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Infrastructure, environment, facilities

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ENVIRONMENT

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

Subject:
Operational Year 4 Quarter Number 3 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 4 Quarter Number 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 of New York, Inc.

Steven M. Feldman
Project Manager

Date:
January 30, 2007

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Broome County
Division of Solid Waste Management

Operational Year 4
Quarter Number 3
Monitoring Report

January 30, 2007

ARCADIS

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Vice President

Operational Year 4
Quarter Number 3
Monitoring Report

Colesville Landfill,
Broome County, New York
NYSDEC Site 704010

Prepared for:
Broome County Division of Solid Waste Management

Prepared by:
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Our Ref.:
NY000949.0019.00004

Date:
January 30, 2007

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1. Introduction

This Monitoring Report (Report) was prepared on behalf of the Broome County Division of Solid Waste Management for the Colesville Landfill, located in Broome County, New York (site) to evaluate and document long-term monitoring (LTM) activities at the site. Remediation and monitoring activities are being conducted pursuant to the Record of Decision (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 July 2006 groundwater quality monitoring event conducted during Operational Year 4, Quarter Number 3. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from April 2006 through July 2006 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.

During the current reporting period, damage occurred at the former SP-4 spring area and at production well GMPW-5 as a result of flooding of the North Stream. Further discussion of the flood damage is provided herein when applicable to the LTM program and/or OM&M of the Groundwater Remediation System. Repair of the damaged components will be discussed in future Monitoring Reports.

2. Methodology

The following section provides a summary of the environmental effectiveness and remedial system performance monitoring methodology for Operational Year 4, 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 4, Quarter Number 3 included the following:

- Groundwater samples were collected from five monitoring wells (Year 4, Q3 list of wells) during the week of July 24, 2006 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-4 and F-6 surface water locations on July 28, 2006.

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

2.2 Groundwater Remediation System Performance Monitoring

Groundwater Remediation System performance monitoring activities during Operational Year 4, 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 July 24, 2006. 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 July 24, 2006. 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 during the week of July 24, 2006.

- 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 and GMPW-4, the combined influent water to the low profile air stripper, and the combined effluent after the cartridge filters. A grab sample could not be collected from production well GMPW-5 due to well damage caused by flooding of the North Stream. 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 July 28, 2006 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

A synoptic round of water level measurements will be completed during Quarters 2 and 4 for evaluation of groundwater flow conditions.

4. Groundwater Quality

The following sections describe the analytical results for groundwater samples collected during the July 2006 monitoring round (Operational Year 4, Quarter Number 3). 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 in the same table for comparative purposes.

4.1 Volatile Organic Compounds

As shown in Table 1, total VOC (TVOC) concentrations in all monitoring wells sampled during the reporting period were generally stable to decreasing. Specifically, monitoring well GMMW-5, which is located closest to the IRZ, remained stable at 299.0

micrograms per liter (ug/L) during the current reporting period. Similarly, TVOC concentrations in mid-plume monitoring wells PW-4, W-5 and GMMW-2 remained stable at 60.2 ug/L, 193.3 ug/L, and 337.8 ug/L, respectively. TVOC concentrations in mid-plume monitoring well GMMW-6 decreased significantly to 551.1 ug/L.

PT system analytical VOC results are provided in Table 4. During the current reporting period, TVOC concentration at production wells GMPW-3 and GMPW-4 were consistent with prior rounds of data. Specifically, TVOC concentrations in production wells GMPW-3 and GMPW-4 were 284.0 ug/L and 362.5 ug/L, respectively. A complete evaluation of performance monitoring conducted on the PT system is provided in Section 7.1.2 of this report.

4.2 Indicators of Reducing Conditions

Groundwater analytical results for biogeochemical parameters and field parameters were collected in accordance with the LTM plan and are provided in Table 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., 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. Ethene results for monitoring well GMMW-6 remained elevated during Operational Year 4, Quarter Number 3 and continue to indicate 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 samples from the SP-2 and SP-3 spring water locations were not collected during the current reporting period due to unsafe conditions caused by

flooding of the North Stream. Further details are provided in Section 10, Recommendations.

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 4, Quarter Number 3 monitoring round are summarized in Table 1. As shown in Table 1, surface water quality at the F-6 and SP-4 sampling locations remains consistent with prior rounds of analytical data. Specifically, TVOC concentrations at the F-6 and SP-4 sampling locations were 4.1 ug/L and 6.6 ug/L, respectively. This data indicate that surface water quality is not being adversely impacted despite the damage caused to the side-slopes of the landfill and the former SP-4 spring area.

7. Groundwater Remediation System Performance

The following section describes the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 4, Quarter Number 3.

7.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 4, Quarter Number 3.

7.1.1 Summary of Operation, Maintenance, and Monitoring

The PT system operated continuously during Operational Year 4, Quarter Number 3. PT system OM&M was conducted during the week of July 24, 2006 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 0.25-gallons per minute (gpm), with individual recovery rates of 0.03-gpm, 0.21-gpm, and 0.03-gpm for production wells GMPW-3, GMPW-4, and GMPW-5, respectively. The average recovery rate during Operational Year 4, Quarter Number 3 at production wells GMPW-3 and GMPW-5 were well below system startup conditions. ARCADIS

continued to troubleshoot the cause of the decreased flow rate at GMPW-3 and believes it is a result of a mechanical malfunction as opposed to a well problem. As referenced previously, production well GMPW-5 was damaged as a result of flooding of the North Stream. Accordingly, this well did not operate during most of the current reporting period. Production well GMPW-4 operated in a manner consistent with its previous operation. A total of 43,205 gallons of groundwater were recovered during the reporting period and a total of 1,117,090 gallons of groundwater have been recovered since system startup. The low profile air stripper operated at design specifications with the blower discharge pressure of 8.6-inches of water column (i.w.c.) and a low profile air stripper blower flowrate of 325 standard cubic feet per minute (scfm).

7.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 4, Quarter Number 3 was conducted on July 27 and 28, 2006. As discussed previously, four groundwater samples and one vapor sample were collected. Groundwater samples included collection of individual production well samples (GMPW-3 and GMPW-4), 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 average BPJ limit. Based on the total groundwater recovered during the reporting period and total influent groundwater concentration, an estimated 0.11 pounds (lbs) of VOC mass were removed from the subsurface during the quarterly reporting period, as shown in Table 5. A total of approximately 2.00 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, VOCs were not detected above their respective detection limits. To be conservative, a NYSDEC DAR-1 air model was calculated using the actual analytical data for detected constituents 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 4, Quarter Number 3.

7.2.1 Summary of Operation, Maintenance, and Monitoring

ARI system OM&M was conducted during the Operational Year 4, Quarter Number 3 OM&M site visit during the week of July 24, 2006 and included operation and maintenance of system equipment. A reagent injection was not conducted during the current reporting period. Nonetheless, sufficient organic carbon was maintained within the subsurface to maintain the anaerobic IRZ (as described below).

7.2.2 Results of Performance Sampling

ARI system performance sampling was conducted on July 28, 2006. As discussed previously, this event consisted of obtaining TOC samples at three injection wells. In addition, analytical results from select monitoring wells under the environmental effectiveness monitoring program were utilized to determine the effectiveness of the ARI system. A summary of key observations is as follows:

- The TOC concentration at monitoring well GMMW-5 (24.1 mg/L), GMMW-6 (38.6 mg/L) and injection wells IW-3 (430 mg/L), IW-8 (274 mg/L), and IW-13 (40.5 mg/L) indicate that sufficient organic carbon is being delivered to the subsurface to maintain the IRZ.

- The methane concentration in monitoring well GMMW-5 remained significantly elevated at 23,000 micrograms per liter (ug/L), providing evidence that strongly reducing conditions (methanogenic) are being maintained within the IRZ.

- Similarly, the methane concentration in monitoring well GMMW-6 remained elevated at 3,900 ug/L.

- The ethene concentration in monitoring well GMMW-5 remained elevated at 36,000 nanograms per liter (ng/L). The ethane concentration in monitoring

well GMMW-5 increased to 11,000 (ng/L). The data continue to indicate that complete reductive dechlorination is occurring within the IRZ; and,

- The ethene concentration in monitoring well GMMW-6 remained elevated at 110,000 ng/L.

As referenced previously, TVOC concentrations remained stable at monitoring well GMMW-5 and TVOC concentrations in mid-plume monitoring well GMMW-6 decreased significantly to 551.1 ug/L.

8. Spring Water Remediation System Performance

SP-5 Spring Water Remediation System OM&M was conducted on July 28, 2006 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 at or below their respective BPJ limits via the LPGAC. Influent TVOC analytical data (79.6 ug/L) remained consistent with historical analytical data. Table 8 contains the SP-5 Spring Water Remediation System field parameters recorded during Operational Year 4, Quarter Number 3. As shown in Table 8, the SP-5 remedial system treated approximately 178,823 gallons of spring water during the operating period. An estimated 0.13 lbs of VOCs was removed by the SP-5 remedial system during the same period. An estimated 1,034,177 gallons of spring water have been treated and an estimated 0.76 lbs of VOC mass have been recovered since system startup.

9. Conclusions

Based on the data obtained from the Operational Year 4, Quarter Number 3 monitoring, ARCADIS concludes the following:

- The revised injection methodology continues to maintain the anaerobic IRZ and is completely degrading contaminant mass. This is evidenced by the observation of methanogenic conditions and significant increase in reductive dechlorination end-products (i.e., ethene).

- The Groundwater Remediation System operated continuously during the current reporting period. Similar to recent operation, the recovery rate in production well GMPW-3 remained below historical levels. In addition, production well GMPW-5

did not operate for the majority of the current reporting period due to damage caused by flooding of the North Stream.

- 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.
- Surface water data indicate that surface water quality is not being adversely impacted despite the damage caused to the side-slopes of the landfill and the former SP-4 spring area.

10. Recommendations

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

- Once conditions are made safe for entry, inspect the SP-2 and SP-3 spring locations to identify their current condition as a result of the flood damage.
- Continue to operate the ARI system following the modified injection methodology utilized during the current reporting period.
- Continue to evaluate and troubleshoot performance of production well GMPW-3 to determine the cause of decreased performance. Consider replacing the pump.
- Locate production well GMPW-5 and determine the appropriate repair for the well.
- Inspect the former SP-4 spring location and determine the appropriate maintenance for this area.

11. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted for Operational Year 4 on the quarterly schedule set forth in the Proposed Modifications to Long-Term Monitoring Program (ARCADIS 2005). System OM&M of the Groundwater Remediation System will continue to be performed on a quarterly basis consistent with the LTM Plan. Evaluation of the flood damage to remedial components is currently underway. The damaged components will be repaired as soon as feasible. Repair status of the damaged remedial components will be documented in future Monitoring Reports and through interim correspondence with the NYSDEC and USEPA.

12. References

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

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

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

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

ARCADIS G&M, Inc. 2006 Operational Year 3 Annual Monitoring Report, Broome County, New York, NYSDEC Site 704010. March 2, 2006.

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Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	GMMW-02 3/30/2006	GMMW-02 7/27/2006	GMMW-05 3/30/2006	GMMW-05 7/27/2006	GMMW-06 3/30/2006	GMMW-06 7/27/2006	GMMW-06* 7/27/2006
1,1,1-Trichloroethane		**24**	**19**	<1.0	<1.0	**8.2**	**6**	**5.6**
1,1,2-Trichloroethane		<1.0	**<1.0**	<1.0	<1.0	<1.0	<5.0	<5.0
1,1-Dichloroethane		**110**	**83**	**62**	**3.5**	**440**	**250**	**250**
1,1-Dichloroethene		**2.0**	**1.3**	<1.1	<1.0	<1.0	<5.0	<5.0
1,2-Dichloroethane		<1.0	<1.0	**<1.0**	3.5	<1.0	<5.0	<5.0
1,2-Dichloropropane		<1.0	<1.0	<1.1	<1.0	<1.0	<5.0	<5.0
Benzene		**2.8**	**2.9**	**1.4**	**2.5**	**5.9**	**7.1**	**7**
Chlorobenzene		**37**	**32**	**17**	**22**	**36**	**33**	**34**
Chloroethane		**34**	**24**	**160**	**230**	**190**	**150**	**150**
Chloroform		<1.0	**<1.0**	<1.1	<1.0	<1.0	<5.0	<5.0
cis-1,2-Dichloroethene		**140**	**100**	**38**	**16**	**200**	**64**	**60**
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Methylene chloride		**1.4**	**1.6 U**	**2.4**	**2.8 U**	**11**	**12**	**12**
Methyl tert-butyl ether		<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
Naphthalene		<1.0	<1.0	<1.0	<1.0	<1.0	<5.0	<5.0
o-Xylene		<1.0	<1.0	**1.8**	**3.2**	<1.0	<5.0	<5.0
Tetrachloroethene		<1.0	<1.0	<1.1	<1.0	<1.0	<5.0	<5.0
Toluene		<1.0	<1.0	**2.8**	**4.8**	<1.0	<5.0	<5.0
trans-1,2-Dichloroethene		**<1.0**	<1.0	<1.1	<1.0	<1.0	<5.0	<5.0
Trichloroethene		**67**	**60**	<1.1	<1.0	**9**	<1.0	<1.0
Vinyl chloride		**17**	**14**	**12**	**11**	**87**	**29**	**28**
Total VOCs		**435.2**	**336.2**	**297.4**	**297**	**987.1**	**551.1**	**546.6**

(1) Surfacewater sample

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.
ug/L Micrograms per liter.
* Field replicate.
J Estimated value.
MDL Method detection limit.
NA Not analyzed.
U Data Qualified as Non-Detect.

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	PW-04 3/30/2006	PW-04 7/27/2006	W-05 3/30/2006	W-05 7/27/2006	SP-4[1] 3/31/06	SP-4[1] 7/28/2006	F-6[1] 12/23/2005
1,1,1-Trichloroethane		**18**	**12**	<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
1,1-Dichloroethane		**17**	**13**	**94**	**81**	**3.5**	**4.9**	**1.7**
1,1-Dichloroethene		<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
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene		<1.0	<1.0	**5.2**	**4.6**	<1.0	<1.0	<1.0
Chlorobenzene		<1.0	<1.0	**20**	**18**	<1.0	<1.0	<1.0
Chloroethane		**7.2**	**2.5**	**95**	**79**	<1.0	<1.0	<1.0
Chloroform		**1.4**	**1.5**	<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene		**13**	**15**	**3.2**	**1.7**	<1.0	**1.7**	<1.0
Dichlorodifluoromethane		**2.1**	ND	**2.3**	<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		<1.0	**1.2 U**	**2.5**	**3.1 U**	<1.0	<1.0	<1.0
Methyl tert-butyl ether		<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
o-Xylene		<1.0	<1.0	<1.0	1.1	<1.0	<1.0	<1.0
Tetrachloroethene		<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
trans-1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene		**17**	**15**	**2.8**	**1.7**	<1.0	<1.0	<1.0
Vinyl chloride		**1.5**	<1.0	**6.2**	**3.1**	<1.0	<1.0	<1.0
Total VOCs		**77.2**	**59.0**	**231.2**	**190.2**	**3.5**	**6.6**	**1.7**

(1) Surfacewater sample

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.
ug/L Micrograms per liter.
* Field replicate.
J Estimated value.
MDL Method detection limit.
NA Not analyzed.
U Data Qualified as Non-Detect.

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	F-6[1] 7/28/2006	TBV072706 7/27/2006	TBV072806 7/28/2006	FBV072806 7/28/2006
1,1,1-Trichloroethane		<1.0	<1.0	<1.0	<1.0
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane		**3.0**	<1.0	<1.0	<1.0
1,1-Dichloroethene		<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0
Benzene		<1.0	<1.0	<1.0	<1.0
Chlorobenzene		<1.0	<1.0	<1.0	<1.0
Chloroethane		<1.0	<1.0	<1.0	<1.0
Chloroform		<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene		**1.1**	<1.0	<1.0	<1.0
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0
Ethylbenzene		<1.0	<1.0	<1.0	<1.0
Methylene chloride		<1.0	<1.0	**1.1**	**1.1**
Methyl tert-butyl ether		<1.0	<1.0	<1.0	<1.0
Naphthalene		<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	<1.0	<1.0
Tetrachloroethene		<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0
Trichloroethene		<1.0	<1.0	<1.0	<1.0
Vinyl chloride		<1.0	<1.0	<1.0	<1.0
Total VOCs		**4.1**	**0.0**	**1.1**	**1.1**

(1) Surfacewater sample

Bold Constituent detected above MDL.

VOCs Volatile Organic Compounds.
ug/L Micrograms per liter.
* Field replicate.
J Estimated value.
MDL Method detection limit.
NA Not analyzed.
U Data Qualified as Non-Detect.

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Table 2. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-02 3/30/06	GMMW-02 7/27/06	GMMW-05 3/30/06	GMMW-05 7/27/06
	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	**4.6**	ND	**37.6**	**24.1**
Sulfate	mg/L	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--
Iron (field)	mg/L	--	--	--	--
FIELD PARAMETERS					
pH	Standard units	**6.4**	**6.54**	**6.07**	**6.6**
Specific Conductance	mmhos/cm	**0.704**	**0.1245**	**0.687**	**1.039**
Turbidity	NTU	--	--	--	--
Dissolved Oxygen	mg/L	--	--	--	--
Temperature	deg C	**13.1**	**18.6**	**10.4**	**18.8**
ORP	mV	--	--	--	--
DISSOLVED GASES					
Carbon dioxide	mg/L	**220**	**180**	**170**	**200**
Carbon monoxide	mg/L	**<1.0**	**<1**	**<1.0**	**<1**
Ethane	ng/L	**550**	**550**	**1400**	**11000**
Ethene	ng/L	**2900**	**3600**	**50000**	**36000**
Methane	ug/L	**1500**	**1600**	**18000**	**23000**
Nitrogen	mg/L	**23**	**14**	**13**	**4.1**
Oxygen	mg/L	**3.7**	**1.3**	**2.6**	**0.99**

Bold Constituent detected above MDL.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	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, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-06 3/30/06	GMMW-06 7/27/06	PW-4 3/30/06	PW-04 7/27/06
	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	**19.8**	**38.6**	**3.98**	ND
Sulfate	mg/L	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--
Iron (field)	mg/L	--	--	--	--
FIELD PARAMETERS					
pH	Standard units	**6.59**	**6.66**	**6.02**	**5.73**
Specific Conductance	mmhos/cm	**1.139**	**1.225**	**0.647**	**0.591**
Turbidity	NTU	--	--	--	--
Dissolved Oxygen	mg/L	--	--	--	--
Temperature	deg C	**11.1**	**16.3**	**10**	**17.7**
ORP	mV	--	--	--	--
DISSOLVED GASES					
Carbon dioxide	mg/L	**210**	**200**	**220**	**190**
Carbon monoxide	mg/L	<1.0	<1	**<1.0**	<1
Ethane	ng/L	**1500**	**2300**	**70**	<25
Ethene	ng/L	**110000**	**110000**	**310**	**160**
Methane	ug/L	**2400**	**3900**	**31**	**10**
Nitrogen	mg/L	**20**	**14**	**14**	**15**
Oxygen	mg/L	**2.9**	**1.6**	**2.8**	**4.2**

Bold Constituent detected above MDL.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	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, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	UNITS	W-05 3/30/06	W-05 7/27/06	IW-03 3/30/06	IW-03 7/28/06
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	**6.79**	**3.87**	**630**	**430**
Sulfate		mg/L	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--
Iron (field)		mg/L	--	--	--	--
FIELD PARAMETERS						
pH		Standard units	**6.77**	**6.52**	--	**5.32**
Specific Conductance		mmhos/cm	**0.946**	**0.417**	--	--
Turbidity		NTU	--	--	--	--
Dissolved Oxygen		mg/L	--	--	--	--
Temperature		deg C	**12.5**	**17.7**	--	--
ORP		mV	--	--	--	--
DISSOLVED GASES						
Carbon dioxide		mg/L	**210**	190	--	--
Carbon monoxide		mg/L	**<1.0**	<1	--	--
Ethane		ng/L	**16000**	**18000**	--	--
Ethene		ng/L	**8100**	**9500**	--	--
Methane		ug/L	**1500**	**2000**	--	--
Nitrogen		mg/L	**15**	**16**	--	--
Oxygen		mg/L	**1.8**	**1.5**	--	--

Bold Constituent detected above MDL.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	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, Operational Year 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	IW-08 3/30/06	IW-08 7/28/06	IW-13 3/30/06	IW-13 7/28/06
	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	**2000**	**274**	**80.7**	**40.5**
Sulfate	mg/L	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--
Iron (field)	mg/L	--	--	--	--
FIELD PARAMETERS					
pH	Standard units	--	**4.68**	--	**6.26**
Specific Conductance	mmhos/cm	--	--	--	--
Turbidity	NTU	--	--	--	--
Dissolved Oxygen	mg/L	--	--	--	--
Temperature	deg C	--	--	--	--
ORP	mV	--	--	--	--
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	--	--	--	--

Bold Constituent detected above MDL.

mg/L	Milligrams per liter.
mmhos/cm	Millimhos per centimeter.
NTU	Nephelometric Turbidity Units.
deg C	Degrees Celsius.
mV	Millivolts.
ng/L	Nanograms per liter.
--	Not analyzed or collected.
ug/L	Micrograms per liter.
IW	Injection well.
ORP	Oxidation-reduction potential.
J	Qualifier assigned to analytical data indicating result is estimated.

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Table 3. PT System Operating Parameters, Operational Year 4, 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)
3/31/2006	5:30 PM	8.9	263	1,073,885.4	949,698.8	366,582.0	30,641.3	379,936.8
7/28/2006	1:10 PM	8.6	325	1,117,090.0	981,809.0	371,630.7	67,327.1	384,879.0
		Average Daily Flowrate (gpm) =		**0.25**	**0.19**	**0.03**	**0.21**	**0.03**
		Total Groundwater Recovered During Reporting Period (gallons) =		**43,205**	**32,110**	**5,049**	**36,686**	**4,942**

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

Notes:

1. GMPW-4 totalizing flow meter malfuctioned and was replaced on 12/23/2005.
** GMPW-5 shutdown during reporting period due to damage caused by local flooding.

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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 4, Quarter Number 3, 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	COMBINED INF	EFFLUENT AC II
		Date:	7/27/2006	7/27/2006	7/28/2006	7/28/2006
1,1,1-Trichloroethane	10-20		**37**	**33**	**38**	<1.0
1,1,2-Trichloroethane	10		<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	10		**57**	**81**	**65**	<1.0
1,1-Dichloroethene	10		**2.8**	**2.6**	**2.7**	<1.0
1,2-Dichloroethane	10-30		<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane	NA		<1.0	<1.0	<1.0	<1.0
Benzene	5		**4.7**	**4.6**	**4.8**	<1.0
Chlorobenzene	NA		<1.0	**6**	**1.3**	<1.0
Chloroethane	NA		**20**	**34**	**22**	<1.0
Chloroform	NA		<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	10		**83**	**84**	**85**	<1.0
Dichlorodifluoromethane	NA		**1.9**	**2.2**	**1.9**	<1.0
Ethylbenzene	5		<1.0	<1.0	<1.0	<1.0
Methylene Chloride	10-50		**3.6 U**	**4.1 U**	**3.8 U**	<1.0
Methyl tert-butyl ether	50		<1.0	<1.0	<1.0	<1.0
Naphthalene	10		<1.0	<1.0	<1.0	<1.0
o-Xylene	5		<1.0	<1.0	<1.0	<1.0
Tetrachloroethene	10		<1.0	<1.0	<1.0	<1.0
Toluene	5		<1.0	<1.0	<1.0	<1.0
trans-1,2-Dichloroethene	10-50		<1.0	<1.0	<1.0	<1.0
Trichloroethene	10		**63**	**80**	**68**	<1.0
Vinyl Chloride	10-50		**11**	**31**	**15**	<1.0
Total VOCs			**280.4**	**358.4**	303.7	**0**
Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)					
Total Iron	1.2 / 0.61		**0.364**	**3.63**	**4.9**	**0.558**

See Notes on Last Page.

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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 4, 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.
PT	Pump and Treat.
--	Not Analyzed or Collected.
<	Analyte Below Detection Limit.
U	Data Qualified as Non-Detect.

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Table 5. PT System Mass Removal Rate of Volatile Organic Compounds, Operational Year 4, 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)
3/30/2006	299.8	1,073,885.4	NA	NA	NA
7/28/2006	307.5	1,117,090.0	43,204.6	304	0.11
			Total Estimated Mass Removed During Operational Year 4, Quarter Number 3 (lbs) =		**0.11**
			Total Estimated Mass Removed Since System Startup (lbs) =		**2.00**

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

Compounds	CAS Numbers	Sample ID: Date Sampled:	Effluent 7/28/2006 ppbv
Vinyl Chloride	75-01-4		<7.2
Chloroethane(Ethyl Chloride)	75-00-3		<7.2
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4		<7.2
Methylene Chloride(Dichloromethane)	75-09-2		<7.2
1,1-Dichloroethane	75-34-3		<7.2
cis-1,2-Dichloroethylene	156-59-2		<7.2
Chloroform	67-66-3		<7.2
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6		<7.2
Benzene	71-43-2		<7.2
Trichloroethene	79-01-6		<7.2
Toluene	108-88-3		<7.2
Ethyl benzene	100-41-4		<7.2
m,p-Xylene	108-38-3/106-42-3		<7.2
o-Xylene	95-47-6		<7.2
1,2,4-Trimethylbenzene	95-63-6		<7.2
2-Propanol (Isopropyl alcohol)	67-63-0		<7.2
Dichlorodifluoromethane(Freon 12)	75-71-8		<7.2

Bold Constituent detected above MDL.
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 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents	Model Technology BPJ Limits[1,2] (ug/L)	Sample ID: Date:	SP-5 INF. 7/28/2006	SP-5 EFF. 7/28/2006
VOCs (units in ug/L)				
1,1,1-Trichloroethane	10		<1.0	<1.0
1,1-Dichloroethane	10		**32**	**5.4**
1,2-Dichloroethane	10-100		<1.0	<1.0
Benzene	5		**3**	<1.0
Chlorobenzene	10-25		**31**	**1.4**
Chloroethane	10		**9.8**	**10**
cis-1,2-Dichloroethene	10		**1.8**	<1.0
Dichlorodifluoromethane	NA		<1.0	<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**	<1.0
Vinyl Chloride	10		<1.0	<1.0
Total VOCs			**79.6**	**16.8**

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 4, Quarter Number 3, 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)
3/31/2006	91.5	0.99	0	NA	NA	NA
7/28/2006	79.6	1.1	0	178,823	85.3	0.13
				Total Estimated Mass Removed During Current Quarter (lbs) =		**0.13**
				Total Estimated Mass Removed Since System Startup (lbs) =		**0.76**
				Total Effluent Treated Since System Startup (gallons) =		**1,034,177**

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).

Appendix A

Groundwater Sampling Logs

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. AK/000949/0019.0003D Well SPB-INF Date 7-28-06

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials ____ PVC ____ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method Pump Off: ____ **Volumes Purged** ____

Centrifugal ____ **Sample Time:** ____

Submersible ____

Other ✓ (Bailer circled) Bailer Type: ____ Sampled By: DM-LT

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1130					6.57	662				17.7	

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ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NL000949.0019-0003A Well SPS-EFF Date 5-28-06

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials ____ PVC ____ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method Pump Off: ____ **Volumes Purged** ____

Centrifugal ____ **Sample Time:** ____

Submersible ____

Other ✓ (Bailer) Type: ____ Sampled By: DM-KI.

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1140		1.1GAL			6.58	529				17.7	

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Groundwater Sampling Form

Page ____ of ____

Project/No. X1Y00999.0019.0003A   Well Effluent Vapor   Date 7-28-06

Screen Setting ______   Measuring Point Description ______   Casing Diameter (inches) ______

Static Water Level ______   Measured Width ______   Well Materials ___ PVC ___ ST. Steel

Total depth ______   Pump On: ______   Pump Intake: ______

Purge Method   Pump Off: ______   **Volumes Purged** ______

Centrifugal ______   **Sample Time:** ______

Submersible ______

Other ______   Bailer Type: ______   Sampled By: D. [illegible]

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1250											VAC-299 [illegible]
											EV9-00-9

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000GMA.0019-00034 Well Effluent Date 7-28-06

Screen Setting ________ Measuring Point Description ________ Casing Diameter (inches) ________

Static Water Level ________ Measured Width ________ Well Materials ____ PVC ____ ST. Steel

Total depth ________ Pump On: ________ Pump Intake: ________

Purge Method Pump Off: ________ **Volumes Purged** ________

Centrifugal ________ **Sample Time:** ________

Submersible ________

Other Sample Port Bailer Type: ________ Sampled By: DM - KJ.

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000948.0005.00003A Well COMBINED ENF. Date 7-28-06

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) _____

Static Water Level _____ Measured Width _____ Well Materials PVC / ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: _____

Submersible _____

Other Sample Pump Bailer Type: _____ Sampled By: D.M.-R.S.

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1110											

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. 11Y000949-0002.0003A Well SG-4 Date 7-28-04

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) _____

Static Water Level _____ Measured Width _____ Well Materials PVC / ___ ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: _____

Submersible _____

Other ✓ (Bailer) Type: _____ Sampled By: DM-KT.

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1600					7.84	123.4				78.2	

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Groundwater Sampling Form

Page ____ of ____

Project/No. NL000919-0019.0003A Well P-6 Date 7-28-04

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials ____ PVC ____ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method Pump Off: ____ Volumes Purged ____

Centrifugal ____ Sample Time: ____
Submersible ____
Other ✓ (Bailer) Type: ____ Sampled By: DM-KI

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
0950					7.22	1233				18.2	

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NN000849.0019.0063A Well IW-13 Date 7-28-06

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials ____ PVC ____ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method Pump Off: ____ **Volumes Purged** ____

Centrifugal ____ **Sample Time:** 0840

Submersible ____

Other ____ Bailer Type: ____ Sampled By: DM

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
0840					6.26						

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Color - Light
Slight odor

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000999.0019.00034 Well IW8 Date ____

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) 4"

Static Water Level ____ Measured Width ____ Well Materials ✓ PVC ___ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method ____ Pump Off: ____ Volumes Purged ____

Centrifugal ____ Sample Time: 0825

Submersible ____

Other J Bailer Type: ____ Sampled By: DM

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
0825					4.68						

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Color- Light Amber
Strong odor

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000949-0019.0003A Well IW-3 Date 7-28-10

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) 4"

Static Water Level _____ Measured Width _____ Well Materials PVC / ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method _____ Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: 0814

Submersible ✓

Other _____ Bailer Type: _____ Sampled By: DM

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
0814					5.52						

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Color AMBER
STRONG ODOR

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Project/No. ANV00949.0019.0003A Well GMPW4 Date 7-27-06

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials ____ PVC ____ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method Pump Off: ____ **Volumes Purged** ____

Centrifugal ____ **Sample Time:** 13:28

Submersible ____

Other ✓ S.P. Bailer Type: ____ Sampled By: DM- KJ

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
13:28					6.52						

Clear
odorless

VOC's + Fe

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. M0009490019.0003A Well GMPW 9 Date 2-27-06

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) _____

Static Water Level _____ Measured Width _____ Well Materials ___ PVC ___ ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method _____ Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: 1515

Submersible _____

Other _____ Bailer Type: _____ Sampled By: DM. K.J.

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
1515					6.79						

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Clean Odors

VOC's + Fe

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Project/No. N4000949.0019.0003A Well GMMW-6 Date 7/27/06

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) _____

Static Water Level _____ Measured Width _____ Well Materials PVC / ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: 14:14

Submersible _____

Other _____ Bailer Type: _____ Sampled By: DM

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
14:14					6.66	1225				16.30	

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VOC's - Clear
TOC Clear

Odor - ~~Slight~~ Very Slight

VOC's, ~~METALS~~, + TOC's

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000949.0019.0003A Well GMMW-2 Date 7-27-06

Screen Setting ________ Measuring Point Description ________ Casing Diameter (inches) ________

Static Water Level ________ Measured Width ________ Well Materials ____ PVC ____ ST. Steel

Total depth ________ Pump On: ________ Pump Intake: ________

Purge Method Pump Off: ________ Volumes Purged ________

Centrifugal ________ Sample Time: 14:45

Submersible ________

Other ✓ Bailer Type: ________ Sampled By: ________

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
14:45					6.54	124.5				18.6	

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VOC'S / toc Clear
no odor

VOC'S, METH GAS, ETHENE, + TOC'S

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY00949.0019.0003A   Well W-5   Date 7-27-06

Screen Setting ________   Measuring Point Description ________   Casing Diameter (inches) ________

Static Water Level ________   Measured Width ________   Well Materials ___ PVC ___ ST. Steel

Total depth ________   Pump On: ________   Pump Intake: ________

Purge Method   Pump Off: ________   Volumes Purged ________

Centrifugal ________   Sample Time: 15:25

Submersible ________   Sampled By: KT

Other ________   Bailer Type: ________

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
15:25					6.52	417				17.7	

Clear
Slight odor

VOC's - Methane, Ethane, Ethene + VOC's

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ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Page ____ of ____

Project/No. NY000649-0019-0003A Well PW-4 Date 7-27-06

Screen Setting ____ Measuring Point Description ____ Casing Diameter (inches) ____

Static Water Level ____ Measured Width ____ Well Materials PVC / ___ ST. Steel

Total depth ____ Pump On: ____ Pump Intake: ____

Purge Method ____ Pump Off: ____ Volumes Purged ____

Centrifugal ____ Sample Time: 15:05

Submersible ____

Other ✓ Bailer Type: ____ Sampled By: KJ

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
15:05					5.79	591				17.7	

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Clear
Odor none

VOC's, Methane, Ethane, Ethene & TOC

ARCADIS GERAGHTY & MILLER

Groundwater Sampling Form

Project/No. 40000949.0019.0003A Well GMMW-5 Date 7/27/06

Screen Setting _____ Measuring Point Description _____ Casing Diameter (inches) _____

Static Water Level _____ Measured Width _____ Well Materials PVC / ST. Steel

Total depth _____ Pump On: _____ Pump Intake: _____

Purge Method _____ Pump Off: _____ Volumes Purged _____

Centrifugal _____ Sample Time: 13:58

Submersible _____

Other _____ Bailer Type: _____ Sampled By: DM

Time	Minutes Elapsed	Rate (gpm) (ML)	DTW	Gallons Purged	pH	Cond. umhos ms/cm	TURB (NTUs)	Redox (mV)	Diss. O2 (mg/L)	TEMP. (C) (F)	REMARKS 3)
13:58					6.60	1039				18.8	

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VOC's - clear odor none

Toc gold VOC's, Gases, Toc's

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

Parameters for 7/28/2006 Sampling Event			
Discharge Temperature	T	527	°R
Ambient Temperature	Ta	541	°R
Stack Diameter	D	6	in
Stack Radius	R	0.25	ft
Stack Area	A	0.20	ft^2
Exit Velocity	V	27.6	fps
Exit Flow	Q	325	acfm
Exit Flow	Q	325	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 67°F based on recorded parameters.
2. The ambient temperature is approximately 81°F based on recorded conditions.
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 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Calculation of the Short-Term Guideline Concentration (SGC) for Sampling Event on 7/28/2006

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	7.2	*	18.71	2.63E-05	0.0045	0.29191	1.6E-04
Chloroethane(Ethyl Chloride)	75-00-3	--	7.2	*	19.31	2.71E-05	0.0046	0.30134	NA
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	--	7.2	*	29.02	4.08E-05	0.0070	0.45280	NA
Methylene Chloride(Dichloromethane)	75-09-2	14,000	7.2	*	25.42	3.57E-05	0.0061	0.39671	2.8E-03
1,1-Dichloroethane	75-34-3	--	7.2	*	29.62	4.16E-05	0.0071	0.46224	NA
cis-1,2 - Dichloroethylene	156-59-2	--	7.2	*	29.02	4.08E-05	0.0070	0.45280	NA
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	68,000	7.2	*	39.93	5.61E-05	0.0096	0.62314	9.2E-04
Trichloroethene	79-01-6	54,000	7.2	*	39.33	5.52E-05	0.0094	0.61370	1.1E-03
Dichlorofluoromethane(Freon 12)	75-71-8	--	7.2	*	36.19	5.08E-05	0.0087	0.56466	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 4, Quarter Number 3, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 7/28/2006 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	7.2	*	18.71	2.28E-05	0.19935	**1.85**
Chloroethane(Ethyl Chloride)	75-00-3	10,000	978,044.97	7.2	*	19.31	2.35E-05	0.20579	**0.00**
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	70	6,846.31	7.2	*	29.02	3.54E-05	0.30922	**0.00**
Methylene Chloride(Dichloromethane)	75-09-2	2.1	205.39	7.2	*	25.42	3.10E-05	0.27092	**0.13**
1,1-Dichloroethane	75-34-3	0.63	61.62	7.2	*	29.62	3.61E-05	0.31567	**0.51**
cis-1,2-Dichloroethylene	156-59-2	1,900	185,828.54	7.2	*	29.02	3.54E-05	0.30922	**0.00**
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	1,000	97,804.50	7.2	*	39.93	4.87E-05	0.42555	**0.00**
Trichloroethene	79-01-6	0.5	48.90	7.2	*	39.33	4.79E-05	0.41910	**0.86**
Dichlorodifluoromethane(Freon 12)	75-71-8	12,000	1,173,653.96	7.2	*	17.99	2.19E-05	0.19169	**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 67°F based on recorded parameters.
2. The ambient temperature is approximately 81°F based on recorded conditions.
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 4, Quarter Number 3 Injection Quantities, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

NO INJECTIONS COMPLETED DURING REPORTING PERIOD