August 28, 2020

The Honorable Christopher Cerino
Mayor
Town of Chestertown
118 N. Cross Street
Chestertown, Maryland 21620

Dear Mayor Cerino:

Thank you for your letter regarding the oil cleanup project at the University of Maryland Shore Medical Center at Chestertown (the Hospital). The Maryland Department of the Environment (MDE) is committed to continuing to be transparent in its review and handling of the project. The MDE is also committed to ensuring the approved turning off of the pump and treat (P&T) system is done in a safe and measured manner. The MDE team has been investigating what led to the P&T system shutdown in April and May 2020 and how that occurred without MDE's knowledge. As part of that investigation, MDE has requested that the Hospital review its records and disclose any prior instances of P&T system down time. We will be providing our findings of that investigation in the coming weeks and you will be copied on those findings.

The MDE team is also exploring additional long-term sampling requirements for the Hospital to initiate prior to and during the shut down of the P&T system. Our goal with these additional sampling requirements is to have more lines of evidence that the cleanup to date has been effective and once the project enters the post active remediation phase that biodegradation is effectively stabilizing and decreasing the residual petroleum hydrocarbons. The Town will receive a copy of that requirement letter as well.

In contemplating the needs for the long-term monitoring of this project, MDE would like to discuss the possibility of the unused town well number 8 (TW#8) being made available to the Hospital for sampling. This well is a potential direct receptor and is the closest available well to the Town's active municipal wells. The MDE believes the data collected from this location will be meaningful in considering any future request for closing the case in the years to come.

In your letter of August 3, 2020, you asked that MDE consider not allowing the use of the silica gel cleanup (SGC) method for future sampling. While the MDE team understands the concerns raised by the Town, we find the total petroleum hydrocarbon (TPH) detections with and without the SGC method to be more informative than just the traditionally used TPH method (i.e. without SGC). Evaluating the combination of both data sets across the monitoring well network has allowed MDE to determine that there is active biodegradation occurring within the area of the project with the greatest residual petroleum hydrocarbon concentrations. In fact, the additional sampling that MDE will be requiring, as mentioned above, will build on this theme of monitoring the natural attenuation

(i.e. biodegradation) of the residual petroleum hydrocarbons. Enclosed is a more thorough discussion of the science behind the use of the SGC method. That said, MDE does want to be clear that TPH-DRO data will not be used as the only analyte to make final decisions on closing the case. MDE will continue to evaluate all of the data collected, including benzene, toluene, ethylbenzene, xylenes, naphthalene, and methyl tertiary butyl ether.

MDE appreciates the invitation to participate in future Town Council meetings and would be open to doing so. However, at the present time we feel it best to complete the investigation of the undisclosed P&T system shut down and to complete ongoing technical discussions within MDE and with the Hospital before committing to a specific date. As stated, those final documents will be provided to the Town as well.

If you have any questions, please contact me at 410-537-3470 or at chris.ralston@maryland.gov.

Sincerely,

Christopher H. Ralston, Program Manager
Oil Control Program

Enclosure – TPH Information

cc: Mr. Bill Ingersoll, Manager, Town of Chestertown
Mr. Kenneth Kozel, President and CEO, U of M Shore Regional Health
Mr. Michael Powell, Esq., Gordon Feinblatt, LLC
Mr. John Beskid, Director, Environmental Health Programs, Kent County Health Dept.
Ms. Julie Kuspa, Esq., Office of the Attorney General
Mr. John Grace, Source Protection and Appropriation Div., Water Supply Program, MDE
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Mr. Tyler Abbot, Director, Legislative and Intergovernmental Relations, MDE

Total Petroleum Hydrocarbons Information
(Enclosure to August 27, 2020 letter to Mayor Cerino)

Petroleum hydrocarbons are a mixture of various molecules consisting of combinations of hydrogen and carbon atoms. They are often grouped into classes of compounds that share similar general characteristics (e.g. aromatics, aliphatics). Some typical individual compounds that are routinely measured at petroleum release sites are benzene, toluene, ethylbenzene, xylenes, and naphthalene (there are numerous others). Petroleum products like gasoline, diesel, and heating oil are made up of hundreds or more of these individual petroleum hydrocarbon compounds. However, many compounds are not included as part of routine analytical suites (e.g. volatile organic compounds [VOCs] by EPA Method 8260). Therefore, methods to measure total petroleum hydrocarbons (TPH) were developed over the decades.

Maryland, and numerous other states, rely on one particular analytical methodology to measure TPH in environmental samples: EPA Method 8015. The TPH analysis is typically broken down to TPH in the gasoline range (TPH-GRO) or the diesel range (TPH-DRO). These ranges generally correspond to the range of petroleum hydrocarbon compounds that are found in the corresponding product type (i.e. gasoline or diesel). The ranges are established by the number of carbon atoms found in products (e.g. C6-C10/C12 for TPH-GRO and C8/C10-C28 for TPH-DRO). Please note that diesel and heating oil (i.e., No. 2 Fuel) are essentially the same product.

EPA Method 8015 is a method by which a prepared sample is analyzed. The preparation method for a typical TPH-DRO sample is EPA Method 3510 (an extraction method). This method is employed to extract certain compounds from the environmental sample so that the TPH-DRO content can then be measured by EPA Method 8015. In this typically used extraction method, organic content is extracted from the sample indiscriminately. Further, EPA Method 8015 is not exclusive to detecting petroleum hydrocarbons, meaning that in addition to petroleum hydrocarbons other organic compounds can be extracted and analyzed, and then reported as TPH-DRO. So, the routine TPH-DRO procedure is not necessarily a precise measurement of petroleum hydrocarbons.

This is the routine TPH analytical procedure used in 99% of the petroleum related cases that Maryland handles. It is highly used because it is a relatively inexpensive test to run and it provides suitable data to meet the objectives of the case. TPH-GRO and TPH-DRO are most useful to assess gross petroleum contamination throughout the life cycle of a project, including, in the case of the Chester River Hospital cleanup, whether the pump and treat system can be shut down to allow for further evaluation. Individual compounds (e.g. benzene) are typically used to determine when a cleanup is complete because there is specific toxicological data available to compare concentrations to. That will happen in the hospital case as well.

In recent years, the use of the silica gel cleanup (SGC) preparation method has become better understood and has been more often put into practice nationally. The Interstate Technology and Regulatory Council (ITRC), a program of the Environmental Research Institute of the States (an educational and research nonprofit supporting the Environmental Council of the States), has published an extremely helpful document on TPH management, *TPH Risk Evaluation at Petroleum-Contaminated Sites*, November 2018, which includes information on the use of SGC for TPH-DRO measurements. ITRC TPH document: https://tphrisk-1.itrcweb.org/.

SGC is a sample preparation method similar to the previously stated EPA Method 3510. The significant difference is the use of the silica gel during the extraction process, which is done to extract polar compounds out of the environmental sample. (A compound or molecule is polar if it has a positively charged end and a negatively charged end [e.g. water].) Polar compounds extracted from TPH-DRO samples can be a number of different things including metabolites from the biodegradation of petroleum hydrocarbons. The polar compounds adsorb to the silica gel, which is also polar in nature. Whereas, petroleum hydrocarbons are non-polar and will not absorb to the silica gel.

So, a sample that is cleaned up with silica gel (e.g. by EPA Method 3630) and is then processed and analyzed by EPA Method 8015 will produce a TPH-DRO result that is a much more precise measure of petroleum hydrocarbons. This is useful to determine how much of the TPH-DRO content are petroleum hydrocarbons, which can be extracted by a pump and treat system, versus how much are the metabolites of biodegradation of the petroleum contamination, which show that natural attenuation is occurring. So, both measurements together provide the users of the data with much more useful information than one measurement on its own.

ITRC has included very useful information on SGC in the referenced TPH document and created a fact sheet on SGC. The fact sheet is available here: https://tphrisk-1.itrcweb.org/wp-content/uploads/2018/11/tph_fact_sheet_a3_silica_gel_cleanup_11_4_18.pdf.

In fact, looking at both datasets from multiple wells can provide an indication of biodegradation occurring at the site. As an example, because there are several wells on the periphery of the sampling area that have frequently not detected TPH-DRO (e.g. MW-21) during the history of the remediation case, it can be concluded that there is not a naturally occurring background level of TPH-DRO in the aquifer (i.e. polar compounds that would be included in an EPA Method 8015 analysis). Then looking at several wells that have had both TPH-DRO with and without SGC, it can be determined that there is an area of the site where there are TPH-DRO concentrations that are not petroleum hydrocarbons. The literature (e.g. the referenced ITRC report) highlights that the polar compounds detected by the TPH-DRO analysis are often products of biodegradation in these circumstances. This is a positive finding in that it suggests that there are naturally occurring microorganisms that are consuming the residual petroleum hydrocarbons.