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Mr. Anthony M. Bucco, Esq. (abucco@murphymckeonlaw.com)
Murphy McKeon P.C. Counsellors-At-Law
Riverdale South
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VIA E-MAIL

Re: Groundwater Monitoring Results - Samples Collected August 28, 2015
Fenimore Landfill Site
Mountain Road, Roxbury Township, NJ
MC Project No. 13000078A

Dear Mr. Bucco:

Maser Consulting P.A. (Maser Consulting) provides this letter report summarizing the analytical results for ground-water samples collected under authorization by the Township of Roxbury on August 28, 2015 from the five (5) monitoring wells at the Fenimore Landfill. The wells are the same wells last sampled by the New Jersey Department of Environmental Protection (NJDEP) on April 1, 2015.

Attached to this letter report you will find **Tables 1 and 2** summarizing the organic and inorganic (and field) analysis data, **Table 3** shows the historic benzene concentrations in ground-water samples, and **Figure 1** shows the approximate locations of the five monitoring wells on an aerial photograph. A full copy of the laboratory analysis report is being transmitted electronically to your office via e-mail, and on a compact disc via standard mail.

The ground-water data are compared herein to the April 1, 2015 sample results, and to the NJDEP's Ground Water Quality Standards, or – if none - to the drinking water standards. Comparison also is provided to the volatile organic data summarized by Matrix New World Engineering in an earlier report. Further evaluation, particularly regarding data trends, will be conducted once data are available for the next round of samples the NJDEP will be collecting. According to Mr. Ed Putnam of NJDEP, the samples will be collected in November 2015. Data from the November sampling will be available sometime in December.

Sampling Protocol

Access to the landfill and monitoring wells was gained through the cooperation of the NJDEP. Mr. Putnam arranged for the well keys to be available. Monitoring wells MW-7 and MW-8 were located in areas of overgrowth, which required some clearing by Maser personnel at the time of sampling.



Ground-water samples were collected from the five wells previously assessed by the NJDEP to be sound and suitable for sampling: MW-7; MW-8; MW-201; MW-202, and; MW-203. A duplicate sample was collected from MW-8. Field and trip blanks were prepared for subsequent analysis.

Maser Consulting did not observe any surface or in-well expression suggesting that the integrity of MW-7 was compromised, although this was previously suspected based on aberrant temperature readings obtained from this well by the NJDEP in April 2015.

Per standard NJDEP field-sampling protocol, field analysis parameters included temperature (°C), dissolved oxygen (D.O.), specific conductance (Sp. Cond.) and eH / oxidation-reduction potential (ORP). The “depth to water” was measured in each well from the top of the PVC casing. Field measurements were collected prior to purging (pumping with a submersible pump), post-purging and post-sampling. The values reported on **Table 2** are all for the pre-purge measurements.

The August 28, 2015 water levels in each of the wells was generally within two or three feet (lower) of the water levels measured by NJDEP on April 1, 2015, except for MW-7 where the water level was over 5.5 feet lower than in April. Comparatively lower ground-water levels are typical for summer, particularly in years such as this one when our region experiences lower than normal rainfall.

Laboratory Analysis

The samples were analyzed by Accutest Laboratories of Dayton, NJ, a NJDEP-certified laboratory. The samples, including a field blank and a duplicate sample, were analyzed for the USEPA Target Compound List (TCL) plus 30 library search compounds [volatile organic compounds (VOCs), semi-volatile organic compounds (base/neutral compounds and acid extractable compounds), pesticides and herbicides and polychlorinated biphenyls (PCBs)] and Target Analyte List (TAL) metals. TAL analyses also were conducted on filtered ground-water samples. General chemistry analyses included sulfate (SO₄), sulfide, biological oxygen demand (BOD), chemical oxygen demand (COD), chloride, cyanide and hydrogen sulfide. Analysis for ammonia was inadvertently skipped by Accutest during the initial analysis, but was conducted just out of the analysis holding time, which is not expected to have had any appreciable effect on the results. The trip blank was analyzed for VOCs only.

Analytical Results

Of the volatile organic compounds (VOCs), only benzene **exceeded** its respective ground water quality standard (GWQS) of 1.0 µg/liter, or parts per billion (ppb). Benzene was not detected in the samples from MW-7 or MW-203, but ranged from 1.8 to 3.0 ppb in the other wells, with the



highest concentration in the sample from MW-8. This contrasts with the April 2015 data when benzene was detected at 15 ppb in MW-202. Other non-chlorinated VOCs that were detected (but at levels **below** the respective GWQS) in one or more ground-water samples included chlorobenzene, dichlorobenzenes, dichlorodifluoromethane, isopropylbenzene, toluene and xylenes. Chlorinated VOCs, such as trichloroethene and tetrachloroethene that were detected at trace concentrations in April 2015, were absent from the August sample.

Two semi-volatile organic compounds (SVOCs) were detected at concentrations **above** the respective GWQS: bis(2-chloroethyl)ether and pentachlorophenol. The former compound is likely a lab-induced contaminant. Pentachlorophenol was only found in the MW-8 sample, but not in the field duplicate of this sample. Accutest did not have sufficient sample remaining to run a confirmatory analysis of the MW-8 sample.

Other SVOCs that were detected, but at levels below the respective GWQS, were: 1,4-Dioxane; bis(2-chloromethylether), naphthalene, and n-nitrosidiphenylamine. 1,4-Dioxane was only detected in the three NJDEP-installed wells at the toe of the landfill.

PCBs or pesticides/herbicides were not detected. This contrasts to the April 2015 samples when nearly all of the TCL pesticides and PCBs (Aroclor1016 and/or Aroclor 1221) were detected (generally at trace levels) in the samples from several of the monitoring wells.

Of the TAL Metals, the analyses detected aluminum, arsenic, iron, manganese and sodium in one or more ground-water samples at concentrations above the respective GWQS. Arsenic exceeded its GWQS (3 ppb) only in the sample from MW-202 (5.4 ppb); whereas in April 2015, arsenic exceeded its GWQS in four of the five wells (the highest concentration of 5.98 ppb was again then found in MW-202). The latter three metals mentioned above were detected at elevated levels in both non-filtered and filtered samples, suggesting the metals are indeed present in the dissolved state and are therefore mobile in ground water. Sodium was elevated only in the sample from MW-202, and was higher in the filtered sample, an occurrence that was unique to sodium.

The Biological Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) concentrations were highest in MW-8 and MW-202, but were not of the magnitude for general concern at this time, but provide a baseline for future monitoring. Similarly, these two wells yielded samples with the highest levels of SVOs detected in the “library search” match of tentatively identified / unidentified compounds. Sulfate and sulfides, expected from sheetrock leaching, were not found at levels above the detection limit in any of the samples. Hydrogen sulfide likewise was absent from the samples. Ammonia (nitrogen, ammonia) was detected in samples from each well except for MW-7; the highest level (44.8 parts per million, or ppm) was found in MW-202. The ammonia concentrations exceeded the 3 ppm GWQS in the samples from MW-8, MW-201 and MW-202. Total Dissolved Solids (TDS) levels were fairly similar.



Summary and Recommendations

In summary, the data for samples collected on August 28, 2015 show some exceedances of the GWQS, most notably for benzene (in three wells), arsenic (in one well) and ammonia (in three wells). Historic benzene concentrations for the five monitoring wells are presented in **Table 3**. The benzene concentrations in samples from MW-8 show a slight increase in the three samples collected since 2011. The benzene concentration for MW-202 decreased from 15 ppb in April 2011 to 2.0 ppb in late August, but still exceed the 1 ppb GWQS.

Further evaluation with the addition of future ground-water quality data may provide insight into seasonal variation trends. As stated in our earlier evaluation, the contaminants detected are not unusual or unanticipated at a landfill such as this, and do not represent a significant or anticipated threat to human health or drinking water quality.

Data to be collected by NJDEP during the next round of sampling and analysis will add to our understanding of the ground-water conditions and possible seasonality of ground-water quality. NJDEP's data for the planned November 2015 sampling event should be available in December.

Closing

We look forward to continuing our assistance to the Township of Roxbury in the pursuit of the protection of the environment and human health with respect to the Fenimore Landfill.

Thank you for this opportunity, and we look forward to continue working with you.

Very truly yours,

MASER CONSULTING P.A.

A handwritten signature in black ink, appearing to read 'R. Zelle', is written over a horizontal line.

Robert L. Zelle, P.G., LSRP
Senior Principal
Director of Environmental Services

RLZ/JT/dw
Attachments