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Broome County
Division of Solid Waste Management

Operational Year 7
Quarter Number 2
Monitoring Report

October 15, 2009

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Kenneth Zegel, P.E.
Senior Engineer

Steven M. Feldman
Project Director

Christina Berardi Tuohy, P.E.
Vice President
License Number 078743-1, New York

Operational Year 7
Quarter Number 2
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

Prepared for:
Broome County Division of Solid Waste Management

Prepared by:
ARCADIS
Two Huntington Quadrangle
Suite 1S10
Melville
New York 11747
Tel 631.249.7600
Fax 631.249.7610

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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 and Explanation of Significant Difference that were issued in March 1991 and September 2000, 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 2003), Interim Remedial Action Report (ARCADIS 2004), and the Proposed Modifications to the Long-Term Monitoring Program (ARCADIS 2005) which were approved by the United States Environmental Protection Agency 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 2009 groundwater quality monitoring event conducted during Operational Year 7, Quarter Number 2. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from January 2009 through March 2009 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 7, 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 7, Quarter Number 2 included the following:

- Groundwater samples were collected from six monitoring wells (Year 7, Quarter 2 list of wells plus alternate electron donor test well TW-1) during the week of March

23, 2009. 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.

- Samples (VOCs only) were collected at the SP-4 surface water location on March 27, 2009.

In accordance with the Proposed Modifications to the Long-Term Monitoring Program (ARCADIS 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 7, Quarter Number 2, were as follows:

- Pump-and-treat (PT) system recovery well influent, combined influent, and effluent samples were collected on March 27, 2009. The samples were selectively analyzed for VOCs and total iron.
- One vapor sample from the PT system air stripper effluent was collected on March 27, 2009. The sample was analyzed for VOCs.
- PT system operating parameters were recorded during the quarterly OM&M site visit.
- Samples were collected from select injection wells during the week of March 23, 2009.
- A TOC sample was collected from alternate electron donor monitoring well TW-1 on March 27, 2009.
- Automated reagent injection (ARI) system operating parameters were recorded during each injection event.

PT system groundwater samples were collected as grab samples directly from the individual recovery pipelines connected to recovery wells GMPW-3, GMPW-4, GMPW-5, the combined influent water to the low profile air stripper, and the combined effluent

after the cartridge filters. The effluent air sample was collected as a grab sample directly from the designated point located on the low profile air stripper stack.

2.3 Spring Water Remediation System Performance Monitoring

SP-5 Spring Water Remediation System OM&M was conducted on March 27, 2009. System OM&M was conducted in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS 2003) and consisted of the collection of influent and effluent spring water samples for analysis of VOCs. Discharge flow rate and depth to water in the treatment unit were also recorded. The influent sample was collected after removing greater than 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 26, 2009. 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 7, 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 6, Quarter Number 4 monitoring event.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the March 2009 monitoring round (Operational Year 7, 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

As shown in Table 2, total VOC (TVOC) concentrations in all monitoring wells sampled during the reporting period remained generally consistent when compared to analytical

results from the previous round, with the exception of monitoring well GMMW-6. TVOC concentrations in monitoring well GMMW-6 increased when compared to analytical results from the previous round, but remained generally consistent when compared with historical concentrations. Specifically, the TVOC concentration in monitoring wells GMMW-2, GMMW-5, W-5, GMMW-6, and PW-4 were 299.4 micrograms per liter (ug/L), 144.4 ug/L, 181.0 ug/L, 590.5 ug/L, and 59.7 ug/L, respectively. The TVOC concentration in monitoring well TW-1 (143.0 ug/L) remained consistent when compared to analytical results from the previous round.

During the current reporting period, the TVOC concentration at recovery wells GMPW-3, GMPW-4, and GMPW-5 were consistent with prior rounds of data. Specifically, TVOC concentrations in recovery wells GMPW-3, GMPW-4, and GMPW-5 were 254.1 ug/L, 254.6 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-5, and GMMW-6 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 background 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 well GMMW-6 continues 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

Spring water locations SP-2 and SP-3 were inspected during the OM&M site visit on March 27, 2009. Springs were not observed at the SP-2 location, and no springs or stagnant water were observed between SP-2 and SP-3, as had been observed during the December 2008 inspection. At the SP-3 location, a small wet puddle was observed, but no flow of water was evident.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 7, 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.

7. Groundwater Remediation System Performance

The following sections describe the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 7, Quarter Number 2.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 7, Quarter Number 2.

7.1.1 Summary of Operation, Maintenance, and Monitoring

During Operational Year 7, Quarter Number 2, the PT system operated continuously with the exception of brief system shutdowns as a result of minor system alarms and routine OM&M activities.

PT system OM&M for Operational Year 7, Quarter Number 2 was conducted during the week of March 23, 2009 and included operation and maintenance of system equipment, the collection of system performance samples (water and vapor), and recording system operating parameters. Table 4 provides a summary of the recorded system operating parameters for the current operating period. As shown in Table 4, the total effluent groundwater recovery rate for Operational Year 7, Quarter Number 2

was approximately 0.59 gallons per minute (gpm), with individual recovery rates of 0.00 gpm, 0.17 gpm, and 0.31 gpm in GMPW-3, GMPW-4, and GMPW-5, respectively. The average individual recovery well pumping rates during Operational Year 7, Quarter Number 2 were consistent with previous data (i.e., Operational Year 7, Quarter Number 1) but were still slightly lower than baseline (startup) conditions for all wells excluding GMPW-3. The pump installed in GMPW-3 is scheduled to be removed and cleaned during the next quarter. In addition, the GMPW-3 flow meter will be removed, cleaned and inspected during the next quarter to verify that it is operating properly.

A total of 86,204 gallons of groundwater was recovered during Operational Year 7, Quarter Number 2 and a total of 1,787,229 gallons of groundwater has been recovered since system startup. The low profile air stripper operated in accordance with the design specifications and had a blower flow rate of 242 standard cubic feet per minute.

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 7, Quarter Number 2 was conducted on March 27, 2009. As discussed previously, five groundwater samples and one vapor sample were collected. Groundwater samples included collection of individual recovery well samples (GMPW-3, GMPW-4, and GMPW-5), total influent, and total effluent after the cartridge filters. The vapor sample was collected from the effluent stack of the low profile air stripper.

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. Based on the total groundwater recovered during the reporting period and total influent groundwater concentration, an estimated 0.13 pounds (lbs) of VOC mass were removed from the subsurface during the quarterly reporting period, as shown in Table 6. A total of approximately 3.25 lbs of VOCs have been removed from the subsurface since system startup.

Table 7 provides a summary of the PT system performance vapor sampling analytical results. As shown in Table 7, VOCs were not detected above their respective detection limits. To be conservative, a NYSDEC DAR-1 air model was calculated using the actual analytical data for detected constituents and the detection limit of all constituents that were not detected but have historically been detected in the influent groundwater. All COCs were below their respective short-term guideline concentrations (SGCs) and annual guideline concentrations (AGCs). Appendix B

contains the NYSDEC DAR-1 AGC screening simulation based on the hand calculations provided in the NYSDEC DAR-1 AGC/SGC tables dated September 10, 2007.

7.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 7, Quarter Number 2.

7.2.1 Summary of Operation, Maintenance, and Monitoring

ARI system OM&M was conducted during the Operational Year 7, Quarter Number 2 OM&M site visit during the week of March 23, 2009. The visit included operation and maintenance of system equipment and the collection of samples for analysis of TOC from injection wells IW-3 and IW-13. In addition, a TOC sample was collected from injection well IW-8 and monitoring well TW-1 to evaluate the long-term performance of the alternate electron donor in providing TOC to the subsurface.

One reagent injection was completed during Operational Year 7, Quarter Number 2. The injection was initiated on December 30, 2008 and was completed on January 19, 2009. As described in the Hydraulic Injection Test and Alternate Electron Donor Pilot Test Letter Work Plan (ARCADIS 2006), a slow-release alternate electron donor (e.g., emulsified edible oil [EOS]) was injected into existing injection well IW-8 during the week of December 18, 2006. Accordingly, IW-8 was not included in the current reagent injection to allow for long-term groundwater monitoring of the alternate electron donor. In addition, injection well IW-14 was not included in the current injection due to a crack in the well casing observed during the March 2009 OM&M site visit.

Based on the number of injection events, quantity of molasses solution delivered to each injection well, and molasses solution percentage, approximately 12,716-gallons of molasses solution were delivered to the subsurface during Operational Year 7, Quarter Number 2. A total of 198,469-gallons of molasses solution have been injected since system startup. Appendix C provides a summary of the recorded system operating parameters for each of the injection events for Operational Year 7, Quarter Number 2.

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted during the week of March 23, 2009. As discussed previously, this event consisted of collecting TOC samples at two 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, and IW-13 were 92.7 mg/L and 624 mg/L, which indicate that sufficient organic carbon is being delivered to the subsurface to maintain the IRZ.

- The TOC in monitoring well TW-1 was 85.7 mg/L. The TOC in injection well IW-8 was 766 mg/L. The data indicate that the slow-release alternate electron donor (EOS) continues to provide sufficient organic carbon to the subsurface following the one time injection in injection well IW-8.

- VOC data for monitoring well TW-1 remained relatively consistent with historical data (i.e., prior to September 2008). The data indicate a stable to decreasing trend in the concentration of VOCs in the vicinity of alternate electron donor pilot test.

- Monitoring wells in close proximity to the anaerobic IRZ (i.e., GMMW-5, W-5 and GMMW-6) exhibited VOC concentrations that are significantly lower than baseline conditions.

- The VOC concentration at monitoring well GMMW-2, located approximately 100 feet hydraulically downgradient of the anaerobic IRZ, is 80 percent lower than baseline conditions.

- The methane concentration in monitoring wells GMMW-5 and TW-1 remained elevated at 6,100 ug/L and 13,000 ug/L, respectively. These data provide evidence that strongly reducing conditions (methanogenic) are being maintained within the IRZ.

- The ethene concentration in monitoring well GMMW-6 remained elevated at 31,000 nanograms per liter (ng/L).

- The ethane concentration remained elevated in monitoring wells GMMW-5 and GMMW-6 at 25,000 ng/L and 7,700 ng/L, respectively.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on March 26, 2009 in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS 2003). SP-5 remediation system analytical results are provided in Table 8. As shown in Table 8, all effluent COCs, excluding 1,1-dichloroethene, were treated to below their respective BPJ limits via the LPGAC. 1,1-dichloroethene was detected at 16 ug/L in the effluent which is slightly above its BPJ limit. The LPGAC unit will be replaced with fresh media during the spring of 2009. Influent TVOC analytical data (87.5 ug/L) remained consistent with historical analytical data. Table 9 contains the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 7, Quarter Number 2. As shown in Table 9, the SP-5 remedial system treated approximately 65,983 gallons of spring water during the operating period. An estimated 0.04 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 1,217,420 gallons of spring water have been treated and an estimated 0.88 lbs of VOC mass have been recovered since system startup.

9. Conclusions

Based on the data obtained from the Operational Year 7, Quarter Number 2 monitoring, ARCADIS concludes the following:

- The anaerobic IRZ established downgradient of the injection transect is successfully reducing the concentration of site-related VOCs through enhanced reductive dechlorination.
- The PT system is operating as designed and is treating recovered groundwater VOCs to below BPJ limits prior to discharge.
- Sufficient organic carbon was delivered to the subsurface to maintain the IRZ.
- Surface water quality continues to be consistent with historical data indicating that impacted groundwater is not causing an adverse impact to surface water along the North Stream.
- Ongoing TOC data from the alternate electron donor pilot test indicate the EOS is an effective product to provide sufficient organic carbon to the subsurface over long periods of time. VOC data from monitoring well TW-1 continues to indicate stable to decreasing VOCs in the alternate electron donor pilot test area.

- 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 2009) were successful in mitigating the presence of tailwater.

10. Recommendations

The following recommendations are made for Operational Year 7, Quarter Number 3 activities:

- Continue to inspect the former spring locations and the side slopes of the North Stream.
- Continue to operate the ARI system without injection well IW-8. Continue to obtain and evaluate data related to the ongoing slow-release alternate electron donor pilot program. If data are favorable, consider transitioning to the alternate electron donor EOS™ on a full-scale basis.
- Repair the injection well IW-14 well casing.
- Replace the SP-5 LPGAC unit with fresh media.
- Evaluate and troubleshoot the apparent decline in flow rate from recovery well GMPW-3.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted for Operational Year 7 on the quarterly schedule set forth in the Proposed Modifications to Long-Term Monitoring Program (ARCADIS 2005). System OM&M of the Groundwater Remediation System will continue to be performed on a quarterly basis consistent with the LTM Plan. Replacement of the SP-5 remediation system LPGAC is scheduled for the Spring 2009.

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.

ARCADIS G&M, Inc. 2005 Proposed Modifications to Long-Term Monitoring Program, Broome County, New York, NYSDEC Site 704010. June 28, 2005.

ARCADIS G&M, Inc. 2006. Hydraulic Injection Test and Alternate Electron Donor Pilot Test, Colesville Landfill, Broome County, New York (Site No. 704010). November 30, 2006.

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

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Table 1. Water-Level Measurements Collected During Opertational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Well Identification	MP Elevation (feet above msl)	3/26/2009 Depth to Water (feet below MP)	3/26/2009 Water-Table Elevation (feet above msl)	MP Description
GMMW-2	1,030.95	36.75	994.20	Inner casing
GMMW-3	1,028.02	34.68	993.34	Inner casing
GMMW-4	1,042.90	46.10	996.80	Inner casing
GMMW-5	1,043.66	48.99	994.67	Inner casing
GMMW-6	1,033.56	38.97	994.59	Inner casing
GMMW-7	1,045.43	47.70	997.73	Inner casing
PW-3	988.92	11.65	977.27	Inner casing
PW-4	1,001.75	17.20	984.55	Inner casing
PW-5	986.12	0.35	985.77	Inner casing
W-5	1,051.41	52.30	999.11	Inner casing
W-6	1,050.38	50.55	999.83	Inner casing
PW-7	1,042.47	40.11	1,002.36	Inner casing
W-7	1,049.12	43.14	1,005.98	Inner casing
PW-10	1,049.29	39.11	1,010.18	Inner casing
PW-11	1,052.37	52.80	999.57	Inner casing
PW-13	1,072.41	62.50	1,009.91	Inner casing
W-13	1,053.43	48.09	1,005.34	Inner casing
W-14S	957.68	6.00	951.68	Inner casing
W-16S	990.33	9.22	981.11	Outer casing
W-17S	959.13	8.94	950.19	Inner casing
W-18	973.56	10.25	963.31	Inner casing
W-20S	952.88	8.45	944.43	Inner casing

msl Mean sea level.
MP Measuring point.

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Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID:	GMMW-02	GMMW-02	GMMW-05	GMMW-05	GMMW-05*	GMMW-06	GMMW-06	PW-04	PW-04
	Date:	12/16/2008	3/27/2009	12/16/2008	3/27/2009	3/27/2009	12/16/2008	3/27/2009	12/16/2008	3/27/2009
1,2,4-Trimethylbenzene		<10	<10	<10	**0.91 J**	**0.91 J**	<10	**3.5 J**	<10	<5.0
1,3,5-Trimethylbenzene		<10	<10	<10	**0.59 J**	<5.0	<10	<20	<10	<5.0
1,1,1-Trichloroethane		**7.1**	**4.3 J**	<1.0	<5.0	<5.0	**2.2**	**3.7 J**	**8.4 J**	**8.8**
1,1,2-Trichloroethane		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	<1.0	<5.0
1,1-Dichloroethane		**120**	**130**	**31**	**46 J**	**42**	**140**	**200**	**7.8 J**	**9.6**
1,1-Dichloroethene		**1.1**	<10	<1.0	<5.0	<5.0	<1.0	<20	<1.0	<5.0
1,2-Dichloroethane		<1.0	<10	<1.0	**0.86 J**	**0.81 J**	<1.0	<20	<1.0	<5.0
1,2-Dichloropropane		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	<1.0	<5.0
Benzene		**2.5**	**2.3 J**	**1.5**	**0.98 J**	**0.83 J**	**7.4**	**5.7 J**	<1.0	<5.0
Carbon Tetrachloride		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	**1.6 J**	<5.0
Chlorobenzene		**27**	**26**	**16**	**11**	**12**	**32**	**31**	<1.0	<5.0
Chloroethane		**22**	**26**	**91**	**74**	**63**	**160**	**270**	**1.8 J**	**9.3**
Chloroform		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	**1.1 J**	**0.92 J**
cis-1,2-Dichloroethene		**89**	**83**	**2.1**	**2.1 J**	**1.8 J**	**7.2**	**17 J**	**13 J**	**7.1**
Dichlorodifluoromethane		<1.0	<10	<1.0	<5.0	<5.0	**2.8**	**10 J**	**1.0 J**	<5.0
Ethylbenzene		<1.0	<10	<1.0	<5.0	<5.0	**2.2**	<20	<1.0	<5.0
Methylene chloride		<1.0	<10	**1.5**	<5.0	<5.0	**6.7**	**7.1 J**	<1.0	<5.0
Methyl tert-butyl ether		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	<1.0	<5.0
Naphthalene		<1.0	<10	<1.0	**1.0 J**	<5.0	<1.0	<20	<1.0	<5.0
o-Xylene		<1.0	<10	**1.3**	**1.8 J**	**1.8 J**	**1.2**	**5.7 J**	<1.0	<5.0
m,p-Xylene		<2.0	<10	<2.0	**2.1 J**	**2.1 J**	**4.2**	**7.8 J**	<2.0	<5.0
Tetrachloroethene		<1.0	<10	<1.0	<5.0	<5.0	<1.0	<20	<1.0	<5.0
Toluene		<1.0	<10	**1.6**	**0.91 J**	**0.79 J**	**2.4**	<20	<1.0	<5.0
trans-1,2-Dichloroethene		<1.0	<10	<1.0	<5.0	<5.0	**1.2**	<20	<1.0	<5.0
Trichloroethene		**21**	**18**	<1.0	**0.99 J**	**0.84 J**	**7.8**	**14 J**	**21 J**	**24**
Vinyl chloride		**12**	**9.8 J**	<1.0	**1.2 J**	<5.0	**6.5**	**15 J**	<1.0	<5.0
Total VOCs		**301.7**	**299.4 J**	**146.0**	**144.4 J**	**126.1 J**	**383.8**	**590.5 J**	**55.7 J**	**59.7**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

B Compound considered non-detect at the listed value due to associated blank contamination.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	W-05 12/16/2008	W-05 3/27/2009	TW-1 12/16/2008	TW-1 3/27/2009	SP-4 12/17/2008	SP-4 3/27/2009	TBV032609 3/26/2009	TBV032709 3/27/2009
1,2,4-Trimethylbenzene		<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0
1,3,5-Trimethylbenzene		<10	<5.0	<10	<5.0	<10	<5.0	<5.0	<5.0
1,1,1-Trichloroethane		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
1,1,2-Trichloroethane		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
1,1-Dichloroethane		**55**	**49**	<1.0	**2.1 J**	<1.0	<5.0	<5.0	<5.0
1,1-Dichloroethene		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
1,2-Dichloroethane		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
1,2-Dichloropropane		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Benzene		**5.8**	**6.0**	**2.5**	**2.5 J**	<1.0	<5.0	<5.0	<5.0
Carbon Tetrachloride		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Chlorobenzene		**7.7**	**7.3**	**6.5**	**6.3**	<1.0	<5.0	<5.0	<5.0
Chloroethane		**120**	**110**	**63**	**110**	<1.0	<5.0	<5.0	<5.0
Chloroform		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene		**3.0**	**4.3 J**	**2.3**	**2.0 J**	<1.0	<5.0	<5.0	<5.0
Dichlorodifluoromethane		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Ethylbenzene		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Methylene chloride		**3.1**	<5.0 B	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Naphthalene		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
o-Xylene		**1.7**	**2.4 J**	<1.0	**1.0 J**	<1.0	<5.0	<5.0	<5.0
m,p-Xylene		**1.0 J**	<5.0	<2.0	<5.0	<2.0	<5.0	<5.0	<5.0
Tetrachloroethene		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Toluene		<1.0	<5.0	**85**	**18**	<1.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene		<1.0	<5.0	<1.0	<5.0	<1.0	<5.0	<5.0	<5.0
Trichloroethene		**1.2**	**2.0 J**	<1.0	**1.1 J**	<1.0	<5.0	<5.0	<5.0
Vinyl chloride		**1.1**	<5.0	**1.5**	<5.0	<1.0	<5.0	<5.0	<5.0
Total VOCs		**199.6 J**	**181.0 J**	**160.8**	**143.0 J**	**0.0**	**0.0**	**0.0**	**0.0**

Bold Constituent detected above MDL.
VOCs Volatile Organic Compounds.
ug/L Micrograms per liter.
* Field replicate.
J Estimated value.
MDL Method detection limit.
B Compound considered non-detect at the listed value due to associated blank contamination.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-02 12/16/08	GMMW-02 3/27/09	GMMW-05 12/16/08	GMMW-05 3/27/09	GMMW-06 12/16/08	GMMW-06 3/27/09
	Units						
GENERAL CHEMISTRY							
Total Organic Carbon	mg/L	**4.2**	**0.71 J**	**18**	**19**	**5.4**	**5.1**
FIELD PARAMETERS							
pH	Standard units	**6.85**	**6.74**	**6.37**	**6.44**	**6.48**	**6.59**
Specific Conductance	mmhos/cm	**0.773**	**0.622**	**0.530**	**0.288**	**1.133**	**0.987**
Turbidity	NTU	--	--	--	--	--	--
Dissolved Oxygen	mg/L	**2.08**	--	**1.26**	--	**2.10**	--
Temperature	deg C	**6.72**	**9.90**	**7.76**	**10.10**	**7.35**	**10.50**
ORP	mV	**-40**	--	**-30**	--	**-1**	--
DISSOLVED GASES							
Carbon dioxide	mg/L	**140**	**58**	**110**	**91**	**250**	**290**
Carbon monoxide	mg/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Ethane	ng/L	**600**	**110**	**32,000**	**25,000**	**8,000**	**7,700**
Ethene	ng/L	**16,000**	**3,400**	**500**	**600**	**26,000**	**31,000**
Methane	ug/L	**3,300**	**970**	**12,000**	**6,100**	**4,900**	**2,100**
Nitrogen	mg/L	**19.00**	**17.00**	**9.60**	**16.00**	**14.00**	**17.00**
Oxygen	mg/L	**3.70**	**8.70**	**2.10**	**2.20**	**2.30**	**2.30**

Bold Constituent detected above MDL.

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.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	PW-04 12/16/08	PW-04 3/27/09	W-05 12/16/08	W-05 3/27/09	IW-03 12/16/08	IW-03 3/26/09
	Units						
GENERAL CHEMISTRY							
Total Organic Carbon	mg/L	**1.1**	<1.0	**7.1**	**6.9**	**230**	**92.7**
FIELD PARAMETERS							
pH	Standard units	**5.91**	**5.79**	**6.48**	**6.45**	**5.98**	**6.28**
Specific Conductance	mmhos/cm	**1.049**	**0.714**	**1.086**	**0.912**	**0.823**	**0.534**
Turbidity	NTU	--	--	--	--	--	--
Dissolved Oxygen	mg/L	**5.92**	--	**2.17**	--	**1.84**	--
Temperature	deg C	**6.55**	**8.60**	**4.74**	**10.50**	**6.84**	**10.00**
ORP	mV	**36**	--	**-11**	--	**73**	--
DISSOLVED GASES							
Carbon dioxide	mg/L	**200**	**240**	**290**	**280**	--	--
Carbon monoxide	mg/L	<1.00	<1.00	<1.00	<1.00	--	--
Ethane	ng/L	<25	**34**	**14,000**	**10,000**	--	--
Ethene	ng/L	**18 J**	**78**	**1,100**	**760**	--	--
Methane	ug/L	**0.14**	**4.30**	**8,300**	**9,400**	--	--
Nitrogen	mg/L	**15.00**	**15.00**	**12.00**	**11.00**	--	--
Oxygen	mg/L	**6.50**	**3.40**	**2.10**	**2.80**	--	--

Bold Constituent detected above MDL.

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.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	IW-08 12/16/08	IW-08 3/26/09	IW-13 12/16/08	IW-13 3/26/09	TW-1 12/16/08	TW-1 3/27/09
	Units						
GENERAL CHEMISTRY							
Total Organic Carbon	mg/L	**1,200**	**766**	**1,100**	**624**	160	85.7
FIELD PARAMETERS							
pH	Standard units	**4.67**	**5.35**	**4.80**	**5.22**	**6.48**	**6.48**
Specific Conductance	mmhos/cm	**2.070**	**1.435**	**1.550**	**0.951**	**1.800**	**1.366**
Turbidity	NTU	--	--	--	--	--	--
Dissolved Oxygen	mg/L	**2.86**	--	**2.03**	--	**1.21**	--
Temperature	deg C	**2.46**	**10.30**	**5.65**	**10.30**	**5.43**	**10.70**
ORP	mV	**96**	--	**71**	--	**-24**	--
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	--	**400**	**380**
Carbon monoxide	mg/L	--	--	--	--	<1.00	<1.00
Ethane	ng/L	--	--	--	--	**520**	**1,000**
Ethene	ng/L	--	--	--	--	**480**	**430**
Methane	ug/L	--	--	--	--	**15,000**	**13,000**
Nitrogen	mg/L	--	--	--	--	**4.90**	**6.40**
Oxygen	mg/L	--	--	--	--	**1.70**	**1.90**

Bold Constituent detected above MDL.

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.

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Table 4. PT System Operating Parameters, Operational Year 7, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

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] Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4[3] Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5[3] Totalizer FQI-103 (gallons)
12/15/2008	2:10 PM	9.0	218	525,195.7	101,677.2	41,136.7	43,394.3	59,388.8
3/26/2009	4:14 PM	9.1	242	611,399.7	152,690.4	41,447.6	67,878.8	104,347.5
		Average Daily Flowrate (gpm) =		**0.59**	**0.35**	**0.00**	**0.17**	**0.31**
		Total Groundwater Recovered During Reporting Period (gallons) =		**86,204**	**51,013**	**311**	**24,484**	**44,959**

NM Not measured.
gpm Gallons per minute.
i.w.c. Inches of water column.
scfm Standard cubic feet per minute.

Notes:

1. Total effluent totalizer replaced on 12/23/2005.
2. Water bypass totalizer damaged as a result of freezing in February, 2007. Totalizer replaced on June 25, 2008.
3. Individual well totalizers replaced on June 26, 2008.

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Table 5. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York[5,6].

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID:	GMPW-3 INF	GMPW-4 INF	GMPW-5 INF	COMBINED INF	COMBINED EFF
		Date:	3/27/2009	3/27/2009	3/27/2009	3/27/2009	3/27/2009
1,1,1-Trichloroethane	10-20		**20**	**11**	<5.0	**16**	<5.0
1,1,2-Trichloroethane	10		<5.0	<5.0	<5.0	<5.0	<5.0
1,1-Dichloroethane	10		**55**	**70**	<5.0	**49**	<5.0
1,1-Dichloroethene	10		**2.3 J**	<5.0	<5.0	**1.5 J**	<5.0
1,2-Dichloroethane	10-30		<5.0	<5.0	<5.0	<5.0	<5.0
1,2-Dichloropropane	NA		<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5		**4.0 J**	**3.8 J**	<5.0	**3.3 J**	<5.0
Carbon Tetrachloride	NA		<5.0	<5.0	<5.0	<5.0	<5.0
Chlorobenzene	NA		**2.8 J**	**12**	<5.0	**4.0 J**	<5.0
Chloroethane	NA		**17**	**33**	<5.0	**27**	<5.0
Chloroform	NA		<5.0	<5.0	<5.0	<5.0	<5.0
cis-1,2-Dichloroethene	10		**65**	**51**	<5.0	**53**	<5.0
Dichlorodifluoromethane	NA		<5.0	<5.0	<5.0	<5.0	<5.0
Ethylbenzene	5		<5.0	<5.0	<5.0	<5.0	<5.0
Methylene Chloride	10-50		<5.0 B	<5.0 B	<5.0	<5.0 B	<5.0
Methyl tert-butyl ether	50		<5.0	<5.0	<5.0	<5.0	<5.0
Naphthalene	10		<5.0	<5.0	<5.0	<5.0	<5.0
o-Xylene	5		<5.0	<5.0	<5.0	<5.0	<5.0
Tetrachloroethene	10		<5.0	<5.0	<5.0	<5.0	<5.0
Toluene	5		<5.0	<5.0	<5.0	<5.0	<5.0
trans-1,2-Dichloroethene	10-50		<5.0	<5.0	<5.0	<5.0	<5.0
Trichloroethene	10		**68**	**68**	<5.0	**58**	<5.0
Vinyl Chloride	10-50		**20**	**5.8**	<5.0	**14**	<5.0
Total VOCs			**254.1 J**	**254.6 J**	**0.0**	**225.8 J**	**0.0**
Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)						
Total Iron	1.2 / 0.61		**1.90**	**53.1**	**0.038 J**	**4.20**	**0.360**

See Notes on Last Page.

Table 5. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York[5,6].

Notes:

1. Model Technology Best Professional Judgment (BPJ) Limits recommended for Air Stripping 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.
3. Model Technology BPJ Limits recommended for Lime, Settle and Filter treatment.
4. The recommended daily maximum permit limit is 1.2 mg/L and the recommended daily average permit limit is 0.61 mg/L.
5. Production wells were sampled in accordance with the schedule set forth in Table 3 of the Long-Term Monitoring Plan (ARCADIS 2002).
6. Bold values indicate compound detected above method detection limit.

NA	No BPJ limit listed.
J	Estimated value.
ug/L	Micrograms per liter.
mg/L	Milligrams per liter.
VOCs	Volatile organic compounds.
PT	Pump and treat.
<	Analyte below detection limit.

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Table 6. PT System Mass Removal Rate of Volatile Organic Compounds, Operational Year 7, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Date Sampled	Total VOC Influent Concentration (ug/L)	Total Effluent Totalizer FQI-401 (gallons)	Total Groundwater Recovered[1] Between Sampling Intervals (gal)	Influent Concentration[2] Geometric Mean (ug/L)	Total Estimated Mass[3] Removed (lbs)
12/15/2008	142.3	525,196	NA	NA	NA
3/27/2009	225.8	611,400	86,204	179.3	0.13
			Total Estimated Mass Removed During Operational Year 7, Quarter Number 2 (lbs) =		**0.13**
			Total Estimated Mass Removed Since System Startup (lbs) =		**3.25**

Notes:

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

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).

Table 7. Concentrations of Volatile Organic Compounds Detected in Air Stripper Effluent, Operational Year 7, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York[1].

Compounds	CAS Numbers	Sample ID: Sampled:	Effluent 3/27/2009
Vinyl Chloride	75-01-4		<7.8
Chloroethane (Ethyl Chloride)	75-00-3		<7.8
1,1-Dichloroethene (Vinylidene Chloride)	75-35-4		<7.8
Methylene Chloride (Dichloromethane)	75-09-2		<7.8
1,1-Dichloroethane	75-34-3		<7.8
cis-1,2-Dichloroethylene	156-59-2		<7.8
Chloroform	67-66-3		<7.8
1,1,1-Trichloroethane (Methyl Chloroform)	71-55-6		<7.8
Benzene	71-43-2		<7.8
Trichloroethene	79-01-6		<7.8
Toluene	108-88-3		<7.8
Ethyl benzene	100-41-4		<7.8
m,p-Xylene	108-38-3/106-42-3		<7.8
o-Xylene	95-47-6		<7.8
1,2,4-Trimethylbenzene	95-63-6		<7.8
2-Propanol (Isopropyl alcohol)	67-63-0		<7.8
Dichlorodifluoromethane (Freon 12)	75-71-8		<7.8

Bold Constituent detected above MDL.
ppbv: parts per billion by volume

Notes:

1. Samples collected by ARCADIS personnel on the dates shown and submitted to Air Toxics Laboratories LTD. for volatile organic compound (VOC) analyses using a modified United States Environmental Protection Agency Method TO-14A.

Table 8. Concentrations of Volatile Organic Compounds Detected in Aqueous Samples Collected from the SP-5 Spring Water Remediation System, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	SP-5 INF. 3/26/2009	SP-5 EFF. 3/26/2009
VOCs (units in ug/L)				
1,2,4-Trimethylbenzene	NA		**0.89 J**	**0.87 J**
Isopropylbenzene	NA		**1.3 J**	**1.2 J**
1,1,1-Trichloroethane	10		<5.0	<5.0
1,1-Dichloroethane	10		**27**	**16**
1,2-Dichloroethane	10-100		<5.0	<5.0
Benzene	5		**2.1 J**	<5.0
Chlorobenzene	10-25		**36**	**12**
Chloroethane	10		**9.1**	**7.3**
cis-1,2-Dichloroethene	10		**1.6 J**	<5.0
Dichlorodifluoromethane	NA		**3.2 J**	**2.5 J**
Ethylbenzene	5		<5.0	<5.0
o-Xylene	5		**1.4 J**	**1.4 J**
m&p-Xylenes	5		**1.7 J**	**1.7 J**
Toluene	5		<5.0	<5.0
trans-1,2-Dichloroethene	10-100		<5.0	<5.0
Trichloroethene	10		**3.2 J**	**1.4 J**
Vinyl Chloride	10		<5.0	<5.0
Total VOCs			**87.5 J**	**44.4 J**

Bold Constituent detected above MDL.

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

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.

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Table 9. Spring Water Remediation System Mass Removal Rate of Volatile Organic Compounds, Operational Year 7, 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)
12/17/2008[4]	72.3	0.13	0.00	NA	NA	NA
3/27/2009	87.5	1.59	NM	65,983	79.5	0.04
				Total Estimated Mass Removed During Current Quarter (lbs) =		**0.04**
				Total Estimated Mass Removed Since System Startup (lbs) =		**0.88**
				Total Effluent Treated Since System Startup (gallons) =		**1,217,420**

Notes:

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

1. Total Spring Water Treated Between Sampling Intervals = Effluent Flowrate 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).
4. Original field data sheet lost; flow rate and depth to water measurement inferred from operator memory.

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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.

Cloudy 40°
Light Rain

Date: 3/26/09

Well Identification		Depth to Water (feet below MP)	Comments
GMMW-2		36.75	
GMMW-3		34.68	
GMMW-4		46.10	
GMMW-5		48.99	
GMMW-6		38.97	
GMMW-7		47.70	
PW-3		11.65	
PW-4		17.2	
PW-5		0.35	
W-5		52.30	
W-6		50.55	
PW-7		40.11	
W-7		43.14	
PW-10		39.11	
PW-11		52.80	
PW-13		62.50	
W-13		48.09	
W-14S		6.00	
W-16S		9.22	
W-17S		8.94	
W-18		10.25	
W-20S		8.45	

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Water Sampling Log

Project: Colesville Landfill | Project No.: NY000949.0022 | Page 1 of 1

Site Location: Harpursville, NY | Date: 3/27/09

Site/Well No.: GMW-2 | Replicate No.: — | Code No.: —

Weather: Cloudy 45 | Sampling Time: Begin 1000 | End ~~1606~~ 1603 1606

Evacuation Data

Measuring Point	—
MP Elevation (ft)	—
Land Surface Elevation (ft)	—
Sounded Well Depth (ft bmp)	55.89
Depth to Water (ft bmp)	36.75
Water-Level Elevation (ft)	—
Water Column in Well (ft)	19.14
Casing Diameter/Type	2"
Gallons in Well	3.06
Gallons Pumped/Bailed Prior to Sampling	9.18
Sample Pump Intake Setting (ft bmp)	—
Purge Time	begin 1510 end —
Pumping Rate (gpm)	—
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear	
Odor	None	
Appearance	Clear	
pH (s.u.)	6.74	After Bailing 3V: 7.02
Conductivity (mS/cm)	622 µs/cm	726
(µmhos/cm)	—	
Turbidity (NTU)	—	
Temperature (°C)	9.90	11.30
Dissolved Oxygen (mg/L)	—	
ORP	—	
Sampling Method	Bailer / PDB	

Remarks: Redeployed a PDB (on the 2nd time).
* PDB Bag was only 1/3 Full - could not grab entire sample

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	* ~~5~~ 2	HCL
Ethene, Ethane, Methane	40 ML Vials	~~3~~ 2	
TOC	40 ml ~~amber~~ vials	2	Unpres. H2SO4
Total Iron	250 ML Plastic		HNO3

Sampling Personnel: KA | CD * Bailed 3 volumes + Re sampled

VOC s + Ethene Ethane Methane

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	GMMW-5	Replicate No.	Dup VOCs	Code No.	
Weather	Sun 45°	Sampling Time:	Begin 0820	End	0838

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	Clear
Odor	Slight
Appearance	
pH (s.u.)	6.44
Conductivity (mS/cm)	288 µS/cm
(µmhos/cm)	
Turbidity (NTU)	—
Temperature (°C)	10.1
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / PDB
Remarks	Redeployed @ PDB

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	3	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H2SO4
Total Iron	250 ML Plastic		HNO3

Sampling Personnel: KA / CD

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	Gmmw-6	Replicate No.	MS/MSD	Code No.	—
Weather	cloudy 45°	Sampling Time: Begin	1025	End	1100

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	clear
Odor	none
Appearance	Black particles
pH (s.u.)	6.59
Conductivity (mS/cm)	987 µS/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	10.5
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / PDB
Remarks	Redeployed ~~as~~ a PDB

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL 3 MS/MSD
Ethene, Ethane, Methane	40 ML Vials	2	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic		HNO3

Sampling Personnel: KA / CD

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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Water Sampling Log

Project	Colesville Landfill	Project No	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	PW-4	Replicate No.	—	Code No.	—
Weather	Cloudy 45	Sampling Time: Begin	0942	End	0949

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	Clear
Odor	None
Appearance	—
pH (s.u.)	5.79
Conductivity (mS/cm)	714 µS/cm
(µmhos/cm)	
Turbidity (NTU)	—
Temperature (°C)	8.6
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / PDB
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	2	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA / CD

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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Water Sampling Log

Project	Colesville Landfill	Project No	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	W-5	Replicate No.	—	Code No.	
Weather	Sun 45	Sampling Time:	Begin 0847	End	0900

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	Clear
Odor	None
Appearance	Cloudy
pH (s.u.)	6.45
Conductivity (mS/cm)	912 µs/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	10.5
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / PDB
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	2	
TOC	40 ml ~~amber~~ vials	2	Unpres. H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA / CD

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	TW-1	Replicate No.	—	Code No.	
Weather	Sun 45	Sampling Time:	Begin 0905	End	0915

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	Mod.
Appearance	—
pH (s.u.)	6.48
Conductivity (mS/cm)	1366 µs/cm
(µmhos/cm)	
Turbidity (NTU)	—
Temperature (°C)	10.7
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / PDB
Remarks	Redeployed a PDB

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	2	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA / CD

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
fl	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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/26/09
Site/Well No.	Iw - 3	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time: Begin	1328	End	1330

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	strong
Appearance	
pH (s.u.)	6.28
Conductivity (mS/cm)	534 us/cm
(µmhos/cm)	
Turbidity (NTU)	
Temperature (°C)	10.00
Dissolved Oxygen (mg/L)	
ORP	
Sampling Method	Bailer / grab
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project: Colesville Landfill | Project No: NY000949.0022 | Page 1 of 1

Site Location: Harpursville, NY | Date: 3/26/09

Site/Well No.: IW-8 | Replicate No.: — | Code No.: —

Weather: Cloudy 40 | Sampling Time: Begin 1342 End 1348

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	
pH (s.u.)	5.35
Conductivity (mS/cm)	1435 µs/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	10.3
Dissolved Oxygen (mg/L)	—
ORP	
Sampling Method	Bailer / grab
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project: Colesville Landfill | Project No.: NY000949.0022 | Page 1 of 1

Site Location: Harpursville, NY | Date: 3/26/09

Site/Well No.: IW-13 | Replicate No.: — | Code No.: —

Weather: Cloudy 40 | Sampling Time: Begin 1400 End 1405

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	strong
Appearance	—
pH (s.u.)	5.22
Conductivity (mS/cm)	951 us/cm
(µmhos/cm)	8
Turbidity (NTU)	—
Temperature (°C)	10.3
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer / grab
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	—	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml ~~amber~~ vials	2	~~Unpres.~~ H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project: Colesville Landfill | Project No.: NY000949.0022 | Page 1 of 1

Site Location: Harpursville, NY | Date: 3/27/09

Site/Well No.: GnPw-3 | Replicate No.: — | Code No.: ____

Weather: ____ | Sampling Time: Begin 1150 End 1155

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	Clear
Odor	—
Appearance	Few Black particles
pH (s.u.)	6.44
Conductivity (mS/cm)	528 µS/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	5.6
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer
Remarks	System Sampling

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml amber vials	—	Unpres.
Total Iron	250 ML Plastic	1	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project: Colesville Landfill | Project No: NY000949.0022 | Page 1 of 1

Site Location: Harpursville, NY | Date: 3/27/09

Site/Well No.: GMW-4 | Replicate No.: — | Code No.: —

Weather: — | Sampling Time: Begin 1122 End 1128

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	Clear
Odor	—
Appearance	Particles a lot
pH (s.u.)	6.89
Conductivity (mS/cm)	747. us/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	6.3
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	~~Bailer~~
Remarks	System Sampling

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml amber vials	—	Unpres.
Total Iron	250 ML Plastic	1	HNO3

Sampling Personnel: KA ICD

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	GMPW-5	Replicate No.	—	Code No.	
Weather	—	Sampling Time:	Begin 1140	End	1150

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	Clear
Odor	None
Appearance	Clear
pH (s.u.)	8.08
Conductivity (mS/cm)	207 us/cm
(µmhos/cm)	
Turbidity (NTU)	
Temperature (°C)	6.5
Dissolved Oxygen (mg/L)	
ORP	
Sampling Method	Bailer
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml amber vials	—	Unpres.
Total Iron	250 ML Plastic	1	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No.	Combined influent	Replicate No.	—	Code No.	
Weather	—	Sampling Time:	Begin 1200	End	1204

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	Clear
Odor	None
Appearance	Small Black particles
pH (s.u.)	
Conductivity (mS/cm)	
(µmhos/cm)	
Turbidity (NTU)	
Temperature (°C)	
Dissolved Oxygen (mg/L)	
ORP	
Sampling Method	~~Bailer~~ System
Remarks	Sampling

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml amber vials	—	Unpres.
Total Iron	250 ML Plastic	1	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/27/09
Site/Well No	Effluent water	Replicate No.	—	Code No.	—
Weather	—	Sampling Time:	Begin 1205	End	1210

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	Clear
Odor	none
Appearance	Small Black particles
pH (s.u.)	
Conductivity (mS/cm)	
(µmhos/cm)	
Turbidity (NTU)	
Temperature (°C)	
Dissolved Oxygen (mg/L)	
ORP	
Sampling Method	~~Bailer~~
Remarks	System Sampling

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	
TOC	40 ml amber vials	—	Unpres.
Total Iron	250 ML Plastic	1	HNO3

Sampling Personnel: KA

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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Water Sampling Log

Project	Colesville Landfill	Project No.	NY000949.0022	Page	1 of 1
Site Location	Harpursville, NY			Date	3/26/09
Site/Well No.	SP-5 INFluent	Replicate No.	—	Code No.	—
Weather	Cloudy 40°	Sampling Time: Begin	1450	End	1455

Evacuation Data

Measuring Point	—
MP Elevation (ft)	—
Land Surface Elevation (ft)	—
Sounded Well Depth (ft bmp)	4.15
Depth to Water (ft bmp)	0.00
Water-Level Elevation (ft)	—
Water Column in Well (ft)	4.15
Casing Diameter/Type	2"
Gallons in Well	0.66
Gallons Pumped/Bailed Prior to Sampling	1.00
Sample Pump Intake Setting (ft bmp)	—
Purge Time	begin ____ end ____
Pumping Rate (gpm)	—
Evacuation Method	2" Disposable poly bailer

Field Parameters

Color	Clear
Odor	none
Appearance	Clear
pH (s.u.)	6.34
Conductivity (mS/cm)	487 µS/cm
(µmhos/cm)	—
Turbidity (NTU)	—
Temperature (°C)	6.2
Dissolved Oxygen (mg/L)	—
ORP	—
Sampling Method	Bailer
Remarks	

Constituents Sampled	Container Description	Number	Preservative
8021 VOLATILES	40 ML VOA VIALS	2	HCL
Ethene, Ethane, Methane	40 ML Vials	—	—
TOC	40 ml ~~amber~~ vials	—	Unpres. H_2SO_4
Total Iron	250 ML Plastic	—	HNO3

Sampling Personnel: KA

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.: NY000949.0022 Page: 1 of 1

Site Location: Harpursville NY Date: 3/26/09

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

Weather: Cloudy 40° Sampling Time: Begin 1640 End 1645

Site Conditions

Water Quality Meter: ~~Oranta~~ WTW

Location Condition: Still backing up a lot of orang/Iron deposits/Staining

Vegetation: —

Depth of Water: —

Estimated Flow Rate: 600 mL / 6 Sec

Collection Method: Direct collection

Field Parameters

Color	Clear
Odor	none
Appearance	Orange Iron
pH (s.u.)	6.56
Conductivity (mS/cm)	448 us/cm
Temperature (°C)	6.1
DO (mg/L)	—
Turbidity (NTU)	—
ORP	—
Time	—

Remarks:

Constituents Sampled: See COC Sampling Personnel: KA

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Surface Water Sampling Form

Project Colesville Landfill Project No. NY000949.0022 Page 1 of 1

Site Location Harpursville NY Date 3/27/09

Site/Well No. SP-4 Replicate No. —

Weather Sun Sampling Time: Begin 1233 End 1238

Site Conditions

Water Quality Meter: ~~Quanta~~ WTW

Location Condition: good
Cobbles + Stone / some Mud

Vegetation: Little green
orange

Depth of Water: 12"

Estimated Flow Rate: 5'/4 secs

Collection Method: Direct collection

Field Parameters

Color	Clear
Odor	none
Appearance	Clear
pH (s.u.)	7.70
Conductivity (mS/cm)	101 us/cm
Temperature (°C)	8.0
DO (mg/L)	—
Turbidity (NTU)	—
ORP	—
Time	—

Remarks: Little orange Staining on Slope into Stream

Constituents Sampled: See COC Sampling Personnel: KA/CD

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Appendix B

New York State Department of Environmental Conservation DAR-1 Air Modeling Data

Table B-1. NYSDEC DAR-1 Air Modeling Data, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters for 3/27/09 Sampling Event			
Discharge Temperature[1]	T	512	°R
Ambient Temperature[2]	Ta	500	°R
Stack Diameter	D	6	in
Stack Radius	R	0.25	ft
Stack Area	A	0.20	ft^2
Exit Velocity	V	20.0	fps
Exit Flow	Q	235	acfm
Exit Flow	Q	242	scfm
Stack Height	h_s	17	ft
Building Height	h_b	13.25	ft
Ratio of Heights	h_s/h_b	1.28	
Plume rise credit? $h_s/h_b > 1.5$?	(If no, $h_e=h_s$)	(If Yes, $h_e = h_s + 1.1 (F_m)^{1/3}$)	
Momentum Flux	$F_m = T_a/T * V2 * R2$	n/a	ft^4/s^2
Effective Stack Height	h_e	17	ft
Reduction Factor? $2.5 > h_s/h_b > 1.5$?		No, do not reduce impact	
Actual Annual Impact	C_a	$RF*6*Q_a/h_e^{2.25}$	
Mass Flow	Q_a	S lbs emitted for last 12 months	

°R: degrees Rankine
in: inches
ft: feet
ft^2: square feet
fps: feet per second
acfm: actual cubic feet per minute
scfm: standard cubic feet per minute
ft^4/s^2: feet to the fourth per square second

Notes/Assumptions:

1. The stack discharge temperature is 52.6 °F based on recorded parameters.
2. The ambient temperature is approximately 40°F based on recorded conditions.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.

Table B-2. NYSDEC DAR-1 Air Modeling Data, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Calculation of the Short-Term Guideline Concentration (SGC) for Sampling Event on 3/27/2009

Compounds	CAS Numbers	Maximum Limit (SGC[2]) (ug/m^3)	Analytical Concentration (ppb)	Detection Limit Used[3]	Actual Emissions C_a (ug/m^3)	Mass/hour (lb/hr)	Maximum Potential Impact (Step III.A.3 in DAR-1)[1] (ug/m^3)	Short Term Impact (Step III.A.5 in DAR-1)[1] (ug/m^3)	Percent of the SGC (%)
Vinyl Chloride	75-01-4	180,000	7.8	*	20.27	2.85E-05	0.0049	0.31623	1.8E-04
Chloroethane (Ethyl Chloride)	75-00-3	--	7.8	*	20.92	2.94E-05	0.0050	0.32645	NA
1,1-Dichloroethene (Vinylidene Chloride)	75-35-4	380[4]	7.8	*	31.44	4.42E-05	0.0075	0.49054	1.3E-02
Methylene Chloride (Dichloromethane)	75-09-2	14,000	7.8	*	27.54	3.87E-05	0.0066	0.42977	3.1E-03
1,1-Dichloroethane	75-34-3	--	7.8	*	32.09	4.51E-05	0.0077	0.50076	NA
cis-1,2 - Dichloroethylene	156-59-2	190,000[5]	7.8	*	31.44	4.42E-05	0.0075	0.49054	2.6E-04
Chloroform	67-66-3	150	7.8	*	38.71	5.44E-05	0.0093	0.60408	4.0E-01
1,1,1-Trichloroethane (Methyl Chloroform)	71-55-6	68,000	7.8	*	43.26	6.08E-05	0.0104	0.67507	9.9E-04
Benzene	71-43-2	1,300	7.8	*	25.33	3.56E-05	0.0061	0.39521	3.0E-02
Trichloroethene	79-01-6	14,000	7.8	*	42.61	5.98E-05	0.0102	0.66484	4.7E-03
Toluene	108-88-3	37,000	7.8	*	29.87	4.20E-05	0.0072	0.46615	1.3E-03
Ethyl benzene	100-41-4	54,000	7.8	*	34.42	4.84E-05	0.0083	0.53714	9.9E-04
m,p-Xylene	108-38-3/106-42-3	4,300	7.8	*	33.77	4.74E-05	0.0081	0.52692	1.2E-02
o-Xylene	95-47-6	4,300	7.8	*	34.42	4.84E-05	0.0083	0.53714	1.2E-02
1,2,4-Trimethylbenzene	95-63-6	--	7.8	*	38.97	5.47E-05	0.0094	0.60813	NA
2-Propanol (Isopropyl alcohol)	67-63-0	120,000	7.8	*	19.49	2.74E-05	0.0047	0.30409	2.5E-04
Dichlorofluoromethane (Freon 12)	75-71-8	--	7.8	*	39.20	5.51E-05	0.0094	0.61172	NA

See Notes on Next Page.

ug/m^3: micrograms per cubic meter
ppb: parts per billion
*: analyte concentration below detection limit, detection limit was used in calculations
lb/hr: pounds per hour
--: no SGC listed for compound; an interim SGC was not developed for these compounds because they have low toxicity ratings, as specified in the NYSDEC DAR-1 AGC/SGC tables revised September 10, 2007.
NA: not applicable

Notes:

1. DAR-1 refers to DAR-1 AGC/SGC Tables dated September 10,2007.
2. SGC refers to the Short-Term Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated September 10, 2007.
3. To be conservative the lower detection limit was used for compounds that were below the limit of detection, but are found in the influent groundwater of the Groundwater Remediation System.
4. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for 1,1- dichloroethene, which is not defined as a moderate-toxicity compound, the Interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2. or 1,600 µg/m^3 / 4.2 = approximately 380 µg/m^3. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated September 10, 2007.
5. An SGC was not provided in the DAR-1 AGC/SGC Tables, dated September 10, 2007. An interim SGC was developed based on in Section IV.A.2.b.1 of guidance provided the New York State DAR-1 Guidelines for the Control of Toxic Ambient Air Contaminants, 1991 edition. Specifically for cis-1,2 dichloroethene, which is not defined as a moderate-toxicity compound, the interim SGC = (smaller of Time Weighted Average [TWA] - Threshold Limit Value or TWA - Recommended Exposure Limit)/4.2 or 790,000 µg/m^3 / 4.2 = approximately 190,000 µg/m^3. An interim SGC was developed for this compound because it has a moderate toxicity rating, as specified in the DAR-1 AGC/SGC Tables, dated September 10, 2007.

Table B-2. NYSDEC DAR-1 Air Modeling Data, Operational Year 7, Quarter Number 2, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 3/27/2009 Sampling Event

Compounds	CAS Numbers	Maximum Limit on C_a (AGC[1]) (ug/m^3)	Maximum Mass Flow Q_a (lb/yr)	Lab Data (ppb)	Detection Limit Used[2]	Actual Emissions C_a (ug/m^3)	Actual Mass Flow per Hour (lb/hr)	Actual Mass Flow per Year (lb/yr)	**Percent of Annual** (%)
Vinyl Chloride	75-01-4	0.11	10.76	7.8	*	20.27	1.84E-05	0.15642	**1.45**
Chloroethane (Ethyl Chloride)	75-00-3	10,000	978,044.97	7.8	*	20.92	1.90E-05	0.16147	**0.00**
1,1-Dichloroethene (Vinylidene Chloride)	75-35-4	70	6,846.31	7.8	*	31.44	2.85E-05	0.24264	**0.00**
Methylene Chloride (Dichloromethane)	75-09-2	2.1	205.39	7.8	*	27.54	2.50E-05	0.21258	**0.10**
1,1-Dichloroethane	75-34-3	0.63	61.62	7.8	*	32.09	2.91E-05	0.24769	**0.40**
cis-1,2-Dichloroethylene	156-59-2	63	6,161.68	7.8	*	31.44	2.85E-05	0.24264	**0.00**
Chloroform	67-66-3	0.04	4.21	7.8	*	38.71	3.51E-05	0.29880	**7.10**
1,1,1-Trichloroethane (Methyl Chloroform)	71-55-6	1,000	97,804.50	7.8	*	43.26	3.93E-05	0.33391	**0.00**
Benzene	71-43-2	0.13	12.71	7.8	*	25.33	2.30E-05	0.19549	**1.54**
Trichloroethene	79-01-6	0.5	48.90	7.8	*	42.61	3.87E-05	0.32886	**0.67**
Toluene	108-88-3	400	39,121.80	7.8	*	29.87	2.71E-05	0.23057	**0.00**
Ethyl benzene	100-41-4	1,000	97,804.50	7.8	*	34.42	3.12E-05	0.26569	**0.00**
m,p-Xylene	108-38-3/106-42-3	100	9,780.45	7.8	*	33.77	3.06E-05	0.26063	**0.00**
o-Xylene	95-47-6	700	68,463.15	7.8	*	34.42	3.12E-05	0.26569	**0.00**
1,2,4-Trimethylbenzene	95-63-6	290	28,363.30	7.8	*	38.97	3.54E-05	0.30080	**0.00**
2-Propanol (Isopropyl alcohol)	67-63-0	7,000	684,631.48	7.8	*	19.49	1.77E-05	0.15041	**0.00**
Dichlorodifluoromethane (Freon 12)	75-71-8	12,000	1,173,653.96	7.8	*	19.49	1.77E-05	0.15041	**0.00**

ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion
*: analyte concentration below detection limit, detection limit was used in calculations

Notes/Assumptions:

1. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated September 10, 2007.
2. To be conservative the lower detection limit was used for compounds that were below the limit of detection, but are found in the influent groundwater of the Groundwater Remediation System.

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Appendix C

Automated Reagent Injection System
Operating Parameters

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Table C-1. Automated Reagent Injection System Summary of Operational Year 7, Quarter Number 2 Injection Quantities, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Summary of Automated Reagant Injections

Date	Total Quantity of Molasses Solution Injected (gal.)	Total Quantity of Molasses Injected (gal.)	Total Quantity of Rinse Water Injected (gal.)
1/19/2009	12,716	127	300
Quarter Totals (gal.) =	**12,716**	**127**	**300**
Totals Since Startup (gal.) =	**198,469**	**9,277**	**9,019**

Notes:

gal. Gallons

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Table C-2. Automated Reagent Injection System, Operational Year 7, Quarter Number 2 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 60

Injection Start Date = 12/30/2008
Injection Completion Date = 1/19/2009

Molasses to Water Ratio (%) = 1.0 Programmed Mixing Time (min.)[1] = 60

Injection Well ID	Molasses Solution Injection Quantity (gal.)	Rinse[2] Quantity (gal.)	Raw Molasses Per Well (gal.)	Min. Injection[3] Flowrate (gpm)	Max. Injection Pressure (psi)
PW-6	530	20	5.3	NM	26
IW-3	530	20	5.3	NM	26
IW-1	210	20	2.1	NM	28
IW-2	210	20	2.1	NM	26
GMMW-1	140	20	1.4	NM	9
IW-4	989	20	9.9	NM	26
IW-5	989	20	9.9	NM	26
IW-6	989	20	9.9	NM	27
IW-7	989	20	9.9	NM	28
IW-8[3]	0	0	0.0	NM	0
IW-9	1,230[4]	20	12.3[4]	NM	0[4]
IW-10	1,230	20	12.3	NM	27
IW-11	1,230	20	12.3	NM	26
IW-12	1,230	20	12.3	NM	27
IW-13	1,230	20	12.3	NM	26
IW-14[5]	0	0	0.0	NM	0
IW-15	989[4]	20	9.9[4]	NM	0[4]
Totals (gal.) =	12,716	300	127.2	NA	NA

Notes:

gal. Gallons.
min. Minutes.
i.w.c. Inches of water column.
psi Pounds per square inch.
gpm Gallons per minute.
NA Not applicable.
NM Not measured.

1. Programmed mixing time is calculated from the expiration time of the molasses injection countdown timer to the startup of transfer pump TP-900 during an injection sequence or from the end of transfer pump TP-600 operation to the restart of an injection during a mixing sequence.
2. Rinse quantity was injected manually. 20 gallons of rinse water were injected into each well.
3. Injection not conducted into IW-8 for ongoing Alternate Electron Donor Pilot test evaluation.
4. Parameter not measured due to SCADA system malfunction. Molasses solution injection quantity and raw molasses per well reported were manually recorded during the injection.
5. Injection not conducted into IW-14 due to a damaged well head.