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

Via Electronic Mail

October 29, 2019

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

RE: Coakley Landfill Superfund Site
September 10, 2019, *Draft Deep Bedrock Reconnaissance Well Interval Packer Sampling Results*

Dear Mr. Britz:

The United States Environmental Protection Agency (USEPA), is in receipt of the September 10, 2019, *Draft Deep Bedrock Reconnaissance Well Interval Packer Sampling Results* (the "Recon Well Report") prepared by CES, Inc., on behalf of the Coakley Landfill Group (CLG). The investigation and sampling of the reconnaissance wells was conducted as part of the ongoing bedrock investigation at the Coakley Landfill Superfund Site (the "Site"). Following consultation with the New Hampshire Department of Environmental Services (NHDES), USEPA provides the following comments:

1. Note that USEPA, NHDES and Weston Solutions, Inc., evaluated the packer intervals that were recommended for sampling by CLG.

2. Note that well MW-24 located on the North Hill Nursery property on Lafayette Road was previously removed from service as a water supply well as directed by NHDES and USEPA.

3. The Recon Well Report provides the interval packer sampling results without detailed interpretation or explanation of the relevance to the overall bedrock investigation and conceptual site model (CSM). USEPA expects that the borehole geophysical information and packer interval sample results collected from the reconnaissance wells will be interpreted and used in the refinement of the CSM in the interim technical memorandum to be submitted by CLG.

4. A table should be developed presenting the details of the well construction for each of the reconnaissance wells, along with all other bedrock wells at the Site.

5. Table 1 includes the analytical results from the packer interval sampling but is titled "Summary of Deep Bedrock Reconnaissance Well Packer Sampling Specific Capacity and Transmissivity."

6. Discussion and interpretation of the general chemistry and field parameters should be included with the discussion and interpretation of results for each monitoring well.

7. Table 1 - Date of Sample Collection cell for Zone 4 in GZ-116 appears to be too narrow and does not show the date.

8. Well MW-24 is referred to as MW-24D in the geophysical log included in Attachment 2.

9. The Recon Well Report should include the field sampling forms and the analytical laboratory reports as appendices or attachments.

10. The measurement of water levels inside and outside the packer intervals during sampling, and a description of the integrity of the packer seal at each interval zone, should be provided when describing the packer interval sampling procedure to allow for the assessment of the relative quality of the sample results. Field sampling data sheets containing this information should be included as appendices or attachments.

11. USEPA does not concur with the conclusion that the impacts observed at GZ-130 are *not* from Coakley based primarily on distance from the landfill. PFAS compounds and 1,4-dioxane have different fate and transport characteristics so it is not unexpected that the PFAS may have traveled further from the landfill than 1,4-dioxane. And contaminant migration through discrete fractures often will involve tortuous pathways, so a consistent concentration gradient outward from a source is often not observed. That would be more common in a porous media. Lastly, GZ-130 is located along the predominant bedrock fracture strike from the Site.

12. In Summary and Conclusions, CLG concludes that the analytical results from the nine wells sampled are consistent with the "interpreted distribution of contaminants based on the results of long-term sampling at monitoring wells associated with Operable Unit 1 and Operable Unit 2 at the Coakley site and do not indicate the presence of significant previously undefined contaminant migration pathways from the Coakley landfill." This conclusion is premature and does not appear to consider other information and data that has been gathered as part of the ongoing bedrock investigation, including lineament and surface geophysical data interpretations and fracture orientation data from other bedrock boreholes. All data and information gathered to date shall be included in the updated CSM and interpreted in total. Multiple lines of evidence shall be used to support conclusions wherever possible.

13. In Summary and Conclusions, CLG suggests that the similarity of results for PFOA from the five intervals in GZ-130 suggests that groundwater within the sampled intervals was well mixed prior to sampling, and that "it does not appear that the Coakley Landfill is the source of PFAS contribution to bedrock groundwater in this area." CLG shall investigate this hypothesis further and make recommendations for validating the results from GZ-130

and determining if the water quality samples collected from GZ-130 are representative of the aquifer zone(s) sampled. This investigation should include data-driven hypotheses regarding the particular mechanism(s) which may account for the 'mixing', i.e. is the 'mixing' a function of aquifer characteristics, well hydraulics, such as short-circuiting of previously isolated zones via the borehole, leakage at the base of the casing, etc., or sampling-induced mixing from overly aggressive pumping, packer leakage or other factors.

14. USEPA offers the following preliminary interpretations for the data provided in the Recon Well Report for consideration in drafting the interim technical memorandum and to assist in developing an updated and technically-defensible CSM:

    a. GZ-108 is located hydraulically downgradient of the Site. The manganese exceedances, combined with low pH and high specific conductance, suggest that this well is impacted by the landfill. While the well also appears to be upgradient of the Rye Landfill, detections of ammonia, nitrate and elevated chloride/hardness levels are further evidence of landfill impacts. The aerobic conditions observed in this well are somewhat unusual; almost all the other wells in the study exhibited anaerobic conditions. While aerobic conditions are not typically associated with landfills, many wells in this data set which otherwise exhibit typical landfill impacts, seem to be aerobic. This may suggest circumstances which possibly produce the occurrence of aerobic conditions in conjunction with more landfill-impacted groundwater and possibly due to recharge of the oxygenated runoff from the landfill cap. These issues should be investigated further to diagnose and geochemically discriminate between un-impacted and landfill-impacted groundwater. Perhaps there are instances of leaking casing annuli in monitoring wells across the site which allow shallow groundwater to mix with groundwater from deeper zones screened below the casing.

    b. The data from GZ-109 do not presently suggest impacts from the Site, and as a result the data may potentially be able to be used to describe 'ambient' groundwater quality conditions (un-impacted by landfills) in local bedrock wells. Additional analyses are recommended to determine site-specific geochemical signatures of impacted and un-impacted groundwater in relation to the Site and to evaluate historic and future data from wells within and beyond the boundaries of the Site. Other wells that exhibit similar groundwater chemistry to GZ-109 include GZ-110, GZ-116 and GZ-122. Some of the geochemical parameters which exhibit similar ranges in these wells include pH (neutral to basic), reducing conditions, anaerobic oxygen levels, and specific conductance around 300 us/cm.

    c. While located generally hydraulically downgradient from the Site, the data from GZ-110 fit the general pattern described above for groundwater which appears to be un-impacted by landfills, although the pH levels are a bit higher in this well.

    d. While also located generally hydraulically downgradient from the Site, the data from GZ-116 also show geochemical conditions indicative of a lack of landfill-related impacts. The only exception is the slightly high manganese level in Zone 1, but the higher turbidity in this zone and the shallow nature suggest the sample

may be influenced by overburden groundwater. The geophysics log for this well suggests possible leakage from the impacted overburden and the potential for cross contamination and/or short-circuiting. This could be an indication that the bedrock intervals sampled in GZ-116 are not significantly impacted by the Site. Future efforts should conclusively determine whether the casing for this well is leaking, and if so, well repairs and/or new well installations may be needed.

e. Site contaminants (PFAS, 1,4-dioxane, manganese) were detected above applicable standards in GZ-119, suggesting a strong landfill-related impact. Because of the proximity of the well to the Rye Landfill, the Recon Well Report concludes that the impacts are related to the Rye Landfill as opposed to Coakley. While it is likely that the Rye Landfill is the major contributor to the contamination found in this well (and is probably the predominant source of the exceedances noted), minor supplemental impacts from the Coakley Landfill cannot be ruled out.

f. The data from GZ-122 also seem to fit the general pattern described above for geochemical conditions believed to show an absence of landfill-related impacts in bedrock. The only exception is the slightly high manganese level in Zone 1, but the shallow nature of the fracture in this interval suggests the sample may be influenced by overburden groundwater. The geophysics log for this well suggests possible leakage from the overburden. Although the bedrock aquifer in this location does not appear to be significantly affected by the Site, future efforts should conclusively determine whether the casing for this well is leaking, and if so, well repairs and/or new well installations may be needed.

g. GZ-125 is located along the predominant fracture strike south-southwest of the Coakley Landfill. The detection of manganese above standards and toluene, combined with acidic and aerobic conditions as well as slightly elevated specific conductance suggests it is impacted by the Site.

h. GZ-130 is also located along the predominant fracture strike south-southwest of the Site. The detection of toluene and manganese is similar to that observed in GZ-125 which is located along the same flowpath. PFAS compounds are also detected above the AGQS. Ammonia detections provide additional evidence of landfill impacts. The pH is acidic/oxidizing and the deeper groundwater is aerobic, fitting the pattern of other impacted wells in this study. The specific conductance is also elevated. It is also possible that the PFAS found in this well are migrating via surface water and then recharging the bedrock downgradient of the landfill.

i. MW-24 is located within the Coakley Landfill GMZ and 1,4-dioxane was detected above AGQS. This well exhibits a fracture pattern that is significantly different than the other wells, with a predominant fracture orientation of west-northwest to east-southeast. These fractures align with the Site and are the likely pathway for the 1,4-dioxane migration. The field parameters in this well do not fit the pattern of landfill impacts observed in the other wells: the pH is basic and anaerobic and strongly reducing conditions persist throughout the well. However, the specific conductance is elevated, and ammonia and toluene were also detected, suggesting

landfill impacts. This well is drilled into one of the mafic igneous rock units known to exist in the area and the variations in field geochemical parameters may be related to this change in lithology. These data, combined with localized hydraulic head data that support a slight easterly flow component, suggest the need for further delineation of the eastern GMZ boundary (e.g., GZ-109 may not be sufficient).

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

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

cc: Andrew Hoffman, NHDES
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