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Infrastructure, environment, buildings

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Mr. George Jacob
United Stated Environmental Protection Agency – Region 2
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New York, New York 10007-1866

ENVIRONMENT

Subject:
Operational Year 3, Quarter 1 Monitoring Report,
Colesville Landfill, Broome County, New York. (Site No. 704010).

Dear Mr. Jacob:

Date:
8 April 2005

On behalf of Broome County, ARCADIS is providing the Operational Year 3, Quarter 1 Monitoring Report for the Colesville Landfill, Broome County, New York.

Please feel free to contact me if you have any questions or comments.

Sincerely,

ARCADIS G&M, Inc.

Steven Feldman

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Project Manager

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Operational Year 3 Quarter Number 1 Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

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Operational Year 3
Quarter Number 1
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

Prepared for:
Broome County Division of Solid Waste Management

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Our Ref.:
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Date:
7 April 2005

Tables

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Appendices

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) and Explanation of Significant Difference (ESD) 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), which was approved by the United States Environmental Protection Agency (USEPA) and New York State Department of Environmental Conservation (NYSDEC). The LTM Plan provides a detailed description of the LTM program, methodology, and rationale. Where applicable these elements are either summarized or incorporated by reference herein.

This report provides the data collected from the December 2004 water-level measurement round and the results of groundwater quality monitoring conducted during Operational Year 3, Quarter Number 1. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from October 2004 through December 2004 has also been included. In addition, this report describes SP-5 Spring Water Remediation System OM&M activities conducted during this quarter. 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 3, Quarter Number 1. A site plan, which shows the location of environmental effectiveness monitoring, is provided on Figure 1.

2.1 Environmental Effectiveness Monitoring

The environmental effectiveness monitoring performed during Operational Year 3, Quarter Number 1 included the following:

- Water-level (hydraulic) measurements were collected from 17 monitoring wells on December 7, 2004.

- Groundwater samples (Year 3, Q1 list of wells) were collected from five monitoring wells during the week of December 6, 2004 and selectively analyzed for volatile organic compounds (VOCs), select inorganic parameters, and field parameters.

- Samples (VOCs only) were collected and field parameters were measured at surface water locations F-6 and SP-4 on December 7, 2004.

- Samples (VOCs only) were collected and field parameters were measured at the two spring water locations (SP-2 and SP-3) on December 7, 2004.

The depth to groundwater in monitoring wells was measured using methods consistent with those described in the LTM Plan. As referenced in the Interim Remedial Action Report (ARCADIS 2004) and Operational Year 2 Annual Monitoring Report, an additional surface water quality sample was collected immediately downgradient of the former SP-4 spring location. This sample replaces the previously collected SP-4 spring location sample as a result of the SP-4 construction activities conducted during Operational Year 2.

Monitoring wells were purged and sampled using methods described in the LTM Plan.

2.2 Groundwater Remediation System Performance Monitoring

Groundwater Remediation System performance monitoring activities during Operational Year 3, Quarter Number 1 were as follows:

- Pump-and-treat (PT) system production well influent and effluent samples were collected during the OM&M quarterly site visit on December 9, 2004 and selectively analyzed for VOCs and total iron (influent only).

- One vapor sample from the PT system air stripper effluent was collected during the OM&M quarterly site visit on December 9, 2004 and analyzed for VOCs.

- Total organic carbon (TOC) samples were collected from injection wells IW-1, IW-8, and IW-13 on December 8, 2004.

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

- Automated reagent injection (ARI) system operating parameters were recorded during each injection event.

- Bromide samples were collected from wells GMPW-1, GMMW-4 and GMMW-5 on December 8, 2004.

PT system groundwater samples were collected as grab samples directly from production wells GMPW-3, GMPW-4 and 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.

Prior to TOC sampling in the injection wells, field parameters were recorded using a Hereba U22 multi-parameter, water quality meter. The Hereba multi-probe was placed in a bailed sample of groundwater for the collection of the field measurements. Field parameters were recorded after each of three well volumes was removed from the well.

2.3 Spring Water Remediation System Performance Monitoring

SP-5 Spring Water Remediation System OM&M was conducted on December 8 and 9, 2004. System OM&M was conducted in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS 2003) and consisted of recording field parameters (discharge flowrate and depth to water in treatment unit) and the collection of an influent and effluent spring water sample for analysis of VOCs. 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 riprap-lined outlet. All spring water samples were analyzed for VOCs using USEPA Method 8260.

3. Groundwater Flow

Water-level measurements were made from existing wells on December 7, 2004. Water-level elevation data are provided in Table 1. The groundwater flow direction in the project area (i.e., adjacent to the landfill western perimeter) and site-wide in the Operational Year 3, Quarter Number 1 round was consistent with previous rounds. The groundwater flow direction in the project area is toward the southwest from the western perimeter of the landfill. The groundwater flow direction in areas further to the east of the project area is toward the south/southwest.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the December 2004 monitoring round (Operational Year 3, Quarter Number 1). Groundwater analytical results are provided in Tables 2 and 3. Where applicable, the previous round of analytical results for the respective sampling location have been provided on the same table for comparative purposes.

4.1 Volatile Organic Compounds

Groundwater analytical results for VOCs are provided in Table 2. As shown in Table 2, total VOCs (TVOCs) for monitoring wells sampled during the Operational Year 3, Quarter Number 1 round were stable to decreasing when compared to analytical results from the previous round. Specifically, monitoring wells GMMW-2 (552.4 micrograms per liter [ug/L]) and PW-4 (89.1 ug/L) were stable to slightly decreasing while monitoring wells GMMW-5 (577 ug/L), GMMW-6 (1,378 ug/L), and W-5 (246.1 ug/L) decreased when compared to their previous round of analytical results.

PT system analytical results for VOCs are provided in Table 5. Groundwater analytical results for PT system production wells GMPW-3, GMPW-4, and GMPW-5 are consistent with prior rounds of data. Specifically, TVOC concentrations for the Operational Year 3, Quarter Number 1 sampling round were as follows: GMPW-3 (244.3 ug/L), GMPW-4 (279.9 µg/L) and GMPW-5 (323.3 ug/L). 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

Laboratory analytical parameters which typically demonstrate reducing conditions (i.e., dissolved oxygen [DO] and methane) were not collected during the reporting period in accordance with the LTM Plan. Although field parameters were recorded, these measurements are typically used as qualitative parameters in conjunction with laboratory analytical results to demonstrate that reducing conditions exist. Nonetheless, field parameter results (DO and oxidation-reduction potential [ORP]) for well GMMW-5 remain consistent with prior rounds of data providing a qualitative indication that reducing conditions are being maintained within the IRZ. Further details of the ARI system performance monitoring are provided in Section 7.2.2 of this report.

4.3 Evidence of Biodegradation

Biodegradation end products were not sampled during the Operational Year 3, Quarter Number 1monitoring event in accordance with the LTM Plan monitoring schedule. Therefore, further discussion of evidence of biodegradation is not provided in this report.

5. Spring Water Quality

Spring water quality analytical results for the Operational Year 3, Quarter Number 1 monitoring round are summarized in Tables 2 and 3. TVOC concentrations for spring monitoring location SP-2 (0.0 µg/L) is significantly lower when compared to it's previous round of analytical data (Operational Year 2, Quarter Number 3) while spring monitoring location SP-3 (2.0 µg/L) is consistent when making the same comparison. Analytical results for these springs continue to indicate stable to decreasing concentrations. Analytical results for the former SP-4 spring location are provided in Section 6 below. Analytical results for the SP-5 Spring Water Remediation System are discussed in Section 8 of this report.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 3, Quarter Number 1 monitoring round are summarized in Tables 2 and 3. As shown in Table 2, surface water quality remains consistent with prior rounds of analytical data. Specifically, surface water quality location F-6 was non-detect for all constituents while surface water quality location SP-4 was 1.2 ug/L. The data indicate that the SP-4 spring location remedial construction was successful in preventing surface water impacts caused by the former SP-4 spring.

7. Groundwater Remediation System Performance

The following section describes the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 3, Quarter Number 1.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 3, Quarter Number 1.

7.1.1 Summary of Operation, Maintenance, and Monitoring

During the Operational Year 3, Quarter Number 1 system operation, the PT system operated continuously with only a few system shutdowns while on-site to conduct routine OM&M.

PT system OM&M was conducted on December 9, 2004 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. As shown in Table 4, the total influent groundwater recovery rate was approximately 0.45-gallon per minute (gpm), with individual recovery rates of 0.05-gpm, 0.21-gpm, and 0.21-gpm for production wells GMPW-3, GMPW-4, and GMPW-5, respectively. The average individual recovery rate for GMPW-3 decreased significantly during Operational Year 3, Quarter Number 1 compared to previous performance data. During the routine OM&M site visit, it was determined that the decrease in recovery rate for production well GMPW-3 was the result of fouling of the pump inlet filter sock. However, as referenced in the Operational Year 2 Annual Monitoring Report, the decline in production may also be the result of well screen fouling, or similar well condition problem. ARCADIS will continue to troubleshoot the operation of this production well and will make system adjustments to increase the production rate. The average recovery rate of production well GMPW-4 was consistent with previous operation. The average recovery rate of production well GMPW-5 was slightly lower when compared to previous operation. Similar to GMPW-3, the decreased pumping capacity observed at GMPW-5 was the result of fouling of the pump inlet filter sock. A total of 40,361 gallons of groundwater was recovered during the reporting period and a total of 821,310 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 discharge pressure of 9.0-inches of water column (i.w.c.) and a low profile air stripper blower flowrate of 166 standard cubic feet per minute (scfm).

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 3, Quarter Number 1 was conducted on December 9, 2004. As discussed previously, five groundwater samples and one vapor sample were collected. Groundwater samples collected included individual production 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 sampling groundwater 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. Total iron after the cartridge filters was inadvertently not sampled. Total iron will be sampled in accordance with the LTM Plan during the next scheduled quarterly OM&M site visit. 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 1.33 lbs of VOCs have been removed from the subsurface since system startup.

Table 7 provides a summary of the PT system performance sampling vapor analytical results. As shown in Table 7, low concentrations of cis-1, 2-dichloroethylene (37 parts per billion by volume [ppbv]), 1,1-dichloroethane (18 ppbv), and trichloroethylene (16 ppbv were detected above the detection limit in the air stripper effluent vapor sample. To be conservative, a NYSDEC DAR-1 air model was calculated using the actual analytical data for constituents with detections or the detection limit of all constituents without detections, but historically detected in the influent groundwater. All COCs were below their respective short-term guidance concentrations (SGCs) and annual guidance 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 December 22, 2003.

7.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 3, Quarter Number 1.

7.2.1 Summary of Operation, Maintenance, and Monitoring

System operation during Operational Year 3, Quarter Number 1 had occasional interruptions due to troubleshooting of system alarms. Despite these interruptions in operation, sufficient molasses solution was delivered to the subsurface to maintain the existing reducing environment. As outlined in the Operational Year 2 Annual Monitoring Report, the ARI system was shutdown until October 18, 2004 for troubleshooting of mixing tank MT-800.

ARI system OM&M was conducted during the Operational Year 3, Quarter Number 1 OM&M site visit on December 9, 2004 and included operation and maintenance of system equipment. In addition, ARI system operating parameters were recorded

during each automated injection event. During Operational Year 3, Quarter Number 1, two automated injections were conducted. Based on the number of injection events, quantity of molasses solution delivered to each injection well, and molasses solution percentage, approximately 5,440-gallons of molasses solution was delivered to the subsurface during Operational Year 3, Quarter Number 1. A total of 55,824-gallons of molasses solution has been delivered since system startup. Appendix C provides a summary of the recorded system operating parameters for each of the injection events for this period.

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted on December 8, 2004. As discussed previously, this event consisted of measuring field parameters and collecting samples for TOC in injection wells IW-1, IW-8, and IW-13. In addition to performance sampling conducted explicitly for ARI system monitoring, analytical results of select monitoring wells sampled under the environmental effectiveness monitoring program were also utilized to determine the effectiveness of the ARI system.

As discussed previously, Tables 2 and 3 summarize the results of VOCs, and biogeochemical and field parameters, respectively, for the ARI system performance monitoring and environmental effectiveness Operational Year 3, Quarter Number 1 sampling event. Key observations are as follows:

- Field parameter results for well GMMW-5 were consistent with prior rounds of data indicating depressed DO and ORP.

- The TOC concentration in injection wells was sufficient to maintain the in-situ reactive zone (IRZ). Similarly, the TOC concentration at GMMW-5 (102 mg/L) remains significantly above baseline conditions. Combined, the data indicate that sufficient organic carbon is being delivered to the subsurface to maintain the IRZ.

- The TOC concentration at monitoring well GMMW-6 remained elevated at 57.9 mg/L.

TVOC concentrations decreased from 940.0 ug/L to 577.0 ug/L within well GMMW-5 when comparing Operational Year 3, Quarter Number 1 data to Operational Year 2, Quarter Number 4 data, respectively. Similarly, TVOC concentrations decreased from 1,775 ug/L to 1,378 ug/L within well GMMW-6 when making the same comparison. Combined, the analytical data (TOC and VOCs) for monitoring well GMMW-6 may

indicate that the anaerobic IRZ has been established within the vicinity of this well and that VOCs are being completely degraded.

Bromide analytical results for monitoring wells GMPW-1 (0.022 mg/L), GMMW-4 (0.033 mg/L), and GMMW-5 (0.035 mg/L) were considerably lower when compared to their previous round of monitoring data. These results confirm that the estimated groundwater advective seepage velocity is approximately 0.031 feet per day in the vicinity of the injection wells.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on December 8 and 9, 2004 in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS 2003). SP-5 Spring Water Remediation System Operational Year 3, Quarter Number 1 analytical results are provided in Table 8. As shown in Table 8, all effluent COCs were treated to below their respective BPJ limits via the LPGAC. Influent TVOC analytical data (76.4 ug/L) was slightly lower when compared with historical analytical data. Table 9 contains the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 3, Quarter Number 1. As shown in Table 9, the SP-5 remedial system treated approximately 137,491 gallons of spring water during the operating period. An estimated 0.1 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 397,107 gallons of spring water has been treated and an estimated 0.32 lbs of VOC mass has been recovered since system startup. The recorded instantaneous flowrate was 1.24 gpm for the Operational Year 3, Quarter Number 1 monitoring event.

9. Conclusions

Based on the data obtained from the Operational Year 3, Quarter Number 1 monitoring, ARCADIS concludes the following:

- The groundwater flow direction in the project area (i.e., adjacent to the landfill western perimeter) and site-wide in the December 2004 round was consistent with previous rounds. The groundwater flow direction in the project area is toward the southwest from the western perimeter of the landfill. The groundwater flow direction in areas further to the east of the project area is toward the south/southwest.

- TVOC analytical results in wells located closest to the ARI injection well line (GMMW-5) decreased when compared to the Operational Year 2, Quarter Number 1 monitoring round.

- TVOC analytical results in monitoring well GMMW-6 decreased significantly during the operational quarter while TOC results in monitoring well GMMW-6 remained elevated. When combined with data from the Operational Year 2, Quarter Number 4 monitoring event, it appears that the IRZ has extended to the vicinity of this well.

- The Groundwater Remediation System operated continuously during the reporting period with intermittent system shutdowns for OM&M activities and due to minor mechanical problems. Similar to the Operational Year 2, Quarter Number 4 operating period, the recovery rate in production well GMPW-3 remained lower than historical operation.

- The PT system is operating as designed and is treating recovered groundwater VOCs and total iron to below BPJ limits prior to discharge.

- The ARI system is operating as designed and has established an anaerobic IRZ in the vicinity of the injection wells.

- The SP-5 Spring Water Remediation System is operating as designed and is treating recovered spring water VOCs to below BPJ limits prior to discharge.

10. Recommendations

Continue troubleshooting of production well GMPW-3 to determine the cause of the decreased production rate. Perform maintenance on the recovery well pump and/or well rehabilitation, as necessary.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted for on the quarterly schedule set forth in the LTM Plan. Performance monitoring of the Groundwater Remediation System will also be performed 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 (Site Number 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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Table 1. Water-Level Measurements Collected During Opertational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Well Identification	MP Elevation (feet above msl)	12/7/2004 Depth to Water (feet below MP)	12/7/2004 Water-Level Elevation (feet above msl)	MP Description
GMMW-2	1030.95	37.65	993.30	Inner casing
GMMW-5	1043.66	46.65	997.01	Inner casing
GMMW-6	1033.56	37.17	996.39	Inner casing
PW-3	988.92	10.11	978.81	Inner casing
PW-4	1001.75	16.48	985.27	Inner casing
PW-5	986.12	AM	AM	Inner casing
W-5	1051.41	50.58	1000.83	Inner casing
W-6	1050.38	48.05	1002.33	Inner casing
PW-7	1042.47	38.75	1003.72	Inner casing
W-7	1049.12	40.67	1008.45	Inner casing
PW-10	1049.29	35.91	1013.38	Inner casing
PW-13	1072.41	59.84	1012.57	Inner casing
W-13	1053.43	44.96	1008.47	Inner casing
W-14S	957.68	7.58	950.10	Inner casing
W-16S	990.33	8.66	981.67	Outer casing
W-17S	959.13	8.85	950.28	Inner casing
W-18	973.56	11.88	961.68	Inner casing
W-20S	952.88	7.75	945.13	Inner casing

msl Mean sea level.
MP Measuring point.
NM Not measured.
AM Anomalous measurement.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Springs, and Surface Water, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	GMMW-02 9/23/04	GMMW-02* 9/23/04	GMMW-02 12/8/04	GMMW-05 9/21/04	GMMW-05 12/7/04	GMMW-06 9/21/04	GMMW-06 12/9/04	PW-04 9/22/04	PW-04 12/9/04	W-05 9/22/04	W-05 12/8/04
1,1,1-Trichloroethane		**66**	**67**	**62**	<50	<10	<10	<10	**26**	**22**	**3.1**	**2**
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		**130**	**130**	**120**	**170**	**110**	**640**	**520**	**18**	**16**	**150**	**97**
1,1-Dichloroethene		**2.7**	**2.4**	**2.3**	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Benzene		**3.2**	**3.2**	**3.6**	<50	<10	<10	<10	<1.0	<1.0	**3.4**	**3.8**
Chlorobenzene		**44**	**44**	**44**	<50	**17**	**42**	**38**	<1.0	<1.0	**19**	**23**
Chloroethane		**46**	**41**	**38**	**100**	**90**	**340**	**250**	**7.4**	**4.6**	**120**	**87**
Chloroform		<1.0	<1.0	<1.0	<50	<10	<10	<10	**1.7**	**1.7**	<1.0	<1.0
cis-1,2-Dichloroethene		**160**	**160**	**150**	**670**	**360**	**470**	**290**	**24**	**15**	**13**	**7.8**
Dichlorodifluoromethane		**1.7**	**1.5**	**1.5**	<50	<10	<10	<10	**2.0**	**2.0**	**2.0**	**1.4**
Ethylbenzene		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Methylene chloride		**2.7**	**2.6**	<2.0	<50	<10	**31**	**21**	**1.2**	<1.0	**2.8**	<2.8
Methyl tert-butyl ether		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Naphthalene		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene		<1.0	<1.0	<1.0	<50	<10	<10	**13**	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<1.0	<50	<10	<10	<10	<1.0	<1.0	**1.9**	**1.4**
trans-1,2-Dichloroethene		**1.1**	<1.0	**2**	<50	<10	<10	<10	<1.0	**1.8**	<1.0	<1.0
Trichloroethene		**110**	**110**	**110**	<50	<10	**12**	**16**	**22**	**28**	**4.5**	**5.9**
Vinyl chloride		**24**	**19**	**21**	<50	<10	**240**	**230**	<1.0	<1.0	**30**	**16**
Total VOCs		**591.4**	**580.7**	**554.4**	**940.0**	**577.0**	**1,775.0**	**1,378.0**	**102.3**	**91.1**	**349.7**	**245.3**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

1. Sample collected at former SP-4 spring location.
2. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Springs, and Surface Water, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	W-05* 12/8/2004	SP-2 6/15/2004	SP-2 12/7/2004	SP-3 6/15/2004	SP-3 12/7/2004	SP-4[1] 6/15/2004	SP-4[2] 12/7/2004	SP-4*[2] 12/7/2004	F-6 6/15/2004	F-6 12/7/2004	FBMW12804 12/8/04
1,1,1-Trichloroethane		**2.2**	**1.6**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		**100**	**63**	<1.0	**7.8**	**2**	**67**	**1.2**	**1.2**	<1.0	<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene		**4**	**1.3**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene		**24**	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane		**88**	**28**	<1.0	**1.8**	<1.0	**30**	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene		**8.2**	**2.1**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane		**1.4**	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	**6.6**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		<2.3	**1.3**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	**1.4**
Methyl tert-butyl ether		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene		<1.0	**6.2**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		**1.5**	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene		**6.2**	**4.2**	<1.0	<1.0	<1.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride		**18**	**5.1**	<1.0	<1.0	<1.0	**29**	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		**253.5**	**119.4**	**0.0**	**9.6**	**2.0**	**126.0**	**1.2**	**1.2**	**0.0**	**0.0**	**1.4**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

1. Sample collected at former SP-4 spring l
2. Sample collected from North Stream, imn

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Springs, and Surface Water, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: FBSP12704 Date: 12/7/04	TRIP BLANK 12/9/04
1,1,1-Trichloroethane	<1.0	<1.0
1,1,2-Trichloroethane	<1.0	<1.0
1,1-Dichloroethane	<1.0	<1.0
1,1-Dichloroethene	<1.0	<1.0
1,2-Dichloroethane	<1.0	<1.0
1,2-Dichloropropane	<1.0	<1.0
Benzene	<1.0	<1.0
Chlorobenzene	<1.0	<1.0
Chloroethane	<1.0	<1.0
Chloroform	<1.0	<1.0
cis-1,2-Dichloroethene	<1.0	<1.0
Dichlorodifluoromethane	<1.0	<1.0
Ethylbenzene	<1.0	<1.0
Methylene chloride	**1.9**	<1.0
Methyl tert-butyl ether	<1.0	<1.0
Naphthalene	<1.0	<1.0
o-Xylene	<1.0	<1.0
Tetrachloroethene	<1.0	<1.0
Toluene	<1.0	<1.0
trans-1,2-Dichloroethene	<1.0	<1.0
Trichloroethene	<1.0	<1.0
Vinyl chloride	<1.0	<1.0
Total VOCs	**1.9**	**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.

1. Sample collected at former SP-4 spring l
2. Sample collected from North Stream, imn

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-02 9/23/04	GMMW-02* 9/23/04	GMMW-02 12/8/04	GMMW-04 9/23/04	GMMW-04 10/8/04	GMMW-04 12/8/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	<0.0853	<0.152	--	--	--	--
Manganese, Dissolved	mg/L	<0.0469	<0.0982	--	--	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	**1.2**	**1.32**	**0.033**
Chloride	mg/L	**2.50**	**2.20**	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	<0.2	<0.2	--	--	--	--
Nitrogen, Nitrite	mg/L	<0.01	<0.01	--	--	--	--
Total Organic Carbon	mg/L	<2.0	<2.0	<2.0	--	--	--
Sulfate	mg/L	**7.92**	**7.90**	--	--	--	--
Sulfide (field)	mg/L	**0.004**	**0.004**	**0.031**	--	--	--
Iron (field)	mg/L	--	--	**0.09**	--	--	--
FIELD PARAMETERS							
pH	Standard units	**6.14**	**6.14**	**6.02**	--	--	--
Specific Conductance	mmhos/cm	**0.536**	**0.536**	**56**	--	--	--
Turbidity	NTU	**13**	**13**	**189**	--	--	--
Dissolved Oxygen	mg/L	**7.85**	**7.85**	**2.13**	--	--	--
Temperature	deg C	**13.99**	**13.99**	**11.15**	--	--	--
ORP	mV	**290.7**	**290.7**	**116**	--	--	--
DISSOLVED GASES							
Carbon dioxide	mg/L	**220**	--	--	--	--	--
Carbon monoxide	mg/L	<0.40	--	--	--	--	--
Ethane	ng/L	**660**	--	--	--	--	--
Ethene	ng/L	**3,400**	--	--	--	--	--
Methane	ug/L	**1,200**	--	--	--	--	--
Nitrogen	mg/L	**17**	--	--	--	--	--
Oxygen	mg/L	**2.9**	--	--	--	--	--

[1] Spring water sample
[2] Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-05 9/21/04	GMMW-05 9/23/04	GMMW-05 10/8/04	GMMW-05 12/7/04	GMMW-05 12/8/04	GMMW-06 9/21/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	**259**	--	--	--	--	**17.4**
Manganese, Dissolved	mg/L	**9.39**	--	--	--	--	**4.07**
GENERAL CHEMISTRY							
Bromide	mg/L	--	**1.2**	**1.24**	--	**0.035**	--
Chloride	mg/L	**38.0**	--	--	--	--	**3.60**
Nitrogen, Nitrate (As N)	mg/L	**1.53**	--	--	--	--	**0.440**
Nitrogen, Nitrite	mg/L	**0.280**	--	--	--	--	**0.0360**
Total Organic Carbon	mg/L	**360**	--	--	**102**	--	**58.8**
Sulfate	mg/L	**30.1**	--	--	--	--	**4.13**
Sulfide (field)	mg/L	**0.075**	--	--	**0.096**	--	**0.033**
Iron (field)	mg/L	--	--	--	**1.84**	--	--
FIELD PARAMETERS							
pH	Standard units	**6.01**	--	--	**5.9**	--	**6.56**
Specific Conductance	mmhos/cm	**1.851**	--	--	**74.5**	--	**1.421**
Turbidity	NTU	**26**	--	--	**115**	--	**50**
Dissolved Oxygen	mg/L	**1.54**	--	--	**0.49**	--	**1.85**
Temperature	deg C	**15.63**	--	--	**12.59**	--	**13.67**
ORP	mV	**3.1**	--	--	**-53**	--	**-4.1**
DISSOLVED GASES							
Carbon dioxide	mg/L	**280**	--	--	--	--	**350**
Carbon monoxide	mg/L	<0.40	--	--	--	--	<0.40
Ethane	ng/L	**71**	--	--	--	--	**3,100**
Ethene	ng/L	**30,000**	--	--	--	--	**200,000**
Methane	ug/L	**12,000**	--	--	--	--	**1,700**
Nitrogen	mg/L	**11**	--	--	--	--	**17**
Oxygen	mg/L	**0.40**	--	--	--	--	**1.5**

1 Spring water sample
2 Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-06 12/7/04	GMMW-06 12/9/04	GMPW-1 12/8/04	PW-04 9/22/04	PW-04 12/8/04	W-05 9/22/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	--	--	--	**0.217**	--	**54.9**
Manganese, Dissolved	mg/L	--	--	--	**0.0361**	--	**3.68**
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	**0.022**	--	--	--
Chloride	mg/L	--	--	--	**136**	--	**3.20**
Nitrogen, Nitrate (As N)	mg/L	--	--	--	**0.828**	--	<0.2
Nitrogen, Nitrite	mg/L	--	--	--	**0.0250**	--	**0.0380**
Total Organic Carbon	mg/L	--	**57.9**	--	<2.0	<2.0	**4.20**
Sulfate	mg/L	--	--	--	**5.37**	--	**7.66**
Sulfide (field)	mg/L	**0.073**	--	--	**0.011**	**0.061**	**0.039**
Iron (field)	mg/L	**1.17**	--	--	--	**0.17**	--
FIELD PARAMETERS							
pH	Standard units	**6.21**	--	--	**5.77**	**5.6**	**6.11**
Specific Conductance	mmhos/cm	**0.149**	--	--	**0.639**	**57.4**	**0.698**
Turbidity	NTU	**93.3**	--	--	**11**	**42.7**	--
Dissolved Oxygen	mg/L	**0.7**	--	--	**2.17**	**3.44**	**5.52**
Temperature	deg C	**10.69**	--	--	**15.1**	**12.91**	**19.10**
ORP	mV	**-61**	--	--	**106.1**	**171**	**-57.9**
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	**220**	--	**250**
Carbon monoxide	mg/L	--	--	--	<0.40	--	<0.40
Ethane	ng/L	--	--	--	**32**	--	**20,000**
Ethene	ng/L	--	--	--	**42**	--	**15,000**
Methane	ug/L	--	--	--	**6.0**	--	**1,600**
Nitrogen	mg/L	--	--	--	**18**	--	**18**
Oxygen	mg/L	--	--	--	**3.1**	--	**0.67**

1 Spring water sample
2 Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	W-05 12/8/04	W-05* 12/8/2004	IW-01 9/23/04	IW-01 12/8/04	IW-08 9/23/04	IW-08 12/8/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	--	--	--	--	--	--
Manganese, Dissolved	mg/L	--	--	--	--	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--	--
Total Organic Carbon	mg/L	<2.0 J	**5.67 J**	**38.2**	**3300**	**2,020**	**961**
Sulfate	mg/L	--	--	--	--	--	--
Sulfide (field)	mg/L	**0.236**	**0.236**	--	--	--	--
Iron (field)	mg/L	**1.96**	**1.96**	--	--	--	--
FIELD PARAMETERS							
pH	Standard units	**6.24**	**6.24**	--	**3.73**	--	**3.69**
Specific Conductance	mmhos/cm	**78.6**	**78.6**	--	**0.296**	--	**0.124**
Turbidity	NTU	**186**	**186**	--	**755**	--	**433**
Dissolved Oxygen	mg/L	**1.69**	**1.69**	--	**5.11**	--	**5.01**
Temperature	deg C	**11.04**	**11.04**	--	**10.38**	--	**10.01**
ORP	mV	**-79**	**-79**	--	**119**	--	**164**
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	--	--	--
Carbon monoxide	mg/L	--	--	--	--	--	--
Ethane	ng/L	--	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--	--
Methane	ug/L	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--

1 Spring water sample
2 Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	IW-14 9/23/04	IW-13 12/8/04	SP-2[1] 6/15/04	SP-2[1] 12/7/04	SP-3[1] 6/15/04	SP-3[1] 12/7/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	--	--	--	--	--	--
Manganese, Dissolved	mg/L	--	--	--	--	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--	--
Total Organic Carbon	mg/L	**254**	**314**	--		--	
Sulfate	mg/L	--	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--	--
Iron (field)	mg/L	--	--	--	--	--	--
FIELD PARAMETERS							
pH	Standard units	--	**4.96**	**6.43**	**7.14**	**7.02**	**6.64**
Specific Conductance	mmhos/cm	--	**86.2**	**0.008**	**9.9**	**0.138**	**9.9**
Turbidity	NTU	--	**530**	--	**50.8**	--	**46.1**
Dissolved Oxygen	mg/L	--	**3.91**	**5.09**	**14.94**	**9.53**	**15.61**
Temperature	deg C	--	**9.92**	**12.8**	**2.6**	**12.96**	**2.79**
ORP	mV	--	**-4**	**49.8**	**104**	**85.5**	**71**
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	--	--	--	--
Carbon monoxide	mg/L	--	--	--	--	--	--
Ethane	ng/L	--	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--	--
Methane	ug/L	--	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--	--

1 Spring water sample
2 Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

Table 3. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Spring and Surface Water Samples, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	SP-4[1] 6/15/04	SP-4[2] 12/7/04	F-6[2] 6/15/04	F-6[2] 12/8/04	FBMW12804 12/8/2004
	UNITS					
METALS						
Iron, Dissolved	mg/L	--	--	--	--	--
Manganese, Dissolved	mg/L	--	--	--	--	--
GENERAL CHEMISTRY						
Bromide	mg/L	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--
Total Organic Carbon	mg/L	--	--	--	--	<2.0
Sulfate	mg/L	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--
Iron (field)	mg/L	--	--	--	--	--
FIELD PARAMETERS						
pH	Standard units	**6.60**	**6.76**	**6.98**	**6.36**	--
Specific Conductance	mmhos/cm	**0.798**	**10.1**	**0.147**	**10.3**	--
Turbidity	NTU	--	**48.2**	--	**46**	--
Dissolved Oxygen	mg/L	**1.89**	**15.49**	**9.55**	**15.7**	--
Temperature	deg C	**14.24**	**2.77**	**13.71**	**2.85**	--
ORP	mV	**-11.3**	**64**	**167.7**	**80**	
DISSOLVED GASES						
Carbon dioxide	mg/L	--	--	--	--	--
Carbon monoxide	mg/L	--	--	--	--	--
Ethane	ng/L	--	--	--	--	--
Ethene	ng/L	--	--	--	--	--
Methane	ug/L	--	--	--	--	--
Nitrogen	mg/L	--	--	--	--	--
Oxygen	mg/L	--	--	--	--	--

1 Spring water sample
2 Surface water sample
* Duplicate sample

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.
R Qualifier assigned to analytical data indicating result is unusable due to contamination detected in the blank.
J Qualifier assigned to analytical data indicating result is estimated.

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Table 4. PT System Operating Parameters, Operational Year 3, Quarter Number 1, 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 Effluent Totalizer FQI-401 (gallons)	Flow Measurements: Water Bypass Totalizer FQI-402 (gallons)	Flow Measurements: GMPW-3 Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4 Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5 Totalizer FQI-103 (gallons)
10/8/2004	3:16 PM	8.9	318	780,949.0	708,178.5	348,902.5	199,825.6	250,519.8
12/9/2004	3:30 PM	9	166	821,310.4	742,310.3	353,036.9	218,428.3	269,021.4
		Average Daily Flowrate (gpm) =		**0.45**	**0.38**	**0.05**	**0.21**	**0.21**
		Total Groundwater Recovered During Reporting Period (gallons) =		**40,361**	**34,132**	**4,134**	**18,603**	**18,502**

Notes:

gpm Gallons per minute.
i.w.c. Inches of water column.
scfm Standard cubic feet per minute.

Table 5. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York[5,6].

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID:	GMPW-3INF	GMPW-4 INF	GMPW-5 INF	COMBINED INF	EFFLUENT AC II
		Date:	12/9/04	12/9/04	12/9/04	12/9/2004	12/9/2004
1,1,1-Trichloroethane	10-20		**49**	**59**	**51**	**57**	**1.6**
1,1,2-Trichloroethane	10		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	10		**47**	**53**	**67**	**73**	**3.0**
1,1-Dichloroethene	10		**2.6**	**3.0**	**2.5**	**3.1**	<1.0
1,2-Dichloroethane	10-30		<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	NA		<1.0	<1.0	<1.0	<1.0	<1.0
Benzene	5		**4.3**	**4.8**	**5.6**	**6.2**	<1.0
Chlorobenzene	NA		<1.0	<1.0	**1.7**	**2.0**	<1.0
Chloroethane	NA		**12**	**14**	**20**	**22**	<1.0
Chloroform	NA		<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	10		**68**	**77**	**87**	**93**	**4.2**
Dichlorodifluoromethane	NA		<1.0	<1.0	**1.1**	**1.4**	<1.0
Ethylbenzene			<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	10-50		<4.6	<4.5	<4.4	**4.3**	<1.0
Methyl tert-butyl ether			<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene	10		<1.0	<1.0	<1.0	<1.0	<1.0
o-Xylene	5		<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	10		<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5		<1.0	<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	10-50		<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	10		**49**	**58**	**64**	**71**	**2.4**
Vinyl Chloride	10-50		**7.8**	**9.6**	**19**	**22**	<1.0
Total VOCs			**239.7**	**275.4**	**318.9**	**353.0**	**8.2**

Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)					
Total Iron	1.2 / 0.61	**1.28**	**0.543**	**1.20**	**1.66**	--

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 2, Quarter Number 3, 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.
AC	After Cartridge Filter.
BC	Before Cartridge Filter.
PT	Pump and Treat.
--	Not Analyzed or Collected.
<	Analyte Below Detection Limit.

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Table 6. PT System Mass Removal Rate of Volatile Organic Compounds, Operational Year 3, Quarter Number 1, 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)
10/8/2004	443.5	780,949.0	NA	NA	NA
12/9/2004	353.0	821,310.4	40,361	395.7	0.13
			Total Estimated Mass Removed During Operational Year 3, Quarter Number 1 (lbs) =		**0.13**
			Total Estimated Mass Removed Since System Startup (lbs) =		**1.33**

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 3, Quarter Number 1, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Compounds	CAS Numbers	Sample ID: Effluent Date Sampled: 12/9/2004 ppbv
Vinyl Chloride	75-01-4	<13
Chloroethane(Ethyl Chloride)	75-00-3	<13
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	<13
Methylene Chloride(Dichloromethane)	75-09-2	<13
1,1-Dichloroethane	75-34-3	**18**
cis-1,2-Dichloroethylene	156-59-2	**37**
Chloroform	67-66-3	<13
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	<13
Benzene	71-43-2	<13
Trichloroethene	79-01-6	**16**
Toluene	108-88-3	<13
Ethyl benzene	100-41-4	<13
m,p-Xylene	108-38-3/106-42-3	<13
o-Xylene	95-47-6	<13
1,2,4-Trimethylbenzene	95-63-6	<13
2-Propanol (Isopropyl alcohol)	67-63-0	<13
Dichlorodifluoromethane(Freon 12)	75-71-8	<13

ppbv: parts per billion by volume

Notes/Assumptions:

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 USEPA 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 3, Quarter 1, Colesville Landfill, Broome County, New York.

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	SP-5 INF. 12/8/04	SP-5 EFF. 12/8/04
VOCs (units in ug/L)				
1,1,1-Trichloroethane	10		<1.0	<1.0
1,1-Dichloroethane	10		**31**	**7**
1,2-Dichloroethane	10-100		<1.0	<1.0
Benzene	5		**2.8**	<1.0
Chlorobenzene	10-25		**30**	**6.4**
Chloroethane	10		**9**	**2.8**
cis-1,2-Dichloroethene	10		<1.0	<1.0
Dichlorodifluoromethane	NA		**1.4**	<1.0
Ethylbenzene	5		<1.0	<1.0
Toluene	5		<1.0	<1.0
trans-1,2-Dichloroethene	10-100		<1.0	<1.0
Trichloroethene	10		**2.2**	<1.0
Vinyl Chloride	10		<1.0	<1.0
Total VOCs			**76.4**	**16.2**

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.

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 3, Quarter Number 1, 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)
9/23/2004	105.7	1.13	0.20	NA	NA	NA
12/9/2004	76.4	1.24	0.19	137,491	89.9	0.10
				Total Estimated Mass Removed During Quarter (lbs) =		**0.10**
				Total Estimated Mass Removed Since System Startup (lbs) =		**0.32**
				Total Effluent Treated to Date (gallons) =		**397,107**

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.

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).

Appendix A

Water-Level Measurement and Groundwater Sampling Logs.

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. NY000949 Well GMMW-5 Date 12/7/04

Total depth (ft bmp) _____ Screened Interval (ft bmp) _____ Casing Diameter (inches) _____

Measuring Point Description TOC Static Water Level (ft bmp) 46.65

Pump Intake (ft bmp) _____ Sampling Tir Begin 1300 End 1305

Weather _____ Pump type: _____

Sampled by : TM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	Cond. (umhos or ms/cm)	TURB (NTU)	DO (mg/L)	TEMP. (C)	ORP (mV)	Notes
1225			5.78	89.6	63.7	2.60	9.11	-83	
30			5.93	87.2	49.4	0.77	8.90	-91	
1235			5.94	81.4	60.3	0.69	11.01	-76	
1240			5.94	76.>	87.6	0.80	12.86	-64	
1245			5.95	73.5	141.1	0.85	14.12	-57	
1250			5.93	74.0	130.8	0.66	13.06	-54	
1255			5.92	74.1	121.4	0.61	13.00	-54	
1300			5.80	74.5	115.0	0.49	12.59	-53	
			FE	1.84					
			S	.096					
			H_2O IS	LT. YELLOW	W/ STRONG	ODORS			

G:\TECHNICL\FIELD LOGS\Low Flow Samling Form.XLS- Sheet1

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. NY000949 Well GMW-6 Date 12/7/04

Total depth (ft bmp) _____ Screened Interval (ft bmp) _____ Casing Diameter (inches) _____

Measuring Point Description TOC Static Water Level (ft bmp) 37.17

Pump Intake (ft bmp) _____ Sampling Tir Begin 1355 End 1400

Weather _____ Pump type: _____

Sampled by : TM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	Cond. (umhos or ms/cm)	TURB (NTU)	DO (mg/L)	TEMP. (C)	ORP (mV)	Notes
1320		37.17	6.27	99.9	>999	13.13	8.34	-35	
1325		39.46	6.20	46.3	871	4.76	8.81	-40	
1330		45.20	6.16	0.153	311	1.05	9.62	-52	
1335		44.96	6.18	0.152	193	0.99	10.09	-53	
1340		44.18	6.19	0.152	140	0.96	10.61	-54	
1345	200	44.09	6.20	0.151	120	0.73	10.40	-59	
1350	200	44.03	6.21	0.150	108	0.71	10.63	-60	
1355	200	44.00	6.21	0.149	93.3	0.70	10.64	-61	
				H_2O Lt. Gray, Slt. Silty, NEO ~~NO~~ odors (ORGANIC)					
				FE: 1.17					
				S: .073					

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. N4000949 Well GMMW-2 Date 12/8/04

Total depth (ft bmp) _____ Screened Interval (ft bmp) _____ Casing Diameter (inches) _____

Measuring Point Description TOC Static Water Level (ft bmp) 37.65

Pump Intake (ft bmp) _____ Sampling Tir Begin 940 End 945

Weather _____ Pump type: _____

Sampled by : TM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	Cond. (umhos or ms/cm)	TURB (NTU)	DO (mg/L)	TEMP. (C)	ORP (mV)	Notes
900	150	47.80	6.62	57.8	374	3.77	9.96	73	
905	150		6.13	51.0	284	1.13	10.60	88	
910	100	50.14	6.11	52.9	594	1.68	10.89	94	
915	100	50.70	6.08	55	356	1.91	10.82	102	
920	100		6.04	55.6	207	2.36	10.94	110	
925	100	50.66	6.04	56.1	199	2.06	11.01	112	
930	125		6.04	56.0	216	2.25	11.06	115	
935	100		6.04	55.1	209	2.10	11.12	113	
940	125		6.02	56.0	189	2.13	11.15	116	
				FE: 0.09					
				S: 0.031					
				MS/MSD Collected Here					

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. NY000949 Well AW-4 Date 12/8/04

Total depth (ft bmp) _____ Screened Interval (ft bmp) _____ Casing Diameter (inches) _____

Measuring Point Description _____ Static Water Level (ft bmp) 16.51

Pump Intake (ft bmp) _____ Sampling Tir Begin 1045 End 1055

Weather Sun, Wind, 45° Pump type: _____

Sampled by : TM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	Cond. (umhos or ms/cm)	TURB (NTU)	DO (mg/L)	TEMP. (C)	ORP (mV)	Notes
1010	250	16.99	6.32	64.5	>999	9.72	11.24	130	
1015	250		6.01	64.1	861	6.47	11.68	159	
1020	250		5.55	63.9	208	5.01	12.26	168	
1025			5.57	57.9	66.4	~~12.3~~ 3.92	12.69	169	
1030			5.59	57.9	52.7	3.60	12.86	169	
1035			5.60	57.5	46.3	3.48	12.81	170	
1040			5.60	57.4	44.6	3.45	12.88	171	
1045			5.60	57.4	42.7	3.44	12.91	171	
				FE: 0.17					
				S: 0.061					
				MS/MSD COLLECTED HERE					

ARCADIS
Water Sampling Log

Project NY000949 Project No. _____ Page 1 of 1

Site Location _____ Date 12/8/04

Site/Well No. MW-5 Replicate No. DUP "DUPMW12804"

Weather 45° SUN/CLOUDS, WINDY Sampling Time: Begin 1130 End _____

Evacuation Data

Measuring Point: TOC
Sounded Well Depth (ft bmp): _____
Depth to Water (ft bmp): 50.61
Depth to Packer (ft bmp): _____
Water Column in Well (ft): _____
Casing Diameter: _____
Gallons in Well: _____
Gallons Pumped/Bailed Prior to Sampling: 1.25 g
Sample Pump Intake Setting (ft bmp): _____
Packer Pressure (psi): _____
Pumping Rate (gpm): _____
Evacuation Method: BAILER
Sampling Method: BAILER
Purge Time Begin _____ End _____

Field Parameters

Color: CLEAR
Odor: SLIGHT
Appearance: LITTLE SILT

	I	1V	2V	3V
pH (s.u.)	6.16	6.24		
Conductivity (mS/cm)	81.2	78.6		
(µmhos/cm)				
Temperature (°C)	10.81	11.04		
DO (mg/L)	1.84	1.69		
Turbidity (NTU)	119	186		
~~Time~~ ORP	-84	-79		
DTW (ft bmp)				

Remarks: BAILED DRY AFTER 1.25 g
FE: 1.96
S: .236

Constituents Sampled: See COC Sampling Personnel: TM

Well Casing Volumes

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

bmp	below measuring point	mS/cm	Milisiemens per centimeter	VOC	Volatile Organic Compounds
°C	Degrees Celsius	s.u.	Standard units	umhos/cm	Micromhos per centimeter
ft	feet	NTU	Nephelometric Turbidity Units		
gpm	Gallons per minute	N/A	Not Applicable		
mg/L	Miligrams per liter	COC	Chain of Custody		

ARCADIS

Water Sampling Log

Project _____ Project No. NY000949 Page ___ of ___

Site Location _____ Date 12/8/04

Site/Well No. IW-1 Replicate No. _____

Weather _____ Sampling Time: Begin 1245 End _____

Evacuation Data

Measuring Point _____

Sounded Well Depth (ft bmp) _____

Depth to Water (ft bmp) _____

Depth to Packer (ft bmp) _____

Water Column in Well (ft) _____

Casing Diameter _____

Gallons in Well _____

Gallons Pumped/Bailed Prior to Sampling _____

Sample Pump Intake Setting (ft bmp) _____

Packer Pressure (psi) _____

Pumping Rate (gpm) _____

Evacuation Method _____

Sampling Method _____

Purge Time Begin _____ End _____

Field Parameters

Color Dark ORANGE

Odor Molasses

Appearance Clear

	I	1V	2V	3V
pH (s.u.)	3.73			
Conductivity (mS/cm)	.296			
(µmhos/cm)				
Temperature (°C)	10.38			
DO (mg/L)	5.11			
Turbidity (NTU)	755			
~~Time~~ ORP	119			
DTW (ft bmp)				

Remarks: * IW-1 INSTEAD OF IW-3 ; COULD NOT GET IW-3 OPEN*

Constituents Sampled: See COC Sampling Personnel: TM

Well Casing Volumes

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

bmp	below measuring point	mS/cm	Milisiemens per centimeter	VOC	Volatile Organic Compounds
°C	Degrees Celsius	s.u.	Standard units	umhos/cm	Micromhos per centimeter
ft	feet	NTU	Nephelometric Turbidity Units		
gpm	Gallons per minute	N/A	Not Applicable		
mg/L	Miligrams per liter	COC	Chain of Custody		

ARCADIS
Water Sampling Log

Project _____ Project No. NY000949 Page 1 of 1

Site Location _____ Date 12/8/04

Site/Well No. IW-8 Replicate No. _____

Weather _____ Sampling Time: Begin 1310 End _____

Evacuation Data

Measuring Point _____

Sounded Well Depth (ft bmp) _____

Depth to Water (ft bmp) –

Depth to Packer (ft bmp) _____

Water Column in Well (ft) _____

Casing Diameter _____

Gallons in Well _____

Gallons Pumped/Bailed Prior to Sampling _____

Sample Pump Intake Setting (ft bmp) MID. OF WELL

Packer Pressure (psi) _____

Pumping Rate (gpm) _____

Evacuation Method BAILER

Sampling Method BAILER

Purge Time Begin _____ End _____

Field Parameters

Color Lt. ORANGE

Odor MED. MOLASSES

Appearance CLEAR

	I	1V	2V	3V
pH (s.u.)	3.69			
Conductivity (mS/cm)	.124			
(µmhos/cm)				
Temperature (°C)	10.01			
DO (mg/L)	5.01			
Turbidity (NTU)	433			
~~Time~~ ORP	164			
DTW (ft bmp)				

Remarks: _____

Constituents Sampled: See COC Sampling Personnel: TM

Well Casing Volumes

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

bmp	below measuring point	mS/cm	Milisiemens per centimeter	VOC	Volatile Organic Compounds
°C	Degrees Celsius	s.u.	Standard units	umhos/cm	Micromhos per centimeter
ft	feet	NTU	Nephelometric Turbidity Units		
gpm	Gallons per minute	N/A	Not Applicable		
mg/L	Miligrams per liter	COC	Chain of Custody		

ARCADIS
Water Sampling Log

Project _____ Project No. N4000949 Page 1 of 1

Site Location _____ Date 12/8/04

Site/Well No. IW-13 Replicate No. _____

Weather _____ Sampling Time: Begin 1400 End _____

Evacuation Data

Measuring Point _____

Sounded Well Depth (ft bmp) _____

Depth to Water (ft bmp) _____

Depth to Packer (ft bmp) _____

Water Column in Well (ft) _____

Casing Diameter _____

Gallons in Well _____

Gallons Pumped/Bailed

Prior to Sampling _____

Sample Pump Intake

Setting (ft bmp) _____

Packer Pressure (psi) _____

Pumping Rate (gpm) _____

Evacuation Method _____

Sampling Method _____

Purge Time Begin _____ End _____

Field Parameters

Color MED ORANGE

Odor MED. MOLASSES AND ORGANIC

Appearance CLEAR

	1	1V	2V	3V
pH (s.u.)	4.96			
Conductivity (mS/cm)	86.2			
(µmhos/cm)				
Temperature (°C)	9.92			
DO (mg/L)	3.91			
Turbidity (NTU)	530			
~~Time~~ ORP	-4			
DTW (ft bmp)				

Remarks: _____

Constituents Sampled: See COC Sampling Personnel: TM

Well Casing Volumes

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

bmp	below measuring point	mS/cm	Milisiemens per centimeter	VOC	Volatile Organic Compounds
°C	Degrees Celsius	s.u.	Standard units	umhos/cm	Micromhos per centimeter
ft	feet	NTU	Nephelometric Turbidity Units		
gpm	Gallons per minute	N/A	Not Applicable		
mg/L	Miligrams per liter	COC	Chain of Custody		

ARCADIS
Water Sampling Log

Project _____ Project No. NY000949 Page 1 of 1

Site Location _____ Date 12/8/04

Site/Well No. SP-5 Replicate No. _____

Weather _____ Sampling Time: Begin 1615 End _____

Evacuation Data

Measuring Point	TOC
Sounded Well Depth (ft bmp)	
Depth to Water (ft bmp)	SURFACE
Depth to Packer (ft bmp)	
Water Column in Well (ft)	
Casing Diameter	
Gallons in Well	
Gallons Pumped/Bailed Prior to Sampling	
Sample Pump Intake Setting (ft bmp)	
Packer Pressure (psi)	
Pumping Rate (gpm)	
Evacuation Method	BAILER
Sampling Method	BAILER
Purge Time	Begin _____ End _____

Field Parameters

	INF	EFF
Color	LT. ORANGE	LT. ORANGE
Odor	STRONG	STRONG
Appearance	SHEEN	SILTY

	I	1V	2V	3V
pH (s.u.)	5.81			6.02
Conductivity (mS/cm)	68.7			62.2
(µmhos/cm)	~~709~~			796
Temperature (°C)	8.04			7.83
DO (mg/L)	2.86			3.55
Turbidity (NTU)	103			196
~~Time~~ ORP	-19			-34
DTW (ft bmp)				

Remarks: SP-5 EFF @ 1615

SP-5 INF @ 1630

FLOW @ EFF AFTER CLEANING OUT LINE = 4200 ml/MIN

Constituents Sampled: See COC Sampling Personnel: TM

Well Casing Volumes

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

bmp	below measuring point	mS/cm	Milisiemens per centimeter	VOC	Volatile Organic Compounds
°C	Degrees Celsius	s.u.	Standard units	umhos/cm	Micromhos per centimeter
ft	feet	NTU	Nephelometric Turbidity Units		
gpm	Gallons per minute	N/A	Not Applicable		
mg/L	Miligrams per liter	COC	Chain of Custody		

Daily Events Report

ARCADIS G&M Project Number	Date of Activities
	12/7/04
ARCADIS G&M Project Name	Location of Project
ARCADIS G&M Personnel Present Thom McClenahan	Other Persons Present
Daily Task Assigned	

Time:	Activities:	
845	TM ARRIVES ON SITE	
900	FRAN ARRIVES - BRIEF ABOUT WORK AND CONDUCT SITE	
	SAFETY MEETING	
	H_2O LEVELS	
	GMMW-5: 46.65 (DETECTABLE SHEEN)	
	GMMW-6: 37.17	W-16S: 8.66
	GMMW-2: 37.65	W-18: 11.88
	PW-4: 16.48	PW-7: 38.75
	PW-10: 35.91	PW-13: 59.84
	W-5: 50.58	W-13: 44.96
	PW-3: 10.11	W-14S: 7.58
	PW-5: ARTESIAN	W-17S: 8.85
	W-6: 48.05	W-20S: 7.75
	W-7: 40.67	
		Bail • GMMW-1 • GMMW-4 • GMMW-5

COLLECT FB "FBSP12704" AT 945

	SP2 pH COND TURB DO TEMP ORP
	7.14 9.9 ms/m SEE ABOVE 14.94 2.61 104
	SAMPLE FOR VOCS AT 1000
	SP3 6.64 9.9 46.1 15.61 2.79 71
	SAMPLE FOR VOCS AT 1015
	SP-4 6.76 10.1 48.2 15.49 2.77 64
	SAMPLE FOR VOCS AT 1030
	F6 6.36 10.3 46.0 15.70 2.85 80
	SAMPLE FOR VOCS AT 1045
	COLLECTED DUPSP12704 WITH SP-4
	SP-4 OBSERVATIONS → STREAM GAUGE IS WASHED DOWNSTREAM (REPLACED IN CENTER OF STREAM IN FRONT OF RIP RAP. DEPTH = .8'
	- 3 AREAS OF SHEEN JUST RIP RAP ABOVE H_2O LINE - NONE MORE UPSTREAM THAN UPPER LIMIT OF RIP RAP. ROCKS UNDER H_2O JUST FOLLOWING RIP RAP ARE STAINED ORANGE BY IRON. SMALL AMT. OF STAINING ON ROCKS JUST UNDER EDGE OF RIP RAP. ABOVE H_2O. SHEEN APPEARS "STICKY" (AS ORGANIC LIKE). SMALL AMT. (~1') OF LINER EXPOSED AT UPSTREAM EDGE OF RIP RAP. TERRESTRIAL AREA ABOVE RIP RAP IS SNOW COVERED BUT APPEARS SMOOTH AND IN NORMAL CONDITION. DOES NOT APPEAR TO BE ANY SIGNIFICANT EROSION BELOW/ABOVE RIP RAP.
	LOW FLOW SAMPLE GMMW-5, GMMW-6
1530	CLEAN BF-400 + BF-401 - Δ OUT 14 5 MICRON FILTERS
	CLEAN PARTS AND REPLACE W/ 14 5 MIC. FILTERS
1630	RE-START SYSTEM + MONITOR
1730	TM DEPARTS SITE LOCKED

Daily Events Report

ARCADIS G&M Project Number	Date of Activities
30000949.0017	12/8/04
ARCADIS G&M Project Name	**Location of Project**
COLESVILLE	COLESVILLE, NY
ARCADIS G&M Personnel Present	**Other Persons Present**
Thom McClenahan	FRAN, LEO (COUNTY)
Daily Task Assigned	

Time:	Activities:
730	TM ARRIVES ON SITE. FRAN, LEO ON SITE
	CONDUCT A SITE SAFETY MEETING
	CALIBRATE HORIBA U-22 = OK
	LOW FLOW PW-4 AND GMMW-2
	BAIL W-5, IW-1, IW-8, IW-13
	MW FB 12804 COLLECTED AT 1100
	SAMPLE FOR BIOCIDE ON:
	GMPW-1 AT 1445
	GMMW-4 AT 1515
	GMMW-5 AT 1545
1420	FRAN/LEO DEPART SITE
	SAMPLE SP-5 FOLLOWING DTW AND DISCHARGE PIPE
	CLEANING W/ SWAGE
1730	DEPART SITE

Daily Events Report

ARCADIS G&M Project Number	Date of Activities
N4000949.0017.02	12/10/04
ARCADIS G&M Project Name	**Location of Project**
Colesville	Colesville, NY
ARCADIS G&M Personnel Present	**Other Persons Present**
Thom McClenahan	
Daily Task Assigned	
Check Pumps For Flow	

Time:	Activities:
900	TM Drops off Samples at Buck Labs (1 cooler)
930	TM Drops off Air Toxic Sample at Fed Ex For
	Saturday Delivery
	Talk w/ J Hime
1015	TM Arrives on Site
	GMPW-3 353683.1 1023 693.9 1038 = 10.8 = .72
	GMPW-4 218755.8 758.6 = 2.8 = .19
	GMPW-5 269381.2 386.9 = 5.7 = .38
	19.3 ÷ 15 = 1.29 g
	Talk w/ JH
	System + Flow Look Ok
1110	TM Departs Site

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Appendix B

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

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Table B-1. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Parameters for 12/9/2004 Sampling Event			
Discharge Temperature	T	515.67	°R
Ambient Temperature	Ta	488.67	°R
Stack Diameter	D	6	in
Stack Radius	R	0.25	ft
Stack Area	A	0.20	ft^2
Exit Velocity	V	13.8	fps
Exit Flow	Q	162	acfm
Exit Flow	Q	166	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	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	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	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 56°F based on recorded parameters.
2. The ambient temperature is approximately 29°F, the average temperature for December 9.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Table B-2. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Calculation of the Short-Term Guideline Concentration (SGC) for Sampling Event on 12/9/2004

Compounds	CAS Numbers	Maximum Limit (SGC) (ug/m^3)	Analytical Concentration (ppb)	Detection Limit Used	Actual Emissions C_a (ug/m^3)	Mass/hour (lb/hr)	Maximum Potential Impact (Step III.A.3 in DAR-1) (ug/m^3)	Short Term Impact (Step III.A.5 in DAR-1) (ug/m^3)	Percent of the SGC (%)
Vinyl Chloride	75-01-4	180,000	13	*	33.78	4.02E-05	0.0069	0.44694	2.5E-04
Chloroethane(Ethyl Chloride)	75-00-3	--	13	*	34.87	4.15E-05	0.0071	0.46139	NA
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	--	13	*	52.39	6.24E-05	0.0107	0.69329	NA
Methylene Chloride(Dichloromethane)	75-09-2	14,000	13	*	45.90	5.47E-05	0.0093	0.60741	4.3E-03
1,1-Dichloroethane	75-34-3	--	18	*	74.06	8.82E-05	0.0151	0.97995	NA
cis-1,2 - Dichloroethylene	156-59-2	--	37	*	149.12	1.78E-04	0.0304	1.97322	NA
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	68,000	13	*	72.10	8.59E-05	0.0147	0.95409	1.4E-03
Trichloroethene	79-01-6	54,000	16	*	87.40	1.04E-04	0.0178	1.15649	2.1E-03
Dichlorofluoromethane(Freon 12)	75-71-8	--	13	*	65.34	7.78E-05	0.0133	0.86456	NA

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
NA: Not applicable

Notes:

1. DAR-1 refers to DAR-1 AGC/SGC Tables dated December 22, 2003.
2. SGC refers to the Short-Term Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
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.

Table B-3. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 12/9/2004 Sampling Event

Compounds	CAS Numbers	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Lab Data ppb	Detection Limit Used[5]	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	13	*	33.78	2.10E-05	0.17996	**1.67**
Chloroethane(Ethyl Chloride)	75-00-3	10,000	978,044.97	13	*	34.87	2.17E-05	0.18578	**0.00**
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	70	6,846.31	13	*	52.39	3.26E-05	0.27916	**0.00**
Methylene Chloride(Dichloromethane)	75-09-2	2.1	205.39	13	*	45.90	2.86E-05	0.24458	**0.12**
1,1-Dichloroethane	75-34-3	0.63	61.62	18	*	74.06	4.61E-05	0.39458	**0.64**
cis-1,2-Dichloroethylene	156-59-2	1,900	185,828.54	37	*	149.12	9.28E-05	0.79454	**0.00**
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	1,000	97,804.50	13	*	72.10	4.49E-05	0.38417	**0.00**
Trichloroethene	79-01-6	0.5	48.90	16	*	87.40	5.44E-05	0.46567	**0.95**
Dichlorodifluoromethane(Freon 12)	75-71-8	12,000	1,173,653.96	13	*	32.48	2.02E-05	0.17305	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 56°F based on recorded parameters.
2. The ambient temperature is approximately 29°F, the average temperature for December 9.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Appendix C

Automated Reagent Injection System Operating Parameters

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Table C-1. Automated Reagent Injection System Summary of Operational Year 3, Quarter Number 1 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.)
10/18/2004	2,720	272	157
11/22/2004	2,720	272	157
Quarter Totals (gal.) =	**5,440**	**544**	**314**
Totals Since Startup (gal.) =	**55,824**	**6,825**	**6,739**

Notes:

gal. Gallons

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Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 1 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 45

Injection Date = 10/18/2004

Molasses to Water Ratio (%) = 10.0

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 Flowrate [3] (gpm)	Max. Injection Pressure (psi)
PW-6	160	5	16.0	0	20
IW-3	160	5	16.0	20	15
IW-1	160	4	16.0	0	16
IW-2	160	3	16.0	20	16
GMMW-1	160	3	16.0	0	0
IW-4	160	4	16.0	20	16
IW-5	160	5	16.0	0	17
IW-6	160	7	16.0	18	20
IW-7	160	8	16.0	0	19
IW-8	160	9	16.0	0	19
IW-9	160	11	16.0	0	19
IW-10	160	12	16.0	0	18
IW-11	160	13	16.0	0	19
IW-12	160	15	16.0	20	19
IW-13	160	16	16.0	0	19
IW-14	160	18	16.0	0	20
IW-15	160	19	16.0	0	19
Totals (gal.) =	2720	157	272.0	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 is approximately 1-pipeline volume for each injection well.
3. Parameters not recorded by system properly.

Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 1 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 46

Injection Date = 11/22/2004

Molasses to Water Ratio (%) = 10.0

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 Flowrate [3] (gpm)	Max. Injection Pressure (psi)
PW-6	160	5	16.0	20	18
IW-3	160	5	16.0	0	16
IW-1	160	4	16.0	0	15
IW-2	160	3	16.0	20	13
GMMW-1	160	3	16.0	0	0
IW-4	160	4	16.0	0	22
IW-5	160	5	16.0	13	18
IW-6	160	7	16.0	0	16
IW-7	160	8	16.0	0	13
IW-8	160	9	16.0	0	19
IW-9	160	11	16.0	20	19
IW-10	160	12	16.0	0	19
IW-11	160	13	16.0	20	20
IW-12	160	15	16.0	0	18
IW-13	160	16	16.0	0	18
IW-14	160	18	16.0	0	18
IW-15	160	19	16.0	0	14
Totals (gal.) =	2720	157	272.0	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 is approximately 1-pipeline volume for each injection well.
3. Parameters not recorded by system properly.

ARCADIS

Infrastructure, environment, buildings

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ENVIRONMENT

Mr. George Jacob
United Stated Environmental Protection Agency – Region 2
290 Broadway, 20th Floor
New York, New York 10007-1866

Subject:
Operational Year 3, Quarter 2 Monitoring Report,
Colesville Landfill, Broome County, New York. (Site No. 704010).

Dear Mr. Jacob:

On behalf of Broome County, ARCADIS is providing the Operational Year 3, Quarter 2 Monitoring Report for the Colesville Landfill, Broome County, New York.

Please feel free to contact me if you have any questions or comments.

Sincerely,

ARCADIS G&M, Inc.

Steven M. Feldman
Project Manager

Date:
21 July 2005

Contact:
Steven M. Feldman

Phone:
(631) 391-5244

Email:
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Our ref:
NY000949.0018.00004

Copies:
Joe Yavonditte, NYSDEC
David Donoghue, Broome County
Julia Guastella, NYSDOH

Operational Year 3
Quarter Number 2
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

ARCADIS
Infrastructure, buildings, environment, communications

ARCADIS

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Steven M. Feldman
Project Director

Operational Year 3
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 G&M, Inc.
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Tel 631 249 7600
Fax 631 249 7610

Our Ref.:
NY000949.00018.00004

Date:
15 July 2005

Tables

Figures

Appendices

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) and Explanation of Significant Difference (ESD) 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), and Interim Remedial Action Report (ARCADIS 2004), 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 2005 groundwater quality monitoring event conducted during Operational Year 3, Quarter Number 2. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from January 2005 through March 2005 has also been included. In addition, this report describes SP-5 Spring Water Remediation System OM&M activities conducted during this quarter. 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 3, Quarter Number 2. A site plan, which shows the location of environmental effectiveness monitoring, is provided on Figure 1.

2.1 Environmental Effectiveness Monitoring

The environmental effectiveness monitoring performed during Operational Year 3, Quarter Number 2 included the following:

- Groundwater samples (Year 3, Q2 list of wells) were collected from eleven monitoring wells during the week of March 21, 2005 and were selectively

analyzed for volatile organic compounds (VOCs) and select inorganic parameters. Field parameters were also recorded at these monitoring locations.

- A sample (VOCs only) was collected and field parameters were measured at the SP-4 surface water location on March 25, 2005.

As referenced in the Interim Remedial Action Report (ARCADIS 2004) and Operational Year 2 Annual Monitoring Report, an additional surface water quality sample was collected immediately downgradient of the former SP-4 spring location. This sample replaces the previously collected SP-4 spring location sample as a result of the SP-4 construction activities conducted during Operational Year 2.

Monitoring wells were purged and sampled using methods described in the LTM Plan.

2.2 Groundwater Remediation System Performance Monitoring

Groundwater Remediation System performance monitoring activities during Operational Year 3, Quarter Number 2 were as follows:

- Pump-and-treat (PT) system production well influent and effluent samples were collected during the OM&M quarterly site visit on March 23, 2005 and selectively analyzed for VOCs and total iron.

- One vapor sample from the PT system air stripper effluent was collected during the OM&M quarterly site visit on March 23, 2005 and analyzed for VOCs.

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

- Automated reagent injection (ARI) system operating parameters were recorded during each injection event.

PT system groundwater samples were collected as grab samples directly from production wells GMPW-3, GMPW-4 and 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.

Total Organic Carbon (TOC) samples were not collected from select injection wells during the current reporting period. These samples will be collected in accordance with

the LTM Plan during the next scheduled quarterly site visit (Operational Year 3, Quarter Number 3).

2.3 Spring Water Remediation System Performance Monitoring

SP-5 Spring Water Remediation System OM&M was conducted on March 23 and 24, 2005. 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 an influent and effluent spring water sample for analysis of VOCs. Discharge flow rate and depth to water in the treatment unit were inadvertently not collected during the current reporting period. 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 riprap-lined outlet. All spring water samples were analyzed for VOCs using USEPA Method 8260.

3. Groundwater Flow

A synoptic round of water-level measurements was not collected during Operational Year 3, Quarter Number 2.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the March 2005 monitoring round (Operational Year 3, Quarter Number 2). Groundwater analytical results are provided in Tables 1 and 2. Where applicable, the previous round of analytical results for the respective sampling location has been provided on the same table for comparative purposes.

4.1 Volatile Organic Compounds

As shown on Table 1, total VOCs (TVOCs) at landfill perimeter Wells W-6 and W-7 remained stable at 70.2 ug/L and 11.3 ug/L, respectively. TVOCs at mid-plume monitoring Wells PW-3, GMMW-2, W-5, and W-16S, remained stable at 131 ug/L, 523 ug/L, 231 ug/L, and 63.2 ug/L, respectively, while TVOCs at mid-plume monitoring well PW-4 decreased to 72.2 ug/L. TVOCs at mid-plume monitoring well PW-5 increased to 72.2 ug/L. TVOCs at the plume boundary monitoring Well W-18 increased slightly to 26.0 ug/L.

Overall, groundwater analytical VOC data collected during operational Year 3, Quarter Number 2 continue to corroborate historical data and indicate that the dissolved phase plume is stable.

TVOCs at monitoring well GMMW-6 decreased to 967 ug/L. As referenced in the previous report, it is believed that this location is currently being affected by the IRZ. TVOCs at the monitoring Well GMMW-5, located closest to the IRZ injection wells, remained stable at 576 ug/L.

PT system analytical results for VOCs are provided in Table 5. Groundwater analytical results for PT system production wells GMPW-3, GMPW-4, and GMPW-5 are consistent with prior rounds of data. Specifically, TVOC concentrations for the Operational Year 3, Quarter Number 2 sampling round were as follows: GMPW-3 (304 ug/L), GMPW-4 (502 ug/L) and GMPW-5 (336 ug/L). 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 2. In summary, field and laboratory groundwater data for Wells GMMW-5 and GMMW-6 indicate that strongly reducing conditions are being maintained within the IRZ. This is evidenced by the presence of reduced forms of alternate electron acceptors (i.e. dissolved iron, sulfide, and methane). Further details of the ARI system performance monitoring are provided in Section 7.2.2 of this report.

4.3 Evidence of Biodegradation

Table 2 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 within monitoring wells GMMW-5 and GMMW-6 continue to be elevated when compared to baseline conditions. GMMW-5 is located closest to the ARI injection wells and would be expected to be the first well to exhibit increases in biodegradation end products. Ethene results for monitoring well GMMW-6 continued to increase during Operational Year 3, Quarter Number 2 and indicates that the IRZ has extended to the vicinity of this well. 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 monitoring was not conducted during Operational Year 3, Quarter Number 2, as outlined in the LTM Plan monitoring schedule. Therefore, further discussion of spring water quality is not provided in this report. Analytical results for the former SP-4 spring location are provided in Section 6 below. Analytical results for the SP-5 Spring Water Remediation System are discussed in Section 8 of this report.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 3, Quarter Number 2 monitoring round are summarized in Tables 1 and 2. As shown in Table 1, surface water quality at SP-4 remains consistent with prior rounds of analytical data. Specifically, TVOCs at this location remained stable at 1.4 ug/L. The data continue to indicate that the SP-4 spring location remedial construction was successful in preventing surface water impacts caused by the former SP-4 spring.

In accordance with the LTM Plan monitoring schedule, surface water quality at F-6 was not conducted during Operational Year 3, Quarter Number 2.

7. Groundwater Remediation System Performance

The following section describes the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 3, Quarter Number 2.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 3, Quarter Number 2.

7.1.1 Summary of Operation, Maintenance, and Monitoring

During Operational Year 3, Quarter Number 2, the PT system operated continuously with only a few system shutdowns while on-site to conduct routine OM&M.

PT system OM&M was conducted on March 23, 2005 and included operation and maintenance of system equipment, the collection of system performance samples (water and vapor), and recording system operating parameters. Table 3 provides a summary of the recorded system operating parameters. As shown in Table 3, the total influent groundwater recovery rate was approximately 0.35-gallon per minute (gpm),

with individual recovery rates of 0.01-gpm, 0.18-gpm, and 0.17-gpm for production wells GMPW-3, GMPW-4, and GMPW-5, respectively. The average individual recovery rate for GMPW-3 continued to be reduced during Operational Year 3, Quarter Number 2 when compared to previous performance data. Based on troubleshooting activities performed during the current reporting period, ARCADIS believes that the decline in production is a result of well screen fouling, or similar well condition problem. The average recovery rate of production wells GMPW-4 and GMPW-5 was slightly lower when compared to previous operation. Similar to GMPW-3, ARCADIS believes that the decreased pumping capacity observed at GMPW-4 and GMPW-5 is a result of well screen fouling, or a similar well condition. Accordingly, well maintenance (i.e. inspection and redevelopment) will be scheduled for the near future (see Section 10). A total of 52,968 gallons of groundwater were recovered during the reporting period and a total of 874,278 gallons of groundwater have been recovered since system startup. The low profile air stripper operated slightly below the design specifications and had a blower discharge pressure of 9.0-inches of water column (i.w.c.) and a low profile air stripper blower flowrate of 56 standard cubic feet per minute (scfm). However, as described below, the reduced air flow rate did not have a negative impact on the effluent water quality.

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 3, Quarter Number 2 was conducted on March 23, 2005. As discussed previously, five groundwater samples and one vapor sample were collected. Groundwater samples included collection of individual production 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 4 provides a summary of the PT system performance groundwater sampling analytical results. As shown in Table 4, all groundwater VOCs were treated to below their respective Best Professional Judgment (BPJ) limits via the low profile air stripper. The total iron concentration after the cartridge filter was below the respective recommended daily maximum BPJ limit and slightly above the recommended daily average BPJ limit. Based on the total groundwater recovered during the reporting period and total influent groundwater concentration, an estimated 0.17 pounds (lbs) of VOC mass were removed from the subsurface during the quarterly reporting period, as shown in Table 5. A total of approximately 1.50 lbs of VOCs have been removed from the subsurface since system startup.

Table 6 provides a summary of the PT system performance vapor sampling analytical results. As shown in Table 6, low concentrations of cis-1, 2-dichloroethylene (50 parts per billion by volume [ppbv]), 1,1-dichloroethane (30 ppbv), 1,1,1-trichloroethane (16 ppbv), and trichloroethylene (26 ppbv) were detected above the detection limit in the air stripper effluent vapor sample. To be conservative, a NYSDEC DAR-1 air model was calculated using the actual analytical data for detected constituents or the detection limit of all constituents, which were not detected but have historically been detected in the influent groundwater. All COCs were below their respective short-term guidance concentrations (SGCs) and annual guidance 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 December 22, 2003.

7.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 3, Quarter Number 2.

7.2.1 Summary of Operation, Maintenance, and Monitoring

System operation during Operational Year 3, Quarter Number 2 had occasional interruptions due to troubleshooting of system alarms and replacement of system components. Specifically, the following alarms and troubleshooting activities caused intermittent operation:

- The injection beginning January 18, 2005 was interrupted due to level switch malfunctions on both the PT and the ARI systems.
- On February 1, 2005, it was noted that the molasses pump motor required replacement.
- The molasses pump motor was replaced on February 26, 2005 and the ARI system was restarted.
- On March 7, 2005, the ARI system shut down due to a low molasses flow alarm.
- Molasses was delivered on March 23, 2005 and the ARI system was restarted.

Despite these interruptions in operation, sufficient molasses solution was delivered to the subsurface to maintain the existing reducing environment.

ARI system OM&M was conducted during the Operational Year 3, Quarter Number 2 OM&M site visit on March 23, 2005 and included operation and maintenance of system equipment. In addition, ARI system operating parameters were recorded during each automated injection event. Due to the troubleshooting activities referenced previously, one automated injection was conducted during Operational Year 3, Quarter Number 2. Based on the number of injection events, quantity of molasses solution delivered to each injection well, and molasses solution percentage, approximately 2,720-gallons of molasses solution was delivered to the subsurface during Operational Year 3, Quarter Number 2. A total of 58,544 gallons of molasses solution has been delivered since system startup. Appendix C provides a summary of the recorded system operating parameters for each of the injection events for this period.

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted on March 23, 2005. As discussed previously, this event consisted of measuring field parameters and sampling of select monitoring wells under the environmental effectiveness monitoring program. The analytical results were also utilized to determine the effectiveness of the ARI system.

Analytical results and field parameters indicate that geochemical conditions in the current area of ARI system influence are strongly reducing and that VOC mass is currently being degraded at an enhanced rate. Key observations are as follows:

- The TOC concentration at GMMW-5 (224 mg/L) remains significantly above baseline conditions, which indicates that sufficient organic carbon is being delivered to the subsurface to maintain the IRZ.
- The methane concentration in monitoring well GMMW-5 increased to 17,000 micrograms per liter (ug/L).
- The methane concentration in monitoring well GMMW-6 increased to 2,500 ug/L.
- The ethene concentration in monitoring well GMMW-5 increased to 36,000 nanograms per liter (ng/L).

- The ethene concentration in monitoring well GMMW-6 remained elevated at 140,000 ng/L.

As referenced previously, TVOC concentrations remained stable at 576 ug/L within well GMMW-5 when comparing Operational Year 3, Quarter Number 2 data to Operational Year 3, Quarter Number 1 data. TVOC concentrations decreased from 1,378 ug/L to 967 ug/L within well GMMW-6 when making the same comparison. Accordingly, the total concentration of PCE and its respective daughter compounds (i.e., TCE, 1,2-DCE, and VC) at well GMMW-6 are approximately 65-percent lower than baseline (pre-injection) conditions. Figure D-1 (see Appendix D) presents a summary of groundwater data for monitoring well GMMW-6 since the baseline monitoring event conducted in July 2002. As shown on Figure D-1, the decline in contaminant mass (primarily 1,2-DCE) corresponds to a significant increase in methane and degradation end product (ethene). This trend is typical for successful IRZs.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on March 25, 2005 in accordance with the LTM Plan Addendum for Spring Water Remediation Systems (ARCADIS 2003). SP-5 remediation system analytical results are provided in Table 7. As shown in Table 7, all effluent COCs were treated to below their respective BPJ limits via the LPGAC. Influent TVOC analytical data (77.0 ug/L) remained consistent with historical analytical data. Table 8 contains the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 3, Quarter Number 2. As shown in Table 8, the SP-5 remedial system treated approximately 165,222 gallons of spring water during the operating period. An estimated 0.11 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 562,329 gallons of spring water has been treated and an estimated 0.42 lbs of VOC mass has been recovered since system startup. As referenced previously, the discharge flow rate was inadvertently not measured during the current reporting period. Accordingly, a discharge flow rate of 0.94 gpm was assumed for calculation purposes. This value represents a geometric average of the discharge flow rates recorded during the Operational Year 3, Quarter Number 1 and Quarter Number 3.

9. Conclusions

Based on the data obtained from the Operational Year 3, 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. TVOC analytical results in monitoring well GMMW-6 decreased significantly during the operational quarter while the concentration of methane and ethene remained elevated. Currently, the total concentration of PCE and its respective daughter compounds (i.e., TCE, 1,2-DCE, and VC) are approximately 65-percent lower than baseline (pre-injection) conditions.

- The Groundwater Remediation System operated continuously during the reporting period with intermittent system shutdowns for OM&M activities and due to minor mechanical problems. Similar to the Operational Year 3, Quarter Number 1 operating period, the recovery rate in production well GMPW-3 remained lower than historical operation. ARCADIS believes that the reduced performance is related to fouling of the well screen, or a similar well condition problem.

- The PT system is operating as designed and is treating recovered groundwater VOCs and total iron to below BPJ limits prior to discharge.

- The ARI system is operating as designed and has established an anaerobic IRZ in the vicinity of and downgradient of the injection wells.

- The SP-5 Spring Water Remediation System is operating as designed and is treating recovered spring water VOCs to below BPJ limits prior to discharge.

10. Recommendations

Perform well maintenance (inspection and redevelopment) on each of the recovery wells, as necessary.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted on the quarterly schedule set forth in the LTM Plan. Performance monitoring of the Groundwater Remediation System will also be performed consistent with the LTM Plan. ARCADIS intends to perform well maintenance on each of the recovery wells during installation of the proposed monitoring well upgradient of the injection transect. This work has been tentatively scheduled for July/August 2005.

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 (Site Number 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

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	GMMW-02 12/8/04	GMMW-02 3/24/05	GMMW-05 12/7/04	GMMW-05 3/24/05	GMMW-06 12/9/04	GMMW-06 3/24/05	GMMW-06* 3/24/05	PW-03 9/22/04	PW-03 3/23/05	PW-04 12/9/04	PW-04 3/24/05
1,1,1-Trichloroethane		**62**	**57**	<10	<10	<10	<10	<10	**13**	**13**	**22**	**18**
1,1,2-Trichloroethane		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
1,1-Dichloroethane		**120**	**120**	**110**	**150**	**520**	**390**	**360**	**34**	**37**	**16**	**13**
1,1-Dichloroethene		**2.3**	**2.8**	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
1,2-Dichloroethane		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
1,2-Dichloropropane		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
Benzene		**3.6**	**3.6**	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
Chlorobenzene		**44**	**38**	**17**	**25**	**38**	**31**	**29**	<1.0	<1	<1	<1
Chloroethane		**38**	**40**	**90**	**190**	**250**	**190**	**170**	**9.1**	**9.6**	**4.6**	**4.6**
Chloroform		<1	<1	<10	<10	<10	<10	<10	**1.4**	**1.7**	**1.7**	**1.6**
cis-1,2-Dichloroethene		**150**	**150**	**360**	**180**	**290**	**170**	**160**	**32**	**42**	**15**	**15**
Dichlorodifluoromethane		**1.5**	<1	<10	<10	<10	<10	<10	<1.0	<1	**2.0**	<1
Ethylbenzene		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
Methylene chloride		<2.0	**1.9**	<10	<10	**21**	**16**	**15**	**2.6**	**2**	<1	<1
Methyl tert-butyl ether		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
Naphthalene		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
o-Xylene		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
Tetrachloroethene		<1	<1	<10	<10	**13**	<10	<10	**2.6**	**2.7**	<1	<1
Toluene		<1	<1	<10	<10	<10	<10	<10	<1.0	<1	<1	<1
trans-1,2-Dichloroethene		**2**	<1	<10	<10	<10	<10	<10	<1.0	<1	**1.8**	<1
Trichloroethene		**110**	**90**	<10	<10	**16**	<10	<10	**17**	**23**	**28**	**20**
Vinyl chloride		**21**	**20**	<10	**31**	**230**	**170**	**150**	<1.0	<1	<1	<1
Total VOCs		**554**	**523**	**577**	**576**	**1,378**	**967**	**884**	**111.7**	**131**	**91.1**	**72.2**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	PW-05 9/23/04	PW-05 3/25/05	W-05 12/8/04	W-05 3/24/05	W-06 9/21/04	W-06 3/22/05	W-07 9/21/04	W-07 3/23/05	W-16S 9/22/04	W-16S 3/23/05	W-18 9/23/04
1,1,1-Trichloroethane		<1.0	<1	**2**	**2.4**	<1.0	<1	<1.0	<1	<1.0	<1	**3.3**
1,1,2-Trichloroethane		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
1,1-Dichloroethane		**2.8**	**5.7**	**97**	**91**	**32**	**31**	**3.4**	**3.6**	**22**	**23**	**2.6**
1,1-Dichloroethene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
1,2-Dichloroethane		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
1,2-Dichloropropane		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Benzene		<1.0	<1	**3.8**	**3.3**	**4.4**	**4.8**	<1.0	<1	**2.9**	**3.1**	<1.0
Chlorobenzene		<1.0	<1	**23**	**23**	**11**	**13**	**5.7**	**3.8**	**22**	**24**	<1.0
Chloroethane		<1.0	**1.4**	**87**	**63**	**8.0**	**7.4**	**5.5**	**2.8**	**12**	**11**	<1.0
Chloroform		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
cis-1,2-Dichloroethene		**35**	**60**	**7.8**	**14**	**5.5**	**8.5**	<1.0	<1	**1.6**	<1	**1.8**
Dichlorodifluoromethane		<1.0	<1	**1.4**	<1	**2.9**	<1	<1.0	<1	**1.4**	<1	<1.0
Ethylbenzene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Methylene chloride		<1.0	<1	<2.8	**1.8**	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Methyl tert-butyl ether		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Naphthalene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
o-Xylene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Tetrachloroethene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Toluene		<1.0	<1	**1.4**	**2.1**	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
trans-1,2-Dichloroethene		<1.0	<1	<1	<1	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Trichloroethene		**1.5**	**2.8**	**5.9**	**7.4**	**3.9**	**5.5**	**1.0**	**1.1**	**1.7**	**2.1**	**6.4**
Vinyl chloride		<1.0	**2.3**	**16**	**23**	<1.0	<1	<1.0	<1	<1.0	<1	<1.0
Total VOCs		**39.3**	**72.2**	**245**	**231**	**67.7**	**70.2**	**15.6**	**11.3**	**63.6**	**63.2**	**14.1**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	W-18 3/22/05	SP-4[1] 12/7/04	SP-4[1] 3/25/05	FBMW32205 3/22/05	FBSP32405 3/24/05	TRIP BLANK 3/22/05	TRIP BLANK 3/24/05	TRIP BLANK 3/25/05
1,1,1-Trichloroethane		**7.1**	<1	<1	<1	<1	<1	<1	<1
1,1,2-Trichloroethane		<1	<1	<1	<1	<1	<1	<1	<1
1,1-Dichloroethane		**6**	**1.2**	**1.4**	<1	<1	<1	<1	<1
1,1-Dichloroethene		<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane		<1	<1	<1	<1	<1	<1	<1	<1
1,2-Dichloropropane		<1	<1	<1	<1	<1	<1	<1	<1
Benzene		<1	<1	<1	<1	<1	<1	<1	<1
Chlorobenzene		<1	<1	<1	<1	<1	<1	<1	<1
Chloroethane		<1	<1	<1	<1	<1	<1	<1	<1
Chloroform		<1	<1	<1	<1	<1	<1	<1	<1
cis-1,2-Dichloroethene		**4.2**	<1	<1	<1	<1	<1	<1	<1
Dichlorodifluoromethane		<1	<1	<1	<1	<1	<1	<1	<1
Ethylbenzene		<1	<1	<1	<1	<1	<1	<1	<1
Methylene chloride		<1	<1	<1	<1	<1	<1	<1	<1
Methyl tert-butyl ether		<1	<1	<1	<1	<1	<1	<1	<1
Naphthalene		<1	<1	<1	<1	<1	<1	<1	<1
o-Xylene		<1	<1	<1	<1	<1	<1	<1	<1
Tetrachloroethene		<1	<1	<1	<1	<1	<1	<1	<1
Toluene		<1	<1	<1	<1	<1	<1	<1	<1
trans-1,2-Dichloroethene		<1	<1	<1	<1	<1	<1	<1	<1
Trichloroethene		**8.7**	<1	<1	<1	<1	<1	<1	<1
Vinyl chloride		<1	<1	<1	<1	<1	<1	<1	<1
Total VOCs		**26.0**	**1.2**	**1.4**	**0.0**	**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.

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

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

Parameters	Sample ID: / Date:	GMMW-02 12/8/04	GMMW-02 3/24/05	GMMW-05 12/7/04	GMMW-05 3/24/05	GMMW-06 12/7/04	GMMW-06 12/9/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	--	**0.0548**	--	**187**	--	--
Manganese, Dissolved	mg/L	--	**0.032**	--	**7.38**	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	--	**23.6**	--	**21.8**	--	--
Nitrogen, Nitrate (As N)	mg/L	--	<0.1	--	<0.1	--	--
Nitrogen, Nitrite	mg/L	--	<0.1	--	**1.54**	--	--
Total Organic Carbon	mg/L	<2.0	<2.0	**102**	**224**	--	**57.9**
Sulfate	mg/L	--	**7.26**	--	<1	--	--
Sulfide (field)	mg/L	**0.031**	**0.21**	**0.096**	**0.398**	**0.073**	--
Iron (field)	mg/L	**0.09**	--	**1.84**	--	**1.17**	--
FIELD PARAMETERS							
pH	Standard units	**6.02**	**7.29**	**5.9**	**8.12**	**6.21**	--
Specific Conductance	mmhos/cm	**56**	**0.587**	**74.5**	**1.335**	**0.149**	--
Turbidity	NTU	**189**	**36**	**115**	--	**93.3**	--
Dissolved Oxygen	mg/L	**2.13**	**4.13**	**0.49**	**2.99**	**0.7**	--
Temperature	deg C	**11.15**	**10.75**	**12.59**	**8.29**	**10.69**	--
ORP	mV	**116**	**102.4**	**-53**	**-31**	**-61**	--
DISSOLVED GASES							
Carbon dioxide	mg/L	--	**220**	--	**290 J**	--	--
Carbon monoxide	mg/L	--	<0.40	--	<0.40 J	--	--
Ethane	ng/L	--	**480**	--	<5.0 J	--	--
Ethene	ng/L	--	**2,800**	--	**36,000 J**	--	--
Methane	ug/L	--	**1,000**	--	**17,000 J**	--	--
Nitrogen	mg/L	--	**22**	--	**17 J**	--	--
Oxygen	mg/L	--	**4.8**	--	**2.5 J**	--	--

1 Spring water sample
2 Surface water sample
* Duplicate sample

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 Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	GMMW-06 3/24/05	PW-03 9/22/04	PW-03 3/23/05	PW-04 12/8/04	PW-04 3/24/05	PW-05 9/23/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	**13.9**	--	--	--	**0.0436**	--
Manganese, Dissolved	mg/L	**4.16**	--	--	--	**0.00998**	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	**14.8**	--	--	--	**443**	--
Nitrogen, Nitrate (As N)	mg/L	<0.1	--	--	--	**1.2**	--
Nitrogen, Nitrite	mg/L	**0.306**	--	--	--	<1	--
Total Organic Carbon	mg/L	**7.09**	<2.0	<2.0	<2.0	<2.0	<2.0
Sulfate	mg/L	**1.08**	--	--	--	**4.06**	--
Sulfide (field)	mg/L	**0.27**	**0.026**	**0.034**	**0.061**	**0.02**	**0.046**
Iron (field)	mg/L	--	--	--	**0.17**	--	--
FIELD PARAMETERS							
pH	Standard units	**8.22**	**6.25**	**6.43**	**5.6**	**6.53**	**8.06**
Specific Conductance	mmhos/cm	**1.291**	**3.36**	**0.588**	**57.4**	**1.657**	**0.239**
Turbidity	NTU	**45**	**65**	--	**42.7**	--	--
Dissolved Oxygen	mg/L	**2.76**	**4.22**	**13.42**	**3.44**	**7.59**	**0.38**
Temperature	deg C	**6.2**	**27.22**	**6.46**	**12.91**	**9.50**	**10.32**
ORP	mV	**20.4**	**145**	**97.5**	**171**	**112.3**	**-76**
DISSOLVED GASES							
Carbon dioxide	mg/L	**240 J**	**200**	--	--	**210**	**1.7**
Carbon monoxide	mg/L	<0.40 J	<0.40	--	--	<0.40	<0.40
Ethane	ng/L	**2,300 J**	**32**	--	--	**63**	**9.0**
Ethene	ng/L	**140,000 J**	**39**	--	--	**140**	**360**
Methane	ug/L	**2,500 J**	**3.3**	--	--	**28**	**3.2**
Nitrogen	mg/L	**25 J**	**17**	--	--	**23**	**21**
Oxygen	mg/L	**3.4 J**	**6.7**	--	--	**5.2**	**3.4**

[1] Spring water sample
[2] Surface water sample
[*] Duplicate sample

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 Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	PW-05 3/25/05	W-05 12/8/04	W-05 3/24/05	W-06 9/21/04	W-06 3/22/05	W-07 9/21/04
	UNITS						
METALS							
Iron, Dissolved	mg/L	--	--	**33.9**	--	--	--
Manganese, Dissolved	mg/L	--	--	**3.31**	--	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--		--	--	--
Chloride	mg/L	--	--	**19.5**	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	<0.1	--	--	--
Nitrogen, Nitrite	mg/L	--	--	<0.1	--	--	--
Total Organic Carbon	mg/L	<2.0	<2.0 J	**4.24**	<2.0	<2.0	<2.0
Sulfate	mg/L	--	--	**2.09**	--	--	--
Sulfide (field)	mg/L	**0.045**	**0.236**	**0.024**	**0.128**	**0.098**	**0.004**
Iron (field)	mg/L	--	**1.96**	--	--	--	--
FIELD PARAMETERS							
pH	Standard units	**7.41**	**6.24**	**7.94**	**5.93**	**6.93**	**5.88**
Specific Conductance	mmhos/cm	**0.24**	**78.6**	**0.738**	**0.563**	**0.546**	**0.482**
Turbidity	NTU	--	**186**	--	**12**	--	**11**
Dissolved Oxygen	mg/L	**1.11**	**1.69**	**8.14**	**1.29**	**6.13**	**0.00**
Temperature	deg C	**8.75**	**11.04**	**9.68**	**15.13**	**12.42**	**17.77**
ORP	mV	**119.9**	**-79**	**-10.8**	**-6.5**	**25**	**29**
DISSOLVED GASES							
Carbon dioxide	mg/L	--	--	**200 J**	--	--	--
Carbon monoxide	mg/L	--	--	<0.40 J	--	--	--
Ethane	ng/L	--	--	**13,000 J**	--	--	--
Ethene	ng/L	--	--	**11,000 J**	--	--	--
Methane	ug/L	--	--	**1,200 J**	--	--	--
Nitrogen	mg/L	--	--	**23 J**	--	--	--
Oxygen	mg/L	--	--	**2.8 J**	--	--	--

1	Spring water sample
2	Surface water sample
*	Duplicate sample
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	Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	W-07 3/23/05	W-16S 9/22/04	W-16S 3/23/05	W-18 9/23/04	W-18 3/22/05
	UNITS					
METALS						
Iron, Dissolved	mg/L	--	--	--	--	--
Manganese, Dissolved	mg/L	--	--	--	--	--
GENERAL CHEMISTRY						
Bromide	mg/L	--	--	--	--	--
Chloride	mg/L	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--
Total Organic Carbon	mg/L	<2.0	<2.0	<2.0	**2.15**	<2.0
Sulfate	mg/L	--	--	--	--	--
Sulfide (field)	mg/L	**0.116**	0	**0.013**	**0.006**	**0.342**
Iron (field)	mg/L	--	--	--	--	--
FIELD PARAMETERS						
pH	Standard units	**6.79**	**6.25**	**6.45**	**6.05**	**6.66**
Specific Conductance	mmhos/cm	**0.489**	**0.463**	**0.453**	**0.166**	**0.226**
Turbidity	NTU	--	--	--	**3.9**	**<20**
Dissolved Oxygen	mg/L	**3.00**	**5.2**	**4.38**	**8.64**	**10.78**
Temperature	deg C	**9.82**	**18.79**	**6.66**	**15.13**	**6.8**
ORP	mV	**36.9**	**137**	**94.4**	**147.6**	**108.4**
DISSOLVED GASES						
Carbon dioxide	mg/L	--	**170**	--	**72**	--
Carbon monoxide	mg/L	--	<0.40	--	<0.40	--
Ethane	ng/L	--	**390**	--	**22**	--
Ethene	ng/L	--	**260**	--	**29**	--
Methane	ug/L	--	**970**	--	**3.6**	--
Nitrogen	mg/L	--	**15**	--	**19**	--
Oxygen	mg/L	--	**6.7**	--	**8.1**	--

1 Spring water sample
2 Surface water sample
* Duplicate sample

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 Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	UNITS	SP-4[2] 12/7/04	SP-4[2] 3/25/05
METALS				
Iron, Dissolved		mg/L	--	--
Manganese, Dissolved		mg/L	--	--
GENERAL CHEMISTRY				
Bromide		mg/L	--	--
Chloride		mg/L	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--
Nitrogen, Nitrite		mg/L	--	--
Total Organic Carbon		mg/L	--	--
Sulfate		mg/L	--	--
Sulfide (field)		mg/L	--	--
Iron (field)		mg/L	--	--
FIELD PARAMETERS				
pH		Standard units	**6.76**	--
Specific Conductance		mmhos/cm	**10.1**	--
Turbidity		NTU	**48.2**	--
Dissolved Oxygen		mg/L	**15.49**	--
Temperature		deg C	**2.77**	--
ORP		mV	**64**	--
DISSOLVED GASES				
Carbon dioxide		mg/L	--	--
Carbon monoxide		mg/L	--	--
Ethane		ng/L	--	--
Ethene		ng/L	--	--
Methane		ug/L	--	--
Nitrogen		mg/L	--	--
Oxygen		mg/L	--	--

1	Spring water sample
2	Surface water sample
*	Duplicate sample
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	Qualifier assigned to analytical data indicating result is estimated.

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Table 3. PT System Operating Parameters, Operational Year 3, 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 Effluent Totalizer FQI-401 (gallons)	Flow Measurements: Water Bypass Totalizer FQI-402 (gallons)	Flow Measurements: GMPW-3 Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4 Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5 Totalizer FQI-103 (gallons)
12/9/2004	3:30 PM	9.0	166	821,310.4	742,310.3	353,036.9	218,428.3	269,021.4
3/23/2005	3:43 PM	9.0	58	874,278.3	786,844.6	354,557.9	244,855.8	294,826.2
		Average Daily Flowrate (gpm) =		**0.35**	**0.30**	**0.01**	**0.18**	**0.17**
		Total Groundwater Recovered During Reporting Period (gallons) =		**52,968**	**44,534**	**1,521**	**26,427**	**25,805**

Notes:

gpm	Gallons per minute.
i.w.c.	Inches of water column.
scfm	Standard cubic feet per minute.

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Table 4. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 3, 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	EFFLUENT AC II
		Date:	3/23/2005	3/23/2005	3/23/2005	3/23/2005	3/23/2005
1,1,1-Trichloroethane	10-20		**67**	**74**	**64**	**71**	<1
1,1,2-Trichloroethane	10		<1	<1	<1	<1	<1
1,1-Dichloroethane	10		**56**	**100**	**66**	**85**	<1
1,1-Dichloroethene	10		**3.8**	**4.6**	**3.6**	**4.1**	<1
1,2-Dichloroethane	10-30		<1	<1	<1	<1	<1
1,2-Dichloropropane	NA		<1	<1	<1	<1	<1
Benzene	5		**4.8**	**7.2**	**5.1**	**6.1**	<1
Chlorobenzene	NA		<1	**4.5**	<1	**2.7**	<1
Chloroethane	NA		**13**	**26**	**16**	**27**	<1
Chloroform	NA		<1	**1.1**	<1	1	<1
cis-1,2-Dichloroethene	10		**88**	**140**	**99**	**120**	**1.9**
Dichlorodifluoromethane	NA		<1	<1	<1	<1	<1
Ethylbenzene	5		<1	<1	<1	<1	<1
Methylene Chloride	10-50		**4.5**	**5.2**	**4.8**	**4.9**	<1
Methyl tert-butyl ether	50		<1	<1	<1	<1	<1
Naphthalene	10		<1	<1	<1	<1	<1
o-Xylene	5		<1	<1	<1	<1	<1
Tetrachloroethene	10		<1	<1	<1	<1	<1
Toluene	5		<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	10-50		<1	<1	<1	<1	<1
Trichloroethene	10		**59**	**110**	**67**	**90**	**1.3**
Vinyl Chloride	10-50		**8**	**29**	**10**	**20**	<1
Total VOCs			**304**	**502**	**336**	**432**	**3.2**

Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)					
Total Iron	1.2 / 0.61	**0.262**	**1.07**	**0.478**	**0.561**	**0.76**

See Notes on Last Page.

Table 4. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 3, 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.
AC	After Cartridge Filter.
BC	Before Cartridge Filter.
PT	Pump and Treat.
--	Not Analyzed or Collected.
<	Analyte Below Detection Limit.

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Table 5. PT System Mass Removal Rate of Volatile Organic Compounds, Operational Year 3, 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)
12/9/2004	353	821,310.4	NA	NA	NA
3/23/2005	432	874,278.3	52,967.9	391	0.17
			Total Estimated Mass Removed During Operational Year 3, Quarter Number 2 (lbs) =		**0.17**
			Total Estimated Mass Removed Since System Startup (lbs) =		**1.50**

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 6. Concentrations of Volatile Organic Compounds Detected in Air Stripper Effluent, Operational Year 3, Quarter Number 2, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Compounds	CAS Numbers	Sample ID: Effluent Date Sampled: 3/23/2005 ppbv
Vinyl Chloride	75-01-4	<7.3
Chloroethane(Ethyl Chloride)	75-00-3	<7.3
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	<7.3
Methylene Chloride(Dichloromethane)	75-09-2	<7.3
1,1-Dichloroethane	75-34-3	**30**
cis-1,2-Dichloroethylene	156-59-2	**50**
Chloroform	67-66-3	<7.3
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	**16**
Benzene	71-43-2	<7.3
Trichloroethene	79-01-6	**26**
Toluene	108-88-3	<7.3
Ethyl benzene	100-41-4	<7.3
m,p-Xylene	108-38-3/106-42-3	<7.3
o-Xylene	95-47-6	<7.3
1,2,4-Trimethylbenzene	95-63-6	<7.3
2-Propanol (Isopropyl alcohol)	67-63-0	<7.3
Dichlorodifluoromethane(Freon 12)	75-71-8	<7.3

ppbv: parts per billion by volume

Notes/Assumptions:

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 USEPA Method TO-14A.

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Table 7. Concentrations of Volatile Organic Compounds Detected in Aqueous Samples Collected from the SP-5 Spring Water Remediation System, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	SP-5 INF. 3/25/2005	SP-5 EFF. 3/25/2005
VOCs (units in ug/L)				
1,1,1-Trichloroethane	10		<1	<1
1,1-Dichloroethane	10		**33**	<1
1,2-Dichloroethane	10-100		<1	<1
Benzene	5		**2.8**	<1
Chlorobenzene	10-25		**28**	<1
Chloroethane	10		**9**	**3.8**
cis-1,2-Dichloroethene	10		**1.7**	<1
Dichlorodifluoromethane	NA		<1	<1
Ethylbenzene	5		<1	<1
Toluene	5		<1	<1
trans-1,2-Dichloroethene	10-100		<1	<1
Trichloroethene	10		**2.5**	<1
Vinyl Chloride	10		<1	<1
Total VOCs			**77.0**	**3.8**

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.

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 8. Spring Water Remediation System Mass Removal Rate of Volatile Organic Compounds, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Date Sampled	Total VOC Influent Concentration (ug/L)	Effluent Flowrate[4] (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)
12/9/2004	76.4	1.24	0.19	NA	NA	NA
3/25/2005	77.0	0.94	NR	165,222	76.7	0.11
					Total Estimated Mass Removed During Quarter (lbs) =	**0.11**
					Total Estimated Mass Removed Since System Startup (lbs) =	**0.42**
					Total Effluent Treated to Date (gallons) =	**562,329**

Notes:

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

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. Discharge flow rate was not measured during the current reporting period. The flow rate was calculated based on the geometric average of the discharge flow rates recorded during the Operational Year 3, Quarter Number 1 and Quarter Number 3.

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: MY000941.0018
Task: 15003A
Well ID: GMMW-2
Date: 12.24.05
Sampled By: GW FM
Sampling Time: 11:25 AM
Recorded By: GW FM
Weather: —
Coded Replicate No.: N/A

Instrument Identification

Water Quality Meter(s): —
Serial #: —

Purging Information

Casing Material: PVC
Purge Method: Rediflow Pump
Casing Diameter: 2"
Screen Interval (ft bmp): Top 45 Bottom 55
Sounded Depth (ft bmp): 60
Pump Intake Depth (ft bmp): 50
Depth to Water (ft bmp): 46.18
Purge time Start: 10:55 AM Finish: 11:25 AM

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
10:55	—	—	—	7.04	6.64	0.010	108.3	15.55	—	46.18	—
11:00	—	—	—	7.04	6.64	0.010	108.3	15.54	—	—	—
11:05	—	—	—	7.04	6.64	0.010	108.3	15.54	—	42.75	—
11:10	—	—	—	10.70	7.29	.563	101.1	6.29	60	—	—
11:15	—	—	—	10.79	7.31	.574	101.7	4.59	—	42.752	—
11:20	—	—	—	10.86	7.29	.585	102.1	4.26	—	—	—
11:25	—	—	—	10.75	7.29	.587	102.4	4.12	36	—	—
					.21						
					52·	.21 ms/c					

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000949.0018 Task: 00034 Well ID: PW-3
Date: 3-23-05 Sampled By: CW
Sampling Time: 2135pm Recorded By: (CW)
Weather: — Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): — Serial #: —

Purging Information
Casing Material: PVC Purge Method: Peristaltic Pump
Casing Diameter: 2" Screen Interval (ft bmp): Top 4.7 Bottom 29.7
Sounded Depth (ft bmp): 29.7 Pump Intake Depth (ft bmp):
Depth to Water (ft bmp): 10.61 Purge time Start: 2105 pm Finish: 2135pm

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
2105	—	500	—	5.37	6.62	.582	100.	12.64	60	10.61	—
2110	—	—	—	5.99	6.54	.595	99.9	12.12	—	—	—
2115	—	—	—	6.09	6.52	.587	98.1	11.90	—	—	—
2120	—	350	—	6.15	6.50	.587	97.3	12.20	—	14.63	—
2125	—	—	—	6.48	6.49	.585	97.0	13.24	—	14.82	—
2130	—	—	—	6.47	6.47	.587	97.1	13.30	—	—	—
2135	—	—	—	6.46	6.43	.588	97.5	13.42	—	—	—
					SET .034 mg/L						

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY001949.0018 Task: 0003A Well ID: PW-4

Date: 3-24-05 Sampled By: GW

Sampling Time: 10:15 AM Recorded By: ~~GW~~ FM

Weather: — Coded Replicate No.: N/A

Instrument Identification

Water Quality Meter(s): — Serial #: —

Purging Information

Casing Material: PVC Purge Method: Rediflow Pump

Casing Diameter: 2" Screen Interval (ft bmp): Top 8 Bottom 23

Sounded Depth (ft bmp): 23 Pump Intake Depth (ft bmp): —

Depth to Water (ft bmp): — Purge time Start: 9:45 AM Finish: 10:15 AM

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
9:45	—	—	—	7.75	6.49	1.574	113.6	10.51	—	—	—
9:50	—	—	—	7.15	6.67	1.677	117.[illegible]	~~[illegible]~~ 9.55	—	18.0	—
9:55	—	—	—	7.99	6.64	1.721	116.7	7.99	—	—	—
10:00	—	—	—	8.95	6.64	1.727	114.3	7.17	45	18.07	—
10:05	—	—	—	9.45	6.66	1.190	115.7	7.94	—	—	—
10:10	—	—	—	9.46	6.57	1.77	117.8	7.46	25	—	—
10:15	—	—	—	9.50	6.53	1.657	112.3	7.59	—	18.05	—
					[illegible]	[illegible] mg/L					

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading: —

Comments: —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000949.0018 Task: 0003A Well ID: PW-5
Date: 3-25-05 Sampled By: GW
Sampling Time: — Recorded By: GW
Weather: — Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): — Serial #: —

Purging Information
Casing Material: — Purge Method: Rediflow Pump
Casing Diameter: 2" Screen Interval (ft bmp): Top 4.7 Bottom 29.7
Sounded Depth (ft bmp): 29.7 Pump Intake Depth (ft bmp): —
Depth to Water (ft bmp): — Purge time Start: 9:30 AM Finish: 10:00 AM

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
9:30	—	—	—	7.56	7.04	.236	125.9	4.60	—	—	—
9:35	—	—	—	8.09	7.10	.230	123.7	2.11	—	7.40	—
9:40	—	—	—	8.77	7.19	.228	122.4	1.83	—	—	—
9:45	—	—	—	8.83	7.19	.228	121.6	1.61	—	—	—
9:50	—	—	—	8.79	7.36	.229	120.5	1.49	—	7.45	—
9:55	—	—	—	8.77	7.42	.232	119.8	1.42	—	—	—
10:00	—	—	—	8.75	7.41	.240	119.9	1.11	—	—	—
					5[2-]	0.045 mg/L					

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC	—	—	—
—	—	—	—
—	—	—	—

PID Reading: —

Comments: —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000949.0018 Task: 00034 Well ID: GM MW-5
Date: 3-24-05 Sampled By: G.W.
Sampling Time: 1:55pm Recorded By: GW/FM
Weather: — Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): — Serial #: —

Purging Information
Casing Material: PVC Purge Method: Redflow Pump
Casing Diameter: 2" Screen Interval (ft bmp): Top 53 Bottom 63
Sounded Depth (ft bmp): 68 Pump Intake Depth (ft bmp): 58
Depth to Water (ft bmp): 48.31 Purge time Start: 1:25pm Finish: 1:55pm

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
1:25	—	—	—	9.25	9.43	1.382	-53.0	4.41	—	48.31	—
1:30	—	—	—	9.31	9.17	1.317	-51.1	2.84	—	—	—
1:35	—	—	—	9.22	8.80	1.366	-44.7	2.90	—	—	—
1:40	—	—	—	7.62	8.35	1.348	-37.4	3.04	—	55.60	—
1:45	—	—	—	8.17	8.26	1.338	-31.2	2.99	—	—	—
1:50	—	—	—	8.14	8.18	1.336	-30.5	2.98	—	—	—
1:55	—	—	—	7.29	8.12	1.335	-31.0	2.99	—	—	—

.398 mS/L

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter: See COC Container: No. Preservative:

PID Reading —

Comments: Pump ran out of water from the battery. Let recover 10 min and purged.

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000944.0018
Date: 3-24-05
Sampling Time: —
Weather: —

Task: 0003A
Sampled By: GW
Recorded By: GW
Coded Replicate No.: N/A

Well ID: W-5

Instrument Identification

Water Quality Meter(s): —
Serial #: —

Purging Information

Casing Material: PVC
Casing Diameter: 2"
Sounded Depth (ft bmp): 58.50
Depth to Water (ft bmp): —

Purge Method: —
Screen Interval (ft bmp): Top — Bottom —
Pump Intake Depth (ft bmp): —
Purge time Start: — Finish: —

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
				9.62			-3	~~16.24~~			
						SC = 0.024 mS/cm					
				9.68	7.91	.738	-10.8	8.14			

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments: HAND BAILED AFTER DRYING WELL AND LETTING RECOVER

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000941.0012C Task: 02C37 Well ID: GMMW-6

Date: 3-24-05 Sampled By: —

Sampling Time: 12:35pm Recorded By: —

Weather: — Coded Replicate No.: N/A

Instrument Identification

Water Quality Meter(s): — Serial #: —

Purging Information

Casing Material: PVC Purge Method: Rediflow Pump

Casing Diameter: 2" Screen Interval (ft bmp): Top 40 Bottom 50

Sounded Depth (ft bmp): 50 Pump Intake Depth (ft bmp): 45

Depth to Water (ft bmp): 37.88 Purge time Start: 12:05 pm Finish: 12:35pm

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
12:05	—	400	—	8.24	8.50	1.344	-35	6.10	220	37.88	—
12:10	—	—	—	7.47	8.91	.343	3.4	3.33	200	—	—
12:15	—	—	—	6.67	8.70	.338	10.0	3.00	272	44.20	—
12:20	—	100	—	6.75	8.54	.326	14.1	2.89	85	—	—
12:25	—	—	—	6.09	8.40	.344	17.2	2.86	60	43.85	—
12:30	—	—	—	6.02	8.28	.314	19.6	2.79	50	—	—
12:35	—	—	—	6.20	8.22	.291	20.4	2.78	45	43.86	—
						S^2- .27 mg/L					

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000949.0018 Task: 00034 Well ID: W-6
Date: 5-23-05 Sampled By: GW
Sampling Time: 9:35AM Recorded By: GW
Weather: — Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): / Serial #: /

Purging Information
Casing Material: PVC Purge Method: Rediflow Pump
Casing Diameter: 2" Screen Interval (ft bmp): Top 44.5 Bottom 59.5
Sounded Depth (ft bmp): 59.5 Pump Intake Depth (ft bmp): /
Depth to Water (ft bmp): 48.38 Purge time Start: 9:00 AM Finish: 9:35AM

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
9:00	—	350	946	9.61	7.25	.569	48.5	10.57	—	48.38	—
9:05	—	"	—	9.79	7.51	.530	39.00	9.42	—	—	—
9:10	—	"	—	10.37	7.30	.495	36.5	9.52	—	52.55	—
9:15	—	"	—	11.07	7.10	.486	34.6	9.01	—	—	—
9:20	—	450	1692	12.20	7.40	.501	37.0	7.27	—	52.12	—
9:25	—	"	—	12.98	7.02	.518	23.9	6.04	—	—	—
9:30	—	"	—	12.5	6.95	.534	27.1	6.70	—	53.23	—
9:35	—	—	—	12.42	6.93	.546	25.6	6.13	—	52.95	—

Sample Condition Color: / Odor: / Appearance: /

Sample Collection

Parameter:	Container:	No.	Preservative:
See CoC			

PID Reading —

Comments /

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number:	N 000949.0018	Task:	0003A	Well ID:	W-7
Date:	3.22.05	Sampled By:	GW		
Sampling Time:	10:40 AM	Recorded By:	GW		
Weather:	Overcast 38	Coded Replicate No.:	N/A		

Instrument Identification

Water Quality Meter(s): — Serial #: —

Purging Information

Casing Material:	PVC	Purge Method:	Rediflow Pump		
Casing Diameter:	2"	Screen Interval (ft bmp):	Top 35	Bottom	50
Sounded Depth (ft bmp):	51.5	Pump Intake Depth (ft bmp):	—		
Depth to Water (ft bmp):	42.84	Purge time Start:	10:10 AM	Finish:	10:40 AM

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
10:10	—	500	—	7.46	7.00	.549	40.2	4.83	—	42.84	—
10:15	—	—	—	9.24	6.47	.357	77.5	3.73	—		—
10:20	—	350	—	9.85	6.64	.368	66.7	.331	—	46.00	—
10:25	—	—	—	10.04	6.63	.410	56.9	3.27	—	—	—
10:30	—	—	—	10.49	6.74	.431	45.2	3.23	—	45.81	—
10:35	—	—	—	10.24	6.78	.478	37.5	3.11	—	—	—
10:40	—	—	—	9.82	6.79	.489	34.7	3.00	—	—	—

Fe²⁺ 52 .116 = mg/L 5

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

G:\APROJECT\WHCS Melville\ERD Pilot Test\lowflowsampforms.xls-LoFlo-GW-Samp

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: N4000949.0018 Task: 0003A Well ID: GW-16S
Date: 3-23-15 Sampled By: GW
Sampling Time: 12:30pm Recorded By: GW
Weather: — Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): — Serial #: —

Purging Information
Casing Material: — Purge Method: —
Casing Diameter: — Screen Interval (ft bmp): Top — Bottom —
Sounded Depth (ft bmp): — Pump Intake Depth (ft bmp): —
Depth to Water (ft bmp): 10.10 Purge time Start: 12:00 Finish: 12:30pm

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
12:02	—	—	—	6.13	6.41	.451	95.1	8.62	10.10	10.10	—
12:05	—	—	—	6.42	6.44	.441	94.5	7.06	—	—	—
12:10	—	—	—	6.54	6.44	.449	94.2	6.41	—	—	—
12:15	—	—	—	6.6	6.45	.450	94.3	5.71	12.8	12.6	—
12:20	—	—	—	6.71	6.45	.452	94.3	4.79	12.25	12.25	—
12:25	—	—	—	6.66	6.45	.454	94.2	4.54	11.40	11.40	—
12:30	—	—	—	6.66	6.45	.453	94.4	4.32	—	—	—
						S^{2-} 0.013 mg/L					

Sample Condition Color: — Odor: — Appearance: —

Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NY000949.0018 Task: 0003A Well ID: W-185
Date: 13-27-05 Sampled By: GW
Sampling Time: 1150pm Recorded By: GW
Weather: CLEAR 50° Coded Replicate No.: N/A

Instrument Identification
Water Quality Meter(s): — Serial #: —

Purging Information
Casing Material: PVC Purge Method: Rediflow Pump
Casing Diameter: 2" Screen Interval (ft bmp): Top 7 Bottom 22
Sounded Depth (ft bmp): 23 Pump Intake Depth (ft bmp): —
Depth to Water (ft bmp): 12.14 Purge time Start: 1120pm Finish: 1150pm

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
1120	—	500	—	6.38	7.24	.238	111.6	12.67	—	12.14	—
1125	—	500	—	6.55	6.77	.223	113.7	10.99	—	—	—
1130	—	"	—	6.71	6.76	.222	112.1	10.88	—	12.27	—
1135	—	"	—	6.82	6.75	.223	109.9	10.77	—	—	—
1140	—	"	—	6.83	6.73	.226	107.9	10.75	—	—	—
1145	—	"	—	6.82	6.70	.226	108.0	10.77	—	12.29	—
1150	—	"	—	6.80	6.66	.226	108.4	10.78	<20	12.29	—
						SC = .342 mS/c					

Sample Condition Color: — Odor: — Appearance: —
Sample Collection

Parameter:	Container:	No.	Preservative:
See COC			

PID Reading —

Comments —

ARCADIS

Laboratory Task Order No./P.O. No. _____ **CHAIN-OF-CUSTODY RECORD** Page ____ of ____

Project Number/Name: NY000949.0018.00034

Project Location: COLLINSVILLE NY

Laboratory: ENCK LABS

Project Manager: STEVE FRIEDMAN

Sampler(s)/Affiliation: GW FM

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	ANALYSIS / METHOD / SIZE: 40ml VOA (HCl) VOC	250ml Plastic TOC (H2SO4)					Remarks	Total
FW-5	L	3-25-05		2	1						3
SW5-INF				2							2
SW-5 Eff				2							2
SW-4				2							2
TB 3-25-05				2							2
											11

Sample Matrix: L = Liquid; S = Solid; A = Air — Total No. of Bottles/ Containers

Relinquished by:	Organization: ARCADIS	Date 3/25/05	Time 1130	Seal Intact?	
Received by:	Organization:	Date / /	Time	Yes No N/A	
Relinquished by:	Organization:	Date / /	Time	Seal Intact?	
Received by:	Organization:	Date / /	Time	Yes No N/A	

Special Instructions/Remarks: REPORT TO DAVE STERN

Delivery Method: ☒ In Person ☐ Common Carrier _____ (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

AG 05-12/01

CHAIN - OF - CUSTODY RECORD

Phone: (412) 826-5245 | **Microseeps, Inc. - 220 William Pitt Way - Pittsburgh, PA 15238** | Fax No. : (412) 826-3433

Company : ARCADIS
Co. Address : 88 DUKE RD. - MELVILLE NY. 11747
Proj. Manager: STEVE THOMAS
Proj. Location: COLESVILLE NY.
Proj. Number: NY000949.0018.00003A
Phone # : (631-249-7601) **Fax # :** 631-249-7610

Sampler's signature : [signature]

Parameters Requested

Results to : DAVE STERN
88 DUKE RD

Invoice to : DAVE STERN
88 DUKE RD.

Cooler ID	Cooler Temp.

Sample ID	Sample Description	Date	Time	Comp.	Grab	# Cont.	CO_2 CO N_2 O_2 CH_4	ETHENE	ETHANE						Remarks
	PW-4 (AQ)	3-24-05			✓	2	✓	✓	✓						
	6m MW-2				✓	2	✓	✓	✓						
	6m MW-5				✓	2	✓	✓	✓						
	6m MW-6				✓	2	✓	✓	✓						
	W-5				✓	2	✓	✓	✓						

Relinquished by :	Company :	Date :	Time :	Received by :	Company :	Date :	Time :
[signature]	ARCADIS	3-24-05	5:00				
Relinquished by :	Company :	Date :	Time :	Received by :	Company :	Date :	Time :
Relinquished by :	Company :	Date :	Time :	Received by :	Company :	Date :	Time :

WHITE COPY : Accompany Samples YELLOW COPY : Laboratory File PINK COPY : Submitter

ARCADIS

Laboratory Task Order No./P.O. No. _____ **CHAIN-OF-CUSTODY RECORD** Page ____ of ____

Project Number/Name N4000949.0018.0003A
Project Location COLESVILLE N.Y.
Laboratory BUCK LABS
Project Manager STEVE FELDMAN
Sampler(s)/Affiliation G.W.F.M.

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	ANALYSIS / METHOD / SIZE: 40ml Vial VOC (HCl)	125ml Plastic TOC (H2SO4)	250ml Plastic Dissolved Fe/Mn (HNO3)	500ml Plastic NO2 NO3 SO4 Cl- (UNP)			Remarks	Total
PW-4	L	3.24.05		2	1	1	1				5
6mMW-2				2	1	1	1				5
6mmw-5				2	1	1	1				5
6mmw-6				2	1	1	1				5
W-5				2	1	1	1				5
REP-3-24-05				2							2
TB-3-24-05				2							2
FBB 3-24-05				2							2

Sample Matrix: L = Liquid; S = Solid; A = Air — Total No. of Bottles/Containers: 31

Relinquished by: [signature]	Organization: ARCADIS	Date 3 24 05	Time 5:00	Seal Intact?	
Received by: _____	Organization: _____	Date / /	Time _____	Yes No N/A	
Relinquished by: _____	Organization: _____	Date / /	Time _____	Seal Intact?	
Received by: _____	Organization: _____	Date / /	Time _____	Yes No N/A	

Special Instructions/Remarks: REPORT TO DAVE STERN

Delivery Method: ☐ In Person ☒ Common Carrier FED EX (SPECIFY) ☐ Lab Courier ☐ Other _____ (SPECIFY)

AC-US-12401

ARCADIS

Appendix B

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

ARCADIS

Table B-1. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Parameters for 3/23/2005 Sampling Event				
Discharge Temperature		T	509	°R
Ambient Temperature		Ta	490	°R
Stack Diameter		D	6	in
Stack Radius		R	0.25	ft
Stack Area		A	0.20	ft^2
Exit Velocity		V	4.8	fps
Exit Flow		Q	56	acfm
Exit Flow		Q	58	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	Fm = Ta/T * V2 * R2		n/a	ft^4/s^2
Effective Stack Height		h_e	17.0	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	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 49°F based on recorded parameters.
2. The ambient temperature is 30°F based on recorded parameters.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Table B-2. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 2, Colesville Landfill, Broome County, New York.

Calculation of the Short-Term Guideline Concentration (SGC) for Sampling Event on 3/23/2005

Compounds	CAS Numbers	Maximum Limit (SGC) (ug/m^3)	Analytical Concentration (ppb)	Detection Limit Used	Actual Emissions C_a (ug/m^3)	Mass/hour (lb/hr)	Maximum Potential Impact (Step III.A.3 in DAR-1) (ug/m^3)	Short Term Impact (Step III.A.5 in DAR-1) (ug/m^3)	Percent of the SGC (%)
Vinyl Chloride	75-01-4	180,000	7.3	*	18.97	2.26E-05	0.0039	0.25097	1.4E-04
Chloroethane(Ethyl Chloride)	75-00-3	--	7.3	*	19.58	2.33E-05	0.0040	0.25909	NA
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	--	7.3	*	29.42	3.50E-05	0.0060	0.38931	NA
Methylene Chloride(Dichloromethane)	75-09-2	14,000	7.3	*	25.78	3.07E-05	0.0052	0.34108	2.4E-03
1,1-Dichloroethane	75-34-3	--	30		123.43	1.47E-04	0.0251	1.63324	NA
cis-1,2 - Dichloroethylene	156-59-2	--	50		201.52	2.40E-04	0.0410	2.66651	NA
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	68,000	16		88.74	1.06E-04	0.0181	1.17427	1.7E-03
Trichloroethene	79-01-6	54,000	26		142.02	1.69E-04	0.0289	1.87929	3.5E-03
Dichlorofluoromethane(Freon 12)	75-71-8	--	7.3	*	36.69	4.37E-05	0.0075	0.48548	NA

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
NA: Not applicable

Notes:

1. DAR-1 refers to DAR-1 AGC/SGC Tables dated December 22, 2003.
2. SGC refers to the Short-Term Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
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.

Table B-3. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 1, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 3/23/2005 Sampling Event

Compounds	CAS Numbers	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Lab Data ppb	Detection Limit Used[5]	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	7.3	*	18.97	4.12E-06	0.03483	**0.32**
Chloroethane(Ethyl Chloride)	75-00-3	10,000	978,044.97	7.3	*	19.58	4.26E-06	0.03595	**0.00**
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	70	6,846.31	7.3	*	29.42	6.40E-06	0.05402	**0.00**
Methylene Chloride(Dichloromethane)	75-09-2	2.1	205.39	7.3	*	25.78	5.60E-06	0.04733	**0.02**
1,1-Dichloroethane	75-34-3	0.63	61.62	30		123.43	2.68E-05	0.22664	**0.37**
cis-1,2-Dichloroethylene	156-59-2	1,900	185,828.54	50		201.52	4.38E-05	0.37002	**0.00**
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	1,000	97,804.50	16		88.74	1.93E-05	0.16295	**0.00**
Trichloroethene	79-01-6	0.5	48.90	26		142.02	3.09E-05	0.26078	**0.53**
Dichlorodifluoromethane(Freon 12)	75-71-8	12,000	1,173,653.96	7.3	*	18.24	3.97E-06	0.03349	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 49°F based on recorded parameters.
2. The ambient temperature is 30°F based on recorded parameters.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Appendix C

Automated Reagent Injection System
Operating Parameters

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Table C-1. Automated Reagent Injection System Summary of Operational Year 3, 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.)
1/18/2005	320	32	0
2/26/2005	960	96	0
3/23/2005	1,440	144	157
Quarter Totals (gal.) =	**2,720**	**272**	**157**
Totals Since Startup (gal.) =	**58,544**	**7,097**	**6,896**

Notes:

gal. Gallons

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Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 2 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 47a

Injection Date = 1/18/2005

Molasses to Water Ratio (%) = 10.0

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 Flowrate [3] (gpm)	Max. Injection Pressure (psi)
PW-6	NM	NM	NM	NM	NM
IW-3	NM	NM	NM	NM	NM
IW-1	NM	NM	NM	NM	NM
IW-2	NM	NM	NM	NM	NM
GMMW-1	NM	NM	NM	NM	NM
IW-4	NM	NM	NM	NM	NM
IW-5	NM	NM	NM	NM	NM
IW-6	NM	NM	NM	NM	NM
IW-7	NM	NM	NM	NM	NM
IW-8	NM	NM	NM	NM	NM
IW-9	NM	NM	NM	NM	NM
IW-10	NM	NM	NM	NM	NM
IW-11	NM	NM	NM	NM	NM
IW-12	NM	NM	NM	NM	NM
IW-13	NM	NM	NM	NM	NM
IW-14	160	NM	16.0	20	19
IW-15	160	NM	16.0	0	19
Totals (gal.) =	320	0	32.0	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 is approximately 1-pipeline volume for each injection well.
3. Parameters not recorded by system properly.

Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 2 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 47b

Injection Date = 2/26/2005

Molasses to Water Ratio (%) = 10.0 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 Flowrate [3] (gpm)	Max. Injection Pressure (psi)
PW-6	NM	NM	NM	NM	NM
IW-3	NM	NM	NM	NM	NM
IW-1	NM	NM	NM	NM	NM
IW-2	NM	NM	NM	NM	NM
GMMW-1	NM	NM	NM	NM	NM
IW-4	NM	NM	NM	NM	NM
IW-5	NM	NM	NM	NM	NM
IW-6	NM	NM	NM	NM	NM
IW-7	NM	NM	NM	NM	NM
IW-8	160	NM	16	20	11
IW-9	160	NM	16	20	13
IW-10	160	NM	16	0	17
IW-11	160	NM	16	0	17
IW-12	160	NM	16	20	18
IW-13	160	NM	16	0	20
IW-14	NM	NM	NM	NM	NM
IW-15	NM	NM	NM	NM	NM
Totals (gal.) =	960	0	96.0	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 is approximately 1-pipeline volume for each injection well.
3. Parameters not recorded by system properly.

Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 2 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 47c

Injection Date = 3/23/2005

Molasses to Water Ratio (%) = 10.0 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 Flowrate [3] (gpm)	Max. Injection Pressure (psi)
PW-6	160	5	16	11	35
IW-3	160	5	16	11	35
IW-1	160	4	16	0	36
IW-2	160	3	16	13	34
GMMW-1	160	3	16	13	13
IW-4	160	4	16	0	36
IW-5	160	5	16	NM	NM
IW-6	160	7	16	NM	NM
IW-7	160	8	16	NM	NM
IW-8	NM	9	NM	NM	NM
IW-9	NM	11	NM	NM	NM
IW-10	NM	12	NM	NM	NM
IW-11	NM	13	NM	NM	NM
IW-12	NM	15	NM	NM	NM
IW-13	NM	16	NM	NM	NM
IW-14	NM	18	NM	NM	NM
IW-15	NM	19	NM	NM	NM
Totals (gal.) =	1440	157	144.0	NA	NA

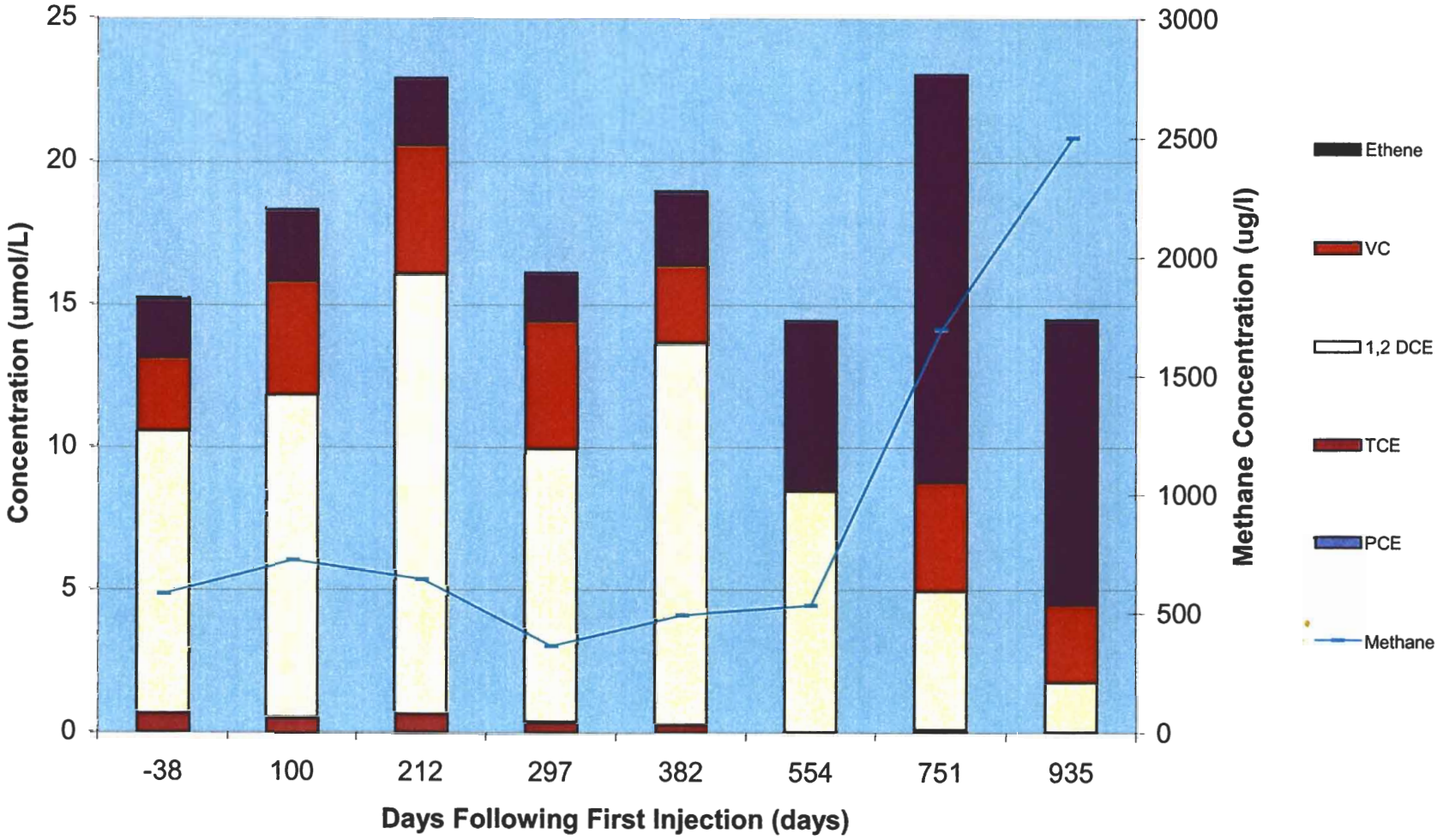
Notes:

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 is approximately 1-pipeline volume for each injection well.
3.	Parameters not recorded by system properly.

Appendix D

Degradation Trend Figures

Figure D-1. Concentration of PCE Daughter Products Versus Time in GMMW-6.



ARCADIS

Infrastructure, environment, buildings

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Mr. George Jacob
United Stated Environmental Protection Agency – Region 2
290 Broadway, 20th Floor
New York, New York 10007-1866

ENVIRONMENT

Subject:
Operational Year 3, Quarter 3 Monitoring Report,
Colesville Landfill, Broome County, New York. (Site No. 704010).

Dear Mr. Jacob:

Date:
17 November 2005

On behalf of Broome County, ARCADIS is providing the Operational Year 3, Quarter 3 Monitoring Report for the Colesville Landfill, Broome County, New York.

Please feel free to contact me if you have any questions or comments.

Sincerely,

ARCADIS G&M, Inc.

Contact:
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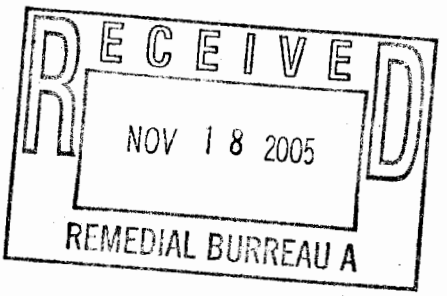

Operational Year 3
Quarter Number 3
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

ARCADIS
Infrastructure, environment, buildings

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Operational Year 3
Quarter Number 3
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

Prepared for:
Broome County Division of Solid Waste Management

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Our Ref.:
NY000949.00018.00004

Date:
November 17, 2005

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Tables

Figures

Appendices

A Water-Level Measurement and Groundwater Sampling Logs.

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

C 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) and Explanation of Significant Difference (ESD) 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), and Interim Remedial Action Report (ARCADIS 2004), 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 June 2005 groundwater quality monitoring event conducted during Operational Year 3, Quarter Number 3. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from April 2005 through June 2005 has also been included. In addition, this report describes SP-5 Spring Water Remediation System OM&M activities conducted during this quarter. 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 3, Quarter Number 3. A site plan, which shows the location of environmental effectiveness monitoring, is provided on Figure 1.

2.1 Environmental Effectiveness Monitoring

The environmental effectiveness monitoring performed during Operational Year 3, Quarter Number 3 included the following:

- Groundwater samples (Year 3, Q3 list of wells) were collected from five monitoring wells during the week of June 20, 2005 and were selectively analyzed

for volatile organic compounds (VOCs) and select inorganic parameters. Field parameters were also recorded at these monitoring locations.

- Samples (VOCs only) were collected at the SP-2 and SP-3 spring water locations on June 22, 2005.

- Samples (VOCs only) were collected at the SP-4 and F-6 surface water locations on June 22, 2005.

In addition to the environmental effectiveness monitoring described in the LTM program, monitoring wells GMMW-2, GMMW-5, GMMW-6, and W-5 were sampled for 1,4-Dioxane in order to evaluate its potential presence in site groundwater. USEPA assessment of Superfund sites has shown that 1,4-dioxane is present at many sites where 1,1,1-trichloroethane (1,1,1-TCA) is detected. The presence of 1,4-dioxane at the site has not been evaluated since the USEPA did not require its analysis at the time of the Remedial Investigation (RI). In the April 2005 Five-Year Review Report for the Colesville Landfill, the USEPA indicated that future groundwater samples should be analyzed for 1,4-dioxane.

Monitoring wells were purged and sampled using methods described in the LTM Plan.

2.2 Groundwater Remediation System Performance Monitoring

Groundwater Remediation System performance monitoring activities during Operational Year 3, Quarter Number 3 were as follows:

- Pump-and-treat (PT) system production well influent and effluent samples were collected during the OM&M quarterly site visit completed during the week of June 20, 2005. The samples were selectively analyzed for VOCs and total iron.

- One vapor sample from the PT system air stripper effluent was collected during the OM&M quarterly site visit completed during the week of June 20, 2005. The sample was analyzed for VOCs.

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

- Total Organic Carbon (TOC) samples were collected from select injection wells on June 23, 2005.

- 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 production wells GMPW-3, GMPW-4 and 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 June 23, 2005. 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 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 riprap-lined outlet. All spring water samples were analyzed for VOCs using USEPA Method 8260.

3. Groundwater Flow

The depth to water in existing wells was measured on June 21, 2005. Water-level elevation data are provided in Table 1. The groundwater flow direction in the project area (i.e., adjacent to the landfill western perimeter) and site-wide during the Operational Year 3, Quarter Number 3 round was consistent with previous rounds. The groundwater flow direction in the project area is toward the southwest from the western perimeter of the landfill. The groundwater flow direction in areas further to the east of the project area is toward the south/southwest.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the June 2005 monitoring round (Operational Year 3, Quarter Number 3). 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 on the same table for comparative purposes.

4.1 Volatile Organic Compounds

As shown in Table 2, total VOCs (TVOCs) at mid-plume monitoring wells GMMW-2 and W-5, remained stable at 557 ug/L and 260 ug/L, respectively, while TVOCs at mid-plume monitoring well PW-4 increased to 110.4 ug/L.

TVOCs within the monitoring wells currently affected by the IRZ decreased during the current operating period when compared with the previous quarter. Specifically, TVOCs at monitoring well GMMW-6 decreased from 967 ug/L to 826 ug/L. Similarly, TVOCs at monitoring well GMMW-5 decreased from 576 ug/L to 475 ug/L.

PT system analytical results for VOCs are provided in Table 5. Groundwater analytical results for PT system production wells GMPW-3, GMPW-4, and GMPW-5 are consistent with prior rounds of data. Specifically, TVOC concentrations for the Operational Year 3, Quarter Number 3 sampling round were as follows: GMPW-3 (246 ug/L), GMPW-4 (376 ug/L) and GMPW-5 (216 ug/L). A complete evaluation of performance monitoring conducted on the PT system is provided in Section 7.1.2 of this report.

4.2 1,4-Dioxane

As shown on Table 2, groundwater samples at monitoring wells GMMW-2, GMMW-5, GMMW-6, and W-5 were analyzed for presence of 1,4-Dioxane. 1,4-Dioxane was not detected in any of the sampled monitoring wells. Of particular significance in these results is the fact that 1,4-dioxane was not detected in GMMW-2 and W-5 despite the presence of 1,1,1-TCA in these wells. Select wells will be sampled during the Operational Year 3, Quarter 4 sampling event in September 2005.

4.3 Indicators of Reducing Conditions

Laboratory analytical parameters which typically demonstrate reducing conditions (i.e., dissolved oxygen [DO] and methane) were not collected during the reporting period, which is in accordance with the LTM Plan. Nonetheless, field parameter results (DO and oxidation-reduction potential [ORP]) for well GMMW-5 remain consistent with prior rounds of data, which provide a qualitative indication that reducing conditions are being maintained within the IRZ. Further details of the ARI system performance monitoring are provided in Section 7.2.2 of this report.

4.4 Evidence of Biodegradation

In accordance with the LTM plan, the monitoring wells were not samples for dissolved metals and gasses during this reporting period and will be sampled during the next 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 analytical results for VOCs are summarized in Table 2. Spring water quality at the SP-2 and SP-3 spring water sampling locations was consistent with previous data. Specifically, TVOCs were not detected above the respective detection limits at spring location SP-2, while TVOCs at spring location SP-3 were detected at 6.8 ug/L. Analytical results for the former SP-4 spring location are provided in Section 6 below. Analytical results for the SP-5 Spring Water Remediation System are discussed in Section 8 of this report.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 3, Quarter Number 3 monitoring round are summarized in Table 2. As shown in Table 2, surface water quality at SP-4 remains consistent with prior rounds of analytical data. Specifically, TVOCs were not detected above the respective method detection limits at this location. The data continue to indicate that the SP-4 spring location remedial construction was successful in preventing surface water impacts caused by the former SP-4 spring.

Surface water quality at the F-6 location remains consistent with prior rounds of analytical data. TVOCs at this location remained stable at 2.0 ug/L.

7. Groundwater Remediation System Performance

The following section describes the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 3, Quarter Number 3.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 3, Quarter Number 3.

7.1.1 Summary of Operation, Maintenance, and Monitoring

During Operational Year 3, Quarter Number 3, the PT system operated intermittently with a few system shutdowns while on-site to conduct routine OM&M and replace system components. Specifically, the following alarm troubleshooting activities caused intermittent operation:

- On May 24, 2005, the following PT electrical and control system upgrades were performed:

    1) a new solenoid valve was installed on the influent to the new cartridge filter BF-402 used to remove particulates from the air stripper AS-100 effluent water. The new solenoid valve will allow for remote control of the new bag filter.

    2) a new solenoid valve was installed on the 1-inch diameter level switch mounting pipe at the water holding tank HT-500 to allow for remote flushing of the level switch mounting pipe and testing level switch response.

- The PT System holding tank HT-500 water transfer pump TP-600 failed on June 3, 2005. The pump was inspected and replaced on June 24, 2005.

- Due to a motor failure of air compressor AC-200 on June 31, 2005, the groundwater recovery well pumps shut down. The compressor motor was inspected and repaired following well redevelopment activities on July 29, 2005 during Operational Year 3, Quarter Number 4. Corresponding activities will be outlined in the next quarterly report.

PT system OM&M was conducted on June 24, 2005 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. As shown in Table 4, the total influent groundwater recovery rate was approximately 0.24-gallon per minute (gpm), with individual recovery rates of 0.04-gpm, 0.19-gpm, and 0.02-gpm for production wells GMPW-3, GMPW-4, and GMPW-5, respectively. The average individual recovery rate for GMPW-3 and GMPW-5 continued to be reduced during Operational Year 3, Quarter Number 3 when compared to previous performance data. As discussed in the previous quarterly report, ARCADIS believes that the decline in production is a result of well screen fouling, or a similar well condition problem. The average

recovery rate of production well GMPW-4 was consistent when compared to previous operation. Well maintenance (i.e. inspection and redevelopment) has been scheduled to be completed during Operational Year 3, Quarter Number 4 (see Section 10). A total of 31,772 gallons of groundwater were recovered during the reporting period and a total of 906,050 gallons of groundwater have been recovered since system startup. The low profile air stripper operated at design specifications with the blower discharge pressure of 8.7-inches of water column (i.w.c.) and a low profile air stripper blower flowrate of 375 standard cubic feet per minute (scfm).

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 3, Quarter Number 3 was conducted on June 22, 2005. As discussed previously, five groundwater samples and one vapor sample were collected. Groundwater samples included collection of individual production 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. The total iron concentration after the cartridge filter was below the respective recommended daily average BPJ limit. Based on the total groundwater recovered during the reporting period and total influent groundwater concentration, an estimated 0.07 pounds (lbs) of VOC mass were removed from the subsurface during the quarterly reporting period, as shown in Table 6. A total of approximately 1.57 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 with the exception of isopropyl alcohol (160 ppbv). Based on a review of historical groundwater and vapor analytical data, it is contemplated that the detection of isopropyl alcohol is a sampling or a laboratory derived compound. To be conservative, a NYSDEC DAR-1 air model was calculated using the actual analytical data for detected constituents or the detection limit of all constituents, which were not detected but have historically been detected in the influent groundwater. All COCs were below their respective short-term guidance concentrations (SGCs) and annual guidance 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 December 22, 2003.

7.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 3, Quarter Number 3.

7.2.1 Summary of Operation, Maintenance, and Monitoring

System operation during Operational Year 3, Quarter Number 3 had occasional interruptions due to troubleshooting of system alarms and replacement of system components. Specifically, the following alarm and troubleshooting activities caused intermittent operation:

- The injections beginning April 11 and June 27, 2005 were interrupted due to level switch malfunctions on both the PT and the ARI systems. The April 11, 2005 injection was completed on June 3, 2005; the June 27, 2005 injection continued through Operational Year 3, Quarter Number 4 and will be described in the next quarterly report.

- The existing solenoid valve SV-19, connected to the mixing tank MT-800 tank washing nozzle was moved and installed on the 1-inch diameter level switch mounting pipe at the mixing tank MT-800. The solenoid valve will allow for remote flushing of the level switch mounting pipe and testing level switch response.

- The ARI molasses flow control valve control circuit was upgraded.

- On May 27, 2005, it was noticed that the ARI system mixing tank MT-800 high-high level switch LSHH-800 was malfunctioning. The level switch was replaced.

Despite these interruptions in operation, groundwater analytical data confirms that sufficient organic carbon was delivered to the subsurface to maintain the existing reducing environment (see Section 7.2.2).

ARI system OM&M was conducted during the Operational Year 3, Quarter Number 3 OM&M site visit on June 24, 2005 and included operation and maintenance of system equipment. In addition, ARI system operating parameters were recorded during each automated injection event. Due to the troubleshooting activities referenced previously, one automated injection was conducted during Operational Year 3, Quarter Number 3. Based on the number of injection events, quantity of molasses solution delivered to

each injection well, and molasses solution percentage, approximately 2,720-gallons of molasses solution was delivered to the subsurface during Operational Year 3, Quarter Number 3. A total of 61,274 gallons of molasses solution has been delivered since system startup. Appendix C provides a summary of the recorded system operating parameters for each of the injection events for this period.

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted on June 23, 2005. As discussed previously, this event consisted of obtaining TOC samples at three injection wells under the environmental effectiveness monitoring program. The analytical results were also utilized to determine the effectiveness of the ARI system.

- As referenced above, TOC analytical data indicate that sufficient organic carbon was delivered to the subsurface during the operating period. Specifically, TOC at injection wells IW-2, IW-8, and IW-13 remained elevated at 20,200 mg/L, 10,700 mg/L, and 156 mg/L, respectively. Similarly, TOC at monitoring well GMMW-5 remained elevated at 528 mg/L.

As referenced previously, TVOC concentrations within well GMMW-5 decreased from 576 ug/L to 475 ug/L when comparing Operational Year 3, Quarter Number 3 data to Operational Year 3, Quarter Number 2 data. TVOC concentrations decreased from 967 ug/L to 826 ug/L within well GMMW-6 when making the same comparison.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on June 23, 2005 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 were treated to below their respective BPJ limits via the LPGAC. Influent TVOC analytical data (82.5 ug/L) remained consistent with historical analytical data. Table 9 contains the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 3, Quarter Number 3. As shown in Table 9, the SP-5 remedial system treated approximately 106,896 gallons of spring water during the operating period. An estimated 0.07 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 669,225 gallons of spring water has been treated and an estimated 0.50 lbs of VOC mass has been recovered since system startup.

9. Conclusions

Based on the data obtained from the Operational Year 3, Quarter Number 3 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. TVOC analytical results in monitoring well GMMW-6 continued to decrease during the operational quarter. Currently, the total concentration of PCE and its respective daughter compounds (i.e., TCE, 1,2-DCE, and VC) are approximately 70-percent lower than baseline (pre-injection) conditions.

- The Groundwater Remediation System operated intermittently during the reporting period with system shutdowns for OM&M activities and due to minor mechanical problems. Similar to the Operational Year 3, Quarter Number 2 operating period, the recovery rate in production well GMPW-3 and GMPW-5 remained lower than historical operation. ARCADIS believes that the reduced performance is related to fouling of the well screen, or a similar well condition problem.

- The PT system is operating as designed and is treating recovered groundwater VOCs and total iron to below BPJ limits prior to discharge.

- The ARI system is operating as designed and has established an anaerobic IRZ in the vicinity of and downgradient of the injection wells.

- The SP-5 Spring Water Remediation System is operating as designed and is treating recovered spring water VOCs to below BPJ limits prior to discharge.

- 1,4-Dioxane was not detected in any of the sampled monitoring wells despite the presence of 1,1,1-TCA in site groundwater.

10. Recommendations

The following recommendations are made for Operational Year 3, Quarter Number 4 activities:

- Perform well maintenance (inspection and redevelopment) on each of the recovery wells, as necessary.

- Troubleshoot and repair air compressor AC-200 motor and restart the recovery well pumps.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted on the quarterly schedule set forth in the LTM Plan. Performance monitoring of the Groundwater Remediation System will also be performed consistent with the LTM Plan. ARCADIS intends to perform well maintenance on each of the recovery wells during installation of the proposed monitoring well upgradient of the injection transect. This work has been tentatively scheduled for July/August 2005. Repair of air compressor AC-200 will be completed as soon as possible.

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 (Site Number 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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Table 1. Water-Level Measurements Collected During Opertational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Well Identification	MP Elevation (feet above msl)	6/21/2005 Depth to Water (feet below MP)	6/21/2005 Water-Table Elevation (feet above msl)	MP Description
GMMW-2	1030.95	55.85	975.10	Inner casing
GMMW-5	1043.66	47.78	995.88	Inner casing
GMMW-6	1033.56	37.77	995.79	Inner casing
PW-3	988.92	10.92	978.00	Inner casing
PW-4	1001.75	16.15	985.60	Inner casing
PW-5	986.12	AM	AM	Inner casing
W-5	1051.41	50.35	1001.06	Inner casing
W-6	1050.38	47.35	1003.03	Inner casing
PW-7	1042.47	39.46	1003.01	Inner casing
W-7	1049.12	40.87	1008.25	Inner casing
PW-10	1049.29	35.17	1014.12	Inner casing
PW-13	1072.41	58.73	1013.68	Inner casing
W-13	1053.43	44.64	1008.79	Inner casing
W-14S	957.68	9.41	948.27	Inner casing
W-16S	990.33	10.59	979.74	Outer casing
W-17S	959.13	10.43	948.70	Inner casing
W-18	973.56	11.46	962.10	Inner casing
W-20S	952.88	10.00	942.88	Inner casing

msl	Mean sea level.
MP	Measuring point.
NM	Not measured.
AM	Anomalous measurement.

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Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Spring Water, and Surface Water, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	GMMW-02 3/24/05	GMMW-02 6/22/05	GMMW-05 3/24/05	GMMW-05 6/21/05	GMMW-06 3/24/05	GMMW-06 6/21/05	GMMW-06* 6/21/05	PW-04 3/24/05	PW-04 6/21/05	W-05 3/24/05	W-05 6/22/05
1,1,1-Trichloroethane		**57**	**57**	<10	<10	<10	<10	<10	**18**	**21**	**2.4**	**7.4**
1,1,2-Trichloroethane		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		**120**	**130**	**150**	**88**	**390**	**370**	**380**	**13**	**23**	**91**	**120**
1,1-Dichloroethene		**2.8**	**2.7**	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
1,4-Dioxane		NS	<1	NS	<10	NS	<1	NS	NS	NS	NS	<1
Benzene		**3.6**	**4.0**	<10	<10	<10	<10	<10	<1.0	<1.0	**3.3**	**4.9**
Chlorobenzene		**38**	**42**	**25**	**28**	**31**	**32**	**34**	<1.0	<1.0	**23**	**25**
Chloroethane		**40**	**45**	**190**	**240**	**190**	**120**	**130**	**4.6**	**9.7**	**63**	**51**
Chloroform		<1.0	<1.0	<10	<10	<10	<10	<10	**1.6**	**1.3**	<1.0	<1.0
cis-1,2-Dichloroethene		**150**	**150**	**180**	**96**	**170**	**200**	**200**	**15**	**25**	**14**	**36**
Dichlorodifluoromethane		<1.0	**1.9**	<10	<10	<10	<10	<10	<1.0	**1.7**	<1.0	**2.3**
Ethylbenzene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Methylene chloride		**1.9**	**2.0**	<10	<10	**16**	<10	<10	<1.0	<1.0	**1.8**	<1.0
Methyl tert-butyl ether		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Naphthalene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	**2.1**	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0	<10	<10	<10	<10	<10	<1.0	<1.0	<1.0	<1.0
Trichloroethene		**90**	**100**	<10	<10	<10	**10**	**11**	**20**	**27**	**7.4**	**6.6**
Vinyl chloride		**20**	**22**	**31**	**23**	**170**	**94**	**93**	<1.0	**1.7**	**23**	**7.2**
Total VOCs		**523**	**557**	**576**	**475**	**967**	**826**	**848**	**72.2**	**110.4**	**231**	**260**

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.

ug/L Micrograms per liter.

* Field replicate.

J Estimated value.

MDL Method detection limit.

NS Not Sampled

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Spring Water, and Surface Water, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: / Date:	SP-2 12/7/2004	SP-2 6/22/2005	SP-3 12/7/2004	SP-3 6/22/2005	SP-4[1] 3/25/05	SP-4[1] 6/22/05	F-6 12/7/2004	F-6 6/22/2005	FB062105 6/21/05	FB062205 6/22/05	TRIP BLANK 6/21/05
1,1,1-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0	**2**	**1.3**	**1.4**	<1.0	<1.0	**2.0**	<1.0	<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dioxane		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Benzene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroform		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene		<1.0	<1.0	<1.0	**5.5**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methyl tert-butyl ether		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Naphthalene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Tetrachloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**2.6**	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		**0.0**	**0.0**	**2.0**	**6.8**	**1.4**	**0.0**	**0.0**	**2.0**	**0.0**	**2.6**	**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.

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

Table 2. Concentrations of Volatile Organic Compounds Detected in Groundwater, Spring Water, and Surface Water, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	TRIP BLANK 1 6/22/05	TRIP BLANK 2 6/22/05
1,1,1-Trichloroethane		<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0
1,1-Dichloroethane		<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0
1,4-Dioxane		NS	NS
Benzene		<1.0	<1.0
Chlorobenzene		<1.0	<1.0
Chloroethane		<1.0	<1.0
Chloroform		<1.0	<1.0
cis-1,2-Dichloroethene		<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0
Ethylbenzene		<1.0	<1.0
Methylene chloride		<1.0	<1.0
Methyl tert-butyl ether		<1.0	<1.0
Naphthalene		<1.0	<1.0
o-Xylene		<1.0	<1.0
Tetrachloroethene		<1.0	<1.0
Toluene		<1.0	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0
Trichloroethene		<1.0	<1.0
Vinyl chloride		<1.0	<1.0
Total VOCs		**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.

1. Sample collected from North Stream, immediately down flow of former SP-4 spring area.

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

Parameters	Sample ID: / Date:	GMMW-02 3/24/05	GMMW-02 6/22/05	GMMW-05 3/24/05	GMMW-05 6/21/05	GMMW-06 3/24/05	GMMW-06 6/21/05
	UNITS						
METALS							
Iron, Dissolved	mg/L	**0.0548**	--	**187**	--	**13.9**	--
Manganese, Dissolved	mg/L	**0.032**	--	**7.38**	--	**4.16**	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	**23.6**	--	**21.8**	--	**14.8**	--
Nitrogen, Nitrate (As N)	mg/L	<0.1	--	<0.1	--	<0.1	--
Nitrogen, Nitrite	mg/L	<0.1	--	**1.54**	--	**0.306**	--
Total Organic Carbon	mg/L	<2.0	**2.86**	**224**	**528**	**7.09**	**9.75**
Sulfate	mg/L	**7.26**	--	<1	--	**1.08**	--
Sulfide (field)	mg/L	**0.21**	**0.57**	**0.398**	**0.284**	**0.27**	**0.039**
Iron (field)	mg/L	--	--	--	--	--	--
FIELD PARAMETERS							
pH	Standard units	**7.29**	**6.38**	**8.12**	**5.39**	**8.22**	**6.41**
Specific Conductance	mmhos/cm	**0.587**	**0.543**	**1.335**	**1.634**	**1.291**	**0.914**
Turbidity	NTU	**36**		--	--	**45**	--
Dissolved Oxygen	mg/L	**4.13**	**4.03**	**2.99**	**1.64**	**2.76**	**2.77**
Temperature	deg C	**10.75**	**12.62**	**8.29**	**19.64**	**6.2**	**16.21**
ORP	mV	**102.4**	**131.8**	**-31**	**-90.1**	**20.4**	**-59.8**
DISSOLVED GASES							
Carbon dioxide	mg/L	**220**	--	**290 J**	--	**240 J**	--
Carbon monoxide	mg/L	<0.40	--	<0.40 J	--	<0.40 J	--
Ethane	ng/L	**480**	--	<5.0 J	--	**2,300 J**	--
Ethene	ng/L	**2,800**	--	**36,000 J**	--	**140,000 J**	--
Methane	ug/L	**1,000**	--	**17,000 J**	--	**2,500 J**	--
Nitrogen	mg/L	**22**	--	**17 J**	--	**25 J**	--
Oxygen	mg/L	**4.8**	--	**2.5 J**	--	**3.4 J**	--

* Duplicate sample

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	Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	PW-04 3/24/05	PW-04 6/21/05	W-05 3/24/05	W-05 6/22/05	IW-01 12/8/04	IW-02 6/23/05
	UNITS						
METALS							
Iron, Dissolved	mg/L	**0.0436**	--	**33.9**	--	--	--
Manganese, Dissolved	mg/L	**0.00998**	--	**3.31**	--	--	--
GENERAL CHEMISTRY							
Bromide	mg/L	--	--	--	--	--	--
Chloride	mg/L	**443**	--	**19.5**	--	--	--
Nitrogen, Nitrate (As N)	mg/L	**1.2**	--	<0.1	--	--	--
Nitrogen, Nitrite	mg/L	<1	--	<0.1	--	--	--
Total Organic Carbon	mg/L	<2.0	<2.0	**4.24**	**38.6**	**3,300**	**20,200**
Sulfate	mg/L	**4.06**	--	**2.09**	--	--	--
Sulfide (field)	mg/L	**0.02**	**0.007**	**0.024**	**0.302**	--	--
Iron (field)	mg/L	--		--		--	--
FIELD PARAMETERS							
pH	Standard units	**6.53**	**5.31**	**7.94**	**6.62**	**3.73**	--
Specific Conductance	mmhos/cm	**1.657**	**1.397**	**0.738**	**0.667**	**0.296**	--
Turbidity	NTU	--	--	--	--	**755**	--
Dissolved Oxygen	mg/L	**7.59**	**4.76**	**8.14**	**5.64**	**5.11**	--
Temperature	deg C	**9.50**	**12.08**	**9.68**	**10.72**	**10.38**	--
ORP	mV	**112.3**	**264.2**	**-10.8**	**-39.4**	**119**	--
DISSOLVED GASES							
Carbon dioxide	mg/L	**210**	--	**200 J**	--	--	--
Carbon monoxide	mg/L	<0.40	--	<0.40 J	--	--	--
Ethane	ng/L	**63**	--	**13,000 J**	--	--	--
Ethene	ng/L	**140**	--	**11,000 J**	--	--	--
Methane	ug/L	**28**	--	**1,200 J**	--	--	--
Nitrogen	mg/L	**23**	--	**23 J**	--	--	--
Oxygen	mg/L	**5.2**	--	**2.8 J**	--	--	--

* Duplicate sample

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	Qualifier assigned to analytical data indicating result is estimated.

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

Parameters	Sample ID: / Date:	UNITS	IW-08 12/8/04	IW-08 6/23/05	IW-13 12/8/04	IW-13 6/23/05
METALS						
Iron, Dissolved		mg/L	--	--	--	--
Manganese, Dissolved		mg/L	--	--	--	--
GENERAL CHEMISTRY						
Bromide		mg/L	--	--	--	--
Chloride		mg/L	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--
Nitrogen, Nitrite		mg/L	--	--	--	--
Total Organic Carbon		mg/L	**961**	**10,700**	**314**	**156**
Sulfate		mg/L	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--
Iron (field)		mg/L	--	--	--	--
FIELD PARAMETERS						
pH		Standard units	**3.69**	--	**4.96**	--
Specific Conductance		mmhos/cm	**0.124**	--	**86.2**	--
Turbidity		NTU	**433**	--	**530**	--
Dissolved Oxygen		mg/L	**5.01**	--	**3.91**	--
Temperature		deg C	**10.01**	--	**9.92**	--
ORP		mV	**164**	--	**-4**	--
DISSOLVED GASES						
Carbon dioxide		mg/L	--	--	--	--
Carbon monoxide		mg/L	--	--	--	--
Ethane		ng/L	--	--	--	--
Ethene		ng/L	--	--	--	--
Methane		ug/L	--	--	--	--
Nitrogen		mg/L	--	--	--	--
Oxygen		mg/L	--	--	--	--

* Duplicate sample

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	Qualifier assigned to analytical data indicating result is estimated.

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Table 4. PT System Operating Parameters, Operational Year 3, Quarter Number 3, 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 Effluent Totalizer FQI-401 (gallons)	Flow Measurements: Water Bypass Totalizer FQI-402 (gallons)	Flow Measurements: GMPW-3 Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4 Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5 Totalizer FQI-103 (gallons)
3/23/2005	3:43 PM	9.0	58	874,278.3	786,844.6	354,557.9	244,855.8	294,826.2
6/24/2005	11:20 AM	8.7	375	906,050.1	810,793.1	360,475.7	269,880.4	298,009.0
		Average Daily Flowrate (gpm) =		**0.24**	**0.18**	**0.04**	**0.19**	**0.02**
		Total Groundwater Recovered During Reporting Period (gallons) =		**31,772**	**23,949**	**5,918**	**25,025**	**3,183**

Notes:

gpm	Gallons per minute.
i.w.c.	Inches of water column.
scfm	Standard cubic feet per minute.

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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 3, Quarter Number 3, Colesville Landfill, Broome County, New York[5,6].

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	GMPW-3 INF 6/22/2005	GMPW-4 INF 6/22/2005	GMPW-5 INF 6/22/2005	COMBINED INF 6/22/2005	EFFLUENT AC II 6/22/2005
1,1,1-Trichloroethane	10-20		**50**	**52**	**34**	**25**	<1
1,1,2-Trichloroethane	10		<1	<1	<1	<1	<1
1,1-Dichloroethane	10		**47**	**78**	**44**	**36**	<1
1,1-Dichloroethene	10		**3.2**	**3.4**	**1.8**	**1.2**	<1
1,2-Dichloroethane	10-30		<1	<1	<1	<1	<1
1,2-Dichloropropane	NA		<1	<1	<1	<1	<1
Benzene	5		<1	**5.4**	**1.1**	<1	<1
Chlorobenzene	NA		<1	**3.5**	<1	<1	<1
Chloroethane	NA		**12**	**27**	**11**	**8.8**	<1
Chloroform	NA		<1	<1	<1	<1	<1
cis-1,2-Dichloroethene	10		**64**	**88**	**60**	**48**	<1
Dichlorodifluoromethane	NA		**1.3**	**2.3**	<1	<1	<1
Ethylbenzene	5		<1	<1	<1	<1	<1
Methylene Chloride	10-50		**3.1**	**3.7**	**2.3**	**2.0**	<1
Methyl tert-butyl ether	50		<1	<1	<1	<1	<1
Naphthalene	10		<1	<1	<1	<1	<1
o-Xylene	5		<1	<1	<1	<1	<1
Tetrachloroethene	10		<1	<1	<1	<1	<1
Toluene	5		<1	<1	<1	<1	<1
trans-1,2-Dichloroethene	10-50		<1	<1	<1	<1	<1
Trichloroethene	10		**62**	**83**	**57**	**48**	<1
Vinyl Chloride	10-50		**3.6**	**30**	**5.2**	**4.6**	<1
Total VOCs			**246**	**376**	**216**	**174**	**0**

Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)						
Total Iron	1.2 / 0.61		**3.80**	**2.72**	**3.89**	**5.02**	**0.454**

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 3, Quarter Number 3, 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.
AC	After Cartridge Filter.
BC	Before Cartridge Filter.
PT	Pump and Treat.
--	Not Analyzed or Collected.
<	Analyte Below Detection Limit.

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Table 6. PT System Mass Removal Rate of Volatile Organic Compounds, Operational Year 3, Quarter Number 3, 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)
3/23/2005	432	874,278.3	NA	NA	NA
6/24/2005	174	906,050.1	31,771.8	274	0.07
			Total Estimated Mass Removed During Operational Year 3, Quarter Number 3 (lbs) =		**0.07**
			Total Estimated Mass Removed Since System Startup (lbs) =		**1.57**

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).

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Table 7. Concentrations of Volatile Organic Compounds Detected in Air Stripper Effluent, Operational Year 3, Quarter Number 3, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Compounds	CAS Numbers	Sample ID: Effluent Date Sampled: 6/24/2005 ppbv
Vinyl Chloride	75-01-4	<5.0
Chloroethane(Ethyl Chloride)	75-00-3	<5.0
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	<5.0
Methylene Chloride(Dichloromethane)	75-09-2	<5.0
1,1-Dichloroethane	75-34-3	<5.0
cis-1,2-Dichloroethylene	156-59-2	<5.0
Chloroform	67-66-3	<5.0
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	<5.0
Benzene	71-43-2	<5.0
Trichloroethene	79-01-6	<5.0
Toluene	108-88-3	<5.0
Ethyl benzene	100-41-4	<5.0
m,p-Xylene	108-38-3/106-42-3	<5.0
o-Xylene	95-47-6	<5.0
1,2,4-Trimethylbenzene	95-63-6	<5.0
2-Propanol (Isopropyl alcohol)	67-63-0	**160**
Dichlorodifluoromethane(Freon 12)	75-71-8	<5.0

ppbv: parts per billion by volume

Notes/Assumptions:

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 USEPA 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 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	SP-5 INF. 6/23/2005	SP-5 EFF. 6/23/2005
VOCs (units in ug/L)				
1,1,1-Trichloroethane	10		<1.0	<1.0
1,1-Dichloroethane	10		**32**	**3.1**
1,2-Dichloroethane	10-100		<1.0	<1.0
Benzene	5		**2.6**	<1.0
Chlorobenzene	10-25		**32**	**1.5**
Chloroethane	10		**9.3**	**9.8**
cis-1,2-Dichloroethene	10		**2.1**	<1.0
Dichlorodifluoromethane	NA		**1.4**	<1.0
Ethylbenzene	5		<1.0	<1.0
Toluene	5		<1.0	<1.0
trans-1,2-Dichloroethene	10-100		<1.0	<1.0
Trichloroethene	10		**3.1**	<1.0
Vinyl Chloride	10		<1.0	<1.0
Total VOCs			**82.5**	**14.4**

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.

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 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Date Sampled	Total VOC Influent Concentration (ug/L)	Effluent Flowrate[4] (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)
3/25/2005	77.0	0.94	NR	NA	NA	NA
6/23/2005	82.5	0.72	0	106,896	79.7	0.07
				Total Estimated Mass Removed During Current Quarter (lbs) =		**0.07**
				Total Estimated Mass Removed Since System Startup (lbs) =		**0.50**
				Total Effluent Treated to Date (gallons) =		**669,225**

Notes:

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

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. Discharge flow rate was not measured during Operational Year 3, Quarter Number 2. The flow rate was calculated based on the geometric average of the discharge flow rates recorded during the Operational Year 3, Quarter Number 1 and Quarter Number 3.

Appendix A

Water-Level Measurement and Groundwater Sampling Logs.

Table 2. Field Measurements of Depth to Water in Select Wells, Colesville Landfill, Broome County, New York.

Well Identification		6/ /2004 Depth to Water (feet below MP)	Comments
GMMW-2		55.85	
GMMW-5		47.78	
GMMW-6		~~Filled to TOC~~ 37.77	
PW-3		10.92	
PW-4		~~[illegible]~~ 16.15	
PW-5		~~37.77~~ TOC	
W-5		~~25.29~~ 50.35	
W-6		47.35	
PW-7		39.46	
W-7		40.87	
PW-10		~~[illegible]~~ 35.17	
PW-13		~~87.12~~ 58.73	
W-13		44.65	
W-14S		9.41	
W-16S		10.59	
W-17S		10.43	
W-18		11.46	TOP OF METAL CASING
W-20S		10.00	

SP 5 WATER TO TOP OF CASING.
BAILED 15 ~~G~~ TO GET A FULL CHANGE
OF WATER AND SAMPLED.

SP-5 FLOW RATE = 22 seconds per 1 L

ARCADIS

Laboratory Task Order No./P.O. No.

CHAIN-OF-CUSTODY RECORD

Project Number/Name NY0BA NOUF.0013A

Project Location Colesville

Laboratory Air Toxics LTD

Project Manager Steve Feldman

Sampler(s)/Affiliation D. McMillen / ARCADIS

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	ANALYSIS / METHOD / SIZE: 1 Liter Tedlar Bag	USEPA TO-14A	GRAB				Remarks	Total
AIR STRIPPER EFFLUENT	A	6-23-05		↓	↓	↓					2

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 2

Relinquished by: [illegible signature]	Organization: ARCADIS	Date 6/23/05	Time 1200	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A

Special Instructions/Remarks:
1 Tedlar Bag Taken STD TAT USEPA Method TO-14A

Delivery Method: ☐ In Person ☒ Common Carrier Fed. Ex. (SPECIFY) ☐ Lab Courier ☐ Other ____ (SPECIFY)

AG 05-12/01

ARCADIS

Laboratory Task Order No./P.O. No. OTL ... Samples

CHAIN-OF-CUSTODY RECORD

Page 1 of

Project Number/Name NY000949.0005.0003A

Project Location Collegeville

Laboratory STL Savannah

Project Manager Steve Feldman

Sampler(s)/Affiliation DMcWilliams / Arcadis

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	1 Liter Ambers	1,4 Dioxane 8270 Mod.	Grab	USEPA Method 8270			Remarks	Total
GMMW 5	L	6-21-05		↓	↓	↓	↓				2
GMMW 6	↓	↓		↓	↓	↓	↓				2
PW 4	↓			↓	↓	↓	↓				2
GMMW 2	↓	6-22-05		↓	↓	↓	↓				2
W5	↓	↓		↓	↓	↓	↓				2
Field Blank	↓	6-21-05		↓	↓	↓	↓				2

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 12

Relinquished by: DMcWilliams	Organization: Arcadis	Date 6/22/05	Time 1730	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	
Relinquished by:	Organization:	Date / /	Time	Seal Intact? Yes No N/A
Received by:	Organization:	Date / /	Time	

Special Instructions/Remarks:
ATTN: ANGIE WEISMANSEIKT STD. TAT. THANK YOU

Delivery Method: ☐ In Person ☑ Common Carrier FED. EX (SPECIFY) ☐ Lab Courier ☐ Other ____ (SPECIFY)

AG 05-12/01

ARCADIS

Laboratory Task Order No./P.O. No. [illegible]

CHAIN-OF-CUSTODY RECORD

Project Number/Name ANOO0499.0018.0003A

Project Location Collegeville

Laboratory Buck

Project Manager Steve Feldman

Sampler(s)/Affiliation D. McLafferty

ANALYSIS / METHOD / SIZE

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	40 mL VOAs Vol. [illegible]	Metals TOC 6010	Group B				Remarks	Total
PW 4	L	6-21-05		2	1	↓					3
GMMW-6		↓		2	1						3
GMMW-5		↓		2	1						3
[illegible]062105		↓		2							2
T.B		↓		2							2
REP062105		↓		2							2
W 5		6-22-05		2	1						3
GMMW 2		↓		2	1						3
F.B		↓		2							2
T.B		↓		2							2

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 25

Relinquished by: D. McLafferty	Organization: ARCADIS	Date 6/22/05	Time	Seal Intact?
Received by: [illegible]	Organization: Buck Labs	Date 6/22/05	Time 5:15	Yes (circled) No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A

Special Instructions/Remarks: [illegible]

[illegible]

Delivery Method: ☒ In Person ☐ Common Carrier ________ SPECIFY ☐ Lab Courier ☐ Other ________ SPECIFY

AG 05-12/01

ARCADIS

Laboratory Task Order No./P.O. No. ______

CHAIN-OF-CUSTODY RECORD

Project Number/Name [illegible]

Project Location [illegible]

Laboratory Buck Labs

Project Manager [illegible]

Sampler(s)/Affiliation [illegible]

Sample ID/Location	Matrix	Date/Time Sampled	Lab ID	ANALYSIS / METHOD / SIZE: 40 ML VOA's VOCs 8021	Plastic Bottle	TOC USEPA 6016	Amber Bottle [illegible] 6010			Remarks	Total
GMPW 3		6-22-05		2			1				
GMPW 4		↓		2			1				
GMPW 5		↓		2			1				
P+T INF.		↓		2			1				
P+T EFF.		↓		2			1				
F 6		↓		2							
SP 2		↓		2							
SP 3		↓		2							
SP 4		↓		2							
TB		↓		2							
IW-2		6-23-05			1		PH 3.71				
SP5 INF		↓		2							
SP EFF		↓		2							
IW-8		↓			1		PH 3.57				
IW-13		↓			1		PH 6.55				

Sample Matrix: L = Liquid; S = Solid; A = Air

Total No. of Bottles/Containers 32

Relinquished by: [illegible]	Organization: Arcadis	Date 6/23/05	Time	Seal Intact?
Received by: [illegible]	Organization: [illegible]	Date [illegible]	Time [illegible]	Yes No N/A
Relinquished by:	Organization:	Date / /	Time	Seal Intact?
Received by:	Organization:	Date / /	Time	Yes No N/A

Special Instructions/Remarks: 2.3°

Delivery Method: ☐ In Person ☒ Common Carrier ______ SPECIFY ☐ Lab Courier ☐ Other ______ SPECIFY

AG 05-12/01

ARCADIS G&M, Inc.

10% 16.3

Low-Flow Groundwater Sampling Log

Project Number: XN000949.0018 Task: 00134 Well ID: 6mw02

Date: 6-22-05 Sampled By: D.M

Sampling Time: Recorded By: D.M.

Weather: Cloudy - Rainy Coded Replicate No.:

Instrument Identification

Water Quality Meter(s): YSI 600 XL Serial #:

Purging Information

Casing Material: 2" PVC Purge Method: Reg. Flow

Casing Diameter: 2" Screen Interval (ft bmp): Top Bottom

Sounded Depth (ft bmp): Pump Intake Depth (ft bmp):

Depth to Water (ft bmp): 39.14 Purge time Start: 0830 Finish:

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
0830				10.98	6.16	.488	99.6	2.70		39.14	
0835				12.05	6.55	.537	103.8	2.25			
0840				12.43	6.46	.547	100.6	3.61		41.66	
0845				12.61	6.42	.548	112.8	3.86			
0850				12.59	6.40	.546	122.5	4.04		42.97	
0855				12.56	6.39	.546	127.6	4.10			
0900				12.62	6.38	.543	131.8	4.03		43.55	
						.057					
						MW 52					

Sample Condition Color: Odor: Appearance:

Sample Collection

Parameter:	Container:	No.	Preservative:

PID Reading 0.0

Comments

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: AN001949.0018.0003A
Task:
Well ID: GM MW 5
Date: 6-21-05
Sampled By: D. McCafferty
Sampling Time: 1030
Recorded By: D. McCafferty
Weather: Sunny - Hot
Coded Replicate No.:

Instrument Identification
Water Quality Meter(s): YSI 600XL
Serial #: 02H021

Purging Information
Casing Material: PVC
Purge Method: Low Flow - Redi Flow
Casing Diameter: 2"
Screen Interval (ft bmp): Top ______ Bottom ______
Sounded Depth (ft bmp): 70.21
Pump Intake Depth (ft bmp):
Depth to Water (ft bmp): 49.60
Purge time Start: 1050 Finish: 1125

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
1050		200		17.12	5.29	1.291	-97.3	2.37		49.60	
1055		—		19.07	5.35	1.831	-114.1	0.22			
1100		—		18.30	5.09	1.709	-81.1	2.29			
1105		—		18.71	5.36	1.617	-88.8	2.28		~~[illegible]~~ 52.45	
1110				19.06	5.35	1.616	-89.2	1.94			
1115				19.21	5.37	1.624	-90.2	1.71			
1120				19.64	5.39	1.634	-90.1	1.64		~~[illegible]~~ 58.96	
1125											
						0.289 mg/L					
						S2					

Sample Condition Color: Odor: Appearance:

Sample Collection
Parameter: Container: No. Preservative:

PID Reading: 0.0

Comments:

G:\APROJECT\WHCS Melville\EAD Pilot Test\lowflow\samplorms.xls-LoFlo-GW-Samp

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: [illegible] Task: 1003A Well ID: GMMW 6

Date: 6-15-05 Sampled By: D. [illegible]

Sampling Time: Recorded By: D. [illegible]

Weather: Sunny, Hot Coded Replicate No.: Rep 062105

Instrument Identification

Water Quality Meter(s): YSI 600 X L Serial #:

Purging Information

Casing Material: PVC Purge Method: Low Flow - [illegible]

Casing Diameter: 2" Screen Interval (ft bmp): Top Bottom

Sounded Depth (ft bmp): ~~38.75~~ 55.85 Pump Intake Depth (ft bmp):

Depth to Water (ft bmp): 38.75 Purge time Start: Finish:

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
1245				11.31	5.83	1.005	-30.6	0.85		38.75	
1250				12.46	5.93	0.975	-58.2	0.51			
1255				13.52	6.03	.952	-53.7	0.67		45.27	
1300				13.91	6.17	.943	-59.2	0.990			
1305				15.14	[illegible]	.920	-52.4	1.77			
1310				15.46	6.36	.915	-56.7	1.95		46.34	
1315				16.21	6.41	.914	-59.8	2.77			
						.039					
						mg/L 52					

Sample Condition Color: Odor: Appearance:

Sample Collection

Parameter: Container: No. Preservative:

PID Reading 0.0

Comments

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: NH000949.0018 Task: 0003A Well ID: MW-5

Date: 6-22-05 Sampled By: D.M.

Sampling Time: Recorded By: D. M

Weather: Cloudy - RAIN Coded Replicate No.:

Instrument Identification

Water Quality Meter(s): Serial #:

Purging Information

Casing Material: PVC Purge Method: HAND BAILER

Casing Diameter: 2" Screen Interval (ft bmp): Top Bottom

Sounded Depth (ft bmp): 75.29 Pump Intake Depth (ft bmp):

Depth to Water (ft bmp): 50.35 Purge time Start: Finish:

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
				10.72	6.62	-667	-39.4	5.64			
						0.302					
						mg/L 52					

Sample Condition Color: Odor: Appearance:

Sample Collection

Parameter:	Container:	No.	Preservative:

PID Reading 0.0

Comments

ARCADIS G&M, Inc.

Low-Flow Groundwater Sampling Log

Project Number: 21600490018 Task: 0003 A Well ID: PW-4

Date: 6-21-05 Sampled By: D. M

Sampling Time: Recorded By: D. M

Weather: Sunny HOT Coded Replicate No.:

Instrument Identification

Water Quality Meter(s): Serial #:

Purging Information

Casing Material: PVC Purge Method: Low Flow

Casing Diameter: 2" Screen Interval (ft bmp): Top Bottom

Sounded Depth (ft bmp): Pump Intake Depth (ft bmp):

Depth to Water (ft bmp): 16.20 Purge time Start: Finish:

Field Parameter Measurements Taken During Purging

Time	Minutes Elapsed	Rate (mL/min)	Volume Purged	Temp (°C)	pH (SI Units)	Spec. Cond. (mS/cm)	ORP (mV)	DO (mg/L)	Turbidity (NTU)	Depth to Water (ft bmp)	Comments
2:15				10.28	5.33	1.346	198.3	[illegible]	2.26	16.20	
220				11.04	5.38	1.242	216.4	1.57			
225				12.68	5.29	1.312	224.4	2.32			
230				12.74	6.32	1.363	235.1	2.22			
235				12.77	5.33	1.426	245.7	2.30		17.71	
240				12.20	5.26	1.487	239.2	4.44			
245				12.18	5.31	1.472	254.2	4.54			
250				12.01	5.33	1.438	262.2	4.78			
255				12.08	5.31	1.397	264.2	4.76			
						.007					
						mg/L 52					

Sample Condition Color: Odor: Appearance:

Sample Collection

Parameter:	Container:	No.	Preservative:

PID Reading On

Comments

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Appendix B

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

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Table B-1. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters for 6/24/2005 Sampling Event			
Discharge Temperature	T	524	^{o}R
Ambient Temperature	Ta	526	^{o}R
Stack Diameter	D	6	in
Stack Radius	R	0.25	ft
Stack Area	A	0.20	ft^2
Exit Velocity	V	31.6	fps
Exit Flow	Q	372	acfm
Exit Flow	Q	375	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	Fm = Ta/T * V2 * R2	n/a	ft^4/s^2
Effective Stack Height	h_e	17.0	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	

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 64°F based on recorded parameters.
2. The ambient temperature is approximately 66°F, the average temperature recorded in Binghamton, NY on June 24.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Table B-2. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Calculation of the Short-Term Guideline Concentration (SGC) for Sampling Event on 6/24/2005

Compounds	CAS Numbers	Maximum Limit (SGC) (ug/m^3)	Analytical Concentration (ppb)	Detection Limit Used	Actual Emissions C_a (ug/m^3)	Mass/hour (lb/hr)	Maximum Potential Impact (Step III.A.3 in DAR-1) (ug/m^3)	Short Term Impact (Step III.A.5 in DAR-1) (ug/m^3)	Percent of the SGC (%)
Vinyl Chloride	75-01-4	180,000	5.0	*	12.99	1.82E-05	0.0031	0.20271	1.1E-04
Chloroethane(Ethyl Chloride)	75-00-3	--	5.0	*	13.41	1.88E-05	0.0032	0.20926	NA
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	--	5.0	*	20.15	2.83E-05	0.0048	0.31445	NA
Methylene Chloride(Dichloromethane)	75-09-2	14,000	5.0	*	17.66	2.48E-05	0.0042	0.27549	2.0E-03
1,1-Dichloroethane	75-34-3	--	5.0	*	20.57	2.89E-05	0.0049	0.32100	NA
cis-1,2 - Dichloroethylene	156-59-2	--	5.0	*	20.15	2.83E-05	0.0048	0.31445	NA
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	68,000	5.0	*	27.73	3.90E-05	0.0067	0.43273	6.4E-04
Trichloroethene	79-01-6	54,000	5.0	*	27.31	3.84E-05	0.0066	0.42618	7.9E-04
Dichlorofluoromethane(Freon 12)	75-71-8	--	5.0	*	25.13	3.53E-05	0.0060	0.39213	NA

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
NA: Not applicable

Notes:

1. DAR-1 refers to DAR-1 AGC/SGC Tables dated December 22, 2003.
2. SGC refers to the Short-Term Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
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.

Table B-3. NYSDEC DAR-1 Air Modeling Data, Operational Year 3, Quarter Number 3, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 6/24/2005 Sampling Event

Compounds	CAS Numbers	Maximum Limit on C_a (AGC[4]) ug/m^3	Maximum Mass Flow Q_a lb/yr	Lab Data ppb	Detection Limit Used[5]	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	5	*	12.99	1.82E-05	0.15852	**1.47**
Chloroethane(Ethyl Chloride)	75-00-3	10,000	978,044.97	5	*	13.41	1.88E-05	0.16364	**0.00**
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	70	6,846.31	5	*	20.15	2.83E-05	0.24590	**0.00**
Methylene Chloride(Dichloromethane)	75-09-2	2.1	205.39	5	*	17.66	2.48E-05	0.21544	**0.10**
1,1-Dichloroethane	75-34-3	0.63	61.62	5	*	20.57	2.89E-05	0.25102	**0.41**
cis-1,2-Dichloroethylene	156-59-2	1,900	185,828.54	5	*	20.15	2.83E-05	0.24590	**0.00**
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	1,000	97,804.50	5	*	27.73	3.89E-05	0.33840	**0.00**
Trichloroethene	79-01-6	0.5	48.90	5	*	27.31	3.83E-05	0.33328	**0.68**
Dichlorodifluoromethane(Freon 12)	75-71-8	12,000	1,173,653.96	5	*	12.49	1.75E-05	0.15243	**0.00**

fps: feet per second
acfm: actual cubic feet per minute
ug/m^3: micrograms per cubic meter
lb/yr: pounds per year
lb/hr: pounds per hour
ppb: parts per billion

Notes/Assumptions:

1. The stack discharge temperature is 64°F based on recorded parameters.
2. The ambient temperature is approximately 66°F, the average temperature recorded in Binghamton, NY on June 24.
3. Calculations assume that the system will run with the maximum allowable concentrations between quarterly readings.
4. AGC refers to the Annual Guideline Concentration as determined using the hand calculations in the DAR-1 AGC/SGC Tables dated December 22, 2003.
5. 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.

Appendix C

Automated Reagent Injection System
Operating Parameters

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Table C-1. Automated Reagent Injection System Summary of Operational Year 3, Quarter Number 3 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.)
4/11/2005	2,720	272	157
Quarter Totals (gal.) =	**2,720**	**272**	**157**
Totals Since Startup (gal.) =	**61,274**	**7,369**	**7,053**

Notes:

gal. Gallons

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Table C-2. Automated Reagent Injection System, Operational Year 3, Quarter Number 3 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 48

Injection Start Date = 4/11/2005
Injection Completion Date = 6/3/2005

Molasses to Water Ratio (%) = 10.0 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 Flowrate (gpm)	Max. Injection Pressure (psi)
PW-6	160	5	16.0	5	35
IW-3	160	5	16.0	5	35
IW-1	160	4	16.0	9	36
IW-2	160	3	16.0	9	38
GMMW-1	160	3	16.0	9	13
IW-4	160	4	16.0	9	36
IW-5	160	5	16.0	10	38
IW-6	160	7	16.0	8	35
IW-7	160	8	16.0	0	39
IW-8	160	9	16.0	10	38
IW-9	160	11	16.0	9	37
IW-10	160	12	16.0	11	38
IW-11	160	13	16.0	10	35
IW-12	160	15	16.0	7	38
IW-13	160	16	16.0	7	38
IW-14	160	18	16.0	11	38
IW-15	160	19	16.0	7	36
Totals (gal.) =	2720	157	272.0	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 is approximately 1-pipeline volume for each injection well.