NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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MEMORANDUM

TO: Brookhaven Landfill File

FROM: Vincent Fay, Professional Geologist VK Fay

SUBJECT: Review of PFAS Results, Groundwater Testing for PFAS at Brookhaven Landfill, March24, 2017

DATE: April 26, 2021

On March 24, 2017, Region 1 staff sampled groundwater and leachate for Perfluorooctanoic acid (PFOA) and Perfluorooctanesulfonic acid (PFOS) at the Brookhaven landfill. The sampling was comprised of two (2) upgradient wells and one (1) downgradient well in the groundwater, and one leachate sample. In addition, staff took one groundwater duplicate and one field blank (FB) for quality control.
The samples were taken in the Shallow Upper Glacial Aquifer between 12.9 and 55.5 feet.
The PFAS results from this sampling event are noted below in parts per trillion (ppt):

	MRF-4 (up)	MRF-4 dup(up)	72816 (up)	73758(down)	Leachate	FB
PFOA	19.3	19.7	8.43	76.6	2390	14
PFOS	41	39.9	3.51	27.5	12.6	3.9

Observations:

1. MRF-4 (upgradient well) - PFOA and PFOS exceed the New York State Department of Health (DOH) maximum contaminant level (MCL) of 10 ppt (established July 30, 2020), but they did not exceed the EPA health advisory level of 70 ppt. The fact that MRF-4 is an up gradient well indicates that the presence of PFOA and PFOS has a source other than the landfill.
2. 72816 (upgradient well) – Neither PFOA or PFOS exceeds the DOH MCL or the EPA health advisory level for these parameters.
3. 73758 (downgradient well) – PFOA and PFOS exceed the DOH MCL of 10 ppt and PFOA exceeds the EPA health advisory level of 70 ppt. The downgradient well exceeds upgradient well MRF-4 in PFOA but not in PFOS. The decrease in PFOS downgradient is unexpected if the landfill is also a contributing source of the PFOS detected downgradient.
4. Field blank - The field blank exceeds the DOH MCL of 10 ppt in PFOA, but not PFOS.

Upgradient vs Downgradient Concentration:

The behavior of PFOA in groundwater follows the standard narrative of background upgradient concentrations, with an increase downgradient of the landfill with the assumption that the landfill is contributing to the downgradient enrichment. The interesting component is the presence of PFOA in both upgradient wells, one of which is close to the DOH MCL and one that exceeds the MCL. Unless contradicted by additional sampling, the conclusion is that background PFOA is very close to the DOH MCL.

The behavior of the PFOS in groundwater from MRF-4 contradicts the standard narrative of background upgradient concentrations, with downgradient enrichment due to landfill contributions. PFOS in MRF-4 decreases from 41 ppt in the upgradient well to 27.5 ppt in the downgradient well. The groundwater behavior from upgradient well 72816 to downgradient well 73758 fits expectations.

Turbidity:

The recommended turbidity of a groundwater sample is below 10 nephelometric turbidity units (NTU). One of the three wells tested was able to achieve this goal. After purging, the final NTU for 72816 was 6.9, for MRF-4 was 78.5, and for 73758 was 262.

	Initial NTU	Final NTU	PFOA	PFOS
MRF-4	760	76.5	19.3/19.7	41/39.9
72816	33.1	6.9	8.43	3.51
73758	295	262	76.6	27.5

As noted, the turbidity criteria were only met in one of the three wells sampled. Turbidity is not considered a major issue if the sampling is conducted as part of the monitoring at the facility. It is the change in conditions that is of concern. The monitoring at a facility is to ensure that the parameters of concern are not increasing over background groundwater quality. Turbidity is a concern if the groundwater is sampled to determine the quality of drinking water. In this instance turbidity may cause the results to be biased high.

Field Blank:

As part of the quality control, a field blank was included with this sampling event. A field blank can be used with any type of analysis, and its purpose is to detect and identify any contaminant from the sampling site. Field blanks are created in the field by the sampler. The lab provides a bottle and deionized (DI) water to fill this bottle as part of the sampling kit. The sampler opens the bottle in the field and collects the field blank by filling the bottle with the provided DI water. By doing this, the field blanks are exposed to the atmosphere of the sampling site. The field blank results can be used to identify the contaminants that are coming from the field.

It is significant to note that the field blank in this sampling event recorded 14 ppt for PFOA and 3.9 ppt for PFOS. The PFOA and PFOS results for the field blank should have been zero for each of these parameters. This indicates that the field blank and probably the groundwater samples were contaminated during the sampling event. This would result in the groundwater samples being biased high.

Leachate:

The leachate results are 2,390 ppt for PFOA and 12.6 ppt for PFOS. These results cannot be compared to the groundwater results as they represent two different environments. The 12.6 ppt for PFOS is unexpectedly low. Subsequent sampling of the leachate in 2018 indicated a range of 614-1900 ppt for PFOA and a range of 87.4-302 for PFOS. These measurements indicate that the PFOA is consistently higher than the PFOS in the two leachate sampling rounds.

Conclusions:

It is difficult to draw any significant conclusions based on a single groundwater sampling event. Groundwater monitoring at landfills relies on multiple sampling events over time. Subsequent data sets are compared to previous sampling events to establish trends in the groundwater quality. This analysis is further complicated by the high turbidity, the fact that an upgradient well exceeds the concentration for PFOS in the downgradient well, the presence of PFOA and PFOS in the field blank and the fact that we are dealing with concentrations in parts per trillion, which is a very small number. These data would be most useful as a comparison to data from subsequent sampling events.