Gannett Fleming

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June 16, 2021

Christopher Ralston
Program Manager, Oil Control Program
Land and Materials Administration
Maryland Department of the Environment
1800 Washington Boulevard, Suite 620
Baltimore, MD 21230

RE: Response to Town of Chestertown Letter dated May 10, 2021
Shore Regional Health Chester River Hospital; MDE Oil Control Program Case 87-2534-KE

Dear Mr. Ralston:

The Town of Chestertown issued a letter to Maryland Department of the Environment on May 10, 2021. The letter had multiple questions and concerns relating to the Chester River Hospital site remediation. In e-mail correspondence dated May 21, 2021, you directed our team to respond to the letter. On behalf of the University of Maryland Shore Regional Health, we are providing our responses to the Town questions below. Each question/comment is reproduced on the following pages followed by the response in italics.

We will query you and the Town Council for a mutually agreeable time when we can meet to discuss the questions and responses.

If you have any questions or would like additional information, please contact me at rscrafford@gfnet.com or 443-562-6714.

Sincerely,
GANNETT FLEMING

Rob Scrafford P.E., PMP
Project Manager

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A. Miller (MDE)
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M. Powell (Gordon Feinblatt)

Responses to Town of Chestertown Letter of May 10, 2021

1. COMMENT: It would be extremely helpful to have a section devoted to the sentinel wells in the Executive Summary to include data and potential trends associated with MW-18, MW-23,MW-25, MW-28, MW-29, MW-Sl, MW-S2, and MW-S3.

   RESPONSE: We will add a section on the sentinel wells to the Executive Summary of future quarterly status reports.

2. COMMENT: The Monitoring Summary states that the TPH-DRO plume continues to shrink when compared with previous sampling events. Such a statement warrants a detailed analysis and references to the sampling events reviewed in making this determination.

   RESPONSE: This statement was based on a visual comparison of maps of the TPH-DRO plume in previous status reports and the Mann-Kendall analysis. For example, our presentation to the Town Council on November 20, 2020 showed the plume from September 2012 vs. July 2015 vs. October 2020 and the plume is visually smaller with each time period (slides 13 through 15). The Mann-Kendall statistical analysis results presented in the quarterly status reports indicate that a majority of wells show a stable or declining trend in TPH-DRO concentration. This analysis is a robust analysis that takes into account the last 40 samples taken from each monitoring well.

3. COMMENT: Reports done by the previous contractor included detailed analyses regarding wells with detection levels of TPH DRO and constituents of concern. The Town recommends that the Executive Summary includes this type of an analysis.

   RESPONSE: We understand this request and agree to include more details regarding wells with detection levels of TPH-DRO and other constituents of concern listed in the MDE consent order, in Executive Summary sections of quarterly status reports going forward.

4. COMMENT: The presence of a petroleum sheen in recovery wells RW-2D and MW-22 were observed during the monthly gauging event. Are petroleum sheens being observed in other recoverywells? According to the Fourth Quarter 2020 Report, when petroleum sheens are observed, an oil-water interface probe is used to measure the depth of groundwater and the depth ofthickness of LPH. Will this always be the case? Will the monthly gauging events also include observations of petroleum related odors?

   RESPONSE: The only petroleum sheens observed in the six-month period covered by the last two quarterly status reports were in August 2020 as noted by the previous remediation consultant. Gannett Fleming has not observed sheen in any wells since we assumed the role of environmental consultants in September 2020. As a standard practice, all well gauging is performed with an oil-water interface probe to make sure that sheens or liquid petroleum hydrocarbons (LPH) are detected when present and confirmed visually with a bailer. Petroleum odor information does not provide useful information for this project and is not noted on the gauging sheets. There is a long history of analytical data at all 55 wells and,

therefore, odor information does not add any new information to our understanding of the plume.

5. COMMENT: Is the Mann-Kendall Test Method analysis being conducted with samples using EPA Method 8015 and not the Silica Gel Cleanup (SGC) preparatory Method 3630?

   RESPONSE: The statistical analysis is done on TPH-DRO with and without silica gel cleanup as shown in Table 8 of the quarterly status report. Constituents included in the Mann-Kendall statistical testing includes benzene, naphthalene, TPH-DRO, and TPH-DRO with silica gel cleanup (Method 3630) data as stated in Section 5.5 of the quarterly status reports. Appendix D shows the details of the statistical analysis.

6. COMMENT: The SGC data and analysis are discussed though out the Executive Summary. Can this analysis be pulled together and contained in Section 5.3 TPH-DRO in the SGC Analysis Section? Having SGC analysis referenced in multiple sections, such as the Groundwater Sampling Analysis, and the Analytical Results in Sections 4.2, and 5.2 respectively, creates confusion with regards to data and cleanup goals.

   RESPONSE: The Executive Summary of the quarterly status report does not include a section with SGC results. We will include a section in the Executive Summary in future reports dedicated to SGC methods and results.

7. COMMENT: According to the Executive Summary, sampling and analysis were performed in accordance with MDE requirements except for two analyses using HACH24140-25, which according to Gannett Fleming is no longer available. What type of analysis does this sampling method provide? Was this type of analysis performed in the past?

   RESPONSE: As described in Section 4.2 of the quarterly status report, HACH field test kit 24210-25 was requested by MDE in their letter dated September 9, 2020. This kit was no longer available from the manufacturer, HACH, but was replaced with an equivalent test kit, IR-18C, also made by HACH. The HACH IR-18C test is a color disc field analysis used to test for ferrous iron, which is the soluble form of iron. This analysis was a new requirement for the project that was required by MDE in their letter of September 9, 2020, was performed in October 2020 and January 2021and will continue to be performed as directed by MDE.

8. COMMENT: Section 5.4 -- Natural Attenuation Monitoring. This section states that the goal is to assessthe aquifer's assimilative capacity to naturally degrade the petroleum compound. How canthis be accurately achieved if the natural attenuation process is influenced by many aspects of the subsurface environment as discussed in this section?

   RESPONSE: The assessment of the occurrence of natural attenuation typically requires multiple lines of evidence. Natural attenuation monitoring results are used to determine the degree to which intrinsic biodegradation of heating oil (TPH-DRO) is occurring. It appears aerobic degradation is occurring as evidenced by the lack of dissolved oxygen in the residual LPH area as shown in Figure 9. It is well known that dissolved oxygen is used by bacteria to aerobically degrade petroleum compounds. It appears that nitrate reduction is occurring

as indicated by the lower concentrations of nitrate in the area of the aquifer with residual LPH as shown in Figure 10. In the absence of dissolved oxygen, petroleum compounds can be degraded by bacteria converting nitrate to nitrogen gas. A reducing zone shown by the red line (i.e., -100 ORP) in Figure 12 appears to show anaerobic biodegradation processes occurring. This correlates to the low dissolved oxygen in wells in this area. In addition, silica gel cleanup results indicate that polar hydrocarbons are present in groundwater indicating the presence of metabolites, which are the products of biodegradation. Therefore, the data show multiple lines of evidence that natural attenuation is occurring at the site.

9. COMMENT: It is difficult to identify the data tables being analyzed. The Town recommends a cover page for each of Tables 1-8. One table (EPA Method 8260) seems to have monitoring well data pages out of numerical order. As a result, the Town was unable to find and reviewthe table associated with acetone for MW-S2 in both Reports. Is acetone still being detected in MW-S2?

   RESPONSE: A cover page for the tables will be included in future quarterly status reports. We do not have a table for the full EPA Method 8260 results. We only include the contaminants of concern relevant to TPH-DRO/heating oil in Table 6. The full data reports with acetone and all the other EPA Method 8260 constituents are contained in Appendix C. Acetone was not detected in monitoring well S-2 for the last two sampling events. It appears to have been an outlier detection since it was not detected before July 2020 nor since then.

10. COMMENT: We suggest that the data tables also include a table for sentinel well data.

    RESPONSE: Sentinel well data are included in Table 6.

11. COMMENT: Settlement Agreement/Consent Order (SACO) Criteria. The SACO states clearly that a prerequisite for requesting a shut-down is that TPH-DRO at all wells must be below 1.0 ppm. As of January 2021, there are still 8 wells that do not meet these criteria.

    RESPONSE: There were 8 wells out of 55 wells with results of 1.0 ppm to 3.2 ppm TPH-DRO (without SGC) during the January 2021 sampling event. All wells were less than 1.0 ppm with SGC. The SACO is silent on the topic of SGC's use with the TPH-DRO method. U.S. EPA issued a letter dated November 25, 2019 authorizing the states to independently decide the appropriateness of using SGC with TPH-DRO to support cleanup decisions. MDE discussed their decision-making process regarding allowing the Hospital to turn off the system in detail in their letter to the Town dated November 10, 2020.

    Please see our letter to MDE dated March 18, 2021, which lays out our position as to why the containment system should be turned off on a trial basis and please note this will be a pilot shut down. The system will be able to be restarted within 10 calendar days if necessary.

12. COMMENT: Attenuation Data Needed. The ground water indicators being used to assume natural attenuation require baseline data. Assumptions are made that dissolved hydrocarbons in groundwater will continue to biodegrade before they reach the sentinel wells.

RESPONSE: We assume "background" is what was meant by this comment instead of "baseline." We obtained "background" (i.e., wells without TPH-DRO detection) groundwater data to compare against the impacted wells. We measured the natural attenuation parameters in all 55 monitoring wells at the site. Many of these wells are upgradient or outside the impacted area of the aquifer and, therefore, are considered background wells. These wells provide what the unimpacted groundwater concentrations of the natural attenuation parameters are and we compare those to wells within the plume to observe the differences. In this case, the differences provide lines of evidence that biodegradation of hydrocarbons is occurring within the plume.

Petroleum hydrocarbon compounds such as TPH-DRO degrade in the environment; that is a fundamental fact of environmental science. The uncertainty is how fast they degrade. Turning off the containment system allows us to observe how much the dissolved hydrocarbons will degrade before they reach the sentinel wells. If the plume does not biodegrade as expected, we will evaluate whether the system should be turned back on.

13. COMMENT: Limitations and Clarity on the use of the silica gel cleanup (SOC) method (EPA Method 3630) for the TPH-DRO analysis in measurement of petroleum hydrocarbon with EPA Method 8015. The Town is apprehensive that this innovative approach with no apparent track record in Maryland may not account for the Chestertown's geological characteristicsand settings.

    Where drinking water is at stake, and the migration status of metabolites[3] cannot be predicted with confidence, any thought of using SOC for demonstrating compliance with applicable standards should be foreclosed in Chestertown.

    [3]In its Request to Discontinue Pumping, the Hospital mentions its "expectation" that "the??? dissolved hydrocarbons in groundwater will continue to biodegrade before they reach thesentinel wells." Without more, this is an insufficient basis on which to stake the integrityof the Town's drinking water supply.

    RESPONSE: MDE discussed the Silica Gel Cleanup (SGC) issue in detail in their letter to the Town dated November 10, 2020. SGC data provides useful information on the biodegradation of petroleum hydrocarbons. This was discussed with the Town Council in our November 20, 2020 presentation (slide 32). Our expectation that dissolved hydrocarbons will continue to biodegrade before reaching the sentinel wells is reasonable given the evidence of ongoing biodegradation. The integrity of the Town's drinking water supply is the number one concern of the hospital and the hospital would never take actions that it believed would put the water supply at risk. Although extremely unlikely, if the Town's water supply is ever deemed by MDE to be at risk from the hospital's hydrocarbon plume, the containment system will be restarted, and any other appropriate actions will be taken to ensure that the Town's water supply wells are not impacted per the Agreement with the Town dated June 22, 2016.

14. COMMENT: Site Investigation as Prerequisite to Shutdown. In 1999, it was thought that

the pump-and-treat system had removed all it could and that substantially diminishing returns had set in.After installing new wells, however, the system again achieved the removal of approximately 10,000 gallons. A thorough site investigation, including soil borings,should be done before shutdown of the remediation system.

RESPONSE: It is our expert opinion and as we have shared with the Hospital, a site investigation as a prerequisite for a pilot system shutdown is unnecessary and inappropriate. Events from 22 years ago are not a factor for the current condition of the site and are not relevant for current decisions. Since 1999, thousands of samples have been collected and analyzed. It is clear, based on analytical data, that the containment system is capturing a miniscule mass of TPH-DRO. This issue was discussed with the Town Council in our presentation dated November 20, 2021 (slides 6 through 11). Figure 8 in the quarterly status report shows TPH-DRO concentrations in all 55 wells at the site. The zone of contamination shown on this figure is entirely surrounded by wells that are unimpacted by TPH-DRO. Therefore, the plume has been entirely spatially delineated.

15. COMMENT: Spelling Out Shutdown Criteria. *All* criteria for approval and compliance must be described in detail well in advance of any shut-down. This is vital not only for purposes of clarity and transparency, but in view of the past minimal compliance with the SACO, for regaining public confidence in the wake of the frequent, well-documented lapses by previous consultants to the Hospital.

RESPONSE: The April 24, 2020 letter from MDE to the Hospital has the criteria for the shut-down. We agree that this is vital, and we have agreed to comply with those criteria in our March 18, 2021 letter, and we will comply with any other criteria that MDE requires related to the pilot shutdown.