From: Fitzgerald, Conan <conan.fitzgerald@aecom.com>
Sent: Monday, August 21, 2023 8:01 AM
To: Devlin, Cynde <devlincl@dhec.sc.gov>
Cc: Berresford, James <berresjl@dhec.sc.gov>; Alexander, Leslee (Greenville) <Leslee.Alexander@aecom.com>; DiNardo, Paul M RTX <paul.dinardo@rtx.com>; Fuss, Travis R. <FUSSTR@dhec.sc.gov>; McLeod, Todd <todd.mcleod@delavan.com>; Ros, Ian <ian.ros@aecom.com>
Subject: Delavan Spray Technologies site (final)

Cynde,
Attached is a letter to clarify the schedule for the Off-Site Feasibility Study for the Delavan project. Please let me know if we should discuss further.

Please disregard the letter that came over the weekend, which was generated from a draft Word file, not the final.

Conan Fitzgerald PE, AECOM Technical Services of North Carolina
Associate Vice President, Engineering Manager
Environment-Carolinas
D +1-919-461-1260
M +1-919-349-5486
conan.fitzgerald@aecom.com

AECOM
5438 Wade Park Boulevard, Suite 200
Raleigh, NC 27607, USA
T +1-919-461-1100
aecom.com

AECOM
5438 Wade Park Blvd
Suite 200
Raleigh NC 27607
www.aecom.com

919 461 1100 tel
919 461 1415 fax

August 21, 2023

Ms. Cynde Devlin, Project Manager
SC Department of Health and Environmental Control
Bureau of Land and Waste Management
2600 Bull Street
Columbia, SC 29201

Re: Off-Site Feasibility Study (FS) Work Plan Approval Letter
Delavan Spray Technologies Site
Bamberg, South Carolina
SCDHEC VCC Number 13-4762-RP
SCDHEC File Number 51778
AECOM Project Number 60707644

Dear Ms. Devlin:

AECOM Technical Services, Inc. (AECOM) on behalf of RTX Corporation (RTX) for Delevan Spray, LLC (Delevan) is responding to your letter dated July 24, 2023 indicating approval of the *Feasibility Study Work Plan for Off-Site Areas* (AECOM, February 2023). While AECOM appreciates the approval, it is necessary to clarify the schedule in the now approved Work Plan, since the deadline of December 15, 2023 identified in the letter is not attainable considering the scope of approved activities. SCDHEC's comments and closing statement are presented in italics below followed by AECOM's response.

Comment 1: Following the completion of the drone field activities, collection of groundwater/surface water interface samples in Lemon Creek and Halfmoon Branch should be considered.

Response: Use of an unmanned aerial vehicle or drone was considered in the work plan. With the SCDHEC's endorsement, AECOM will plan on implementing this technology. However, as noted in the work plan, this work must be implemented in the winter when vegetative cover is minimal and the surface water temperature is colder than groundwater. Therefore, while many of the proposed activities can be scheduled for the Fall 2023, a reasonable time frame to schedule the drone work will be January 2024.

Although not proposed in the work plan, AECOM concurs with the concept of groundwater/surface water samples in Lemon Creek and Halfmoon Branch. Porewater samples can be effective for pinpointing the location where contaminants in groundwater such as PCE are entering surface water features. Attached is a Standard Operating Procedure for Micro Streambed Piezometer Installation and Monitoring (**Attachment A**). AECOM will plan on utilizing these tools in the Spring of 2024 after the drone work is completed, consistent with SCDHEC's suggestion.

Comment 2: The referenced document focuses on data gaps related to groundwater contamination in residential wells down gradient of the facility. Please note that groundwater contamination between the property boundary and the residential wells should also be part of the remediation alternative evaluation.

Response: AECOM acknowledges this comment. Additionally, AECOM notes that the most definite and impactful method for expediting plume treatment will be to initiate on-site treatment, which RTX set aside funding for construction in 2022. On-site groundwater treatment has not advanced

beyond evaluation of the conceptual designs while SCDHEC review of the On-Site Feasibility Study, Revision 1 (AECOM February 2023) is pending.

Comment 3: Institutional control of groundwater cannot be implemented on property not owned by Delavan.

Response: AECOM acknowledges this comment.

SCDHEC Closing Statement: Please submit the focused FS and workplan for additional offsite data needs on or before December 15, 2023.

Response: Since one of the interim tasks in the approved FS Work Plan cannot occur until January 2024, as noted above, a due date of December 15, 2023 is not feasible. The FS Work Plan proposed a submittal date for the Off-site FS of December 2024. Additionally, it was the intention that documentation of these field tasks will be included in the Off-site FS. But it is evident that this was not clearly conveyed in the FS Work Plan. Therefore, AECOM is proposing a separate Off-Site Remedial Investigation Report that would be submitted followed by preparation of the Off-site FS. An updated schedule inclusive of porewater sampling and the Off-Site Remedial Investigation Report is included as **Attachment B**. As shown, the proposed schedule maintains an Off-site FS submittal date of December 2024. This is contingent upon gaining the necessary access agreements in time to meet this schedule.

If you have any questions or require further information, please feel free to contact us.

Sincerely,

AECOM Technical Services, Inc.

Conan Fitzgerald, P.E.
Project Manager
919-461-1260
conan.fitzgerald@aecom.com

cc: Paul DiNardo – RTX
Todd McLeod – Delavan
Project File 60314964\60707644

ATTACHMENT A
MICRO-STREAMBED PIEZOMETER INSTALLATION AND MONITORING PROCEDURES

ATTACHMENT A
MICRO-STREAMBED PIEZOMETER INSTALLATION AND MONITORING PROCEDURES

Micro-piezometers can be used to identify areas in small streams or drainages where groundwater is discharging into surface water.

A.1 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide standardized guidelines for installing micro-piezometers in surface water features in order to provide hydraulic head measurements to assess groundwater and surface water interactions.

A.2 EQUIPMENT AND MATERIALS

The micro-piezometers will be constructed using either a section of Tygon® tubing that is slotted along the bottom 2.5 to 5 centimeters and wrapped in fine-mesh nylon window screen and plugged on the bottom with silicone or a commercially available M.H.E. Products push-point sampler equipped with Tygon® tubing. M.H.E. products are constructed of an approximately ¼ inch diameter stainless steel tube equipped with a four-centimeter long steel screen that can be pushed into the sediments of a stream. Either method allows for the monitoring of the piezometric head differential between the stream and the groundwater. When measured relative to the surface water level, the head in the piezometer can be used to identify whether the groundwater is discharging into the stream (indicated by a piezometric head that is above the water level in the stream) or whether the stream is recharging the underlying groundwater (indicated by a piezometric head that is lower than the water level of the stream).

The following is a list of equipment generally needed for the installation of micro-streambed piezometers:

1. M.H.E Push-Point samplers or a slotted section of ½-inch inside diameter Tygon® tubing of sufficient length to be installed in the streambed
2. Reinforcing bars or wooden stakes and survey flagging/high-visibility spray paint to mark piezometer locations
3. Hammer, machete, and any other tools for clearing measuring stations and setting stake
4. If using a field constructed slotted section of Tygon® tubing, a four to five foot long length of ¾-inch diameter steel pipe and a box of carriage bolts with a head that is greater than ¾ inches that fits into the bottom of the pipe for

deployment of the piezometer into the streambed (Note: one carriage bolt will be required for each location).

5. Surface-type depth measuring rod, or engineering rule with 0.01 foot increments and a measuring tape
6. Peristaltic pump, syringes (from M.H.S., Inc.) or hand pump that with connections for the Tygon® tubing
7. Global Positioning System (GPS) unit
8. Hip boots or chest waders depending on depth of the stream
9. Deionized or distilled water
10. Alconox®, Liquinox® (or equivalent)
11. Paper towels
12. 100 milliliter and 250 milliliter graduated cylinders
13. Trash bags
14. Site documents and record-keeping material (e.g., Health and Safety Plan [HASP], Work Plan for measurement task, field log book, measurement record forms, pen, permanent marker)
15. Personal Protective Equipment (PPE) - see site-specific HASP or Work Plan
16. First aid kit
17. Decontamination equipment (see Appendix I).

A.3 INSTALLATION AND MONITORING PROCEDURES FOR MICROSTREAMBED PIEZOMETERS

A.3.1 Selection of Piezometer Locations

Micro-Streambed stations will be selected based on their suitability to meet the project data needs after a thorough reconnaissance of the area. Basic factors to be considered in the site selection include the following:

1. Calm surface water conditions that allow the reading of the water level in the clear Tygon® tubing.
2. Subsurface site conditions should allow the deployment of the device. Sandy sediments are considered optimal. Clayey or rocky bottoms are not ideal.
3. Measurements stations should be accessible under reasonably foreseeable flow and weather conditions.

A.3.2 Manufacturing of Piezometers (if necessary)

Instructions for manufacturing micro-piezometers from Tygon® tubing are as follows:

1. Pre-cut Tygon® tubing in approximately 3.5 to 4-foot lengths.

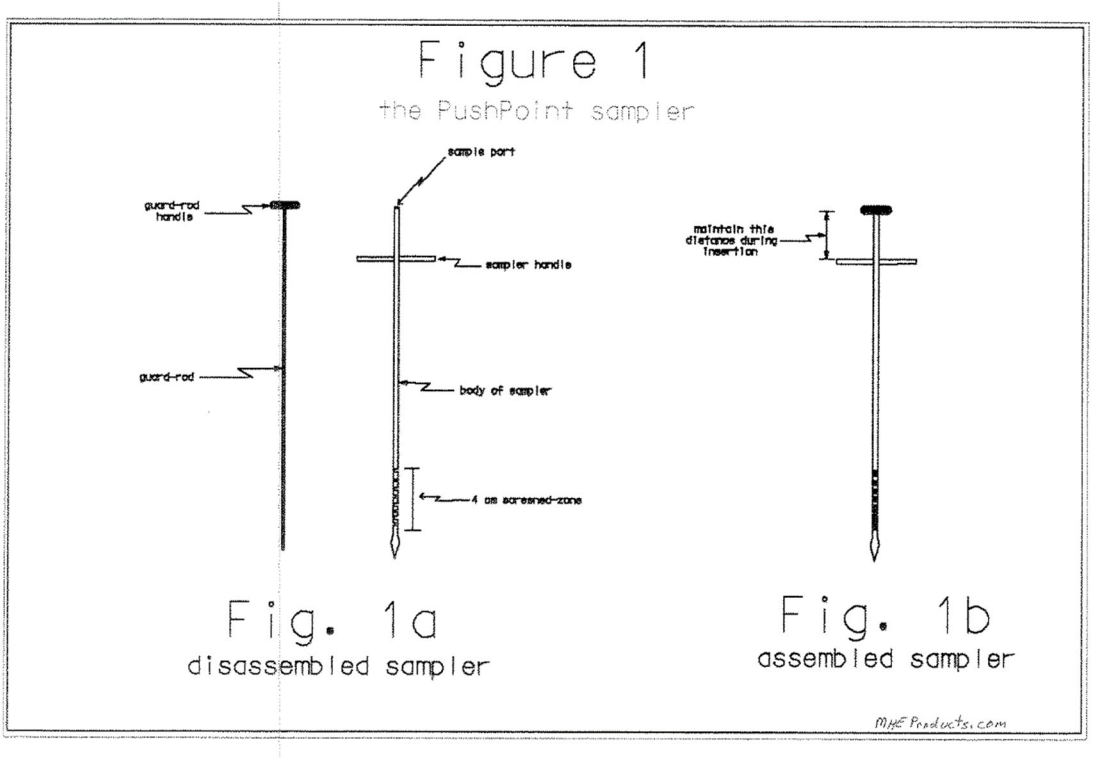
2. Slot the bottom 2.5 to 5 centimeters or the tube with an Exacto-knife or similar.
3. Wrap a 3 to 6 centimeter wide strip of fine-mesh nylon window screen around the slotted section of tubing and secure in place with two rubber bands and a bead of superglue along the width of the strip of screen.
4. Insert a small bead of silicone seal into the bottom end of the Tygon® tube and allow the silicone to cure.

A.3.3 Installation of M.H.E. Push Point Samplers

M.H.E. Products Push-Point samplers can be used in locations that allow the top of the piezometer to be installed at a depth where the top of the sampler will not be below the surface of the stream.

Installation procedures for M.H.E. Push Point samplers for use as stream bed piezometers are as follows:

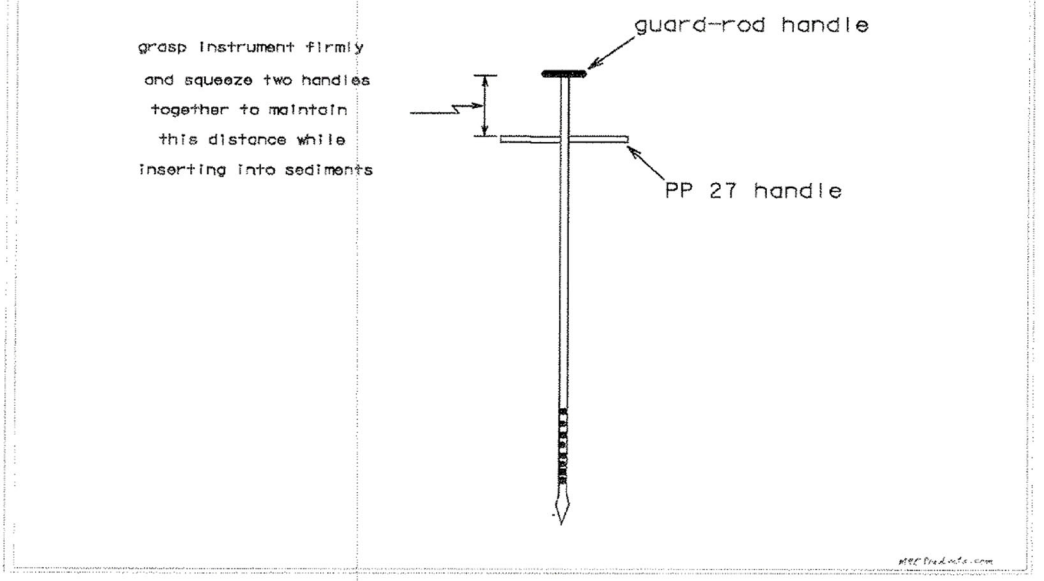
1. Don a pair of clean nitrile gloves.
2. Measure the length of the Push-Point sampler and the screen interval of the sampler and record this information in the field log book.
3. Insert the into the Push-Point sampler as shown on Figure 1.



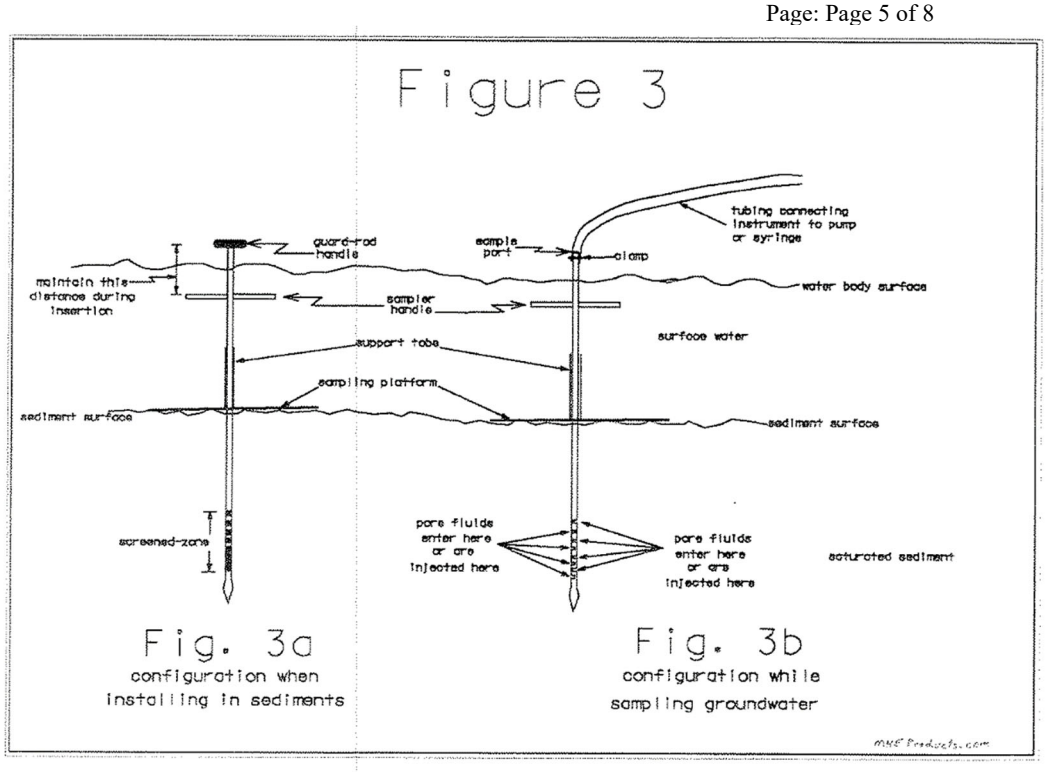
4. If installing the Push-Point sampler in very fine sand or silt/clays, place a filter sock over the slotted portion of the sampler.

5. Hold the device in a manner that squeezes the two handles towards each other to maintain the guard-rod fully inserted in the Push-Point sampler body during the insertion process (see Figure 2). Holding the device in this manner, push the Push-Point sampler into the sediments or beach to the desired depth using a gentle twisting motion.

Figure 2



6. When the desired depth is reached, remove the guard-rod from the Push-Point sampler body without disturbing the position of the deployed sampler. Record the depth of the midpoint of the screen below the bed of the surface water body.
7. Once the guard-rod has been removed from the Push-Point, it SHOULD NOT be reinserted into the device until the bore of the Push-Point has been thoroughly cleansed of all sand, silt, etc.
8. Connect a clean section of Tygon® tubing equipped with a hose clamp to the sampling port of the Push-Point sampler and secure clamp.
9. Attach a syringe or peristaltic pump to the other end of the Tygon® tubing (Figure 3) and withdraw water at a low-flow rate (50-200 ml/min.). The first 20-50 ml of groundwater will be turbid. This is the "development" water and should be discarded in a container for disposal.



10. When purge water clears, the piezometer has been adequately developed.
11. To obtain a hydraulic head measurement, lower the tygon tubing so that a portion of the tubing is below the water surface and the opening of the tube is above the surface as illustrated on Figure 4. Inject distilled water into the end of the tubing to purge air bubbles. When air bubbles have been purged and the syringe has been removed, measure the water level inside the tygon tubing relative to the water surface outside the tube. Push-Point water levels that are above the level of the surface water are to be identified as "+" and water levels below the surface water level are to be identified as "-". Record these data as well as the depth of the stream in the field log book.

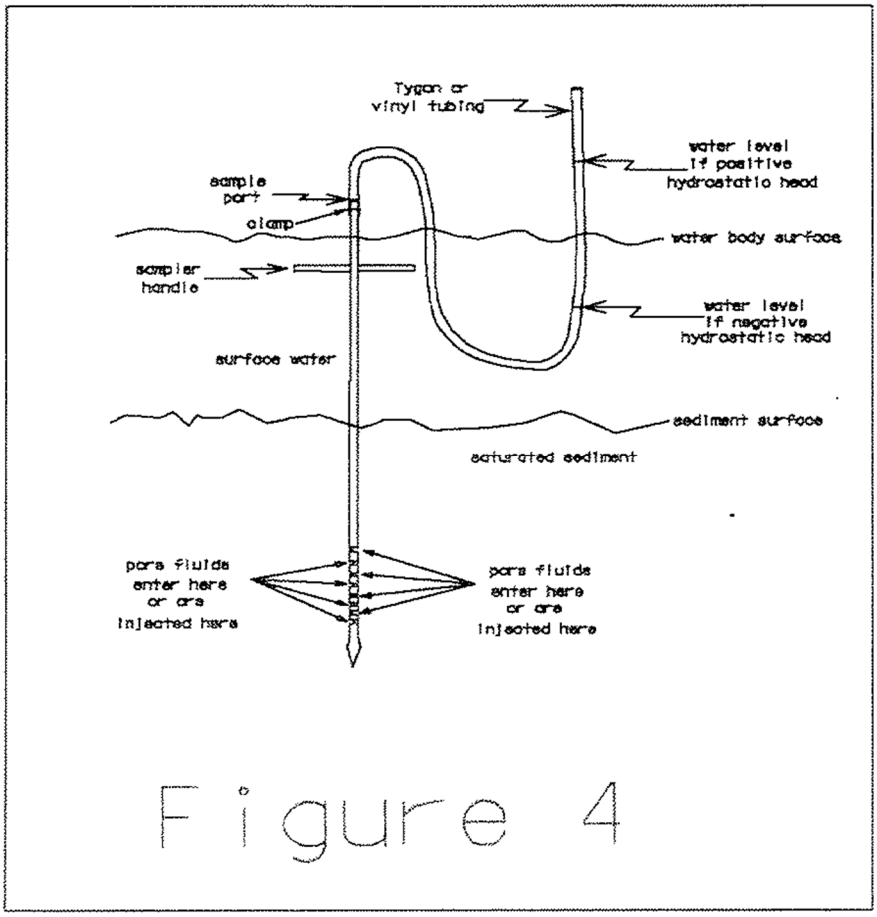


Figure 4

12. Each piezometer location will be marked with a pin-flag and located using GPS (NAD 83 North Carolina State Plane Coordinates) or conventional survey methods and tied to the Site monitoring network to facilitate interpretation of the data. These data will be recorded in the field log book and on sample data sheets.
13. Complete field log book entries regarding flow conditions and bottom cover material, evidence of seeps, and observations of sheens, unusual colors or odors.

A.3.4 Installation of Micro-Piezometers Constructed of Tygon® Tubing

The procedure for installing flexible piezometers constructed of Tygon® tubing is as follows:

1. Don a clean pair of nitrile gloves.
2. Place a carriage bolt in the bottom of a 4 to 5 foot long section of ¾ inch steel pipe and drive the pipe between 6 inches and one foot into the bottom sediments of the stream bed to create a pilot hole for the micro-piezometer.

3. Upon reaching the desired depth, insert the micro-piezometer to the bottom of the pipe and then slowly removed the pipe in a twisting motion allowing the sediments to collapse around the screen.
4. Attach a peristaltic pump or hand pump to the piezometer and purge until the discharge is clear.
5. Groundwater head measurements are obtained by measuring the water level in the piezometer relative to the surface water level outside the piezometer. Water levels that are above the level of the surface water are to be identified as "+" and water levels below the surface water level are to be identified as "-". Record these data as well as the depth of the stream in the field log book.
6. Each piezometer location will be marked with a pin-flag and located using GPS (NAD 83 North Carolina State Plane Coordinates) or conventional survey methods and tied to the Site monitoring network to facilitate interpretation of the data. These data will be recorded in the field log book and on sample data sheets.
7. Complete field log book entries regarding flow conditions and bottom cover material, evidence of seeps, and observations of sheens, unusual colors or odors.

A.4 PERMEABILITY TESTING OF MICRO-STREAMBED PIZOMETERS

Permeability testing may be performed on micro piezometers that exhibit heads that are greater than the level of the stream using Darcy's Law. Parameters needed to calculate the permeability of the stream bed sediments include the following:

- The inside diameter of the piezometer
- The length of the screen section of the piezometer
- The depth of the midpoint of the screen relative to the bottom of the surface water feature
- The depth of surface water
- The piezometer head
- The rate of discharge from the piezometer. To determine the flow rate, a dry plastic sandwich bag can be fastened to the end of the piezometer using a rubber band. After attaching the plastic bag to the end of the piezometer, let the piezometer rest on the bottom of the surface water body and allow groundwater to discharge into the bag for a preset period of time. At the end of this time period, retrieve the bag and measure the volume of water captured in the bag using a graduated cylinder. Record the volume and time in the field log book

and calculate the flow rate. Repeat these measurement three times and compute the arithematic average.

These parameters can be used with the following equation to estimate the hydraulic conductivity of the stream bed sediments:

$$K_h = [Q*\ln\{(L/D) + [1+(L/D)^2]^{1/2}\} /(2*\pi*L*\Delta h)$$

where:

K_h = horizontal hydraulic conductivity of the sediments (centimeters per second);

Q = Discharge rate from piezometer (cubic centimeters per second);

L = Length of the screen section of the piezometer (centimeters);

D = Diameter of the piezometer intake (centimeters);

Π = pi = 3.14; and

Δh = head difference between the water level in the piezometer and the surface water level adjacent to the piezometer (centimeters).

A.5 DECONTAMINATION AND INVESTIGATION-DERIVED WASTES

Reusable sample equipment will be thoroughly decontaminated prior to and between uses at individual monitoring locations to avoid cross-contamination. This decontamination sequence follows the suggested decontamination protocol outlined in Appendix I of the QAPP. Sampling equipment that cannot be readily decontaminated will be discarded after each use. Discarded materials will be accumulated and stored in appropriate receptacles for disposal as solid waste in accordance to Appendix J of the QAPP.

ATTACHMENT B
SCHEDULE FOR TASKS IN SUPPORT OF OFF-SITE FEASIBILITY STUDY

Attachment B

Schedule for Tasks in Support of Off-Site Feasibility Study
Delavan Spray Technologies, Bamberg SC

Project Activity or Task	Estimated Start Date	Estimated Duration	Estimated Completion or Delivery Date
Groundwater MNA Parameters	October 2023	Collect Semi-Annual	January 2024
Compound-Specific Isotope Analysis	October 2023	90 days	January 2024
Soil Sampling and Analysis	October 2023	90 days	January 2024
Surface Water Sampling (Initial)	October 2023	60 days	December 2023
Passive Flux Meters (Pre-Remediation)	October 2023	90 days	January 2024
Mann Kendall Analysis	November 2023	Perform Semi-Annually	November 2023
Drone Study	Jan 2024	60 days	February 2024
Surface Water and Porewater Sampling (post-Drone)	March /April 2024	60 days	May / June 2024
Off-Site Remedial Investigation Report	June 2024	90 days	September 2024
Off-Site Feasibility Study Report	September 2024	90 Days	December 2024