

**NEW YORK STATE DEPARTMENT OF TRANSPORTATION
ALBANY, NEW YORK**

**HARRISON SUBRESIDENCY
WESTCHESTER COUNTY
POST-CLOSURE MONITORING RESULTS**

D008873, PIN 8806.51.301

FOUTH YEAR, FOURTH QUARTERLY REPORT

April 2005

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WESTCHESTER COUNTY
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EXECUTIVE SUMMARY

This report presents the results of the fourth year fourth quarter post-closure sampling and monitoring conducted at the Harrison Subresidency site located in the town of Harrison, Westchester County, New York. The objectives of the post-closure sampling and monitoring program are to; 1) evaluate the environmental impacts of the landfill; 2) meet the post-closure monitoring requirements of the NYSDEC and; 3) provide NYSDEC with data to evaluate and/or modify the existing sampling and monitoring program. Five wells (LMW-2, MW-4, PC-1, PC-2, and PC-3), four surface water locations (SW-1, SW-2, SW-3 and SW-4) and four sediment locations (SD-1, SD-2, SD-3 and SD-4) were sampled for Target Analyte List (TAL) metals and chloride. One off-site well, PC-4, was removed by the New York City Department of Environmental Protection (NYCDEP) during the construction of a retention basin.

The current analytical results indicate that the landfill appears to be contributing elevated levels of the non-RCRA metals iron and manganese to the groundwater. External sources appear to be contributing elevated levels of the RCRA metal chromium and non-RCRA metals antimony and sodium to the groundwater. In addition, the unfiltered sample results indicate that elevated levels of both RCRA and non-RCRA metals may be the result of increased sample turbidity, which could occur during sampling activities.

The current surface water analytical results indicate the landfill may be contributing elevated levels of the non-RCRA metals iron, manganese and sodium to the surface water.

The current sediment analytical results indicate the landfill appears to be contributing elevated levels of the non-RCRA metals copper and manganese to the sediment. External sources appear to be contributing elevated levels of the RCRA metals chromium, silver and lead (lead was detected within the normal background range for this area)¹ and the non-RCRA metals iron and nickel to the sediment.

¹ NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels, Appendix A.

1.0 INTRODUCTION

1.1 Background

This report presents the results of the 5 January, 2005 fourth year, fourth quarter post-closure sampling and monitoring conducted at the Harrison Subresidency site located in the town of Harrison, Westchester County, New York (Figure 1). The site, a seasonal highway maintenance support and salt storage facility operated by the New York State Department of Transportation (NYSDOT), includes approximately 2.6 acres of landfill area (Figure 2) that was closed in December 1998 in compliance with New York State Department of Environmental Conservation (NYSDEC) 6 NYCRR Part 360 regulations. The fourth year, fourth quarter sampling and monitoring was conducted to evaluate the environmental impacts of landfill closure through groundwater, surface water and sediment sampling, gas monitoring and a landfill inspection. In accordance with the December 2000 Post-Closure Operations and Maintenance Manual (LMS 2000) The quarterly sampling and monitoring program was established to conform to the requirements of 6 NYCRR Part 360 2.15 (K).

1.2 Monitoring Objectives

The objectives of the post-closure sampling and monitoring program are to; 1) evaluate the environmental impacts of the landfill; 2) meet the post-closure monitoring requirements of the NYSDEC and; 3) provide NYSDEC with data to evaluate and/or modify the existing sampling and monitoring program.

2.0 FIELD INVESTIGATION

2.1 Monitoring Well Sampling

On 5 January, 2005, as part of the quarterly post-closure sampling and monitoring program, five monitoring wells (Figure 3) were purged and sampled for TAL metals (filtered and unfiltered) and chloride. One off-site well, PC-4, was removed by the New York City Department of Environmental Protection (NYCDEP) during the construction of a retention basin.

The upgradient well LMW-2 was purged dry after 2.5 gallons. The well was allowed to recharge to 84% before sampling. The downgradient well MW-4, which was purged dry after 4.5 gallons, was allowed to fully recover before sampling. PC-1, PC-2 and PC-3 were each purged of three well volumes prior to sampling. Well purging was performed by hand using a dedicated bailer or with a submersible pump. PC-2 was purged with a peristaltic pump because of a damaged casing

(the well casing at PC-2 had sheared sideways allowing only a gap of about 2 cm down the well). After purging, samples were collected using dedicated disposable bailers. The samples were preserved on ice to 4°C and sent, under chain of custody, to a New York State Department of Health (NYSDOH)-approved laboratory for analysis.

A round of static water level measurements was recorded for all wells prior to sampling activities. Groundwater chemistry measurements (temperature, pH, conductivity, and turbidity) were recorded before, during, and after purging, with a measurement recorded for approximately every well volume. An additional round of static water measurements was recorded for all wells after purging. Groundwater purging information is recorded on the groundwater well sampling logs included in Attachment A.

2.2 Surface Water Sampling

Four surface water locations (SW-1, SW-2, SW-3 and SW-4) were sampled for TAL metals (total and filtered) and chloride.

SW-1 was collected from a point located at the eastern section of wetlands B. SW-2 was collected from a point located at the northern portion of wetlands A (western side of the landfill). SW-3 was collected from a point located at the southwestern section of the landfill. SW-4 was collected from a point located approximately 17 ft. northeast of the 36-in. reinforced concrete pipe (RCP) culvert that diverts the stream southwest under Route 120 to Rye Lake. The flow at SW-1, SW-2, SW-3 and SW-4 was very low [<1 cubic foot per second (cfs)] and limited to a small channel approximately 0.3 to 1.4 inches deep.

The samples were collected by dipping a dedicated laboratory-cleaned stainless steel ladle into the water and transferring the sample to the appropriate pre-cleaned laboratory-supplied container. The containers were iced to 4°C and sent, under chain of custody, to a NYSDOH-approved laboratory for analysis. Water chemistry measurements (temperature, pH, conductivity, and turbidity) were recorded during sample collection and are included in Attachment B.

2.3 Sediment Sampling

Four sediment samples (Figure 4) were collected for TAL metal and chloride analyses. Each sediment sample was collected subsequent to, and at the same location as, its corresponding surface water sample. The samples were collected using a dedicated laboratory-cleaned stainless

steel trowel and were placed directly into the appropriate pre-cleaned laboratory-supplied sample container. Each sample container was iced to 4°C and sent, under chain of custody, to a NYSDOH-approved laboratory for analysis. The sample depth, texture, color and odor were noted and are included in Attachment B.

2.4 Gas Monitoring

In conformance with the June 2000 Post-Closure Operations and Maintenance Manual, a gas monitoring program was instituted to verify that any gases, produced as a result of the natural decomposition of waste, do not pose a hazard to health or safety. The program includes the measurement of concentrations of methane or other explosive gases, hydrogen sulfide and volatile organic compounds (VOCs) at each of four gas vents and around the perimeter of the landfill (Figure 5).

Methane and other explosive gases were measured with a combustible gas indicator (CGI) around the perimeter of landfill and at each of four gas vents. Gas vent readings were obtained by inserting the instrument detector probe into the vent. The CGI was set to sound an alarm if the readings exceeded 10 % of the lower explosive limit (LEL) of methane. In addition, alarms were set at 10% of the LEL of hydrogen sulfide, 25 parts per million (ppm) of carbon monoxide and 19.5% and 23.5% of oxygen. No readings were detected above the preset alarm levels at the gas vents or the perimeter of the site.

VOCs were measured with a photoionization detector (PID) and a flame ionization detector (FID) (with and without the methane filter) at the perimeter of the landfill and at each of the four gas vents. There were no readings above background levels at the vents or the perimeter of the landfill. An air monitoring field data sheet is included in Attachment C.

2.5 Inspections

All five groundwater monitoring wells were inspected and, with the exception of PC-2, were found to be in good condition. As noted in Section 2.1 the well casing at PC-2 had sheared sideways allowing only a gap of approximately two centimeters down the well. The landfill cap, drainage swales, and gas vents were also inspected. No vermin or vector were observed on the landfill.

3.0 ANALYTICAL RESULTS

3.1 Groundwater Results

Filtered and unfiltered groundwater samples were collected from four on-site monitoring wells (LMW-2, MW-4, PC-1 and PC-2) and one off-site well (PC-3) and analyzed for TAL metals, and chloride.

Groundwater samples were analyzed according to NYSDEC Analytical Services Protocol (ASP). Analytical results for TAL metals (filtered and unfiltered groundwater samples) and chloride are presented in Table 1. A copy of the analytical laboratory report is presented in Attachment D. Field parameters for temperature, pH, specific conductance, and turbidity are provided on the groundwater well sampling logs included in Attachment A.

TAL Metals and Chloride

Results of the analysis indicate that 20 TAL metals were detected in the groundwater samples. Mercury, selenium and thallium were not detected in the groundwater samples. With some exceptions (Table 1) the concentrations of TAL metals detected in the filtered groundwater samples were lower than those detected in the unfiltered samples. Many of these compounds were detected below the groundwater standards in the filtered samples.

The highest concentration of chloride (100 ppm) was detected in the unfiltered sample collected from PC-3.

3.2 Surface Water Results

Four surface water samples were collected and analyzed for TAL metals (filtered and unfiltered) and chloride according to NYSDEC ASP. Analytical results for TAL metals and chloride are presented in Table 2. A copy of the analytical laboratory report is presented in Attachment D. Field parameters for temperature, pH, specific conductance, and turbidity are provided on the surface water sampling logs included in Attachment B.

TAL Metals and Chloride

Results of the analysis indicate that 13 TAL metals were detected in the surface water samples. Antimony, arsenic, cadmium, chromium, copper, lead, nickel, selenium, thallium and vanadium were not detected in the surface water samples. With some exceptions (Table 2) the

concentrations of TAL metals detected in the filtered surface water samples were lower than those detected in the unfiltered samples.

The highest concentration of chloride (34 ppm) was detected in the unfiltered sample collected from the upstream location SW-1 which indicates a contributing off-site source of chloride in the surface water.

3.3 Sediment Data Results

Four sediment samples were collected and analyzed for TAL metals and chloride according to NYSDEC ASP. TAL metal and chloride analytical results are presented in Table 3. A copy of the analytical laboratory report is presented in Attachment D. Sample depths and field observations are provided on the sediment sampling logs included in Attachment B.

TAL Metals and Chloride

Twenty-one TAL metals were detected in the sediment samples. Cadmium and thallium were not detected in the sediment samples.

Chloride was not detected in the sediment samples.

4.0 COMPARISON TO APPLICABLE CRITERIA

4.1 Groundwater

TAL Metals and Chloride

The results of the groundwater TAL metal and chloride analyses were compared to current NYSDEC Ambient Water Quality Class GA Standards and Guidance Values (April 2000 Revision).

The TAL metals groundwater analysis indicates that four non-RCRA metals (antimony, iron, manganese and sodium) and one RCRA metal (chromium), detected in the unfiltered and filtered samples, occurred at concentrations exceeding their respective groundwater criteria (Table 1). Chloride was not detected above the standard in the groundwater.

Protocol requires analysis of both filtered and unfiltered samples. Unfiltered analytical results indicate that elevated concentrations of TAL-metals are related to increased sample turbidity, which could result from sampling activities.

Unfiltered Samples

Chromium was detected above the Class GA standard of 50 ppb in the sample collected from the off-site well PC-3 (85 ppb) which indicates a contributing off-site source of chromium in the groundwater. Antimony exceeded the Class GA standard of 3 ppb in the unfiltered samples PC-1 (4.0 ppb) and PC-3 (9.8 ppb). The concentration detected in the off-site well PC-3 indicates a contributing source of antimony in the groundwater. Iron and manganese exceeded the combined Class GA standard of 500 ppb in all the unfiltered samples. The highest combined concentration, 193,000 ppb, was detected in MW-4. Sodium exceeded the standard of 20,000 ppb in all unfiltered groundwater samples. The highest concentration (78,000 ppb) was detected in the sample collected from the off-site well PC-3 which suggests an off-site contribution of sodium in the groundwater.

Filtered Samples

Chromium was not detected above the Class GA standard of 50 ppb in the filtered groundwater samples. Antimony was not detected above the Class GA standard of 3 ppb in the filtered groundwater samples. Iron and manganese exceeded the combined Class GA standard of 500

parts per billion (ppb) in three filtered samples (MW-4, PC-2 and PC-3). The highest combined concentration of iron and manganese (86,000 ppb) was detected in the sample collected from MW-4. Sodium was detected above the standard of 20,000 ppb in all the filtered samples. The highest concentration, 74,000 ppb, was detected in the sample collected from PC-3 which suggests an off-site contribution to the concentration of sodium in the groundwater.

4.2 Surface Water

At the request of the NYSDEC, the results of the surface water analyses were compared to current NYSDEC Ambient Water Quality Class GA Standards and Guidance Values (April 2000 Revision).

TAL Metals and Chloride

The results of the TAL metals analysis indicates that three non-RCRA metals (iron, manganese and sodium) were detected in the unfiltered and filtered surface water samples at concentrations exceeding their respective criteria (Table 2). Chloride was not detected above the Class GA standard in the surface water samples.

Iron and manganese exceeded the combined Class GA standard of 500 ppb in SW-1 and SW-2. The highest combined concentration, 2520 ppb, was detected in the unfiltered sample collected from SW-2. Elevated levels detected in the unfiltered samples are likely the result of increased turbidity related to sampling activities. Sodium was detected above the Class GA standard of 20,000 in SW-1 and SW-3. The highest concentration, 49,000 ppb was detected in the unfiltered sample collected from SW-3. Chloride was not detected above the Class GA standard of 250 ppm in the surface water samples.

4.3 Sediment

The results of the sediment analysis (Table 3) were compared to the NYSDEC Technical Guidance for Screening Contaminated Sediments (January 1999 Revision).

TAL Metals and Chloride

The results of the TAL metals analysis indicate that concentrations of the RCRA metal chromium and lead and the non-RCRA metals copper, iron and nickel exceeded their respective criteria for the lowest effect level (LEL). The RCRA metal silver exceeded the LEL in three

samples and the severe effect level (SEL) in one sample. The non-RCRA metal manganese was detected at a concentration exceeding the SEL in two samples. Chloride was not detected in the sediment samples.

Chromium was detected above the LEL of 26 ppm in the sample collected from the upstream location SD-1 at 29 ppm, which indicates a contributing off-source of chromium in the sediment. Copper was detected above the LEL of 16 ppm in samples collected from SD-1 (31 ppm) and SD-2 (36 ppm). Iron was detected above LEL of 20,000 ppm in the sample collected from the upstream location SD-1 at 25,000 ppm which indicates a contributing off-site source of iron in the sediment. Lead was detected above the LEL of 31 ppm in SD-1 (48 ppm)[which is within the normal background range for this area (NYSDEC TAGM HWR-94-4046)]. The concentration of lead detected in the sample collected from the upstream location indicates a contributing off-source of lead in the sediment. Manganese was detected above the SEL of 1100 ppm in SD-2 (1500 ppm) and SD-4 (1300 ppm). Nickel was detected above the LEL of 16 ppm in the sample collected from the upstream location SD-1 (22 ppm) which indicates a contributing off-site source of nickel in the sediment. Silver was detected above the LEL of 1 ppm in samples collected from SD-2, SD-3 and SD-4 at 1.2 ppm. Silver was detected above the SEL of 2.2 ppm in the sample collected from the upstream location SD-1 (3.8 ppm) which indicates a contributing off-site source of silver in the sediment.

According to the NYSDEC Technical Guidance for Screening Contaminated Sediments, if only the LEL criterion is exceeded the impact to the sediment is considered moderate.

5.0 COMPARISON WITH THE PREVIOUS QUARTER

5.1 Groundwater

Results of the fourth year fourth quarter groundwater sampling event (January, 2005) indicate that there has been a decrease in the non-RCRA metals antimony, iron, manganese and sodium in the filtered samples. There were no concentrations of chloride detected above the standards in the groundwater samples collected during the current or previous quarter.

5.2 Surface Water

Between September 2004 and January 2005, there has been a decrease in the non-RCRA metal antimony and an increase in the non-RCRA metals iron, manganese and sodium in the surface water samples.

There were no concentrations of chloride detected above the standards in the surface water samples collected during the current or previous quarter.

5.3 Sediments

Between September 2004 and January 2005 there has been a decrease in the concentration of the RCRA metal lead and the non-RCRA metal nickel in the sediment. There has been an increase in the RCRA metals chromium and silver and the non-RCRA metals copper, iron and manganese in the sediment samples.

There has been no change in the chloride concentration (not detected) in the sediment between September 2004 and January 2005.

6.0 CONCLUSIONS

The current analytical results indicate that the landfill appears to be contributing elevated levels of the non-RCRA metals iron and manganese to the groundwater. External sources appear to be contributing elevated levels of the RCRA metal chromium and non-RCRA metals antimony and sodium to the groundwater. In addition, the unfiltered sample results indicate that elevated levels of both RCRA and non-RCRA metals may be the result of increased sample turbidity, which could occur during sampling activities.

The current surface water analytical results indicate the landfill may be contributing elevated levels of the non-RCRA metals iron, manganese and sodium to the surface water.

The current sediment analytical results indicate the landfill appears to be contributing elevated levels of the non-RCRA metals copper and manganese to the sediment. External sources appear to be contributing elevated levels of the RCRA metals chromium, silver and lead (lead was detected within the normal background range for this area)² and the non-RCRA metals iron and nickel to the sediment.

² NYSDEC Division Technical and Administrative Guidance Memorandum (TAGM): Determination of Soil Cleanup Objectives and Cleanup Levels, Appendix A.