Message

**From**: Rossi, Debra [/O=EXCHANGELABS/OU=EXCHANGE ADMINISTRATIVE GROUP (FYDIBOHF23SPDLT)/CN=RECIPIENTS/CN=F1AA8EE0AD5E41C5B1D296767097F89E-DROSSI]
**Sent**: 2/25/2019 3:59:39 PM
**To**: John Andrade [jandrade@pgslegal.com]; Michael Harris (Michael.Harris@newcastlede.gov) [Michael.Harris@newcastlede.gov]
**CC**: Susanna Mays [susanna@trustsc.com]; Michele Ruth [mcrrai@gmail.com]; Theresa Miller (theresa_miller@golder.com) [theresa_miller@golder.com]
**Subject**: RE: Follow-up to Summary of 9/20/2018 ACL Meeting and Request for Extension for submittal of the Revised Work Plan and SAP
**Attachments**: Draft Response to Long Screen Well Purge and Rationale rfs 12.14.2018.pdf; Draft Sept 20 2018 Meeting Notes Attachments.pdf

John and Mike,

EPA approves the proposed purging and sampling methodology described in Golder Associates' December 11, 2018 Response to USEPA Request for Alternate Purging and Sampling Method for Long-Screen Wells (attached). However, we recommend that at least one pair of wells (one screened in the upper sand and the other screened in the lower sand) be purged and sampled using both techniques (low-flow and three-well-volume). This will help determine if the traditional purge draws from material intercepted by one or both of the wells and/or if groundwater from aquifer material intercepted by each well is representative regardless of the technique used.

Regarding Table 4 - Vertical Gradient Assessment (included in attached 9/20/18 Meeting Note Attachments), please specify which extraction wells and/or production wells were pumping during the measurement dates. In addition, because radial flow occurs at many landfills, please provide a groundwater elevation map for the upper sand, with water elevations posted, to ensure that well MW-58 is truly upgradient.

Please submit the revised Work Plan for Additional Investigation to EPA for approval by March 27, 2019.

Thank you.

Debbie

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**From:** Susanna Mays <susanna@trustsc.com>
**Sent:** Tuesday, December 18, 2018 10:16 AM
**To:** Rossi, Debra <Rossi.Debra@epa.gov>
**Subject:** FW: Follow-up to Summary of 9/20/2018 ACL Meeting and Request for Extension for submittal of the Revised Work Plan and SAP

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**From:** Susanna Mays [mailto:susanna@trustsc.com]
**Sent:** Monday, December 17, 2018 12:12 PM

**To:** Debra Rossi (Rossi.Debra@epamail.epa.gov) <Rossi.Debra@epamail.epa.gov>
**Cc:** John C. Andrade Esquire (jandrade@pgslegal.com) <jandrade@pgslegal.com>; Mike Harris (addMichael.Harris@newcastlede.gov) <addMichael.Harris@newcastlede.gov>; Michele Ruth (mcrrai@gmail.com) <mcrrai@gmail.com>; Miller, Theresa <theresa_miller@golder.com>
**Subject:** Follow-up to Summary of 9/20/2018 ACL Meeting and Request for Extension for submittal of the Revised Work Plan and SAP

Hi Debbie,

The below response to your email dated December 7, 2018 has been prepared by Golder Associates, Inc. and Ruth Associates, Inc. on behalf of New Castle County and the Army Creek Private Settlors. The request for extension for submittal of the revised Work Plan and SAP for the Additional Investigation at Army Creek is being requested by New Castle County and the Army Creek Private Settlors.

In response to your email dated December 7, 2018 regarding submission of "a summary table of the well construction information, the proposed sampling method, the proposed subset of wells that will be purged by both low-flow and 3-well-volume purging methods and the rationale for their selection", please see the attached memorandum titled "Response to USEPA Request for Alternate Purging and Sampling Method for Long-Screen Wells".

In addition, your email dated December 7, 2018 stated "This email constitutes EPA's formal approval of a phased extension of the due date for the revised Work Plan. To avoid potential impacts to the project schedule, revisions to those portions of the Work Plan, including the Sampling and Analysis Plan, which pertain to the installation of new monitoring wells should be submitted to EPA by December 20, 2018. Please submit a redline/strikeout version of these revisions to facilitate EPA's timely review of these changes. Revisions to the remainder of the Work Plan are to be submitted no later than January 11, 2019." Our consultants have considered this request and determined that separating the revised SAP/QAPP into two separate documents at this point would be complicated and lead to errors and additional comments from EPA to address. Furthermore, there are some unresolved issues that we would prefer to drive to resolution prior to issuing the revised documents. These issues are presented in our responses (see Green text in email below = Golder and Ruth Associates' responses to EPA's comments and our Attachments) prepared to your responses (see Red text in email below = EPA's clarifying comments on the Summary Notes dated October 10, 2018).

Due to the outstanding responses on: 1) sampling methods for long-screened wells, 2) Eurofins' PFAS modified Method 537, and 3) coming to resolution on the items in the email below, we propose to submit the revised Work Plan and SAP to EPA within 30 days of receipt of EPA's final comments from their review of the sampling methods for long-screened wells and/or Eurofins' modified PFAS method, whichever is later.

Please let us know if you would like to discuss any of these items further,

Regards,

Susanna

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**From:** Rossi, Debra <Rossi.Debra@epa.gov>
**Sent:** Wednesday, October 10, 2018 10:20 AM
**To:** Michael Harris <MHarris@nccde.org>; Michael Sherrier (michael.p.sherrier@dupont.com) <michael.p.sherrier@dupont.com>
**Cc:** Susanna Mays <susanna@TrustSC.com>; Miller, Theresa <theresa_miller@golder.com>; Ex. 4 CBI Ex. 4 CBI @cdmsmith.com>; christina.wirtz@state.de.us; Michele Ruth <mcrrai@gmail.com>; Davies, Kathy <Davies.Kathy@epa.gov>
**Subject:** FW: Summary of 9/20/2018 ACL Meeting

Mike and Mike,

EPA has reviewed the summary notes prepared by Golder and Ruth Associates and is submitting clarifying comments in red, below. Please submit the revised Work Plan and SAP to EPA and DNREC by November 9.

Thank you.

Debbie

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**From:** Miller, Theresa [mailto:theresa_miller@golder.com]
**Sent:** Monday, October 01, 2018 1:50 PM
**To:** Rossi, Debra <Rossi.Debra@epa.gov>; christina.wirtz@state.de.us
**Cc:** Michele Ruth (mcrrai@gmail.com) <mcrrai@gmail.com>; susanna@trustsc.com; 'Michael P. Sherrier' <michael.p.sherrier@dupont.com>; Harris, Michael (MHarris@nccde.org) <MHarris@nccde.org>; Ex. 4 CBI Ex. 4 CBI @cdmsmith.com>
**Subject:** Summary of 9/20/2018 ACL Meeting

Hi Debbie and Christina,

Golder and Ruth Associates (RAI) prepared this email to document our understanding of the Army Creek Landfill Site meeting on September 20, 2018 with EPA, DNREC, Artesian Water Company (AWC), New Castle County (NCC), Army Creek Private Settlors (ACPS), RAI and Golder. The items covered were related to:

- Work Plan by RAI and Sampling and Analysis Plan (SAP) by Golder dated February 14, 2018
- EPA comments on those documents dated April 24, 2018
- Response to Comments (RTC) document by Golder and RAI dated June 1, 2018
- Correspondence from EPA on July 24 and 25, 2018 regarding cross sections
- Discussions during the July 25, 2018 conference call with EPA, DNREC, NCC, ACPS, RAI and Golder
- Submission of ACL cross sections on September 13 and 19, 2018

The objective of the September 20, 2018 meeting was to gain consensus on the final scope of work and the path forward for finalizing the Work Plan. As such, we anticipate that EPA will provide a response to this email and provide approval or additional comments on our response to comments (RTC) document dated June 1, 2018 for use in revision of the Work Plan and Sampling and Analysis Plan (SAP) dated February 14, 2018.

The following summarizes the items discussed during the meeting and the outcome:

**Cross-Sections**:

- All parties recognized the limited data available for preparation of the cross sections between ACL's Western Lobe and AWC's Llangollen wellfield.
- The prevalence of gravel on the cross-section between wells C-1 and AWC-G3R was noted and discussed. AWC indicated that wells AWC-E2, ASR and J-1 are big producers with gravel in their lithologic sequence, but that gravel was not observed in well AWC-6R (drilled in late 2017). Golder and RAI will review logs for wells AWC-7, -2, -K-1 for the presence of gravel. Upon further consideration, it is not clear why the gravel encountered is not shown as a continuous layer, similar to other materials on the cross-section. It is common practice to correlate similar material along a section as laterally continuous across an area when data indicates it is present. Any new figures should include this

depiction. The UPA is known to contain isolated channels and it is Golder and Ruth Associates' opinion that it would be an overgeneralization to illustrate the gravels as a layer on the cross-section based on the limited number of borings over long distances. New cross-sections will be developed after performance of the drilling program and included in the Investigation Summary Report.

- Apparent lack of dividing clay (UPDC) between the UPA upper and lower sands on the cross-section between wells C-1 and AWC-G3R was noted and discussed.
- Available head data indicates downward gradients between the Columbia Aquifer and the Upper Potomac Aquifer Water elevation contour maps for the Columbia should be provided. At the very least, water elevations to corroborate this conclusion should be presented. A contour map and a vertical head difference table have been prepared. Please see attached.
- Revised cross sections were not requested at this time; however, EPA requested that when the cross-sections are updated following the investigation to include information from the new wells (to be installed) that the filter packs be shown in addition to the screened intervals. Please see relevant comment above regarding changes to the cross-sections. Filter packs will be illustrated on revised cross-sections prepared after performance of the drilling program and included in the Investigation Summary Report.

**Responses to EPA, OASQA and GWA Comments on the Work Plan and SAP:**

- In emails dated July 5 and 6, 2018, EPA indicated their acceptance of our responses to OASQA Comments 1 through 14, with the exception of OASQA Comment 11 (same as EPA Comment 10) regarding Eurofins information on Method 537 modified. The information requested by EPA in response to OASQA Comment 11 will be provided with a separate email. OASQA expects to complete its review of Eurofins' recent submittals by mid-November. OASQA's review of recent submittals resulted in the request for additional information. The additional information requested was received from Eurofins on November 21 and forwarded to EPA on November 27, 2018. Because OASQA review could result in requested revisions to the SAP/QAPP, we will submit the revised Work Plan (which includes the SAP/QAPP) after receipt and review of the OASQA comments. At this time, due to the outstanding response on a different matter (sampling methods for long-screened wells; see discussion below), our assumption is that the revised Work Plan and SAP/QAPP will be submitted within 30 days of receipt of EPA's final comments from their review of Eurofins' PFAS modified Method 537 or within 30 days of receipt of EPA's final comments from their review of the sampling methods for long-screened wells, whichever is later.
- Responses to EPA Comments 1, 2, 3, 7, 8, 9, 12, 13, 15, 18, 19, 20, 21, 22, 23, 25, 27, 28, 32, 33, 34, and 35, and GWA Comments 1, 4, and 5 were not discussed during the September 20, 2018 meeting and EPA did not identify issues with the responses and/or referenced changes during the July 25, 2018 conference call; therefore, the responses/changes are assumed to be acceptable to EPA. Responses to these EPA comments are acceptable except as noted below:

Response to EPA comment 1: The figure should include available PFOA and PFOS monitoring results in addition to the well locations. Figures with PFOA and PFOS have been prepared (see attached) and will be provided in the Revised Work Plan. (PFOA figures for DS&G have previously been submitted to EPA.)

Response to EPA comment 2: The response to EPA comment 2, which includes statements from the 1986 Feasibility Study, provides contradictory descriptions of the interconnection between the Columbia and Upper Potomac Aquifers beneath the western lobe of ACL. The statement in the first excerpt from the response to the comment, below, is inconsistent with statements in the subsequent excerpts. Agreed, we recommend acknowledging the inconsistencies between the quoted excerpts, but keeping the excerpts.

> *"... It is reported that as time progressed, cover material and landfill space became critically depleted; this situation may have encouraged deeper excavation, especially in the western end of the pit. This excavation probably removed various thicknesses of the confining clay overlying the Potomac sands. This practice probably created direct routes for the leachate from the landfill to enter the Potomac sands. However, the lithology of the upper part of the Potomac Formation near the landfill is so variable that at least some natural sand channels in the Potomac Formation were in direct contact with the overlying Columbia sands."*

*"The Feasibility Study (FS) (Weston, 1986) determined that a continuous, well developed clay layer exists at the top of the Potomac both in the western portion of the landfill and the area immediately north of the western portion of the landfill. The clay which has relatively low permeability, acts as a barrier to vertical groundwater flow, resulting in lateral groundwater flow within the overlying Columbia formation in the zone of saturated refuse...."*

*.... According to Weston, the western portion "and the area north of the western portion of the landfill generally has a continuous clay floor of relatively low permeability which acts as a barrier to vertical flow...."*

*Although lithologic data is unavailable for locations immediately beneath the landfill itself, water-level data from the Western Lobe gas vents do not show a hydraulic connection between the water within the landfill and he underlying UPA.*

The following comments and responses were discussed during the September 20, 2018 meeting, and the end result of the discussion during that meeting is provided below:

- EPA Comment 4: Request to install additional well cluster between existing wells P-4 and MW-38N. This request was discussed and approximate location for well pair was shown. EPA and DNREC expressed preference for installing the new well pair early in the investigation rather than waiting. Subsequent to the meeting, the ACPS and NCC have discussed the timing for the installation of the new well pair and propose to install the wells during the initial field event. The work plan will be updated accordingly.
- EPA Comment 5: Well construction information. This request was discussed and the well construction table will be revised, or an additional table will be created, and included in the revised work plan to provide information of the filter pack lengths. The sample collection purpose (nature and extent or risk) will also be included. EPA noted that the filter pack on well MW-22N and others is much longer than the screened interval. Well designations (upper sand, lower sand, both lower/upper sands) in Figure 2 should be reviewed to ensure they are consistent with well construction information in Table 2. Golder reviewed Figure 2 and Table 2 and addressed the inconsistencies. Revised figure and table are attached.
- EPA Comment 6: Sampling AWC production wells. This request was discussed and Golder updated the parties that AWC has decided to allow Golder/RAI to sample their production wells for the requested parameters. The work plan will be updated accordingly.
- EPA Comment 10 (same as OASQA Comment 11): Eurofins information on Method 537 modified. The information requested by EPA will be provided with a separate email. It is our understanding that EPA will split samples for PFAS analysis, and EPA will be submitting samples for unmodified 537 analysis and direct-injection analysis to others.
- EPA Comment 14: Clarification on timing of synoptic water level measurement. This request was discussed and it was agreed that to avoid the potential for PFAS contamination, the synoptic round of water level measurements will be performed after all wells are sampled.
- EPA Comments 16, 17, 24 and GWA Comments 2 and 3: Long-screened wells and low flow sampling. The following items were discussed between the parties and are in discussion with the ACPS and NCC at this time:
    - Use a vertical flow meter to determine if groundwater is flowing vertically within the screened intervals of the long-screened wells under ambient conditions. This item will be performed for long-screen wells and wells screened across significant lithologic changes (e.g., wells screened across clays and sands, or sands and gravels).
    - Collect samples using low-flow purging and sampling techniques and collect a subset of samples using volumetric averaging (conventional 3x purging followed by sample collection), then compare the results to determine if there is a difference in results (recommend relative percent difference calculation). This has to be on a well-by-well basis as each well is unique in terms of lithology encountered and monitored by the constructed well screen. A memo and table for EPA's review is attached. EPA's comments will be needed prior to issuing the Revised Work Plan and SAP. As indicated in response to OASQA's review of the PFAS modified method by Eurofins.
    - Don't sample long-screened wells MW-38N and MW-49N at this time as they are screened across both the UPA upper sand and the UPA lower sand.

- Perform natural gamma logging down wells MW-38N, MW-22N and MW-49N to evaluate lithology (sands and gravels) and presence (or absence) of the dividing clay (UPDC).
- Review options for discrete interval sampling not using low-flow techniques (example: use of HydraSleeve sampler), limitation is sample collection for metals analysis.
- Eventual replacement of long-screen wells if needed for discrete sampling. EPA does not agree that any determinations regarding replacement of long-screen wells would be deferred until three quarters of groundwater monitoring data have been collected, as suggested in the ACPS and NCC June 1, 2018 response to EPA comment 16. For clarification, our reference to 'three quarters of groundwater monitoring data' was related to installation of a well pair between existing wells P-4 and MW-38N. As noted in our summary under comment 4 above, "[s]ubsequent to the meeting, the ACPS and NCC have discussed the timing for the installation of the new well pair [between existing wells P-4 and MW-38N] and propose to install the wells during the initial field event. The work plan will be updated accordingly." It is our understanding that EPA agrees with "[e]ventual replacement of long-screen wells if needed for discrete sampling" as discussed during the meeting.

- EPA Comment 26: Low-flow purging and sampling method. The request for purging one well volume, in addition to the volume of the sampling apparatus and tubing, was discussed and it was agreed that purging one well volume prior to measurement of well parameters is not required.
- EPA Comments 29, 30 and 31: Use of bailers. The use of bailers was discussed briefly. EPA agreed to the use of bailers because bailers will only be used for purging and collection of gas vent samples for PFAS analysis. EPA will review the revised gas vent purging and sampling procedure.

**Work Plan Revision:** 30 days after receipt of response from the EPA on these outstanding items, the revised Work Plan and SAP will be provided to EPA. After EPA's review and approval of the revised Work Plan, then drilling can be coordinated for well installation. Due to the outstanding responses on: 1) sampling methods for long-screened wells, and 2) Eurofins' PFAS modified Method 537, the revised Work Plan and SAP will be provided to EPA within 30 days of receipt of EPA's final comments from their review of the sampling methods for long-screened wells and/or Eurofins' modified PFAS method, whichever is later.

Please let Mike Sherrier and Mike Harris know if you have any questions or need additional information.

Thanks,
Theresa

GOLDER

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