ARCADIS

Infrastructure, environment, facilities

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

ENVIRONMENT

Subject:
Operational Year 5 Quarter Number 3 Monitoring Report,
Colesville Landfill, Broome County, New York. (Site No. 704010).

Date:
January 3, 2008

Dear Mr. Jacob:

On behalf of Broome County, ARCADIS is providing the Operational Year 5 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

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Broome County
Division of Solid Waste Management

Operational Year 5
Quarter Number 3
Monitoring Report

January 3, 2008

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Operational Year 5
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.:
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Date:
January 3, 2008

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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 June 2007 groundwater quality monitoring event conducted during Operational Year 5, Quarter Number 3. A description of the operation, maintenance, and monitoring (OM&M) associated with the Groundwater Remediation System from April 2007 through June 2007 has also been included. Following the detailed data analysis and discussion is a summary of findings, conclusions, and recommendations.

As referenced in previous monitoring reports (ARCADIS 2007), damage occurred at the former SP-4 spring area and at recovery well GMPW-5 as a result of flooding of the North Stream. Further discussion of the repair of the flood damage is provided herein when applicable to the LTM program and/or OM&M of the Groundwater Remediation System.

2. Methodology

The following section provides a summary of the environmental effectiveness and remedial system performance monitoring methodology for Operational Year 5, 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 5, Quarter Number 3, included the following:

- Groundwater samples were collected from five monitoring wells (Year 5, Q3 list of wells) during the week of June 18, 2007 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 June 19, 2007.

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 5, Quarter Number 3 were as follows:

- Pump-and-treat (PT) system recovery well influent and effluent samples were collected on June 19, 2007. The samples were selectively analyzed for VOCs and total iron.

- One vapor sample from the PT system air stripper effluent was collected on June 19, 2007. 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 June 18, 2007.

- A TOC samples was collected from alternate electron donor monitoring well TW-1 on June 18, 2007.

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

PT system groundwater samples were collected as grab samples directly from the individual recovery pipelines connected to recovery wells GMPW-3, GMPW-4, GMPW-5, the combined influent water to the low profile air stripper, and the combined effluent after the cartridge filters. The effluent air sample was collected as a grab sample directly from the designated point located on the low profile air stripper stack.

2.3 Spring Water Remediation System Performance Monitoring

SP-5 Spring Water Remediation System performance monitoring could not be conducted during the current reporting period because maintenance activities related to repair and expansion of the system have not been completed. Further discussion is provided in Section 9.0 of this report.

3. Groundwater Flow

A synoptic round of water level measurements is conducted 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 June 2007 monitoring round (Operational Year 5, 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, decreased significantly to below detection limits during the current reporting period. TVOC concentrations in mid-plume monitoring wells PW-4, W-5, and GMMW-2, remained stable at 61.0 micrograms per liter (ug/L), 247.3 ug/L, and 312.6 ug/L, respectively. TVOC concentrations in mid-plume monitoring well GMMW-6 decreased slightly to a value of 483.7 ug/L.

PT system analytical VOC results are provided in Table 4. During the current reporting period, the TVOC concentration at recovery wells GMPW-3, GMPW-4, and GMPW-5 were consistent with prior rounds of data. Specifically, TVOC concentrations in recovery wells GMPW-3, GMPW-4, and GMPW-5 were 213.6 ug/L, 329.6 ug/L, and 121.8 ug/L, respectively. A complete evaluation of performance monitoring conducted on the PT system is provided in Section 8.1.2 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 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 8.2.2 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 concentrations of ethene within monitoring well GMMW-6 continue to be elevated when compared to baseline conditions. Similarly, the concentration of ethane remained elevated within monitoring well GMMW-5 and monitoring well GMMW-6 during the reporting period. Additional details on the results of biogeochemical monitoring as evidence of Groundwater Remediation System performance and effectiveness are discussed in Section 8.2.2 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 Operational Year 5, Quarter Number 3 period due to construction activities being conducted in response to the flood damage along the North Stream. Further details regarding the flood damage related activities is provided in Section 7.

6. Surface Water Quality

Surface water quality analytical results for the Operational Year 5, 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 1.2 µg/L and 2.4 µg/L, respectively. This data indicate that surface water quality is not being adversely impacted.

7. Status of Flood Related Damages

As referenced in the previous monitoring reports, damage was incurred to the former SP-4 spring location and recovery well GMPW-5 as a result of flooding of the North Stream. In addition, it was noted that the SP-2 and SP-3 springs could not be located any longer following the stabilization of the landfill side-slopes. However, several small areas of ponding were noted between the stream and the stabilized landfill slope.

During the current reporting period, the following actions were taken:

- Maintenance of the former SP-4 spring area was completed.
- ARCADIS conducted a visual inspection of the North Stream to confirm and/or document if the previously observed areas of ponding between the stream and landfill slope were still prevalent. A few wet areas were identified, but there was not evidence of seeping water and no samples were collected. The SP-2 and SP-3 areas were relocated with stakes so that the areas can be inspected during future quarterly sampling events.

8. Groundwater Remediation System Performance

The following section describes the results of the Groundwater Remediation System performance monitoring conducted during Operational Year 5, Quarter Number 3.

8.1 PT System

The following section describes the results of the PT system performance monitoring conducted during Operational Year 5, Quarter Number 3.

8.1.1 Summary of Operation, Maintenance, and Monitoring

During Operational Year 5, Quarter Number 3, the PT system operated continuously with the exception of brief system shutdowns as a result of minor system alarms and routine OM&M activities.

PT system OM&M for Operational Year 5, Quarter Number 3 was conducted during the week of June 18, 2007 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 for the current operating period. As shown in Table 3, the total effluent groundwater recovery rate for Operational Year 5, Quarter Number 3 was approximately 0.91-gallon per minute (gpm), with individual recovery rates of 0.57-gpm, 0.34-gpm, and 0.06-gpm in GMPW-3, GMPW-4, and GMPW-5, respectively. The average recovery rates in recovery wells GMPW-3 and GMPW-5 were consistent with system startup data. The average individual recovery well rate during Operational Year 5, Quarter Number 3 in recovery well GMPW-5 continued to be lower when compared to previous operation. However, ARCADIS replaced the GMPW-5 well pump with a new well pump during the week of July 31, 2007.

A total of 108,248.2 gallons of groundwater was recovered during Operational Year 5, Quarter Number 3 and a total of 1,284,078 gallons of groundwater has been recovered since system startup. The low profile air stripper operated in accordance with the design specifications and had a blower flow rate of 310 standard cubic feet per minute (scfm).

8.1.2 Results of Performance Sampling

PT system performance sampling for Operational Year 5, Quarter Number 3 was conducted on June 19, 2007. As discussed previously, five groundwater samples and one vapor sample were collected. Groundwater samples included collection of individual recovery well samples (GMPW-3, GMPW-4, and GMPW-5), total influent, and total effluent after the cartridge filters. The vapor sample was collected from the effluent stack of the low profile air stripper.

Table 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 is slightly above the respective

recommended daily maximum BPJ limit. The cartridge filters were replaced shortly after the quarterly sampling event. Based on the total groundwater recovered during the reporting period and total influent groundwater concentration, an estimated 0.25 pounds (lbs) of VOC mass were removed from the subsurface during the quarterly reporting period, as shown in Table 5. A total of approximately 2.37 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 and the detection limit of all constituents that were not detected but have historically been detected in the influent groundwater. All COCs were below their respective short-term 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.

8.2 ARI System

The following section describes the results of the ARI system performance monitoring conducted during Operational Year 5, Quarter Number 3.

8.2.1 Summary of Operation, Maintenance, and Monitoring

ARI system OM&M was conducted during the Operational Year 5, Quarter Number 3 OM&M site visit during the week of June 18, 2007 and included operation and maintenance of system equipment and the collection of samples for analysis of TOC from injection wells IW-2, IW-3, IW-8, and IW-13. In addition, a TOC sample was collected from a monitoring well TW-1 to evaluate the long- term performance of the alternate electron donor in providing TOC to the subsurface.

One reagent injection was conducted during Operational Year 5, Quarter Number 3. The injection was initiated on March 27, 2007 and was completed on April 9, 2007. As described in the Hydraulic Injection Test and Alternate Electron Donor Pilot Test Letter Work Plan (ARCADIS 2006), an altemate electron donor (e.g., emulsified edible oil [EOS]) was injected into existing injection well IW-8 during the week of December 18, 2006. Accordingly, IW-8 was not included in the current reagent injection to allow for long-term groundwater monitoring of the alternate electron donor.

Based on the number of injection events, quantity of molasses solution delivered to each injection well, and molasses solution percentage, approximately 13,706-gallons of molasses solution were delivered to the subsurface during Operational Year 5, Quarter Number 3. A total of 117,226-gallons of molasses solution have been injected since system startup. Appendix C provides a summary of the recorded system operating parameters for each of the injection events for Operational Year 5, Quarter Number 3.

8.2.2 Results of Performance Sampling

ARI system performance sampling was conducted on June 19, 2007. As discussed previously, this event consisted of collecting TOC samples at four injection wells. In addition, analytical results from select monitoring wells under the environmental effectiveness monitoring program were used to determine the effectiveness of the ARI system. A summary of key observations is as follows:

- The TOC concentration at monitoring well GMMW-5 (130 mg/L) and injection wells IW-3 (227 mg/L), IW-8 (1,370 mg/L), and IW-13 (17.2 mg/L) indicated that sufficient organic carbon is being delivered to the subsurface to maintain the IRZ.

- The TOC in monitoring well TW-1 was 169 mg/L. The data indicate that the alternate electron donor EOS continues to provide sufficient organic carbon to the subsurface following the one time injection at injection well IW-8.

- The methane concentration in monitoring wells GMMW-5 and GMMW-6 remained elevated at 25,000 ug/L and 1,700 ug/L, respectively. These data provide evidence that strongly reducing conditions (methanogenic) are being maintained within the IRZ.

- The ethene concentration in monitoring well GMMW-6 remained elevated at 85,000 ng/L.

- The ethane concentration remained elevated in monitoring wells GMMW-5 and GMMW-6 at 13,000 and 4,000 ng/L, respectively.

- TVOC concentrations decreased significantly to below the limits of detection limits in monitoring well GMMW-5.

- TVOC concentrations remained stable but significantly lower than baseline conditions in monitoring well and GMMW-6.

9. Spring Water Remediation System Performance

As referenced previously, SP-5 Spring Water Remediation System OM&M could not be conducted during Operational Year 5, Quarter Number 3 due to clogging of the SP-5 effluent riprap infiltration zone. Completion of maintenance activities at the SP-5 effluent riprap infiltration zone to accommodate the higher flow rate (due to expansion of the groundwater collection area) will occur during Operational Year 5, Quarter Number 4.

10. Conclusions

Based on the data obtained from the Operational Year 5, 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.
- The PT system is operating as designed and is treating recovered groundwater VOCs to below BPJ limits prior to discharge.
- Sufficient organic carbon was delivered to the subsurface to maintain the IRZ as evidenced through the analytical data.
- Repair of flood related damages caused by flooding of the North Stream are complete.
- Surface water quality continues to be consistent with historical data indicating that impacted groundwater and/or flood related damages are not causing an adverse impact to surface water along the North Stream.

11. Recommendations

The following recommendations are made for Operational Year 5, Quarter Number 4 activities:

- Continue to inspect the former spring locations and the side slopes of the North Stream.
- Continue to operate the ARI system without injection well IW-8. Obtain and evaluate data related to the ongoing alternate electron donor pilot program.
- Continue to evaluate the performance of recovery well GMPW-5 to determine if the corrective actions referenced herein have resolved the observed decrease in groundwater recovery.
- Perform maintenance of the SP-5 spring water remediation system to repair the invert elevation of the discharge pipe.

12. Project Schedule

Groundwater environmental effectiveness monitoring is scheduled to be conducted for Operational Year 5 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. Maintenance of the SP-5 spring water remediation system will be completed.

13. 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.

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

ARCADIS of New York, Inc. 2007. Operational Year 5, Quarter Number 2 Monitoring Report, Colesville Landfill, Broome County, New York (Site No. 704010).

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Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

(units in ug/L)	Sample ID: / Date:	GMMW-02 3/26/2007	GMMW-02 6/19/2007	GMMW-05 3/26/2007	GMMW-05 6/19/2007	GMMW-06 3/26/2007	GMMW-06 6/19/2007	GMMW-06* 6/19/2007	PW-04 3/26/2007	PW-04 6/19/2007
1,1,1-Trichloroethane		**12**	**9.6**	<1.0	<1.0	**5.2**	**6.1**	**6.1**	**10**	**9.8**
1,1,2-Trichloroethane		<1.0	<1.0	<1.0	<1.0	**1.4**	**1.6**	**1.4**	<1.0	<1.0
1,1-Dichloroethane		**78**	**79**	**32**	<1.0	**170**	**180**	**180**	**9.3**	**10**
1,1-Dichloroethene		**1.3**	**1.3**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloroethane		<1.0	<1.0	**2.1**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichloropropane		<1.0	<1.0	<1.0	<1.0	**1.2**	**1.3**	**1.3**	<1.0	<1.0
Benzene		**2.5**	**2.4**	**1.6**	<1.0	**7.7**	**7.2**	**7.4**	<1.0	<1.0
Carbon Tetrachloride		**1.8**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	**1.7**	<1.0
Chlorobenzene		**32**	**31**	**26**	<1.0	**38**	**33**	**34**	<1.0	<1.0
Chloroethane		**24**	**29**	**120**	<1.0	**180**	**150**	**150**	**3**	**4.6**
Chloroform		<1.0	<1.0	<1.0	<1.0	**1.3**	**1.1**	**1.2**	**1**	**1**
cis-1,2-Dichloroethene		**110**	**98**	**2.7**	<1.0	**54**	**45**	**46**	**9.2**	**11**
Dichlorodifluoromethane		<1.0	<1.0	<1.0	<1.0	**5.1**	**4.6**	**4.3**	**1.5**	**2.5**
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	**1.6**	**1.7**	**1.8**	<1.0	<1.0
Methylene chloride		<1.0	**1.3**	**1.7**	<1.0	**6.1**	**4.9**	**5.4**	<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
Naphthalene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o-Xylene		<1.0	<1.0	**3**	<1.0	**1.4**	**1.7**	**1.9**	<1.0	<1.0
m,p-Xylene		<2.0	<2.0	<2.0	<2.0	**3.6**	**3.6**	**3.9**	<2.0	<2.0
Tetrachloroethene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene		<1.0	<1.0	**5.3**	<1.0	**2**	**1.9**	**2.1**	<1.0	<1.0
trans-1,2-Dichloroethene		<1.0	<1.0	<1.0	<1.0	**1.5**	**1.4**	**1.5**	<1.0	<1.0
Trichloroethene		**49**	**43**	<1.0	<1.0	**8.5**	**9.6**	**9.4**	**24**	**21**
Vinyl chloride		**15**	**18**	**1.8**	<1.0	**31**	**29**	**29**	<1.0	**1.1**
Total VOCs		**325.6**	**312.6**	**196.2**	**0.0**	**519.6**	**483.7**	**486.7**	**59.7**	**61.0**

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.

Table 1. Concentrations of Volatile Organic Compounds Detected in Groundwater and Surface Water, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Constituents (units in ug/L)	Sample ID: Date:	W-05 6/19/2007	W-05 6/19/2007	F-6 3/27/2007	F-6 6/20/2007	SP-4 3/27/2007	SP-4 6/20/2007	FBV122105 6/20/2007
1,1,1-Trichloroethane		<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
1,1-Dichloroethane		**66**	**67**	<1.0	**1.2**	<1.0	**2.4**	**<1.0**
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	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0
Benzene		**5.8**	**6.4**	<1.0	<1.0	<1.0	<1.0	<1.0
Carbon Tetrachloride		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Chlorobenzene		**13**	**13**	<1.0	<1.0	<1.0	<1.0	<1.0
Chloroethane		**120**	**150**	<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
cis-1,2-Dichloroethene		**2.8**	**2.4**	<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
Ethylbenzene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride		**2.8**	**3.5**	<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
Naphthalene		<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
o-Xylene		**1.7**	**2.6**	<1.0	<1.0	<1.0	<1.0	<1.0
m,p-Xylene		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
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		**1.7**	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl chloride		**1.4**	**1.2**	<1.0	<1.0	<1.0	<1.0	<1.0
Total VOCs		**215.2**	**247.3**	**0.0**	**1.2**	**0.0**	**2.4**	**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.
NA Not analyzed.

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Table 2. Concentrations of Selected Metals, General Chemistry, Field Parameters, and Dissolved Gases Detected in Groundwater, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-02 3/26/07	GMMW-02 6/19/07	GMMW-05 3/26/07	GMMW-05 6/19/07	GMMW-4 6/19/07
	UNITS					
GENERAL CHEMISTRY						
Bromide	mg/L	--	--	**0.306**	<1.00	<1.00
Chloride	mg/L	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--
Total Organic Carbon	mg/L	<2.00	<2.00	**96.4**	**130**	**7.6**
Sulfate	mg/L	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--
Iron (field)	mg/L	--	--	--	--	--
FIELD PARAMETERS						
pH	Standard units	**6.56**	**6.29**	**6.56**	**6.4**	**6.57**
Specific Conductance	mmhos/cm	**0.442**	**0.558**	**0.754**	**0.843**	**0.553**
Turbidity	NTU	**4.9**	--	**13.3**	--	--
Dissolved Oxygen	mg/L	--	**2.74**	--	**3.9**	**3.5**
Temperature	deg C	**10.4**	**13.23**	**10.5**	**14.95**	**12.8**
ORP	mV	--	**79**	--	**-71**	**-70**
DISSOLVED GASES						
Carbon dioxide	mg/L	--	<5.00	--	<5.00	--
Carbon monoxide	mg/L	--	<1.00	--	<1.00	--
Ethane	ng/L	**830**	**800**	**20,000**	**13,000**	--
Ethene	ng/L	**5,300**	**6,400**	**6,200**	**1,500**	--
Methane	ug/L	**4,000**	**4,100**	**29,000**	**25,000**	--
Nitrogen	mg/L	--	**21**	--	**4.4**	--
Oxygen	mg/L	--	**2.7**	--	**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 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Parameters	Sample ID: / Date:	GMMW-06 3/26/07	GMMW-06 6/19/07	PW-04 3/26/07	PW-4 6/19/07	TW-1 6/19/07
	UNITS					
GENERAL CHEMISTRY						
Bromide	mg/L	--	--	--	--	**2.06**
Chloride	mg/L	--	--	--	--	--
Nitrogen, Nitrate (As N)	mg/L	--	--	--	--	--
Nitrogen, Nitrite	mg/L	--	--	--	--	--
Total Organic Carbon	mg/L	**4.55**	**2.40**	<2.00	<2.00	**169**
Sulfate	mg/L	--	--	--	--	--
Sulfide (field)	mg/L	--	--	--	--	--
Iron (field)	mg/L	--	--	--	--	--
FIELD PARAMETERS						
pH	Standard units	**6.61**	**6.38**	**5.56**	**5.41**	**6.17**
Specific Conductance	mmhos/cm	**0.821**	**0.88**	**1.82**	1.65	**1.016**
Turbidity	NTU	**8.1**	--	**126**	--	--
Dissolved Oxygen	mg/L	--	**4.45**	--	**4.5**	**3.75**
Temperature	deg C	**10.3**	**14.07**	**9.9**	**13.27**	**15.67**
ORP	mV	--	**-6**	--	--	**-67**
DISSOLVED GASES						
Carbon dioxide	mg/L	--	<5.00	--	<5.00	--
Carbon monoxide	mg/L	--	<1.00	--	<1.00	--
Ethane	ng/L	**4,800**	**3,800**	**62**	**58**	--
Ethene	ng/L	**100,000**	**85,000**	**150**	**74**	--
Methane	ug/L	**1,800**	**1,700**	**12**	**17**	--
Nitrogen	mg/L	--	**20**	--	**19**	--
Oxygen	mg/L	--	**1.9**	--	**4**	--

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

Parameters	Sample ID: / Date:	UNITS	W-05 3/26/07	W-05 6/19/07	IW-03 3/27/07	IW-03 6/18/07	IW-2 6/19/07
GENERAL CHEMISTRY							
Bromide		mg/L	**0.445**	<1.00	--	--	<1.00
Chloride		mg/L	--	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--	--
Nitrogen, Nitrite		mg/L	--	--	--	--	--
Total Organic Carbon		mg/L	**7.61**	**9.51**	**32.5**	**227**	**26.3**
Sulfate		mg/L	--	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--	--
Iron (field)		mg/L	--	--	--	--	--
FIELD PARAMETERS							
pH		Standard units	**6.46**	**6.31**	**5.64**	**5.27**	**5.33**
Specific Conductance		mmhos/cm	**0.829**	**0.95**	**0.376**	**0.634**	**0.182**
Turbidity		NTU	**41**	--	--	--	--
Dissolved Oxygen		mg/L	--	**2.5**	--	**2.9**	**2.72**
Temperature		deg C	**10.6**	**15.66**	--	**12.6**	**13.3**
ORP		mV	--	**-36**	--	**68**	**42**
DISSOLVED GASES							
Carbon dioxide		mg/L	--	<5.00	--	--	--
Carbon monoxide		mg/L	--	<1.00	--	--	--
Ethane		ng/L	**20,000**	**22,000**	--	--	--
Ethene		ng/L	**4,400**	**3,600**	--	--	--
Methane		ug/L	**2,300**	**2,400**	--	--	--
Nitrogen		mg/L	--	**21**	--	--	--
Oxygen		mg/L	--	**2.4**	--	--	--

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

Parameters	Sample ID: / Date:	UNITS	IW-09 3/27/07	IW-08 6/18/07	IW-13 3/27/07	IW-13 6/18/07
GENERAL CHEMISTRY						
Bromide		mg/L	**<0.1**	**1.59**	--	--
Chloride		mg/L	--	--	--	--
Nitrogen, Nitrate (As N)		mg/L	--	--	--	--
Nitrogen, Nitrite		mg/L	--	--	--	--
Total Organic Carbon		mg/L	**426**	**1,370**	**13**	**17.2**
Sulfate		mg/L	--	--	--	--
Sulfide (field)		mg/L	--	--	--	--
Iron (field)		mg/L	--	--	--	--
FIELD PARAMETERS						
pH		Standard units	**3.51**	**4.42**	**5.87**	**5.78**
Specific Conductance		mmhos/cm	**2.19**	**1.176**	**0.473**	**0.436**
Turbidity		NTU	--	--	**86**	--
Dissolved Oxygen		mg/L	--	**3.35**	--	**3.06**
Temperature		deg C	**6.6**	**13.94**	--	**14.27**
ORP		mV	--	**3.35**	--	**-2**
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 Groundwater Remediation System Operating Parameters, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Date	Time Recorded	Air Stripper Measurements: Blower Discharge Pressure PI-301 (i.w.c.)	Air Stripper Measurements: Blower Effluent Flowrate (scfm)	Flow Measurements: Total[1] Effluent Totalizer FQI-401 (gallons)	Flow Measurements: Water Bypass[2] Totalizer FQI-402 (gallons)	Flow Measurements: GMPW-3 Totalizer FQI-101 (gallons)	Flow Measurements: GMPW-4 Totalizer FQI-102 (gallons)	Flow Measurements: GMPW-5 Totalizer FQI-103 (gallons)
3/27/2007	3:00 PM	8.9	NM	NM	NM	437,782.2	118,370.7	408,216.7
6/18/2007	12:51 PM	8.9	361	108,248.2	NM	506,371.0	159,041.5	415,950.3
		Average Daily Flowrate (gpm) =		**0.91**	NA	**0.57**	**0.34**	**0.06**
		Total Groundwater Recovered During Reporting Period (gallons) =		**108,248**	NA	**68,589**	**40,671**	**7,734**

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

Notes:

1. Total effluent totalizer replaced on March 13, 2007.
2. Water bypass totalizer damage as a result of freezing in February 2007.

Table 4. Concentrations of Volatile Organic Compounds and Selected Metals Detected in Aqueous Samples Collected from the PT System, Operational Year 5, 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 6/19/2007	GMPW-4 6/19/2007	GMPW-5 6/19/2007	Combined Influent 6/19/2007	Combined Effluent 6/19/2007
1,1,1-Trichloroethane	10-20		**20**	**19**	<1.0	**17**	<1.0
1,1,2-Trichloroethane	10		<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	10		**44**	**78**	**21**	**50**	<1.0
1,1-Dichloroethene	10		**2.2**	**2.2**	<1.0	**1.8**	<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		**3.3**	**3.9**	<1.0	**3.1**	<1.0
Carbon Tetrachloride	NA		<1.0	**3.4**	<1.0	**3.1**	<1.0
Chlorobenzene	NA		<1.0	**7.1**	**20**	**3.5**	<1.0
Chloroethane	NA		**20**	**42**	**70**	**28**	<1.0
Chloroform	NA		<1.0	<1.0	<1.0	<1.0	<1.0
cis-1,2-Dichloroethene	10		**61**	**68**	**2.4**	**56**	<1.0
Dichlorodifluoromethane	NA		**1.7**	**2.4**	<1.0	**1.6**	<1.0
Ethylbenzene	5		<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	10-50		**2.4**	**2.6**	**1.1**	**2.2**	<1.0
Methyl tert-butyl ether	50		<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	**2.5**	<1.0	<1.0
Tetrachloroethene	10		<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5		<1.0	<1.0	**3.5**	<1.0	<1.0
trans-1,2-Dichloroethene	10-50		<1.0	<1.0	<1.0	<1.0	<1.0
Trichloroethene	10		**48**	**64**	<1.0	**51**	<1.0
Vinyl Chloride	10-50		**11**	**37**	**1.3**	**15**	<1.0
Total VOCs			**213.6**	**329.6**	**121.8**	**232.3**	**0**
Metals (units in mg/L)	Model Technology BPJ Limits[3,4] (mg/L)						
Total Iron	1.2 / 0.61		**1.23**	**0.607**	**0.541**	**0.719**	**1.57**

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

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 Groundwater Remediation System Mass Removal Rate of Volatile Organic Compounds, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Date Sampled	Total VOC Influent Concentration (ug/L)	Total Effluent Totalizer[4] FQI-401 (gallons)	Total Groundwater Recovered[1] Between Sampling Intervals (gal)	Influent Concentration[2] Geometric Mean (ug/L)	Total Estimated Mass[3] Removed (lbs)
3/9/2007	319.6	NA	NA	NA	NA
6/18/2007	232.3	108,248	108,248	272	0.25
			Total Estimated Mass Removed During Operational Year 5, Quarter Number 3 (lbs) =		**0.25**
			Total Estimated Mass Removed Since System Startup (lbs) =		**2.37**

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 Intervals) x Influent Concentration Geometric Mean x 3.7854 L/gallon x (1 lb / 453,592,370 ug).
4. Total effluent totalizer was replaced on Masrch 13, 2007.

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Table 6. Concentrations of Volatile Organic Compounds Detected in Groundwater Remediation System Air Stripper Effluent, Operational Year 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Compounds	CAS Numbers	Sample ID: Date Sampled:	Effluent 6/19/2007 ppbv
Vinyl Chloride	75-01-4		<7.0
Chloroethane(Ethyl Chloride)	75-00-3		<7.0
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4		<7.0
Methylene Chloride(Dichloromethane)	75-09-2		<7.0
1,1-Dichloroethane	75-34-3		<7.0
cis-1,2-Dichloroethylene	156-59-2		<7.0
Chloroform	67-66-3		<7.0
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6		<7.0
Benzene	71-43-2		<7.0
Trichloroethene	79-01-6		<7.0
Toluene	108-88-3		<7.0
Ethyl benzene	100-41-4		<7.0
m,p-Xylene	108-38-3/106-42-3		<7.0
o-Xylene	95-47-6		<7.0
1,2,4-Trimethylbenzene	95-63-6		<7.0
2-Propanol (Isopropyl alcohol)	67-63-0		<7.0
Dichlorodifluoromethane(Freon 12)	75-71-8		<7.0

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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Appendix A

Groundwater Sampling Logs

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

Date: 6/18/07

Well Identification		Depth to Water (feet below MP)	Comments
GMMW-2		35.35	* most wells need new locks
GMMW-3		33.34	
GMMW-4		45.47	
GMMW-5		48.44	
GMMW-6		37.74	
GMMW-7		46.82	
PW-1		14.67	
PW-2		6.70	
PW-3		12.29	
PW-4		16.74	
PW-5		~~50.00~~ 0.0	Top of PVC
PW-7		39.03	
PW-8		38.51	
PW-10		36.41	
PW-11		51.18	
PW-13		59.86	
W-5		50.77	
W-6		~~48.28~~ 48.25	
W-7		41.42	
W-13		45.53	
W-14S		8.00	
W-16S		9.33	Top of Casing
W-17S		10.26	
W-18		11.68	(Top of Casing)
W-20S		10.31	

10.31

S:\Cassella for Kate\Sampling\July 2007\DTW Form_0606 - Sheet1

ARCADIS G&M

Low Flow Groundwater Sampling Form

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Project/No. Colesville N4000948 Well IW-2 Date 6/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 4"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin 1635 End

Weather Sw 85° Pump type: Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			5.33	13.25	0.182	92	2.72		

TOC

Bromide

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Cokesville N4000949 Well IW-3 Date 6/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 4"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 16:50

Weather Sun 85° Pump type: Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			5.27	12.59	0.634	68	2.90		

TOC

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville/W4000949 Well TW-1 Date 6/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (Inches) 2"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 16:18

Weather Sun 85° Pump type: Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.17	15.67	1.016	-67	3.75		

TOC
Bromide

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville NY000949 Well IW-13 Date 6/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 4"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin — End 1535

Weather Sun 85° Pump type: Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			5.78	14.27	0.436	-2	2.06		

Sampled for TOC

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville / NY000949.0020 Well IW-8 Date 3/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 4"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin ____ End 16:00

Weather Sun 85° Pump type: Baker

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			4.42	13.94	1.176	105	3.35		

TOC
Bromide

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Coleville N4000949 Well GMMW-4 Date 6/18/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 1705

Weather SW 85° Pump type: Baker

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.57	12.78	0.553	-70	3.50		

MS/MSD (2 Bottles each)

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Coleswilk / 14000949 Well GMMW-5 Date 6/19/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2"

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

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 10:30

Weather Sun 90° Pump type: PDB / Baker

Sampled by: KA Fran

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.40	14.95	0.843	-71	3.90		

VOC's - 2
TOC
Brom.dc
microSeeps

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. N4600949.0020 Well LW-5 Date 6/19/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 10.50

Weather Sun 90 Pump type: PDB / Bailer

Sampled by: KA / Fran

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.31	75.66	0.950	-36	2.50		

VOC's
Bromide
TOC
microcosms

ARCADIS G&M

REPV190607

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville NY000949 Well GMMW-6 Date 6/19/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin ____ End 1140

Weather Sun 90° ~~Pump type~~: PBB / Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.38	14.07	0.880	-6	4.45		

TOC + Dup
VOC's
Microsurps

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Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville Well GMMW-2 Date 6/19/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 12:00

Weather Sun 90 Pump type: PDB / Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.29	13.23	0.557	79	2.74		

VOC
TOC
Microseeps

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville N4000949 Well PW-4 Date 6/19/07

Total depth (ft bmp) — Screened Interval (ft bmp) — Casing Diameter (inches) 2"

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 12:15

Weather Sun 90° Pump type: PDB / Bailer

Sampled by : KA

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			5.41	13.27	1.605	160	4.50		

VOC
TOC
MicroSeps

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville / NY000949 Well Effluent water Date 6/19/07

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 14:15

Weather Sun 90° ~~Pump type:~~ grab - System

Sampled by : DM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes

Voc
Total Iron

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. N4000949.0020 Well Combined Influent Date 6/19/07

Colesville

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 1405

Weather Sun 90° Pump type: grab | System

Sampled by : DM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes

VOC
Total IRON

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Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Odessville/N4000949.0020 Well GMPW - 3 Date 6/19/07

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End ~~1300~~ 11:00

Weather Sun 90° Pump type: grab - System

Sampled by : DM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.24						

VOC
Total IRON

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Low Flow Groundwater Sampling Form

Page — of —

Project/No. Oaksville / WY000949.0020 Well GMPW-4 Date 6/19/07

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 12:10

Weather Sun 90° Pump type: grab / System

Sampled by : DM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			6.40						

VOC
Total IRON

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Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Calsville N4000949.0020 Well GMPW 5 Date 6/19/07

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 11:15 Hrs

Weather Sun 90 Pump type: ~~Pump type~~: grab / System

Sampled by : DM

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos or ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			7.61						

VOC
Total Iron

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Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colesville / NY000949 Well F-6 Date 6/20/07

Total depth (ft bmp) — Screen Setting (ft bmp) — Casing Diameter (inches) —

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin ______ End 10:15

Weather Sun 70° Slight Sheen + Rust Staining along edge of bank

Sampled by : KA / Fran

Date/Time	Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. umhos or ms/cm	Redox (mV)	DO (mg/L)	TURB (NTU)	Notes
			7.23	15.24	0.193	123	3.01		

ARCADIS G&M

Low Flow Groundwater Sampling Form

Page 1 of 1

Project/No. Colksville NY000949 Well SP-4 Date 6/20/07

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

Measuring Point Description — Static Water Level (ft bmp) —

Pump Intake (ft bmp) — Sampling Time: Begin _____ End 1030

Weather Sun 75 Pump type: grab

Sampled by: KA / Fran

Time	Pumping Rate (ml/min)	DTW (ft bmp)	pH (s.u.)	TEMP. (C)	Cond. (umhos ~~or~~ ms/cm)	ORP (mV)	DO (mg/L)	TURB (NTU)	Notes
			7.06	14.50	0.184	140	3.00		

See photos + specific notes on SP-4

Appendix B

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

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

Parameters for 6/18/2007 Sampling Event				
Discharge Temperature		T	520	°R
Ambient Temperature		Ta	539	°R
Stack Diameter		D	6	in
Stack Radius		R	0.25	ft
Stack Area		A	0.20	ft^2
Exit Velocity		V	26.2	fps
Exit Flow		Q	309	acfm
Exit Flow		Q	313	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 60°F based on recorded parameters.
2. The ambient temperature is approximately 65°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 5, Quarter Number 3, Colesville Landfill, Broome County, New York.

Calculation of AGC based on 6/18/2007 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	7.0	*	18.19	2.14E-05	0.18420	**1.71**
Chloroethane(Ethyl Chloride)	75-00-3	10,000	978,044.97	7.0	*	18.78	2.20E-05	0.19015	**0.00**
1,1-Dichloroethene(Vinylidene Chloride)	75-35-4	70	6,846.31	7.0	*	28.21	3.31E-05	0.28573	**0.00**
Methylene Chloride(Dichloromethane)	75-09-2	2.1	205.39	7.0	*	24.72	2.90E-05	0.25033	**0.12**
1,1-Dichloroethane	75-34-3	0.63	61.62	7.0	*	28.80	3.38E-05	0.29168	**0.47**
cis-1,2-Dichloroethylene	156-59-2	1,900	185,828.54	7.0	*	28.21	3.31E-05	0.28573	**0.00**
1,1,1-Trichloroethane(Methyl Chloroform)	71-55-6	1,000	97,804.50	7.0	*	38.83	4.56E-05	0.39321	**0.00**
Trichloroethene	79-01-6	0.5	48.90	7.0	*	38.24	4.49E-05	0.38726	**0.79**
m,p-Xylene	108-38-3/106-42-3	700	68,463.15	7.0	*	30.30	3.56E-05	0.30692	**0.00**
Dichlorodifluoromethane(Freon 12)	75-71-8	12,000	1,173,653.96	7.0	*	17.49	2.05E-05	0.17713	**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 60°F based on recorded parameters.
2. The ambient temperature is approximately 65°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 5, 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.)
4/9/2007	13,706	148	148
Quarter Totals (gal.) =	**13,706**	**148**	**148**
Totals Since Startup (gal.) =	**117,226**	**8,429**	**7,829**

Notes:
gal. Gallons

Table C-2. Automated Reagent Injection System, Operational Year 5, Quarter Number 3 Operating Parameters, Groundwater Remediation System, Colesville Landfill, Broome County, New York.

Injection Number 54

Injection Start Date =	3/27/2007		
Injection Completion Date =	4/9/2007		
Molasses to Water Ratio (%) =	1.0	Programmed Mixing Time (min.)[1] =	60

Injection Well ID	Molasses Solution Injection Quantity (gal.)	Rinse[2] Quantity (gal.)	Raw Molasses Per Well (gal.)	Min. Injection[3] Flowrate (gpm)	Max. Injection Pressure (psi)
PW-6	530	5	5.3	NM	28
IW-3	530	5	5.3	NM	28
IW-1	210	4	2.1	NM	29
IW-2	210	3	2.1	NM	28
GMMW-1	140	3	1.4	NM	7
IW-4	989	4	9.9	NM	29
IW-5	989	5	9.9	NM	29
IW-6	989	7	9.9	NM	30
IW-7	989	8	9.9	NM	29
IW-8[4]	0	0	0.0	NM	0
IW-9	1,230	11	12.3	NM	0
IW-10	1,230	12	12.3	NM	29
IW-11	1,230	13	12.3	NM	29
IW-12	1,230	15	12.3	NM	29
IW-13	1,230	16	12.3	NM	30
IW-14	989	18	9.9	NM	29
IW-15	989	19	9.9	NM	39
Totals (gal.) =	13,706	148	137.1	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.	Parameter not measured due to SCADA system malfunction.
4.	Injection not conducted into IW-8 for ongoing Alternate Electron Donor Pilot test evaluation.