



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 1 – NEW ENGLAND
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BOSTON, MASSACHUSETTS 02109-3912**

Via Electronic Mail

September 18, 2018

Mr. Peter Britz, Environmental Planner
City of Portsmouth Planning Department
1 Junkins Avenue
Portsmouth, NH 03801

RE: Coakley Landfill Superfund Site
August 27, 2018, *Deep Bedrock Downhole Geophysics and Packer Sampling Intervals:
MS-20/MW-21/MW-22*

Dear Mr. Britz:

The United States Environmental Protection Agency (USEPA), in consultation with the New Hampshire Department of Environmental Services (NHDES), has reviewed the August 27, 2018, *Deep Bedrock Downhole Geophysics and Packer Sampling Intervals: MW-20/MW-21/MW-22* memorandum (the "Memo") prepared by CES, Inc. The Memo proposes fracture intervals within newly-drilled bedrock boreholes MW-20, MW-21 and MW-22, to be sampled using inflatable packer technology. The intervals being proposed for sampling were recommended based on geophysical survey data of the boreholes that was collected in accordance with CES, Inc.'s *Revised Draft Deep Bedrock Investigation Work Plan* (the "Revised Work Plan") dated May 31, 2018, as conditionally approved by USEPA on July 17, 2018.

The following general observations and suggestions related to the ongoing bedrock investigation are provided and should be considered while implementing the remainder of the bedrock investigation:

- Future bedrock interpretations should consider the correlation between borehole geophysical data and surface geophysics and lineament data to evaluate any connectivity between interpretations of surface survey results and borehole survey results. The merit of this type of evaluation is demonstrated by correlating data between the surface geophysics performed to assist in locating wells MW-20, MW-21 and MW-22 and the borehole geophysics presented in the Memo.
- The large variation in ambient vertical flow over the relatively short distance between MW-21D and MW-22D suggests that vertical gradients in the bedrock vary widely across the study area.

The Memo is subject to the terms and conditions specified in the Consent Decree that was lodged in District Court on January 14, 1999 (the "Consent Decree"). Pursuant to paragraph 37(b) of the Consent Decree, USEPA, after consultation with the NHDES, approves the Memo subject to the following comments:

MW-20D:

- The fluid temperature and caliper variations observed in proposed zone # 1 at 20-26 feet may be caused by the casing at the transition from overburden to bedrock and may not be indicative of flow. Accordingly, the agencies do not consider this a critical sampling zone.
- The low-bulk resistivity interpreted by CES, Inc. in zones # 4, 5, and 8 at 116-122 feet, 130-136 feet and 280-286 feet respectively, are likely due to lithology rather than the presence of water producing fractures. Purging and retrieving a sample may be difficult in these zones. Accordingly, the agencies do not consider these critical sampling zones.
- USEPA suggests combining proposed zones # 2 at 64-70 feet and # 3 at 71-77 feet into one zone to allow for an adequate seal above and below this fractured area of the borehole. The fractures in these zones are so close that it is likely that they are interconnected by cross-cutting fractures and that the water quality is the same in both zones. Suggest an 11-foot packer interval from 66-77 feet.

MW-21D:

- The low-bulk resistivity interpreted by CES, Inc. in zone # 2 at 62-68 feet, is likely due to lithology rather than the presence of water producing fractures. Purging and retrieving a sample may be difficult in this zone. Accordingly, the agencies do not consider this a critical sampling zone.
- Proposed zone # 7 at 264.5-270.5 feet does not appear to have a large visual fracture and the noted fluid resistivity may be due to "bottom effect" typically seen in deep boreholes that is caused by sinking of more mineralized water. Accordingly, the agencies do not consider this a critical sampling zone.
- USEPA suggests combining proposed zones # 4 at 126-132 feet and # 5 at 132-138 feet into one zone to allow for an adequate seal above and below this fractured area of the borehole and to sample the 4 identified fractures as a single hydraulic unit. Suggest an 11-foot packer interval from 125-136 feet.
- Rather than sampling proposed zone # 8 at 302-308 feet using a straddle packer, USEPA suggests a single packer set at 304 feet to isolate the bottom of the borehole, as it may be difficult to position a packer below the fracture at 306 feet.
- USEPA suggests adding an interval zone at 182-188 feet. There is a large fracture at 184 feet that correlates with a substantial variation in the HPFM results (0.72 to 0.47 gpm) that is indicative of a hydraulically-active fracture. There is also a slight wrinkle in the fluid conductivity log just below 184 feet suggesting inflow of groundwater with a potentially different chemical signature.

- USEPA suggests adding an interval zone at 228-234 feet. There is a large fracture at 232.5 feet that corresponds roughly with a slight variation in the fluid conductivity log.

MW-22D:

- USEPA suggests combining proposed zones # 3 at 86.5-92.5 feet and # 4 at 92.5-98.5 feet into one zone to allow for an adequate seal above and below this fractured area of the borehole. Suggest an 11-foot packer interval from 86-97 feet.
- The low-bulk resistivity interpreted by CES, Inc. in zone # 8 at 270-276 feet, is likely due to lithology rather than the presence of water producing fractures. USEPA suggests that zone # 8 be moved to 251-257 feet to capture the fracture at 253 feet.

Due to the possible connection of flow from the shallow fracture zones in MW-20 to deeper fracture zones, USEPA requests that CLG finish borehole MW-20 immediately following receipt and interpretation of the packer sample results. The packer sample results will ultimately inform which zones are most representative for screening in a finished well, but it will be important to isolate the shallow fractures that may be influenced by surface water and that are possibly adding flow downwards in the borehole to the deeper fractures.

In addition, USEPA and NHDES have reviewed the *Sampling and Analysis Plan for Coakley Landfill Superfund Site* dated July 18, 2018. With respect to the PFAS analysis procedures detailed in SOP #10, *Field Sampling Protocols for Sampling Per- & Polyfluoroalkyl Substances*, as applied to the bedrock borehole packer interval sampling, the CLG shall analyze all samples for an expanded list of PFAS to allow for a broader spectrum of analytes and direct comparison with past and future results in various media. The NHDES sampling of surface water in December 2016, utilized Vista Analytical Laboratory (Vista) and included 23 PFAS (11 were detected in surface water). The CLG should determine the list of PFAS that can be analyzed and reported by its current contract laboratory service (Vista) using modified EPA Method 537. Vista currently reports 26 PFAS analytes to NHDES.

If you have any questions or comments regarding this letter, you can contact me at (617) 918-1882 or Hull.Richard@epa.gov.

Sincerely,



Richard W. Hull, Remedial Project Manager
New Hampshire and Rhode Island Superfund Program

cc: Andrew Hoffman, NHDES
Jim Soukup, Weston Solutions, Inc.
William Brandon, USEPA
Jim Murphy, USEPA
RuthAnn Sherman, USEPA
Michael Deyling, CES, Inc.