5	100.84	36.70	ND	64.14
	1/20/09			36.02	ND	64.82
	7/22/13			36.04	ND	64.80
	4/7/15			33.58	ND	67.26
MW-18	1/20/09	15-30	103.46	22.21	ND	81.25
	7/22/13			19.69	ND	83.77
	4/7/15			20.00	ND	83.46
MW-18D	1/23/09	57-62	103.28	49.20	ND	54.08
	7/22/13			44.64	ND	58.64
	4/7/15			41.60	ND	61.68
MW-19	1/20/09	19.6-34.6	95.74	31.30	ND	64.44
	7/22/13			31.47	ND	64.27
	4/7/15			29.27	ND	66.47

TABLE 2
GROUND WATER ELEVATION DATA

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	DATE MEASURED	SCREEN INTERVAL (bgs)	TOP OF CASING ELEVATION*	DEPTH TO GROUND WATER (btoc)	PRODUCT THICKNESS	GROUND WATER ELEVATION
MW-20	1/20/09	18.7-33.7	92.93	29.94	ND	62.99
	7/22/13			29.97	ND	62.96
	4/7/15			27.88	ND	65.05
MW-21	4/16/09	5-20	98.89	15.42	ND	83.47
	7/22/13			12.86	ND	86.03
	4/7/15			14.53	ND	84.36
DW-1	5/15/08	35-40	98.48	35.31	ND	63.17
	1/20/09			34.84	ND	63.64
	7/11/11		97.48	NR	NR	NR
	7/22/13			34.65	ND	62.83
	4/7/15			32.33	ND	65.15

NOTES:

1) bgs = below ground surface
2) btoc = below top of casing
3) ND = not detected
4) NR = not recorded. Water levels had not stabilized during sampling (rising in well)
5) * = Top-of-casing elevations were altered during site redevelopment. A new survey was conducted in 2008 by Jay Joshi, PLS #14811, as part of the additional assessment event.

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-1A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	2	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
	7/22/13	DRY							
	4/7/15	DRY							
MW-1R	1/20/09	**388**	113	310	786	**546**	**89.3**	< 0.00350	< 0.0027
	7/22/13	**13.1**	1.56 J	207	263	16.1	**132**	< 0.0039	NA
	4/7/15	**185**	12.4	548	271	**191**	**324**	< 0.00602	NA
MW-2	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DRY							
	12/3/07	DRY							
	6/3/08	DRY							
	7/22/13	NOT SAMPLED*							
	4/7/15	DRY							
MW-3	7/16/93	5	13	1	5	< 1.00	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-3A	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA	NA
	1/14/97	< 1.0	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	DESTROYED							
MW-5	7/26/93	**19,000**	**86,000**	**3,500**	**22,000**	**4,000**	**6,000**	NA	NA
	9/19/03	DESTROYED							
MW-5R	5/15/08	**28,600**	**64,500**	**3,620**	**17,300**	**4,520**	< 2,500	**4.84**	< 0.015
	1/20/09	**27,300**	**55,100**	**3,100**	**14,100**	**4,540**	**1,310 J**	**0.741**	**0.019**
	7/23/13	**16,600**	**50,000**	**4,320**	**21,900**	**2,410**	**1,430 J**	**0.416**	NA
	4/9/15	**17,800**	**52,400**	**5,470**	**28,500**	**1,990**	**2,360**	**0.230**	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-5D	1/12/09	**51.9**	346	65.2	331	< 0.385	**28.5**	NA	NA
	1/24/09	**124**	624	88.8	333	12.1	**33.5 J**	< 0.0035	0.42
	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00577	NA
MW-5DD	3/23/09	1.85	11.1	3.98	18.0	< 0.077	7.24	< 0.0035	< 0.003
	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	8.40	< 0.00588	NA
MW-6	7/26/93	**9,600**	**2,200**	**1,900**	9,300	< 1.00	NA	NA	NA
	9/19/03	DESTROYED							
MW-7	7/16/93	**19,000**	**86,000**	3,500	2,200	**4,000**	NA	NA	NA
	1/14/97	**7,000**	**8,900**	**1,700**	3,200	**4,300**	**150**	NA	NA
	9/19/03	DESTROYED							
MW-7R	5/14/08	**37.1**	355	68.1	91.8	< 5.00	**29.7**	< 0.010	**0.023**
	1/20/09	2.33	78.5	126	106	< 0.077	15.7	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00583	NA
MW-7R DUP	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00578	NA
MW-8	7/16/93	**130**	**1,100**	73	730	< 5.00	NA	NA	NA
	1/14/97	**40**	1.70	1.60	32	< 1.00	31	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.44 J	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00598	NA
MW-9	7/16/93	< 10	< 10	< 10	< 10	**10,000**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	**3,800**	**500**	NA	NA
	12/3/07	WELL NOT LOCATED							

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-9R	5/14/08	**34.9**	11.9	126	249	34.1	**175**	< 0.010	< 0.015
	1/20/09	4.36	< 0.076	16.6	< 0.183	11.7	8.86	< 0.003	< 0.003
	7/22/13	**21.8**	2.82	114	25.4	19.7	**92.2**	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	2.27	3.10	6.71	13.3	< 0.00589	NA
MW-10	7/16/93	< 1.00	< 1.00	< 1.00	< 1.00	**970**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	32	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-10R	6/3/08	DRY							
	1/20/09	DRY							
	7/22/13	NOT SAMPLED*							
	4/7/15	NOT SAMPLED*							
MW-11	7/16/93	3	< 1.00	< 1.00	< 1.00	**56**	NA	NA	NA
	1/14/97	**13**	< 1.00	< 1.00	< 1.00	**190**	**500**	NA	NA
	9/19/03	DESTROYED							
MW-11R	5/15/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.50 J	< 0.003	0.0086 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	2.47	< 0.00584	NA
MW-12	7/26/93	**1,200**	29	150	110	**1,000**	NA	NA	NA
	1/14/97	4.90	< 1.00	1.20	< 1.00	**74**	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-12R	5/14/08	**74.4**	2.46	52.3	25.2	**145**	**138**	< 0.010	**34**
	1/20/09	3.02	< 0.076	< 0.065	< 0.183	**64.1**	< 0.118	< 0.003	< 0.003
	7/22/13	2.27	< 0.122	< 0.109	< 0.179	13.3	< 0.176	< 0.0039	NA
	4/9/15	< 0.160	< 0.140	< 0.190	< 0.200	14.7	< 0.220	< 0.00601	NA
MW-12D	1/7/09	< 0.065	< 0.076	< 0.065	5.62	**52.9**	< 0.118	NA	NA
	1/23/09	< 0.065	1.17	< 0.065	2.29J	< 0.077	2.36 J	< 0.0035	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/9/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00607	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-13	7/26/93	< 1.00	4.00	< 1.00	5.00	< 1.00	NA	NA	NA
	1/14/97	**18**	< 1.00	< 1.00	< 1.00	28	1.20	NA	NA
	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	NA	NA
	12/3/07	1.33	< 1.00	< 1.00	< 3.00	5.99	< 5.00	NA	NA
	6/3/08	< 1.00	< 1.00	< 1.00	< 3.00	< 1.00	< 5.00	< 0.010	**0.037**
	1/20/09	DRY							
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00596	NA
MW-14	10/1/93	< 1.00	< 1.00	< 1.00	< 1.00	**270**	NA	NA	NA
	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	14	< 1.00	NA	NA
	9/19/03	DESTROYED							
MW-15	9/19/03	< 1.00	< 1.00	< 1.00	< 3.00	**300**	< 5.00	NA	NA
	12/3/07	< 1.00	< 1.00	< 1.00	< 3.00	**160**	< 5.00	NA	NA
	5/15/08	DRY							
	7/22/13	NOT SAMPLED*							
	4/7/15	NOT SAMPLED*							
MW-15R	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	**185**	2.59 J	< 0.003	**0.075**
	7/22/13	DRY							
	4/9/15	< 0.160	< 0.140	< 0.190	5.00	**185**	8.47	< 0.00586	NA
MW-16	1/14/97	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	NA
	9/19/03	2.60	< 1.00	< 1.00	< 3.00	5.66	< 5.00	NA	NA
	12/3/07	**58.5**	< 1.00	< 1.00	4.06	29.5	5.23	NA	NA
	5/15/08	< 1.00	< 1.00	< 1.00	< 1.00	1.75	< 1.00	NA	< 0.015
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	1.11	< 0.118	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.6	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.180	< 0.180	1.15	< 0.00589	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
MW-17	5/14/08	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	< 1.00	NA	< 15
	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.550 J	< 0.118	< 0.003	< 0.003
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00586	NA
MW-18	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	4.68	< 0.118	< 0.003	0.0074 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.24	< 0.176	< 0.0039	NA
	4/9/15	< 0.160	< 0.140	< 0.190	< 0.200	1.47	< 0.220	< 0.00601	NA
MW-18 DUP	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.31	< 0.176	< 0.0039	NA
MW-18D	1/23/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	2.47 J	< 0.035	0.0088 B
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/9/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00602	NA
MW-19	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	< 0.077	< 0.118	< 0.003	0.034
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	2.33	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00592	NA
MW-20	1/20/09	< 0.065	< 0.076	< 0.065	< 0.183	0.853 J	< 0.118	< 0.003	0.069
	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	1.07	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	3.07	< 0.220	< 0.00591	NA
MW-21	1/23/09	**23,300**	**62,900**	**4,780**	**21,600**	**2,370**	**1,650 J**	**0.405**	0.018
	7/23/13	**12,400**	**46,300**	**4,690**	**21,500**	**160 J**	**1,110 J**	**0.068**	NA
	4/7/15	**2,830**	**70,200**	**4,700**	**23,100**	< 0.180	**1,390**	**0.161**	NA
MW-21 DUP	7/23/13	**10,800**	**45,000**	**4,980**	**23,900**	**142 J**	**1,320**	**0.065**	NA
	4/7/15	**2,480**	**78,600**	**4,640**	**22,600**	< 0.180	**1,240**	**0.0957**	NA
DW-1	5/15/08	**17.1**	96.6	19.2	104	3.53	**43.8**	< 0.010	< 0.015
	1/20/09	**5.80**	< 0.076	3.68	12.5	< 0.077	7.22	< 0.003	**0.036**
	8/9/13	1.97	<0.122	<0.109	0.999J	<0.078	1.03J	<0.0039	NA
	4/8/15	< 0.160	10.2	10.10	69.3	< 0.180	20.3	< 0.00593	NA
DW-1 DUP	8/9/13	1.77	<0.122	0.627J	1.08J	<0.078	0.934J	<0.0039	NA

TABLE 3
GROUND WATER ANALYTICAL DATA
Petroleum Compounds

Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit No. 07680

WELL NUMBER	SAMPLE DATE	BENZENE (µg/L)	TOLUENE (µg/L)	ETHYL-BENZENE (µg/L)	XYLENES (µg/L)	MTBE (µg/L)	NAPHTH-ALENE (µg/L)	EDB (µg/L)	LEAD (mg/l)
RBSLs		*5*	*1,000*	*700*	*10,000*	*40*	*25*	*0.05*	*0.015*
Field Blank	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	7/23/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	8/9/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	< 0.0039	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00582	NA
	4/8/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00574	NA
	4/9/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	< 0.00599	NA
Trip Blank	7/22/13	< 0.111	< 0.122	< 0.109	< 0.179	< 0.078	< 0.176	NA	NA
	8/9/13	<0.111	<0.122	<0.109	<0.179	<0.078	<0.176	NA	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	NA	NA
	4/7/15	< 0.160	< 0.140	< 0.190	< 0.200	< 0.180	< 0.220	NA	NA

Notes:
1) Results shown in boldface type indicate concentrations which exceed the RBSL for that compound
2) µg/L - micrograms per liter or parts per billion
3) NA = Not Analyzed
4) RBSL- Risk-Based Screening Level as defined by the SCDHEC RBCA Document
5) NS = not sampled
6) < 1.00 = below detection levels
8) J - indicates an estimated value
7) B - indicates a result between the Reporting Detection Limit and the Method Detection Limit
8) * - insufficient water in well to allow representative water sample

TABLE 3A
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
MW-1A	5/14/08	DRY								
	7/22/13	DRY								
	4/7/15	DRY								
MW-1R	1/20/09	**12.9 J**	< 202	< 1.30	8.40 J	< 21.8	911	< 1.74	280	< 1.79
	7/22/13	< 0.232	< 250	< 0.468	< 0.472	< 75.2	< 0.580	< 0.480	< 2.03	< 0.974
	4/7/15	< 0.180	< 8.00	< 0.300	3.68	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-2	5/14/08	DRY								
	7/22/13	NOT SAMPLED*								
	4/7/15	DRY								
MW-5R	5/15/08	< 2,500	< 10,000	< 500	< 500	< 1,000	**6,880**	< 500	**46,900**	< 1,000
	1/20/09	< 44.9	< 20,200	< 130	< 265	< 2,180	**6,230**	< 174	**39,500**	< 179
	7/23/13	**< 58.1**	**< 62,500**	**< 117**	< 118	< 18,800	< 145	< 120	**29,300**	< 243
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	124	**26,600**	< 1.00
MW-5D	1/24/09	< 0.89	< 403	< 2.59	< 5.29	< 43.6	< 4.12	< 3.48	< 15.6	<0.357
	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-5DD	3/23/09	< 0.89	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	<0.348	< 15.6	< 0.357
	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-7R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	125	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-7R DUP	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-8	5/15/08	< 5.00	< 20.0	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-9R	5/14/08	< 25.0	< 100	< 5.00	< 5.00	< 10.0	< 50.0	< 5.00	< 50.0	< 10.0
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	6.93 J	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	6.48 J	< 0.240	13.3 J	< 0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.0

TABLE 3A
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
MW-10R	5/14/08	DRY								
	7/22/13	NOT SAMPLED*								
	4/7/15	NOT SAMPLED*								
MW-11R	5/15/08	< 5.00	71.6	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-12R	5/14/08	< 5.00	59.2	< 1.00	< 1.00	< 2.00	89.6	5.28	141	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	27.0	< 0.348	47.8	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	21.6	< 0.487
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	72.1	< 1.00
MW-12D	1/23/09	< 0.09	< 403	< 2.59	< 5.29	< 43.6	< 41.2	< 3.48	< 156	< 3.57
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-13	6/3/08	< 5.00	49.4	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-15	5/15/08	DRY								
	7/22/13	NOT SAMPLED*								
	4/7/15	NOT SAMPLED*								
MW-15R	1/20/09	0.924 J	< 40.3	< 0.259	6.08	< 4.36	155	< 0.348	44.6	< 0.357
	7/22/13	DRY								
	4/9/15	1.01	< 8.00	< 0.300	8.69	75	182	< 0.300	131	< 1.00
MW-16	5/15/08	< 5.00	43.9	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-17	5/14/08	< 5.00	47.1	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	< 10.0	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/8/15	< 0.180	< 0.800	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00

TABLE 3A
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
MW-18	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-18 DUP	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
MW-18D	1/23/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-19	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-20	1/20/09	< 0.091	< 40.4	< 0.259	< 0.529	< 4.36	< 4.12	< 0.349	< 15.7	< 0.358
	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
MW-21	1/23/09	< 45	< 20200	< 130	<265	<2180	<2060	<174	<7800	<179
	7/23/13	**< 29.0**	**< 31,200**	**< 58.5**	< 59.0	< 9,400	< 72.5	< 60.0	**4,870 J**	< 122
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	948	< 1.00	< 0.300	**3,800**	< 1.00
MW-21 DUP	7/23/13	**< 29.0**	**< 31,200**	**< 58.5**	< 59.0	< 9,400	< 72.5	< 60.0	**4,430 J**	< 122
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.800	933	< 1.00	< 0.300	**3,690**	< 1.00
DW-1	5/15/08	< 5.00	45.7	< 1.00	< 1.00	< 2.00	< 10.0	< 1.00	35.5	< 2.00
	1/20/09	< 0.090	< 40.3	< 0.259	< 0.529	< 4.36	< 4.12	< 0.348	< 15.6	< 0.357
	8/9/13	<0.116	< 125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
DW-1 DUP	8/9/13	<0.116	< 125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487
Field Blank	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	7/23/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	< 0.290	< 0.240	< 1.01	< 0.487
	8/9/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	7.47 J	< 0.240	< 1.01	< 0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
	4/8/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
	4/9/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00

TABLE 3A
GROUND WATER ANALYTICAL DATA
Petroleum Additives (Oxygenates)

Former SC-015
3800 Devine Street, Columbia, SC
UST Permit # 07680
Terracon Project No. 73078012

WELL NUMBER	SAMPLE DATE	1,2-DCA (µg/L)	Ethanol (µg/L)	ETBE (µg/L)	DIPE (µg/L)	ETBA (µg/L)	TBA (µg/L)	TAME (µg/L)	TAA (µg/L)	TBF (µg/L)
ALs	-	*5*	*10,000*	*47*	*150*	*NE*	*1,400*	*128*	*240*	*NE*
Trip Blank	7/22/13	< 0.116	< 125	< 0.234	< 0.236	< 37.6	5.32 J	< 0.240	< 1.01	< 0.487
	8/9/13	**5.42**	<125	<0.234	<0.236	<37.6	<0.290	<0.240	<1.01	<0.487
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00
	4/7/15	< 0.180	< 8.00	< 0.300	< 0.0800	< 1.10	< 1.00	< 0.300	< 1.10	< 1.00

Notes:
1) Results shown in boldface type indicate concentrations which exceed the AL for that compound
2) µg/L - micrograms per liter or parts per billion
3) ALs- SCDHEC Action Levels
4) NE - Not Established
5) 1,2-DCA = 1,2-dichloroethane
6) 8 Oxygenates abbreviated as:
   - ETBE = ethyl tert-butyl ether
   - DIPE = diisopropyl ether
   - ETBA = ethyl tert-butanol
   - TBA = t-butanol
   - TAME = t-amyl methyl ether
   - TAA = tert-amyl alcohol
   - TBF = tert-butyl formate
7) * - insufficient water in well to allow representative water sample

APPENDIX B

Ground Water Sampling Logs and Laboratory Analytical Report

Terracon

Groundwater Sampling Log

Well ID:	MW-1R
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1200

Total Well Depth:	28 ft. BTOC
Depth to water:	15.96 ft. BTOC
Length of Water Column (LWC):	12.04 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	2.04 gal.
3 Casing Volumes:	6.14 gal.
Remarks:	Hi GH deg Prod. odor

Field Analyses

Volume Purged (gal.)	2.04	4.08	6.14				
Time	1140	1150	1200				
pH	7.41	6.15	6.15				
Specific Conductivity (umhos/cm)	263.8	267.0	2523				
Water Temperature ©	20.4	20.1	20.1				
Turbidity	0.95	3.74	9.86				
Dissolved Oxygen (mg/L)	4.40						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-5R
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	75
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0945

Total Well Depth:	20.0	ft. BTOC
Depth to water:	14.36	ft. BTOC
Length of Water Column (LWC):	5.64	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	.95	gal.
3 Casing Volumes:	2.87	gal.

Remarks: Hight dog. Road. odor

well Gone dry @ 2.0 Gal

Field Analyses

Volume Purged (gal.)	.95	1.92	2.87				
Time	0935	0940	0945				
pH	4.65	4.32	4.57				
Specific Conductivity (umhos/cm)	379.3	373.3	393.6				
Water Temperature ©	20.6	20.2	20.3				
Turbidity	0.75	1100+	1100+				
Dissolved Oxygen (mg/L)	3.21						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-5D
Date:	4-8-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloud;
Air Temperature:	75
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1115

Total Well Depth:	85	ft. BTOC	
Depth to water:	43.15	ft. BTOC	
Length of Water Column (LWC):	41.85	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x 0.17 =	7.11	gal.	
3 Casing Volumes:	21.33	gal.	

Remarks:

Field Analyses

Volume Purged (gal.)	7.11	14.22	21.33				
Time	1010	1030	1115				
pH	7.52	6.93	6.74				
Specific Conductivity (umhos/cm)	123.1	119.1	118.1				
Water Temperature ©	21.8	20.6	20.7				
Turbidity	8.14	9.01	9.66				
Dissolved Oxygen (mg/L)	4.60						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-5dd
Date:	4-8-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0915

Total Well Depth:	117	ft. BTOC	
Depth to water:	52.52	ft. BTOC	
Length of Water Column (LWC):	64.48	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= 10.96	gal.
3 Casing Volumes:	32.88	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	10.96	21.92	32.88				
Time	0800	0830	0915				
pH	6.39	5.91	5.62				
Specific Conductivity (umhos/cm)	52.3	35.0	33.4				
Water Temperature ©	19.9	19.6	20.1				
Turbidity	2.19	6.0	9.7				
Dissolved Oxygen (mg/L)	3.09						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-7R
Date:	4-8-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1245

Total Well Depth:	25	ft. BTOC	
Depth to water:	14.40	ft. BTOC	
Length of Water Column (LWC):	10.6	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.80	gal.
3 Casing Volumes:	5.40	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.80	3.60	5.40				
Time	1230	1240	1245				
pH	6.16	6.24	6.14	6.12	6.10		
Specific Conductivity (umhos/cm)	438.6	435.9	440.1	439.5	438.6		
Water Temperature ©	23.4	21.4	21.1	21.1	21.1		
Turbidity	75.9	88	90	89	98		
Dissolved Oxygen (mg/L)	3.83						

Terracon

Groundwater Sampling Log

Well ID:	MW-7R dup
Date:	4-8-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1245

Total Well Depth:	25 ft. BTOC
Depth to water:	14.40 ft. BTOC
Length of Water Column (LWC):	10.6 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.80 gal.
3 Casing Volumes:	5.40 gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time						1245	
pH						6.10	
Specific Conductivity (umhos/cm)						437.9	
Water Temperature ©						21.1	
Turbidity						98	
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Well ID:	MW-8
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1220

Total Well Depth:	25	ft. BTOC	
Depth to water:	15.71	ft. BTOC	
Length of Water Column (LWC):	9.29	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= 1.57	gal.
3 Casing Volumes:	4.73	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.57	3.14	4.73				
Time	1210	1215	1220				
pH	5.01	4.47	4.23				
Specific Conductivity (umhos/cm)	111.5	96.7	97.0				
Water Temperature ©	21.2	21.0	20.8				
Turbidity	0.53	6.6	8.9				
Dissolved Oxygen (mg/L)	4.13						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-9R
Date:	4- -15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	CLEAR
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1400

Total Well Depth:	20.0	ft. BTOC
Depth to water:	11.13	ft. BTOC
Length of Water Column (LWC):	8.87	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	1.50	gal.
3 Casing Volumes:	4.50	gal.

Remarks:

Field Analyses

Volume Purged (gal.)	1.50	3.00	4.50				
Time	1350	1355	1400				
pH	5.75	5.93	5.88	5.88	5.76	5.77	
Specific Conductivity (umhos/cm)	245.3	216.4	221.0	223.1	223.4	222.7	
Water Temperature ©	25.7	22.2	21.5	21.5	21.0	21.5	
Turbidity	1.51	124.6	128.8	128.0	128.9	129.9	
Dissolved Oxygen (mg/L)	3.89						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-11R
Date:	4-7-15
Site Name:	SC-015
Project No.:	7307801Z
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1235

Total Well Depth:	30	ft. BTOC	
Depth to water:	26.53	ft. BTOC	
Length of Water Column (LWC):	3.47	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= .58	gal.
3 Casing Volumes:	1.76	gal.	

Remarks: well going dry @ 1.0 Gal

Field Analyses

Volume Purged (gal.)	.58	1.18	1.76				
Time	1230	1235					
pH	4.50	4.37					
Specific Conductivity (umhos/cm)	50.8	47.7					
Water Temperature ©	22.0	21.4					
Turbidity	11.7	1100+					
Dissolved Oxygen (mg/L)	5.40						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12R
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	75
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1125

Total Well Depth:	20	ft. BTOC	
Depth to water:	11.55	ft. BTOC	
Length of Water Column (LWC):	8.45	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x 0.17 =	1.43	gal.	
3 Casing Volumes:	4.30	gal.	

Remarks: ____

Field Analyses

Volume Purged (gal.)	1.43	2.86	4.30				
Time	1115	1120	1125				
pH	5.29	5.24	5.32	5.24	5.24		
Specific Conductivity (umhos/cm)	234.1	237.4	225.0	226.4	225.2		
Water Temperature ©	22.1	21.8	19.9	19.2	19.0		
Turbidity	5.05	12.2	26.1	27.2	28.1		
Dissolved Oxygen (mg/L)	3.42						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-12d
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	75
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1056

Total Well Depth:	75	ft. BTOC
Depth to water:	38.30	ft. BTOC
Length of Water Column (LWC):	36.70	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	6.23	gal.
3 Casing Volumes:	18.49	gal.

Remarks:

Field Analyses

Volume Purged (gal.)	6.23	12.46	18.49				
Time	0955	1025	1056				
pH	8.59	7.71	6.92	6.88			
Specific Conductivity (umhos/cm)	73.6	52.9	48.7	48.1			
Water Temperature ©	22.7	22.0	21.8	21.6			
Turbidity	0.63	3.45	4.90	5.60			
Dissolved Oxygen (mg/L)	4.19						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-13
Date:	4-8-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	50
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1325

Total Well Depth:	16.5	ft. BTOC	
Depth to water:	10.40	ft. BTOC	
Length of Water Column (LWC):	6.10	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	1.03	gal.
3 Casing Volumes:	3.09	gal.	X

Remarks: Cloudy dry @ .50

Field Analyses

Volume Purged (gal.)	1.03	2.06	3.09				
Time	1320	1325					
pH	6.81	5.85					
Specific Conductivity (umhos/cm)	93.8	100.7					
Water Temperature ©	22.4	21.2					
Turbidity	23.9	11001					
Dissolved Oxygen (mg/L)	3.65						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-15R
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	70
Well Evacuation Method:	Peristaltic Pump
Sample Collection Method:	Peristaltic Pump
Sampled at (time):	1055

Total Well Depth:	39	ft. BTOC
Depth to water:	24.23	ft. BTOC
Length of Water Column (LWC):	14.77	ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x 0.17 =	2.51	gal.
3 Casing Volumes:	7.53	gal.

Remarks: low vol single parameter

Field Analyses

Volume Purged (gal.)	2.51	5.02	7.53				
Time	1055						
pH	6.22						
Specific Conductivity (umhos/cm)	479						
Water Temperature ©	22.1						
Turbidity	1000+						
Dissolved Oxygen (mg/L)	3.91						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-16
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	78
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1025

Total Well Depth:	35.00	ft. BTOC	
Depth to water:	26.65	ft. BTOC	
Length of Water Column (LWC):	8.35	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= 1.41	gal.
3 Casing Volumes:			gal.

Remarks: well going dry @ 4.0

Field Analyses

Volume Purged (gal.)	1.41	2.84	4.25				
Time	1015	1020	1025				
pH	7.40	6.49	5.84				
Specific Conductivity (umhos/cm)	205.4	175.8	167.2				
Water Temperature ©	20.7	20.2	20.1				
Turbidity	2.64	228	233				
Dissolved Oxygen (mg/L)	4.95						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-17
Date:	4-__-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1520

Total Well Depth:	39.5	ft. BTOC	
Depth to water:	33.58	ft. BTOC	
Length of Water Column (LWC):	5.92	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= 1.00	gal.
3 Casing Volumes:	3.00	gal.	

Remarks: Could dry @ 2.5 Gal

Field Analyses

Volume Purged (gal.)	1.00	2.00	3.00				
Time	1510	1515	1520				
pH	7.55	6.69	6.69				
Specific Conductivity (umhos/cm)	62.6	44.3	42.9				
Water Temperature ©	26.8	23.2	23.1				
Turbidity	1.19	1100+	1100+				
Dissolved Oxygen (mg/L)	3.26						

Terracon

Groundwater Sampling Log

Well ID:	MW-18
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1145

Total Well Depth:	30 ft. BTOC
Depth to water:	20 ft. BTOC
Length of Water Column (LWC):	10.0 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.70 gal.
3 Casing Volumes:	5.10 gal.
Remarks:	well gone dry @ 4.50 Gal

Field Analyses

Volume Purged (gal.)	1.70	3.40	5.10				
Time	1135	1140	1145				
pH	6.43	5.51	5.04	4.71			
Specific Conductivity (umhos/cm)	62.2	33.4	37.4	37.8			
Water Temperature ©	22.3	19.8	20.0	20.1			
Turbidity	2.37	741	493	1100+			
Dissolved Oxygen (mg/L)	4.98						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-18d
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1205

Total Well Depth:	49.20 ft. BTOC
Depth to water:	41.60 ft. BTOC
Length of Water Column (LWC):	7.60 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.29 gal.
3 Casing Volumes:	3.87 gal. 2
Remarks:	Gone dry @ 1.50 gal

Field Analyses

Volume Purged (gal.)	1.29	2.58	3.87				
Time	1155	1200	1205				
pH	5.08	4.88	4.81				
Specific Conductivity (umhos/cm)	20.9	20.5	20.4				
Water Temperature ©	22.1	21.1	21.0				
Turbidity	6.23	143	370				
Dissolved Oxygen (mg/L)	5.03						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-19
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1315

Total Well Depth:	34.60	ft. BTOC	
Depth to water:	29.27	ft. BTOC	
Length of Water Column (LWC):	4.63	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= .78	gal.
3 Casing Volumes:	2.34	gal.	

Remarks: Going dry @ 2.00 Gal

Field Analyses

Volume Purged (gal.)	.78	1.58	2.36				
Time	1305	1310	1315				
pH	4.53	4.36	4.36				
Specific Conductivity (umhos/cm)	62.2	51.7	49.0				
Water Temperature ©	22.4	21.4	21.3				
Turbidity	1.72	1106+	1106+				
Dissolved Oxygen (mg/L)	5.14						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-20
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1345

Total Well Depth:	33.70	ft. BTOC	
Depth to water:	27.88	ft. BTOC	
Length of Water Column (LWC):	5.82	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17	= .98	gal.
3 Casing Volumes:	2.96	gal.	

Remarks: well going dry @ 4.0 GAL

Field Analyses

Volume Purged (gal.)	.98	1.96	2.96				
Time	1335	1340	1345				
pH	4.77	4.62	4.60	4.58	4.64		
Specific Conductivity (umhos/cm)	49.4	43.7	42.6	42.4	42.4		
Water Temperature ©	21.8	21.1	20.7	21.0	20.6		
Turbidity	0-72	1100+	1100+	1100+	1100+		
Dissolved Oxygen (mg/L)	5.10						

Terracon

Groundwater Sampling Log

Well ID:	MW-21
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1125

Total Well Depth:	20	ft. BTOC	
Depth to water:	14.53	ft. BTOC	
Length of Water Column (LWC):	5.47	ft.	
Casing Diameter:	2.0	in.	
1 Casing Volume = LWC x	0.17 =	.92	gal.
3 Casing Volumes:	2.78	gal.	

Remarks: Hight chlor & mod. odor

Field Analyses

Volume Purged (gal.)	.92	1.86	2.78				
Time	1145	1120	1125				
pH	4.87	4.82	4.74	4.68	4.69		
Specific Conductivity (umhos/cm)	266.2	259.3	256.5	256.1	257.2		
Water Temperature ©	21.8	20.4	20.2	19.9	20.1		
Turbidity	5.57	155	166	160	160		
Dissolved Oxygen (mg/L)	2.36						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	MW-21 dup
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1125

Total Well Depth:	20 ft. BTOC
Depth to water:	14.53 ft. BTOC
Length of Water Column (LWC):	5.47 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	Hight deer predation

Field Analyses

Volume Purged (gal.)							
Time						1125	
pH						4.69	
Specific Conductivity (umhos/cm)						2568	
Water Temperature ©						20.1	
Turbidity						159	
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	DW-1
Date:	4-__-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1440

Total Well Depth:	39 ft. BTOC
Depth to water:	32.33 ft. BTOC
Length of Water Column (LWC):	6.67 ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	1.13 gal.
3 Casing Volumes:	3.39 gal.
Remarks:	Light deg. petrol. odor

Field Analyses

Volume Purged (gal.)	1.13	2.26	3.39				
Time	1430	1435	1440				
pH	6.04	6.05	6.12	6.05	6.01		
Specific Conductivity (umhos/cm)	184.8	184.7	167.5	162.9	160.4		
Water Temperature ©	26.7	24.1	23.7	23.0	23.1		
Turbidity	6.24	369	1100+	1100+	1100+		
Dissolved Oxygen (mg/L)	2.78						

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Field blank
Date:	4-9-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	50
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1210

Total Well Depth:	____ ft. BTOC
Depth to water:	____ ft. BTOC
Length of Water Column (LWC):	____ ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	____ gal.
3 Casing Volumes:	____ gal.
Remarks:	

Field Analyses

Volume Purged (gal.)	✓						
Time	1210						
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Trip blank
Date:	4-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	
Air Temperature:	
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Field Blank
Date:	4-__-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Clear
Air Temperature:	80
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	1525

Total Well Depth:		ft. BTOC
Depth to water:		ft. BTOC
Length of Water Column (LWC):		ft.
Casing Diameter:	2.0	in.
1 Casing Volume = LWC x	0.17 =	gal.
3 Casing Volumes:		gal.

Remarks: ____

Field Analyses

Volume Purged (gal.)	✓						
Time	1525						
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Field blank
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078012
Field Personnel:	Akre
Weather Conditions:	Cloudy
Air Temperature:	70
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	0810

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

Terracon

Groundwater Sampling Log

Page ____ of ____

Well ID:	Trip blank
Date:	4-7-15
Site Name:	SC-015
Project No.:	73078017
Field Personnel:	Akre
Weather Conditions:	
Air Temperature:	
Well Evacuation Method:	Bailer
Sample Collection Method:	Bailer
Sampled at (time):	

Total Well Depth:	ft. BTOC
Depth to water:	ft. BTOC
Length of Water Column (LWC):	ft.
Casing Diameter:	2.0 in.
1 Casing Volume = LWC x 0.17 =	gal.
3 Casing Volumes:	gal.
Remarks:	

Field Analyses

Volume Purged (gal.)							
Time							
pH							
Specific Conductivity (umhos/cm)							
Water Temperature ©							
Turbidity							
Dissolved Oxygen (mg/L)							

SC-015

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55(06G1604) YSI-~~63(09M100557)~~ PRO 1030

SER. #

SER. #

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.7.15	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 63	4	7	10	
				pH	4.0	7.0	10.0	

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.7.15	~~one point~~ ~~two point~~ ~~three point~~ other (specify):	yes no	AKRE SIGNATURE	YSI 55 ELEV. 292' Columbia, SC PPT 0.0

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.7.15	one point two point ~~three point~~ other (specify):	yes no	AKRE SIGNATURE	YSI 63	4	7	10	
				pH		7.0		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.7.15	one point two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 55 ELEV 292' Columbia, SC PPT 0.0

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.7.15	~~one point~~ two point ~~three point~~ other (specify):	yes no	AKRE SIGNATURE	YSI 63	4	7	10	
				pH		7.0		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.7.15	~~one point~~ two point three point other (specify):	yes no	AKRE SIGNATURE	YSI 55 ELEV 292' Columbia SC PPT 0.0

* SAME METERS USED FOR ALL CALIBRATIONS

LAMOTTE 2020 Turbidimeter

10 NTU STD PRE — 10
MID — 10
POST — 10

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55(06G1604) YSI-~~63(09M100557)~~ PRO 1030

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.8.15	one point two point (three point) other (specify):	yes	AKRE	YSI 63	4	7	10	SER. #
			SIGNATURE					
		no		pH	4.0	7.0	10.0	

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.8.15	~~one point~~ ~~two point~~ ~~three point~~ other (specify):	yes	AKRE	YSI 55 ELEV. 292 SER.#
		SIGNATURE		
		no		Columbia SC PPT 0.0

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.8.15	one point two point ~~three point~~ other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE					
		no		pH		7.0		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.8.15	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
		SIGNATURE		
		no		Columbia SC PPT 0.0

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.8.15	~~one point~~ two point ~~three point~~ other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE					
		no		pH		7.0		

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.8.15	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
		SIGNATURE		
		no		Columbia SC PPT 0.0

* SAME METERS USED FOR ALL CALIBRATIONS

LAMOTTE 2020 Turbidimeter
10 NTU STD.
PRE – 10 NTU
mid –
POST –

SC-015

EQUIPMENT CALIBRATION LOG

INSTRUMENT: YSI-55 (06G1604) YSI-63 (09M100557) PRO 1030

PRE

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.9.15	one point two point (three point) other (specify):	yes	AKRE	YSI 63	4	7	10	SER. #
			SIGNATURE	pH	4.0	7.0	10.0	
		no						

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.9.15	~~one point~~ ~~two point~~ ~~three point~~ other (specify):	yes	AKRE	YSI 55 ELEV. 292 SER.#
		SIGNATURE		
		no		Columbia SC PPT 0.0

mid

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.9.15	one point two point ~~three point~~ other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE	pH		7.0		
		no						

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.9.15	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
		SIGNATURE		
		no		Columbia, SC PPT 0.0

POST

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS				
4.9.15	~~one point~~ two point ~~three point~~ other (specify):	yes	AKRE	YSI 63	4	7	10	
			SIGNATURE	pH		7.0		
		no						

DATE	CALIBRATION TYPE	CALIBRATION SUCCESSFUL?	NAME	COMMENTS
4.9.15	one point two point three point other (specify):	yes	AKRE	YSI 55 ELEV 292
		SIGNATURE		
		no		Columbia SC PPT 0.0

* SAME METERS USED FOR ALL CALIBRATIONS

LA Motte 2020 Turbidimeter

10 NTU Std.

PRE – 10 NTU

mid – 10 NTU

POST – 10 NTU

Terracon **WATER/PRODUCT LEVEL MEASUREMENT LOG**

PROJECT NAME SC-015

PROJECT NO. 3078012

DATE 4.7.15

EQUIPMENT USED Elec. H2O meter

FIELD PERSONNEL AKRE

Well ID	Depth to Water	Depth to Product	Product Thickness	Total Depth	Comments
MW-18d	41.60				
MW-18	20.00				
MW-11R	26.53				
MW-10R	29.85				Low Vol H2O sample
MW-19	29.27				
MW-9R	11.13				
MW-12R	11.55				
MW-12d	38.30				
MW-20	27.88				
MW-13	10.40				
MW-8	15.71				
MW-7R	14.40				
Dup					
DW-1	32.33				
MW-5R	14.36				
MW-5d	43.15				
MW-5dd	52.52				
MW-21	141.53				
Dup					
MW-15R	~~24.28~~			→	39.00 TD
MW-15	33.85			→	low vol H2O sample
MW-1A				→	dry @ 8.70
MW-1R	15.96				
MW-2				→	dry @ 30.98
MW-17	33.58				
MW-16	26.65				

Analytical Report 505858

for

TERRACON

Project Manager: Regan Norris

SC-015

73048012

17-APR-15

Collected By: Client

6017 Financial Dr., Norcross, GA 30071
Ph:(770) 449-8800 Fax:(770) 449-5477

Xenco-Houston (EPA Lab code: TX00122):
Texas (T104704215-14-18), Arizona (AZ0765), Florida (E871002), Louisiana (03054)
New Jersey (TX007), North Carolina(681), Oklahoma (9218), Pennsylvania (68-03610)

Xenco-Atlanta (EPA Lab Code: GA00046):
Florida (E87429), North Carolina (483), South Carolina (98015), Kentucky (85), DoD (L10-135)
Texas (T104704477), Louisiana (04176), USDA (P330-07-00105)

Xenco-Lakeland: Florida (E84098)
Xenco-Odessa (EPA Lab code: TX00158): Texas (T104704400-TX)
Xenco-Dallas (EPA Lab code: TX01468): Texas (T104704295-TX)
Xenco Phoenix (EPA Lab Code: AZ00901): Arizona(AZ0757)
Xenco-Phoenix Mobile (EPA Lab code: AZ00901): Arizona (AZM757)
Xenco Tucson (EPA Lab code:AZ000989): Arizona (AZ0758)

XENCO Laboratories
Florida Testing Services, LLC

17-APR-15

Project Manager: **Regan Norris**
TERRACON
521 CLEMSON RD
Columbia, SC 29229

Reference: XENCO Report No(s): **505858**
SC-015
Project Address:

Regan Norris:

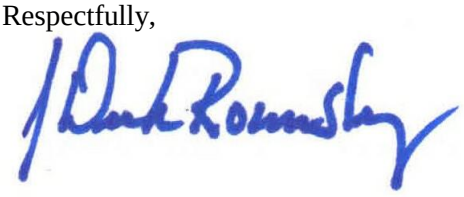
We are reporting to you the results of the analyses performed on the samples received under the project name referenced above and identified with the XENCO Report Number(s) 505858. All results being reported under this Report Number apply to the samples analyzed and properly identified with a Laboratory ID number. Subcontracted analyses are identified in this report with either the NELAC certification number of the subcontract lab in the analyst ID field, or the complete subcontracted report attached to this report.

Unless otherwise noted in a Case Narrative, all data reported in this Analytical Report are in compliance with NELAC standards. The uncertainty of measurement associated with the results of analysis reported is available upon request. Should insufficient sample be provided to the laboratory to meet the method and NELAC Matrix Duplicate and Matrix Spike requirements, then the data will be analyzed, evaluated and reported using all other available quality control measures.

The validity and integrity of this report will remain intact as long as it is accompanied by this letter and reproduced in full, unless written approval is granted by XENCO Laboratories. This report will be filed for at least 5 years in our archives after which time it will be destroyed without further notice, unless otherwise arranged with you. The samples received, and described as recorded in Report No. 505858 will be filed for 60 days, and after that time they will be properly disposed without further notice, unless otherwise arranged with you. We reserve the right to return to you any unused samples, extracts or solutions related to them if we consider so necessary (e.g., samples identified as hazardous waste, sample sizes exceeding analytical standard practices, controlled substances under regulated protocols, etc).

We thank you for selecting XENCO Laboratories to serve your analytical needs. If you have any questions concerning this report, please feel free to contact us at any time.

Respectfully,



J. Derek Rounsley
Project Manager

Recipient of the Prestigious Small Business Administration Award of Excellence in 1994.
Certified and approved by numerous States and Agencies.
A Small Business and Minority Status Company that delivers SERVICE and QUALITY

Houston - Dallas - Odessa - San Antonio - Tampa - Lakeland - Atlanta - Phoenix - Oklahoma - Latin America

Sample Cross Reference 505858

TERRACON, Columbia, SC

SC-015

Sample Id	Matrix	Date Collected	Sample Depth	Lab Sample Id
MW-1R 07680	W	04-07-15 12:00	- 28 ft	505858-001
MW-8 07680	W	04-07-15 12:20	- 25 ft	505858-002
MW-11R 07680	W	04-07-15 12:35	- 30 ft	505858-003
MW-16 07680	W	04-07-15 10:25	- 35 ft	505858-004
MW-19 07680	W	04-07-15 13:15	- 34.60	505858-005
MW-20 07680	W	04-07-15 13:45	- 33.70 ft	505858-006
MW-21 07680	W	04-07-15 11:25	- 20 ft	505858-007
MW-21DUP 07680	W	04-07-15 11:25	- 20 ft	505858-008
Field Blank 07680	W	04-07-15 08:10	- 0 ft	505858-009
MW-5d 07680	W	04-08-15 11:15	- 85	505858-010
MW-5dd 07680	W	04-08-15 09:15	- 117 ft	505858-011
MW-7R 07680	W	04-08-15 12:45	- 25 ft	505858-012
MW-7R DUP 07680	W	04-08-15 12:45	- 25 ft	505858-013
MW-9R 07680	W	04-08-15 14:00	- 20 ft	505858-014
MW-13 07680	W	04-08-15 13:25	- 16.5 ft	505858-015
MW-17 07680	W	04-08-15 15:20	- 39.5 ft	505858-016
DW-1 07680	W	04-08-15 14:40	- 39 ft	505858-017
Field Blank 07680	W	04-08-15 15:25		505858-018
MW-5R 07680	W	04-09-15 09:45	- 20 ft	505858-019
MW-15R 07680	W	04-09-15 10:55	- 39 ft	505858-020
MW-12D 07680	W	04-09-15 10:55	- 75 ft	505858-021
MW-12R 07680	W	04-09-15 11:25	- 20 ft	505858-022
MW-18 07680	W	04-09-15 11:45	- 20 ft	505858-023
MW-18D 07680	W	04-09-15 12:05	- 49.20 ft	505858-024
Field Blank 07680	W	04-09-15 12:10		505858-025
Trip Blank 07680	W	04-07-15 00:00		505858-026
Trip Blank 07680	W	04-07-15 00:00		505858-027

Sample receipt non conformances and comments:

Sample receipt non conformances and comments per sample:

None

Analytical non conformances and comments:

Batch: LBA-965973 TCL VOCs by SW-846 8260B
Lab Sample ID 505858-004 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). Toluene recovered above QC limits in the Matrix Spike. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 505858-001, -003, -004, -005, -006, -007, -008, -025, -026, -027.
The Laboratory Control Sample for Toluene is within laboratory Control Limits, therefore the data was accepted.

Batch: LBA-966212 BTEX & Oxygenates by SW-846 8260B
Lab Sample ID 505858-021 was randomly selected for Matrix Spike/Matrix Spike Duplicate (MS/MSD). tert-Butyl formate recovered below QC limits in the Matrix Spike and Matrix Spike Duplicate. Outlier/s are due to possible matrix interference. Samples in the analytical batch are: 505858-002, -009, -010, -020, -021, -022, -023, -024.
The Laboratory Control Sample for tert-Butyl formate is within laboratory Control Limits, therefore the data was accepted.

Flagging Criteria

X In our quality control review of the data a QC deficiency was observed and flagged as noted. MS/MSD recoveries were found to be outside of the laboratory control limits due to possible matrix /chemical interference, or a concentration of target analyte high enough to affect the recovery of the spike concentration. This condition could also affect the relative percent difference in the MS/MSD.

B A target analyte or common laboratory contaminant was identified in the method blank. Its presence indicates possible field or laboratory contamination.

D The sample(s) were diluted due to targets detected over the highest point of the calibration curve, or due to matrix interference. Dilution factors are included in the final results. The result is from a diluted sample.

E The data exceeds the upper calibration limit; therefore, the concentration is reported as estimated.

F RPD exceeded lab control limits.

J The target analyte was positively identified below the quantitation limit and above the detection limit.

U Analyte was not detected.

L The LCS data for this analytical batch was reported below the laboratory control limits for this analyte. The department supervisor and QA Director reviewed data. The samples were either reanalyzed or flagged as estimated concentrations.

H The LCS data for this analytical batch was reported above the laboratory control limits. Supporting QC Data were reviewed by the Department Supervisor and QA Director. Data were determined to be valid for reporting.

K Sample analyzed outside of recommended hold time.

JN A combination of the "N" and the "J" qualifier. The analysis indicates that the analyte is "tentatively identified" and the associated numerical value may not be consistent with the amount actually present in the environmental sample.

** Surrogate recovered outside laboratory control limit.

BRL Below Reporting Limit.

RL Reporting Limit

MDL Method Detection Limit **SDL** Sample Detection Limit **LOD** Limit of Detection

PQL Practical Quantitation Limit **MQL** Method Quantitation Limit **LOQ** Limit of Quantitation

DL Method Detection Limit

NC Non-Calculable

+ NELAC certification not offered for this compound.

***** (Next to analyte name or method description) = Outside XENCO's scope of NELAC accreditation

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-1R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-001 Date Collected: 04.07.15 12.00 Sample Depth: 28 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00602	0.0201	0.00602	ug/L	04.14.15 15.28	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	104	%	60-140	04.14.15 15.28	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	**185**	1.00	0.160	ug/L	04.14.15 12.54		1
Toluene	108-88-3	**12.4**	1.00	0.140	ug/L	04.14.15 12.54		1
Ethylbenzene	100-41-4	**548**	10.0	1.90	ug/L	04.15.15 12.25	D	10
o-Xylene	95-47-6	**9.95**	1.00	0.200	ug/L	04.14.15 12.54		1
m,p-Xylenes	179601-23-1	**261**	2.00	0.510	ug/L	04.14.15 12.54		1
Xylenes, Total	1330-20-7	**271**	1.00	0.200	ug/L	04.14.15 12.54		1
Methyl tert-butyl ether	1634-04-4	**191**	2.00	0.180	ug/L	04.14.15 12.54		1
Naphthalene	91-20-3	**324**	10.0	2.20	ug/L	04.15.15 12.25	D	10
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 12.54	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 12.54	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 12.54	U	1
Diisopropyl ether	108-20-3	**3.68**	1.00	0.0800	ug/L	04.14.15 12.54		1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 12.54	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 12.54	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 12.54	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 12.54	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 12.54	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	102	%	53-159	04.14.15 12.54	
4-Bromofluorobenzene	460-00-4	101	%	30-186	04.14.15 12.54	
Toluene-D8	2037-26-5	95	%	70-130	04.14.15 12.54	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-8 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-002 Date Collected: 04.07.15 12.20 Sample Depth: 25 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00598	0.0199	0.00598	ug/L	04.14.15 15.53	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	101	%	60-140	04.14.15 15.53	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 16.29	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 16.29	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 16.29	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 16.29	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 16.29	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 16.29	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.16.15 16.29	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 16.29	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 16.29	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 16.29	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 16.29	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 16.29	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 16.29	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 16.29	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 16.29	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 16.29	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 16.29	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	128	%	53-159	04.16.15 16.29	
4-Bromofluorobenzene	460-00-4	106	%	30-186	04.16.15 16.29	
Toluene-D8	2037-26-5	101	%	70-130	04.16.15 16.29	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-11R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-003 Date Collected: 04.07.15 12.35 Sample Depth: 30 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00584	0.0195	0.00584	ug/L	04.14.15 16.17	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	101	%	60-140	04.14.15 16.17	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 13.48	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 13.48	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 13.48	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 13.48	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 13.48	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 13.48	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 13.48	U	1
Naphthalene	91-20-3	**2.47**	1.00	0.220	ug/L	04.14.15 13.48		1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 13.48	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 13.48	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 13.48	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 13.48	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 13.48	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 13.48	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 13.48	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 13.48	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 13.48	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	104	%	53-159	04.14.15 13.48	
4-Bromofluorobenzene	460-00-4	112	%	30-186	04.14.15 13.48	
Toluene-D8	2037-26-5	99	%	70-130	04.14.15 13.48	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-16 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-004 Date Collected: 04.07.15 10.25 Sample Depth: 35 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00589	0.0196	0.00589	ug/L	04.14.15 17.30	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	101	%	60-140	04.14.15 17.30	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 14.15	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 14.15	UX	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 14.15	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 14.15	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 14.15	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 14.15	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 14.15	U	1
Naphthalene	91-20-3	**1.15**	1.00	0.220	ug/L	04.14.15 14.15		1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 14.15	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 14.15	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 14.15	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 14.15	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 14.15	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 14.15	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 14.15	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 14.15	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 14.15	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	103	%	53-159	04.14.15 14.15	
4-Bromofluorobenzene	460-00-4	110	%	30-186	04.14.15 14.15	
Toluene-D8	2037-26-5	97	%	70-130	04.14.15 14.15	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-19 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-005 Date Collected: 04.07.15 13.15 Sample Depth: 34.60

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00592	0.0197	0.00592	ug/L	04.14.15 17.54	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	103	%	60-140	04.14.15 17.54	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 14.41	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 14.41	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 14.41	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 14.41	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 14.41	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 14.41	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 14.41	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 14.41	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 14.41	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 14.41	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 14.41	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 14.41	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 14.41	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 14.41	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 14.41	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 14.41	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 14.41	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	106	%	53-159	04.14.15 14.41	
4-Bromofluorobenzene	460-00-4	109	%	30-186	04.14.15 14.41	
Toluene-D8	2037-26-5	98	%	70-130	04.14.15 14.41	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-20 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-006 Date Collected: 04.07.15 13.45 Sample Depth: 33.70 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00591	0.0197	0.00591	ug/L	04.14.15 18.18	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	109	%	60-140	04.14.15 18.18	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 15.08	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 15.08	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 15.08	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 15.08	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 15.08	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 15.08	U	1
Methyl tert-butyl ether	1634-04-4	**3.07**	2.00	0.180	ug/L	04.14.15 15.08		1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 15.08	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 15.08	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 15.08	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 15.08	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 15.08	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 15.08	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 15.08	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 15.08	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 15.08	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 15.08	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	107	%	53-159	04.14.15 15.08	
4-Bromofluorobenzene	460-00-4	111	%	30-186	04.14.15 15.08	
Toluene-D8	2037-26-5	98	%	70-130	04.14.15 15.08	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-21 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-007 Date Collected: 04.07.15 11.25 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	**0.161**	0.0202	0.00605	ug/L	04.14.15 18.43		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	91	%	60-140	04.14.15 18.43	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	**2830**	50.0	8.00	ug/L	04.15.15 12.51	D	50
Toluene	108-88-3	**70200**	1000	140	ug/L	04.15.15 13.15	D	1000
Ethylbenzene	100-41-4	**4700**	50.0	9.50	ug/L	04.15.15 12.51	D	50
o-Xylene	95-47-6	**6270**	50.0	10.0	ug/L	04.15.15 12.51	D	50
m,p-Xylenes	179601-23-1	**16800**	100	25.5	ug/L	04.15.15 12.51	D	50
Xylenes, Total	1330-20-7	**23100**	50.0	10.0	ug/L	04.15.15 12.51		50
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 15.35	U	1
Naphthalene	91-20-3	**1390**	50.0	11.0	ug/L	04.15.15 12.51	D	50
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 15.35	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 15.35	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 15.35	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 15.35	U	1
Ethyl tert-butyl alcohol	590-36-3	**948**	5.00	1.10	ug/L	04.14.15 15.35		1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 15.35	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 15.35	U	1
tert-Amyl alcohol	75-85-4	**3800**	250	55.0	ug/L	04.15.15 12.51	D	50
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 15.35	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	117	%	53-159	04.14.15 15.35	
4-Bromofluorobenzene	460-00-4	103	%	30-186	04.14.15 15.35	
Toluene-D8	2037-26-5	87	%	70-130	04.14.15 15.35	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-21DUP 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-008 Date Collected: 04.07.15 11.25 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	**0.0957**	0.0193	0.00579	ug/L	04.14.15 19.07		1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	116	%	60-140	04.14.15 19.07	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	**2480**	50.0	8.00	ug/L	04.15.15 13.41	D	50
Toluene	108-88-3	**78600**	1000	140	ug/L	04.15.15 14.05	D	1000
Ethylbenzene	100-41-4	**4640**	50.0	9.50	ug/L	04.15.15 13.41	D	50
o-Xylene	95-47-6	**6110**	50.0	10.0	ug/L	04.15.15 13.41	D	50
m,p-Xylenes	179601-23-1	**16500**	100	25.5	ug/L	04.15.15 13.41	D	50
Xylenes, Total	1330-20-7	**22600**	50.0	10.0	ug/L	04.15.15 13.41		50
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 16.01	U	1
Naphthalene	91-20-3	**1240**	50.0	11.0	ug/L	04.15.15 13.41	D	50
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 16.01	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 16.01	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 16.01	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 16.01	U	1
Ethyl tert-butyl alcohol	590-36-3	**933**	5.00	1.10	ug/L	04.14.15 16.01		1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 16.01	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 16.01	U	1
tert-Amyl alcohol	75-85-4	**3690**	250	55.0	ug/L	04.15.15 13.41	D	50
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 16.01	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	110	%	53-159	04.14.15 16.01	
4-Bromofluorobenzene	460-00-4	107	%	30-186	04.14.15 16.01	
Toluene-D8	2037-26-5	84	%	70-130	04.14.15 16.01	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **Field Blank 07680** Matrix: Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-009 Date Collected: 04.07.15 08.10 Sample Depth: 0 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00582	0.0194	0.00582	ug/L	04.14.15 19.31	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	79	%	60-140	04.14.15 19.31	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 16.05	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 16.05	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 16.05	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 16.05	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 16.05	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 16.05	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.16.15 16.05	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 16.05	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 16.05	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 16.05	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 16.05	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 16.05	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 16.05	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 16.05	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 16.05	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 16.05	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 16.05	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	119	%	53-159	04.16.15 16.05	
4-Bromofluorobenzene	460-00-4	107	%	30-186	04.16.15 16.05	
Toluene-D8	2037-26-5	106	%	70-130	04.16.15 16.05	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-5d 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-010 Date Collected: 04.08.15 11.15 Sample Depth: 85

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00577	0.0192	0.00577	ug/L	04.14.15 19.55	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	99	%	60-140	04.14.15 19.55	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 16.53	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 16.53	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 16.53	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 16.53	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 16.53	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 16.53	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.16.15 16.53	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 16.53	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 16.53	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 16.53	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 16.53	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 16.53	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 16.53	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 16.53	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 16.53	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 16.53	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 16.53	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	132	%	53-159	04.16.15 16.53	
4-Bromofluorobenzene	460-00-4	100	%	30-186	04.16.15 16.53	
Toluene-D8	2037-26-5	100	%	70-130	04.16.15 16.53	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-5dd 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-011 Date Collected: 04.08.15 09.15 Sample Depth: 117 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00588	0.0196	0.00588	ug/L	04.14.15 20.43	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	60-140	04.14.15 20.43	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 12.29	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 12.29	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 12.29	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 12.29	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 12.29	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 12.29	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 12.29	U	1
Naphthalene	91-20-3	**8.40**	1.00	0.220	ug/L	04.14.15 12.29		1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 12.29	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 12.29	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 12.29	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 12.29	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 12.29	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 12.29	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 12.29	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 12.29	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 12.29	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	133	%	53-159	04.14.15 12.29	
4-Bromofluorobenzene	460-00-4	108	%	30-186	04.14.15 12.29	
Toluene-D8	2037-26-5	98	%	70-130	04.14.15 12.29	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-7R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-012 Date Collected: 04.08.15 12.45 Sample Depth: 25 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00583	0.0194	0.00583	ug/L	04.14.15 21.08	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	100	%	60-140	04.14.15 21.08	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 12.52	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 12.52	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 12.52	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 12.52	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 12.52	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 12.52	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 12.52	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 12.52	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 12.52	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 12.52	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 12.52	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 12.52	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 12.52	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 12.52	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 12.52	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 12.52	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 12.52	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	135	%	53-159	04.14.15 12.52	
4-Bromofluorobenzene	460-00-4	105	%	30-186	04.14.15 12.52	
Toluene-D8	2037-26-5	106	%	70-130	04.14.15 12.52	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-7R DUP 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-013 Date Collected: 04.08.15 12.45 Sample Depth: 25 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00578	0.0193	0.00578	ug/L	04.14.15 21.32	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	96	%	60-140	04.14.15 21.32	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 13.16	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 13.16	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 13.16	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 13.16	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 13.16	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 13.16	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 13.16	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 13.16	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 13.16	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 13.16	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 13.16	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 13.16	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 13.16	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 13.16	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 13.16	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 13.16	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 13.16	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	136	%	53-159	04.14.15 13.16	
4-Bromofluorobenzene	460-00-4	105	%	30-186	04.14.15 13.16	
Toluene-D8	2037-26-5	103	%	70-130	04.14.15 13.16	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-9R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-014 Date Collected: 04.08.15 14.00 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00589	0.0196	0.00589	ug/L	04.14.15 21.56	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	111	%	60-140	04.14.15 21.56	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 14.56	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 14.56	U	1
Ethylbenzene	100-41-4	**2.27**	1.00	0.190	ug/L	04.14.15 14.56		1
o-Xylene	95-47-6	**3.10**	1.00	0.200	ug/L	04.14.15 14.56		1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 14.56	U	1
Xylenes, Total	1330-20-7	**3.10**	1.00	0.200	ug/L	04.14.15 14.56		1
Methyl tert-butyl ether	1634-04-4	**6.71**	2.00	0.180	ug/L	04.14.15 14.56		1
Naphthalene	91-20-3	**13.3**	1.00	0.220	ug/L	04.14.15 14.56		1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 14.56	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 14.56	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 14.56	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 14.56	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 14.56	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 14.56	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 14.56	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 14.56	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 14.56	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	126	%	53-159	04.14.15 14.56	
4-Bromofluorobenzene	460-00-4	108	%	30-186	04.14.15 14.56	
Toluene-D8	2037-26-5	99	%	70-130	04.14.15 14.56	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-13 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-015 Date Collected: 04.08.15 13.25 Sample Depth: 16.5 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00596	0.0199	0.00596	ug/L	04.14.15 22.20	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	77	%	60-140	04.14.15 22.20	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 15.21	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 15.21	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 15.21	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 15.21	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 15.21	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 15.21	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 15.21	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 15.21	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 15.21	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 15.21	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 15.21	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 15.21	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 15.21	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 15.21	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 15.21	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 15.21	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 15.21	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	135	%	53-159	04.14.15 15.21	
4-Bromofluorobenzene	460-00-4	107	%	30-186	04.14.15 15.21	
Toluene-D8	2037-26-5	102	%	70-130	04.14.15 15.21	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-17 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-016 Date Collected: 04.08.15 15.20 Sample Depth: 39.5 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00586	0.0195	0.00586	ug/L	04.14.15 22.44	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	102	%	60-140	04.14.15 22.44	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 15.45	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 15.45	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 15.45	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 15.45	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 15.45	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 15.45	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 15.45	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 15.45	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 15.45	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 15.45	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 15.45	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 15.45	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 15.45	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 15.45	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 15.45	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 15.45	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 15.45	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	136	%	53-159	04.14.15 15.45	
4-Bromofluorobenzene	460-00-4	105	%	30-186	04.14.15 15.45	
Toluene-D8	2037-26-5	100	%	70-130	04.14.15 15.45	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **DW-1 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-017 Date Collected: 04.08.15 14.40 Sample Depth: 39 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00593	0.0198	0.00593	ug/L	04.14.15 23.08	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	88	%	60-140	04.14.15 23.08	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 16.09	U	1
Toluene	108-88-3	**10.2**	1.00	0.140	ug/L	04.14.15 16.09		1
Ethylbenzene	100-41-4	**10.1**	1.00	0.190	ug/L	04.14.15 16.09		1
o-Xylene	95-47-6	**15.3**	1.00	0.200	ug/L	04.14.15 16.09		1
m,p-Xylenes	179601-23-1	**54.0**	2.00	0.510	ug/L	04.14.15 16.09		1
Xylenes, Total	1330-20-7	**69.3**	1.00	0.200	ug/L	04.14.15 16.09		1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 16.09	U	1
Naphthalene	91-20-3	**20.3**	1.00	0.220	ug/L	04.14.15 16.09		1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 16.09	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 16.09	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 16.09	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 16.09	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 16.09	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 16.09	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 16.09	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 16.09	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 16.09	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	119	%	53-159	04.14.15 16.09	
4-Bromofluorobenzene	460-00-4	89	%	30-186	04.14.15 16.09	
Toluene-D8	2037-26-5	104	%	70-130	04.14.15 16.09	

TERRACON, Columbia, SC

SC-015

Sample Id: **Field Blank 07680** Matrix: Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-018 Date Collected: 04.08.15 15.25

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00574	0.0191	0.00574	ug/L	04.14.15 23.32	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	99	%	60-140	04.14.15 23.32	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 16.32	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 16.32	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 16.32	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 16.32	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 16.32	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 16.32	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 16.32	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 16.32	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 16.32	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 16.32	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 16.32	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 16.32	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 16.32	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 16.32	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 16.32	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 16.32	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 16.32	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	118	%	53-159	04.14.15 16.32	
4-Bromofluorobenzene	460-00-4	106	%	30-186	04.14.15 16.32	
Toluene-D8	2037-26-5	103	%	70-130	04.14.15 16.32	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-5R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-019 Date Collected: 04.09.15 09.45 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	**0.230**	0.0193	0.00578	ug/L	04.15.15 12.03	D	20

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	108	%	60-140	04.14.15 23.56	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.14.15 07.08
Seq Number: 966041

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	**17800**	200	32.0	ug/L	04.15.15 14.30	D	200
Toluene	108-88-3	**52400**	1000	140	ug/L	04.15.15 16.07	D	1000
Ethylbenzene	100-41-4	**5470**	200	38.0	ug/L	04.15.15 14.30	D	200
o-Xylene	95-47-6	**8240**	200	40.0	ug/L	04.15.15 14.30	D	200
m,p-Xylenes	179601-23-1	**20300**	400	102	ug/L	04.15.15 14.30	D	200
Xylenes, Total	1330-20-7	**28500**	200	40.0	ug/L	04.15.15 14.30		200
Methyl tert-butyl ether	1634-04-4	**1990**	400	36.0	ug/L	04.15.15 14.30	D	200
Naphthalene	91-20-3	**2360**	200	44.0	ug/L	04.15.15 14.30	D	200
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 16.56	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 16.56	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 16.56	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 16.56	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 16.56	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 16.56	U	1
tert-Amyl methyl ether	994-05-8	**124**	1.00	0.300	ug/L	04.14.15 16.56		1
tert-Amyl alcohol	75-85-4	**26600**	1000	220	ug/L	04.15.15 14.30	D	200
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 16.56	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	124	%	53-159	04.14.15 16.56	
4-Bromofluorobenzene	460-00-4	108	%	30-186	04.14.15 16.56	
Toluene-D8	2037-26-5	124	%	70-130	04.14.15 16.56	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-15R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-020 Date Collected: 04.09.15 10.55 Sample Depth: 39 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.14.15 11.33
Seq Number: 966051

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00586	0.0195	0.00586	ug/L	04.15.15 00.20	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	85	%	60-140	04.15.15 00.20	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 18.50	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 18.50	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 18.50	U	1
o-Xylene	95-47-6	**3.72**	1.00	0.200	ug/L	04.16.15 18.50		1
m,p-Xylenes	179601-23-1	**1.28**	2.00	0.510	ug/L	04.16.15 18.50	J	1
Xylenes, Total	1330-20-7	**5.00**	1.00	0.200	ug/L	04.16.15 18.50		1
Methyl tert-butyl ether	1634-04-4	**185**	2.00	0.180	ug/L	04.16.15 18.50		1
Naphthalene	91-20-3	**8.47**	1.00	0.220	ug/L	04.16.15 18.50		1
1,2-Dichloroethane	107-06-2	**1.01**	1.00	0.180	ug/L	04.16.15 18.50		1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 18.50	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 18.50	U	1
Diisopropyl ether	108-20-3	**8.69**	1.00	0.0800	ug/L	04.16.15 18.50		1
Ethyl tert-butyl alcohol	590-36-3	**75.0**	5.00	1.10	ug/L	04.16.15 18.50		1
tert-Butyl alcohol	75-65-0	**182**	5.00	1.00	ug/L	04.16.15 18.50		1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 18.50	U	1
tert-Amyl alcohol	75-85-4	**131**	5.00	1.10	ug/L	04.16.15 18.50		1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 18.50	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	124	%	53-159	04.16.15 18.50	
4-Bromofluorobenzene	460-00-4	104	%	30-186	04.16.15 18.50	
Toluene-D8	2037-26-5	100	%	70-130	04.16.15 18.50	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-12D 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-021 Date Collected: 04.09.15 10.55 Sample Depth: 75 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.15.15 12.13
Seq Number: 966133

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00607	0.0202	0.00607	ug/L	04.15.15 15.39	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	102	%	60-140	04.15.15 15.39	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 17.16	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 17.16	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 17.16	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 17.16	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 17.16	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 17.16	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.16.15 17.16	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 17.16	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 17.16	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 17.16	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 17.16	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 17.16	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 17.16	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 17.16	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 17.16	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 17.16	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 17.16	UX	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	132	%	53-159	04.16.15 17.16	
4-Bromofluorobenzene	460-00-4	109	%	30-186	04.16.15 17.16	
Toluene-D8	2037-26-5	104	%	70-130	04.16.15 17.16	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-12R 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-022 Date Collected: 04.09.15 11.25 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.15.15 12.13
Seq Number: 966133

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00601	0.0200	0.00601	ug/L	04.15.15 16.51	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	100	%	60-140	04.15.15 16.51	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 17.40	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 17.40	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 17.40	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 17.40	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 17.40	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 17.40	U	1
Methyl tert-butyl ether	1634-04-4	**14.7**	2.00	0.180	ug/L	04.16.15 17.40		1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 17.40	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 17.40	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 17.40	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 17.40	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 17.40	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 17.40	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 17.40	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 17.40	U	1
tert-Amyl alcohol	75-85-4	**72.1**	5.00	1.10	ug/L	04.16.15 17.40		1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 17.40	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	132	%	53-159	04.16.15 17.40	
4-Bromofluorobenzene	460-00-4	103	%	30-186	04.16.15 17.40	
Toluene-D8	2037-26-5	102	%	70-130	04.16.15 17.40	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-18 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-023 Date Collected: 04.09.15 11.45 Sample Depth: 20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.15.15 12.13
Seq Number: 966133

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00601	0.0200	0.00601	ug/L	04.15.15 17.16	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	92	%	60-140	04.15.15 17.16	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 18.03	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 18.03	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 18.03	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 18.03	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 18.03	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 18.03	U	1
Methyl tert-butyl ether	1634-04-4	**1.47**	2.00	0.180	ug/L	04.16.15 18.03	J	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 18.03	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 18.03	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 18.03	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 18.03	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 18.03	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 18.03	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 18.03	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 18.03	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 18.03	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 18.03	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	135	%	53-159	04.16.15 18.03	
4-Bromofluorobenzene	460-00-4	105	%	30-186	04.16.15 18.03	
Toluene-D8	2037-26-5	103	%	70-130	04.16.15 18.03	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **MW-18D 07680** Matrix: Ground Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-024 Date Collected: 04.09.15 12.05 Sample Depth: 49.20 ft

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.15.15 12.13
Seq Number: 966133

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00602	0.0201	0.00602	ug/L	04.15.15 17.40	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	99	%	60-140	04.15.15 17.40	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: MWE % Moisture:
Analyst: ZHO Date Prep: 04.16.15 11.43
Seq Number: 966212

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.16.15 18.27	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.16.15 18.27	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.16.15 18.27	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.16.15 18.27	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.16.15 18.27	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.16.15 18.27	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.16.15 18.27	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.16.15 18.27	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.16.15 18.27	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.16.15 18.27	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.16.15 18.27	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.16.15 18.27	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.16.15 18.27	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.16.15 18.27	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.16.15 18.27	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.16.15 18.27	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.16.15 18.27	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	139	%	53-159	04.16.15 18.27	
4-Bromofluorobenzene	460-00-4	105	%	30-186	04.16.15 18.27	
Toluene-D8	2037-26-5	100	%	70-130	04.16.15 18.27	

TERRACON, Columbia, SC

SC-015

Sample Id: **Field Blank 07680** Matrix: Water Date Received:04.11.15 09.49
Lab Sample Id: 505858-025 Date Collected: 04.09.15 12.10

Analytical Method: EDB by EPA 8011 Prep Method: SW8011P
Tech: CLAR % Moisture:
Analyst: CLAR Date Prep: 04.15.15 12.13
Seq Number: 966133

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
1,2-Dibromoethane	106-93-4	<0.00599	0.0200	0.00599	ug/L	04.15.15 18.04	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
4-Bromofluorobenzene	460-00-4	97	%	60-140	04.15.15 18.04	

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B
Tech: ZHO % Moisture:
Analyst: ZHO Date Prep: 04.14.15 06.54
Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 10.40	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 10.40	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 10.40	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 10.40	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 10.40	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 10.40	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 10.40	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 10.40	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 10.40	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 10.40	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 10.40	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 10.40	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 10.40	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 10.40	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 10.40	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 10.40	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 10.40	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	111	%	53-159	04.14.15 10.40	
4-Bromofluorobenzene	460-00-4	111	%	30-186	04.14.15 10.40	
Toluene-D8	2037-26-5	99	%	70-130	04.14.15 10.40	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **Trip Blank 07680** Matrix: Water Date Received:04.11.15 09.49

Lab Sample Id: 505858-026 Date Collected: 04.07.15 00.00

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B

Tech: ZHO % Moisture:

Analyst: ZHO Date Prep: 04.14.15 06.54

Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 10.13	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 10.13	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 10.13	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 10.13	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 10.13	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 10.13	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 10.13	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 10.13	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 10.13	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 10.13	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 10.13	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 10.13	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 10.13	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 10.13	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 10.13	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 10.13	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 10.13	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	110	%	53-159	04.14.15 10.13	
4-Bromofluorobenzene	460-00-4	113	%	30-186	04.14.15 10.13	
Toluene-D8	2037-26-5	98	%	70-130	04.14.15 10.13	

Certificate of Analytical Results 505858

TERRACON, Columbia, SC

SC-015

Sample Id: **Trip Blank 07680** Matrix: Water Date Received:04.11.15 09.49

Lab Sample Id: 505858-027 Date Collected: 04.07.15 00.00

Analytical Method: BTEX & Oxygenates by SW-846 8260B Prep Method: SW5030B

Tech: ZHO % Moisture:

Analyst: ZHO Date Prep: 04.14.15 06.54

Seq Number: 965973

Parameter	Cas Number	Result	RL	MDL	Units	Analysis Date	Flag	Dil
Benzene	71-43-2	<0.160	1.00	0.160	ug/L	04.14.15 11.07	U	1
Toluene	108-88-3	<0.140	1.00	0.140	ug/L	04.14.15 11.07	U	1
Ethylbenzene	100-41-4	<0.190	1.00	0.190	ug/L	04.14.15 11.07	U	1
o-Xylene	95-47-6	<0.200	1.00	0.200	ug/L	04.14.15 11.07	U	1
m,p-Xylenes	179601-23-1	<0.510	2.00	0.510	ug/L	04.14.15 11.07	U	1
Xylenes, Total	1330-20-7	<0.200	1.00	0.200	ug/L	04.14.15 11.07	U	1
Methyl tert-butyl ether	1634-04-4	<0.180	2.00	0.180	ug/L	04.14.15 11.07	U	1
Naphthalene	91-20-3	<0.220	1.00	0.220	ug/L	04.14.15 11.07	U	1
1,2-Dichloroethane	107-06-2	<0.180	1.00	0.180	ug/L	04.14.15 11.07	U	1
Ethanol	64-17-5	<8.00	20.0	8.00	ug/L	04.14.15 11.07	U	1
Ethyl tert-butyl ether	637-92-3	<0.300	1.00	0.300	ug/L	04.14.15 11.07	U	1
Diisopropyl ether	108-20-3	<0.0800	1.00	0.0800	ug/L	04.14.15 11.07	U	1
Ethyl tert-butyl alcohol	590-36-3	<1.10	5.00	1.10	ug/L	04.14.15 11.07	U	1
tert-Butyl alcohol	75-65-0	<1.00	5.00	1.00	ug/L	04.14.15 11.07	U	1
tert-Amyl methyl ether	994-05-8	<0.300	1.00	0.300	ug/L	04.14.15 11.07	U	1
tert-Amyl alcohol	75-85-4	<1.10	5.00	1.10	ug/L	04.14.15 11.07	U	1
tert-Butyl formate	762-75-4	<1.00	5.00	1.00	ug/L	04.14.15 11.07	U	1

Surrogate	Cas Number	% Recovery	Units	Limits	Analysis Date	Flag
1,2-Dichloroethane-D4	17060-07-0	113	%	53-159	04.14.15 11.07	
4-Bromofluorobenzene	460-00-4	110	%	30-186	04.14.15 11.07	
Toluene-D8	2037-26-5	99	%	70-130	04.14.15 11.07	

TERRACON

SC-015

Analytical Method: EDB by EPA 8011 — Prep Method: SW8011P
Seq Number: 966051 — Matrix: Water — Date Prep: 04.14.15
MB Sample Id: 691200-1-BLK — LCS Sample Id: 691200-1-BKS — LCSD Sample Id: 691200-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
1,2-Dibromoethane	<0.00600	0.150	0.144	96	0.154	103	60-140	7	30	ug/L	04.14.15 14:40	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	100		97		102		60-140	%	04.14.15 14:40

Analytical Method: EDB by EPA 8011 — Prep Method: SW8011P
Seq Number: 966133 — Matrix: Water — Date Prep: 04.15.15
MB Sample Id: 691253-1-BLK — LCS Sample Id: 691253-1-BKS — LCSD Sample Id: 691253-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
1,2-Dibromoethane	<0.00600	0.150	0.137	91	0.143	95	60-140	4	30	ug/L	04.15.15 14:51	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	100		95		96		60-140	%	04.15.15 14:51

Analytical Method: EDB by EPA 8011 — Prep Method: SW8011P
Seq Number: 966051 — Matrix: Ground Water — Date Prep: 04.14.15
Parent Sample Id: 505858-003 — MS Sample Id: 505858-003 S — MSD Sample Id: 505858-003 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
1,2-Dibromoethane	<0.00588	0.147	0.143	97	0.145	101	60-140	1	30	ug/L	04.14.15 16:41	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	100		99		60-140	%	04.14.15 16:41

Analytical Method: EDB by EPA 8011 — Prep Method: SW8011P
Seq Number: 966133 — Matrix: Ground Water — Date Prep: 04.15.15
Parent Sample Id: 505858-021 — MS Sample Id: 505858-021 S — MSD Sample Id: 505858-021 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
1,2-Dibromoethane	<0.00606	0.151	0.160	106	0.162	106	60-140	1	30	ug/L	04.15.15 16:03	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
4-Bromofluorobenzene	104		104		60-140	%	04.15.15 16:03

QC Summary 505858

TERRACON

SC-015

Analytical Method: **BTEX & Oxygenates by SW-846 8260B** Prep Method: SW5030B

Seq Number: 965973 Matrix: Water Date Prep: 04.14.15

MB Sample Id: 691217-1-BLK LCS Sample Id: 691217-1-BKS LCSD Sample Id: 691217-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	43.5	87	45.4	91	80-120	4	20	ug/L	04.14.15 07:51	
Toluene	<0.140	50.0	43.9	88	45.2	90	75-120	3	20	ug/L	04.14.15 07:51	
Ethylbenzene	<0.190	50.0	45.5	91	47.0	94	75-125	3	20	ug/L	04.14.15 07:51	
o-Xylene	<0.200	50.0	46.3	93	48.3	97	80-120	4	20	ug/L	04.14.15 07:51	
m,p-Xylenes	<0.510	100	88.9	89	93.3	93	75-130	5	20	ug/L	04.14.15 07:51	
Methyl tert-butyl ether	<0.180	100	93.6	94	94.1	94	65-125	1	20	ug/L	04.14.15 07:51	
Naphthalene	<0.220	50.0	42.6	85	43.7	87	55-140	3	20	ug/L	04.14.15 07:51	
1,2-Dichloroethane	<0.180	50.0	46.5	93	46.7	93	70-130	0	20	ug/L	04.14.15 07:51	
Ethanol	<8.00	2000	1830	92	2010	101	65-135	9	20	ug/L	04.14.15 07:51	
Ethyl tert-butyl ether	<0.300	50.0	47.4	95	48.3	97	65-135	2	20	ug/L	04.14.15 07:51	
Diisopropyl ether	<0.0800	50.0	46.4	93	47.2	94	65-135	2	20	ug/L	04.14.15 07:51	
Ethyl tert-butyl alcohol	<1.10	500	409	82	421	84	40-140	3	20	ug/L	04.14.15 07:51	
tert-Butyl alcohol	<1.00	500	459	92	459	92	65-135	0	20	ug/L	04.14.15 07:51	
tert-Amyl methyl ether	<0.300	50.0	45.2	90	46.3	93	65-135	2	20	ug/L	04.14.15 07:51	
tert-Amyl alcohol	<1.10	500	413	83	418	84	40-140	1	20	ug/L	04.14.15 07:51	
tert-Butyl formate	<1.00	250	237	95	241	96	40-140	2	20	ug/L	04.14.15 07:51	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	105		105		101		53-159	%	04.14.15 07:51
4-Bromofluorobenzene	112		96		96		30-186	%	04.14.15 07:51
Toluene-D8	100		99		97		70-130	%	04.14.15 07:51

TERRACON

SC-015

Analytical Method: BTEX & Oxygenates by SW-846 8260B — Prep Method: SW5030B
Seq Number: 966041 — Matrix: Water — Date Prep: 04.14.15
MB Sample Id: 691251-1-BLK — LCS Sample Id: 691251-1-BKS — LCSD Sample Id: 691251-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	42.0	84	44.3	89	80-120	5	20	ug/L	04.14.15 08:31	
Toluene	<0.140	50.0	41.2	82	44.7	89	75-120	8	20	ug/L	04.14.15 08:31	
Ethylbenzene	<0.190	50.0	46.4	93	49.5	99	75-125	6	20	ug/L	04.14.15 08:31	
o-Xylene	<0.200	50.0	42.9	86	45.4	91	80-120	6	20	ug/L	04.14.15 08:31	
m,p-Xylenes	<0.510	100	95.3	95	102	102	75-130	7	20	ug/L	04.14.15 08:31	
Methyl tert-butyl ether	<0.180	100	106	106	110	110	65-125	4	20	ug/L	04.14.15 08:31	
Naphthalene	<0.220	50.0	38.9	78	39.5	79	55-140	2	20	ug/L	04.14.15 08:31	
1,2-Dichloroethane	<0.180	50.0	49.7	99	51.6	103	70-130	4	20	ug/L	04.14.15 08:31	
Ethanol	<8.00	2000	1810	91	1770	89	65-135	2	20	ug/L	04.14.15 08:31	
Ethyl tert-butyl ether	<0.300	50.0	47.0	94	49.2	98	65-135	5	20	ug/L	04.14.15 08:31	
Diisopropyl ether	<0.0800	50.0	44.7	89	47.1	94	65-135	5	20	ug/L	04.14.15 08:31	
Ethyl tert-butyl alcohol	<1.10	500	446	89	467	93	40-140	5	20	ug/L	04.14.15 08:31	
tert-Butyl alcohol	<1.00	500	559	112	562	112	65-135	1	20	ug/L	04.14.15 08:31	
tert-Amyl methyl ether	<0.300	50.0	51.0	102	54.6	109	65-135	7	20	ug/L	04.14.15 08:31	
tert-Amyl alcohol	<1.10	500	481	96	488	98	40-140	1	20	ug/L	04.14.15 08:31	
tert-Butyl formate	<1.00	250	277	111	291	116	40-140	5	20	ug/L	04.14.15 08:31	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	132		113		113		53-159	%	04.14.15 08:31
4-Bromofluorobenzene	103		99		99		30-186	%	04.14.15 08:31
Toluene-D8	100		97		99		70-130	%	04.14.15 08:31

Analytical Method: BTEX & Oxygenates by SW-846 8260B — Prep Method: SW5030B
Seq Number: 966151 — Matrix: Water — Date Prep: 04.15.15
MB Sample Id: 691332-1-BLK — LCS Sample Id: 691332-1-BKS — LCSD Sample Id: 691332-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	43.5	87	44.9	90	80-120	3	20	ug/L	04.15.15 09:38	
Toluene	<0.140	50.0	44.0	88	47.4	95	75-120	7	20	ug/L	04.15.15 09:38	
Ethylbenzene	<0.190	50.0	49.2	98	53.0	106	75-125	7	20	ug/L	04.15.15 09:38	
o-Xylene	<0.200	50.0	45.5	91	47.5	95	80-120	4	20	ug/L	04.15.15 09:38	
m,p-Xylenes	<0.510	100	101	101	109	109	75-130	8	20	ug/L	04.15.15 09:38	
Methyl tert-butyl ether	<0.180	100	106	106	112	112	65-125	6	20	ug/L	04.15.15 09:38	
Naphthalene	<0.220	50.0	39.5	79	39.4	79	55-140	0	20	ug/L	04.15.15 09:38	
tert-Amyl alcohol	<1.10	500	482	96	520	104	40-140	8	20	ug/L	04.15.15 09:38	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	131		109		116		53-159	%	04.15.15 09:38
4-Bromofluorobenzene	103		100		99		30-186	%	04.15.15 09:38
Toluene-D8	103		97		98		70-130	%	04.15.15 09:38

QC Summary 505858

TERRACON

SC-015

Analytical Method: **BTEX & Oxygenates by SW-846 8260B** Prep Method: SW5030B

Seq Number: 966212 Matrix: Water Date Prep: 04.16.15

MB Sample Id: 691366-1-BLK LCS Sample Id: 691366-1-BKS LCSD Sample Id: 691366-1-BSD

Parameter	MB Result	Spike Amount	LCS Result	LCS %Rec	LCSD Result	LCSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	42.9	86	42.2	84	80-120	2	20	ug/L	04.16.15 12:57	
Toluene	<0.140	50.0	43.5	87	42.8	86	75-120	2	20	ug/L	04.16.15 12:57	
Ethylbenzene	<0.190	50.0	48.4	97	48.6	97	75-125	0	20	ug/L	04.16.15 12:57	
o-Xylene	<0.200	50.0	43.3	87	44.1	88	80-120	2	20	ug/L	04.16.15 12:57	
m,p-Xylenes	<0.510	100	101	101	100	100	75-130	1	20	ug/L	04.16.15 12:57	
Methyl tert-butyl ether	<0.180	100	105	105	106	106	65-125	1	20	ug/L	04.16.15 12:57	
Naphthalene	<0.220	50.0	38.2	76	38.1	76	55-140	0	20	ug/L	04.16.15 12:57	
1,2-Dichloroethane	<0.180	50.0	50.9	102	50.3	101	70-130	1	20	ug/L	04.16.15 12:57	
Ethanol	<8.00	2000	1800	90	1840	92	65-135	2	20	ug/L	04.16.15 12:57	
Ethyl tert-butyl ether	<0.300	50.0	45.3	91	45.9	92	65-135	1	20	ug/L	04.16.15 12:57	
Diisopropyl ether	<0.0800	50.0	44.4	89	45.8	92	65-135	3	20	ug/L	04.16.15 12:57	
Ethyl tert-butyl alcohol	<1.10	500	458	92	463	93	40-140	1	20	ug/L	04.16.15 12:57	
tert-Butyl alcohol	<1.00	500	551	110	564	113	65-135	2	20	ug/L	04.16.15 12:57	
tert-Amyl methyl ether	<0.300	50.0	51.1	102	50.9	102	65-135	0	20	ug/L	04.16.15 12:57	
tert-Amyl alcohol	<1.10	500	467	93	489	98	40-140	5	20	ug/L	04.16.15 12:57	
tert-Butyl formate	<1.00	250	273	109	268	107	40-140	2	20	ug/L	04.16.15 12:57	

Surrogate	MB %Rec	MB Flag	LCS %Rec	LCS Flag	LCSD %Rec	LCSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	130		112		112		53-159	%	04.16.15 12:57
4-Bromofluorobenzene	105		100		97		30-186	%	04.16.15 12:57
Toluene-D8	103		97		98		70-130	%	04.16.15 12:57

TERRACON

SC-015

Analytical Method: **BTEX & Oxygenates by SW-846 8260B** Prep Method: SW5030B

Seq Number: 965973 Matrix: Ground Water Date Prep: 04.14.15

Parent Sample Id: 505858-004 MS Sample Id: 505858-004 S MSD Sample Id: 505858-004 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	44.6	89	44.8	90	77-118	0	20	ug/L	04.14.15 17:49	
Toluene	<0.140	50.0	62.2	124	60.6	121	65-123	3	20	ug/L	04.14.15 17:49	X
Ethylbenzene	<0.190	50.0	48.0	96	48.1	96	66-127	0	20	ug/L	04.14.15 17:49	
o-Xylene	<0.200	50.0	52.0	104	51.9	104	64-123	0	20	ug/L	04.14.15 17:49	
m,p-Xylenes	<0.510	100	101	101	101	101	65-126	0	20	ug/L	04.14.15 17:49	
Methyl tert-butyl ether	<0.180	100	103	103	107	107	58-141	4	20	ug/L	04.14.15 17:49	
Naphthalene	1.15	50.0	47.4	93	49.3	96	30-148	4	20	ug/L	04.14.15 17:49	
1,2-Dichloroethane	<0.180	50.0	41.1	82	41.0	82	55-141	0	20	ug/L	04.14.15 17:49	
Ethanol	<8.00	2000	1990	100	2060	103	38-162	3	20	ug/L	04.14.15 17:49	
Ethyl tert-butyl ether	<0.300	50.0	48.4	97	49.6	99	66-135	2	20	ug/L	04.14.15 17:49	
Diisopropyl ether	<0.0800	50.0	45.1	90	46.9	94	59-148	4	20	ug/L	04.14.15 17:49	
Ethyl tert-butyl alcohol	<1.10	500	445	89	467	93	17-136	5	20	ug/L	04.14.15 17:49	
tert-Butyl alcohol	<1.00	500	494	99	518	104	65-135	5	20	ug/L	04.14.15 17:49	
tert-Amyl methyl ether	<0.300	50.0	47.9	96	47.7	95	56-136	0	20	ug/L	04.14.15 17:49	
tert-Amyl alcohol	<1.10	500	447	89	473	95	40-140	6	20	ug/L	04.14.15 17:49	
tert-Butyl formate	<1.00	500	242	48	248	50	25-148	2	20	ug/L	04.14.15 17:49	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	94		93		53-159	%	04.14.15 17:49
4-Bromofluorobenzene	109		110		30-186	%	04.14.15 17:49
Toluene-D8	98		99		70-130	%	04.14.15 17:49

TERRACON

SC-015

Analytical Method: BTEX & Oxygenates by SW-846 8260B — Prep Method: SW5030B
Seq Number: 966041 — Matrix: Ground Water — Date Prep: 04.14.15
Parent Sample Id: 505684-001 — MS Sample Id: 505684-001 S — MSD Sample Id: 505684-001 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	45.8	92	42.7	85	77-118	7	20	ug/L	04.14.15 18:29	
Toluene	<0.140	50.0	56.8	114	50.6	101	65-123	12	20	ug/L	04.14.15 18:29	
Ethylbenzene	<0.190	50.0	48.0	96	45.1	90	66-127	6	20	ug/L	04.14.15 18:29	
o-Xylene	<0.200	50.0	47.0	94	43.6	87	64-123	8	20	ug/L	04.14.15 18:29	
m,p-Xylenes	<0.510	100	107	107	99.8	100	65-126	7	20	ug/L	04.14.15 18:29	
Methyl tert-butyl ether	<0.180	100	89.1	89	85.2	85	58-141	4	20	ug/L	04.14.15 18:29	
Naphthalene	21.7	50.0	58.9	74	57.4	71	30-148	3	20	ug/L	04.14.15 18:29	
1,2-Dichloroethane	<0.180	50.0	39.9	80	38.1	76	55-141	5	20	ug/L	04.14.15 18:29	
Ethanol	<8.00	2000	1580	79	1450	73	38-162	9	20	ug/L	04.14.15 18:29	
Ethyl tert-butyl ether	<0.300	50.0	44.9	90	44.6	89	66-135	1	20	ug/L	04.14.15 18:29	
Diisopropyl ether	<0.0800	50.0	37.0	74	36.1	72	59-148	2	20	ug/L	04.14.15 18:29	
Ethyl tert-butyl alcohol	<1.10	500	510	102	508	102	17-136	0	20	ug/L	04.14.15 18:29	
tert-Butyl alcohol	<1.00	500	617	123	603	121	65-135	2	20	ug/L	04.14.15 18:29	
tert-Amyl methyl ether	<0.300	50.0	51.5	103	49.3	99	56-136	4	20	ug/L	04.14.15 18:29	
tert-Amyl alcohol	<1.10	500	517	103	500	100	40-140	3	20	ug/L	04.14.15 18:29	
tert-Butyl formate	<1.00	500	10.2	2	7.29	1	25-148	33	20	ug/L	04.14.15 18:29	XF

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	90		88		53-159	%	04.14.15 18:29
4-Bromofluorobenzene	102		105		30-186	%	04.14.15 18:29
Toluene-D8	100		99		70-130	%	04.14.15 18:29

Analytical Method: BTEX & Oxygenates by SW-846 8260B — Prep Method: SW5030B
Seq Number: 966151 — Matrix: Ground Water — Date Prep: 04.15.15
Parent Sample Id: 505866-006 — MS Sample Id: 505866-006 S — MSD Sample Id: 505866-006 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	42.1	84	41.4	83	77-118	2	20	ug/L	04.15.15 19:21	
Toluene	2.34	50.0	44.8	85	42.9	81	65-123	4	20	ug/L	04.15.15 19:21	
Ethylbenzene	<0.190	50.0	48.7	97	47.6	95	66-127	2	20	ug/L	04.15.15 19:21	
o-Xylene	3.19	50.0	44.0	82	44.6	83	64-123	1	20	ug/L	04.15.15 19:21	
m,p-Xylenes	1.84	100	101	99	97.1	95	65-126	4	20	ug/L	04.15.15 19:21	
Methyl tert-butyl ether	<0.180	100	99.8	100	99.2	99	58-141	1	20	ug/L	04.15.15 19:21	
Naphthalene	<0.220	50.0	39.9	80	39.7	79	30-148	1	20	ug/L	04.15.15 19:21	
tert-Amyl alcohol	<1.10	500	475	95	459	92	40-140	3	20	ug/L	04.15.15 19:21	

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	109		105		53-159	%	04.15.15 19:21
4-Bromofluorobenzene	97		98		30-186	%	04.15.15 19:21
Toluene-D8	95		96		70-130	%	04.15.15 19:21

QC Summary 505858

TERRACON

SC-015

Analytical Method: **BTEX & Oxygenates by SW-846 8260B** Prep Method: SW5030B

Seq Number: 966212 Matrix: Ground Water Date Prep: 04.16.15

Parent Sample Id: 505858-021 MS Sample Id: 505858-021 S MSD Sample Id: 505858-021 SD

Parameter	Parent Result	Spike Amount	MS Result	MS %Rec	MSD Result	MSD %Rec	Limits	%RPD	RPD Limit	Units	Analysis Date	Flag
Benzene	<0.160	50.0	43.1	86	41.8	84	77-118	3	20	ug/L	04.16.15 23:46	
Toluene	<0.140	50.0	42.3	85	40.6	81	65-123	4	20	ug/L	04.16.15 23:46	
Ethylbenzene	<0.190	50.0	44.4	89	43.4	87	66-127	2	20	ug/L	04.16.15 23:46	
o-Xylene	<0.200	50.0	40.7	81	40.6	81	64-123	0	20	ug/L	04.16.15 23:46	
m,p-Xylenes	<0.510	100	92.2	92	89.6	90	65-126	3	20	ug/L	04.16.15 23:46	
Methyl tert-butyl ether	<0.180	100	87.7	88	86.9	87	58-141	1	20	ug/L	04.16.15 23:46	
Naphthalene	<0.220	50.0	37.9	76	38.8	78	30-148	2	20	ug/L	04.16.15 23:46	
1,2-Dichloroethane	<0.180	50.0	39.3	79	38.6	77	55-141	2	20	ug/L	04.16.15 23:46	
Ethanol	<8.00	2000	1510	76	1560	78	38-162	3	20	ug/L	04.16.15 23:46	
Ethyl tert-butyl ether	<0.300	50.0	44.7	89	44.2	88	66-135	1	20	ug/L	04.16.15 23:46	
Diisopropyl ether	<0.0800	50.0	37.1	74	36.8	74	59-148	1	20	ug/L	04.16.15 23:46	
Ethyl tert-butyl alcohol	<1.10	500	444	89	427	85	17-136	4	20	ug/L	04.16.15 23:46	
tert-Butyl alcohol	<1.00	500	603	121	601	120	65-135	0	20	ug/L	04.16.15 23:46	
tert-Amyl methyl ether	<0.300	50.0	50.5	101	49.5	99	56-136	2	20	ug/L	04.16.15 23:46	
tert-Amyl alcohol	<1.10	500	472	94	472	94	40-140	0	20	ug/L	04.16.15 23:46	
tert-Butyl formate	<1.00	500	<1.00	0	<1.00	0	25-148	NC	20	ug/L	04.16.15 23:46	X

Surrogate	MS %Rec	MS Flag	MSD %Rec	MSD Flag	Limits	Units	Analysis Date
1,2-Dichloroethane-D4	88		89		53-159	%	04.16.15 23:46
4-Bromofluorobenzene	101		101		30-186	%	04.16.15 23:46
Toluene-D8	99		98		70-130	%	04.16.15 23:46

COC# ATL300281

Page _____ of _____

XENCO LABORATORIES
CHAIN OF CUSTODY

6017 Financial Drive, Norcross, GA 30071
Phone # (770) 449-8800 Fax # (770) 449-5477

Company Name: Terracon	Receiver's Initials/Temp: HA / 13.8
Address: 521 Clemson Rd Columbia SC 29229	Custody Seal(s): Y (Y) N Lab Work Order # 505858
Results Sent to: Reagan Norris	P.O.# (if required):
Email address: RWNorris@Terracon.com	Field Comments / Lab Precautions:
Contact Phone #: 8037419000 Cell#: 803 518 4707	
Project Name (Site): SC-015	
Project Number (ID): 73078012	
Regulatory Program: UST	

Sampler(s): (signature)

Sampler(s): (printed) Neil Acree

Analysis Requested

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	Container Type: G	Container Type: G	Chemical Preservation Code: 1	Chemical Preservation Code: 0
								Benzenes Methyl-tert-butyl ether	EDB		
1	MW-12d 07680	75	4.9.15 1055	GW		X	5	2	3		
2	MW-12R 07680	20	4.9.15 1125	GW		X	5	2	3		
3	MW-18 07680	20	4.9.15 1145	GW		X	5	2	3		
4	MW-18d 07680	49.20	4.9.15 1205	GW		X	5	2	3		
5	FieldBlank07680		4.9.15 1210	W		X	5	2	3		
6	TripBlk07680			W		X	2		2		
7	TripBlk07680			W		X	2		2		
8											
9											
10											

1) Relinquished By:	Date / Time 4.9.15 1300	2) Received By:	Date / Time 4/9/15 13:00
3) Relinquished By:	Date / Time 4/11/15 944	4) Received By:	Date / Time 4/11/15 944
5) Relinquished By:	Date / Time	6) Received By:	Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

Turnaround Time (business days)
TAT Starts when samples are rec'd by 2PM
___10 Days ; ___5-7 Days; ___3 Days
___2 Days ; ___1 Day; ___Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)

Chemical Preservation Codes: 1 = HCL / 2 = HNO_3 / 3 = H_2SO_4 / 4 = NaOH + $NaAsO_2$ / 5 = NaOH + ZnAc / 6 = $Na_2S_2O_3$ / 7 = $NaHSO_4$ & MeOH / 8 = DI Water & MeOH

Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

COC# ATL300279

XENCO LABORATORIES
CHAIN OF CUSTODY

Page _____ of _____
6017 Financial Drive, Norcross, GA 30071
Phone # (770) 449-8800 Fax # (770) 449-5477

Company Name: TERRACON	Receiver's Initials/Temp: HB / 3.8
Address: 521 Clemson Rd Columbia SC	Custody Seal(s): Y (Y) N Lab Work Order # 505858
Results Sent to: REGAN NORRIS	P.O.# (if required):
Email address: RWNORRIS@TERRACON.COM	Field Comments / Lab Precautions:
Contact Phone #: 8037449000 Cell#: 8035184707	
Project Name (Site): SC-015	
Project Number (ID): 73078012	Container Type:
Regulatory Program:	Chemical Preservation Code:
Sampler(s): (signature)	Sampler(s): (printed) NEIL AKRE

Analysis Requested

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	BTEX MTBE DCA EDB	EDB
1	MW-1R 07680	28	4.7.15 1200	GW		X	5	2	3
2	MW-8 07680	25	4.7.15 1220	GW		X	5	2	3
3	MW-11R 07680	30	4.7.15 1235	GW		X	5	2	3
4	MW-16 07680	35	4.7.15 1025	GW		X	5	2	3
5	MW-19 07680	34.60	4.7.15 1315	GW		X	5	2	3
6	MW-20 07680	33.70	4.7.15 1345	GW		X	5	2	3
7	MW-21 07680	20	4.7.15 1125	GW		X	5	2	3
8	MW-21dup 07680	20	4.7.15 1125	GW		X	5	2	3
9	FieldBlank 07680		4.7.15 0810	W		X	5	2	3
10	MW-5D 07680	85	4.8.15 1115	GW		X	5	2	3

1) Relinquished By:	Date / Time 4.9.15 1300	2) Received By:	Date / Time 4/9/15 13:00
3) Relinquished By: Fedex	Date / Time 4/11/15 9AM	4) Received By:	Date / Time 4/11/15 9AM
5) Relinquished By:	Date / Time	6) Received By:	Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

Turnaround Time (business days)
TAT Starts when samples are rec'd by 2PM
___10 Days ; ___5-7 Days; ___3 Days
___2 Days ; ___1 Day; ___Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)
Chemical Preservation Codes: 1 = HCL / 2 = HNO_3 / 3 = H_2SO_4 / 4 = NaOH + $NaAsO_2$ / 5 = NaOH + ZnAc / 6 = $Na_2S_2O_3$ / 7 = $NaHSO_4$ & MeOH / 8 = DI Water & MeOH
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

XENCO LABORATORIES

XENCO LABORATORIES
CHAIN OF CUSTODY

COC# ATL300280

Page _____ of _____

6017 Financial Drive, Norcross, GA 30071
Phone # (770) 449-8800 Fax # (770) 449-5477

Company Name: Terracon	Receiver's Initials/Temp: KA / 3.8
Address: 521 Chemsford Rd Columbia, SC 29229	Custody Seal(s): Y (Y) N Lab Work Order # 505858
Results Sent to: Ryan Norris	P.O.# (if required):
Email address: RWNorris@Terracon.com	Field Comments / Lab Precautions:
Contact Phone #: 803 741 9000 Cell#: 803 518 4707	
Project Name (Site): SC-615	
Project Number (ID): 73078012	
Regulatory Program: UST	

Container Type: G

Chemical Preservation Code: 6

Sampler(s): (signature)

Sampler(s): (printed) Neil Hare

Analysis Requested

Line No.	Sample ID #	Sample Depth (Ft)	Collection Date / Time	Matrix (See below)	Composite	Grab	No. of Containers	BTEX + MTBE + DCA + EDB	
1	MW-5d 07680	117	4.8.15 0915	GW		X	5	2	3
2	MW-7R 07680	25	4.8.15 1245	GW		X	5	2	3
3	MW-7Rdup 07680	25	4.8.15 1245	GW		X	5	2	3
4	MW-9R 07680	20	4.8.15 1400	GW		X	5	2	3
5	MW-13 07680	16.5	4.8.15 1325	GW		X	5	2	3
6	MW-17 07680	39.5	4.8.15 1520	GW		X	5	2	3
7	DW-1 07680	39	4.8.15 1440	GW		X	5	2	3
8	Field blank 07680		4.8.15 1525	W		X	5	2	3
9	MW-5R 07680	20	4.9.15 0945	GW		X	5	2	3
10	MW-15R 07680	39	4.9.15 1055	GW		X	5	2	3

1) Relinquished By:	Date / Time 4.9.15 1300	2) Received By:	Date / Time 4/9/15 13:00
3) Relinquished By: Fedex	Date / Time 4/11/15 9AM	4) Received By:	Date / Time 4/9/15 9AM
5) Relinquished By:	Date / Time	6) Received By:	Date / Time

Delivered by: (Circle One)
Fed Ex / UPS / Courier / Lab Pickup / Hand / Other

Turnaround Time (business days)
TAT Starts when samples are rec'd by 2PM
___10 Days ; ___5-7 Days; ___3 Days
___2 Days ; ___1 Day; ___Same Day

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air) (C = Air Cartridge)

Chemical Preservation Codes: 1 = HCL / 2 = HNO_3 / 3 = H_2SO_4 / 4 = NaOH + $NaAsO_2$ / 5 = NaOH + ZnAc / 6 = $Na_2S_2O_3$ / 7 = $NaHSO_4$ & MeOH / 8 = DI Water & MeOH

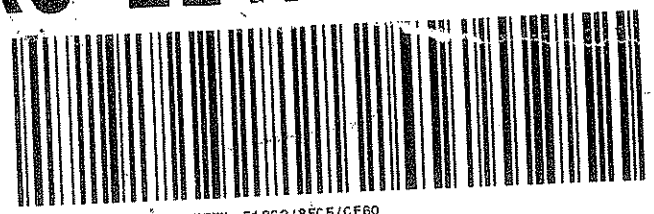
Container Type: VC=Vial (Clear); VA =Vial (Amber); GC=Glass (Clear); GA=Glass (Amber); P=Plastic (HDPE); TB=Tedlar Bag; ES=EnCore Sampler; ZB=Ziploc Bag; O=Other

SATURDAY 12:00P
PRIORITY OVERNIGHT

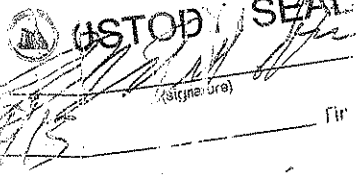
TRK# 0215 8047 7449 4426

30071
GA-US
ATL

XO LIYA



5068569 11Apr 01:14 MEMH 512C2/8FC5/CF60



Person Collecting Sample _____ Sample No. _____
(signature)

_____ Time Collected _____

XENCO Laboratories

Prelogin/Nonconformance Report- Sample Log-In

Florida Testing Services, LLC

Client: TERRACON

Date/ Time Received: 04/11/2015 09:49:00 AM

Work Order #: 505858

Acceptable Temperature Range: 0 - 6 degC
Air and Metal samples Acceptable Range: Ambient

Temperature Measuring device used :

Sample Receipt Checklist		Comments
#1 *Temperature of cooler(s)?	3.8	
#2 *Shipping container in good condition?	**Yes**	
#3 *Samples received on ice?	**Yes**	
#4 *Custody Seals intact on shipping container/ cooler?	**Yes**	
#5 Custody Seals intact on sample bottles?	**N/A**	
#6 *Custody Seals Signed and dated?	**N/A**	
#7 *Chain of Custody present?	**Yes**	
#8 Sample instructions complete on Chain of Custody?	**Yes**	Trip Blanks are listed on COC for EDB analysis; spoke with Regan Norris at Terracon, he advised they are for BETEX/MTBE/NAPH/DCAC analysis not EDB
#9 Any missing/extra samples?	**No**	
#10 Chain of Custody signed when relinquished/ received?	**Yes**	
#11 Chain of Custody agrees with sample label(s)?	**Yes**	
#12 Container label(s) legible and intact?	**Yes**	
#13 Sample matrix/ properties agree with Chain of Custody?	**Yes**	
#14 Samples in proper container/ bottle?	**Yes**	
#15 Samples properly preserved?	**Yes**	
#16 Sample container(s) intact?	**Yes**	
#17 Sufficient sample amount for indicated test(s)?	**Yes**	
#18 All samples received within hold time?	**Yes**	
#19 Subcontract of sample(s)?	**No**	
#20 VOC samples have zero headspace (less than 1/4 inch bubble)?	**Yes**	
#21 <2 for all samples preserved with HNO3,HCL, H2SO4? Except for samples for the analysis of HEM or HEM-SGT which are verified by the analysts.	**Yes**	
#22 >10 for all samples preserved with NaAsO2+NaOH, ZnAc+NaOH?	**N/A**	

*** Must be completed for after-hours delivery of samples prior to placing in the refrigerator**

Analyst: PAT

PH Device/Lot#: I-016662-10

Checklist completed by: J. Derek Rounsley Date: 04/13/2015

Checklist reviewed by: Allen Barnes Date: 04/13/2015

APPENDIX G

Disposal Manifest

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	803-926-0089	2 1 0 4 2

GENERATOR

5. Generator's Name and Mailing Address

40 Hudson St. STE 107
Annapolis, MD 21401-

Generator's Phone: 741-9000

Generator's Site Address (if different than mailing address)

Crown Central LLC- SC 015
3800 Devine Street
Columbia, SC

6. Transporter 1 Company Name: Terracon — U.S. EPA ID Number:

7. Transporter 2 Company Name — U.S. EPA ID Number:

8. Designated Facility Name and Site Address

Regulatory Solutions, Inc.
40 Pascon Court
Gaston, SC, 29053-
803-926-0089

U.S. EPA ID Number:

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA, NON-DOT REGULATED MATERIAL 10660 - 1042	1	T T	1 2	8 g	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: Neil Akre — Signature: — Month: 4 — Day: 23 — Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: Neil Akre — Signature: — Month: 4 — Day: 23 — Year: 15

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Amy McKenzie — Signature: Amy McKenzie — Month: 4 — Day: 23 — Year: 15

169-BLC-O 5 11977 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

APPENDIX K

SCDHEC QAPP Contractors Checklist

CONTRACTOR CHECKLIST

Terracon

Item #	Item	Yes	No	N/A
1	Is Facility Name, Permit #, and address provided?	X		
2	Is UST Owner/Operator name, address, & phone number provided?			X
3	Is name, address, & phone number of current property owner provided?	X		
4	Is the DHEC Certified UST Site Rehabilitation Contractor's Name, Address, telephone number, and certification number provided?	X		
5	Is the name, address, telephone number, and certification number of the well driller that installed borings/monitoring wells provided?			X
6	Is the name, address, telephone number, and certification number of the certified laboratory(ies) performing analytical analyses provided?	X		
7	Has the facility history been summarized?	X		
8	Has the regional geology and hydrogeology been described?	X		
9	Are the receptor survey results provided as required?			X
10	Has current use of the site and adjacent land been described?	X		
11	Has the site-specific geology and hydrogeology been described?	X		
12	Has the primary soil type been described?	X		
13	Have field screening results been described?			X
14	Has a description of the soil sample collection and preservation been detailed?			X
15	Has the field screening methodology and procedure been detailed?			X
16	Has the monitoring well installation and development dates been provided?			X
17	Has the method of well development been detailed?			X
18	Has justification been provided for the locations of the monitoring wells?			X
19	Have the monitoring wells been labeled in accordance with the UST QAPP guidelines?			X
20	Has the groundwater sampling methodology been detailed?	X		
21	Have the groundwater sampling dates and groundwater measurements been provided?	X		
22	Has the purging methodology been detailed?	X		
23	Has the volume of water purged from each well been provided along with measurements to verify that purging is complete?	X		
24	If free-product is present, has the thickness been provided?			X
25	Does the report include a brief discussion of the assessment done and the results?			X
26	Does the report include a brief discussion of the aquifer evaluation and results?			X
27	Does the report include a brief discussion of the fate & transport models used?			X
28	Are the site-conceptual model tables included? (Tier 1 Risk Evaluation)			X
29	Have the exposure pathways been analyzed? (Tier 2 Risk Evaluation)			X
30	Have the SSTLs for each compound and pathway been calculated? (Tier 2 Risk Evaluation)			X

Item #	Item	Yes	No	N/A
31	Have recommendations for further action been provided and explained?	X		
32	Has the soil analytical data for the site been provided in tabular format? (Table 1)			X
33	Has the potentiometric data for the site been provided in tabular format? (Table 2)	X		
34	Has the current and historical laboratory data been provided in tabular format?	X		
35	Have the aquifer characteristics been provided and summarized on the appropriate form?			X
36	Have the Site conceptual model tables been included? (Tier 1 Risk Evaluation)			X
37	Has the topographic map been provided with all required elements? (Figure 1)	X		
38	Has the site base map been provided with all required elements? (Figure 2)	X		
39	Have the CoC site maps been provided? (Figure 3 & Figure 4)	X		
40	Has the site potentiometric map been provided? (Figure 5)	x		
41	Have the geologic cross-sections been provided? (Figure 6)			X
42	Have maps showing the predicted migration of the CoCs through time been provided? (Tier 2 Risk Evaluation)			X
43	Has the site survey been provided and include all necessary elements? (Appendix A)			X
44	Have the sampling logs, chain of custody forms, and the analytical data package been included with all required elements? (Appendix B)	X		
45	Is the laboratory performing the analyses properly certified?	X		
46	Has the tax map been included with all necessary elements? (Appendix C)			X
47	Have the soil boring/field screening logs been provided? (Appendix D)			X
48	Have the well completion logs and SCDHEC Form 1903 been provided? (Appendix E)			X
49	Have the aquifer evaluation forms, data, graphs, equations, etc. been provided? (Appendix F)			X
50	Have the disposal manifests been provided? (Appendix G)	X		
51	Has a copy of the local zoning regulations been provided? (Appendix H)			X
52	Has all fate and transport modeling been provided? (Appendix I)			X
53	Have copies of all access agreements obtained by the contractor been provided? (Appendix J)			X
54	Has a copy of this form been attached to the final report and are explanations for any missing or incomplete data been provided?	X		

Notes:

CONTRACTOR CHECKLIST

Terracon

Item #	Item	Yes	No	N/A
1	Is Facility Name, Permit #, and address provided?	X		
2	Is UST Owner/Operator name, address, & phone number provided?			X
3	Is name, address, & phone number of current property owner provided?	X		
4	Is the DHEC Certified UST Site Rehabilitation Contractor's Name, Address, telephone number, and certification number provided?	X		
5	Is the name, address, telephone number, and certification number of the well driller that installed borings/monitoring wells provided?			X
6	Is the name, address, telephone number, and certification number of the certified laboratory(ies) performing analytical analyses provided?	X		
7	Has the facility history been summarized?	X		
8	Has the regional geology and hydrogeology been described?	X		
9	Are the receptor survey results provided as required?			X
10	Has current use of the site and adjacent land been described?	X		
11	Has the site-specific geology and hydrogeology been described?	X		
12	Has the primary soil type been described?	X		
13	Have field screening results been described?			X
14	Has a description of the soil sample collection and preservation been detailed?			X
15	Has the field screening methodology and procedure been detailed?			X
16	Has the monitoring well installation and development dates been provided?			X
17	Has the method of well development been detailed?			X
18	Has justification been provided for the locations of the monitoring wells?			X
19	Have the monitoring wells been labeled in accordance with the UST QAPP guidelines?			X
20	Has the groundwater sampling methodology been detailed?	X		
21	Have the groundwater sampling dates and groundwater measurements been provided?	X		
22	Has the purging methodology been detailed?	X		
23	Has the volume of water purged from each well been provided along with measurements to verify that purging is complete?	X		
24	If free-product is present, has the thickness been provided?			X
25	Does the report include a brief discussion of the assessment done and the results?			X
26	Does the report include a brief discussion of the aquifer evaluation and results?			X
27	Does the report include a brief discussion of the fate & transport models used?			X
28	Are the site-conceptual model tables included? (Tier 1 Risk Evaluation)			X
29	Have the exposure pathways been analyzed? (Tier 2 Risk Evaluation)			X
30	Have the SSTLs for each compound and pathway been calculated? (Tier 2 Risk Evaluation)			X

Item #	Item	Yes	No	N/A
31	Have recommendations for further action been provided and explained?	X		
32	Has the soil analytical data for the site been provided in tabular format? (Table 1)			X
33	Has the potentiometric data for the site been provided in tabular format? (Table 2)	X		
34	Has the current and historical laboratory data been provided in tabular format?	X		
35	Have the aquifer characteristics been provided and summarized on the appropriate form?			X
36	Have the Site conceptual model tables been included? (Tier 1 Risk Evaluation)			X
37	Has the topographic map been provided with all required elements? (Figure 1)	X		
38	Has the site base map been provided with all required elements? (Figure 2)	X		
39	Have the CoC site maps been provided? (Figure 3 & Figure 4)	X		
40	Has the site potentiometric map been provided? (Figure 5)	x		
41	Have the geologic cross-sections been provided? (Figure 6)			X
42	Have maps showing the predicted migration of the CoCs through time been provided? (Tier 2 Risk Evaluation)			X
43	Has the site survey been provided and include all necessary elements? (Appendix A)			X
44	Have the sampling logs, chain of custody forms, and the analytical data package been included with all required elements? (Appendix B)	X		
45	Is the laboratory performing the analyses properly certified?	X		
46	Has the tax map been included with all necessary elements? (Appendix C)			X
47	Have the soil boring/field screening logs been provided? (Appendix D)			X
48	Have the well completion logs and SCDHEC Form 1903 been provided? (Appendix E)			X
49	Have the aquifer evaluation forms, data, graphs, equations, etc. been provided? (Appendix F)			X
50	Have the disposal manifests been provided? (Appendix G)	X		
51	Has a copy of the local zoning regulations been provided? (Appendix H)			X
52	Has all fate and transport modeling been provided? (Appendix I)			X
53	Have copies of all access agreements obtained by the contractor been provided? (Appendix J)			X
54	Has a copy of this form been attached to the final report and are explanations for any missing or incomplete data been provided?	X		

Notes:

D H E C
PROMOTE PROTECT PROSPER

Catherine E. Heigel, Director
Promoting and protecting the health of the public and the environment



MR JIM JANSON
CROWN CENTRAL LLC C/O QES
40 HUDSON ST STE 107
ANNAPOLIS MD 21401

JUL 17 2015

Re: **Aggressive Fluid and Vapor Directive**
Former Crown SC-015, 3800 Devine St, Columbia, SC
UST Permit # 07680; CA# 50592
Release reported August 15, 1989
Monitoring Report received June 19, 2015
Richland County

Dear Mr. Janson:

The Underground Storage Tank (UST) Management Division of the South Carolina Department of Health and Environmental Control (Agency) recognizes your commitment to continue work at this site using Terracon as your contractor.

In accordance with Section 280.64 of the South Carolina Underground Storage Tank Control Regulations, an Aggressive Fluid and Vapor Recovery (AFVR) event may proceed immediately upon receipt of this letter as outlined in this directive and the UST Quality Assurance Program Plan (QAPP) Revision 2.0. **Please be aware that the AFVR Procedures have been updated.** Four 48-hour events utilizing monitoring wells MW-5R and MW-21 should be performed. Each event should be spaced at least one week apart. The stingers shall be lowered at six inch intervals starting at the water table interface to a target depth of 18 feet in the wells. Please advance to the target depth within the first eight (8) hours of the event. Thereafter, the stinger should be adjusted to achieve the highest vapor recovery while maintaining dewatering of the smear zone. Off-gas treatment will be necessary. A copy of Agency QAPP Revision 2.0 for the Underground Storage Tank Division is available at http://www.scdhec.gov/environment/PermitCentral/ApplicationForms/#UST.

As soon as the beginning date of the event has been scheduled, please contact Sonya Utz at utzst@dhec.sc.gov.

The AFVR Report should be submitted within 90 days from the date of this correspondence. Please note that all applicable South Carolina certification requirements apply to the services and report preparation. All site rehabilitation activities must be performed and submitted by a South Carolina Certified Underground Storage Tank Site Rehabilitation Contractor.

Terracon can submit an invoice for direct payment from State Underground Petroleum Environmental Response Bank (SUPERB) Account for pre-approved costs. By law, the SUPERB Account cannot compensate any costs that are not pre-approved. Please note that

applicable South Carolina certification requirements regarding laboratory services and report preparation must be satisfied. If the invoice is not submitted within 120 days from the date of this letter, monies allocated to pay this invoice will be uncommitted. This means that the invoice will not be processed for payment until all other committed funds are paid or monies become available.

Please note that Sections 44-2-110(4) and 44-2-130 of the SUPERB Statute state that no costs will be allowed unless prior approval is obtained from the UST Management Division. If for any reason additional tasks will be completed, these additional tasks and the associated cost must be preapproved by the Agency for the cost to be paid. The Agency reserves the authority to pay only for work properly performed and/or technically justified and will only pay rates in accordance with established criteria. Further, the Agency reserves the right to question and/or reject costs if deemed unreasonable and the right to audit project records at any time during the project or after completion of work.

On all correspondence concerning this site, please reference UST Permit #07680. If there are any questions concerning this project, feel free to contact me by telephone at (803) 898-0634, by fax at (803) 898-0673, or by e-mail at utzst@dhec.sc.gov.

Sincerely,

Sonya T. Utz, Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

enc: Approved Cost Agreement

cc: Terracon, 521 Clemson Rd., Columbia, SC 29229 (w/enc.)
Technical file (w/enc.)

Approved Cost Agreement 50592

Facility: 07680 SC015

UTZST

PO Number:

Task / Description	Categories	Item	Description	Qty / Pct	Unit Price	Amount
19 RPT/PROJECT MNGT & COORDINATIO						
		PRT	REPORT PREPARATION	0.1200	36,937.25	4,432.47
23 EFR						
		A3	48 HOUR EVENT	4.0000	6,265.00	25,060.00
		C3	OFF GAS TREATMENT 48 HOUR	4.0000	327.00	1,308.00
		D	SITE RECONNAISSANCE	1.0000	203.25	203.25
		F1	EFFLUENT DISPOSAL	20,000.0000	0.44	8,800.00
		G	AFVR EQUIPMENT MOB	4.0000	391.50	1,566.00
				Total Amount		41,369.72

LETTER OF TRANSMITTAL

UST
JAN 13 2016
PROGRAM

Terracon
521 Clemson Rd.
Columbia, SC 29229
803-741-9000 / 803-741-9900 fax

TO Ms. Sonya Utz

SCDHEC
Bureau of Land and Waste Management
UST Program
2600 Bull St.
Columbia, SC 29201

DATE 12/23/15	JOB NO. 73078012
RE: Former SC-015, Columbia, SC UST Site No. 07680; CA # 50592	
Assessment Report	

WE ARE SENDING YOU **X** Attached ☐ Under separate cover via _____ the following items:

COPIES	DATE	DESCRIPTION
1	12/23/15	Report of Aggressive Fluid Vapor Recovery (AFVR)
	1/3/16	Assessment Component Invoice

UST
Tech
DOCKETING

THESE ARE TRANSMITTED as checked below:

- ☐ For approval
- ☐ For your use
- ☐ As requested
- ☐ For review and comment
- ☐ Approved as submitted
- ☐ Approved as noted
- ☐ Returned for corrections
- ☐ Resubmit ___ copies for approval
- ☐ Submit ___ copies for distribution
- ☐ Return ___ corrected prints

REMARKS:

Enclosed is the referenced report.

Please feel free to call me if you have any questions.

COPY TO: Annie Smith-Jones / Crown Central LLC

SIGNED: **Katie Layfield**

If enclosures are not as noted, kindly notify us at once.

Aggressive Fluid Vapor Recovery (AFVR) Report

FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA

UST Permit # 07680



December 23, 2015
Terracon Project No. 73078012

Prepared for:
Crown Central LLC
PO Box 1168
Baltimore, Maryland 21203

Prepared by:
Terracon Consultants, Inc.
Columbia, South Carolina

Offices Nationwide Established in 1965
Employee-Owned terracon.com

Terracon

Geotechnical ■ Environmental ■ Construction Materials ■ Facilities

Terracon

December 23, 2015

Ms. Sonya T. Utz
Underground Storage Tank Program
South Carolina Department of Health
and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201

Re: **Aggressive Fluid Vapor Recovery Report**
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680; CA # 50592
Terracon Project No. 73078012A

Dear Ms. Utz:

On behalf of Crown Central LLC, **Terracon Consultants, Inc. (Terracon)** is pleased to submit this Aggressive Fluid Vapor Recovery (AFVR) report for the Former SC-015 site located in Columbia, South Carolina.

If you have any questions regarding the contents of this report, or if there is a need for further information, please contact us.

Respectfully submitted,

Terracon Consultants, Inc.
UST Contractor Certification No. 246

for Katie Layfield
Environmental Scientist

P. Michael Hudgins, P.G.
Senior Hydrogeologist
S.C. Registration No. 1137

P. MICHAEL HUDGINS REGISTERED NO. 1137 PROFESSIONAL GEOLOGIST SOUTH CAROLINA

Enclosures

cc: Annie Smith-Jones / Crown Central LLC

TABLE OF CONTENTS

Aggressive Fluid Vapor Recovery Report
Former SC-015
3800 Devine Street
Columbia, South Carolina
UST Permit # 07680
Terracon Project No. 73078012A

SECTION PAGE NO.

Cover Letter

1.0 INTRODUCTION 1

1.1 Facility Information 1

1.2 Site History 1

2.0 AGGRESSIVE FLUID VAPOR RECOVERY 2

4.0 CONCLUSIONS AND RECOMMENDATIONS 4

FIGURES

1 Site Location Map
2 Site Map

APPENDICES

A AFVR Field Data
B Disposal Manifests

1.0 INTRODUCTION

Terracon Consultants, Inc. (Terracon) has completed four (4) Aggressive Fluid Vapor Recovery (AFVR) events at the former SC-015 site located in Columbia, South Carolina. The work was performed in accordance with the South Carolina Department of Health and Environmental Control (SCDHEC) cost agreement #50592, the Risk Based Corrective Action (RBCA) guidance document, and the UST Quality Assurance Program Plan (QAPP) prepared by SCDHEC. This report includes a description of the activities performed during this assessment, along with our current findings, conclusions and recommendations.

1.1 Site Description

The site currently operates as Long's Drugstore. The site consists of a commercial building surrounded by land cover including asphalt and landscaping. The site is bordered to the south, southeast, and east by a Piggly Wiggly grocery store and its parking areas. The site is bordered to the west by Kilbourne Road, St. Joseph's Church and School, and a Russell & Jeffcoat Realty office (formerly a service station). Devine Street borders the site to the north. Residential properties are located to the north and northeast of the site beyond Devine Street. A portion of the USGS Topographic Map – Fort Jackson South Quadrangle is included as a site location map (Figure 1).

Crown formerly operated a retail fuel facility at this site which included three gasoline USTs (6,000; 8,000; and 12,000 gallon capacities), distribution lines, and a dispenser island. The USTs, distribution lines, and dispenser island were removed on July 1991. A review of the South Carolina UST Registry indicates that a notice of release from the UST system was submitted to the SCDHEC in August 1989. The release is currently ranked 3BA.

1.2 Site History

Since 1989, assessment activities have included installation of shallow and deep monitoring wells on the property and adjacent properties. In 2001, nine monitoring wells were destroyed during re-development of the site. In 2008, replacement wells and deep wells were installed to define the extent of the plume. These assessment activities are detailed in previous assessment reports. A site map showing the former and existing monitoring well locations is presented as Figure 2. The results of the previous assessments have indicated:

- Hydrocarbon impact to soil and ground water in the vicinity of the UST pit (source) area extending laterally beyond the adjacent site property boundaries to the south and southeast;

- Free product has previously been identified in monitoring wells MW-5 and MW-6;

- Ground water was encountered at a depth of approximately 12 to 15 feet below land

surface (perched aquifer) and 30 to 36 feet (water-table aquifer). Ground water flow is to the southwest with northwesterly and southeasterly flow components. The estimated linear seepage velocity was calculated to range from 0.15 feet per year in the perched aquifer, and 0.018 feet per year in the water table aquifer;

- The nearest likely potential receptor is a subsurface utility located 840 feet downgradient from the former UST (source) area which ultimately discharges to a controlled creek;

- Based on the previous assessment results, a total of nine AFVR events were performed in April 2010, February - August 2012, November – December 2012 and October 2013 to remove high dissolved phase hydrocarbons in the vicinity of the former dispenser islands. A total of 620 pounds of pounds of volatile organic compounds (VOCs) have been removed from the subsurface.

In July 2015, SCDHEC issued a directive for four 48-hour Aggressive Fluid Vapor Recovery (AFVR) events from monitoring wells MW-5R and MW-21. This report includes a summary of the field methods utilized along with the results of ground water elevation measurements, ground water analytical results, and our conclusions and recommendations.

2.0 AGGRESSIVE FLUID VAPOR RECOVERY

Aggressive Fluid Vapor Recovery (AFVR) was utilized to extract dissolved-phase hydrocarbons from the unsaturated zone, capillary fringe, and the shallow aquifer at the site. AFVR is a proven remediation method that utilizes high vacuum pressures and flow rates to remove multiple phase (vapor, dissolved, and free phase) VOCs from the subsurface. Figure 2 is a site map showing monitoring well locations.

The AFVR events were performed using trailer-mounted vacuum extraction rig equipped with a rotary claw pump and an air-water separator unit. Prior to system start up the trailer mounted unit was grounded with a copper grounding rod connected to the trailer by a metal ground cable to reduce the potential of an explosion hazard due to static electricity.

One-inch diameter PVC stinger tubes were set approximately six-inches into the water table. The tubes were adjusted during the event according to water level changes to minimize water production and maximize product recovery and contaminant mass removal from the vadose zone/water table interface. The depth of the stinger was adjusted according to water level changes during the event to a maximum depth of 18 feet within the first 8 hours of the event. Stinger depths are listed on the AFVR Field Data Sheets, included in Appendix A.

System readings were recorded at 30-minute intervals for off-gas concentrations, flow measurements, and vacuum pressure throughout each event. Off-gas concentrations were recorded with a Bacharach TLV Sniffer, and the off-gas velocity was measured using an

anemometer at the system exhaust stack. The concentrations were recorded on an AFVR Field Data Sheet, included in Appendix A.

Four 48-hour AFVR events (Event #10, #11, #12, #13) were performed on monitoring wells MW-5R and MW-21 as listed below. No free product was detected in either monitoring well prior to or after the AFVR events. The velocity and VOC concentration of off-gas from the vacuum rig were measured using an anemometer and a TLV Sniffer with a 10X dilution probe.

Differential pressures (vacuum) measurements recorded with a vacuum gauge at monitoring wells MW-1R, DW-1, MW-7R, MW-8, and MW-15R to evaluate the radius of influence from the extracted wells. These data were recorded on the Vacuum Radius of Influence Data Sheet, included in Appendix A.

In general, system readings for each event were recorded as follows:

Day 1: every half-hour for the first eight hours, every hour for the next eight hours and a final reading after 24 hours;

Day 2: every two hours for 16 hours, and a final reading after the end of the last 24-hour interval.

A summary of each AFVR event is presented below:

Event #10 - August 24-26, 2015

VOC concentrations were recorded to be relatively high throughout the event, starting at 12,000 parts per million (ppm), increasing to 17,000 by the end of the event. The radius of influence was observed within the first three hours of the event in well MW-7R, approximately 75 ft. from the extracted wells; however, was not apparent for the remainder of the event. Approximately 130 pounds of VOCs were removed from the subsurface, generating 395 gallons of petroleum-impacted water from this event.

Event #11 - September 8-10, 2015

VOC concentrations were recorded to be relatively high at the start of the event; however, the AFVR rig shut down due to a malfunction during the after the first 18 hours (during a period when the rig was unattended). The rig was repaired and operational by 1:00pm the next day, so the rig could have been shut down for up to 13 hours. Upon restarting the event, VOC readings were high (12,500 ppm); however soon dropped to 1,100 ppm which held steady at this concentration throughout the remainder of the event. No radius of influence was observed throughout the event. Approximately 39.8 pounds of VOCs were removed from the subsurface, generating 424 gallons of petroleum-impacted water from this event.

Event # 12 - November 2-4, 2015

VOC concentrations were recorded to be relatively high at the beginning of the event and dropped significantly after 16 hours, similar to the response observed during Event 11. The radius of influence was not apparent in any of the wells during the event. Approximately 100.9 pounds of VOCs were removed from the subsurface, generating 638 gallons of petroleum-impacted water from this event.

Event # 13 - November 16-18, 2015

VOC concentrations were recorded to be low (1,200 ppm), dropping to 300 ppm after 16 hours, then rising back to 1,000 ppm toward the end of the event. The radius of influence was not apparent in any of the wells during the event. Approximately 5.6 pounds of VOCs were removed from the subsurface, generating 638 gallons of petroleum-impacted water from this event.

Petroleum-impacted groundwater generated was disposed by Regulatory Solutions, Inc. Gaston, South Carolina. The disposal manifests for the extracted ground water generated are included in Appendix B.

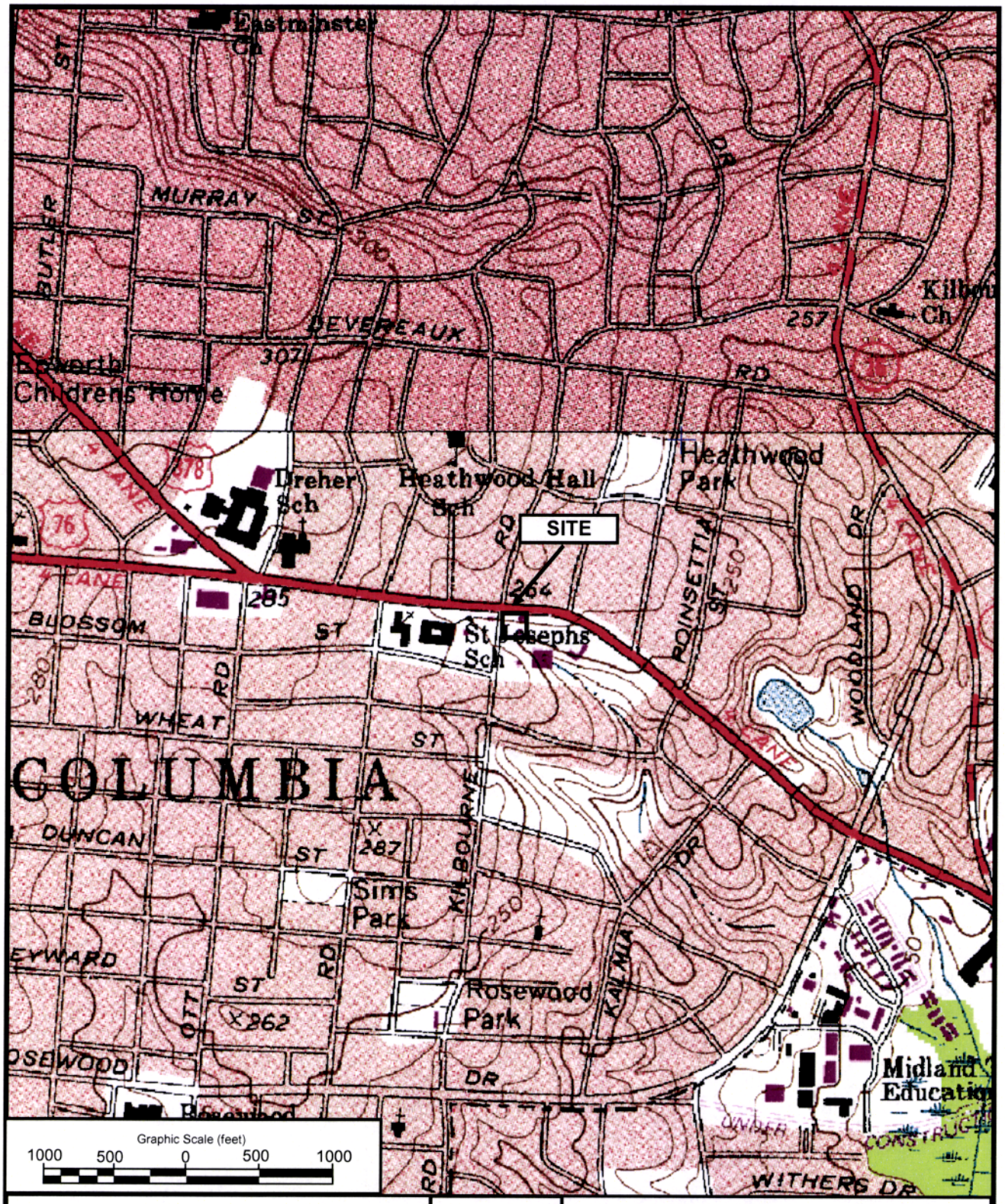
4.0 CONCLUSIONS AND RECOMMENDATIONS

A total of approximately 277 pounds of VOCs were removed from the subsurface, and 2,220 gallons of petroleum-impacted groundwater was extracted during the four events. Event # 13 generated the lowest total of VOC concentrations, indicating the highest dissolved source may have been removed during these events. Since AFVR was initiated, a cumulative total of 897 pounds of VOCs have been removed from the subsurface.

Terracon recommends additional ground water sampling to evaluate the current ground water quality conditions due affected by these events. Upon confirmation of removal of the bulk of the hydrocarbon mass, this site may a candidate for monitored natural attenuation.

FIGURES

Figure 1 – Site Location Map
Figure 2 – Site Map



USGS TOPOGRAPHIC QUADRANGLE MAP
FORT JACKSON SOUTH, SOUTH CAROLINA

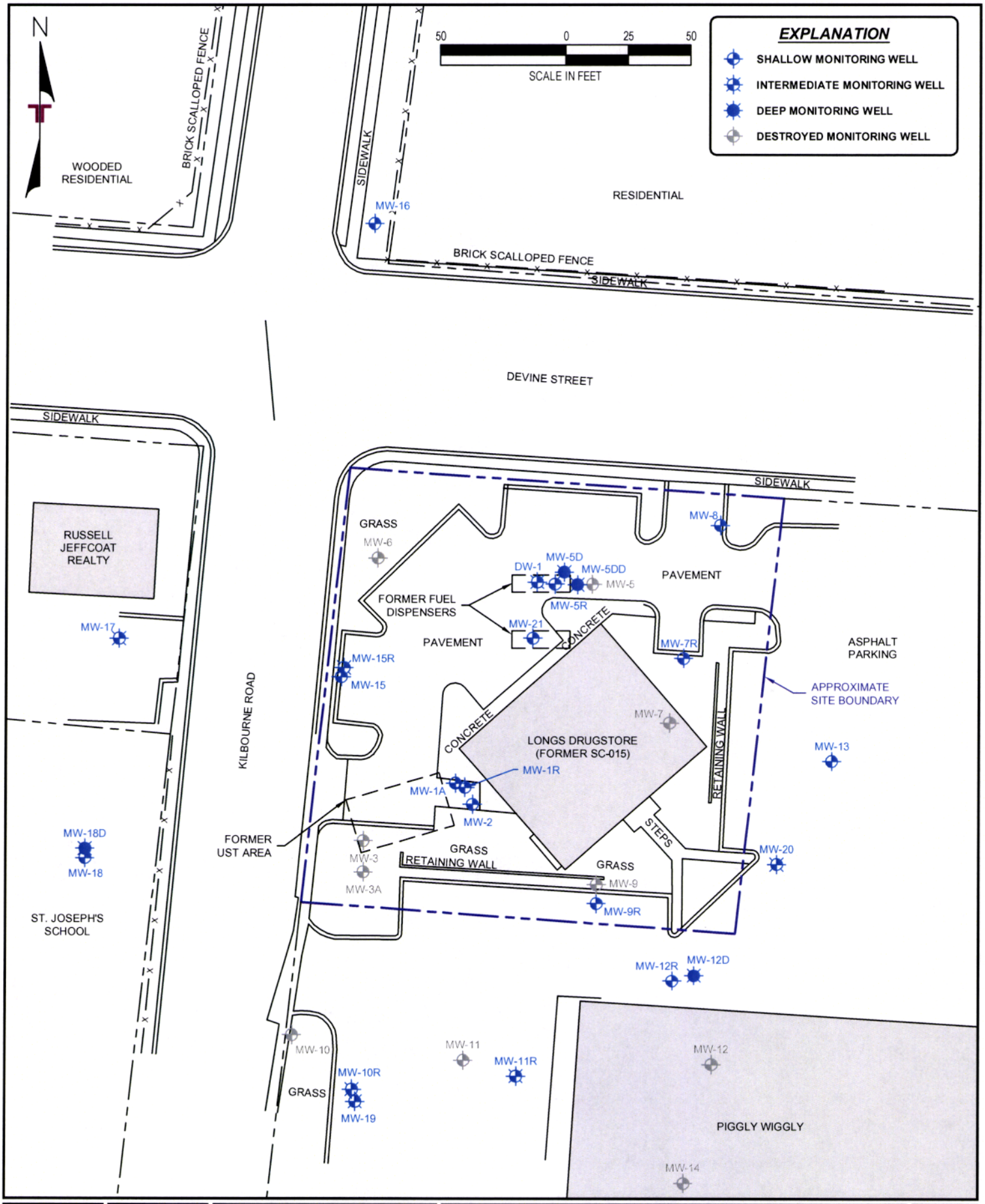
DATE: 1982
SCALE: 1 INCH = 1000 FEET
PROJECT NO. 73078012

N

Terracon

SITE LOCATION MAP
FORMER SC-015
3800 DEVINE STREET
COLUMBIA, SOUTH CAROLINA
UST PERMIT NO. 07680

FIGURE 1: TOPOGRAPHIC MAP



Project Mngr: RWN	Project No. 73078012A	Terracon Consulting Engineers and Scientists	SITE MAP
Drawn By: PTK	Scale: AS SHOWN	521 CLEMSON ROAD COLUMBIA, SC 29229	FORMER SC-015 3800 DEVINE STREET COLUMBIA, SOUTH CAROLINA UST PERMIT #07680
Checked By: RWN	File No. 73078012A		Fig No 2
Approved By:	Date:		

APPENDIX A

AFVR Field Data

AFVR FIELD DATA SHEET

Site: SC-015 - Columbia, SC; UST Site # 07680 | **Project No.: 73078012A** | **Dates: 8/24/15-8/25/15** | **Event #: 10**

Extracted Wells	Date	Start Time hh:mm	End Time hh:mm	Time Interval (min)	Elapsed Time (hours)	VOC Concentrations			Off-Gas Velocity (FPM)			Total Flow (CFM)	VOC Emissions		
						Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)		Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	8/24/2015	8:30	9:00	30	0.5	12,000	12,000	12,000	128.0	121.0	124.5	11.08	1.57	0.78	0.78
		9:00	9:30	30	1	12,000	13,000	12,500	121.0	118.0	119.5	10.64	1.57	0.78	1.57
		9:30	10:00	30	1.5	13,000	10,000	11,500	118.0	116.0	117.0	10.41	1.41	0.71	2.28
		10:00	10:30	30	2.0	10,000	17,000	13,500	116.0	101.0	108.5	9.66	1.54	0.77	3.04
		10:30	11:00	30	2.5	17,000	15,000	16,000	101.0	95.0	98.0	8.72	1.65	0.82	3.87
		11:00	11:30	30	3.0	15,000	22,500	18,750	95.0	91.0	93.0	8.28	1.83	0.92	4.78
		11:30	12:00	30	3.5	22,500	8,000	15,250	91.0	80.0	85.5	7.61	1.37	0.68	5.47
		12:00	12:30	30	4.0	8,000	20,000	14,000	80.0	80.0	80.0	7.12	1.18	0.59	6.06
		12:30	13:00	30	4.5	20,000	20,000	20,000	80.0	80.0	80.0	7.12	1.68	0.84	6.90
		13:00	13:30	30	5.0	20,000	20,000	20,000	80.0	91.0	85.5	7.61	1.80	0.90	7.79
		13:30	14:00	30	5.5	20,000	20,000	20,000	91.0	90.0	90.5	8.05	1.90	0.95	8.74
		14:00	14:30	30	6.0	20,000	30,000	26,000	90.0	99.0	94.5	8.41	2.58	1.29	10.03
		14:30	15:00	30	6.5	30,000	15,000	22,500	99.0	129.0	114.0	10.15	2.69	1.35	11.38
		15:00	15:30	30	7.0	15,000	17,000	16,000	129.0	88.0	108.5	9.66	1.82	0.91	12.29
		15:30	16:00	30	7.5	17,000	17,000	17,000	88.0	94.0	91.0	8.10	1.62	0.81	13.11
		16:00	16:30	30	8.0	17,000	17,000	17,000	88.0	94.0	91.0	8.10	1.62	0.81	13.92
		16:30	17:00	30	8.5	17,000	17,000	17,000	94.0	94.0	94.0	8.37	1.68	0.84	13.94
		17:00	18:00	60	9.5	17,000	17,000	17,000	94.0	124.0	109.0	9.70	1.95	1.95	15.89
		18:00	19:00	60	10.5	17,000	18,000	17,500	124.0	181.0	152.5	13.57	2.80	2.80	18.69
		19:00	20:00	60	11.5	18,000	17,500	17,500	181.0	185.0	183.0	16.29	3.36	3.36	22.06
		20:00	21:00	60	12.5	17,500	17,500	17,500	183.0	174.0	178.5	15.89	3.28	3.28	25.34
		21:00	22:00	60	13.5	17,500	17,500	17,500	174.0	173.0	173.5	15.44	3.19	3.19	28.53
		22:00	23:00	60	14.5	17,500	18,000	17,500	173.0	180.0	176.5	15.71	3.24	3.24	31.77
		23:00	24:00	60	15.5	18,000	18,000	18,000	180.0	177.0	178.5	15.89	3.37	3.37	35.14
		24:00	6:00	360	21.5	18,000	17,000	17,500	177	257	217.0	19.31	3.99	23.93	59.07
	8/25/2015	6:00	8:00	120	23.5	17,000	14,500	15,750	297.0	257.0	277.0	24.65	4.58	9.16	68.24
		8:00	10:00	120	25.5	14,500	14,000	14,250	257.0	116.0	186.5	16.60	2.79	5.58	73.82
		10:00	12:00	120	27.5	14,000	15,000	14,500	116.0	110.0	113.0	10.06	1.72	3.44	77.26
		12:00	14:00	120	29.5	15,000	14,000	14,500	110.0	120.0	115.0	10.24	1.75	3.50	80.76
		14:00	16:00	120	31.5	14,000	14,000	14,000	120.0	128.0	124.0	11.04	1.82	3.65	84.41
		16:00	18:00	120	33.5	14,000	15,000	14,500	128.0	139.0	133.5	11.88	2.03	4.07	88.47
		18:00	20:00	120	35.5	15,000	15,000	15,000	139.0	169.0	154.0	13.71	2.43	4.85	93.33
		20:00	22:00	120	37.5	15,000	15,000	15,000	169.0	191.0	180.0	16.02	2.84	5.67	99.00
	8/26/2015	22:00	8:30	630	48.0	15,000	15,000	15,000	191.0	191.0	191.0	17.00	3.01	31.59	130.59

Total Extraction Time	**192.0**	**hours**
Total Liquid Volume	**395**	**gallons**
Total Liquid-phase Hydrocarbon	**0.0**	**gallons**
Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9)	**22.1**	**gallons**
Total Hydrocarbon Recovery:	**22.1**	**gallons**

TOTAL lbs of VOC emissions = 130.59

Notes:

1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

Event Information

Technicia	David
n:	Lesesne
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event State:	SC
Event County:	Columbia
Event City:	Columbia
UST No.:	07680
Disposal Facility:	
Manifest Number:	
Temp:	

VACUUM RADIUS OF INFLUENCE

SC-015 - Columbia, SC UST Site # 07680 | Dates: 08/24/15-8/25/15 | Event #: 10

Date	Time	Elapsed Time	System Vacuum	MW-5R	MW-21	MW-1R	DW-1	MW-7R	MW-8	MW-15
				Stinger Head		Distance to Nearest Fluid/Vapor Recovery Well				
	8:00	Start	Vacuum (Inches of Mercury Hg)							
08/24/15	8:30	0.5	18.5	18.0	18.0	0.000	-0.002	0.001	0.000	0.000
	9:00	1.0	18.5	18.0	18.0	0.000	-0.006	0.000	0.000	0.000
	9:30	1.5	19.0	18.0	18.0	0.000	-0.004	0.000	-0.001	0.000
	10:00	2.0	19.5	19.0	18.5	0.000	-0.003	0.004	-0.001	0.000
	10:30	2.5	20.0	19.0	18.5	0.000	-0.006	0.006	0.000	0.000
	11:00	3.0	21.0	19.0	18.5	0.000	0.000	0.000	-0.001	0.000
	11:30	3.5	22.0	20.0	19.5	0.000	0.000	0.000	0.000	0.000
	12:00	4.0	22.0	21.5	20.5	0.000	0.000	0.000	0.000	0.000
	12:30	4.5	21.5	21.5	20.5	0.000	0.000	0.000	0.000	0.000
	13:00	5.0	21.0	21.5	20.5	0.000	0.000	0.000	0.000	0.000
	13:30	5.5	21.5	22.0	21.5	0.000	0.000	0.000	0.000	0.000
	14:00	6.0	21.5	22.0	21.25	0.000	0.000	0.000	0.000	0.000
	14:30	6.5	21.0	18.0	18.5	0.000	0.000	0.000	0.000	0.000
	15:00	7.0	20.0	24.5	23.0	0.000	0.000	0.000	0.000	0.000
	15:30	7.5	20.0	23.0	22.5	0.000	0.000	0.000	0.000	0.000
	16:00	8.0	22.0	23.5	22.0	0.000	0.000	0.000	0.000	0.000
	17:00	9.0	22.0	23.5	22.0	0.000	0.000	0.000	0.000	0.000
	18:00	10.0	23.0	22.0	21.0	0.000	0.000	0.000	0.000	0.000
	19:00	11.0	20.0	19.0	19.5	0.000	0.000	0.000	0.000	0.000
	20:00	12.0	25.0	25.0	26.0	0.000	0.000	0.000	0.000	0.000
	21:00	13.0	18.5	16.0	15.5	0.000	0.000	0.000	0.000	0.000
	22:00	14.0	20.0	17.5	18.0	0.000	0.000	0.000	0.000	0.000
	23:00	15.0	20.0	18.0	18.5	0.000	0.000	0.000	0.000	0.000
	24:00	16.0	20.0	18.0	18.0	0.000	0.000	0.000	0.000	0.000
8/25/15	6:00	22.0	15.5	15.5	15.5	0.000	0.000	0.000	0.000	0.000
	8:00	24.0	16.0	15.75	15.5	0.000	0.000	0.000	0.000	0.000
	10:00	26.0	20.0	17.5	17.0	0.000	0.000	0.000	0.000	0.000
	12:00	28.0	20.0	18.5	18.0	0.000	0.000	0.000	0.000	0.000
	14:00	30.0	20.5	20.0	20.5	0.000	0.000	0.000	0.000	0.000
	16:00	32.0	18.0	19.0	18.0	0.000	0.000	0.000	0.000	0.000
	18:00	34.0	18.0	18.5	19.5	0.000	0.000	0.000	0.000	0.000
	20:00	36.0	17.5	17.5	17.0	0.000	0.000	0.000	0.000	0.000
	22:00	38.0	16.0	16.5	16.0	0.000	0.000	0.000	0.000	0.000
8/26/15	8:00	48.0	15.0	15.0	15.0	0.000	0.000	0.000	0.000	0.000

STINGER DEPTH ADJUSTMENTS

SC-015 - Columbia, SC UST Site # 07680					Project No.: 73078012A		
Dates: 8/24/15-8/25/15						Event #: 10	
		MW-5R			MW-21		
		Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
	Pre:	13.73	--	--	14.06	--	--
	Post:	17.96	--	--	18.31	--	--
		Historical Low DTW		12.67	Historical Low DTW		12.86
		Stinger Depth (feet btoc)					

Date	Time	Elapsed Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
08/24/15	8:00	0.0	14.23	0.77	-1.56	14.56	0.44	-1.7
	8:30	0.5	15.00	0.50	-2.33	15	0.50	-2.14
	9:00	1.0	15.50	0.50	-2.83	15.5	0.50	-2.64
	9:30	1.5	16.00	0.50	-3.33	16	0.50	-3.14
	10:00	2.0	16.50	0.50	-3.83	16.5	0.50	-3.64
	10:30	2.5	17.00	0.50	-4.33	17	0.50	-4.14
	11:00	3.0	17.50	0.50	-4.83	17.5	0.50	-4.64
	11:30	3.5	18.00	0.50	-5.33	18	0.50	-5.14
	12:00	4.0	18.00	0.00	-5.33	18	0.00	-5.14
	12:30	4.5	18.00	0.00	-5.33	18	0.00	-5.14
	13:00	5.0	18.00	0.00	-5.33	18	0.00	-5.14
	13:30	5.5	18.00	0.00	-5.33	18	0.00	-5.14
	14:00	6.0	18.00	0.00	-5.33	18	0.00	-5.14
	14:30	6.5	18.00	0.00	-5.33	18	0.00	-5.14
	15:00	7.0	18.00	0.00	-5.33	18	0.00	-5.14
	15:30	7.5	18.00	0.00	-5.33	18	0.00	-5.14
	16:00	8.0	18.00	0.00	-5.33	18	0.00	-5.14
	17:00	9.0	18.00	0.00	-5.33	18	0.00	-5.14
	18:00	10.0	18.00	0.00	-5.33	18	0.00	-5.14
	19:00	11.0	18.00	0.00	-5.33	18	0.00	-5.14
	20:00	12.0	18.00	0.00	-5.33	18	0.00	-5.14
	21:00	13.0	18.00	0.00	-5.33	18	0.00	-5.14
	22:00	14.0	18.00	0.00	-5.33	18	0.00	-5.14
	23:00	15.0	18.00	0.00	-5.33	18	0.00	-5.14
8/25/15	24:00	16.0	18.00	0.00	-5.33	18	0.00	-5.14
	6:00	22.0	18.00	0.00	-5.33	18	0.00	-5.14
	8:00	24.0	18.00	0.00	-5.33	18	0.00	-5.14
	10:00	26.0	18.00	0.00	-5.33	18	0.00	-5.14
	12:00	28.0	18.00	0.00	-5.33	18	0.00	-5.14
	14:00	30.0	18.5	0.50	-5.83	18.5	0.50	-5.64
	16:00	32.0	19.0	0.50	-6.33	19.0	0.50	-6.14
	18:00	34.0	18.0	1.00	-5.33	18.0	1.00	-5.14
	20:00	36.0	18.0	0.00	-5.33	18.0	0.00	-5.14
	22:00	38.0	18.0	0.00	-5.33	18.0	0.00	-5.14
	20:00	48.0	18.0	0.00	-5.33	18.0	0.00	-5.14

AFVR FIELD DATA SHEET

Site: SC-015 - Columbia, SC; UST Site # 07680 | **Project No.: 73078012A** | **Dates: 9/08/15-9/10/15** | **Event #: 11**

		Start Time hh:mm	End Time hh:mm	Time Interval (min)	Elapsed Time (hours)	VOC Concentrations Initial (PPM)	VOC Concentrations Ending (PPM)	VOC Concentrations Average (PPM)	Off-Gas Velocity (FPM) Initial (FPM)	Off-Gas Velocity (FPM) Ending (FPM)	Off-Gas Velocity (FPM) Average (FPM)	Total Flow (CFM)	VOC Emissions Rate (lbs/hr)	VOC Emissions Total (lbs)	VOC Emissions Cumulative Total (lbs)
MW-5R MW-21	9/8/2015	6:00	6:30	30	0.5	12,500	12,500	12,500	235	232	234	20.78	3.07	1.53	1.53
		6:30	7:00	30	1	12,500	12,000	12,250	232	212	222	19.76	2.86	1.43	2.96
		7:00	7:30	30	1.5	12,000	11,000	11,500	212	227	220	19.54	2.65	1.33	4.29
		7:30	8:00	30	2.0	11,000	11,500	11,250	227	211	219	19.49	2.59	1.29	5.58
		8:00	8:30	30	2.5	11,500	11,500	11,500	211	223	217	19.31	2.62	1.31	6.89
		8:30	9:00	30	3.0	11,500	12,000	11,750	223	197	210	18.69	2.59	1.30	8.19
		9:00	9:30	30	3.5	12,000	12,000	12,000	197	191	194	17.27	2.44	1.22	9.41
		9:30	10:00	30	4.0	12,000	12,000	12,000	191	176	184	16.33	2.31	1.16	10.56
		10:00	10:30	30	4.5	12,000	12,000	12,000	176	182	179	15.93	2.26	1.13	11.69
		10:30	11:00	30	5.0	12,000	12,000	12,000	182	173	178	15.80	2.24	1.12	12.81
		11:00	11:30	30	5.5	12,000	12,000	12,000	173	169	171	15.22	2.16	1.08	13.89
		11:30	12:00	30	6.0	12,000	13,000	12,500	169	151	160	14.24	2.10	1.05	14.94
		12:00	12:30	30	6.5	13,000	13,000	13,000	151	147	149	13.26	2.03	1.02	15.96
		12:30	13:00	30	7.0	13,000	13,500	13,250	147	145	146	12.99	2.03	1.02	16.97
		13:00	13:30	30	7.5	13,500	14,000	13,750	145	127	136	12.10	1.96	0.98	17.95
		13:30	14:00	30	8.0	14,000	14,000	14,000	127	130	129	11.44	1.89	0.94	18.90
		14:00	15:00	60	9.0	14,000	14,000	14,000	130	121	126	11.17	1.85	0.92	19.82
		15:00	16:00	60	10	14,000	13,000	13,500	121	263	192	17.09	2.72	1.36	21.18
		16:00	17:00	60	11	13,000	13,000	13,000	263	252	258	22.92	3.52	1.76	22.94
		17:00	18:00	60	12	13,000	12,000	12,500	252	199	226	20.07	2.96	1.48	24.42
		18:00	19:00	60	13	12,000	12,000	12,000	199	175	187	16.64	2.36	1.18	25.60
		19:00	20:00	60	14	12,000	13,000	12,500	175	143	159	14.15	2.09	1.04	26.64
		20:00	21:00	60	15	13,000	14,000	13,500	143	180	162	14.37	2.29	1.14	27.79
		21:00	22:00	60	16	14,000	14,000	14,000	180	181	181	16.06	2.65	1.33	29.11
		22:00	23:00	60	17	14,000	14,000	14,000	181	189	185	16.47	2.72	1.36	30.47
		23:00	24:00	60	18	14,000	13,000	13,500	189	194	192	17.04	2.72	1.36	31.83
		24:00	--	--	--	--	--	--	--	--	--	--	--	--	--
		System shut down during overnight operation. Repairs to the AFVR rig the following morning. Resumed operation at 1:00 PM on 9/9/15.													
	9/9/2015	13:00	14:00	60	18	10,000	11,000	10,500	1,006	343	675	60.03	7.44	3.72	35.55
		14:00	15:00	60	19	1,100	1,100	1,100	343	548	446	39.65	0.51	0.26	35.81
		15:00	17:00	120	20	1,100	1,000	1,050	548	661	605	53.80	0.67	0.33	36.14
		19:00	21:00	120	24	1,000	1,000	1,000	661	698	680	60.48	0.71	0.36	36.50
		21:00	23:00	120	26	1,000	1,000	1,000	698	757	728	64.75	0.76	0.38	36.88
		23:00	6:00	420	33	1,000	1,200	1,100	757	312	535	47.57	0.62	0.31	37.19
	9/10/2015	6:00	8:00	120	35	1,200	1,200	1,200	312	315	314	27.90	0.40	0.20	37.39
		8:00	10:00	120	37	1,200	1,300	1,250	315	279	297	26.43	0.39	0.19	37.58
		10:00	12:00	120	39	1,300	1,300	1,300	279	196	238	21.14	0.32	0.16	37.74
		12:00	14:00	120	41	1,300	1,200	1,250	196	555	376	33.42	0.49	0.25	37.99
		14:00	16:00	120	43	1,200	1,200	1,200	555	559	557	49.57	0.70	0.35	38.34
		16:00	18:00	120	45	1,200	1,200	1,200	559	769	664	59.10	0.84	0.42	38.76
		18:00	20:00	120	47	1,200	1,200	1,200	769	814	792	70.44	1.00	0.50	39.26
		20:00	22:00	120	49	1,200	1,200	1,200	814	880	847	75.38	1.07	0.53	39.79

Total Extraction Time..... **192.0** **hours**
Total Liquid Volume..... **424** **gallons**
Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs + 5.9)..... **6.7** **gallons**
Total Hydrocarbon Recovery:..... **6.7** **gallons**

TOTAL lbs of VOC emissions = 39.79

Notes:

1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

Event Information

Technicia n:	David Lesesne
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event State:	SC
Event County:	Columbia
Event City:	Columbia
UST No.:	07680
Disposal Facility:	
Manifest Number:	
Temp:	

VACUUM RADIUS OF INFLUENCE

SC-015 - Columbia, SC UST Site # 07680 | Dates: 09/08/15-9/10/15 | Event #: 11

Date	Time	Elapsed Time	System Vacuum	MW-5R	MW-21	MW-1R	DW-1	MW-7R	MW-8	MW-15
				Stinger Head		Distance to Nearest Fluid/Vapor Recovery Well				
	6:00	Start	Vacuum (Inches of Mercury Hg)							
09/08/15	6:00	0.0	18.5	15.0	15.5	0.000	-0.001	0.000	0.000	0.000
	6:30	0.5	18.5	15.0	15.5	0.000	-0.001	0.000	0.000	0.000
	7:00	1.0	18.0	15.0	15.0	0.000	0.000	0.000	0.000	0.000
	7:30	1.5	18.0	15.0	15.0	0.000	0.000	0.000	0.000	0.000
	8:00	2.0	18.5	15.0	15.0	0.000	0.000	0.000	0.000	0.000
	8:30	2.5	18.5	15.0	15.0	0.000	0.000	0.000	-0.001	0.000
	9:00	3.0	18.5	15.0	15.5	0.000	0.000	0.000	0.000	0.000
	9:30	3.5	18.5	15.0	15.5	0.000	-0.001	0.000	0.000	0.000
	10:00	4.0	18.5	15.0	15.5	0.000	0.000	0.000	0.000	0.000
	10:30	4.5	18.5	16.0	15.5	0.000	0.000	0.000	0.000	0.000
	11:00	5.0	18.5	16.0	16.0	0.000	0.000	0.000	0.000	0.000
	11:30	5.5	18.5	16.0	16.5	0.000	0.000	0.000	0.000	0.000
	12:00	6.0	18.5	16.5	16.5	0.000	0.000	0.000	0.000	0.000
	12:30	6.5	18.5	16.5	16.5	0.000	0.000	0.000	0.000	0.000
	13:00	7.0	18.5	16.5	17.0	0.000	0.000	0.000	0.000	0.000
	13:30	7.5	18.5	17.0	17.5	0.000	0.000	0.000	0.000	0.000
	14:00	8.0	18.5	17.0	17.0	0.000	0.000	0.000	0.000	0.000
	15:00	9.0	16.0	16.0	15.5	0.000	-0.001	0.000	0.000	0.000
	16:00	10.0	16.0	16.0	15.0	0.000	0.000	0.000	0.000	0.000
	17:00	11.0	15.5	15.0	15.5	0.000	0.000	0.000	0.000	0.000
	18:00	12.0	15.0	15.0	15.0	0.000	0.000	0.000	0.000	0.000
	19:00	13.0	16.5	15.5	15.5	0.000	0.000	0.000	0.000	0.000
	20:00	14.0	16.0	16.0	15.0	0.000	0.000	0.000	0.000	0.000
	21:00	15.0	17.5	15.5	16.0	0.000	0.000	0.000	0.000	0.000
	22:00	16.0	15.5	15.0	15.0	0.000	0.000	0.000	0.000	0.000
	23:00	17.0	15.0	15.0	15.0	0.000	0.000	0.000	0.000	0.000
System shut down during overnight operation. Resumed operation at 1:00 PM on 9/9/15.										
9/9/15	13:00	--	18.0	18.0	21.0	0.000	0.000	0.001	0.000	0.000
	14:00	18	16.5	18.0	19.0	0.000	0.000	0.000	0.000	0.000
	15:00	19	16.0	18.0	18.0	0.000	0.000	0.000	0.000	0.000
	17:00	21	15.0	15.0	12.0	0.000	0.000	0.000	0.000	0.000
	19:00	23	15.0	15.0	12.0	0.000	0.000	0.001	0.000	0.000
	21:00	25	14.5	15.0	12.0	0.000	0.000	0.001	0.000	0.000
	23:00	27	19.0	14.5	15.0	0.000	0.000	0.001	0.000	0.000
9/10/15	6:00	34	19.0	14.5	15.0	0.000	0.000	0.001	0.000	0.000
	8:00	36	19.0	14.5	15.0	0.000	0.000	0.001	0.000	0.000
	10:00	38	19.0	14.5	15.0	0.000	0.000	0.001	0.000	0.000
	12:00	40	16.0	19.0	19.0	0.000	0.000	0.001	0.000	0.000
	14:00	42	16.0	18.0	19.0	0.000	0.000	0.001	0.000	0.000
	16:00	44	14.0	15.0	12.0	0.000	-0.001	0.001	0.000	-0.001
	18:00	46	14.0	15.0	12.0	0.000	0.000	0.001	0.000	0.000
	20:00	48	13.0	14.5	10.0	0.000	0.000	0.001	0.000	0.000

STINGER DEPTH ADJUSTMENTS

SC-015 - Columbia, SC UST Site # 07680						Project No.: 73078012A		
Dates: 9/8/15-9/10/15								Event #: 11
			MW-5R			MW-21		
			Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
		Pre:	13.76			13.71		
		Post:						
			Historical Low DTW		12.67	Historical Low DTW		12.86
			Stinger Depth (feet btoc)					

Date	Time	Elapsed Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
9/08/15	6:00	0.0	15.0	0.00	-2.3	15.0	0.00	-2.1
	6:30	0.5	15.5	0.50	-2.8	15.5	0.50	-2.6
	7:00	1.0	16.0	0.50	-3.3	16.0	0.50	-3.1
	7:30	1.5	16.5	0.50	-3.8	16.5	0.50	-3.6
	8:00	2.0	17.0	0.50	-4.3	17.0	0.50	-4.1
	8:30	2.5	17.5	0.50	-4.8	17.5	0.50	-4.6
	9:00	3.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	9:30	3.5	18.0	0.00	-5.3	18.0	0.00	-5.1
	10:00	4.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	10:30	4.5	18.0	0.00	-5.3	18.0	0.00	-5.1
	11:00	5.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	11:30	5.5	18.0	0.00	-5.3	18.0	0.00	-5.1
	12:00	6.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	12:30	6.5	18.0	0.00	-5.3	18.0	0.00	-5.1
	13:00	7.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	13:30	7.5	18.0	0.00	-5.3	18.0	0.00	-5.1
	14:00	8.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	15:00	9.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	16:00	10.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	17:00	11.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	18:00	12.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	19:00	13.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	20:00	14.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	21:00	15.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	22:00	16.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	23:00	17.0	18.0	0.00	-5.3	18.0	0.00	-5.1
9/09/15	13:00	18.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	14:00	19.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	15:00	21.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	17:00	23.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	19:00	25.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	21:00	27.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	23:00	29.0	18.0	0.00	-5.3	18.0	0.00	-5.1
9/10/15	6:00	34.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	8:00	36.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	10:00	38.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	12:00	40.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	14:00	42.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	16:00	44.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	18:00	46.0	18.0	0.00	-5.3	18.0	0.00	-5.1
	20:00	48.0	18.0	0.00	-5.3	18.0	0.00	-5.1

AFVR FIELD DATA SHEET

Site: SC-015 - Columbia, SC; UST Site # 07680 | **Project No.: 73078012A** | **Dates: 11/02/15-11/04/15** | **Event #: 12**

		Start Time hh:mm	End Time hh:mm	Time Interval (min)	Elapsed Time (hours)	VOC Concentrations			Off-Gas Velocity (FPM)			Total Flow (CFM)	VOC Emissions		
						Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)		Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	11/2/2015	6:00	6:30	30	0.5	11000	11000	11000		1081	541	48.10	6.24	3.12	3.12
		6:30	7:00	30	1.0	11000	10000	10500	1081	1191	1136	101.10	12.53	6.26	9.39
		7:00	7:30	30	1.5	10000	7000	8500	1191	1033	1112	98.97	9.93	4.96	14.35
		7:30	8:00	30	2.0	7000	10000	8500	1033	958	996	88.60	8.89	4.44	18.79
		8:00	8:30	30	2.5	10000	9000	9500	958	972	965	85.89	9.63	4.81	23.61
		8:30	9:00	30	3.0	9000	10000	9500	972	957	965	85.84	9.62	4.81	28.42
		9:00	9:30	30	3.5	10000	9000	9500	957	943	950	84.55	9.48	4.74	33.16
		9:30	10:00	30	4.0	9000	10000	9500	943	1208	1076	95.72	10.73	5.37	38.52
		10:00	10:30	30	4.5	10000	10000	10000	1208	1173	1191	105.95	12.50	6.25	44.77
		10:30	11:00	30	5.0	10000	10000	10000	1173	1006	1090	96.97	11.44	5.72	50.49
		11:00	11:30	30	5.5	10000	10000	10000	1006	1063	1035	92.07	10.86	5.43	55.93
		11:30	12:00	30	6.0	10000	10000	10000	1063	1046	1055	93.85	11.07	5.54	61.46
		12:00	12:30	30	6.5	10000	10000	10000	1046	1074	1060	94.34	11.13	5.57	67.03
		12:30	13:00	30	7.0	10000	11000	10500	1074	1077	1076	95.72	11.86	5.93	72.96
		13:00	13:30	30	7.5	11000	10000	10500	1077	1047	1062	94.52	11.71	5.86	78.81
		13:30	14:00	30	8.0	10000	11000	10500	1047	1070	1059	94.21	11.67	5.84	84.65
		14:00	15:00	60	9.0	11000	10000	10500	1070	1023	1047	93.14	11.54	5.77	90.42
		15:00	16:00	60	9.0	10000	10000	10000	1023	1100	1062	94.47	11.15	5.57	95.99
		16:00	20:45	345	14.75	10000	400	5200	1100	940	1020	90.78	5.57	2.79	98.78
		20:45	22:00	75	16.0	400	380	390	880	1009	945	84.06	0.39	0.19	98.97
	11/3/2015	6:00	8:00	120	26.0	600	400	500	1009	1024	1017	90.47	0.53	0.27	99.24
		8:00	10:00	120	28.0	400	500	450	1024	1000	1012	90.07	0.48	0.24	99.48
		10:00	12:00	120	30.0	500	400	450	1000	1006	1003	89.27	0.47	0.24	99.72
		12:00	14:00	120	32.0	400	400	400	1006	984	995	88.56	0.42	0.21	99.92
		14:00	16:00	120	34.0	400	400	400	984	1010	997	88.73	0.42	0.21	100.13
		16:00	18:00	120	36.0	400	400	400	1010	1039	1025	91.18	0.43	0.22	100.35
		18:00	20:00	120	38.0	400	300	350	1039	1088	1064	94.65	0.39	0.20	100.54
		20:00	22:00	120	40.0	300	300	300	1088	1060	1074	95.59	0.34	0.17	100.71
		22:00	6:00	480	48.0	300	400	350	1060	1068	1064	94.70	0.39	0.20	100.91

Total Extraction Time..... **192.0** **hours**
Total Liquid Volume..... **638** **gallons**
Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs + 5.9)..... **17.1** **gallons**
Total Hydrocarbon Recovery:..... **17.1** **gallons**

TOTAL lbs of VOC emissions = 100.91

Notes:

1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

Event Information

Technicia	David
n:	Lesesne
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event State:	SC
Event County:	Columbia
Event City:	Columbia
UST No.:	07680
Disposal Facility:	
Manifest Number:	
Temp:	

VACUUM RADIUS OF INFLUENCE

SC-015 - Columbia, SC UST Site # 07680							Dates: 11/02/15-11/04/15			Event #: 12
Date	Time	Elapsed Time	System Vacuum	MW-5R	MW-21	MW-1R	MW-7R	MW-15R	MW-8	MW-15
				Stinger Head		Distance to Nearest Fluid/Vapor Recovery Well				
	6:00	Start	Vacuum (Inches of Mercury Hg)							
	6:30	0.5	15.5	14.5	14.5	-0.001	0.000	0.000		
	7:00	1.0	15.0	14.0	14.0	-0.002	0.000	0.000		
	7:30	1.5	15.0	14.0	14.0	-0.001	0.001	0.000		
	8:00	2.0	15.0	14.0	14.5	-0.001	0.000	0.000		
	8:30	2.5	15.0	14.0	14.5	-0.002	-0.001	0.000		
	9:00	3.0	15.0	14.0	14.5	0.000	-0.001	0.000		
	9:30	3.5	15.5	14.0	14.5	-0.001	-0.001	-0.001		
	10:00	4.0	15.0	14.0	14.5	0.000	0.000	-0.002		
11/02/15	10:30	4.5	15.0	14.0	14.5	0.000	0.000	-0.001		
	11:00	5.0	15.0	14.0	14.5	-0.001	0.001	-0.001		
	11:30	5.5	15.0	14.0	14.0	-0.001	-0.001	-0.002		
	12:00	6.0	15.0	14.0	14.0	0.000	0.000	-0.002		
	12:30	6.5	15.0	14.0	14.0	-0.001	0.001	-0.001		
	13:00	7.0	15.0	14.0	14.0	0.000	0.002	-0.001		
	13:30	7.5	15.0	14.0	14.5	0.000	0.001	-0.001		
	14:00	8.0	15.0	14.0	14.5	0.001	0.001	0.000		
	15:00	9.0	15.0	14.0	14.5	0.000	0.001	0.000		
	6:00	24.0	15.0	14.0	14.0	0.000	0.001	0.001		
	8:00	26.0	14.5	13.5	14.0	-0.001	0.001	0.000		
	10:00	28.0	15.0	14.0	14.0	0.000	0.001	-0.001		
	12:00	30.0	15.0	14.0	14.0	0.000	0.001	-0.001		
11/03/15	14:00	32.0	15.0	14.0	14.5	-0.002	0.000	-0.002		
	16:00	34.0	15.0	14.0	14.5	0.000	0.000	-0.002		
	18:00	36.0	15.0	14.0	14.5	0.000	0.001	0.000		
	20:00	38.0	15.0	14.0	14.0	0.000	0.000	0.000		
	22:00	40.0	15.0	13.5	14.0	0.000	0.000	0.000		
11/04/15	6:00	48.0	14.5	13.5	14.0	0.001	0.001	0.000		

STINGER DEPTH ADJUSTMENTS

SC-015 - Columbia, SC UST Site # 07680					Project No.: 73078012A		Event #: 12
Dates: 11/02/15-11/04/15							
		MW-5R			MW-21		
	Pre:	Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
		12.79			13.21		
	Post:	18.13			18.44		
		Historical Low DTW		12.67	Historical Low DTW		12.86
		Stinger Depth (feet btoc)					

Date	Time	Elapsed Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
11/02/15	6:00	0.0	13.25	0.5	-0.58	13.75	0	-0.89
	6:30	0.5	13.75	0.5	-1.08	14.25	0.5	-1.39
	7:00	1.0	14.25	0.5	-1.58	14.75	0.5	-1.89
	7:30	1.5	14.75	0.5	-2.08	15.25	0.5	-2.39
	8:00	2.0	15.25	0.5	-2.58	15.75	0.5	-2.89
	8:30	2.5	15.75	0.5	-3.08	16.25	0.5	-3.39
	9:00	3.0	16.25	0.5	-3.58	16.75	0.5	-3.89
	9:30	3.5	16.75	0.5	-4.08	17.25	0.5	-4.39
	10:00	4.0	17.25	0.5	-4.58	17.75	0.5	-4.89
	10:30	4.5	17.75	0.5	-5.08	18.0	0.25	-5.14
	11:00	5.0	18.0	0.25	-5.33	18.0	0.0	-5.14
	11:30	5.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:00	6.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:30	6.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	13:00	7.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	13:30	7.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	14:00	8.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	15:00	9.0	18.0	0.0	-5.33	18.0	0.0	-5.14
11/03/15	6:00	24.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	8:00	26.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	10:00	28.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:00	30.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	14:00	32.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	16:00	34.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	18:00	36.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	20:00	38.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	22:00	40.0	18.0	0.0	-5.33	18.0	0.0	-5.14
11/04/15	6:00	48.0	18.0	0.0	-5.33	18.0	0.0	-5.14

AFVR FIELD DATA SHEET

Site: SC-015 - Columbia, SC; UST Site # 07680 | **Project No.: 73078012A** | **Dates: 11/16/15-11/18/15** | **Event #: 13**

		Start Time hh:mm	End Time hh:mm	Time Interval (min)	Elapsed Time (hours)	VOC Concentrations			Off-Gas Velocity (FPM)			Total Flow (CFM)	VOC Emissions		
						Initial (PPM)	Ending (PPM)	Average (PPM)	Initial (FPM)	Ending (FPM)	Average (FPM)		Rate (lbs/hr)	Total (lbs)	Cumulative Total (lbs)
MW-5R MW-21	11/16/2015	6:00	6:30	30	0.5	1200	1100	1150	760	702	731	65.06	0.88	0.44	0.44
		6:30	7:00	30	1.0	1100	800	950	702	533	617.5	54.96	0.62	0.31	0.75
		7:00	7:30	30	1.5	800	600	700	533	532	532.5	47.39	0.39	0.20	0.95
		7:30	8:00	30	2.0	600	500	550	532	515	523.5	46.59	0.30	0.15	1.10
		8:00	8:30	30	2.5	500	400	450	515	747	631	56.16	0.30	0.15	1.25
		8:30	9:00	30	3.0	400	400	400	747	750	748.5	66.62	0.31	0.16	1.40
		9:00	9:30	30	3.5	400	400	400	750	732	741	65.95	0.31	0.16	1.56
		9:30	10:00	30	4.0	400	400	400	732	723	727.5	64.75	0.31	0.15	1.71
		10:00	10:30	30	4.5	400	400	400	723	586	654.5	58.25	0.27	0.14	1.85
		10:30	11:00	30	5.0	400	400	400	586	786	686	61.05	0.29	0.14	1.99
		11:00	11:30	30	5.5	400	400	400	786	970	878	78.14	0.37	0.18	2.18
		11:30	12:00	30	6.0	400	400	400	970	504	737	65.59	0.31	0.15	2.33
		12:00	12:30	30	6.5	400	400	400	504	497	500.5	44.54	0.21	0.11	2.44
		12:30	13:00	30	7.0	400	300	350	497	486	491.5	43.74	0.18	0.09	2.53
		13:00	13:30	30	7.5	300	300	300	486	569	527.5	46.95	0.17	0.08	2.61
		13:30	14:00	30	8.0	300	300	300	569	469	519	46.19	0.16	0.08	2.69
		14:00	15:00	60	9.0	300	300	300	469	465	467	41.56	0.15	0.07	2.77
		15:00	16:00	60	10.0	300	300	300	465	471	468	41.65	0.15	0.07	2.84
		16:00	17:00	60	11.0	300	300	300	471	490	480.5	42.76	0.15	0.08	2.92
		17:00	18:00	60	12.0	300	300	300	490	528	509	45.30	0.16	0.08	3.00
		18:00	19:00	60	13.0	300	300	300	528	569	548.5	48.82	0.17	0.09	3.08
		19:00	20:00	60	14.0	300	300	300	569	593	581	51.71	0.18	0.09	3.17
		20:00	21:00	60	15.0	300	300	300	593	603	598	53.22	0.19	0.09	3.27
		21:00	22:00	60	16.0	300	300	300	603	619	611	54.38	0.19	0.10	3.36
		22:00	6:00	480	24.0	300	400	350	619	682	650.5	57.89	0.24	0.12	3.48
	11/17/2005	6:00	8:00	120	26.0	400	600	500	682	521	601.5	53.53	0.32	0.16	3.64
		8:00	10:00	120	28.0	600	800	700	521	443	482	42.90	0.35	0.18	3.82
		10:00	12:00	120	30.0	800	800	800	443	489	466	41.47	0.39	0.20	4.01
		12:00	14:00	120	32.0	800	900	850	489	492	490.5	43.65	0.44	0.22	4.23
		14:00	16:00	120	34.0	900	900	900	492	497	494.5	44.01	0.47	0.23	4.47
		16:00	18:00	120	36.0	900	900	900	497	559	528	46.99	0.50	0.25	4.72
		18:00	20:00	120	38.0	900	900	900	559	589	574	51.09	0.54	0.27	4.99
		20:00	22:00	120	40.0	900	900	900	589	614	601.5	53.53	0.57	0.28	5.27
	11/18/2015	22:00	6:00	480	48.0	900	1000	950	614	609	611.5	54.42	0.61	0.31	5.58

Total Extraction Time..... **192.0** **hours**
Total Liquid Volume..... **763** **gallons**
Total Liquid-phase Hydrocarbon..... **0.0** **gallons**

Total Vapor-phase Hydrocarbon (tot lbs ÷ 5.9)..... **0.9** **gallons**
Total Hydrocarbon Recovery:..... **0.9** **gallons**

TOTAL lbs of VOC emissions = 5.58

Notes:

1. VOC concentrations measured with an Intrinsically Safe TLV (Threshold-Limit Value) sniffer.
2. Off-gas velocity measured with a Dwyer Instruments Series 471 Thermo-Anemometer.
3. Off-gas stack diameter = 4 in.
4. CFM (cubic feet per minute) = FPM X crossectional area of stack (0.089 sq.feet).
5. lbs/hr = CFM * PPM * 0.0000118
6. Empty boxes indicate measurements which were not recorded.

Inputs

Off Gas Stack Diameter = 4 in.

Event Information

Technician:	David Lesesne
Vacuum Pump:	Squire-Cogswell /C15
Vacuum Type:	Rotary Claw Pump
Event State:	SC
Event County:	Richland
Event City:	Columbia
UST No.:	07680
Disposal Facility:	
Manifest Number:	
Temp:	

VACUUM RADIUS OF INFLUENCE

SC-015 - Columbia, SC UST Site # 07680						Dates: 11/16/15-11/18/15			Event #: 13
Date	Time	Elapsed Time	System Vacuum	MW-5R / MW-21 Stinger Head		MW-1R	MW-7R	MW-15R	MW-8	MW-15
						Distance to Nearest Fluid/Vapor Recovery Well				
	6:00	Start	Vacuum (Inches of Mercury Hg)							
11/16/15	6:30	0.5	17.0	15.5	16.0	0.000	0.000	0.000		
	7:00	1.0	17.0	16.0	16.5	0.000	0.000	0.000		
	7:30	1.5	17.5	16.5	16.5	0.000	0.000	0.000		
	8:00	2.0	18.0	16.0	17.0	0.000	0.000	0.000		
	8:30	2.5	17.0	15.0	15.5	0.000	0.000	0.000		
	9:00	3.0	17.5	15.5	16.0	0.000	0.000	0.000		
	9:30	3.5	17.0	16.0	16.0	0.000	0.000	0.000		
	10:00	4.0	17.5	16.0	16.0	0.000	0.000	0.000		
	10:30	4.5	18.5	17.5	17.5	0.000	0.000	0.000		
	11:00	5.0	20.0	17.0	17.0	0.000	0.000	0.000		
	11:30	5.5	20.5	17.5	17.0	0.000	0.000	0.000		
	12:00	6.0	20.0	18.0	18.0	0.000	0.000	0.000		
	12:30	6.5	21.0	18.5	18.0	0.000	0.000	0.000		
	13:00	7.0	20.5	18.0	18.0	0.000	0.000	0.000		
	13:30	7.5	21.0	18.0	18.0	0.000	0.000	0.000		
	14:00	8.0	19.5	18.5	18.0	0.000	0.000	0.000		
	15:00	9.0	20.0	20.0	20.0	0.000	0.000	0.000		
	16:00	10.0	19.0	18.5	18.5	0.000	0.000	0.000		
	17:00	11.0	19.0	18.0	18.0	0.000	0.000	0.000		
	18:00	12.0	18.0	17.0	17.0	0.000	0.000	0.000		
	19:00	13.0	18.0	16.5	17.0	0.000	0.000	0.000		
	20:00	14.0	18.0	16.0	17.0	0.000	0.000	0.000		
	21:00	15.0	17.0	16.0	17.0	0.000	0.000	0.000		
	22:00	16.0	17.0	16.0	16.0	0.000	0.000	0.000		
11/17/15	6:00	24.0	16.5	16.0	16.0	0.000	0.000	0.000		
	8:00	26.0	17.0	16.5	16.5	0.000	0.000	0.000		
	10:00	28.0	18.0	17.5	17.0	0.000	0.000	0.000		
	12:00	30.0	19.0	19.0	18.5	0.000	0.000	0.000		
	14:00	32.0	19.0	19.0	19.0	0.000	0.000	0.000		
	16:00	34.0	19.0	19.5	19.5	0.000	0.000	0.000		
	18:00	36.0	18.5	17.0	17.0	0.000	0.000	0.000		
	20:00	38.0	18.0	17.0	17.5	0.000	0.000	0.000		
	22:00	40.0	17.0	16.5	16.5	0.000	0.000	0.000		
11/18/15	6:00	48.0	17.0	17.0	17.0	0.000	0.000	0.000		

Notes:

1) Hg- Inches Of Mercury

2) Vacuum Recorded as a Negative Pressure in Hg

STINGER DEPTH ADJUSTMENTS

SC-015 - Columbia, SC UST Site # 07680						Project No.: 73078012A		
Dates: 11/16/15-11/18/15								Event #: 13
			MW-5R			MW-21		
			Depth to Water	Depth to Product	Product Thickness	Depth to Water	Depth to Product	Product Thickness
		Pre:	13.32			13.59		
		Post:	18.08			18.46		
			Historical Low DTW		12.67	Historical Low DTW		12.86
			Stinger Depth (feet btoc)					
Date	Time	Elapsed Time	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW	Depth of Stinger BTOC	Change in Depth of Stinger	Depth Above Historical Low DTW
11/16/15	6:00	0.0	13.75	0	-1.08	14	0	-1.14
	6:30	0.5	14.25	0.5	-1.58	14.5	0.5	-1.64
	7:00	1.0	14.75	0.5	-2.08	15	0.5	-2.14
	7:30	1.5	15.25	0.5	-2.58	15.5	0.5	-2.64
	8:00	2.0	15.75	0.5	-3.08	16	0.5	-3.14
	8:30	2.5	16.25	0.5	-3.58	16.5	0.5	-3.64
	9:00	3.0	16.75	0.5	-4.08	17	0.5	-4.14
	9:30	3.5	17.25	0.5	-4.58	17.5	0.5	-4.64
	10:00	4.0	17.75	0.5	-5.08	18.0	0.5	-5.14
	10:30	4.5	18.0	0.25	-5.33	18.0	0.0	-5.14
	11:00	5.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	11:30	5.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:00	6.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:30	6.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	13:00	7.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	13:30	7.5	18.0	0.0	-5.33	18.0	0.0	-5.14
	14:00	8.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	15:00	9.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	16:00	10.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	17:00	11.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	18:00	12.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	19:00	13.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	20:00	14.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	21:00	15.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	22:00	16.0	18.0	0.0	-5.33	18.0	0.0	-5.14
11/17/15	6:00	24.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	8:00	26.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	10:00	28.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	12:00	30.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	14:00	32.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	16:00	34.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	18:00	36.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	20:00	38.0	18.0	0.0	-5.33	18.0	0.0	-5.14
	22:00	40.0	18.0	0.0	-5.33	18.0	0.0	-5.14
11/18/15	6:00	48.0	18.0	0.0	-5.33	18.0	0.0	-5.14

APPENDIX B

Disposal Manifests

73078012A

regulatory solutions, inc.

CUSTOMER NAME: Terracon

GENERATOR: SC-015

TRUCK/CONTAINER #: Vac tank trailer

MANIFEST #:

WEIGHER (INITIALS): AM & K

4833

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA NON-DOT REGULATED MATERIAL			295		
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: David Lesesne — Signature — Month: 09 Day: 11 Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: David Lesesne — Signature — Month: 09 Day: 11 Year: 15

Transporter 2 Printed/Typed Name — Signature — Month Day Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month Day Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Sanette Conley — Signature: Sanette Conley — Month: 9 Day: 11 Year: 15

169-BLC-O 5 11977 (Rev. 9/09)

DESIGNATED FACILITY TO GENERATOR

08:00AM 08/27/2015
ID 561 51200 lb INBOUND

ID 561
GROSS 51200 lb RECALLED
TARE 47660 lb
NET 3540 lb
08/27/2015 10:41AM

regulatory solutions, inc.

CUSTOMER NAME: Terracon

GENERATOR: " "

TRUCK/CONTAINER #: Tm-03

MANIFEST#:

WEIGHER (INITIALS): BB

1551

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	803-926-0089	21752

GENERATOR

5. Generator's Name and Mailing Address

40 Hudson St. STE 107
Annapolis, MD 21401-

Generator's Phone: 741-9000

Generator's Site Address (if different than mailing address)

Crown Central LLC- SC 015
3800 Devine Street
Columbia, SC

6. Transporter 1 Company Name — U.S. EPA ID Number

Regulatory Solutions, Inc — 803-926-0089

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Regulatory Solutions, Inc.
40 Pascon Court
Gaston, SC, 29053-
803-926-0089

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA, NON-DOT REGULATED MATERIAL 10660 - 1042	1	T T	4 2	4	
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: As Signatory Agent for Regan W. Norris Crown Central LLC — Signature — Month: 9 — Day: 21 — Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. — Port of entry/exit:

Transporter Signature (for exports only): — Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month — Day — Year

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name: Janette Conley — Signature — Month: 9 — Day: 21 — Year: 15

169-BLC-0.5 11977 (Rev. 9/09) — DESIGNATED FACILITY TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number
	1	800-926-0099	

GENERATOR

5. Generator's Name and Mailing Address

Generator's Phone:

Generator's Site Address (if different than mailing address)

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Regulatory Solutions, Inc.
90 Patton Court
Easton, MI, 49034
800-926-0099

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA, NON-DOT REGULATED MATERIAL			638		
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name: David Legesse — Signature — Month: 11 — Day: 24 — Year: 15

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name: David Legesse — Signature — Month: 11 — Day: 24 — Year: 15

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in item 17a

Printed/Typed Name: Amy McKenzie — Signature: Amy McKenzie — Month: 11 — Day: 24 — Year: 15

INBOUND
10:41 AM Nov/19/2015
ID:765
23200 lb

OUTBOUND
10:53 AM Nov/19/2015
ID:765
23200 lb G
16840 lb PT
6360 lb N

regulatory solutions, inc.

CUSTOMER NAME: Terracon

GENERATOR: SC-015 Ce Devine

TRUCK/CONTAINER #:

MANIFEST#: 22110

WEIGHER (INITIALS): AMSK

4765

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number	2. Page 1 of	3. Emergency Response Phone	4. Waste Tracking Number

GENERATOR

5. Generator's Name and Mailing Address

Generator's Site Address (if different than mailing address)

Generator's Phone:

6. Transporter 1 Company Name — U.S. EPA ID Number

7. Transporter 2 Company Name — U.S. EPA ID Number

8. Designated Facility Name and Site Address — U.S. EPA ID Number

Facility's Phone:

	9. Waste Shipping Name and Description	10. Containers No.	10. Containers Type	11. Total Quantity	12. Unit Wt./Vol.	
1.	NON-RCRA, NON-DOT REGULATED MATERIAL			703		
2.						
3.						
4.						

13. Special Handling Instructions and Additional Information

14. **GENERATOR'S/OFFEROR'S CERTIFICATION:** I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offeror's Printed/Typed Name — Signature — Month — Day — Year

INT'L

15. International Shipments ☐ Import to U.S. ☐ Export from U.S. Port of entry/exit:

Transporter Signature (for exports only): Date leaving U.S.:

TRANSPORTER

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name — Signature — Month — Day — Year

Transporter 2 Printed/Typed Name — Signature — Month — Day — Year

DESIGNATED FACILITY

17. Discrepancy

17a. Discrepancy Indication Space ☐ Quantity ☐ Type ☐ Residue ☐ Partial Rejection ☐ Full Rejection

Manifest Reference Number:

17b. Alternate Facility (or Generator) — U.S. EPA ID Number

Facility's Phone:

17c. Signature of Alternate Facility (or Generator) — Month — Day — Year

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Printed/Typed Name — Signature — Month — Day — Year

169-BLC-O 5 11977 (Rev. 9/09)

TRANSPORTER #1

dhec
Healthy People. Healthy Communities.

UST 33 DOCKETING

FEB 2 1 2017

ANNIE SMITH-JONES
CROWN CENTRAL LLC C/O QES
40 HUDSON STREET SUITE 107
ANNAPOLIS MD 21401

Re: **Site-Specific Work Plan Request for Groundwater Sampling**
SC-015, 3800 Devine Street, Columbia, SC
UST Permit #07680
Release reported August 15, 1989
AFVR report received January 13, 2016
Richland County

Dear Ms. Smith-Jones:

The UST Management Division of the South Carolina Department of Health and Environmental Control (DHEC) has reviewed the referenced report submitted by Terracon Consultants, Inc. (Terracon) and the next appropriate scope of work at the site is a comprehensive groundwater sampling event.

The groundwater sampling event should be conducted in accordance with Terracon's Annual Contractor Quality Assurance Plan (ACQAP), and must be conducted in compliance with all applicable regulations. Groundwater samples should be collected from all monitoring wells associated with the release and analyzed for BTEX, naphthalene, MTBE, 1,2-DCA, 8 oxygenates, and EDB. Terracon can use Appendix F of the QAPP as a guideline to which samples should be collected. Please make sure to include duplicate samples, field blanks, and trip blanks. A copy of DHEC's QAPP for the UST Management Division is available at http://www.scdhec.gov/Environment/LW/UST/ReleaseAssessmentClean-up/QualityAssurance/

Please have your contractor complete and submit the Site-Specific Work Plan and Cost Proposal within thirty (30) days of the date of this letter. Every component may not be necessary to complete the above scope of work. The State Underground Petroleum Environmental Response Bank (SUPERB) Account allowable cost for each component is included on the Assessment Component Cost Agreement Form. **Please note that technical and financial preapproval from DHEC must be issued before work begins**.

On all correspondence regarding this site, please reference UST Permit # 07680. If you have any questions regarding this correspondence, please contact me by telephone at (803) 898-0634, by fax at (803) 898-0673, or by e-mail at kuhnkm@dhec.sc.gov.

Sincerely,

Kimberly M Kuhn, Hydrogeologist
Corrective Action Section
Underground Storage Tank Management Division
Bureau of Land and Waste Management

cc: Terracon Consultants, Inc., 521 Clemson Road, Columbia, SC 29229
Technical File