

From: Alexander, Leslee (Greenville) <Leslee.Alexander@aecom.com>

Email Scanned

Sent: Monday, August 27, 2018 6:31 PM

To: Rahn, Regan D. <RAHNRD@dhec.sc.gov>

Cc: Reddy, John UTAS (John.Reddy@utas.utc.com) <John.Reddy@utas.utc.com>; Bill Penn (william.penn@utc.com)

<william.penn@utc.com>; Gerald, Walter <WALTER.GERALD@aecom.com>

Subject: Revised Limestone Aquifer Groundwater Assessment Work Plan for Delavan Spray Technologies Site

Hi Regan,

Attached please find a .pdf copy of the Revised Limestone Aquifer Groundwater Assessment Work Plan for the Delavan Spray Technologies Site, located in Bamberg, South Carolina. A printed hard copy of the report was also put in the mail to you today. For your convenience, we are also including a copy of the report on Compact Disk (CD).

Please feel free to contact me or Walter Gerald (walter.gerald@aecom.com) if you have any questions.

Regards,
Leslee

Leslee Alexander, PG
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August 27, 2018

Ms. Regan Rahn
Bureau of Land and Waste Management
SC Department of Health & Environmental Control
2600 Bull Street
Columbia, SC 29201

RECEIVED

AUG 29 2018

**SITE ASSESSMENT,
REMEDIATION &
REVITALIZATION**

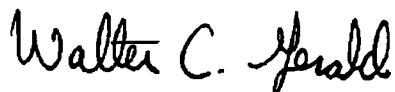
**RE: Revised Limestone Aquifer Groundwater Assessment Work Plan
Delavan Spray Technologies Site
Bamberg, South Carolina
SCDHEC VCC Number: 13-4762-RP
SCDHEC File Number: 51778
AECOM Project Number: 60314964**

Dear Ms. Rahn:

AECOM Technical Services, Inc. (AECOM), on behalf of United Technologies Corporation (UTC), is submitting to SCDHEC a copy of the *Revised Limestone Aquifer Groundwater Assessment Work Plan* for the Delavan Spray Technologies Site in Bamberg, South Carolina. The proposed assessment activities have been revised from the *Limestone Aquifer Groundwater Assessment Work Plan* (AECOM, October 13, 2017) based on comments from SCDHEC (correspondence dated December 18, 2017) and the conference call attended by SCDHEC, UTC, and AECOM personnel on June 27, 2018. A .pdf copy of the revised work plan is also included on the attached Compact Disk,

Please feel free to contact me if you have any questions or need additional information.

Sincerely,
AECOM Technical Services, Inc.



Walter C. Gerald, PG
Project Manager
walter.gerald@aecom.com
864-234-8925

cc: William Penn – United Technologies Corporation (1 copy via e-mail)
John Reddy – UTC Aerospace Systems (1 copy via e-mail)
Leslee Alexander – AECOM (1 copy via e-mail)

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MEMORANDUM

TO: Regan Rahn, SCDHEC
FROM: Walter Gerald, AECOM
COPY: William Penn, UTC
 Leslee J. Alexander, AECOM
 AECOM Project File 60314964/60578249
RE: Revised Limestone Aquifer Groundwater Assessment Work Plan
 Delavan Spray LLC
 Bamberg, South Carolina
 VCC 13-4762-RP
DATE: August 27, 2018

The *Limestone Aquifer Assessment Work Plan* was submitted to the South Carolina Department of Health and Environmental Control (SCDHEC) on October 13, 2017 for the Delavan Spray Technologies Site ("Delavan"), a Delavan Spray LLC manufacturing facility located at 4334 Main Highway in Bamberg, South Carolina. The work plan was submitted by AECOM Technical Services, Inc. (AECOM) on behalf of Delavan Spray LLC, a UTC Aerospace Systems (UTAS) company. Since the submittal, additional information has been collected and changes to the work plan are necessary. This memorandum summarizes the additional information and documents the proposed changes to the work plan.

Background

Following SCDHEC's review of the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017), UTAS and AECOM participated in a teleconference with SCDHEC on December 15, 2017 to discuss the scope of work. During the call and as documented in follow-up correspondence dated December 18, 2017, SCDHEC requested the sampling of select private wells along Lemon Creek and Orange Grove Roads and the vicinity. Twenty-seven private wells were sampled for tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (cis-1,2-DCE), and vinyl chloride between January 4, 2018 and April 19, 2108. The residential well sampling activities were detailed in the documents titled *Technical Memorandum - Residential Sampling Activities and Results* dated February 15, 2018 and June 4, 2018.

The majority of residential well groundwater samples were non-detect for PCE and its degradation products (i.e., TCE, cis-1,2-DCE, and vinyl chloride); however, PCE was detected in groundwater samples from nine (9) residential wells at low concentrations between 0.20 micrograms per liter ($\mu\text{g/L}$) and 0.50 $\mu\text{g/L}$. Results of the residential sampling are illustrated on Figure 1.

Following the completion of the residential well sampling and analysis, UTAS and AECOM participated in an additional conference call with SCDHEC on June 27, 2018 to discuss the path forward at Delavan and the necessary changes to the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017) based on the residential well sampling results. This memorandum has been prepared to document those changes and provide a revised work plan for SCDHEC approval. The revised scope of work and schedule are provided in the Sections that follow.

Revised Scope of Work

Pre-investigation activities, including the securing of access agreements and utility clearance of each monitoring well location, will be completed as described in Section 2.1 of the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017). Additionally, a monitoring well approval letter will be obtained from SCDHEC for the anticipated subsurface drilling work. An updated monitoring well approval application and proposed monitoring well construction details are included in Attachment A of this Revised Work Plan.

October 2017 PCE concentrations from limestone aquifer monitoring wells and PCE concentrations detected in residential well samples were contoured and are illustrated on Figure 1. Based on these data, four (4) deep limestone aquifer monitoring wells are proposed. These locations are expected to complete delineation of the PCE plume (Figure 1). Sonic drilling techniques are expected to be used to advance each boring to the target depth (e.g., a track-mounted Geoprobe® 8140LS sonic rig, or similar). However, other technologies may be used, if necessary, such as: DPT, hollow-stem auger or mud rotary. Boreholes will be logged in accordance with Section 2.3 of the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017). Type III monitoring wells will be installed to depths of 50 to 75 feet below ground surface as described in Section 2.5 of the Work Plan and Attachment A of this Revised Work Plan.

The remaining investigation activities will be completed as described in the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017) in the sections referenced as follows:

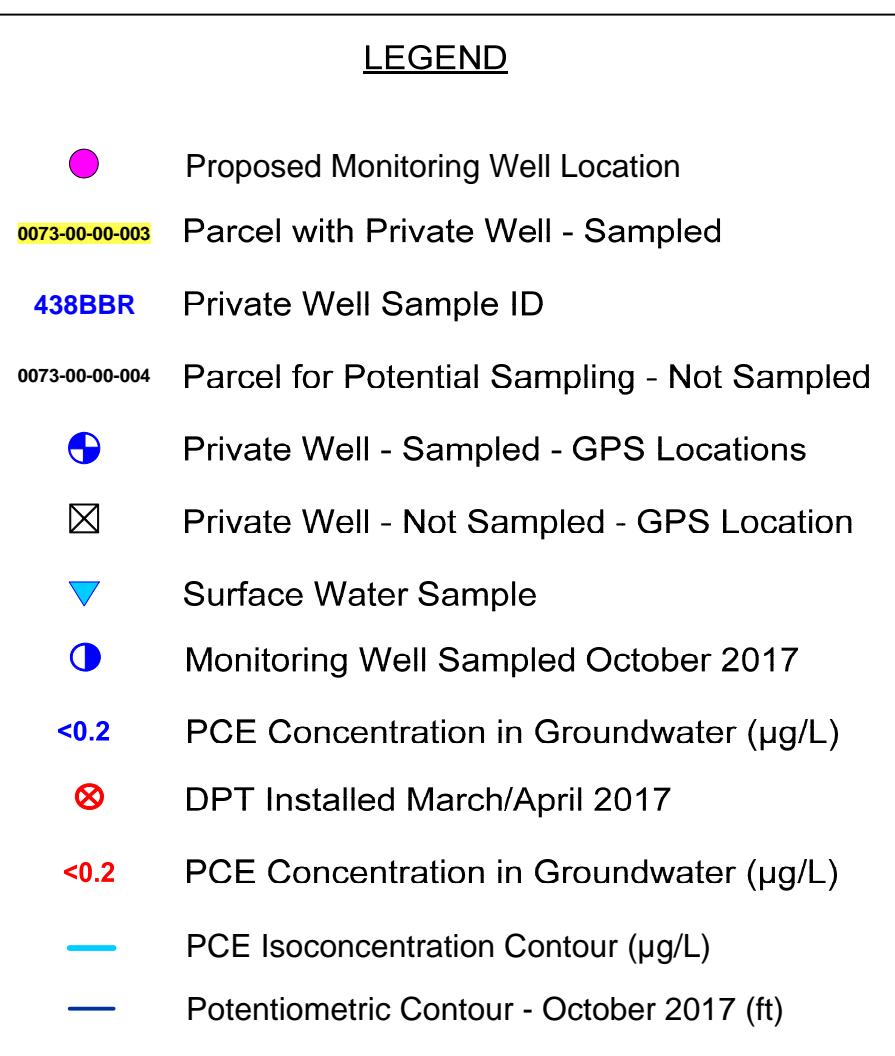
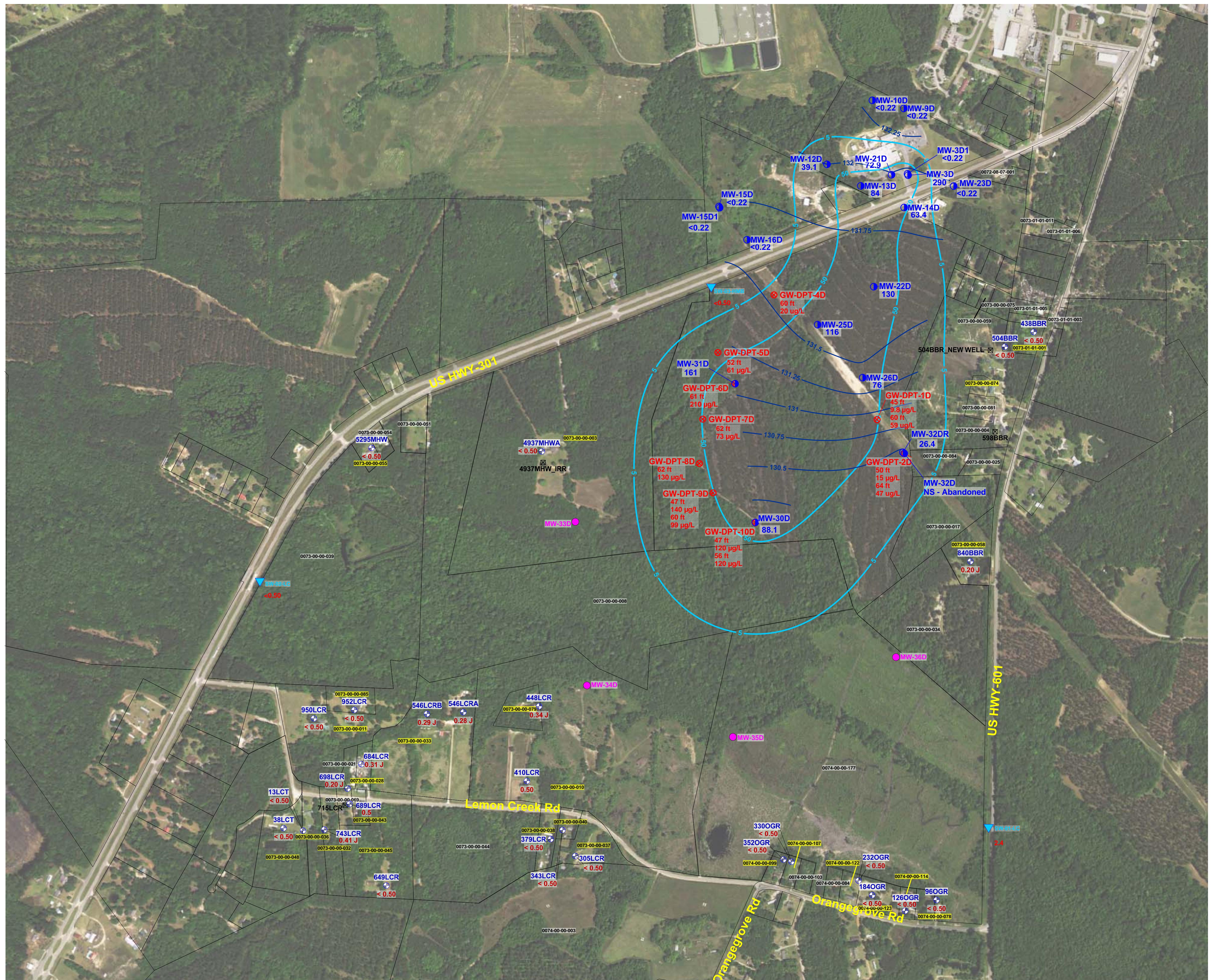
- Monitoring well development - Section 2.6
- Surveying - Section 2.7
- Water level measurement - Section 2.8
- Groundwater sampling - Section 2.9
- Quality assurance / quality control (QA/QC) - Section 2.11
- Slug testing - Section 2.12
- Equipment decontamination - Section 2.13
- IDW management - Section 2.14

Following the completion of investigation activities, a brief report will be prepared as described in Section 3.0 of the *Limestone Aquifer Assessment Work Plan* (AECOM, 2017). The report will be submitted to SCDHEC within 60 days of receipt of the analytical data from the laboratory.

Schedule

It is anticipated that investigation activities will be conducted in Fall/Winter 2018, following SCDHEC approval of this work plan and associated monitoring well permits, and the securing of access agreements. SCDHEC will be notified at least seven (7) prior to the start of field investigation activities. Following the investigation, the report will be submitted to SCDHEC within 60 days of receipt of the analytical data from the laboratory.

Figure



Notes:
 µg/L - micrograms per liter
 DPT - Direct Push Technology
 PCE - Tetrachloroethene
 1) Data was contoured using log and anti-log grid math and the kriging gridding method in Surfer 12. Data used for contouring included October 2017 monitoring well PCE results and January 2018 PCE results from residential wells.
 2) Half the detection limit was used to contour non-detects.

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FIGURE 1
PROPOSED MONITORING WELL LOCATIONS

DELAVAL SPRAY TECHNOLOGIES SITE
BAMBERG, SOUTH CAROLINA

JULY 2018

Attachment A

Monitoring Well Permit Application and Well Construction Details



Monitoring Well Application

| | |
|--|--|
| <p>1. Proposed Location of Monitoring Well(s):</p> <p>Street Address:</p> <p>City (including Zip):</p> <p>County:</p> <p>Please attach Scaled Map or Plat Figure A-1</p> | <p>5. Intended Purpose of Well(s):</p> <p>Pre-Purchase Investigation</p> <p>NOTE: If this request is for an existing DHEC project, please enter the Program area and ID number below.</p> <p>Program Area: Project or Site ID #:</p> |
| <p>2. Well Owner's Information:</p> <p>Name (Last then First):</p> <p>Company:</p> <p>Complete Address:</p> <p>Telephone Number:</p> | <p>6. Proposed number of monitoring wells:</p> <p>7. Proposed parameters to be analyzed (check all that apply), please specify analytical method beside check box:</p> <p>VOCs BTEX MtBE Naphthalene PAHs Metals Nitrates Base, Neutral & Acid Ex. Pesticides/Herbicides</p> |
| <p>3. Property Owner's Information:</p> <p>Check if same as Well Owner</p> <p>Name (Last then First):</p> <p>Company:</p> <p>Address:</p> <p>Telephone Number:</p> | <p>Phenols Radionuclides PCBs Other (<u>specify below</u>)</p> |
| <p>4. Proposed Drilling Date:</p> <p>September 2018</p> | <p>8. Proposed construction details (complete and attach proposed monitoring well schematics):</p> |

South Carolina Department of Health and Environmental Control (SCDHEC) summary of standards for monitoring well construction (per South Carolina Well Standards and Regulations R. 61-71)

Approval and License Requirements

Prior Department approval is required for the installation or abandonment of all monitoring wells including direct push, geoprobe or other temporary type monitoring wells. The attached monitoring well approval document should be completed, submitted and approved prior to construction of any monitoring well. A monitoring well is any well used to obtain water samples for water quality analyses or to measure groundwater levels. There are no fees for approvals. All monitoring wells must be drilled by a driller that is registered in South Carolina with the Board of Certification of the Environmental Systems Operators. If any of the information on the application including the proposed drilling date, well construction details or well placement changes, the Department (i.e. project manager issuing the well approval) must be notified 24 hours prior to well construction.

Location

Due to the nature and purpose of a monitoring well, the depth and location requirements in respect to surface water bodies, potential contamination sources, etc., are variable, and shall be approved on a case by case basis by the Department.

Construction and Material

Casing should be of sufficient strength to withstand normal forces encountered during and after well installation and be composed of material so as to minimally affect water quality analyses. Casing should have a sufficient diameter to allow for efficient sample collection (i.e., to provide access for sampling equipment). The diameter of the drilled hole needs to be large enough on all sides (1.5 inches of annular space) to allow forced injection of grout through a tremie pipe. All monitoring wells should have a cement pad or aggregate reinforced concrete at the ground surface which extends at least six inches beyond the bore hole diameter and six inches below ground surface to prevent infiltration between the surface casing and the bore hole. All monitoring wells should be grouted from the top of the bentonite seal to the surface with a neat cement, high solids bentonite or neat cement, bentonite mixture approved by the Department. A hydrated bentonite seal with a minimum thickness of 12 inches is to be placed above the filter pack to prevent infiltration of grout if the well has a filter pack. The monitoring well intake or screen design should minimize the amount of formation materials entering the well. The gravel pack should be utilized opposite the well screen as appropriate so that parameters analyses will be minimally affected. All monitoring wells should have a locking cap or other security device to prevent damage and/or vandalism. Any monitoring well which is destroyed, rendered unusable or is abandoned should be reported to the Department and be properly abandoned, revitalized or replaced as appropriate or required by permit or regulation.

Development

Monitoring wells shall be properly developed. Development shall include the removal of formation cuttings and drilling fluids from the well bore hole. Development shall be complete when the well produces water typical of the aquifer being monitored.

Reporting Requirements

A monitor well record form (1903) or equivalent to include the following should be completed and submitted to the Department within 30 days after completion of the monitoring wells:

Name and address of facility/owner;

Surveyed or global positioning system location of monitor well(s) on a scaled map or plat;

Driller and certification number;

Date drilled;

Driller's or Geologist's log;

Total depth;

Screened interval;

Diameter and construction details;

Depth to water table with date and time measured;

Surveyed elevation of measuring point with respect to established benchmark;

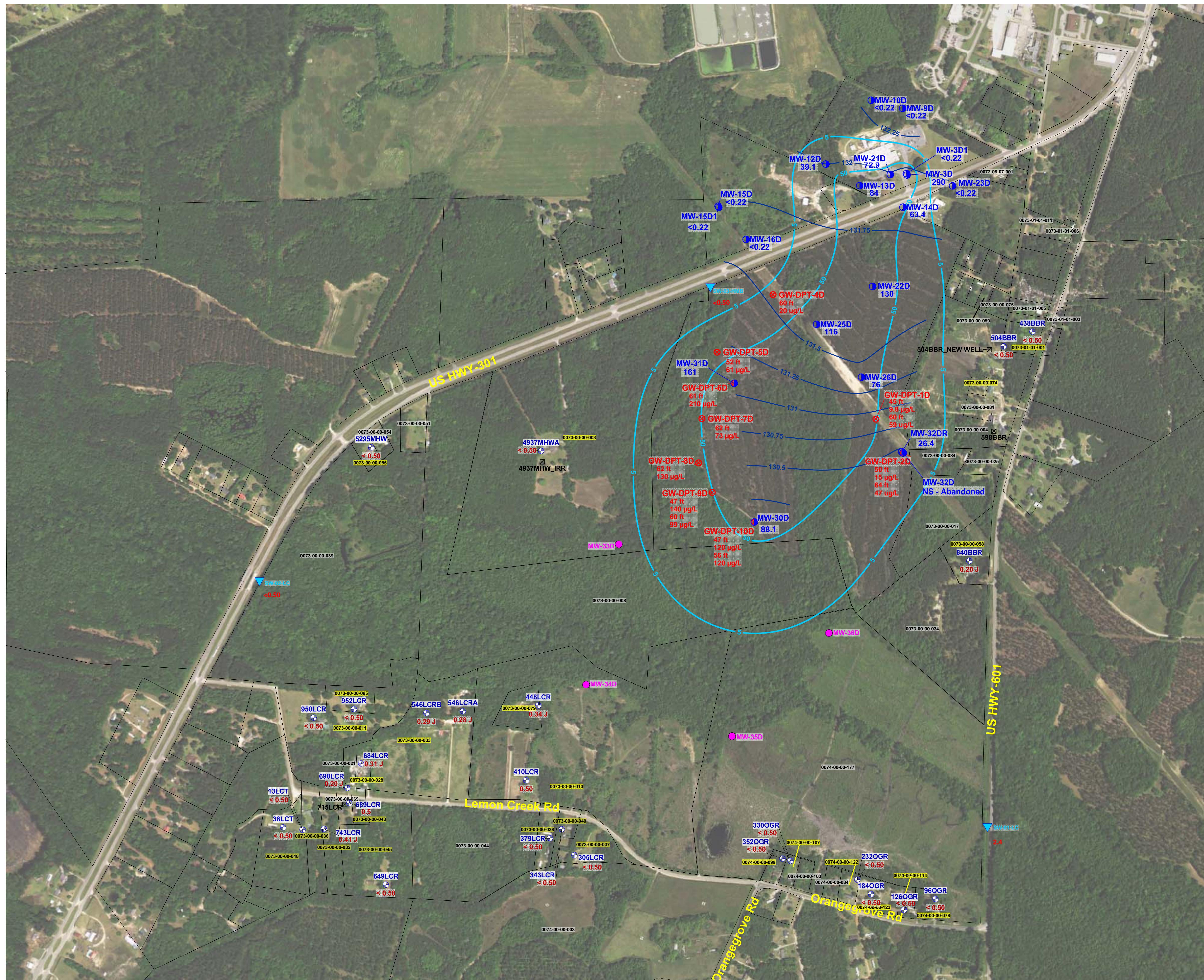
Monitoring well approval number issued by the Department.

Additionally, the groundwater and soil (if taken) analytical results should be submitted to the Department within 30 days of receipt from the laboratory.

Abandonment

All monitoring wells shall be properly abandoned, when deemed appropriate by the Department. Any well that acts as a source of contamination shall be repaired or permanently abandoned immediately after receipt of notice from the Department. Abandonment shall be by forced injection of grout or pouring through a tremie pipe starting at the bottom of the well and proceeding to the surface in one continuous operation. The well shall be filled with either neat cement, bentonite-cement, or 20% high solids sodium bentonite grout, from the bottom of the well to the land surface.

- * This summary of standards for monitoring well construction may not include a listing of all information necessary to obtain an approval to install monitoring wells. Final approval of monitoring well installation will be dependant upon the regulatory requirements for the Department program area for which the monitoring wells are to be installed.
- * Some areas of the Department may require a detailed justification of the placement of monitoring wells and the depth of monitoring well screened zones prior to granting installation approval.



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FIGURE A-1
PROPOSED MONITORING WELL LOCATIONS

DELAVAL SPRAY TECHNOLOGIES SITE
 BAMBERG, SOUTH CAROLINA

JULY 2018

FIGURE A-2
TYPE III GROUNDWATER MONITORING WELL INSTALLATION DETAIL

| | | |
|---|-------------------------------|---------------------------|
| Project Name: <u>Delavan Spray Technologies</u> | Drilling Co: _____ | Well Number: _____ |
| Location: <u>Bamberg, South Carolina</u> | Driller: _____ | Job Number: _____ |
| Client: <u>United Technology Corporation</u> | Drilling Method: <u>Sonic</u> | Date Completed: _____ |
| Geologist: _____ | Static Water Level _____ | b.TOC Survey Datum: _____ |

4-inch square locking protective casing **Top Of Casing** Elevation _____ ft _____ ft Stickup

Grass, Asphalt/Concrete **Land Surface** Elevation _____ ft

Concrete Surface Pad (2 ft x 2 ft x 6 in) **Temp Surf Casing** From _____ ft to _____ ft

COMMENTS

Casing Type: **Temporary Steel**
Inside Diameter: **6** in

Diameter of Borehole (nominal) **6** in

Bentonite/Cement Grout From _____ ft to _____ ft

Approx Depth to Limestone
30 feet

Bentonite Pellet Seal
Type: _____
From _____ ft to _____ ft

Top of Screen Depth _____ ft
Screen Type: **SCH-40 PVC**
Screen Slot Size: **0.010-in** ID **2** in
Screen Length: **10** ft

Filter Sand for Screen
Sand Type: _____
From _____ ft to _____ ft

Diameter of Borehole (nominal) **4** in

Bottom of Well Depth _____ ft
Bottom of Boring (estimated) Depth **50 - 75** ft

Total Depth of Well, b. Top of Casing Depth _____ ft

Note:
Drawing Not to Scale
All Depths are Referenced to Ground Surface

TYPE III GROUNDWATER MONITORING WELL INSTALLATION DETAIL

| | | |
|---|-------------------------------|-----------------------|
| Project Name: <u>Delavan Spray Technologies</u> | Drilling Co: _____ | Well Number: _____ |
| Location: <u>Bamberg, South Carolina</u> | Driller: _____ | Job Number: _____ |
| Client: <u>United Technology Corporation</u> | Drilling Method: <u>Sonic</u> | Date Completed: _____ |
| Geologist: _____ | Static Water Level | b.TOC |
| Survey Datum: _____ | | |

8-inch diameter, steel vault
 Grass, Asphalt/Concrete
 Concrete Surface Pad (2 ft x 2 ft x 6 in)
COMMENTS
 Approx Depth to Limestone
 30 feet

Top Of Casing Elevation _____ ft _____ ft Stickup
 Land Surface Elevation _____ ft
 Temp Surf Casing From _____ ft to _____ ft
 Casing Type: **Temporary Steel**
 Inside Diameter: **6** in
 Diameter of Borehole (nominal) **6** in
 Bentonite/Cement Grout From _____ ft to _____ ft
 Bentonite Pellet Seal Type: _____ From _____ ft to _____ ft
 Top of Screen Depth _____ ft
 Screen Type: **SCH-40 PVC**
 Screen Slot Size: **0.010-in** ID **2** in
 Screen Length: **10** ft
 Filter Sand for Screen Sand Type: _____ From _____ ft to _____ ft
 Diameter of Borehole (nominal) **4** in
 Bottom of Well Depth _____ ft
 Bottom of Boring (estimated) Depth **50 - 75** ft
 Total Depth of Well, b. Top of Casing Depth _____ ft

Note:
 Drawing Not to Scale
 All Depths are Referenced to Ground Surface