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Broome County
Division of Solid Waste Management

Operational Year 9
Quarter Number 2
Monitoring Report

October 2011

ARCADIS

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Operational Year 9
Quarter Number 2
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

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Table of Contents

1. Introduction **1**

2. Methodology **1**

2.1 Environmental Effectiveness Monitoring 1

2.2 Groundwater Remediation System Performance Monitoring 2

2.3 Spring Water Remediation System Performance Monitoring 3

3. Groundwater Flow **3**

4. Groundwater Quality **3**

4.1 Volatile Organic Compounds 4

4.2 Indicators of Reducing Conditions 4

4.3 Evidence of Biodegradation 4

5. Spring Water Quality **5**

6. Surface Water Quality **5**

7. Groundwater Remediation System Performance **5**

7.1 PT System 5

7.1.1 Summary of Operation, Maintenance, and Monitoring 5

7.1.2 Results of Performance Sampling 6

7.2 ARI System 6

7.2.1 Summary of Operation, Maintenance, and Monitoring 6

7.2.2 Results of Performance Sampling 7

8. Spring Water Remediation System Performance **8**

9. Conclusions **8**

10. Recommendations **9**

11. Project Schedule **10**

12. References 11

Tables

Table 1 Water Level Measurements Collected During Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Table 2 Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Table 3 Concentrations of General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Table 4 Pump and Treat System Operating Parameters, Operational Year 9, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Table 5 Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the Pump and Treat System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Table 6 Pump and Treat System Mass Removal Rate of Volatile Organic Compounds, Operational Year 9, Quarter Number 2, Groundwater Remediation System, Colesville Landfiill, Broome County, New York.

Table 7 Concentrations of Volatile Organic Compounds Detected in Aqueous Samples Collected from the SP-5 Spring Water Remediation System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Table 8 SP-5 Spring Water Remediation System Mass Removal Rate of Volatile Organic Compounds, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Figures

Figure 1 Long-Term Effectiveness Monitoring Locations, Colesville Landfill, Broome County, New York.

Appendices

A Groundwater Sampling Logs

B Automated Reagent Injection System Operating Parameters

1. Introduction

This Monitoring Report (Report) was prepared on behalf of the Broome County Division of Solid Waste Management for the Colesville Landfill, located in Broome County, New York (site) to evaluate and document long-term monitoring (LTM) activities at the site. Remediation and monitoring activities are being conducted pursuant to the Record of Decision (ROD) issued in March 1991 and Explanation of Significant Differences (ESD) that were issued in September 2000 and July 2004, respectively. LTM activities (which include environmental effectiveness and remediation system performance monitoring) were performed in accordance with the LTM Plan (ARCADIS G&M, Inc. 2002), LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS G&M, Inc. 2003), Interim Remedial Action Report (ARCADIS G&M, Inc. 2004), and the Proposed Modifications to the Long Term Monitoring Program (ARCADIS G&M, Inc. 2005) which were approved by the United States Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC). These documents provide a detailed description of the LTM program, methodology, and rationale. Where applicable these elements are either summarized or incorporated by reference herein.

This report describes the results of the March 2011 groundwater quality monitoring event conducted during Operational Year 9, Quarter Number 2. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from January 2011 through March 2011 has also been provided. Following the detailed data analysis and discussion is a summary of findings, conclusions, and recommendations.

2. Methodology

The following section provides a summary of the environmental effectiveness and remedial system performance monitoring methodology for Operational Year 9, Quarter Number 2. A site plan showing the environmental effectiveness monitoring locations is provided on Figure 1.

2.1 Environmental Effectiveness Monitoring

The environmental effectiveness monitoring performed during Operational Year 9, Quarter Number 2 included the following:

- Water-level (hydraulic) measurements were collected from 24 monitoring wells on March 16, 2011.

- Groundwater samples were collected from six monitoring wells (Year 9, Q2 list of wells plus monitoring well TW-1) during the week of March 14, 2011. The samples were selectively analyzed for volatile organic compounds (VOCs), dissolved gases, and total organic carbon (TOC). Field parameters were also recorded at these monitoring locations.

- A sample (VOCs only) was collected at the SP-4 surface water location on March 17, 2011.

In accordance with the Proposed Modifications to the Long-Term Monitoring Program (ARCADIS G&M, Inc. 2005), groundwater samples were collected from monitoring wells utilizing passive diffusive bag samplers.

2.2 Groundwater Remediation System Performance Monitoring

Groundwater Remediation System performance monitoring activities during Operational Year 9, Quarter Number 2, were as follows:

- Pump-and-treat (PT) system recovery well effluent, combined influent, and effluent samples were collected on April 5, 2011. The samples were selectively analyzed for VOCs and total iron.

- PT system operating parameters were recorded during the quarterly OM&M site visit.

- TOC samples were collected from select injection wells during the week of March 14, 2011.

- A TOC sample was collected from alternate electron donor monitoring well TW-1 on March 16, 2011.

PT system groundwater samples were collected as grab samples directly from the individual recovery pipelines connected to recovery wells GMPW-4, GMPW-5, the combined influent water to the low profile air stripper, and the combined effluent after the cartridge filters. A groundwater sample was not collected from recovery well GMPW-3. As discussed in the Operational Year 8, Quarter Number 1 Monitoring

Report (ARCADIS of New York, Inc. 2010), the well pump for recovery well GMPW-3 was removed from operation on January 7, 2010 as a result of a faulty intake poppet. As discussed with George Jacob of the USEPA on July 20, 2010, recovery well GMPW-3 will remain off-line until the Focused Feasibility Study (FFS) remedy evaluation is completed, and determination of an alternate groundwater remedy is finalized, if warranted.

2.3 Spring Water Remediation System Performance Monitoring

SP-5 Spring Water Remediation System OM&M was conducted on March 17, 2011. System OM&M was conducted in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS G&M, Inc. 2003) and consisted of the collection of influent and effluent spring water samples for analysis of VOCs. Discharge flow rate was also recorded. The influent sample was collected after removing three well volumes from the influent monitoring well, which is located within the SP-5 treatment unit and screened below the liquid phase granular activated carbon (LPGAC) zone. The treatment system effluent sample was collected as a grab sample from the discharge pipe prior to entering the outfall stone apron. All spring water samples were analyzed for VOCs using USEPA Method 8260.

3. Groundwater Flow

Water-level measurements were made from existing wells on March 16, 2011. The measurements are provided in Table 1. The water level in the project area (i.e., adjacent to the landfill western perimeter) and site-wide in the Operational Year 9, Quarter Number 2 round was consistent with previous rounds. Seasonal fluctuations are observed during each operating quarter; however, the data generally indicate groundwater flow directions consistent with that observed during the Operational Year 8, Quarter Number 4 monitoring event in September 2010.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the March 2011 monitoring round (Operational Year 9, Quarter Number 2). Groundwater analytical results are provided in Tables 2 and 3. Where applicable, the previous round of analytical results for the respective sampling location has been provided in the same table for comparative purposes.

4.1 Volatile Organic Compounds

Total VOC (TVOC) concentrations (Table 2) in all monitoring wells sampled during the reporting period remained generally consistent when compared to historic analytical results. Specifically, the TVOC concentration in monitoring wells GMMW-2, GMMW-5, W-5, GMMW-6, and PW-4 were 193.9 micrograms per liter (ug/L), 124.6 ug/L, 173.0 ug/L, 347.3 ug/L, and 48.6 ug/L, respectively. The TVOC concentration in monitoring well TW-1 (185.6 ug/L) decreased when compared to December 2010 data. Further discussion of the TW-1 analytical data is provided in Section 7.2.2.

During the current reporting period, the TVOC concentration at recovery wells GMPW-4 and GMPW-5 remained consistent with prior rounds of data. Specifically, TVOC concentrations in recovery wells GMPW-4 and GMPW-5 were 218.8 ug/L, and 0.0 ug/L, respectively. A complete evaluation of performance monitoring conducted on the PT system is provided in Section 7.1.2 of this report.

4.2 Indicators of Reducing Conditions

Groundwater analytical results for biogeochemical parameters and field parameters were collected in accordance with the LTM plan and are provided in Table 3. In summary, field and laboratory groundwater data for Wells TW-1, GMMW-2, GMMW-5, GMMW-6, and W-5 indicate that reducing conditions are being maintained within the IRZ. This is evidenced by the presence of reduced forms of alternate electron acceptors (i.e., methane) at a concentration significantly higher than baseline conditions. Further details of the ARI system performance monitoring are provided in Section 7.2.2 of this report.

4.3 Evidence of Biodegradation

Table 3 provides the results of biodegradation end product concentrations in monitoring wells and indicates the continued occurrence of bioactivity and biodegradation of VOCs within the IRZ. Specifically, the concentration of ethene at monitoring wells GMMW-2 and GMMW-6 continued to be elevated when compared to baseline conditions. Similarly, the concentration of ethane remained elevated at monitoring wells GMMW-5 and GMMW-6 during the reporting period. Additional details on the results of biogeochemical monitoring as evidence of Groundwater Remediation System performance and effectiveness are discussed in Section 7.2.2 of this report.

5. Spring Water Quality

The embankment of the North Stream was inspected for springs during the OM&M site visit on March 17, 2011. At the SP-2 area, there was a minor amount of spring water flow, but no evidence of staining. Trees had fallen across the stream in the SP-2 area. Iron hydroxide staining was observed intermittently in the SP-3 area at the base of the heavy stone retaining wall, and in one area it was observed to be running down into the stream. Iron hydroxide staining and a sheen were also observed at the SP-4 area. Additional evaluations of spring water conditions, with particular attention to the SP-4 area, are be conducted during Operational Year 9 to further assess whether the SP-4 remedy will require repairs to ensure compliance with the requirements of the ROD and the July 2004 ESD.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 9, Quarter Number 2 monitoring round are summarized in Table 2. As shown in Table 2, surface water quality at the SP-4 sampling location remained consistent when compared to analytical results from the previous round. Specifically, the TVOC concentration at the SP-4 sampling location was below the limits of detection. The data indicate that surface water quality is not being adversely impacted by the landfill.

7. Groundwater Remediation System Performance

The following sections describe the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 9, Quarter Number 2.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 9, Quarter Number 2.

7.1.1 Summary of Operation, Maintenance, and Monitoring

The P&T System did not operate during the reporting period. Following the Operational Year 9, Quarter Number 1 OM&M event, the recovery well compressed air shut off valve was inadvertently left in the closed position. The valve was placed in the open position during the Operational Year 9, Quarter Number 2 OM&M event, after which the P&T System recovery wells were restarted and are operating properly.

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 9, Quarter Number 2 was conducted on April 5, 2011. Four groundwater samples were collected. Groundwater samples included collection of individual recovery well samples (GMPW-4, and GMPW-5), total influent, and total effluent after the cartridge filters. With prior approval from the NYSDEC, frequency of collection of the PT system air stripper effluent vapor sample was decreased from quarterly to annually beginning with Operational Year 8, Quarter Number 4. Therefore, no vapor sample was collected from the PT system air stripper effluent during Operational Year 9, Quarter Number 2.

Table 5 provides a summary of the PT system performance groundwater sampling analytical results. As shown in Table 5, all groundwater VOCs were treated to below their respective Best Professional Judgment (BPJ) limits via the low profile air stripper. A total of approximately 3.64 lbs of VOCs have been removed from the subsurface since system startup (Table 6).

7.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 9, Quarter Number 2.

7.2.1 Summary of Operation, Maintenance, and Monitoring

ARI system OM&M was conducted during the Operational Year 9, Quarter Number 2 OM&M site visit during the week of March 14, 2011. The visit included operation and maintenance of system equipment and the collection of samples for analysis of TOC from injection wells IW-3, IW-8 and IW-13 and monitoring well TW-1.

No reagent injections were completed during Operational Year 9, Quarter Number 2. As described in the Operational Year 8 Annual Monitoring Report (ARCADIS 2011), reagent injections are completed using a molasses-whey blend (mol-whey) beginning with the Operational Year 9, Quarter Number 1 injection event. Based on the monitoring results from the Operational Year 9, Quarter Number 1 injection event, the frequency of reagent injections will be decreased. The revised injection frequency will be determined based on the results of ongoing TOC monitoring from injection and nearby monitoring wells. The next reagent injection is estimated to be completed during Operational Year 9 Quarter Number 4.

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted during the week of March 14, 2011. As discussed previously, this event consisted of collecting TOC samples at three injection wells. In addition, analytical results from select monitoring wells under the environmental effectiveness monitoring program were used to determine the effectiveness of the ARI system. A summary of key observations is as follows:

- The TOC concentrations at injection wells IW-3, IW-8 and IW-13 were 31.7 mg/L, 750 mg/L and 391 mg/L. The TOC in monitoring well TW-1 was 70.8 mg/L. Combined, these data indicate that sufficient organic carbon is persisting within the subsurface to maintain the IRZ as a result of the mol-whey injection completed in November 2010.

- VOC data for monitoring well TW-1 decreased when compared to December 2011 data but remained consistent when compared to historical data (i.e., prior to December 2010). The decrease in TVOCs was primarily caused by a drop in the concentration of toluene (110 ug/L). As described in previous reports, the presence of toluene is likely from biogenic production caused by complex reactions with in-situ bacteria or suppression of the natural attenuation of existing toluene within the anaerobic treatment zone. The observed increase in toluene at TW-1 will be transient and the toluene will naturally attenuate and be utilized as an electron donor as it flows along the downgradient flow path out of the anaerobic reactive zone. The current declining trend of toluene at monitoring well TW-1, and the low concentration of toluene at downgradient monitoring well W-5 (1.3 ug/L) corroborates these assumptions.

- Monitoring wells in close proximity to the anaerobic IRZ (i.e., GMMW-5, W-5, GMMW-6 and GMMW-2) exhibited stable VOC concentrations when compared to historic analytical results and remain significantly lower than baseline conditions.

- The methane concentration in monitoring wells GMMW-5, W-5, GMMW-6, and GMMW-2 remained elevated at 22,000 ug/L, 11,000 ug/L, 11,000 ug/L, and 8,400 ug/L, respectively. These data provide evidence that strongly reducing conditions (methanogenic) are being maintained within the IRZ.

- The ethene concentration in monitoring wells GMMW-2 and GMMW-6 remained elevated at 6,800 nanograms per liter (ng/L) and 17,000 ng/L, respectively.

- The ethane concentration remained elevated in monitoring wells GMMW-5 and GMMW-6 at 20,000 ng/L and 8,900 ng/L, respectively.

In summary, IRZ performance monitoring data indicate that mol-whey is a suitable alternate electron donor. The revised injection methodology using mol-whey has resulted in a longer allowable injection frequency (i.e., time between injection events), is providing equivalent biogeochemical conditions (i.e., strongly reducing conditions), and is providing equivalent rates of mass degradation when compared to previous injection methodologies.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on March 17, 2011 in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS G&M, Inc. 2003). SP-5 remediation system analytical results are provided in Table 7. As shown in Table 7, all effluent COCs, excluding 1,1-dichloroethane, were treated to below their respective BPJ limits via the LPGAC. 1,1-dichloroethane was detected at 13 ug/L in the effluent which is slightly above its BPJ limit. ARCADIS will evaluate the data from the June 2011 monitoring event and has tentatively scheduled replacement of the LPGAC media for fall of 2011. Influent TVOC analytical data (45.7 ug/L) remained consistent with historical analytical data. Table 8 provides the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 9, Quarter Number 2. As shown in Table 8, the SP-5 remedial system treated approximately 248,317 gallons of spring water during the operating period. An estimated 0.10 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 2,770,064 gallons of spring water have been treated and an estimated 1.63 lbs of VOC mass have been recovered since system startup.

9. Conclusions

Based on the data obtained from the Operational Year 9, Quarter Number 2 monitoring, ARCADIS concludes the following:

- Mol-whey is a suitable alternate electron donor as evidenced by:

- Equivalent rates of mass degradation when compared to previous injection methodologies.
- Sufficient TOC for maintaining the IRZ that has persisted for approximately five months following the first mol-whey injection.
- Equivalent biogeochemical conditions (i.e., strongly reducing conditions) when compared to previous injection methodologies.

- The PT system was restarted on April 5, 2011 and is currently operating with recovery well GMPW-3 offline and is treating recovered groundwater VOCs to below BPJ limits prior to discharge.
- VOC concentrations in surface water continue to be consistent with historical data, and surface water is not being adversely impacted by the landfill.
- SP-5 remediation system operating parameters are consistent with historical operation and indicate that the maintenance activities completed in September 2008 and discussed in the Operational Year 6 Annual Monitoring Report (ARCADIS of New York, Inc. 2009) were successful in mitigating the presence of tailwater.

10. Recommendations

The following recommendations are made for Operational Year 9, Quarter Number 2 activities:

- Continue to inspect the former spring locations and the embankment of the North Stream.
- Implement repairs to the SP-4 remedy to ensure compliance with the requirements of the ROD and the July 2004 ESD.
- Continue to operate the P&T system without recovery well GMPW-3. Recovery well GMPW-3 will remain off-line until the FFS remedy evaluation is completed and determination of an alternate groundwater remedy is finalized, if warranted.

- Continue to monitor the mol-whey injection pilot test results and evaluate the efficiency of this alternate electron donor for the site. Complete the next mol-whey injection when TOC and biogeochemical monitoring data indicate that additional electron donor is required to maintain the IRZ.

- Continue to monitor the concentration of toluene at monitoring well TW-1. In addition, monitor the concentration of toluene at monitoring well W-5 to confirm that it is biodegrading along the downgradient flow path.

- Conduct a focused groundwater investigation in June of 2011 to delineate the downgradient extent of the VOC plume (i.e., downgradient of monitoring well W-18).

- Evaluate SP-5 data from the June 2011 monitoring event and schedule replacement of the LPGAC media for fall of 2011 as necessary.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted for Operational Year 9 on the quarterly schedule set forth in the Proposed Modifications to Long-Term Monitoring Program (ARCADIS G&M, Inc. 2005). System OM&M of the Groundwater Remediation System will continue to be performed on a quarterly basis consistent with the LTM Plan.

12. References

ARCADIS G&M, Inc. 2002. Long-Term Monitoring Plan, Colesville Landfill, Broome County, New York, NYSDEC Site 704010. June 28, 2002.

ARCADIS G&M, Inc. 2003. Long-Term Monitoring Plan Addendum for Spring Water Remediation Systems, Colesville Landfill, Broome County, New York, NYSDEC Site 704010. November 3, 2003.

ARCADIS G&M, Inc. 2004. Interim Remedial Action Report, Colesville Landfill, Broome County, New York, NYSDEC Site 704010. September 22, 2004.

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ARCADIS of New York, Inc. 2009. Operational Year 6 Annual Monitoring Report, Colesville Landfill, Broome County, New York (Site No. 704010). April 30, 2009.

ARCADIS of New York, Inc. 2010. Operational Year 8 Quarter Number 1 Monitoring Report, Colesville Landfill, Broome County, New York (Site No. 704010). June 15, 2010.

ARCADIS of New York, Inc. 2011. Operational Year 8 Annual Monitoring Report, Colesville Landfill, Broome County, New York (Site No. 704010). April 26, 2011.

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Table 1. Water-Level Measurements Collected During Operational Year 9 Quarter Number 2, Colesville Landfill, Broome County, New York.

Well Identification	MP Elevation (feet above msl)	3/16/2011 Depth to Water (feet below MP)	3/16/2011 Water-Table Elevation (feet above msl)	MP Description
GMMW-2	1,030.95	37.08	993.87	Inner casing
GMMW-3	1,028.02	34.36	993.66	Inner casing
GMMW-4	1,042.90	45.51	997.39	Inner casing
GMMW-5	1,043.66	48.89	994.77	Inner casing
GMMW-6	1,033.56	38.83	994.73	Inner casing
GMMW-7	1,045.43	47.56	997.87	Inner casing
PW-1	976.23	14.20	962.03	Inner casing
PW-2	975.28	5.24	970.04	Inner casing
PW-3	988.92	9.65	979.27	Inner casing
PW-4	1,001.75	16.06	985.69	Inner casing
PW-5	986.12	0.0	986.12	Inner casing
W-5	1,051.41	52.55	998.86	Inner casing
W-6	1,050.38	50.46	999.92	Inner casing
PW-7	1,042.47	40.17	1,002.30	Inner casing
W-7	1,049.12	40.99	1,008.13	Inner casing
PW-10	1,049.29	38.90	1,010.39	Inner casing
PW-11	1,052.37	52.86	999.51	Inner casing
PW-13	1,072.41	62.69	1,009.72	Inner casing
W-13	1,053.43	47.71	1,005.72	Inner casing
W-14S	957.68	4.60	953.08	Inner casing
W-16S	990.33	8.49	981.84	Outer casing
W-17S	959.13	7.38	951.75	Inner casing
W-18	973.56	9.05	964.51	Inner casing
W-20S	952.88	6.96	945.92	Inner casing

msl Mean sea level.
MP Measuring point.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	GMMW-02 12/21/2010	GMMW-02 3/16/2011	GMMW-05 12/21/2010	GMMW-05 3/16/2011	GMMW-05* 3/16/2011	GMMW-06 12/21/2010	GMMW-06 3/16/2011
1,1,1,2-Tetrachloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane		3.8 J	3.2 J	<5.0	<5.0	<5.0	1.3 J	<5.0
1,1,2-Trichloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trimethylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane		78	73	3.9 J	<5.0	<5.0	130 DJ	130
1,1-Dichloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	1.3 J	<5.0
1,2-Dichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	0.87 J	<5.0
1,3-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chlorotoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,2-Dichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chlorotoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene		3.1 J	2.7 J	1.1 J	1.7 J	1.6 J	5.5	6.1
Bromobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromochloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
n-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene		33	31	8.2	10	9.8	26	26
Chloroethane		18	20	55	110	110	84 D	170 J
Chloroform		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene		48	44	1.3 J	1.2 J	1.3 J	9.4	3.7 J
cis-1,3-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromomethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane		<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	<5.0
Ethylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Hexachlorobutadiene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
p-Isopropyltoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene chloride		<5.0	<5.0 B	<5.0	<5.0	<5.0	2.2 J	<5.3 B
Methyl tert-butyl ether		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
o-Xylene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
m,p-Xylene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J

See notes on next page.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	GMMW-02 12/21/2010	GMMW-02 3/16/2011	GMMW-05 12/21/2010	GMMW-05 3/16/2011	GMMW-05* 3/16/2011	GMMW-06 12/21/2010	GMMW-06 3/16/2011
n-Propylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
sec-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
tert-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene		<5.0	<5.0	**0.95 J**	**1.7 J**	**1.6 J**	**3.0 J**	**4.4 J**
trans-1,2-Dichloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	**1.2 J**	**0.93 J**
Trichloroethene		**21**	**20**	<5.0	<5.0	<5.0	**9.6**	**4.5 J**
Vinyl chloride		**5.8**	<5.0	<5.0	<5.0	<5.0	**7.6**	<5.0
Total VOCs		**210.7 J**	**193.9 J**	**70.5 J**	**124.6 J**	**124.3 J**	**283.7 J**	**347.3 J**

Bold constituent detected above method detection limit.

B	Compound considered non-detect at the listed value due to associated blank contamination.
D	Concentration is based on a diluted sample analysis.
J	Estimated value.
VOCs	Volatile organic compounds.
ug/L	Micrograms per liter.
*	Field replicate.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID:	PW-04	PW-04	W-05	W-05	TW-1	TW-1
	Date:	12/21/2010	3/16/2011	12/21/2010	3/16/2011	12/21/2010	3/16/2011
1,1,1,2-Tetrachloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1,1-Trichloroethane		7.5	6.1	<5.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2,4-Trimethylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane		<5.0	<5.0	<5.0 J	<5.0	<5.0	<5.0
1,1-Dichloroethane		14	9.6	58	48	16	3.7 J
1,1-Dichloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane		<5.0	<5.0	0.98 J	<5.0	<5.0	<5.0
1,3-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2-Chlorotoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
2,2-Dichloropropane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Chlorotoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene		<5.0	<5.0	6.4	5.4	1.4 J	1.8 J
Bromobenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromochloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromoform		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Bromomethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
n-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene		<5.0	<5.0	6.5	5.0	37	10
Chloroethane		1.7 J	3.2 J	99 D	100	27	57
Chloroform		1.0 J	0.87 J	<5.0	<5.0	<5.0	<5.0
Chloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene		14	8.8	2.8 J	6.6	4.2 J	2.4 J
cis-1,3-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dibromomethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene		<5.0	<5.0	0.95 J	<5.0	<5.0	<5.0
Hexachlorobutadiene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
p-Isopropyltoluene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methylene chloride		<5.0	<5.0	<5.0	<5.0 B	<5.0	<5.0
Methyl tert-butyl ether		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
o-Xylene		<5.0	<5.0	2.2 J	2.3 J	0.85 J	0.68 J
m,p-Xylene		<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0

See notes on next page.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	PW-04 12/21/2010	PW-04 3/16/2011	W-05 12/21/2010	W-05 3/16/2011	TW-1 12/21/2010	TW-1 3/16/2011
n-Propylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
sec-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Styrene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
tert-Butylbenzene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Toluene		<5.0	<5.0	**0.81 J**	**1.3 J**	**390 D**	**110**
trans-1,2-Dichloroethene		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene		**25**	**20**	**1.4 J**	**2.5 J**	**1.0 J**	<5.0
Vinyl chloride		<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Total VOCs		**63.2 J**	**48.6 J**	**179.0 J**	**173.0 J**	**477.5 J**	**185.6 J**

Bold constituent detected above method detection limit.

B	Compound considered non-detect at the listed value due to associated blank contamination.
D	Concentration is based on a diluted sample analysis.
J	Estimated value.
VOCs	Volatile organic compounds.
ug/L	Micrograms per liter.
*	Field replicate.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID:	SP-4	SP-4
	Date:	12/21/2010	3/17/2011
1,1,1,2-Tetrachloroethane		<5.0	<5.0
1,1,2,2-Tetrachloroethane		<5.0	<5.0
1,1,1-Trichloroethane		<5.0	<5.0
1,1,2-Trichloroethane		<5.0	<5.0
1,2,3-Trichlorobenzene		<5.0	<5.0
1,2,3-Trichloropropane		<5.0	<5.0
1,2,4-Trichlorobenzene		<5.0	<5.0
1,2,4-Trimethylbenzene		<5.0	<5.0
1,3,5-Trimethylbenzene		<5.0	<5.0
1,2-Dibromo-3-chloropropane		<5.0	<5.0
1,1-Dichloroethane		2.7 J	<5.0
1,1-Dichloroethene		<5.0	<5.0
1,1-Dichloropropene		<5.0	<5.0
1,2-Dibromoethane		<5.0	<5.0
1,2-Dichlorobenzene		<5.0	<5.0
1,2-Dichloroethane		<5.0	<5.0
1,2-Dichloropropane		<5.0	<5.0
1,3-Dichlorobenzene		<5.0	<5.0
1,3-Dichloropropane		<5.0	<5.0
1,4-Dichlorobenzene		<5.0	<5.0
2-Chlorotoluene		<5.0	<5.0
2,2-Dichloropropane		<5.0	<5.0
4-Chlorotoluene		<5.0	<5.0
Benzene		<5.0	<5.0
Bromobenzene		<5.0	<5.0
Bromochloromethane		<5.0	<5.0
Bromodichloromethane		<5.0	<5.0
Bromoform		<5.0	<5.0
Bromomethane		<5.0	<5.0
n-Butylbenzene		<5.0	<5.0
Carbon Tetrachloride		<5.0	<5.0
Chlorobenzene		<5.0	<5.0
Chloroethane		<5.0	<5.0
Chloroform		<5.0	<5.0
Chloromethane		<5.0	<5.0
cis-1,2-Dichloroethene		<5.0	<5.0
cis-1,3-Dichloropropene		<5.0	<5.0
Dibromochloromethane		<5.0	<5.0
Dibromomethane		<5.0	<5.0
Dichlorodifluoromethane		<5.0	<5.0
Ethylbenzene		<5.0	<5.0
Hexachlorobutadiene		<5.0	<5.0
Isopropylbenzene		<5.0	<5.0
p-Isopropyltoluene		<5.0	<5.0
Methylene chloride		<5.0	<5.0
Methyl tert-butyl ether		<5.0	<5.0
Naphthalene		<5.0	<5.0
o-Xylene		<5.0	<5.0
m,p-Xylene		<5.0	<5.0

See notes on next page.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	SP-4 12/21/2010	SP-4 3/17/2011
n-Propylbenzene		<5.0	<5.0
sec-Butylbenzene		<5.0	<5.0
Styrene		<5.0	<5.0
tert-Butylbenzene		<5.0	<5.0
trans-1,3-Dichloropropene		<5.0	<5.0
Trichlorofluoromethane		<5.0	<5.0
Tetrachloroethene		<5.0	<5.0
Toluene		<5.0	<5.0
trans-1,2-Dichloroethene		<5.0	<5.0
Trichloroethene		<5.0	<5.0
Vinyl chloride		<5.0	<5.0
Total VOCs		**2.7 J**	<5.0

Bold constituent detected above method detection limit.

B	Compound considered non-detect at the listed value due to associated blank contamination.
D	Concentration is based on a diluted sample analysis.
J	Estimated value.
VOCs	Volatile organic compounds.
ug/L	Micrograms per liter.
*	Field replicate.

Table 3. Concentrations of General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	Units	GMMW-02 12/21/10	GMMW-02 3/16/2011	GMMW-05 12/21/10	GMMW-05 3/16/2011	GMMW-06 12/21/10	GMMW-06 3/16/2011
GENERAL CHEMISTRY								
Total Organic Carbon		mg/L	<2.1 B	**1.4**	**7.6**	**4.6**	**2.7**	**3.8**
FIELD PARAMETERS								
pH		Standard units	**6.57**	**6.59**	**6.56**	**6.49**	**6.59**	**6.57**
Specific Conductance		mmhos/cm	**0.592**	**0.538**	**0.417**	**0.500**	**0.778**	**0.926**
Turbidity		NTU	--	--	--	--	--	--
Dissolved Oxygen		mg/L	--	--	--	--	--	--
Temperature		deg C	**7.86**	**9.56**	**7.43**	**9.66**	**7.71**	**9.41**
ORP		mV	--	--	--	--	--	--
DISSOLVED GASES								
Carbon dioxide		mg/L	--	--	--	--	--	--
Carbon monoxide		mg/L	--	--	--	--	--	--
Ethane		ng/L	**1,900**	**1,600**	**25,000**	**20,000**	**8,800**	**8,900**
Ethene		ng/L	**6,600**	**6,800**	**420**	**560**	**25,000**	**17,000**
Methane		ug/L	**8,500**	**8,400**	**15,000**	**22,000**	**3,900**	**11,000**
Nitrogen		mg/L	--	--	--	--	--	--
Oxygen		mg/L	--	--	--	--	--	--

Bold constituent detected above method detection limit.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	Estimated value.
B	Compound considered non-detect at the listed value due to associated blank contamination.

Table 3. Concentrations of General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	PW-04 12/21/10	PW-04 3/16/2011	W-05 12/21/10	W-05 3/16/2011	IW-03 12/21/10	IW-03 3/16/2011
	Units						
GENERAL CHEMISTRY							
Total Organic Carbon	mg/L	<1.0	<1.0	**6.4**	**21.4**	**133**	**31.7**
FIELD PARAMETERS							
pH	Standard units	**5.79**	**5.76**	**6.43**	**6.40**	**5.95**	**6.26**
Specific Conductance	mmhos/cm	**2.46**	**1.68**	**0.922**	**1.04**	--	**0.497**
Turbidity	NTU	--	--	--	--	--	--
Dissolved Oxygen	mg/L	--	--	--	--	--	--
Temperature	deg C	**9.15**	**8.80**	**8.31**	**9.11**	--	**9.67**
ORP	mV	--	--	--	--	--	--
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	--	--	--
Carbon monoxide	mg/L	--	--	--	--	--	--
Ethane	ng/L	**8 J**	**36**	**13,000**	**7,900**	--	--
Ethene	ng/L	**25 J**	**74**	**700**	**3,300**	--	--
Methane	ug/L	**0.22**	**7.5**	**5,800**	**11,000**	--	--
Nitrogen	mg/L	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--

Bold constituent detected above method detection limit.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	Estimated value.
B	Compound considered non-detect at the listed value due to associated blank contamination.

Table 3. Concentrations of General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	IW-08 12/21/10	IW-08 3/16/2011	IW-13 12/21/10	IW-13 3/16/2011	TW-1 12/21/10	TW-1 3/16/2011
	Units						
GENERAL CHEMISTRY							
Total Organic Carbon	mg/L	**1,460**	**750**	**1,480**	**391**	**753**	**70.8**
FIELD PARAMETERS							
pH	Standard units	**5.27**	**5.65**	**4.98**	**5.87**	**6.24**	**6.53**
Specific Conductance	mmhos/cm	--	**1.85**	--	**1.32**	**2.87**	**1.51**
Turbidity	NTU	--	--	--	--	--	--
Dissolved Oxygen	mg/L	--	--	--	--	--	--
Temperature	deg C	--	**9.21**	--	**9.42**	**8.07**	**9.80**
ORP	mV	--	--	--	--	--	--
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	--	--	--
Carbon monoxide	mg/L	--	--	--	--	--	--
Ethane	ng/L	--	--	--	--	**2,500**	**2,700**
Ethene	ng/L	--	--	--	--	**390**	**100**
Methane	ug/L	--	--	--	--	**11,000**	**15,000**
Nitrogen	mg/L	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--

Bold constituent detected above method detection limit.

mg/L	**Milligrams per liter.**
mmhos/cm	**Millimhos per centimeter.**
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	Estimated value.
B	Compound considered non-detect at the listed value due to associated blank contamination.

ARCADIS

Table 4. Pump and Treat System Operating Parameters, Operational Year 9, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.[6]

Date	Time Recorded	Air Stripper Measurements: Blower Discharge Pressure PI-301 (i.w.c.)	Air Stripper Measurements: Blower Effluent Flowrate (scfm)	Flow Measurements: Total[1] Effluent Totalizer FQI-401 (gallons)	Flow Measurements: Water Bypass[2] Totalizer FQI-402 (gallons)	Flow Measurements: GMPW-3[3,5] Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4[4] Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5[4] Totalizer FQI-103 (gallons)
2/15/2011	10:40 AM	9.2	234	1,103,894.5	407,889.6	51,739.1	208,785.1	328,351.5
4/5/2011	2:24 PM	7.9	221	1,104,000.4	408,043.2	51,739.1	208,899.1	328,426.8
		Average Daily Flowrate (gpm) =		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
		Total Groundwater Recovered During Reporting Period (gallons) =		**106**	**154**	**0.00**	**114**	**75**

Notes:

1. Total effluent totalizer replaced on December 23, 2005, and again on April 5, 2011 due to fouling.
2. Water bypass totalizer damaged as a result of freezing in February, 2007. Totalizer replaced on June 25, 2008. Water bypass totalizer replaced on April 5, 2011 due to fouling.
3. GMPW-3 well totalizer replaced on October 7, 2009.
4. GMPW-4 and GMPW-5 well totalizers replaced on June 26, 2008.
5. GMPW-3 well pump was removed from operation on January 7, 2010 as a result of a faulty intake poppet.
6. The Pump and Treat System did not operate between February 15 and April 5, 2011. Values shown were collected after the system was restarted on April 5, 2011.

gpm Gallons per minute.
i.w.c. Inches of water column.
NA Not applicable.

Table 5. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the Pump and Treat System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York[1].

Constituents (units in ug/L)	Model Technology BPJ Limits[2,3]	Sample ID: Date:	GMPW-3 INF[6] --	GMPW-4 INF 04/05/11	GMPW-5 INF 04/05/11	Combined INF 04/05/11	Combined EFF 04/05/11
1,1,1,2-Tetrachloroethane	NA		--	<5.0	<5.0	<5.0	<5.0
1,1,2,2-Tetrachloroethane	NA		--	<5.0 J	<5.0 J	<5.0 J	<5.0 J
1,1,1-Trichloroethane	10-20		--	8.2	<5.0	4.0 J	<5.0
1,1,2-Trichloroethane	10		--	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichlorobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,2,3-Trichloropropane	NA		--	<5.0 J	<5.0 J	<5.0 J	<5.0 J
1,2,4-Trichlorobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,2,4-Trimethylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,2-Dibromo-3-chloropropane	NA		--	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	10		--	59	<5.0	31	<5.0
1,1-Dichloroethene	10		--	<5.0	<5.0	<5.0	<5.0
1,1-Dichloropropene	NA		--	<5.0	<5.0	<5.0	<5.0
1,2-Dibromoethane	NA		--	<5.0	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,2-Dichloroethane	10-30		--	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	NA		--	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
1,3-Dichloropropane	NA		--	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
2-Chlorotoluene	NA		--	<5.0	<5.0	<5.0	<5.0
2,2-Dichloropropane	NA		--	<5.0	<5.0	<5.0	<5.0
4-Chlorotoluene	NA		--	<5.0	<5.0	<5.0	<5.0
Benzene	5		--	3.6 J	<5.0	1.8 J	<5.0
Bromobenzene	NA		--	<5.0	<5.0	<5.0	<5.0
Bromochloromethane	NA		--	<5.0	<5.0	<5.0	<5.0
Bromodichloromethane	NA		--	<5.0	<5.0	<5.0	<5.0
Bromoform	NA		--	<5.0 J	<5.0 J	<5.0 J	<5.0 J
Bromomethane	NA		--	<5.0	<5.0	<5.0	<5.0
n-Butylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
Carbon Tetrachloride	10		--	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	NA		--	14	<5.0	7.4	<5.0
Chloroethane	NA		--	35	<5.0	17	<5.0
Chloroform	NA		--	<5.0	<5.0	<5.0	<5.0
Chloromethane	10		--	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	10		--	56	<5.0	31	<5.0
cis-1,3-Dichloropropene	NA		--	<5.0	<5.0	<5.0	<5.0
Dibromochloromethane	NA		--	<5.0 J	<5.0 J	<5.0 J	<5.0 J
Dibromomethane	NA		--	<5.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane	NA		--	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	5		--	<5.0	<5.0	<5.0	<5.0
Hexachlorobutadiene	NA		--	<5.0	<5.0	<5.0	<5.0
Isopropylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
p-Isopropyltoluene	NA		--	<5.0	<5.0	<5.0	<5.0

See notes on last page.

Table 5. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the Pump and Treat System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York[1].

Constituents (units in ug/L)	Model Technology BPJ Limits[2,3]	Sample ID: Date:	GMPW-3 INF[6] --	GMPW-4 INF 04/05/11	GMPW-5 INF 04/05/11	Combined INF 04/05/11	Combined EFF 04/05/11
Methylene Chloride	10-50		--	<5.0 B	<5.0	<5.0 B	<5.0
Methyl tert-butyl ether	50		--	<5.0	<5.0	<5.0	<5.0
Naphthalene	NA		--	<5.0	<5.0	<5.0	<5.0
o-Xylene	5		--	<5.0	<5.0	<5.0	<5.0
m,p-Xylene	5		--	<5.0	<5.0	<5.0	<5.0
n-Propylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
sec-Butylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
Styrene	NA		--	<5.0	<5.0	<5.0	<5.0
tert-Butylbenzene	NA		--	<5.0	<5.0	<5.0	<5.0
trans-1,3-Dichloropropene	NA		--	<5.0	<5.0	<5.0	<5.0
Trichlorofluoromethane	10		--	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	10		--	<5.0	<5.0	<5.0	<5.0
Toluene	5		--	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	10-50		--	<5.0	<5.0	<5.0	<5.0
Trichloroethene	10		--	**35**	<5.0	**16**	<5.0
Vinyl Chloride	10-50		--	**8.0**	<5.0	**3.4 J**	<5.0
Total VOCs			--	**218.8 J**	<5.0	**111.6 J**	<5.0
Metals (units in mg/L)	**Model Technology BPJ Limits[4,5] (mg/L)**						
Total Iron	1.2 / 0.61		--	**3.90**	**0.089 J**	**0.924**	**0.101 J**

Notes:

1. Production wells were sampled in accordance with the schedule set forth in Table 3 of the Long-Term Monitoring Plan (ARCADIS 2002).
2. Model Technology BPJ Limits recommended for Air Stripping with appropriate pretreatment from Attachment C of TOGS 1.2.1.
3. When a range is listed for the BPJ limit, a variation in available references was found. Recommended daily maximum limits should be in this range.
4. Model Technology BPJ Limits recommended for Lime, Settle and Filter treatment.
5. The recommended daily maximum permit limit is 1.2 mg/L and the recommended daily average permit limit is 0.61 mg/L.
6. GMPW-3 well pump was removed from operation on January 7, 2010 as a result of a faulty intake poppet.

Bold constituent detected above method detection limit.

B	Compound considered non-detect at the listed value due to associated blank contamination.
BPJ	Best professional judgment.
NA	No BPJ limit listed.
J	Estimated value.
mg/L	Milligrams per liter.
VOCs	Volatile organic compounds.
ug/L	Micrograms per liter.
--	Not analyzed or collected.

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Table 6. Pump and Treat System Mass Removal Rate of Volatile Organic Compounds, Operational Year 9, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.[4]

Date Sampled	Total VOC Influent Concentration (ug/L)	Total Effluent Totalizer FQI-401 (gal)	Total Groundwater Recovered[1] Between Sampling Intervals (gal)	Influent Concentration[2] Geometric Mean (ug/L)	Total Estimated Mass[3] Removed (lbs)
2/15/2011	58.7	1,103,894.5	NA	NA	NA
4/5/2011	111.6	1,104,000.4	106	80.9	0.00
				Total Estimated Mass Removed During Operational Year 9, Quarter Number 2 (lbs) =	**0.00**
				Total Estimated Mass Removed During Operational Year 9 (lbs) =	**0.02**
				Total Estimated Mass Removed Since System Startup (lbs) =	**3.64**

Notes:

1. Total Groundwater Recovered Between Sampling Intervals = Well Totalizer Reading for current sampling event - Well Totalizer Reading for prior sampling event.
2. Influent Concentration Geometric Mean = (Influent Concentration for prior sampling event x Influent Concentration for current sampling event) ^ (1/2).
3. Total Mass Removed = (Total Groundwater Recovered Between Sampling Intervals) x Influent Concentration Geometric Mean x 3.7854 L/gallon x (1 lb / 453,592,370 ug).
4. The Pump and Treat System did not operate between February 15 and April 5, 2011. Values shown were collected after the system was restarted on April 5, 2011.

gal Gallons.
lbs Pounds.
NA Not applicable.
ug/L Micrograms per liter.
VOC Volatile organic compound.

Table 7. Concentrations of Volatile Organic Compounds Detected in Aqueous Samples Collected from the SP-5 Spring Water Remediation System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Model Technology BPJ Limits[1,2]	Sample ID: Date:	SP-5 INF. 3/17/2011	SP-5 EFF. 3/17/2011
VOCs				
1,1,1,2-Tetrachloroethane	NA		<5.0	<5.0
1,1,2,2-Tetrachloroethane	50		<5.0	<5.0
1,1,1-Trichloroethane	10		<5.0	<5.0
1,1,2-Trichloroethane	100		<5.0	<5.0
1,2,3-Trichlorobenzene	NA		<5.0	<5.0
1,2,3-Trichloropropane	NA		<5.0	<5.0
1,2,4-Trichlorobenzene	10		<5.0	<5.0
1,2,4-Trimethylbenzene	NA		<5.0	<5.0
1,3,5-Trimethylbenzene	NA		<5.0	<5.0
1,2-Dibromo-3-chloropropane	NA		<5.0	<5.0
1,1-Dichloroethane	10		**13**	**13**
1,1-Dichloroethene	10-100		<5.0	<5.0
1,1-Dichloropropene	NA		<5.0	<5.0
1,2-Dibromoethane	NA		<5.0	<5.0
1,2-Dichlorobenzene	10-50		<5.0	<5.0
1,2-Dichloroethane	10-100		<5.0	<5.0
1,2-Dichloropropane	10		<5.0	<5.0
1,3-Dichlorobenzene	10		<5.0	<5.0
1,3-Dichloropropane	NA		<5.0	<5.0
1,4-Dichlorobenzene	10		<5.0	<5.0
2-Chlorotoluene	10		<5.0	<5.0
2,2-Dichloropropane	NA		<5.0	<5.0
4-Chlorotoluene	10		<5.0	<5.0
Benzene	5		**1.0 J**	<5.0
Bromobenzene	NA		<5.0	<5.0
Bromochloromethane	NA		<5.0	<5.0
Bromodichloromethane	NA		<5.0	<5.0
Bromoform	50		<5.0	<5.0
Bromomethane	10		<5.0	<5.0
n-Butylbenzene	NA		<5.0	<5.0
Carbon Tetrachloride	10-50		<5.0	<5.0
Chlorobenzene	10-25		**17**	**14**
Chloroethane	10		**11**	**3.1 J**
Chloroform	100		<5.0	<5.0
Chloromethane	10		<5.0	<5.0
cis-1,2-Dichloroethene	10		**1.5 J**	**1.2 J**
cis-1,3-Dichloroethene	NA		<5.0	<5.0
Dibromochloromethane	NA		<5.0	<5.0
Dibromomethane	NA		<5.0	<5.0
Dichlorodifluoromethane	10		<5.0	<5.0
Ethylbenzene	5		<5.0	<5.0
Hexachlorobutadiene	10		<5.0	<5.0
Isopropylbenzene	NA		<5.0	<5.0
p-Isopropyltoluene	NA		<5.0	<5.0
Methylene Chloride	10-100		<5.0	<5.0
Methyl tert-butyl ether	NA		<5.0	<5.0
Naphthalene	10-50		<5.0	<5.0

See notes on next page.

Table 7. Concentrations of Volatile Organic Compounds Detected in Aqueous Samples Collected from the SP-5 Spring Water Remediation System, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Model Technology BPJ Limits[1,2]	Sample ID: Date:	SP-5 INF. 3/17/2011	SP-5 EFF. 3/17/2011
VOCs				
o-Xylene	5		<5.0	<5.0
m&p-Xylenes	5		<5.0	<5.0
n-Propylbenzene	NA		<5.0	<5.0
sec-Butylbenzene	NA		<5.0	<5.0
Styrene	NA		<5.0	<5.0
tert-Butylbenzene	NA		<5.0	<5.0
trans-1,3-Dichloropropene	NA		<5.0	<5.0
Trichlorofluoromethane	10		<5.0	<5.0
Tetrachloroethene	10-50		<5.0	<5.0
Toluene	5		<5.0	<5.0
trans-1,2-Dichloroethene	10-100		<5.0	<5.0
Trichloroethene	10		**2.2 J**	**2.2 J**
Vinyl Chloride	10		<5.0	<5.0
Total VOCs			**45.7 J**	**33.5 J**

Notes:

1. Model Technology Best Professional Judgment (BPJ) Limits recommended for carbon adsorption with appropriate pretreatment from Attachment C of TOGS 1.2.1.
2. When a range is listed for the BPJ limit, a variation in available references was found. Recommended daily maximum limits should be in this range.

Bold constituent detected above method detection limit.

ug/L	Micrograms per liter.
VOCs	Volatile organic compounds.
INF.	Influent.
EFF.	Effluent.
NA	No BPJ limit listed.
J	Estimated value.

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Table 8. SP-5 Spring Water Remediation System Mass Removal Rate of Volatile Organic Compounds, Operational Year 9, Quarter Number 2, Colesville Landfill, Broome County, New York.

Date Sampled	Total VOC Influent Concentration (ug/L)	Effluent Flowrate (gpm)	Depth to Water (feet btc)	Total Groundwater Treated[1] Between Sampling Intervals (gal)	Influent Concentration[2] Geometric Mean (ug/L)	Total Estimated Mass[3] Removed (lbs)
12/21/2010	51.0	1.59	NM	NA	NA	NA
3/17/2011	45.7	2.54	NM	248,317	48.3	0.10
				Total Estimated Mass Removed During Current Quarter (lbs) =		**0.10**
				Total Estimated Mass Removed Since System Startup (lbs) =		**1.63**
				Total Effluent Treated Since System Startup (gallons) =		**2,770,064**

Notes:

1. Total Spring Water Treated Between Sampling Intervals = Effluent Flowrate Geometric Mean x 1440 min/day x days between sampling events.
2. Influent Concentration Geometric Mean = (Influent Concentration for prior sampling event x Influent Concentration for current sampling event)^(1/2).
3. Total Mass Removed = (Total Groundwater Treated Between Sampling Intervals) x Influent Concentration Geometric Mean x 3.7854 L/gallon x (1 lb / 453,592,370 ug).

NA	Not applicable.
NM	Not measured.
ug/L	Micrograms per liter.
gpm	Gallons per minute.
btc	Below top of casing.
gal	Gallons.
lbs	Pounds.
VOC	Volatile organic compound.

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Appendix A

Groundwater Sampling Logs

Table 3. Field Measurements of Depth to Water in Select Wells, Colesville Landfill, Broome County, New York.

Date: 3/16/2011

Katie Bidwell

Snow/Rain 35°

Well Identification		Depth to Water (feet below MP)	Comments
GMMW-2		37.08	
GMMW-3		34.36	
GMMW-4		45.51	
GMMW-5		48.89	
GMMW-6		38.83	
GMMW-7		47.56	
PW-1		14.20	
PW-2		5.24	
PW-3		9.65	
PW-4		16.06	
PW-5		0.0	Water surrounds well
W-5		52.55	
W-6		50.46	
PW-7		40.17	
W-7		40.99	
PW-10		38.90	
PW-11		52.86	
PW-13		62.69	
TW-1		51.63	
W-13		47.71	
W-14S		4.60	
W-16S		8.49	
W-17S		7.38	
W-18		9.05	
W-20S		6.96	

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	GMW-2	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time: Begin	1452	End	1500

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	37.08
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear
Odor	Slight
Appearance	Clear
pH (s.u.)	6.59
Conductivity (mS/cm)	0.538
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.56
Dissolved Oxygen (mg/L)	1.66
ORP	9.8
Sampling Method	PDB / Bailer
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	3	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	GMW11-5	Replicate No.	REP031611	Code No.	—
Weather	Cloudy 40°	Sampling Time: Begin	1405	End	1415

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	
Water-Level Elevation (ft)	48.89
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear
Odor	Slight
Appearance	Clear / Tiny particles
pH (s.u.)	6.49
Conductivity (mS/cm)	0.500
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.66
Dissolved Oxygen (mg/L)	2.59
ORP	-99.7
Sampling Method	PDB / Bailer
Remarks	Replaced a PDB

Constituents Sampled	Container Description	Number REP	Preservative
8260B VOLATILES	40 ML VOA Vials	3/3	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	~~[illegible]~~ GMW-6	Replicate No.	MS/MSD	Code No.	—
Weather	cloudy 40°	Sampling Time: Begin	1430	End	1442

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	38.83
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	yellow - orange
Odor	slight
Appearance	clear / iron looking particles orange
pH (s.u.)	6.57
Conductivity (mS/cm)	0.926
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.41
Dissolved Oxygen (mg/L)	1.63
ORP	-69.4
Sampling Method	PDB / Bailer
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number (MS / MSD)	Preservative
8260B VOLATILES	40 ML VOA Vials	3/2/2	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

ARCADIS

Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/11
Site/Well No.	PW-4	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time:	Begin 1507	End	1516

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	16.00
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear
Odor	none
Appearance	Clear
pH (s.u.)	5.76
Conductivity (mS/cm)	1.675
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	8.80
Dissolved Oxygen (mg/L)	3.83
ORP	95.1
Sampling Method	PDB / Bailer
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	3	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic		HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	W-5	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time:	Begin 1333	End	1340

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	52.55
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Cloudy
Odor	Slight
Appearance	Cloudy
pH (s.u.)	6.40
Conductivity (mS/cm)	1.039
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.11
Dissolved Oxygen (mg/L)	0.75
ORP	-114.3
Sampling Method	PDB / Bailer
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	3	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	TW-1	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time: Begin	1344	End	1348

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	51.63
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	yellow
Odor	Medium
Appearance	Clear / particles
pH (s.u.)	6.53
Conductivity (mS/cm)	1.511
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.80
Dissolved Oxygen (mg/L)	0.61
ORP	-133.2
Sampling Method	PDB / Bailer
Remarks	Redeployed as PDB

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	3	HCL
Ethene, Ethane, Methane	40 ML Vials	2	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	IW-3	Replicate No.	—	Code No.	—
Weather	Overcast 40°	Sampling Time: Begin	1545	End	1459

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	yellow
Odor	medium
Appearance	clear
pH (s.u.)	6.26
Conductivity (mS/cm)	0.497
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.67
Dissolved Oxygen (mg/L)	1.80
ORP	-59.3
Sampling Method	Bailer
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.			
1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	IW-8	Replicate No.	—	Code No.	—
Weather	Overcast 40°	Sampling Time: Begin	1608	End	1612

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Dark yellow
Odor	Strong
Appearance	Clear
pH (s.u.)	5.65
Conductivity (mS/cm)	1.847
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.21
Dissolved Oxygen (mg/L)	
ORP	-47.6
Sampling Method	Bailer
Remarks	Inner casing was filled with water. Seal was Tight

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Millisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/16/2011
Site/Well No.	Tw-13	Replicate No.	—	Code No.	
Weather	Overcast 40	Sampling Time:	Begin 1555	End	1600

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	
Water-Level Elevation (ft)	
Water Column in Well (ft)	
Casing Diameter/Type	2"
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Yellow - Dark
Odor	Strong
Appearance	Clear
pH (s.u.)	5.87
Conductivity (mS/cm)	1.315
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	9.42
Dissolved Oxygen (mg/L)	4.07
ORP	-57.6
Sampling Method	Bailer
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	Na3PO4
TOC	40 ML Vials	2	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Miligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Surface Water Sampling Form

Project Colesville Landfill Project No. NY000949.0023 Page ___ of ___

Site Location Colesville, NY Date 3/17/2011

Site/Well No. SP-4 Replicate No. —

Weather Sun 45° Sampling Time: Begin 1007 End 1010

Site Conditions

Water Quality Meter: YSI

Location Condition: Cobble to Stone
First Morning

Vegetation: None in stream
dormant - on banks

Depth of Water: 6"

Estimated Flow Rate: 5'/4 Sec

Collection Method: Direct collection

Field Parameters

Color	Clear
Odor	None
Appearance	Clear
pH (s.u.)	6.77
Conductivity (mS/cm)	0.0164
Temperature (°C)	2.98
DO (mg/L)	12.58
Turbidity (NTU)	—
ORP	154
Time	—

Remarks:

Constituents Sampled: See COC Sampling Personnel: KB

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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0023	Page	1 of 1
Site Location	Colesville, NY			Date	3/17/2011
Site/Well No.	SP 5 influent	Replicate No.	—	Code No.	—
Weather	Sun 50°	Sampling Time:	Begin 1200	End	1204

Evacuation Data

Measuring Point	
MP Elevation (ft)	
Land Surface Elevation (ft)	
Sounded Well Depth (ft bmp)	4.1
Depth to Water (ft bmp)	0.0
Water-Level Elevation (ft)	
Water Column in Well (ft)	4.1
Casing Diameter/Type	2"
Gallons in Well	0.66
Gallons Pumped/Bailed Prior to Sampling	2.00
Sample Pump Intake Setting (ft bmp)	
Purge Time	begin ____ end ____
Pumping Rate (gpm)	
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear
Odor	Slight
Appearance	Clear
pH (s.u.)	6.49
Conductivity (mS/cm)	0.404
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	6.69
Dissolved Oxygen (mg/L)	1.60
ORP	-55.3
Sampling Method	Bailer
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8260B VOLATILES	40 ML VOA Vials	3	HCL
Ethene, Ethane, Methane	40 ML Vials	—	Na3PO4
TOC	40 ML Vials	—	H2SO4
Total Iron	500 ml plastic	—	HNO3

Sampling Personnel: KB

Well Casing Volumes

Gal./Ft.				
	1-¼" = 0.06	2" = 0.16	3" = 0.37	4" = 0.65
	1-½" = 0.09	2-½" = 0.26	3-½" = 0.50	6" = 1.47

bmp	below measuring point	ml	milliliter	NTU	Nephelometric Turbidity Units
°C	Degrees Celsius	mS/cm	Milisiemens per centimeter	PVC	Polyvinyl chloride
ft	feet	msl	mean sea-level	s.u.	Standard units
gpm	Gallons per minute	N/A	Not Applicable	umhos/cm	Micromhos per centimeter
mg/L	Milligrams per liter	NR	Not Recorded	VOC	Volatile Organic Compounds

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Surface Water Sampling Form

Project: Colesville Landfill Project No.: NY000949.0023 Page: of

Site Location: Colesville, NY Date: 3/17/11

Site/Well No.: SP-5 effluent Replicate No.: —

Weather: Sun 50° Sampling Time: Begin 1145 End 1147

Site Conditions

Water Quality Meter: YSI

Location Condition: cleared out effluent line + stream

Vegetation: dormant

Depth of Water: —

Estimated Flow Rate: 320mL / 2 Secs

Collection Method: Direct collection

Field Parameters

Color	Clear
Odor	none
Appearance	Clear
pH (s.u.)	6.46
Conductivity (mS/cm)	0.367
Temperature (°C)	6.19
DO (mg/L)	4.26
Turbidity (NTU)	—
ORP	-34.8
Time	—

Remarks:

Constituents Sampled: See COC Sampling Personnel: KB

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Appendix B

Automated Reagent Injection System
Operating Parameters

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Table B-1. Automated Reagent Injection System Summary of Operational Year 9, Quarter Number 2 Injection Quantities, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

NO INJECTIONS COMPLETED DURING THE REPORTING PERIOD

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Table B-2. Automated Reagent Injection System, Operational Year 9, Quarter Number 2 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

NO INJECTIONS COMPLETED DURING THE REPORTING PERIOD