US Army Corps
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New England District

FINAL
2004 ANNUAL REPORT

SHEPLEY'S HILL LANDFILL
LONG TERM MONITORING & MAINTENANCE
DEVENS, MASSACHUSETTS

June 2006

PREPARED BY:

DEPARTMENT OF ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS 01742

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
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REPLY TO:
ATTENTION OF:

June 8, 2006

Engineering/Planning Division
Geo-Environmental Branch

SUBJECT: *Final* 2004 Annual Report, Long Term Monitoring for the Shepley's Hill Landfill (SHL), Devens, Massachusetts

Mr. Robert Simeone
BRAC Environmental Coordinator
Devens Reserve Forces Training Area
30 Quebec Street
Devens, Massachusetts 01432-4429

Dear Mr. Simeone:

Enclosed are the replacement pages prepared in accordance with the Response-to-Comments (RTC) and to finalize the 2004 Annual Report. Three sets of the replacement pages are provided. Under separate transmittal, BCT distribution will be as follows:

Recipient, Agency	Replacement Pages No. of Sets	CD (pdf) Complete Report
Brenda Jordan, Atlanta Field Office	3	1
Ginny Lombardo, USEPA	3	--
Lynne Welsh, MADEP	3	--
Ron Ostrowski, Mass Development	1	--
Deborah Gevalt, Haley & Aldrich, Inc.	1	--
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These listed replacement pages, dated June 2006, inserted accordingly into the *draft* report, dated August 2005, constitutes the Army's *final* 2004 Annual Report.

Item	Description	Notes
1	Report cover	The word *Draft* was removed and replaced with *Final.*
2	Table of contents	Pages i through ii, word *Draft* was removed and replaced with *Final,* revised date added. Appendix G added to page ii.
3	Tab for Appendix G	
4	RTC package	Responses to EPA and MADEP comments (9 pages)

Please do not hesitate to contact me at 978-318-8722, or Peter Hugh of my staff at 978-318-8452, should you have any questions.

Sincerely,

for H. Farrell McMillan, P.E.
Chief, Engineering/Planning Division

Enclosures

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLES

FIGURES

APPENDICES

DRAFT 2004 ANNUAL REPORT
SHEPLEY'S HILL LANDFILL
LONG TERM MONITORING & MAINTENANCE
DEVENS, MASSACHUSETTS

EXECUTIVE SUMMARY

This annual report documents the results of long term monitoring and maintenance activities conducted in 2004, the ninth year of monitoring, at Shepley's Hill Landfill in Devens, Massachusetts. The U.S. Army Corps of Engineers, New England District prepared this report in accordance with the Record of Decision (ROD) for Areas of Contamination 4, 5, and 18 (ABB-ES, Oct 1995), and the approved Long Term Monitoring and Maintenance Plan (LTMMP), SWEC, May 1996. The ROD selected remedy, Alternative SHL-2, requires completion of landfill closure and post closure monitoring of the effectiveness of the landfill cover. Monitoring activities are described in the LTMMP and consist of an annual inspection of the landfill cover, annual landfill gas vent monitoring, and semi-annual groundwater chemistry monitoring. The results of these activities conducted in 2004 are described below.

An annual landfill inspection was conducted and observations made regarding the vegetative cover, vegetation types, erosion, settlement, and general condition of the various features. Presently, the landfill is in fair condition. The cover surface contains areas of sparse vegetation, intrusive vegetation and settlement. Intermittent standing water, erosion, vegetative overgrowth and wetlands plants were observed in some areas within drainage swales. The security fence is in need of repair at various locations. Two of the fourteen groundwater monitoring wells were not secured with a lock due to broken well casings. Improvements are scheduled to be performed in 2005 and include repairs to fencing and gates, performing maintenance to remove wetland vegetation from drainage swales, and improve the runoff of water from the landfill cap by filling in and regrading low spots resulting from ongoing subsidence.

Construction of a groundwater pump and treat system for the landfill was undertaken during 2004. The system is located just north of the landfill cap, near the set of compliance point wells that monitor the groundwater down-gradient of the landfill (SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-22, SHM-96-22B and SHM-93-22C). This construction included a utility dike across the northern half of the cap. The treatment system was not operational at the time of monitoring activities in 2004. Once the system is operational, the data collected during 2004 may serve as baseline data to compare the pre-treatment and post-treatment conditions.

As part of the annual landfill gas vent monitoring program, readings were collected from eighteen gas vents on the landfill, plus four perimeter probes just north of the landfill enabling a check for landfill gases migrating through the soil and out the cap. Readings collected from the four perimeter probes were similar to levels measured during last year's annual inspection, except for VOC levels which decreased. However, readings collected from the 18 gas vents on the landfill indicated levels of LEL, carbon monoxide, carbon dioxide and methane production increased since last year, while measurements of VOCs, oxygen, and hydrogen sulfide remained about the same.

Increased LEL, carbon monoxide, carbon dioxide, and methane readings in the landfill gas vents and the proximity of commercial development warrant installation of additional perimeter gas monitoring probes along the property line where the landfill is adjacent to structures. Gas

monitoring probes should be installed at the southern perimeter of the site along the commercial properties. The LEL readings in the landfill gas vents near the southern end of the landfill have consistently registered high in the past, most are above 100% this year.

Fourteen compliance point wells were monitored to evaluate the effectiveness of the landfill at reducing risk and achieving cleanup levels for contaminants of concern (COCs) in groundwater. The COCs are arsenic, chromium, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, lead, manganese, nickel, sodium, aluminum, and iron.

The fourteen compliance wells are designated as either Group 1 or Group 2 wells. The ultimate goal of Alternative SHL-2 is to maintain groundwater quality below cleanup levels at Group 1 wells, and to attain cleanup levels at Group 2 wells. Annual reports compare the concentrations of COCs to the cleanup levels to support the next five-year site review in which the effectiveness of Alternative SHL-2 is evaluated in detail. Evaluating effectiveness at Group 2 wells is based on reduction of risk rather than reduction of concentration as a measure of progress toward attainment of cleanup levels, because this approach focuses on the cleanup of arsenic, which is the primary contributor to risk in the Group 2 wells. According to the LTMMP, only chemicals that present carcinogenic risk are considered trigger chemicals in the monitoring program. The trigger chemicals are arsenic, 1,2 dichlorobenzene, 1,4 dichlorobenzene and 1,2-dichloroethane. Reduction of carcinogenic risk, rather than simply reduction of contamination, is the measure of progress toward attainment of cleanup. This risk-based approach keeps the focus on mitigation of the most significant contributors to risk.

Originally, all existing wells were designated as Group 2 wells per the LTMMP, including the three newer wells installed in 1996 (SHM-96-5B, SHM-96-5C, and SHM-96-22B) based on their first round of sampling. Risk reduction was evaluated during the first five-year review in August 1998. During the August 1998 review, six monitoring wells (SHL-3, SHL-5, SHL-9, SHM-93-10C, SHL-22, and SHM-93-22C) achieved cleanup levels for all chemicals of concern and were reclassified as Group 1 wells. The remaining eight wells continue to be classified as Group 2 wells. Since the August 1998 review, three of the Group 1 wells (SHL-9, SHL-22 and SHM-93-22C) exceeded the cleanup level for arsenic at least once. Risk reduction will be reevaluated in the upcoming five-year site review scheduled for 2005. In the mean time, contaminant concentrations for this annual report will simply reference cleanup levels as a benchmark.

Groundwater sampling was performed on the fourteen compliance point monitoring wells, and two additional non-compliance wells located at Molumco Road. Seven of the compliance wells are located on the down-gradient edge of the landfill to the north, while the remaining seven are located on the east side of the landfill near Plow Shop Pond. Samples were collected in accordance with the *EPA's Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (July 1996). Samples were analyzed for VOCs, inorganics, and general water quality parameters. Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed, all data was determined to be of acceptable quality for use, with some qualifications due to holding time exceedances and associated field and method blank contamination.

Arsenic was the only trigger chemical detected above the cleanup level during the 2004 sampling events (see Table ES-1 on following page). Most results indicated no significant change from previous arsenic levels. However, the fall results showed that, for the first time since monitoring began, northern well SHM-96-5B was not the sample location with the highest concentration of arsenic. Northern well SHM-96-22B, located nearby and screened at a similar depth, exhibited a slightly higher concentration. Although none of the wells recorded new historical high arsenic levels in 2004, well SHM-96-22B shows a trend of generally increasing arsenic concentrations. Both these wells have continuously exhibited the highest arsenic levels measured at the site, one to two orders of magnitude above levels measured at the other compliance wells. Eight of the fourteen compliance point wells were below the arsenic cleanup level for the latest round of sampling (a fairly steady trend). Northern well SHL-22 was the only Group 1 well having arsenic concentrations exceeding the cleanup level, which has occurred continuously since May 2002. Concentrations measured at Group 2 wells SHL-4, SHL-10 and SHM-96-5C also met the cleanup level for arsenic, a trend that has been occurring over the past years, particularly at SHL-10.

Cleanup levels for the other three trigger chemicals were not exceeded. However, cleanup levels for the COCs iron, manganese and sodium were exceeded during the 2004 sampling events. With the exception of iron and manganese during the spring sampling event, the levels have decreased since 2003. The next round of groundwater monitoring will be conducted in the spring of 2005.

The first five-year review to assess the protectiveness of the selected remedial action for Shepley's Hill Landfill was completed in 1998, in accordance with the Record of Decision. The review concluded that reductions of contaminant concentrations and corresponding risk satisfied the evaluation criteria at most, but not all, historical groundwater monitoring wells. However, data from monitoring well SHM-96-5B, at the north end of the landfill, showed arsenic concentrations up to two orders of magnitude greater than historical values in other wells. Therefore, supplemental groundwater investigations were performed by the Army to assess whether arsenic contamination exists beyond the Devens Reserve Forces Training Area boundary, and to characterize its nature and location.

Options for corrective action at the landfill were included in the *Draft Cap Drainage Report, Shepley's Hill Landfill, Devens RFTA, Ayer, MA*, dated January 2003. This report recommended the following which will be implemented in 2005: (1) Repair and replace the security fence and gates as required to control access to the site, (2) Perform maintenance to remove wetland vegetation from drainage swales, (3) Improve the runoff of water from the landfill cap by filling and regrading low spots resulting from subsidence, and (4) Install additional landfill gas monitoring probes along the commercial property at the south side of the landfill. Other recommendations to improve the drainage and function of the landfill cap, such as placing topsoil and seed over the sandy area lacking vegetation on the east side along the perimeter, will be addressed in a comprehensive site assessment scheduled to be conducted in the near future. This will assess the overall effectiveness of the landfill cap with regard to infiltration. Finally, some recommendations in the *Cap Drainage Report* are not considered critical and have not yet been addressed, including repairing and regrading around the catch basins on the south side of the landfill, and repairing the hasps on the casings of

groundwater monitoring wells SHL-4 and SHL-9. All of the above is discussed in more detail in Section 3.0 of this report.

TABLE ES-1
Compliance Point Wells Exceeding Arsenic Cleanup Level of 50 µg/L in 2004

Well	Orientation to Landfill	Geological Designation	Group #	Concentration Spring 2004	Concentration Fall 2004
SHL-22	North	Till	1	88.1 µg/L	65.4 µg/L
SHM-96-5B	North	Sand/Till	2	3,950 µg/L	2,110 µg/L
SHM-96-22B	North	Sand/Till	2	1,690 µg/L	2,360 µg/L
SHL-11	East	Water Table	2	502 µg/L	617 µg/L
SHL-19	East	Water Table	2	75.0 µg/L	121 µg/L
SHL-20	East	Till	2	136 µg/L	156 µg/L

DRAFT 2004 ANNUAL REPORT
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1.0 INTRODUCTION

This annual report has been prepared to document the monitoring and maintenance procedures conducted in 2004 at the Shepley's Hill Landfill in Devens, Massachusetts. These procedures were conducted in accordance with the *Record of Decision, Shepley's Hill Operable Unit, Areas of Contamination 4, 5, and 18* (ROD) (ABB-ES Oct 1995) for Shepley's Hill Landfill Areas of Contamination 4, 5, and 18, and the *Long Term Monitoring and Maintenance Plan, Shepley's Hill Landfill* (LTMMP) (SWEC, May 1996). This annual report was prepared by the U.S. Army Corps of Engineers (USACE), New England District.

The ROD selected remedy, Alternative SHL-2, is a source control action that addresses long-term residential exposure to contaminated groundwater, the principal known threat at the Shepley's Hill Landfill Operable Unit. It consists of completing closure of Shepley's Hill Landfill in accordance with applicable Massachusetts requirements of 310 CMR 19.000, and monitoring and evaluating the effectiveness of the landfill cover system completed in 1993 to control groundwater contamination and site risk.

The LTMMP for Shepley's Hill Landfill, completed in May 1996, outlines the landfill closure monitoring and maintenance procedures required by the ROD. These procedures include an annual visual inspection and gas emission monitoring of the landfill cap, and a semi-annual groundwater sampling program to monitor contaminants of concern (COCs) and evaluate the effectiveness of the landfill cover system to control groundwater contamination and site risk. The COCs and their cleanup levels for Shepley's Hill Operable Unit are listed in Table 1-1.

1.1 Evaluating Effectiveness of Remedial Objectives

Fourteen compliance point wells are monitored to evaluate the effectiveness of the landfill at reducing risk and achieving cleanup levels in monitoring wells. They are designated as Group 1 or Group 2 wells. The ultimate goal of Alternative SHL-2 is to maintain groundwater quality below cleanup levels at Group 1 wells, and to attain cleanup levels at Group 2 wells.

Five-year site reviews evaluate the effectiveness of Alternative SHL-2 at reducing the potential human health risk from exposure to groundwater and at preventing groundwater from contributing to Plow Shop Pond sediment contamination in excess of human health and ecological risk-based values. Evaluating effectiveness at Group 2 wells is based on reduction of risk rather than reduction of concentration as a measure of progress toward attainment of cleanup levels, because this approach focuses on the cleanup of arsenic, which is the primary contributor to risk in the Group 2 wells.

According to the LTMMP, only chemicals that present carcinogenic risk are considered trigger chemicals in the monitoring program. The trigger chemicals are arsenic, 1,2 dichlorobenzene, 1,4 dichlorobenzene and 1,2-dichloroethane. Reduction of carcinogenic risk, rather than simply

reduction of contamination, is the measure of progress toward attainment of cleanup. This risk-based approach keeps the focus on mitigation of the most significant contributors to risk.

The LTMMP states Alternative SHL-2 will be considered effective with regard to Group 2 wells if five-year reviews show an ongoing reduction of potential human health risk (based on trigger chemicals) at Group 2 wells and the ultimate attainment of cleanup levels for all COCs by January 2008. Alternative SHL-2 will be considered effective with regard to Group 1 wells if five-year site reviews show that groundwater quality remains at or below cleanup levels for all COCs.

Chemical concentrations in Group 1 wells have historically attained cleanup goals, while those in Group 2 have not. Originally, all existing wells were designated as Group 2 wells per the LTMMP, including three newer wells installed in 1996 (SHM-96-5B, SHM-96-5C, and SHM-96-22B) based on the first round of sampling. During the first five-year site review (August 1998), six monitoring wells (SHL-3, SHL-5, SHL-9, SHM-93-10C, SHL-22, and SHM-93-22C) achieved cleanup levels for all chemicals of concern and were reclassified as Group 1 wells. The remaining eight wells continue to be classified as Group 2 wells. Risk reduction will be reevaluated during the next five-year review, see below.

Construction of a groundwater pump and treat system for the landfill was undertaken during 2004. The system is located just north of the landfill cap, near the set of compliance point wells that monitor the groundwater down-gradient of the landfill (SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-22, SHM-96-22B and SHM-93-22C). This construction included a utility dike across the northern half of the cap. The treatment system was not operational at the time of monitoring activities in 2004. Once the system is operational, the data collected during 2004 may serve as baseline data to compare the pre-treatment and post-treatment conditions.

1.2 Five-Year Site Reviews

Stone & Webster Environmental Technology & Services (SWEC) conducted the first two years of monitoring in 1996 and 1997. These first two years of monitoring were included in the first *Five Year Review, Shepley's Hill Landfill, Long Term Monitoring* (SWEC, August 1998) required by the ROD, and marking five years since the final capping of the landfill in 1993. Since 1998, monitoring has been conducted by USACE, New England District. In 2000, a review of all Devens sites was performed and included in the *First Five Year Review Report for Devens Reserve Forces Training Area, Devens, MA* (HLA, 2000) which included monitoring conducted for Shepley's Hill Landfill Operable Unit in 1996 through 1999. The next five-year review report for Shepley's Hill Landfill Operable Unit is currently being prepared for monitoring conducted from 2000 through 2004.

1.3 2004 Annual Report Objectives

This annual report covers long term monitoring and maintenance activities conducted in 2004 including the following:

- Landfill cap inspection to identify areas requiring maintenance.

- Landfill gas measurements at 18 gas vents to establish long-term trends with regard to gas production and venting.
- Monitoring of fourteen compliance point wells for groundwater elevations and COC concentrations to compare to cleanup levels as a measure of determining the effectiveness of the selected remedy.

The findings documented in this annual report support the upcoming five-year site review in which the effectiveness of the remedy is formally evaluated with regard to risk reduction and attainment of cleanup levels. Interim recommendations are identified at the end of this report.

2.0 LANDFILL CAP MAINTENANCE ACTIVITIES

The ROD for the Shepley's Hill Landfill requires monitoring and maintenance of the landfill cap based on observations made during the annual inspections. Normally scheduled maintenance activities performed during 2004 included mowing of the landfill vegetative cover and cutting of vegetative growth. The remaining recommended maintenance items listed in the 2003 *Annual Report, Shepley's Hill Landfill, Long Term Monitoring & Maintenance* (June 2003) have not been completed, however, the more critical ones were evaluated further and are included in the *Draft Statement of Work, Shepley's Landfill Cap Maintenance* (Cap Maintenance SOW) (19 May 2005).

The 2003 *Annual Report* recommended options to improve the drainage and function of the landfill cap by reducing the potential for water to pond, migrate, and/or infiltrate through the existing cap, to repair the perimeter fencing and gates, and install gas monitoring probes at the southern perimeter of the site near along commercial properties. This work is scheduled to be conducted in 2005 in accordance with the Cap Maintenance SOW. The objectives of this scope are to:

1) Improve the existing vehicle access restrictions to the area (repair fencing/gates)
2) Perform maintenance to remove wetland vegetation from drainage swales (southern swale, western swale and northwest swale)
3) Improve the runoff of water from the landfill cap by filling in and regrading low spots (resulting from ongoing subsidence).
4) Install gas monitoring probes along the southern perimeter of the landfill where it abuts the Webvan warehouse.

These activities, and all maintenance items monitored during the 2004 cap inspection, are discussed in Section 3.0 of this report.

3.0 LANDFILL CAP MONITORING ACTIVITIES

The Shepley's Hill Landfill at Devens, Massachusetts was inspected to identify areas requiring maintenance on 16 & 17 November 2004 by personnel from the U.S. Army Corps of Engineers, New England District (NAE). Features of the landfill inspected included the cap, drainage system, gas vent system, access roads, and security fence. Observations were made regarding the vegetative cover, vegetation types, erosion, settlement, and general condition of the various

features. Appendix A of this report contains the Landfill Maintenance Checklist that summarizes the findings of this inspection. All observations are also presented on Figure 3-1. A narrative of the findings and recommendations of this inspection are included below. Many of the recommendations will be addressed in 2005 in accordance with the *Draft Statement of Work, Shepley's Landfill Cap Maintenance* (SOW) (19 May 2005) described in section 2 of this report. . Others will be addressed in a comprehensive site assessment that will be conducted in the future to assess the overall effectiveness of the landfill cap with regard to infiltration.

- Catch Basin #3 near the Cooke Street entrance to the site is not set at grade. Soil excavation in this area has left the rim of the grate about six to eight inches higher than the surrounding ground. The rim of this catch basin should be lowered to the surrounding grade. At present, this is not scheduled for 2005.

- The concrete headwall drainage structure at the terminus of the catch basin and underground conduit system on the south side is overgrown with vegetation and is silting in. The grade of the channel bottom is uneven and standing water is present. Wetland species are becoming established as well. The structure and channel immediately downstream is scheduled to be cleared, accumulated sediment removed, and the channel regraded as required to properly drain. The channel will then be reseeded or riprap should be placed, depending on water velocities. This work is scheduled to be done in 2005 per SOW referenced above.

- Most of the drainage swale on the south side is being invaded by wetland species. There are also intermittent zones of standing water indicating a lack of proper channel slope and drainage. The south side drainage swale is scheduled to be cleared of wetland vegetation, and regraded in 2005 per SOW referenced above.

- In the east side drainage swale, in the vicinity of gas vent #13 and continuing downstream to the new rock-lined channel, the drainage swale is overgrown with wetland species. Silt has accumulated, as has a large area of standing water. This reach of the drainage swale is scheduled to be cleared of all vegetation and accumulated silt and sand and regraded in 2005 per SOW referenced above.

- The northern reaches of the eastern drainage swale have some minor vegetation growth and sand accumulation that is scheduled to be cleared and regraded in 2005 per SOW referenced above.

- In the vicinity of gas vents 8, 11 and 12, the perimeter of the cap has some areas of sparse/eroded vegetation. The soil in the bare areas is mostly sand and is eroded in some areas. The area should be graded to fill in the eroded areas and topsoil should be placed to a depth of 6 inches over the sand to allow grass to grow. The grass should extend at least twenty feet past the limits of the cap. This will be addressed in the forthcoming comprehensive site assessment.

- The access roads on the site are in good condition. There are no problems on access roads that warrant repair at this time.

- Portions of the perimeter chain-link security fence are in poor condition. Fence sections and gates are missing and unrestricted access to the site is available at several locations. Some evidence of off-road vehicles (ATV's, dirt bikes, etc.) using the cap area was seen. On the east side near monitoring well SHL-11, the fence has been rolled back and is open. A gate and lock will be added here. There are also several other locations around Plow Shop Pond which provide unrestricted access. The security fence is scheduled to be repaired, with all missing fence sections, including gates, replaced or repaired in 2005 per SOW referenced above.

- The gas monitoring probes at the northwest edge of the landfill are in excellent condition, with locked, steel caps.

- The gas vents are in good condition. All screens and pipes are in functional condition. The older gas vents, painted yellow, are showing signs of age, with rusting/corrosion evident. They should be scraped, cleaned, and repainted, however, this is not currently scheduled for 2005.

A summary of Corrective Action measures for the Landfill Cap are included in Section 9.0.

4.0 LANDFILL GAS MONITORING RESULTS

The purpose of the landfill gas monitoring program is to establish long-term trends with regard to gas production and venting. A combustible gas survey was performed on 18 passive gas vents on the landfill cover and four perimeter gas monitoring probes to determine whether methane, hydrogen sulfide, or volatile organic compounds have accumulated in the subsurface of the landfill site or are migrating off-site, and if so, how these readings compare with the previous year.

Originally, 18 passive gas vents were installed in the landfill cover. In November 2001, four landfill perimeter gas monitoring probes were installed to monitor potential landfill gas migration from Shepley's Hill Landfill towards Sculley Road. The locations of the gas vents are shown in Figure 3-1.

The annual landfill gas sampling was conducted on 16 November 2004. The weather was sunny, with temperatures in the 40's (F) and the barometric pressure was 30.0 inches of mercury and steady. Gas samples were field analyzed for the following parameters using the listed equipment:

Parameter	Gas Monitoring Equipment
Total Volatile Organic Compounds (VOC)	Thermo Environmental 580B (PID) with a 10.6 eV lamp
Percent Oxygen	Landtec GA-90 landfill gas monitor
Hydrogen Sulfide (ppm)	Industrial Scientific MG140 CGI
Percent Lower Explosive Limit (LEL)	Industrial Scientific MG140 CGI
Carbon Monoxide (ppm)	Industrial Scientific MG140 CGI
Percent Carbon Dioxide	Landtec GA-90 landfill gas monitor
Percent Methane	Landtec GA-90 landfill gas monitor

The CGI, PID and the Landtec GA-90 were all calibrated in the shop by U.S. Environmental. Samples were collected by attaching a rubber Quik cap with a hose clamp to the gas vent pipe. A barbed fitting was placed in a drilled hole in the cap. Tubing was run from the barbed fitting to an Industrial Scientific SP402 (IS-SP402) sampling pump. The pump was operated for approximately 7 to 10 minutes to purge 2 vent pipe volumes and to ensure that the gases collected were representative of the gas collection layer. The gas monitoring equipment was then attached to the IS-SP402 pump and turned on. The readings were recorded on the Landfill Gas Monitoring Form after they had stabilized. The vents are functioning properly. The scenario of falling atmospheric pressure results in a venting of landfill gas into the atmosphere. The scenario of rising atmospheric pressure results in air intrusion into the upper portion of the landfill. Gas exchanges during this inspection was likely minimal as barometric pressure was steady.

The landfill gas monitoring results are shown on Table 4-1. The following is a summary of the perimeter landfill gas monitoring probe results. All four perimeter landfill gas monitoring probes (PGP-1, PPG-2, PGP-3, PGP-4) tested negative for VOC's, hydrogen sulfide, carbon monoxide, and methane. Carbon Dioxide was not detected at PGP-3 and PGP-4, but was minimally detected at PGP-1 (0.4%) and PGP-2 (1.7%). Oxygen levels ranged from 20.0 % at PGP-2 to 21.3% at PGP-4. Levels of all gases were similar to levels measured during last years annual inspection, except for VOC levels which decreased.

The following is a summary of the landfill gas vent readings. VOCs and hydrogen sulfide were not detected in any of the gas vents. The oxygen levels ranged from 21.2% (Vent # 13, 18) to 0% (Vent # 15,17). LEL readings ranged from 0% at V-18 to over 100% LEL in ten of the 18 vents. Carbon monoxide registered 0 in 13 of the 18 gas vents, and up to 13 PPM at V-14. Carbon dioxide ranged from 0 % (Vent # 18) to 27.6 % at V-17. Methane ranged from 0 % (Vent # 1, 18) to 37.5 % at V-17. Levels of LEL, carbon monoxide, carbon dioxide and methane production increased since last year's annual inspection (2003 Annual Report), while measurements of VOCs, Oxygen, and hydrogen sulfide remained about the same.

The gas readings are within the parameters of a mature landfill. The major concern with landfill gas is off-site migration. If the gas vents are functioning properly and are adequately spaced there should be no significant off-site migration of landfill gases; however, due to the increased LEL, carbon monoxide, carbon dioxide, and methane readings, and the proximity of residential housing and commercial development, gas monitoring probes should be installed along the property line where the landfill is adjacent to structures. This has already been done at the northern end near Sculley Road with gas probes PGP-1 through PGP-4. Gas monitoring probes should also be installed at the southern perimeter of the site along the commercial properties. The LEL readings in the landfill gas vents near the southern perimeter have consistently registered high in the past, most are above 100% this year. The probes should be installed in clusters with screens installed at deep, mid-depth and shallow intervals. The deep screen should extend to just above the saturated zone. The top of the shallow screen should be installed at approximately 3 to 5 feet below ground surface. Current plans include the installation of additional gas monitoring probes as part of the cap maintenance project.

5.0 GROUNDWATER ELEVATIONS

Groundwater elevations were collected from the compliance point wells in order to observe any changes in elevation and the direction of groundwater flow. Groundwater elevations at compliance point wells were measured on the first day of each sampling event, May 3, 2004 and November 15th, 2005, respectfully. During the spring sampling event, approximately 0.8-inches of precipitation fell over the three days, while no significant precipitation event occurred during the fall sampling event.

The depth to water table was measured in the field, then subtracted from the elevation of the reference point to determine the elevation of the water table at each location. Table 5-1 lists the water table elevations (for each sampling round), the geological unit(s) screened by the wells, and the elevation of the screened interval for each well.

Groundwater elevations measured during May 2004 were consistently higher than those measured in November 2004, as is typical for the area. The mean drop in groundwater elevation (from spring to fall reading) was 0.9-feet for the fourteen wells. Groundwater levels taken during spring 2004 were, on average, 0.4-feet higher than those taken approximately one year earlier, but the average level observed during the fall showed no significant change from the previous fall.

In addition to these semi-annual groundwater measurements, regular groundwater measurements of all Shepley's Hill Landfill wells were conducted by Harding ESE from 1992 until 1999. During the first 5-year review (SWEC, August 1998), groundwater elevations were re-evaluated to identify hydraulic gradients and to confirm changes due to the construction of the landfill cap. Groundwater modeling has suggested that the landfill cap has reduced the volume of water beneath the cap, resulting in a more northerly groundwater flow (SWEC, 1998). Water level data collected in 2004 suggests that the model analysis of a northerly groundwater flow is still valid. Groundwater flow patterns will be re-evaluated during the next five-year review.

6.0 GROUNDWATER SAMPLING

Groundwater sampling is conducted at the landfill on a semi-annual basis in accordance with the LTMMP at the fourteen compliance point monitoring wells, SHL-3, SHL-4, SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-10, SHM-93-10C, SHL-11, SHL-19, SHL-20, SHL-22, SHM-96-22B, and SHM-93-22C. These wells were sampled in 2004 in the spring on May 3rd through 5th, and in the fall on Novermber 15th through 18th.

Locations of the wells are shown on Figure 3-1. Of these fourteen long term monitoring wells, the seven at the north end of the landfill (SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-22, SHM-96-22B and SHM-93-22C) are located in the area predicted to experience the greatest intrusion of groundwater flow from the landfill, as suggested by the modeling results depicted in Figure 6-1. The remaining seven are located along the eastern edge of the landfill, between the landfill and Plow Shop Pond.

In addition to compliance point wells, four additional wells located near Molumco Road (SHM-99-31A, SHM-99-31B, SHM-99-31C, and SHM-99-32X) have usually been sampled at the same time as the compliance point wells, for comparison purposes only. During 2004, samples were only collected during the spring event from SHM-99-31B and SHM-99-31C. SHM-99-31A and SHM-99-32X could not be sampled due to damage to their well casings, and SHM-99-31B and SHM-99-31C could not be accessed during the fall event due to flooding.

In accordance with the ROD and LTMMP, compliance point wells are designated as Group 1 or Group 2 wells. Chemical concentrations in Group 1 wells have historically attained cleanup goals, while those in Group 2 have not. Originally, all existing wells were designated as Group 2 wells per the LTMMP, including three newer wells installed in 1996 (SHM-96-5B, SHM-96-5C, and SHM-96-22B). During the first five-year site review (August 1998), six monitoring wells (SHL-3, SHL-5, SHL-9, SHM-93-10C, SHL-22, and SHM-93-22C) achieved cleanup levels for all chemicals of concern and were reclassified as Group 1 wells. The remaining eight wells continue to be classified as Group 2 wells.
These group designations will be revised as necessary during the next five-year review (based on data collected in the years 2000 to 2004) depending on whether groundwater quality meets the criteria of the ROD, see section 1.2.

All wells, along with their compliance requirement, group designation, orientation/location, and condition (whether a sample was collected) are presented in Table 6-1.

6.1 Preparation for Sampling

Sampling activities were coordinated with the Devens BRAC Environmental Office and the contract laboratory prior to commencement of sampling. Bottles were checked to insure they complied with the requirements of the sampling program. Sampling equipment, including YSI water quality meters, portable generators and teflon lined tubing, was rented (or purchased in the case of supplies) from U.S. Environmental. USACE used their own Grundfos Rediflow II pumps, controllers, Heron water level indicators, and HF Scientific DRT-15CE turbidity meters for the sampling events (equipment is occasionally supplemented with identical or similar models rented from U.S.

Environmental, as required – these instances are noted on the Groundwater Field Analysis Forms where appropriate). All equipment was inventoried and tested to ensure it was accounted for and functioning. The well logs of each of the wells to be sampled were reviewed by the field team prior to the scheduled event to determine tubing requirements, and brought to the landfill during the sampling event to confirm the screened intervals.

6.2 Sampling

Monitoring wells were purged and sampled in accordance with *EPA's Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells* (July 1996) using an adjustable rate, low flow submersible pump. Teflon lined tubing was used for sample collection and was disposed after each well was sampled.

Before sampling activities commenced, groundwater elevations were measured at each well location to be sampled. YSI water quality meters and turbidity meters were calibrated at the beginning of each day of use. A calibration check was also performed at the end of each day. During sampling, the generator used to power the pumps was located at a downwind area at least 30 feet away from the well being sampled, to minimize potential contamination from the exhaust. Upon initial opening of each well, initial water level measurements were collected. The pump intake was lowered to approximately the middle of the screen of each well to be sampled when possible. When the water level was below the top of the screen, the pump was positioned at a depth approximately midway between the top of the water level and the bottom of the screen.

Water quality parameters, including temperature (temp), specific conductance, pH, oxidation-reduction potential (ORP), turbidity, and dissolved oxygen (DO) were collected every 3 to 5 minutes to ensure proper purging of the wells before each well was sampled. The results are listed on Groundwater Field Analysis Forms located in Appendix B. All water quality parameters, except turbidity, were monitored using a flow-through cell and a Sonde-YSI water meter (YSI 600XL). Turbidity samples were not collected from the flow through cell due to the silt buildup that can occur in the cell. A T-connector was set up before the flow-through cell to facilitate the collection of samples for turbidity readings. Sampling was conducted when water quality parameters became stabilized for three consecutive readings. The tubing was disconnected from the flow-through cell and samples were collected directly from the discharge tubing. Observations made during the sampling activities include:

- To ensure precision of water level measurements, well casings that had faded marks or no marks were remarked.

- None of the pre-preserved sample bottles required pH adjustments after they were filled with the water samples.

- At several wells during each event, the water level was lower than the top of the screen, and the pumps were lowered to approximately midway between the water level and the bottom of the screen.

- Both well SHL-4 and well SHL-9 have sustained minor damage to their casings. Locking the caps on these wells is impossible since the hasps have been broken. Repairs to the casings are recommended.

- During the spring sampling round, non-compliance point well SHM-99-31A, which is located outside the landfill (off of Molumco Road), was not accessible to sample. The pump was lowered into the well and met resistance at a depth approximately equal to the frost line. The cause of the obstruction could not be determined, but freeze-thaw action may have created a slight bend in the 2-inch well. This same problem was encountered in the spring of the previous year. This well is not among the fourteen compliance point wells at Shepley's Hill Landfill per the LTMMP. It is one of four extra wells that have been historically sampled for comparison purposes only. UPDATE: A sample was successfully collected at this well in February 2005.

- During the fall sampling round, the wetland area alongside Molumco Road was flooded. Non-compliance point wells SHM-99-31A, SHM-99-31B and SHM-99-31C are located in this wetland. The flooding was due to beavers constructing a blockage at a nearby culvert. The culvert had been cleared recently, but water levels were not receding noticeably within a few days of the sampling event. No samples were collected from these wells at this time due to the following reasons: (1) Access to the wells was physically inhibited due to the high water; (2) Safety concerns arose due to the electrical power supply necessary to perform the work; and (3) It was reported that the surface water had recently risen even higher than observed by the sampling team (likely high enough that surface water intrusion of the wells occurred, which would possibly have a significant effect on results). These wells are not among the fourteen compliance point wells at Shepley's Hill Landfill per the LTMMP. UPDATE: A sample was successfully collected from each of these wells in February 2005.

- Non-compliance point well SHM-99-32X, also off of Molumco Road, remains damaged. Apparently, a vehicular collision destroyed the bollards and severely bent the well casing. As such, a sample from this well could not be collected. This well is not among the fourteen compliance point wells at Shepley's Hill Landfill per the LTMMP. It is also one of the four extra wells that have been historically sampled for comparison purposes only. UPDATE: This well was inspected, repaired and sampled in February 2005.

6.3 Equipment Decontamination

All non-disposable sampling and testing equipment that came in contact with the sampling medium was decontaminated to prevent cross contamination between sampling points. The submersible pump was decontaminated using the following procedure:

- Upon removal of the pump from the well following sample collection, the pump was submersed in a 4-inch PVC riser containing potable water and detergent (Alconox) solution. At least 1 to 2 gallons of the detergent solution was pumped through (starting the pump at a low flow rate, as in sampling, and increased to a higher speed).

- The pump was removed and sprayed with potable water to minimize the transfer of soap to the riser.

- The pump was then submersed in a riser filled with potable water and at least 1 to 2 gallons were pumped through.

- The pump was then submersed in a riser filled with deionized water and at least 1 to 2 gallons were pumped through.

- The submersible pump was sprayed with isopropyl alcohol (reagent grade) using a hand held spray bottle, over a tub. The pump was then submersed in a final deionized water rinse and at least 1 to 2 gallons were pumped through.

- The pump was air dried and wrapped in clean aluminum foil.

7.0 LABORATORY TESTING

Groundwater samples were collected from all fourteen compliance wells during the spring and fall sampling events and sent to Severn Trent Laboratories in Colchester, Vermont for analysis. Groundwater samples were also collected from non-compliance wells SHM-99-31B and SHM-99-31C during the spring sampling event and sent to Severn Trent as well. Non-compliance point wells SHM-99-31A and SHM-9932X were not sampled as discussed in section 6.2. All samples were analyzed for volatile organic compounds, inorganics, and general water quality parameters.

7.1 Sample Handling

Samples were collected in containers compatible with the intended analysis and properly preserved prior to shipment to the laboratory. Each sealed container was placed in a leak proof plastic bag and placed in a strong thermal ice chest filled with bubble wrap packing material, or equivalent, to ensure sample integrity during shipment. Ice was added to cool samples to 4^0 C or just below. Chains of Custody (COCs) were used to identify and document the samples being shipped (copies are included in Appendix C). Sample custody was initiated by the sampling team upon collection of samples and COC forms were placed in waterproof plastic bags and taped to the inside lid of the cooler. The cooler was sealed with chain-of-custody seals and shipped to the laboratory via overnight delivery.

7.2 Analyses

COCs for compliance point wells include arsenic, chromium, 1,2-dichlorobenzene, 1,4-dichlorobenzene, 1,2-dichloroethane, lead, manganese, nickel, sodium, aluminum, and iron. Cleanup levels for these COCs are listed on Table 1-1. Water analyses were conducted according to SW846 methods 8260B for volatile organic compounds (VOCs), 6010B for TAL metals (7471A for mercury), and for general chemistry analyses the following methods were used: chemical oxygen demand by EPA method 410.1, biochemical oxygen demand by EPA method 405.1, hardness by Standard Method 2340B, alkalinity by EPA method 310.1, cyanide by EPA method 335.4, anions by EPA method 300.0, total organic carbon by SW846 method 9060, total dissolved solids by EPA

method 160.1, and total suspended solids by EPA method 160.2. These analyses were conducted on samples collected from all fourteen compliance point wells, and from non-compliance point wells SHL-99-31B and SHL-99-31C during the spring round. As reported in previous annual reports, starting with the fall event of 2001, the method used to determine hardness was changed to Standard Method 2340B in order to eliminate the interference to EPA method 130.2 from other heavy metal ions typically present in some of the wells at the site. Table 7-1 summarizes the analysis procedures used.

7.3 Summary of Results

This annual report compares the COC concentrations with the cleanup levels identified in the ROD, see Table 1-1. The goal of ROD Alternative SHL-2 is to maintain groundwater quality below cleanup levels at Group 1 wells, and to attain cleanup levels at Group 2 wells.

The five-year reviews evaluate the effectiveness of Alternative SHL-2 at reducing the potential human health risk from exposure to groundwater and at preventing groundwater from contributing to Plow Shop Pond sediment contamination in excess of human health and ecological risk-based values. Evaluating effectiveness at Group 2 wells is based on reduction of risk rather than reduction of concentration as a measure of progress toward attainment of cleanup levels, because this approach focuses on the cleanup of arsenic, which is the primary contributor to risk in the Group 2 wells.

According to the LTMMP, only chemicals that present carcinogenic risk are considered trigger chemicals in the monitoring program. The trigger chemicals are arsenic, 1,2 dichlorobenzene, 1,4 dichlorobenzene and 1,2-dichloroethane. Reduction of carcinogenic risk, rather than simply reduction of contamination, is the measure of progress toward attainment of cleanup. This risk-based approach keeps the focus on mitigation of the most significant contributors to risk. Progress toward cleanup as measured by risk reduction is evaluated during five-year reviews. The next five-year review is being prepared this year to include data collected in the years 2000 through 2004.

The LTMMP states Alternative SHL-2 will be considered effective with regard to Group 2 wells if five-year reviews show an ongoing reduction of potential human health risk (based on trigger chemicals) at Group 2 wells and the ultimate attainment of cleanup levels for all COCs by January 2008. Alternative SHL-2 will be considered effective with regard to Group 1 wells if five-year site reviews show that groundwater quality remains at or below cleanup levels for all COCs.

Site-wide 2004 results for COCs found at one or more sample location above cleanup levels are displayed in Figure 7-1. Analytical results for groundwater analyses of samples collected at the fourteen compliance point wells are presented in Tables 7-2 and 7-4, for the spring and fall rounds, respectively. Table 7-3 presents additional spring event data, collected beyond the requirements of the LTMMP, determined from samples taken at off-site wells near Molumco Road.

7.3.1 Arsenic Results

Arsenic was the only trigger chemical detected above its cleanup level at the site during the 2004 sampling events. Historical and 2004 arsenic data for the fourteen compliance point wells, plus the additional non-compliance point wells, may be found in Table 7-5. The compliance point monitoring well data was plotted to provide a graphical comparison of historical arsenic concentrations (see Appendix D) as discussed below.

Of the six Group 1 wells, only SHL-22 had arsenic concentrations exceeding the cleanup level during 2004, occurring during both the spring and fall sampling events. Although SHL-22 was designated a Group 1 well in the August 1998 Five Year Review, its arsenic concentrations have consistently measured above the cleanup level since the May 2002 sampling event. Arsenic concentrations have also exceeded clean up levels at least once since the August 1998 Five Year Review in two other Group 1 wells, SHL-9 and SHM-93-22C, but have measured below the cleanup level since October 2002 and May 1999, respectively. Refer to Table 7-6 for wells that exceeded cleanup levels for trigger chemicals since achieving Group 1 status in 1998.

Of the Group 2 wells, arsenic concentrations from SHM-96-5B, SHM-96-22B, SHL-19, SHL-11, SHL-20, and SHM-96-5C exceeded cleanup levels during both spring and fall sampling events with no significant increases or decreases from 2003. Group 2 well SHL-10 continues to have minimal to non-detect arsenic concentrations since May 1998. In addition, Group 2 wells SHL-4 and SHM-96-5C have shown arsenic concentrations meeting the cleanup level since May 2003 and November 2003, respectively.

For the first time since monitoring began, well SHM-96-5B was not the sample location with the highest concentration of arsenic. Well SHM-96-22B, located nearby and screened at a similar depth in sand/till, exhibited a slightly higher concentration. These two northern wells have continuously exhibited the highest arsenic levels, one to two orders of magnitude above arsenic measured in the other compliance wells. None of the wells recorded new historical high arsenic levels in 2004..

Historic concentrations measured in the eastern wells near Plow Shop Pond indicate arsenic concentrations are the same or decreasing in all wells but SHL-11 in which levels are increasing. SHL-11 is screened at the water table, while the other eastern wells include four more screened at the water table, one at the base of till, and one at bedrock.

Historic concentrations measured in northern wells indicate arsenic concentrations are the same or decreasing in all wells except SHL-22 and SHM-96-22B, which are screened in the sand/till layer and the base of till, respectively. It is notable that concentrations in the northern wells screened at the water table do not generally change over the years monitored. These include Group 1 wells SHL-5 and SHL-9 with arsenic concentrations that usually measure well below the cleanup level, and Group 2 well SHM-96-5C with an arsenic concentrations that measured below the cleanup level during 11 of the 17 historic sampling events, including those in 2004.

Fall 2004 arsenic concentrations were typically higher than spring concentrations. It may be of note that the water table was lower by almost a foot in the fall versus spring. Arsenic concentrations are usually higher in the fall than spring in wells SHL-11, SHL-19 and SHM-96-22B. The opposite is

true for SHM-96-5B. The remaining compliance wells don't seem to show a notable seasonal trend for arsenic. The results of the spring and fall events for all COCs are summarized below.

7.3.2 COC Results for Samples Collected Spring 2004

VOCs, metals and general chemistry parameters were analyzed in the fourteen compliance point wells at the landfill site, plus two additional non-compliance point wells located at Molumco Road (SHM-99-31B and SHM-99-31C). Two other non-compliance point wells, also located at Molumco Road and normally included in the monitoring event, were unable to be sampled at that time. The well casing for well SHM-99-32X is damaged badly, and well SHM-99-31A had an obstruction, approximately at the frost line, which prevented the pump from being lowered into the well.

None of the sixteen wells monitored had detectable levels of the VOC trigger chemicals; 1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene. In general, none of the established cleanup levels for VOCs were exceeded.

Arsenic, the only other trigger chemical, was detected at concentrations greater than the cleanup level of 50 µg/L in the Group 1 compliance point well SHL-22 (88.1 µg/L), and Group 2 compliance point wells SHM-96-5B (3,950 µg/L), SHL-11 (502 µg/L), SHL-19 (75.0 µg/L), SHL-20 (136 µg/L), and SHM-96-22B (1,690 µg/L). The duplicate sample (collected from well SHM-96-5B) had a concentration of 3,890 µg/L. Compared to 2003 data, arsenic increased at SHL-19 (which was previously below cleanup criteria), but decreased or remained essentially the same at the other wells. The two Molumco Road wells SHM-99-31B and SHM-99-31C had concentrations of 65.0 and 292 µg/L arsenic, respectively. These results, as well as others of note, are summarized on Table 7-5 and in Figure 7-1.

The other COCs (those not designated as trigger chemicals) detected at concentrations above cleanup levels were also metals (iron, manganese, and sodium). Metal chemicals of concern that were not found to exceed cleanup levels at any of the wells include aluminum, chromium, lead and nickel. Iron was detected at levels above its cleanup level of 9,100 µg/L at Group 2 compliance point wells SHM-95-5B, SHM-96-5C, SHL-11, SHL-19 and SHM-96-22B, with the maximum detected (71,100 µg/L) at well SHM-96-5C. Iron was not detected above the cleanup level at Group 1 wells, however both Molumco Road non-compliance point wells had iron concentrations above the cleanup level (up to 46,400 ug/L at SHM-99-31C). Group 1 wells SHL-5, SHL-9, SHL-22 and SHM-93-22C, and Group 2 wells SHL-4, SHM-96-5B, SHM-96-5C, SHL-11, SHL-19, SHL-20 and SHM-96-22B had concentrations of manganese above the cleanup level of 291 µg/L. Both non-compliance point Molumco Road wells also had concentrations above the cleanup level (up to 6,390ug/L at SHM-99-31C). The maximum value detected for manganese was 8,910 µg/L at SHM-96-5B. Sodium was detected at levels above its cleanup level of 20,000 µg/L at Group 1 well SHL-22, and Group 2 wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, and SHM-96-22B, with the maximum detected (56,900 µg/L) at well SHM-96-22B. One of the Molumco Road wells, SHM-99-31C, also had a concentration above the cleanup level (45,100ug/L). Compared to 2003 data, maximum levels of iron and manganese increased while sodium decreased.

7.3.3 COC Results for Samples Collected Fall 2004

VOCs, metals and general chemistry parameters were analyzed for fourteen groundwater monitoring wells in the fall of 2004. The four non-compliance point wells located at Molumco Road, normally added to the sampling round could not be sampled at this time. The well casing for well SHM-99-32X is damaged badly, and the wetland where wells SHM-99-31A, SHM-99-31B and SHM-99-31C are located was flooded due to a beaver dam. Note that all fourteen compliance point wells were sampled and analyzed for all required parameters.

None of the fourteen wells monitored had detectable levels of the VOC trigger chemicals; 1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene. In general, none of the established cleanup levels for VOCs were exceeded.

Arsenic, the only other trigger chemical, exceeded the cleanup level of 50 µg/L in the Group 2 compliance point monitoring wells SHM-96-5B (2,110 µg/L), SHL-11 (617 µg/L), SHL-19 (121 µg/L), SHL-20 (156 µg/L), and SHM-96-22B (2,360 µg/L), and in the Group 1 compliance point well SHL-22 (65.4 ug/L). The duplicate sample (collected from well SHM-96-5B) had a concentration of 2,240 µg/L. Compared to 2003 data, the arsenic decreased in all the above wells, except for SHL-19.

The other COCs (those not designated as trigger chemicals) detected at concentrations above cleanup levels were also metals (iron, manganese, and sodium). Metal chemicals of concern that were not found to exceed cleanup levels at any of the wells include aluminum, chromium, lead and nickel. Iron was detected at levels above its cleanup level of 9,100 µg/L at Group 2 compliance point wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-19 and SHM-96-22B with the maximum detected (82,900 µg/L) at well SHM-96-22B. Group 1 wells SHL-5, SHL-9, SHL-22 and SHM-93-22C, and Group 2 wells SHL-4, SHM-96-5B, SHM-96-5C, SHL-11, SHL-19, SHL-20 and SHM-96-22B had concentrations of manganese above the cleanup level of 291 µg/L. The maximum value detected for manganese was 10,800 µg/L at SHM-96-5B. Sodium was detected at levels above its cleanup level of 20,000 µg/L at Group 1 well SHL-22, and Group 2 wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, and SHM-96-22B, with the maximum detected (41,900 µg/L) at well SHL-22. Maximum concentrations of iron, manganese and sodium decreased from 2003 data.

8.0 QUALITY CONTROL

Quality assurance/quality control (QA/QC) samples were collected to monitor the sample collection, transportation, and analysis procedures.

8.1 Field Quality Control

One set of equipment (rinsate) blank samples was collected from the pump after decontamination had been conducted for each sampling event (spring and fall) and analyzed for the full suite of analytical parameters. Results of equipment blank samples are discussed in Section 8.3, Data Evaluation. One field duplicate groundwater sample was collected during each sampling round at well SHM-96-5B and analyzed for the full suite of analytical parameters. Results of duplicate samples are shown on Tables 7-2 and 7-4 and are also discussed in Section 8.3. One trip blank

sample was included in each shipped cooler that contained VOC samples, submitted for VOC analysis to evaluate potential cross-contamination of samples during transport. No chemicals of concern were detected in the trip blanks.

8.2 Laboratory Quality Control

A QA sample was collected during each event at well SHM-96-5B and analyzed by an independent laboratory for the full suite of parameters. QA samples were collected, packaged and shipped in the same manner as the other groundwater samples. Appendix E presents the Chemical Quality Assurance Report (CQAR) for each sampling round, providing a statistical comparison of the primary and QA laboratory results.

8.3 Data Quality Evaluation

8.3.1 Data Evaluation for Samples Collected Spring 2004

Groundwater samples from sixteen locations were collected on May 3, 4, 5, and 6, 2004. Fourteen were collected from Shepley's Hill Landfill at the former Fort Devens and two from the Molumco Road wells (off-site), Ayer, Massachusetts. Normally, four wells are sampled off of Molumco Road, but monitor well SHM-99-32X was damaged by a snowplow and has not been repaired yet. Also, monitoring well SHM-99-31A was not sampled due to frost heave damage. Therefore these two wells were not sampled. The samples were analyzed at Severn Trent Laboratories (in Colchester, VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). Refer to Tables 7-2 and 3.

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW-846 guidance, with guidelines provided in "Appendix I - Shell for Analytical Chemistry Requirements" of "EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans", dated 1 February 2001, and with EM 200-1-10, "Guidance for Evaluating Performance Based Chemical Data Packages", dated 31 January 2003.

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including sample handling/receipt, holding times, initial calibration, continuing calibration verifications, method blank results, equipment blank results, surrogate recoveries, field duplicates, LCS/LCSD, MS/MSD, precision, accuracy, representativeness, completeness, comparability, and sensitivity), all data may be reported without qualification and was supported by the associated laboratory QC, except as summarized below:

- Volatiles By Method 5030B/8260B: All of the volatile results were valid and acceptable as reported by the STL-VT laboratory. No additional qualification of the sample results were required.

- Metals Analyses: All MS recoveries are within the 75-125% recovery acceptance limits, except for silver at 151.8% recovery. The laboratory suspects the high recovery was due to a matrix interference. The result for silver on sample SHL-19 were be qualified as 1.0 UJ ug/l.

- Alkalinity and Biological Oxygen Demand (BOD5) Analyses: Holding times for alkalinity and BOD5 were exceeded in some cases by as much as 3 days. Alkalinity and BOD5 results for the samples SHL-22, SHM-96-22B, SHL-5, SHM-96-5B, SHL-DUP-04A, and SHL-EB-04A are qualified as "H" for holding time exceedances. The analyses of samples SHL-22, SHM-96-22B, SHL-5, SHM-96-5B, SHL-DUP-04A, and SHL-EB-04A performed on 5/7/04 were 2.5 to 7 hours beyond the method specific holding time. These samples were analyzed as soon as possible based on the laboratory's defined BOD5 analysis schedule. Refer to Tables 7-2 and 3.

- Nitrate, ortho-phosphate, BOD5 and TOC: The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 5.0 mg/l; chloride at 0.24 mg/l; nitrate at 0.23 mg/l; ortho-phosphate at 0.31 mg/l; alkalinity at 6.1 mg/l; BOD5 at 2.1 mg/l; and TOC at 5.1 mg/l. The levels of contamination for TDS and alkalinity did not affect the sample results since they were greater than five times the associated equipment blank contamination. The sample results for nitrate, ortho-phosphate, BOD5 and TOC required qualification as a result of the equipment blank contamination. All of the non-detected results for nitrate, ortho-phosphate, BOD5 and TOC were qualified with "UJ", denoting that they were estimated at the laboratory reporting limits. All of the results detected below the stated level of contamination of the equipment blank for nitrate, ortho-phosphate, BOD5 and TOC were qualified with "J", denoting an estimated value. Refer to Tables 7-2 and 3 for an evaluation of the qualified general chemistry results.

8.3.2 Data Evaluation for Samples Collected Fall 2004

Groundwater samples from fourteen locations were collected on November 15, 16, and 17, 2004. The fourteen samples were collected from Shepley's Hill Landfill at the former Fort Devens. Three of the wells near Molumco Road (off-site), Ayer, Massachusetts, were not sampled because the area was flooded. Normally, these three wells are sampled. Monitor well SHM-99-32X, damaged by a snowplow, and monitoring well SHM-99-31A, which was damaged by frost heaves, have not been repaired. The samples were analyzed at Severn Trent Laboratories (in Colchester, VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). Refer to Table 7-4.

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW-846 guidance, with guidelines provided in "Appendix I- Shell for Analytical Chemistry Requirements" of "EM-200-1-3, Requirements for the

Preparation of Sampling and Analysis Plans", dated 1 February 2001, and with EM 200-1-10, "Guidance for Evaluating Performance Based Chemical Data Packages", dated 31 January 2003.

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including sample handling/receipt, holding times, initial calibration, continuing calibration verifications, method blank results, equipment blank results, surrogate recoveries, field duplicates, LCS/LCSD, MS/MSD, precision, accuracy, representativeness, completeness, comparability, and sensitivity), all data may be reported without qualification and was supported by the associated laboratory QC, except as summarized below:

- Volatiles By Method 5030B/8260B: All of the Method 8260B specific continuing calibration verifications were within the acceptance limits of 20% difference for all of the target analytes and surrogates, except for only a few select compounds (dichlorodifluoromethane, methyl iodide, vinyl acetate, tetrahydrofuran, tetrachloroethene, and 1,2,3-trichlorobenzene) in the two CCVs performed. Tetrahydrofuran was the only one of these compounds that was detected in samples SHM-96-5B and SHM-96-5C. These affected samples will require an additional "J" qualifier to denote an estimated value for tetrahydrofuran. The MS/MSD outages of 2-chloroethyl vinyl ether indicate a low bias to the sample results for this target analytes and are qualified as "UJ". Historically, these compounds have not been reported at the site and the qualified undetected values are not considered significant. The compound 2-chloroethyl vinyl ether exhibited zero percent recoveries in both the matrix spike and the matrix spike duplicate samples, which the laboratory suspects may be attributed to the acid preservation of the sample. The low bias is noted and all results are acceptable, valid, and usable with the stated validation qualifiers.

- Metals Analyses: All of the metals analyses were acceptable and useable as reported by the primary laboratory. No qualification of the metals results were required.

- General Inorganic Chemistry Analyses: The sample results for SHL-4 and SHL-19 for ortho-phosphate were qualified with a "B", denoting that they were also detected in the method blank performed on 11-24-04. The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 107 mg/l, alkalinity at 6.3 mg/l, BOD5 at 3.1 mg/l and TOC at 5.7 mg/l. The levels of contamination for TDS, BOD5 and alkalinity affected the sample results since they were greater than five times the associated equipment blank contamination for almost all the samples. The sample results for TDS, BOD5 and TOC required a "B" qualifier, denoting that these target analytes were also detected in the equipment blank. The equipment blank results for TSS, chloride, sulfate, nitrate, ortho-phosphate, COD and hardness were free of contamination. Refer to Table 7-4 for an evaluation of the qualified general chemistry results.

- The results of the general inorganic analyses for sample SHM-96-5B, and its duplicate, sample SHM-DUP-04B, showed less than 20% relative percent difference (RPD) for all detected analytes for precision, except for COD at 35.3% RPD, TDS at 39.9% RPD and

TOC at 21.2 RPD. All of the field duplicate inorganic results are acceptable and useable with the noted qualifications.

- All of the ortho-phosphate results were qualified with "J's" or "UJ's", which denotes an estimated concentrations or reporting limits due to several QC outages in the LCS and calibration blank contamination. The sample results are acceptable, valid, and useable with the noted qualifiers applied.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

- The locations of the wells in the LTMP remain appropriate, relative to source areas and the direction of groundwater flow.

- Shepley's Hill Landfill appears to be in fair condition.

- *The Draft Cap Drainage Report, January 2003* resulted in many recommendations to improve the drainage and function of the cap. Some are being implemented this year per the *Landfill Cap Maintenance SOW* including (1) repairing the fence and gates to improve vehicle access restrictions, (2) removing wetland vegetation from drainage swales, (3) filling in and grading low spots to improve runoff, and (4) installing gas monitoring probes along the southern perimeter of the landfill.

- Other recommendations from the *Draft Cap Drainage Report, January 2003* will be further evaluated in an upcoming Comprehensive Site Assessment (CSA), which will assess the adequacy of the landfill. Following the CSA, a Corrective Action Alternatives Analysis will be conducted to identify any remedial repairs required. Implementation of the selected options (if required) should improve the drainage and function of the landfill cap.

9.2 Recommendations

- The next round of groundwater sampling will take place in the spring of 2005. Since the effect of the new groundwater remediation system at the landfill remains to be seen, it is recommended that all wells sampled in 2004 continue to be a part of the sampling plan for 2005. UPDATE: An expanded hydraulic network has been established under the Shepley's Hill Landfill groundwater extraction, treatment and discharge contingency remedy. Baseline hydraulic monitoring occurred in February 2005 and August 2005. Following an extraction test, hydraulic monitoring will occur weekly for one month, monthly for two months and quarterly there after. This effort will take the place of the current long term well monitoring. To avoid duplication of effort, the Army contractor in Winter/Spring 2005 sampled 5 LTM wells, plus the Molumco Road Wells. The Geochemical Sampling Network will be expanded to include all of the LTM wells on a semiannual basis. This effort will take the place of the current well monitoring.

- It is recommended that the number of wells where semi-annual water levels are collected be increased for one year (to adequately determine the groundwater table elevation throughout the landfill), so that updated water level contours for the landfill can be determined, confirming or re-evaluating the historically established contours. This data will be especially useful in updating/confirming groundwater flow paths, so that assessments of the value of sample collection at various wells can be made. This increase in data collection should be done approximately once every five years for future updates.

- Other recommendations made in this annual report that are not currently scheduled but should be addressed in the future include, (1) Repair and regrade around the catch basins on the south side of the landfill; and (2) Repair the hasps on the casings of groundwater monitoring wells SHL-4 and SHL-9.

- During the forthcoming 2005 Five-Year Annual Review to assess the protectiveness of the selected remedial action for Shepley's Hill Landfill, it is recommended the wells be reevaluated with regard to Group 1 and Group 2 status. Eight of the fourteen compliance point wells were below the arsenic cleanup level for the latest round of sampling, a fairly steady trend. Northern well SHL-22 was the only Group 1 well having arsenic concentrations that exceeded the cleanup level in 2004. This well has consistently exceeded the cleanup level for arsenic since May 2002. On the other hand, concentrations measured at Group 2 wells SHL-4, SHL-10 and SHM-96-5C met the cleanup level for arsenic in 2004; a trend that has been occurring over the past few years, particularly at SHL-10. Although cleanup levels for the other three trigger chemicals were not exceeded in 2004, concentrations of the COCs iron, manganese and sodium did exceed cleanup levels. These exceedances should also be evaluated in the forthcoming five-year review.

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SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

TABLES

TABLE 1-1
COC Cleanup Levels

Chemical of Concern	Cleanup Level, µg/L	Selection Basis
Arsenic	50	MCL
Chromium	100	MCL
1,2-Dichlorobenzene	600	MCL
1,4-Dichlorobenzene	5	MMCL
1,2-Dichloroethane	5	MCL
Lead	15	Action Level
Manganese	291	Background
Nickel	100	MCL
Sodium	20,000	Health Advisory
Aluminum	6,870	Background
Iron	9,100	Background

Based on ROD

TABLE 4-1
Landfill Gas Monitoring

INSPECTOR: Kullberg TITLE: Civil Engineer DATE: 11/16/04

ORGANIZATION: CENAE-EP WEATHER: Sunny, 45 d F

BAROMETER: 30.0 in Hg TIME: 1020 BAROMETER: 30.0 in Hg TIME: 1345

Vent No.	VOC ppm PID	O_2 % GA-90	H_2S ppm CGI	LEL % CGI	CO ppm CGI	CO_2 % GA-90	CH4 % GA-90	Remarks
V-1	0	16.9	0	0	0	3.1	0	CGI O2 – 16.9
V-2	0	2.9	0	>100	0	15.4	11.0	CGI O2 – 3.9
V-3	0	8.9	0	>100	0	10.3	7.6	CGI O2 – 10.8
V-4	0	8.0	0	>100	0	9.5	3.0	CGI O2 – 9.2
V-5	0	11.7	0	33	0	7.0	0.7	CGI O2 – 12.7
V-6	0	11.6	0	78	0	6.8	2.2	CGI O2 – 12.5
V-7	0	7.9	0	19	0	8.2	1.3	CGI O2 – 9.4
V-8	0	7.5	0	31	0	9.6	0.9	CGI O2 – 8.7
V-9	0	4.1	0	>100	0	18.6	23.9	CGI O2 – 5.0
V-10	0	0.3	0	>100	4	17.6	6.5	CGI O2 – 2.2
V-11	0	8.4	0	>100	0	7.4	4.2	CGI O2 – 7.7
V-12	0	20.6	0	46	0	0.8	0.5	CGI O2 – 19.4
V-13	0	21.2	0	75	0	0.1	0.2	CGI O2 – 18.4
V-14	0	4.4	0	>100	13	19.9	33.5	CGI O2 – 4.8
V-15	0	0	0	>100	11	26.1	32.4	CGI O2 – 2.8
V-16	0	0.1	0	>100	10	24.6	22.6	CGI O2 – 2.6
V-17	0	0	0	>100	10	27.6	37.5	CGI O2 – 2.4
V-18	0	21.2	0	0	0	0	0	CGI O2 – 20.9
PGP-1	0	20.6	0	0	0	0.4	0	CGI O2 – 20.5
PGP-2	0	20.0	0	0	0	1.7	0	CGI O2 – 19.8
PGP-3	0	21.3	0	0	0	0	0	CGI O2 – 20.9
PGP-4	0	21.3	0	0	0	0	0	CGI O2 – 20.9

CALIBRATION INFORMATION:
Instrument: PID, 10.6 eV lamp
Results: 0.0/100 ppm isobutylene Calibrated by: US Environmental

Instrument: Industrial Scientific MG 140 CGI
Results: 25% LEL Methane/Pentane, 20.9% O_2, 25 ppm H_2S, 100 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech GA-90
Results: 20.9% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

TABLE 5-1
Monitoring Well Specifications and Groundwater Elevations

Well Identification	Orientation to Landfill, [1,2]	Geological Designation	Screened Interval, [3] (feet NGVD)	Groundwater Elev (feet NGVD) May 03 2004	Groundwater Elev (feet NGVD) Nov 15 2004
SHL-3	East	Water Table	213.4-223.4	218.57	217.71
SHL-4	East	Water Table	213.0-223.0	218.50	217.82
SHL-10,	East	Water Table	210.1-231.0	218.34	217.41
SHL-11	East	Water Table	206.5-221.5	217.92	217.33
SHL-19	East	Water Table	209.3-224.3	218.93	217.78
SHL-20	East	Base of Till	185.8-195.8	218.06	217.45
SHM-93-10C	East	Bedrock	192.7-202.7	219.29	218.27
SHL-5	North	Water Table	203.4-213.4	216.12	215.30
SHL-9	North	Water Table	197.8-207.8	215.26	214.14
SHL-22	North	Base of Till	104.5-114.5	215.13	214.15
SHM-93-22C	North	Bedrock	87.3-97.3	215.14	214.15
SHM-96-5B	North	Base of Sand/Till	128.5-138.5	215.31	214.39
SHM-96-5C	North	Water Table	158.5-168.5	215.28	214.37
SHM-96-22B	North	Sand/Till	127.6-157.6	215.08	214.13

[1] North wells are located in the direction of groundwater flow away from the landfill.

[2] East wells are located between the landfill and Plow Shop Pond.

[3] Records show well SHL-10 having an as-built bottom elevation of 207.0 NGVD. Field observations in 2001/2002 revealed that fine material has collected in the bottom of the well, causing refusal to previously be met at 211.2 NGVD. On 15 April 2002, an attempt was made to redevelop the well, with over a foot of the material being removed, to a depth of approximately 210.1 NGVD. Field records indicate difficulty with low flow stabilization for SHL-3 and SHL-10 (again), and redevelopment will be conducted prior to the fall 2005 sampling event.

TABLE 6-1
Monitoring Well Designations and Locations

Monitoring Well Identification	Well Location	Compliance Requirement	Well Designation (Based on First Five-Year Review, SWEC, Aug 1998)	Samples Collected	
				Spring '04	Fall '04
SHL-3	East	Yes	Group 1	1	1
SHL-4	East	Yes	Group 2	1	1
SHL-5	North	Yes	Group 1	1	1
SHL-9	North	Yes	Group 1	1	1
SHL-10	East	Yes	Group 2	1	1
SHL-11	East	Yes	Group 2	1	1
SHL-19	East	Yes	Group 2	1	1
SHL-20	East	Yes	Group 2	1	1
SHL-22	North	Yes	Group 1	1	1
SHM-93-10C	East	Yes	Group 1	1	1
SHM-93-22C	North	Yes	Group 1	1	1
SHM-96-5B	North	Yes	Group 2	1	1
SHM-96-5C	North	Yes	Group 2	1	1
SHM-96-22B	North	Yes	Group 2	1	1
SHM-99-31A	Molumco	No	N/A	0	0
SHM-99-31B	Molumco	No	N/A	1	0
SHM-99-31C	Molumco	No	N/A	1	0
SHM-99-32X	Molumco	No	N/A	0	0

N/A = Not Applicable.

TABLE 7-1
Groundwater Sample Analysis and Procedures

PARAMETERS	METHOD
Volatile Organic Compounds Xylenes Acetone 2-Butanone 2-Methyl-2-Pentanone Benzene Methyl-t-Butyl Ether 1,1-Dichloroethane 1,2-Dichloroethene (total) 1,2-Dichloroethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene	SW846 8260B
Inorganics Aluminum Arsenic Barium Cadmium Chromium Copper Cyanide (wet chemistry) Iron Lead Manganese Mercury Nickel Selenium Sodium Silver Zinc	SW846 6010B except Cyanide by EPA Method 335.4 and Mercury by SW846 Method 7470A
General Parameters (laboratory determination) Hardness Total Dissolved Solids Total Suspended Solids Chloride Nitrate as N Sulfate Alkalinity Biochemical Oxygen Demand – 5 day Chemical Oxygen Demand Total Organic Carbon	 SM 2340B EPA 160.1 EPA 160.2 EPA 300.0 EPA 300.0 EPA 300.0 EPA 310.1 EPA 405.1 EPA 410.1 SW846 9060
General Parameters (field determination) pH Temperature Specific Conductance Dissolved Oxygen Oxygen Reduction Potential Turbidity	

TABLE 7-2
Groundwater Analytical Results - May 3rd, 4th and 5th, 2004 Sampling Event
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No.	SHL-3	SHL-4	SHL-5	SHM-96-5B	SHM-96-5B DUP	SHM-96-5C	SHL-9	SHL-10	SHM-93-10C	SHL-11	SHL-19	SHL-20	SHL-22	SHM-96-22B	SHM-93-22C
	CLEANUP	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
	LEVEL (1)															
	µg/L															
VOLATILES (8260B)																
Xylenes	10,000 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	3,000 (4)	5.0 U	7.4	4.4 J	2.9 J	5.0 U	3.4 J	4.9 J	5.0 U	5.0 U	4.4 J	5.0 U	4.8 J	3.9 J	4.0 J	4.3 J
2-Butanone	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	5.0 U	5.0 U	5.0 U	1.5 J *	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	5.0 U	1.2 J	1.2 J	1.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.4 J	1.0 J	5.0 U
1,2-Dichloroethene (total)	70 (2)	5.0 U	5.0 U	5.0 U	2.3 J	2.3 J	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	2.0 J	1.8 J	5.0 U
1,2-Dichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	600 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
METALS (6010B or as noted)																
Aluminum	6,870	31.4 B	17.6 U	252	17.6 U	17.6 U	35.4 B	55.5 B	17.6 U	20.4 B	19.0 B	17.6 U	17.6 U	17.6 U	17.6 U	33.0 B
Arsenic	50	2.6 U	27.2	7.4 B	**3,950**	**3,890**	47.1	19.8	2.6 U	7.2 B	**502**	**75.0**	**136**	**88.1**	**1,690**	27.8
Barium	2,000 (2)	1.2 U	27.3 B	6.4 B	56.5 B	55.5 B	63.1 B	9.8 B	4.2 B	6.5 B	78.9 B	12.2 B	92.2 B	11.9 B	61.5 B	72.5 B
Cadmium	5 (2)	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.32 B	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.30 U	0.36 B	0.36 B	0.30 U
Chromium	100	2.2 B	1.3 B	1.5 B	2.0 B	2.5 B	2.8 B	1.2 B	1.4 B	1.9 B	1.2 B	1.2 B	2.0 B	2.0 B	1.6 B	2.5 B
Copper	1,300 (3)	0.84 B	2.0 B	0.99 B	2.0 B	2.4 B	3.0 B	1.1 B	1.1 B	2.8 B	2.2 B	0.87 B	4.7 B	2.4 B	3.3 B	2.1 B
Iron	9,100	30.0 B	4,330	1,900	**39,000**	**38,500**	**71,100**	5,680	19.2 U	31.6 B	**60,500**	**13,400**	5,640	541	**59,500**	1,010
Lead	15	1.8 U	1.8 U	2.4 B	3.2	2.6 B	4.7	2.0 B	2.1 B	1.8 U	2.0 B	1.8 U	1.8 U	2.3 B	1.8 U	2.1 B
Manganese	291 (5)	1.9 U	**856**	**332**	**8,910**	**8,750**	**3,960**	**338**	1.9 U	29.8	**2,340**	**1,510**	**6,560**	**1,960**	**798**	**368**
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	100	2.2 B	5.3 B	1.6 B	12.4 B	13.0 B	4.8 B	1.4 U	1.4 U	3.0 B	3.6 B	6.4 B	9.8 B	10.8 B	8.9 B	2.8 B
Selenium	50 (2)	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U	3.6 U
Silver	40 (4)	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 UJ	1.0 U	1.0 U	1.0 U	1.0 U
Sodium	20,000	1,060 B	5,390	2,040 B	**31,000**	**30,200**	**30,000**	1,620 B	1,020 B	8,650	**22,500**	2,300 B	**33,300**	**40,900**	**56,900**	15,100
Zinc	2,000 (4)	4.6 B	4.3 B	5.7 B	6.5 B	7.2 B	4.5 B	1.5 U	3.0 B	7.3 B	3.4 B	4.4 B	2.5 B	24.6	4.7 B	3.5 B
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	8,500	46,100	33,400	314,000	313,000	326,000	67,700	15,000	190,000	194,000	34,100	300,000	425,000	294,000	193,000
Biochemical Oxygen Demand	-	1,400 UJ	1,400 UJ	1,600 JH	1,400 UJH	1,400 UJH	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 UJ	1,400 JH	1,800 JH	1,400 UJ
Chloride	-	1,600	8,800	2,600	28,400	27,300	52,100	1,600	1,900	25,200	23,100	1,700	43,500	41,400	34,100	25,600
Chemical Oxygen Demand	-	20,000 U	20,000 U	23,500	29,900	27,700	32,000	34,100	20,000 U	20, 000 U	29,900	20,000 U	34,100	20,000 U	23,500	25,600
Cyanide (Total)	200 (2)	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U	10.0 U
Hardness as $CaCO_3$	-	8,900	39,000	27,100	257,000	252,000	261,000	61,200	15,200	222,000	130,000	33,500	271,000	392,000	165,000	199,000
Nitrate as Nitrogen	10,000 (2)	270	200 UJ	200 UJ	200 UJ	200 UJ	200 UJ	270	410	200 UJ	200 UJ	230 J	290	200 UJ	810	200 UJ
Sulfate	500,000 (2)	2,500	4,600	1,400	5,600	5,500	2,000	6,400	2,800	22,400	860	11,900	14,700	6,400	3,700	12,700
Total Dissolved Solids	-	15,000	78,000	59,000 H	408,000 H	415,000 H	445,000	87,000	22,000	300,000	268,000	64,000	420,000	519,000 H	393,000 H	268,000
Total Suspended Solids	-	25,200	4,900	2,000	59,500	56,400	91,100	5,900	600	2,300	55,500	18,900	9,200	2,300	117,000	2,600
Total Organic Carbon	-	1,000 J	2,500 J	6,700	5,500	5,300 J	8,000	8,300	1,000 UJ	1,500 J	3,900 J	1,400 J	4,900 J	5,600	6,900	5,600
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-	10.4	0.3	0.3	0.4	0.4	0.7	0.2	11.1	1.1	4.6	1.4	0.6	0.5	0.6	0.9
Oxidation Reduction Potential (mv)	-	196	118	193	-143	-143	-85	-36	378	306	-34	23	-21	133	-103	-44
pH	-	6.7	6.2	5.4	6.4	6.4	6.6 *	6.6	6.5	7.0	6.3	6.4	6.6	6.5	6.9	7.1
Specific Conductivity (µS/cm)	-	26	138	74	769	769	946	146	38	473	582	144	703	885	813	416

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - 25

U = analyte analyzed for, but not dtected above the reporting limit

B = (Inorganics) The result reported is less than the reporting limit, but greater than the instrument detection limit

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

= value circumspect due to potential field equipment failure

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

(5) The LTMMP listed a cleanup goal of 1,715 ug/L. This level has been in use by USACE in past years. The ROD indicated a cleanup goal of 291 ug/L. As there was no ESD prepared, the ROD value is currently reflected in this table.

TABLE 7-3
Groundwater Analytical Results - May 6th, 2004 Sampling Event
Molumco Road Wells (RE: Shepley's Hill Landfill)
Ayer, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHM-99-31A µg/L	SHM-99-31B µg/L	SHM-99-31C µg/L	SHM-99-32X µg/L
VOLATILES (8260B)					
Xylenes	10,000 (2)	NS	5.0 U	5.0 U	NS
Acetone	3,000 (4)	NS	2.7 J	2.5 J	NS
2-Butanone	-	NS	5.0 U	5.0 U	NS
4-Methyl-2-Pentanone	-	NS	5.0 U	5.0 U	NS
Benzene	5 (2)	NS	1.4 J	5.0 U	NS
Methyl-t-Butyl Ether	70 (4)	NS	5.0 U	1.1 J	NS
1,1-Dichloroethane	70 (4)	NS	5.0 U	1.4 J	NS
1,2-Dichloroethene (total)	70 (2)	NS	5.0 U	2.2 J	NS
1,2-Dichloroethane	5	NS	5.0 U	5.0 U	NS
1,3-Dichlorobenzene	600 (2)	NS	5.0 U	5.0 U	NS
1,4-Dichlorobenzene	5	NS	5.0 U	5.0 U	NS
1,2-Dichlorobenzene	600	NS	5.0 U	5.0 U	NS
METALS (6010B or as noted)					
Aluminum	6,870	NS	32.2 B	24.2 B	NS
Arsenic	50	NS	**65.0**	**292**	NS
Barium	2,000 (2)	NS	90.5 B	100 B	NS
Cadmium	5 (2)	NS	0.30 U	0.46 B	NS
Chromium	100	NS	1.7 B	1.8 B	NS
Copper	1,300 (3)	NS	1.9 B	2.4 B	NS
Iron	9,100	NS	**27,200**	**46,400**	NS
Lead	15	NS	2.2 B	1.9 B	NS
Manganese	291 (5)	NS	**1,990**	**6,390**	NS
Mercury (7470A)	2 (2)	NS	0.10 U	0.10 U	NS
Nickel	100	NS	1.9 B	16.7 B	NS
Selenium	50 (2)	NS	3.6 U	3.6 U	NS
Silver	40 (4)	NS	1.0 U	1.0 U	NS
Sodium	20,000	NS	15,200	**45,100**	NS
Zinc	2,000 (4)	NS	7.7 B	5.1 B	NS
GENERAL CHEMISTRY					
Alkalinity as $CaCO_3$	-	NS	186,000	416,000	NS
Biochemical Oxygen $Demand_5$	-	NS	1,500 J	1,400 UJ	NS
Chloride	-	NS	20,300	56,700	NS
Chemical Oxygen Demand	-	NS	25,600	42,600	NS
Cyanide (Total)	200 (2)	NS	10.0 U	10.0 U	NS
Hardness as $CaCO_3$	-	NS	131,000	361,000	NS
Nitrate as Nitrogen	10,000 (2)	NS	200 UJ	200 UJ	NS
Sulfate	500,000 (2)	NS	4,300	1,800	NS
Total Dissolved Solids	-	NS	233,000	547,000	NS
Total Suspended Solids	-	NS	18,800	58,000	NS
Total Organic Carbon	-	NS	6,400	8,700	NS
FIELD READINGS (units as noted below)					
Dissolved Oxygen (mg/L)	-	NS	0.4	0.2	NS
Oxidation Reduction Potential (mv)	-	NS	-22	-117	NS
pH	-	NS	6.3	6.0	NS
Specific Conductivity (µS/cm)	-	NS	426	1,004	NS

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = Analyte or compound was analyzed but not detected at a concentration above the reporting limit.

B = value within 5 times of the greater amount detected in the equipment or preparation blank samples

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

(5) The LTMMP listed a cleanup goal of 1,715 ug/L. This level has been in use by USACE in past years. The ROD indicated a cleanup goal of 291 ug/L. As there was no ESD prepared, the ROD value is currently reflected in this table.

TABLE 7-4
Groundwater Analytical Results - November 15 th, 16th, and 17th, 2004 Sampling Even
Shepley's Hill Landfill Compliance Point Wells
Devens, Massachusetts
(Sheet 1 of 1)

PARAMETERS	Well No. / CLEANUP LEVEL (1) µg/L	SHL-3 µg/L	SHL-4 µg/L	SHL-5 µg/L	SHM-96-5B µg/L	SHM-96-5B DUP µg/L	SHM-96-5C µg/L	SHL-9 µg/L	SHL-10 µg/L	SHM-93-10C µg/L	SHL-11 µg/L	SHL-19 µg/L	SHL-20 µg/L	SHL-22 µg/L	SHM-96-22B µg/L	SHM-93-22C µg/L
VOLATILES (8260B)																
Xylenes	10,000 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	3,000 (4)	5.0 U	5.0 U	4.4 J	5.0 U	5.0 U	5.0 U	4.9 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Butanone	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-Pentanone	-	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	5 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	5.0 U	5.0 U	5.0 U	1.6 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Methyl-t-Butyl Ether	70 (4)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,1-Dichloroethane	70 (4)	5.0 U	5.0 U	5.0 U	1.1 J	1.0 J	1.7 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.2 J	1.0 J	5.0 U
1,2-Dichloroethene (total)	70 (2)	5.0 U	1.2 J	5.0 U	2.2 J	2.2 J	2.1 J	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	1.0 J	1.8 J	1.8 J	5.0 U
1,2-Dichloroethane	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,3-Dichlorobenzene	600 (2)	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,4-Dichlorobenzene	5	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
1,2-Dichlorobenzene	600	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
METALS (6010B or as noted)																
Aluminum	6,870	70.4 B	35.4 U	218	35.4 U	35.4 U	35.4 U	75.1 B	45.1 B	36.4 B	35.4 U	35.4 U	35.4 U	35.4	35.4 U	48.0 B
Arsenic	50	5.8 U	19.5	6.8 B	**2,110**	**2,240**	49.5	32.2	5.8 U	10.6	**617**	**121**	**156**	**65.4**	**2,360**	34.9
Barium	2,000 (2)	12.1 U	90.4 B	12.1 U	43.7 B	45.8 B	60.7 B	12.7 B	12.1 U	12.1 U	72.2 B	23.0 B	85.4 B	12.1 U	85.1 B	84.3 B
Cadmium	5 (2)	0.50 U	0.50 U	0.50 U	0.84 B	1.1 B	2.8 B	0.83 B	0.50 U	0.50 U	3.0 B	0.83 B	0.56 B	0.50 U	4.7 B	0.50 U
Chromium	100	1.2 B	0.90 U	3.6 B	0.90 U	0.90 U	0.90 U	3.0 B	6.3 B	2.2 B	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	1.2 B
Copper	1,300 (3)	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Iron	9,100	35.5 U	6,690	2,740	**21,600**	**22,400**	**55,400**	8,580	39.1 B	47.8 B	**63,000**	**20,000**	6,630	469	**82,900**	1,340
Lead	15	1.2 U	1.2 U	1.2 U	1.2 U	1.9 B	1.3 B	1.2 U	1.2 U	1.2 U	1.5 B	1.2 U	1.2 U	1.2 U	3.2	1.2 U
Manganese	291 (5)	1.2 B	**1,240**	**439**	**10,800**	**11,100**	**3,970**	**373**	1.3 B	47.5	**2,570**	**2,950**	**6,630**	**2,460**	**1,590**	**385**
Mercury (7470A)	2 (2)	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
Nickel	100	3.0 U	15.8 B	3.0 U	7.8 B	8.0 B	3.0 U	3.0 U	3.0 U	3.0 U	3.0 U	7.1 B	8.4 B	10.2 B	3.0 B	3.0 U
Selenium	50 (2)	3.1 U	4.3 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
Silver	40 (4)	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 B	1.1 B	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U	0.90 U
Sodium	20,000	684 B	4,060	1,870 B	**32,200**	**33,100**	**32,200**	1,550 B	845 B	8,190	**22,800**	2,280 B	**31,900**	**41,900**	**34,300**	16,100
Zinc	2,000 (4)	5.5 B	6.8 B	4.2 B	6.6 B	5.4 B	5.7 B	2.8 B	1.9 U	1.9 U	1.9 U	8.8 B	8.7 B	31.7	5.0 B	3.4 B
GENERAL CHEMISTRY	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Alkalinity as $CaCO_3$	-	13.1 B	113	37.1	344	339	341	74.2	24.1 B	190	213	90.5	296	417	304	200
Biochemical Oxygen Demand	-	1.4 UB	2.0 B	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 B	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.4 UB	1.8 B	1.4 UB
Chloride	-	1.1	18.0	9.5	27.3	26.9	41.8	1.7	1.1	25.8	23.1	2.5	34.5	36.6	32.0	26.8
Chemical Oxygen Demand	-	20.0 U	20.0 U	20.0 U	39.9*	27.9	37.9	25.9	20.0 U	37.9	23.8	20.0 U	20.0 U	25.9	25.9	20.0 U
Cyanide (Total)	0.2 (2)	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
Hardness as $CaCO_3$	-	14.1	127	39.9	290	298	271	71.2	23.5	237	140	72.7	286	418	235	235
Nitrate as Nitrogen	10 (2)	0.43	0.45 H	0.20 U	0.26	0.27	0.20 U	0.20 U	0.52	0.20 U	0.20 U	0.20 UH	0.32	0.20 U	0.33	0.20 U
Sulfate	500 (2)	3.5	3.7	6.2	7.5	7.3	4.4	4.0	2.4	20.2	3.4	15.6	13.3	6.1	3.6	12.9
Total Dissolved Solids	-	31.0 B	165 B	292 B	151* B	105 B	103 B	105 B	30.0 B	282 B	257 B	126 B	388 B	492 B	365 B	264 B
Total Suspended Solids	-	0.70	1.4	14.4	25.6	27.3	56.5	2.4	1.9	0.90	49.7	8.5	9.8	1.0	96.4	3.3
Total Organic Carbon	-	1.0 UB	2.1 B	6.6 B	3.8* B	4.7 B	6.2 B	7.4 B	1.0 UB	1.0 UB	3.3 B	1.0 UB	2.9 B	5.6 B	4.7 B	5.8 B
FIELD READINGS (units as noted below)																
Dissolved Oxygen (mg/L)	-	10.0	0.4	0.3	0.9	0.9	0.0	0.0	10.3	0.1	0.0	0.1	0.6	0.5	0.7	0.1
Oxidation Reduction Potential (mv)	-	139	224	90	-25	-25	-199	-132	330	281	-211	124	26	93	-87	-235
pH	-	6.6	5.4	5.7	6.7	6.7	6.5	6.5	6.0	7.2	6.4	5.9	6.6	6.8	6.9	7.5
Specific Conductivity (µS/cm)	-	40	314	82	646	646	750	149	61	419	525	200	609	757	710	412

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance - **25**

U = analyte analyzed for, but not dtected above the reporting limit

B = (metals) The result reported is less than the reporting limit, but greater than the instrument detection limit

B = (General Chemistry) The target analyte was also detected in the associated method blank or equipment blank.

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits OF 20% rpd.

H = holding time exceeded

= value circumspect due to potential field equipment failure

NS = not sampled

(1) Cleanup values as developed in the ROD (unless otherwised noted)

(2) No cleanup value was developed so the Federal Maximum Contamination Level was used

(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used

(4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

(5) The LTMMP listed a cleanup goal of 1,715 ug/L. This level has been in use by USACE in past years. The ROD indicated a cleanup goal of 291 ug/L. As there was no ESD prepared, the ROD value is currently reflected in this table.

TABLE 7-5
Comparison of Historic Arsenic Results
Shepley's Hill Landfill and Molumco Road
Groundwater Monitoring

Landfill Compliance Point	Arsenic (ug/L)																				
Monitoring Well ID	Aug-91	Dec-91	Mar-93	Jun-93	Nov-96	May-97	Oct-97	May-98	Nov-98	May-99	Nov-99	May-00	Nov-00	May-01	Oct-01	May-02	Oct-02	May-03	Nov-03	May-04	Nov-04
SHL-3	35	120	6.5	NS	NS	<10	<10	<5	<5.4	2.7 B	<1.9	<2.5	17.4	<4.1	<1.5	2.8 B	<3.2	<4.7	<4.1	<2.6	<5.8
SHL-4	260	140	2.54	NS	48.8	73.6 J	180	37.4	89.1	78.2	61.3	116	91.5	50.8	66.0	47.8 B	56.1	26.6	13.4	27.2	19.5
SHL-5	23	38	11.4	NS	12	<10	<10	<5	11.5	5.0 B	6.5	<2.5	13.8	13.8	14.8	11.9 B	<3.2	7.3	4.7	7.4 B	6.8 B
SHM-96-5B	NS	NS	NS	NS	1,440	3,300 J	2,040	4,300	3,080	3,490	2,700	5,110	2,500	3,800	1,850	3,800	1,970	3,920	3,380	3,950	2,110
SHM-96-5C	NS	NS	NS	NS	71	43.2	43.1	49.5	46.8	57.0	44.8	52.2	40.3	80.5	41.1	50.4 B	41.3	55.1	48.3	47.1	49.5
SHL-9	37	67	42.4	NS	46.9	16.1 J	25.2	15	27.2	71.3	28.5	15.0	31.4	15.1	28.1	144	29.0	13.4	30.6	19.8	32.2
SHL-10	67	120	280	NS	3.4 B	<10	209	<5	<5.4	2.7 B	<1.9	<2.5	<4.2	<4.1	<1.5	4.0 B	<3.2	<4.7	<4.1	<2.6	<5.8
SHM-93-10C	NS	NS	21.3	18.1	12.4	<10	10.5	7.5	10.2	10.8 B	8.7	5.9 J	8.8	6.9	10.1	11.0 B	7.1	9.8	<5.2	7.2 B	10.6
SHL-11	320	320	340	NS	332	252 J	366	346	376	431	492	404	523	487	573	469	648	498	639	502	617
SHL-19	340	710	390	NS	138	<10	298	77.5	145	156	176	41.4	154	129	183	66.9	164	36.1	83.6	75.0	121
SHL-20	98	89	330	NS	244	<10	227	238	218	216	215	216	172	186	165	154	175	197	194	136	156
SHL-22	27	25	32.9	NS	24.8	<10	34.8	10.6	<5.4	12.2 B	7.3	14.6	45.0	47.6	44.2	55.9 B	77.1	101	76.4	88.1	65.4
SHM-96-22B	NS	NS	NS	NS	324	318 J	352	365	406	707	1,440	1,360	1,180	1,540	1,670	2,040	159	2,070	2,500	1,690	2,360
SHM-93-22C	NS	NS	68.9	49.8	44.6	40.4	<10	31.6	51.1	42.8	33.2	34.4	47.8	19.7	31.6	30.5 B	30.1	21.0	29.8	27.8	34.9

Molumco Road	Arsenic (ug/L)																				
Monitoring Well ID	Aug-91	Dec-91	Mar-93	Jun-93	Nov-96	May-97	Oct-97	May-98	Nov-98	Jun-99	Nov-99	May-00	Nov-00	May-01	Oct-01	May-02	Oct-02	May-03	Nov-03	May-04	Nov-04
SHM-99-31A*	NS	NS	NS	NS	NS	NS	NS	NS	NS	<5.2	14.5	8.1 J	21.3	14.2	9.6	16.6 B	11.6	NS	12.3	NS	NS
SHM-99-31B*	NS	NS	NS	NS	NS	NS	NS	NS	NS	57.9	63.7	44.3	65.5	57.9	66.8	75.1	71.1	69.6	80.1	65.0	NS
SHM-99-31C*	NS	NS	NS	NS	NS	NS	NS	NS	NS	345	311	332	316	321	317	345	332	347	312	292	NS
SHM-99-32X*	NS	NS	NS	NS	NS	NS	NS	NS	NS	188	185	188	198	181	187	176	NS	NS	NS	NS	NS

Notes:

J: estimated value
B: value within five times of the greater amount detected in the equipment or preparation blank samples
NS: not sampled
*: Molumco Road monitoring wells are not compliance point wells - data is provided for comparison purposes
bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 ug/L)

TABLE 7-6
Monitoring Well Trigger Chemical Cleanup Level Exceedances at Monitoring Wells Previously Attaining Cleanup Goals (Group 1)

Monitoring Well Identification	Well Designation (Based on First Five-Year Review, SWEC, Aug 1998)	Exceedances of Cleanup Levels for Trigger Chemicals, Since Achieving Group 1 Status
SHL-3	Group 1	None
SHL-4	Group 2	Not Applicable
SHL-5	Group 1	None
SHL-9	Group 1	71.3 µg/L As (Spring 1999) 144 µg/L As (Spring 2002)
SHL-10	Group 2	Not Applicable
SHL-11	Group 2	Not Applicable
SHL-19	Group 2	Not Applicable
SHL-20	Group 2	Not Applicable
SHL-22	Group 1	55.9 B µg/L As (Spring 2002) 77.1 µg/L As (Fall 2002) 101 µg/L As (Spring 2003) 76.4 µg/L As (Fall 2003) 88.1 µg/L As (Spring 2004) 65.4 µg/L As (Fall 2004)
SHM-93-10C	Group 1	None
SHM-93-22C	Group 1	51.1 µg/L As (Fall 1998)
SHM-96-5B	Group 2	Not Applicable
SHM-96-5C	Group 2	Not Applicable
SHM-96-22B	Group 2	Not Applicable

As - Arsenic
B - Value was within 5 times of the greater amount detected in the equipment or preparation blank samples.

TABLE 8-1
Sample Preparation and Analysis Methods, Containers, Holding Times, and Preservatives

Parameter	Prepa-ration Method[1]	Analysis Method[1]	Sample Container[2]	Minimum Volume	Preservative	Holding Time (VTS)[3]
VOCs	5030B	8260B	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	HCl to pH <2 (No Headspace) 4°+/- 2°C	14 days
Metals [5]	3010A	6010B - Trace ICAP or 7000 series	1-Liter HDPE	300 mL	HNO_3 to pH < 2	180 days (except Hg) 28 days (Hg)
Hardness	NA	SM2340 B		NA		NA
Cyanide	NA	335.4	500-mL HDPE	500 mL	NaOH to pH > 12, 4°+/- 2°C	14 days
Anions [6]	NA	300	500-mL HDPE	100 mL	4°+/- 2°C	48 hours for ortho-Phosphate and Nitrate; 28 days for Sulfate and Chloride
Alkalinity	NA	310.1		100 mL		14 days
TDS	NA	160.1		100 mL		48 hours
COD	NA	410.1	250-mL HDPE	250 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days
BOD5	NA	405.1	1-Liter HDPE	1000 mL	4°+/- 2°C	48 hours
TSS	NA	160.2	1-Liter HDPE	1000 mL	4°+/- 2°C	7 days
TOC	NA	9060	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days

1 "Methods for Chemical Analysis of Water and Wastes", Cincinnati, OH, March 1979, EPA 600-4-79-020. "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", U.S. EPA SW-846, 3rd Edition.

2 Additional sample containers/volume are required for matrix quality control samples.

3 VTS - Verified Time when the Sample was collected.

4 Three vials will be shipped to the laboratory; one will be measured for pH at the laboratory to verify that the sample has been preserved correctly (i.e. pH less than 2).

5 TAL metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

6 Anions include Nitrate, Sulfate, Orthophosphate and Chloride.

NA = Not Applicable Hg = Mercury

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

FIGURES

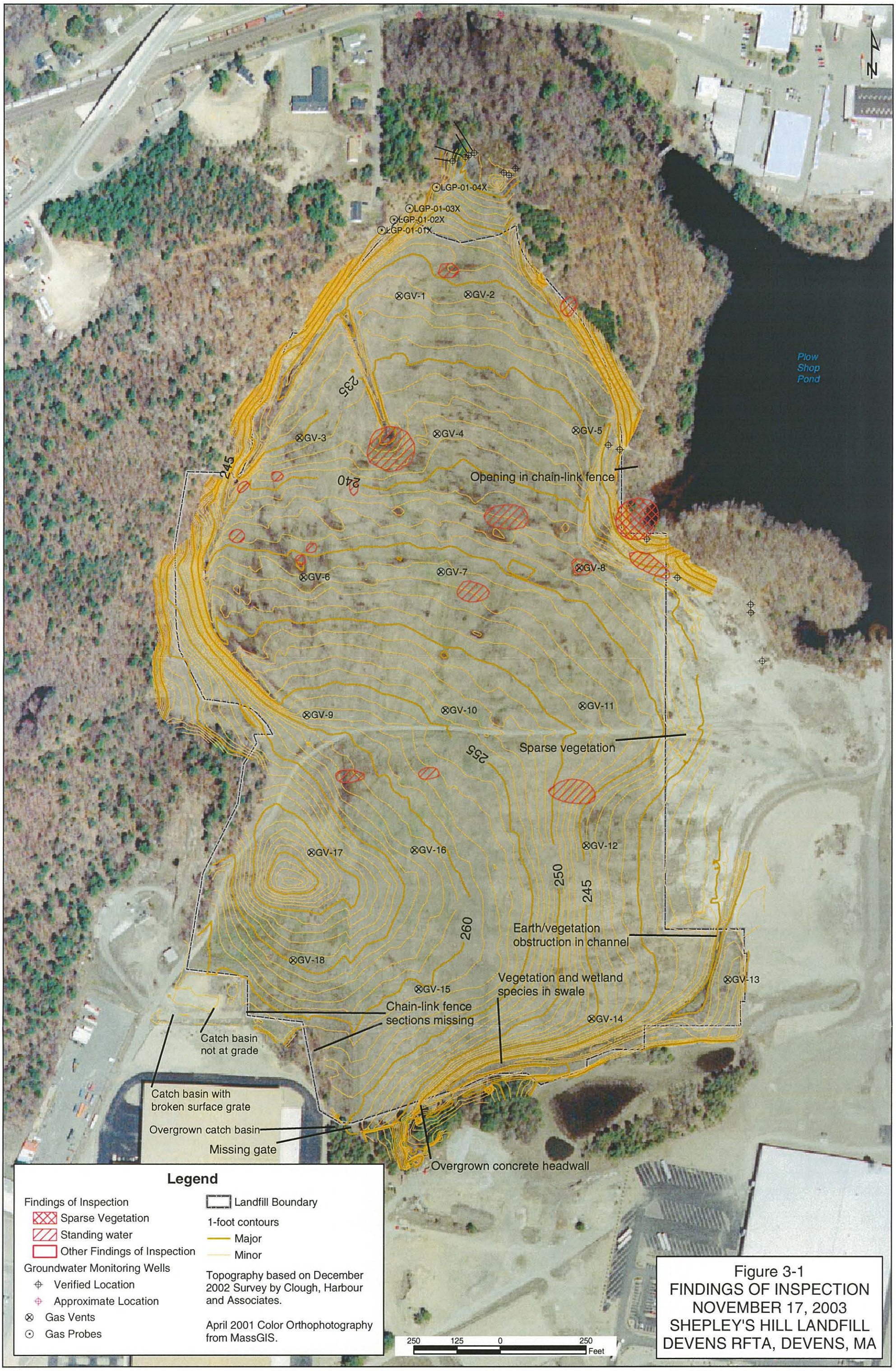


Figure 3-1
FINDINGS OF INSPECTION
NOVEMBER 17, 2003
SHEPLEY'S HILL LANDFILL
DEVENS RFTA, DEVENS, MA

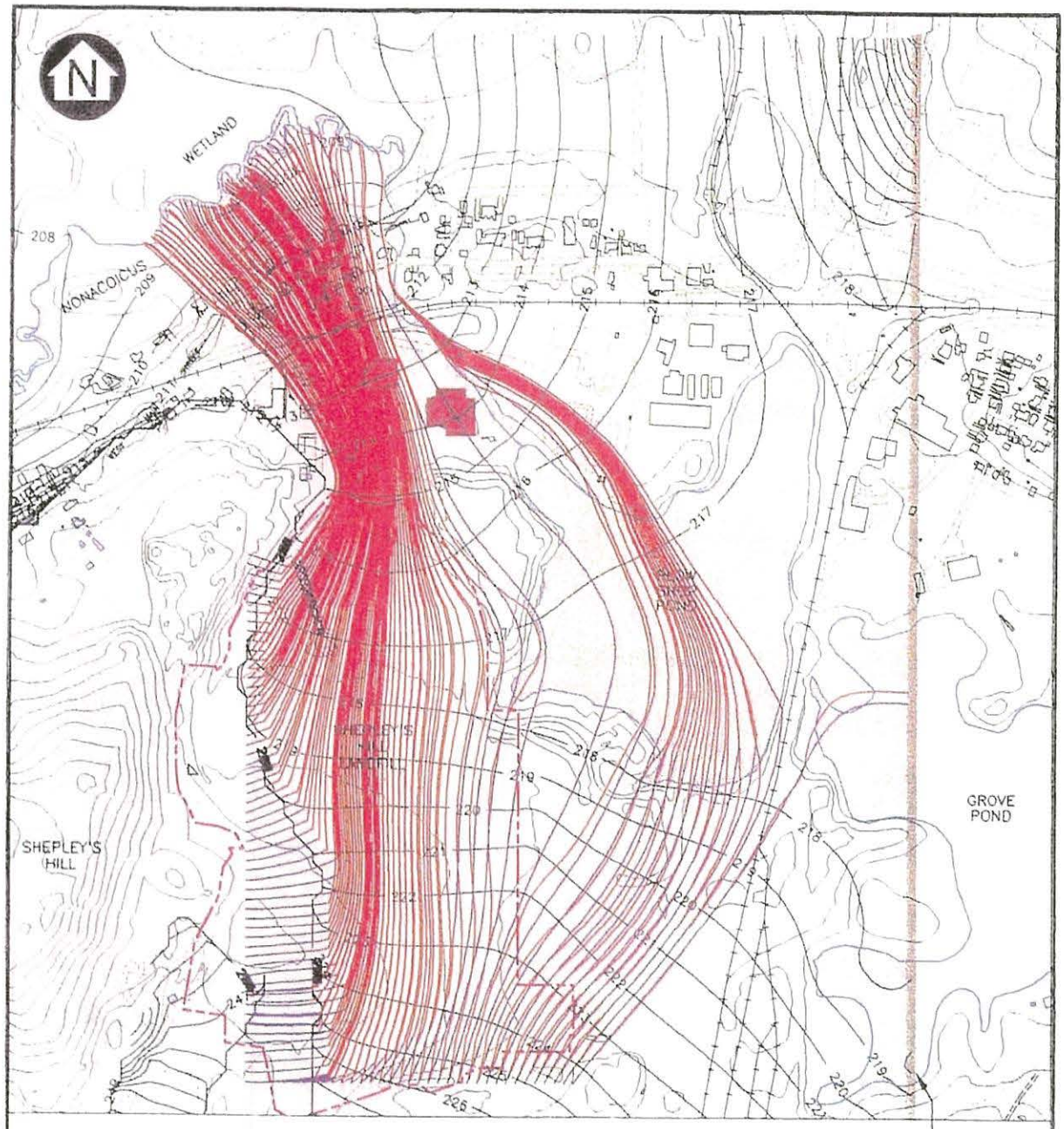
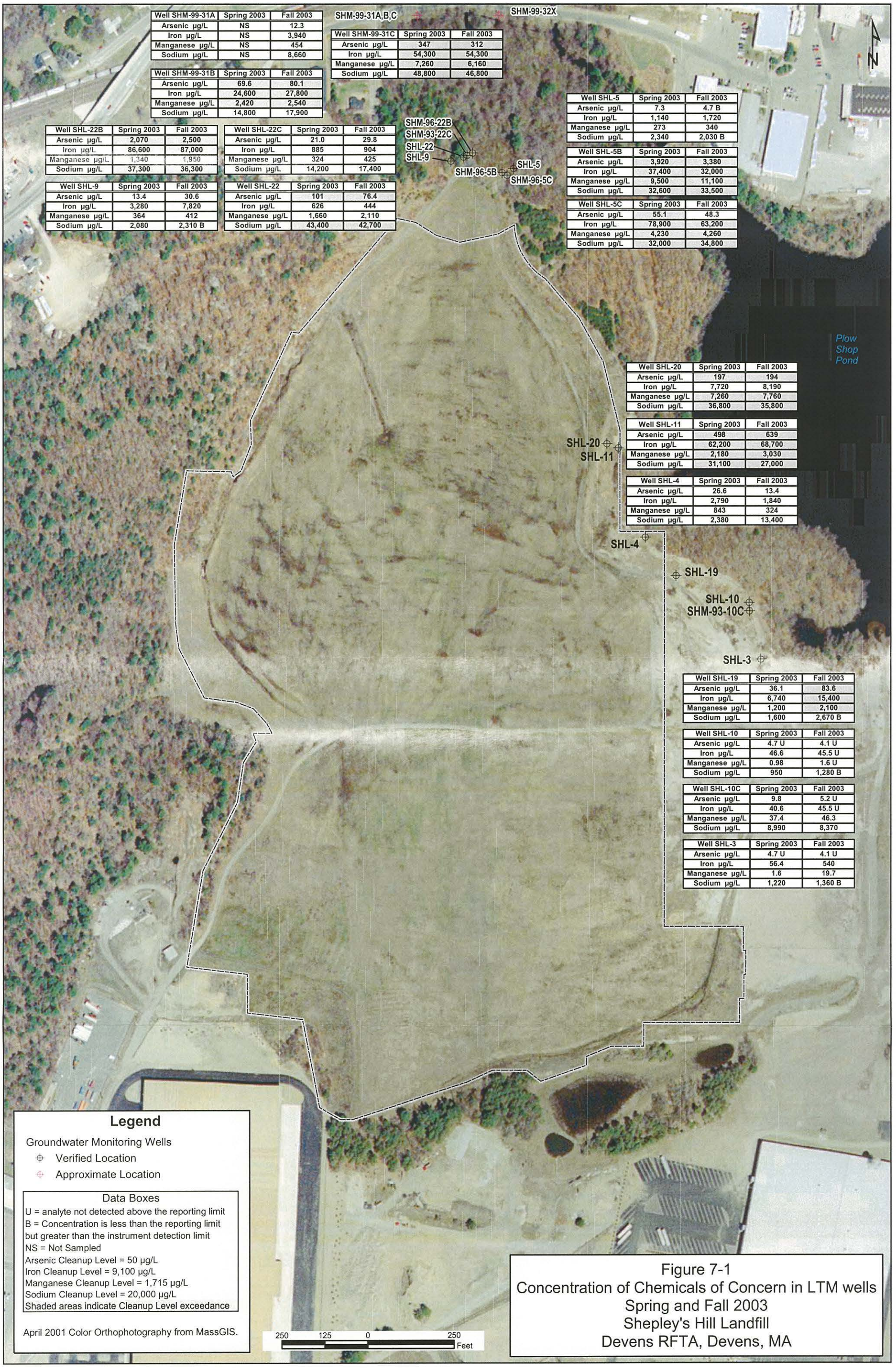


FIGURE 6-1

MODELED PARTICLE TRACKS,
PRESENT-DAY CONDITIONS
SHEPLEY'S HILL LANDFILL SUPPLEMENTAL
GROUNDWATER INVESTIGATION
DEVENS RFTA, DEVENS, MA

Harding Lawson Associates



Well SHM-99-31A	Spring 2003	Fall 2003
Arsenic µg/L	NS	12.3
Iron µg/L	NS	3,940
Manganese µg/L	NS	454
Sodium µg/L	NS	8,660

Well SHM-99-31C	Spring 2003	Fall 2003
Arsenic µg/L	347	312
Iron µg/L	54,300	54,300
Manganese µg/L	7,260	6,160
Sodium µg/L	48,800	46,800

Well SHM-99-31B	Spring 2003	Fall 2003
Arsenic µg/L	69.6	80.1
Iron µg/L	24,600	27,800
Manganese µg/L	2,420	2,540
Sodium µg/L	14,800	17,900

Well SHL-5	Spring 2003	Fall 2003
Arsenic µg/L	7.3	4.7 B
Iron µg/L	1,140	1,720
Manganese µg/L	273	340
Sodium µg/L	2,340	2,030 B

Well SHL-22B	Spring 2003	Fall 2003
Arsenic µg/L	2,070	2,500
Iron µg/L	86,600	87,000
Manganese µg/L	1,340	1,950
Sodium µg/L	37,300	36,300

Well SHL-22C	Spring 2003	Fall 2003
Arsenic µg/L	21.0	29.8
Iron µg/L	885	904
Manganese µg/L	324	425
Sodium µg/L	14,200	17,400

Well SHL-5B	Spring 2003	Fall 2003
Arsenic µg/L	3,920	3,380
Iron µg/L	37,400	32,000
Manganese µg/L	9,500	11,100
Sodium µg/L	32,600	33,500

Well SHL-9	Spring 2003	Fall 2003
Arsenic µg/L	13.4	30.6
Iron µg/L	3,280	7,820
Manganese µg/L	364	412
Sodium µg/L	2,080	2,310 B

Well SHL-22	Spring 2003	Fall 2003
Arsenic µg/L	101	76.4
Iron µg/L	626	444
Manganese µg/L	1,660	2,110
Sodium µg/L	43,400	42,700

Well SHL-5C	Spring 2003	Fall 2003
Arsenic µg/L	55.1	48.3
Iron µg/L	78,900	63,200
Manganese µg/L	4,230	4,260
Sodium µg/L	32,000	34,800

Well SHL-20	Spring 2003	Fall 2003
Arsenic µg/L	197	194
Iron µg/L	7,720	8,190
Manganese µg/L	7,260	7,760
Sodium µg/L	36,800	35,800

Well SHL-11	Spring 2003	Fall 2003
Arsenic µg/L	498	639
Iron µg/L	62,200	68,700
Manganese µg/L	2,180	3,030
Sodium µg/L	31,100	27,000

Well SHL-4	Spring 2003	Fall 2003
Arsenic µg/L	26.6	13.4
Iron µg/L	2,790	1,840
Manganese µg/L	843	324
Sodium µg/L	2,380	13,400

Well SHL-19	Spring 2003	Fall 2003
Arsenic µg/L	36.1	83.6
Iron µg/L	6,740	15,400
Manganese µg/L	1,200	2,100
Sodium µg/L	1,600	2,670 B

Well SHL-10	Spring 2003	Fall 2003
Arsenic µg/L	4.7 U	4.1 U
Iron µg/L	46.6	45.5 U
Manganese µg/L	0.98	1.6 U
Sodium µg/L	950	1,280 B

Well SHL-10C	Spring 2003	Fall 2003
Arsenic µg/L	9.8	5.2 U
Iron µg/L	40.6	45.5 U
Manganese µg/L	37.4	46.3
Sodium µg/L	8,990	8,370

Well SHL-3	Spring 2003	Fall 2003
Arsenic µg/L	4.7 U	4.1 U
Iron µg/L	56.4	540
Manganese µg/L	1.6	19.7
Sodium µg/L	1,220	1,360 B

Legend

Groundwater Monitoring Wells

- Verified Location
- Approximate Location

Data Boxes

U = analyte not detected above the reporting limit
B = Concentration is less than the reporting limit but greater than the instrument detection limit
NS = Not Sampled
Arsenic Cleanup Level = 50 µg/L
Iron Cleanup Level = 9,100 µg/L
Manganese Cleanup Level = 1,715 µg/L
Sodium Cleanup Level = 20,000 µg/L
Shaded areas indicate Cleanup Level exceedance

April 2001 Color Orthophotography from MassGIS.

Figure 7-1
Concentration of Chemicals of Concern in LTM wells
Spring and Fall 2003
Shepley's Hill Landfill
Devens RFTA, Devens, MA

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

APPENDIX A

LANDFILL MAINTENANCE CHECKLIST

APPENDIX A
Landfill Maintenance Checklist

To be completed in indelible ink. Inspections are to be performed annually.

DATE: 17 November 2004
INSPECTOR: Jonathan Kullberg ORGANIZATION: U.S Army Corps of Engineers, New England District

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Cover Surface	1. Vegetative cover is generally satisfactory except as noted in the comments that follow. Various species growing; mowed to about 8 inches height.	1. See specific comments under the sections that follow.	SAT
	2. There are several areas where settlement has occurred.	2. A Comprehensive Site Assessment will be conducted to address this concern in the near future.	SAT
	3. Trees were removed in the fall of 2002 & 2004 in the vicinity of GV-13, the southern perimeter, and the eastern perimeter, and have not reestablished.	3. Monitor for tree growth in future	SAT
	4. A utility dike is being constructed through the middle of the landfill. It appears to provide utility service to a newly constructed pumping station at the northern tip of the landfill.	4. Observe effect on drainage patterns in the vicinity of the new construction during future inspections.	NA
Vegetative Growth	1. In the vicinity of gas vents 8, 11 and 12, the perimeter of the cap has some areas of sparse/eroded vegetation. The soil in the bare areas is mostly sand and is eroded in some areas. The area should be graded to fill in the eroded areas and topsoil should be placed to a depth of 6 inches over the sand to allow grass to grow. The grass cover should extend at least twenty feet beyond the limits of the cap.	1. This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion.	UNSAT
Landfill Gas Vent Wells	1. The gas vents are in good condition. All screens and pipes are in functional condition. All of the non-galvanized, older vents are showing signs of rusting and corrosion.	1. All of the older, non-galvanized gas vents should be scraped, cleaned and painted.	SAT

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Drainage Swales	1. Most of the drainage swale on the south side is being invaded by vegetation/wetland species. There are also intermittent zones of standing water indicating a lack of proper channel slope and drainage. 2. In the east side drainage swale, in the vicinity of gas vent #13 and continuing downstream to the rip rap - lined channel, the drainage swale is overgrown with vegetation and wetland species. It appears to be heavily silted in and has a large area of standing water. There is an earth and vegetation obstruction just upstream of the new rock section preventing the drainage of water and turning the channel into a pond.	1. This should be addressed in the upcoming Comprehensive Site Assessment. 2 This should be addressed and corrected as part of the forthcoming maintenance and a Comprehensive Site Assessment in the near future.	UNSAT UNSAT
Culverts	1. The concrete drainage structure at the terminus of the catch basin and underground conduit system on the south side is overgrown with vegetation and is silting in. Standing water is present and wetland species are becoming established as well.	1. The structure and channel immediately downstream should be cleaned out and the channel regraded as required to properly drain. A Comprehensive Site Assessment will be conducted to address this concern in the near future.	UNSAT
Catch Basins	1. Catch Basin #2 near the entrance to the site has a broken surface grate. 2. Catch Basin #3 near the entrance to the site is not set at grade. The rim of the basin is about six to eight inches higher than the surrounding ground.	1. The surface grate should be replaced. 2. The rim of this catch basin should be lowered to meet the surrounding grade.	UNSAT UNSAT

Settlement	1. It appears that many areas of the landfill may be settling. The extent and its effect on the function of the landfill is unknown	1 A Comprehensive Site Assessment will be conducted to address this concern in the future.	SAT
Erosion	1. No substantial erosion observed.		SAT
Access Roads	1. The access roads on the site are in good condition.	1. There are no problems on access roads which warrant repair at this time.	SAT
Security Fencing	1. The perimeter chain-link security fence is in poor condition. Fence sections and gates are missing and unrestricted access to the site is available at many locations. Some evidence of off-road vehicles (ATV's, dirt bikes, etc.) using the turfed cap area was seen.	1. The security fence should be repaired/replaced and extended.	UNSAT
Wetland Encroachment	1. Wetland encroachment is taking place at several locations, but is not happening on a wide scale. Overall, the areas of encroachment are small. These locations have been noted in above comments.	1. Wetland encroachment should be eliminated by simple mowing in some areas, and by regrading channels in other areas. The above comments address the actions to take at specific locations. Also, a Comprehensive Site Assessment will be conducted to address this concern in the near future.	UNSAT

Immediate Action Required: The following problem areas, from among those mentioned in the comments above, are the most critical and should be addressed before the next inspection;

(1) Repair and replace the security fence and gates as required to control access to the site;

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

APPENDIX B

GROUNDWATER FIELD ANALYSIS FORMS

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Groundwater Field Analysis Forms
Spring 2004

GWM WELL # SHL-3

SCREEN INTERVAL DEPTH: 25.1 - 35.1' * WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 29.93'

DEPTH, POST PUMP INSERTION 29.95'

DEPTH SAMPLED: 34'

DATE: 5/3/04 TIME: 0855 REFERENCE POINT: PVC OR CASING (DEPTHS RECORDED BENEATH) NGVD

RECORDED BY: JK PY KM WM DH PB SIGNATURE:

SAMPLED BY: JK PY KM WM DH PB SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0915	30.47	118.0	340		10.46	29	6.65	231.8	11.92	14.1	
0919	30.33	118.0	340		12.53	30	6.54	223.5	11.68	6.95	
0922	30.27	118.0	230		13.56	29	6.62	215.0	11.66	4.63	
0925	30.19	118.0	80	0.5 gal	13.92	27	6.63	213.9	11.58	4.35	
0929	30.04	160.7	20		14.38	26	6.64	214.7	11.52	6.60	pump turned high
0933	30.09	195.2	100		14.39	26	6.65	207.5	11.19	9.24	" "
0939	30.50	119.4	280	1.8 gal	19.25	26	6.65	185.5	9.87	5.78	flow slowed up, but to back flush +
0943	30.00	147.9 124.8	20		17.90	30	6.63	195.7	10.01	9.66	backflushed again
0947	30.19	118.8	400		17.97	25	6.66	189.0	9.89	4.08	
0950	30.28	119.1	160	2.5 gal	15.85	26	6.65	192.1	10.35	3.88	
0953	30.09	133.9	60		16.08	26	6.66	194.2	10.23	2.40	
0957	30.02	163.8	100		15.73	26	6.65	196.5	10.57	3.20	

3% 3% +0.1 unit +10 mv 10% 10%

NOTES:

SAMPLE TAKEN AT: 1000

* bottom of well met at 33.0' (silting in apparently)

* backflushed well to get flow going again

YSI # 01207072 TURBIDITY # 34575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-4

SCREEN INTERVAL DEPTH: 5.7-15.7' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 10.23'

DEPTH, POST PUMP INSERTION 10.30'

DEPTH SAMPLED: 14' REFERENCE POINT (PVC) OR CASING

DATE: 04 May 2004 TIME: 0830 (DEPTHS RECORDED BENEATH) NGVD

RECORDED BY: JK PY KM WM (DH) PB SIGNATURE: Dan Hensley

SAMPLED BY: JK PY KM WM (DH) PB SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D.O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
9:15	10.30	70.0	600	1	10.91	137	6.18	160.0	.76	.60	Yellow/Brown
9:22	10.30	70.0	600	3	11.09	136	6.18	144	.52	.35	
9:26	10.30	68.5	300	4	11.25	136	6.15	137	.28	.50	
9:29	10.30	68.5	200		12.20	138	6.14	133	.35	.43	
9:33	10.30	68.5	200		12.51	137	6.15	125	.25	.65	
9:42	10.30	68.5	300	5	12.50	137	6.17	117	.39	.42	
9:45	10.30	68.5	300		12.52	137	6.18	117	.38	.42	
9:48	10.30	68.5	300		12.69	137	6.20	116	.38	.45	
9:51	10.30	68.5	300	6	12.74	137	6.22	117	.28	.43	
9:54	10.30	68.5	300		12.73	138	6.20	118	.31	.30	
9:57	10.30	68.5	300	7	12.76	138	6.20	118	.31	.45	
10:00	10.30	68.5			12.78	138	6.20	118	.31	.35	

3% 3% +0.1 unit +10 mv 10% 10%

NOTES:

SAMPLE TAKEN AT: 1005

YSI # 99K1014 AG TURBIDITY # 39576

Pump - Grunfos Redi-flow II

GWM WELL # SHL-5	U.S. Army Corps of Engineers Groundwater Sampling Log Sheet Project Name: Shepley's Hill Landfill, Devens, MA

SCREEN INTERVAL DEPTH: 5.1-15.1' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 2.13'

DEPTH, POST PUMP INSERTION 2.12'

DEPTH SAMPLED: 10'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 05 May 2004 TIME: 0930

RECORDED BY: JK PY KM WM DH (PB) SIGNATURE: P. Bh...

SAMPLED BY: JK PY KM WM DH (PB) SIGNATURE: P. Bh...

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + ~~AscAc~~)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1100	2.45	41.4	280		9.00	74	6.0	215	1.96	15	Visible brown/yellow particl
1104	2.45	41.5	320		9.14	73	5.44	211	0.70	2.5	Clearer
1109	2.45	41.5	320	≈ 0.8 gal	9.54	71	5.37	205	0.52	1.6	
1113	2.46	41.5	340		9.62	74	5.35	198	0.44	1.6	
1117	2.47	41.5	300	≈ 1.8 gal	9.75	74	5.38	193	0.33	1.2	
NOTES:					3%	3%	+0.1 unit	+10 mv	10%	10%	

SAMPLE TAKEN AT: 1130 hrs sample time.

YSI # 99K1014 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-5B

SCREEN INTERVAL DEPTH: 81.3-91.3' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 4.48'

DEPTH, POST PUMP INSERTION 4.30'

DEPTH SAMPLED: 86'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 05 May 2004 TIME: 1210

RECORDED BY: JK PY KM WM DH (PB) SIGNATURE: P.Bhe

SAMPLED BY: JK PY KM WM DH (PB) SIGNATURE: P.Bhe

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH + ~~AscAc~~) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS (PB. Time)
1232	4.70	50.5	100	-	10.27	504	7.0	256	8.25	12.5	1232
1237	4.70	56.0	600		9.08	638	6.35	241	5.35	6.5	1237
12.41	4.89	52.3	240		9.87	753	6.19	66	1.1	5.1	1241
12.45	4.82	52.0	320		9.55	769	6.25	-1	0.80	3.5	1245
12.48	4.81	52.3	330	≈ 1.2 gal	9.50	770	6.30	-46	0.69	2.7	1248
12.51	4.82	52.1	300		9.56	771	6.32	-86	0.54	2.8	1251
12.55	4.82	52.1	300		9.57	771	6.34	-105	0.49	2.0	1255
1300	4.82	52.0	360	≈ 2.8 gal	9.58	770	6.35	-126	0.43	2.4	1300
1305	4.82	52.0	320		9.58	770	6.38	-140	0.41	2.5	1315
1308	4.82	52.1	320		9.58	769	6.38	-143	0.39	2.5	1308

NOTES: 3% 3% +0.1 unit +10 mv 10% 10% (PB)

SAMPLE TAKEN AT: SAMPLE TIME 1320 hrs SAMPLE DUPLICATE IS LABELED SHL-DUP-04A. THERE IS ALSO A QA DUPLICATE

YSI # 99K1014 AG TURBIDITY # 39576

Pump - Grunfos Redi-flow II

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHm-96-5C

SCREEN INTERVAL DEPTH: 50.8' - 60.8' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 3.94'

DEPTH, POST PUMP INSERTION 3.94'

DEPTH SAMPLED: 56' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/5/04 TIME: 1103

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1148	3.97	47.9	300		9.63	698	6.45	-57.4	18.89	9.32	Good Flow
1153	3.97	47.8	300		9.76	977	6.53	-82.1	1.87	9.36	
1158	3.97	47.8	300	1 gal	9.73	997	6.55	-85.1	0.80	7.02	
1203	3.97	47.8	300		9.83	999	6.55	-85.9	0.76	6.05	
1208	3.97	47.8	300		9.82	991	6.56	-86.4	0.76	4.86	
1213	3.97	47.8	300	2 gal.	10.08	982	6.57	-86.8	0.90	4.43	
1218	3.97	47.8	325		9.92	966	6.56	-86.0	0.71	4.53	
1223	3.97	47.8	325	3 gal	9.90	955	6.56	-86.0	0.72	4.23	
1228	3.97	47.8	325	4 gal	9.84	946	6.56	-85.3	0.72	4.29	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1240

YSI # 01L0702 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-9

SCREEN INTERVAL DEPTH: 15.0' - 25.0' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.60'

DEPTH, POST PUMP INSERTION 7.69'

DEPTH SAMPLED: 20'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5-4-04 TIME: 1210

RECORDED BY: JK PY (KM) WM DH PB SIGNATURE: Katherine Miller

SAMPLED BY: JK PY (KM) WM DH PB SIGNATURE: Katherine Miller

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP 61.7 SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1210	7.83	40Q	400		8.35	107	6.49	87.3	1.56	82.1	Rusty, Orange
1225	7.86	61.9	425	1 gal.	9.54	111	6.46	49.6	1.30	52.0	colored #'s
1230	7.86	61.7	420		9.73	117	6.48	30.6	0.94	21.7	at first - Clear
1235	7.86	62.0	300	2.5 gal.	9.89	128	6.54	3.1	0.56	4.53	after ~0.5 gal.
1240	7.86	62.1	450	3 gal	9.97	136	6.56	-13.2	0.54	7.58	
1245	7.86	62.1	450	3.5 gal	9.97	140	6.57	-10.8	0.44	2.75	
1250	7.86	62.1	450	4 gal.	9.93	144	6.60	-22.9	0.32	2.55	
1253	7.86	61.9	450		10.11	145	6.60	-30.5	0.27	2.09	
1257	7.86	62.0	450	5.5 gal	10.18	146	6.61	-33.6	0.25	1.73	
1300	7.86	61.9	440		10.27	146	6.61	-36.4	0.24	1.51	
1305				6 gal							

		3%	3% +0.1 unit	+10 mv	10% 10%

NOTES:

SAMPLE TAKEN AT: 1305

YSI # 01K0893 AA/01L0702 TURBIDITY # -575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-10

SCREEN INTERVAL DEPTH: 17.8 - 41.8' * WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 30.42'

DEPTH, POST PUMP INSERTION 30.40'

DEPTH SAMPLED: 36'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/3/04 TIME: 0930

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1095	30.45	120.2	300		11.06	35	7.86	300.9	11.78	7.14	clear flow
1040	30.50	120.2	300		12.99	32	7.44	319.2	11.48	3.13	
1045	30.46	119.85 psi	150		14.16	33	7.12	334.2	11.33	1.94	
1050	30.44	120.2	25	1.2 gal	14.53	34	6.92	343.1	11.28	2.02	Pump increased/Flow stopped
1055	Flow stopped - Adjust	Pump setting	numerous	Times	—	—	—	—	—	—	Backflushed pump
1100	30.46	118.0	150		14.90	36	6.72	353.7	10.94	10.85	
1105	30.44	118.0	50	2 gal.	16.56	37	6.63	351.7	10.62	4.34	
1110	—	—	—	—	—	—	—	—	—	—	Backflushed pump
1115	30.55	119.1	450	3 gal.	16.37	37	6.58	352.2	11.20	1.22	
1120	30.53	119.1	475		14.81	36	6.49	359.2	11.20	1.53	
1125	30.53	119.1	475	4 gal	14.00	37	6.44	366.1	11.25	2.05	
1130	30.53	119.1	475		14.00	38	6.40	372.2	11.03	0.90	
1135	30.53	119.1	475	5 gal	13.93	38	6.45	376.0	11.10	1.60	
1140	30.53	119.1	475	5.2 gal	13.85	38	6.45	378.2	11.08	1.79	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1145

* bottom of well was not at 38.5' - well has been silted in to this level in recent years.

YSI # 99K1014 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-10C

SCREEN INTERVAL DEPTH: 45.7 - 55.7' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 29.13'

DEPTH, POST PUMP INSERTION 29.04'

DEPTH SAMPLED: 51' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/03/04 TIME: 0850

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0915	29.60	116.8	300		11.19	470	6.63	304.4	1.63	2.94	clear flow
0920	29.78	116.8	250	1gal	11.70	467	6.89	300.7	8.9	1.73	
0925	29.83	116.5	200		12.31	470	7.01	298.1	0.69	2.17	
0930	29.85	116.5	~~175~~		12.42	472	7.06	298.7	0.85	0.96	
0935	29.87	116.5	175		12.44	472	7.07	299.5	0.90	0.75	
0940	29.88	116.5	175	2gal.	12.47	473	7.04	302.0	0.95	0.76	
0945	29.90	116.5	175		12.55	473	7.06	302.1	1.00	0.72	
0950	29.90	116.5	175		12.71	473	7.05	303.5	1.02	0.67	
0955	29.90	116.5	175	2.5gal	12.74	473	7.02	305.9	1.09	0.84	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1000

YSI # 99K1014 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHL-11

SCREEN INTERVAL DEPTH: 14.8 - 29.8' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 18.43'

DEPTH, POST PUMP INSERTION 18.44'

DEPTH SAMPLED: 25' REFERENCE POINT: (TOC) OR CASING

DATE: 04 May 2004 TIME: 0940 (DEPTHS RECORDED BENEATH) NGVD

RECORDED BY: JK PY KM WM (DH) PB SIGNATURE: Donald Munn

SAMPLED BY: JK PY KM WM (DH) PB SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1035	18.5	89.1	400	1	11.1	535	5.99	61.5	7.66	53	Rusty
10:40	18.5	89.1	400	2	12.3	551	6.10	33.0	6.45	36.3	
10:46	18.5	89.1	400		12.4	566	6.12	14.4	6.04	22.3	
10:50	18.5	88.7	300	3	12.4	580	6.14	-9.7	5.39	18.6	
10:57	18.5	88.7	300	4	13.2	582	6.20	-20.0	4.42	13.5	
11:03	18.5	88.7	300		13.0	590	6.20	-26.7	4.20	10.0	
11:06	18.5	88.7	300		12.9	590	6.21	-29.9	4.60	9.5	
11:10	18.5	88.7	300	5	12.6	595	6.21	-29.8	4.41	9.3	
11:14	18.5	88.7	300		12.6	579	6.23	-30.1	4.22	9.3	
11:17	18.5	88.7	300		12.6	573	6.23	-33.0	4.19	8.9	
11:20	18.5	88.7	300	6	12.6	579	6.25	-33.7	4.10	8.0	
11:23	18.5	88.7	300		12.6	590	6.24	-33.4	4.32	7.9	
11:27	18.5	88.7	300		12.6	591	6.26	-32.9	4.60	7.0	
11:30	18.5	88.7	300		12.6	582	6.27	-33.5	4.55	6.8	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT:

YSI # 99K1014 TURBIDITY # 39526

Pump - Grunfos Redi-flow II

GWM WELL # SHL-19

SCREEN INTERVAL DEPTH: 17.0-32.0 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 22.42'

DEPTH, POST PUMP INSERTION 22.43'

DEPTH SAMPLED: 28'

REFERENCE POINT (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/3/06 TIME: 1145

RECORDED BY: JK PY KM (WM) DH PB SIGNATURE:

SAMPLED BY: JK PY KM (WM) DH PB SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1148	22.40	101.8	360		9.59	169	6.42	21.6	0.89	325	orange-color!
1152	22.41	101.8	340	0.5 gal	10.18	164	6.40	19.5	0.74	285	
1155	22.43	101.8	340		11.13	162	6.41	17.8	0.62	257	
1158	22.44	101.8	340	1 gal	11.44	161	6.41	17.4	0.61	223	
1201	22.44	101.8	340		11.66	161	6.41	17.7	0.61	199	
1204	22.44	101.8	340	1.6 gal	11.80	160	6.41	18.5	0.69	174	
1207	22.43	101.7	340		11.92	159	6.41	20.8	0.77	161	
1210	22.44	101.8	340	2.1 gal	12.06	157	6.40	22.5	0.88	137	
1213	22.44	101.8	340		12.01	156	6.40	24.1	0.97	129	
1216	22.44	101.8	340	2.8 gal	12.08	154	6.40	24.1	1.00	119	
1219	22.44	101.8	340	3.0 gal	12.18	153	6.40	23.4	1.02	110	bucket empty
1222	22.44	101.8	340		12.24	152	6.41	25.5	1.18	96.0	
1226	22.44	101.8	340		12.31	149	6.39	26.6	1.32	90.0	
1229	22.44	101.8	340		12.32	147	6.39	27.4	1.37	84.1	
1232	22.44	101.8	340		12.33	146	6.39	28.8	1.36	79.1	
1235	22.44	101.8	340	4.0 gal	12.36	144	6.39	27.5	1.39	79.3	
					3%		3% +0.1 unit +10 mv		10%	10%	

NOTES:

SAMPLE TAKEN AT: 1240

YSI # 01L0722 TURBIDITY # 39525 Pump - Grunfos Redi-flow II

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHL-20

SCREEN INTERVAL DEPTH: 41.0' – 51.0' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 18.78'

DEPTH, POST PUMP INSERTION 18.79'

DEPTH SAMPLED: 46.0' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/4/04 TIME: 0850

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0920	18.81	93.6	300		11.46	672	6.58	7.2	1.56	29.4	Good Flow Rate
0925	18.81	93.6	300		12.13	687	6.61	-9.3	1.18	26.8	
0930	18.81	93.6	300		12.38	694	6.61	-12.9	1.07	24.0	
0935	18.81	93.6	300	2 gal.	12.50	703	6.61	-16.4	0.86	16.45	
0940	18.81	93.6	300		12.59	704	6.61	-17.9	0.73	13.43	
0945	18.81	93.6	300	~~2 gal.~~ pg	12.88	703	6.63	-21.2	0.68	12.31	
0950	18.81	93.6	300	3 gal.	13.03	704	6.61	-20.2	0.59	11.22	
0955	18.81	93.6	300		13.04	705	6.61	-20.6	0.53	9.73	
1000	18.81	93.6	300		13.17	703	6.61	-20.5	0.56	10.15	
1005	18.81	93.6	300	4 gal.	13.22	703	6.61	-20.8	0.56	7.97	
1010	18.81	93.6	300		13.26	704	6.61	-20.6	0.54	7.36	
1015	18.81	93.6	300	5 gal	13.30	703	6.61	-20.6	0.55	7.23	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1020

YSI # 01L0702 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL - 22

SCREEN INTERVAL DEPTH: 106 - 116 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 5.30

DEPTH, POST PUMP INSERTION 5.30

DEPTH SAMPLED: 111 feet

DATE: 5/5/2004 Wed TIME: 0950

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 22.45 NGVD

RECORDED BY: JK PY KM WM DH (PB) SIGNATURE: P.B.

SAMPLED BY: JK PY KM WM DH (PB) SIGNATURE: P.B.

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH + ~~AscAc~~) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0905	5.38	55	500 ml/min		8.51	423	6.78	238	8.96	8.7	clear - flocking
0910	5.78	61	400		9.18	868	6.41	238	2.01	86.	slightly cloudy
0915	5.78	60.2	360		9.13	892	6.48	191	1.22	60.0	
0918	5.80	60.2	360	≈ 1.4 gallons	9.28	890	6.48	165	0.96	32.2	
0923	5.80	60.2	320		9.35	888	6.48	155	0.79	19.0	
0928	5.80	60.2	360	≈ 2.5 gal	9.37	888	6.47	148	0.69	9.0	
0932	5.82	60.2	320		9.43	886	6.48	141	0.61	6.5	
0935	5.82	60.2	360	≈ 3.2 gal	9.46	886	6.48	137	0.56	4.8	
0940	5.83	60.2	380	≈ 4 gal	9.49	885	6.47	133	0.52	3.5	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 0950 hrs

YSI # 600XLM 99K1014 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-22B

SCREEN INTERVAL DEPTH: 62.7'- 92.7' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 5.17'

DEPTH, POST PUMP INSERTION 5.20'

DEPTH SAMPLED: 78' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/5/04 TIME: 0825

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0940	5.17	54.1	150		7.99	789	7.54	-111.6	2.06	80.4	Good Flow
0915	5.17	54.2	175		8.13	813	6.68	-92.1	1.17	43.1	
0920	5.17	54.2	175		8.04	819	6.71	-90.4	0.97	42.3	
0925	5.17	54.2	175	1 gal	8.06	818	6.76	-90.2	0.95	35.7	
0930	5.17	54.2	175		8.17	818	6.76	-88.8	0.93	36.3	
0935	5.17	54.2	175		8.23	819	6.77	-90.5	0.84	35.3	
0940	5.17	54.2	175		8.28	817	6.78	-92.7	0.80	33.0	
0945	5.17	54.2	175	2 gal	8.40	817	6.79	-94.5	0.79	31.0	
0950	5.17	54.2	175		8.49	816	6.81	-96.8	0.76	27.7	
0955	5.17	54.2	175		8.54	816	6.82	-98.3	0.70	24.1	
1000	5.17	54.2	175		8.62	814	6.83	-100.0	0.71	24.4	
1005	5.17	54.2	175	3 gal.	8.65	813	6.85	-101.3	0.69	23.9	
1010	5.17	54.2	175		8.71	813	6.85	-103.1	0.66	24.2	
1015	5.17	54.2	175	3.5 gal.	8.70	813	6.85	-103.3	0.63	23.3	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1020

YSI # 01L0702 TURBIDITY # 39595 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-22C

SCREEN INTERVAL DEPTH: 124.3-134.3' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.38'

DEPTH, POST PUMP INSERTION 5.25'

DEPTH SAMPLED: 130' REFERENCE POINT: (PVC) OR CASING

DATE: 04 May 2004 TIME: 1215 (DEPTHS RECORDED BENEATH) NGVD

RECORDED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK (PY) KM WM DH PB SIGNATURE: Paul Young

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH ~~+ AscAc~~)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1310	26.2	109.3	150		10.60	372	7.25	-49.1	0.48	4.69	
1315	26.26	109.3	150		10.11	371	7.20	-43.4	0.51	2.64	
1320	26.28	109.3	150		9.40	376	7.17	-45.1	0.69	2.09	
1325	26.26	109.0	100		9.21	388	7.16	-45.1	0.79	2.05	
1330	26.21	109.0	100		9.52	391	7.12	-29.6	0.74	1.93	
1335	26.18	109.0	150		9.31	404	7.11	-36.8	0.69	1.76	
1340	26.17	109.0	125	1gal	9.33	407	7.11	-43.3	0.82	1.83	
1345	26.16	109.0	125		9.34	416	7.11	-43.7	0.90	1.85	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1350

water level drawn down from 6.38' to 26.38'. Well has history of slow recharge. Sampling of parameters will commence once the water level reaches 26.38' 13.5 gallons Removed

YSI # 99K 1014 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHM-99-31B

SCREEN INTERVAL DEPTH: 51.8'-61.8' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 2.67'

DEPTH, POST PUMP INSERTION 2.67'

DEPTH SAMPLED: 57' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 5/6/04 TIME: 1010

RECORDED BY: JK PY KM WM DH PB SIGNATURE: Paul Young

SAMPLED BY: JK PY KM WM DH PB SIGNATURE: Paul Young

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1030	2.67	37.7	250		10.81	209	6.19	166.4	3.74	16.34	
1035	2.67	37.7	~~250~~ 300		10.43	313	6.20	10.8	1.37	13.35	
1040	2.67	37.7	300		10.61	356	6.29	-12.9	0.74	8.35	
1045	2.67	37.7	300	1 gal	10.96	377	6.30	-18.0	0.57	6.30	
1050	2.67	37.7	350		10.94	393	6.31	-19.7	0.50	4.25	
1055	2.67	37.7	350	2 gal	11.05	401	6.32	-20.7	0.46	3.35	
1100	2.67	37.7	350		11.02	409	6.32	-21.0	0.42	2.08	
1105	2.67	37.7	350	3 gal	11.18	414	6.33	-21.3	0.38	4.92	
1110	2.67	37.7	350		11.16	418	6.32	-21.6	0.39	3.53	
1115	2.68	37.7	350		11.12	426	6.32	-21.9	0.36		
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1120

YSI # 01L0702 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHM-99-31C

SCREEN INTERVAL DEPTH: 70.1 - 80.1' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 2.92'

DEPTH, POST PUMP INSERTION 2.92'

DEPTH SAMPLED: 75' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 06 May 2004 TIME: 0945

RECORDED BY: (JK) PY KM WM DH PB SIGNATURE:

SAMPLED BY: (JK) PY KM WM DH PB SIGNATURE:

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass via (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1036	3.05	40.7	400		10.55	984	6.09	166.1	1.43	9.7	clear
1040	3.05	40.7	400		10.63	1033	6.13	163.3	0.91	7.8	
1043	3.06	40.7	400	1	10.79	1037	6.12	166.9	0.77	6.1	
1047	3.07	40.7	400		10.97	1041	6.13	-25.5	0.61	4.3	
1050	3.07	40.7	400		11.06	1044	6.13	-45.9	0.58	3.3	
1053	3.07	40.7	400	2	11.12	1039	6.12	-66.8	0.54	2.4	
1058	3.08	40.7	400		11.10	997	6.10	-83.7	0.49	2.1	
1102	3.08	40.7	400	3	11.11	957	6.05	-99.8	0.34	2.2	
1107	3.08	40.7	400		11.16	964	6.03	-105.9	0.31	1.3	
1111	3.08	40.7	400		11.23	981	6.02	-108.2	0.29	1.8	
1114	3.10	40.7	400	4	11.18	988	6.01	-110.9	0.27	1.4	
1120	3.10	40.7	400	4.5	11.19	1004	6.01	-116.9	0.24	2.1	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1126

YSI # 99K1014 AG TURBIDITY # 39576 Pump - Grunfos Redi-flow II

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Groundwater Field Analysis Forms
Fall 2004

GWM WELL #	SAL-3
SCREEN INTERVAL DEPTH:	25.1-35.1
WELL DIAMETER:	2"
H2O LEVEL: DEPTH, PRE PUMP INSERTION	30.79
DEPTH, POST PUMP INSERTION	30.78
DEPTH SAMPLED:	~~33.5'~~ wsm 33'
REFERENCE POINT: (DEPTHS RECORDED BENEATH)	PVC OR CASING (circled: CASING) NGVD
DATE:	11/15/04
TIME:	0900
RECORDED BY: JK KM WM PB NM AG (WM circled)	SIGNATURE: [signature]
SAMPLED BY: JK KM WM PB NM AG (WM circled)	SIGNATURE: [signature]

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0915	31.01	119.5	250		12.79	44	6.97	127.5	10.52	10.9	
0918	30.88	119.5	180		13.41	44	6.75	141.5	10.67	10.44	
0924	30.79	165.6	100		13.69	44	6.63	143.4	10.14	8.45	had to turn controller up
0928	30.84	169.0	150	0.8 gal	14.57	42	6.60	142.0	9.99	11.21	" "
0933	31.66	121.9	800	1.7 gal	13.59	42	6.58	133.4	10.10	4.44	had to backflush
0937	31.58	121.9	800	2.2 gal	16.75	41	6.57	136.7	10.04	1.93	
0941	31.57	122.0	800		16.36	41	6.52	137.8	10.02	1.28	
0944	31.58	122.0	800	3.3 gal	16.17	40	6.55	138.2	10.00	0.87	
0947	31.58	121.8	800	4.0 gal	16.06	40	6.55	139.4	9.98	0.63	

						3%	3%	+0.1 unit	+10 mv	10%	10%

NOTES:

SAMPLE TAKEN AT: 0955 water depth measured from top of metal casing since PVC is 0.83' is below that (& hard to read)

well may be somewhat silted in.

YSI # 99E0152 AA TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHL-4

SCREEN INTERVAL DEPTH: 5.7 - 15.7 ft WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 10.89 ft

DEPTH, POST PUMP INSERTION 10.87 ft

DEPTH SAMPLED: 14 ft REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 15 Nov 04 TIME: 1245

RECORDED BY: JK KM (WM) PB NM AG SIGNATURE:

SAMPLED BY: JK KM (WM) PB NM AG SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1306	10.96	72.6	1200		12.64	335	5.68	116.4	0.53	8.25	container material changed
1311	10.97	69.9	520	2.0 gal	13.47	325	5.57	142.7	0.58	3.50	
1314	10.90	69.7	500	2.4 gal	14.17	324	5.55	145.8	0.60	2.99	
1317	10.91	69.8	460	2.7 gal	14.38	321	5.50	172.0	0.62	2.32	
1320	10.91	69.7	400	3.0 gal	14.40	319	5.46	187.8	0.54	1.37	
1323	10.90	70.0	500	3.4 gal	14.41	317	5.38	212.1	0.48	1.42	
1327	10.91	70.0	500	3.7 gal	14.45	316	5.37	223.1	0.46	1.33	
1330	10.90	70.0	500	4.0 gal	14.49	314	5.43	224.1	0.46	1.16	4 gal bucket Emptied
1333	10.90	69.9	500		14.41	314	5.44	224.0	0.42	0.92	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1340

initial slug of pumped water was turbid. No coloration noted.

YSI # 99E0152AA TURBIDITY # 904151 Pump - Grunfos Redi-flow II

GWM WELL # SHL-5

SCREEN INTERVAL DEPTH: 5.1-15.1' WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 3.28'

DEPTH, POST PUMP INSERTION 3.28'

DEPTH SAMPLED: 10' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 17 Nov 04 TIME: 0905

RECORDED BY: JK KM WM PB NM AG SIGNATURE: Anne Marie Marcella

SAMPLED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy Merrell

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1057	3.69	48.2	300		9.89	85	5.81	112.7	1.05	7.69	
1100	3.69	49.0	400		10.07	83	5.71	102.3	0.48	6.73	
1104	3.69	49.0	400	1 gal	10.13	85	5.71	96.3	0.42	3.64	
1109	3.69	49.1	400		10.37	82	5.72	91.1	0.33	3.45	
1112	3.69	49.2	400		10.46	82	5.72	89.9	0.34	3.51	
1115				2 gal							

	3%	3% +0.1 unit +10 mv	10%	10%

NOTES:

SAMPLE TAKEN AT: 1118

YSI # 152 TURBIDITY # 904151 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-5B

SCREEN INTERVAL DEPTH: 81.3 - 91.3 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 5.43'

DEPTH, POST PUMP INSERTION 5.46

DEPTH SAMPLED: 86' REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 7 NOV 04 TIME: 0819

RECORDED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy M Morrell

SAMPLED BY: JK KM WM PB NM AG SIGNATURE: Nancy M Morrell

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0925	6.12	59.5	800		9.98	657	6.59	76.3	1.26	29.3	
0930	6.19	59.5	850	1 gal	10.19	660	6.64	37.6	1.19	28.2	
0933	6.19	59.5	900	2 gal	10.31	657	6.66	22.6	1.07	20.1	
0936	6.19	59.6 *	900	3 gal	10.38	654	6.67	9.8	1.02	17.4	
0940	6.19	59.8 *	1000	4 gal	10.41	650	6.69	-1.0	0.99	11.4	
0943	6.19	59.8	1000	5 gal	10.43	649	6.69	-7.8	0.97	10.17	
0948	6.2	59.8	950	6 gal	10.40	647	6.70	-11.1	0.95	7.80	
0954	6.21	59.8	950	7 gal	10.45	646	6.70	-23.5	0.88	6.59	
0957	6.21	59.8	900		10.47	644	6.70	-25.4	0.85	4.71	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1065

* controller pump setting going up on it's own

YSI # 0152 TURBIDITY # 904151 Pump - Grunfos Redi-flow II

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHM-96-5C

SCREEN INTERVAL DEPTH: 50.8 - 60.8 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 4.92'

DEPTH, POST PUMP INSERTION 4.92'

DEPTH SAMPLED: ~~FAR~~ 56' 55 Feet REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 17 Nov 04 TIME:

RECORDED BY: (JK) KM WM PB NM AG SIGNATURE:

SAMPLED BY: (JK) KM WM PB NM AG SIGNATURE:

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) — VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH) — BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE — COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE — TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0938	4.95	50.8	400		9.98	742	4.20	229.5	0.12		clear
1005	4.98	55.0	600	3 gal	10.61	762	6.45	-73.8	0.04	0.61	replaced turbidity tape
1010	4.99	55.0	600		10.60	760	6.45	-110.8	0.03	0.53	
1013	4.97	53.9	400	4	10.52	760	6.45	-134.3	0.02	0.47	
1017	4.97	54.0	400		10.58	757	6.46	-149.2	0.02	0.42	
1020	4.97	53.8	400	5	10.58	755	6.46	-160.9	0.02	0.48	
1023	4.97	54.1	400		10.61	752	6.45	-172.1	0.01	0.68	
1026	4.97	53.8	400		10.59	752	6.46	-179.3	0.01	0.56	
1029	4.97	53.9	400	~~3~~ 6	10.62	750	6.46	-189.7	0.01	0.52	
1032	4.97	54.0	400		10.61	750	6.46	-192.9	0.01	0.58	
1035	4.97	54.1	400		10.63	750	6.46	-196.2	0.01	0.64	
1038	4.97	53.9	400	7	10.66	750	6.46	-199.3	0.01	0.55	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1040

YSI # 01J085I AC TURBIDITY # 39576

Pump - Grunfos Redi-flow II

top of PVC = .52' below casing

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

GWM WELL # SHL-9
SCREEN INTERVAL DEPTH: 15.0-25.0 WELL DIAMETER: 2"
H2O LEVEL: DEPTH, PRE PUMP INSERTION 8.72
DEPTH, POST PUMP INSERTION 9.27
DEPTH SAMPLED: 20'
REFERENCE POINT: TOP OF CASING (DEPTHS RECORDED BENEATH) NGVD
DATE: 16 NOV 04 TIME: 1136
RECORDED BY: JK KM WM PB NM AG SIGNATURE: Nanagh McNally
SAMPLED BY: JK KM WM PB NM AG SIGNATURE: Nanagh McNally

SAMPLE METHOD: EPA LOW STRESS METHOD
Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH) BOD 1 x 1L HDPE
Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1142	9.42	70.3	-		10.28	106	6.53	135.0	4.73	5.28	strong sulfer
1155	9.37	68.1	400	< 1 gal	12.15	148	6.51	89.6	0.38	4.53	odor
1200	9.37	68.1	250	1 gal	12.28	148	6.52	62.6	0.17	4.34	↓
1204	9.35	68.5	300		12.17	149	6.52	41.2	0.16	4.28	
1207	9.37	68.5	300	2 gal	12.57	148	6.52	16.2	0.14	4.16	strong sulfer odor
1210	9.37	68.5	275		12.99	148	6.52	-12.9	0.11	4.35	
1215	9.37	68.5	250	2.5 gal	13.09	149	6.53	-48.6	0.09	4.81	
1219	9.38	68.8	300		13.14	148	6.53	-63.7	0.08	3.96	
1222	9.39	68.8	350	3 gal	13.19	148	6.52	-77.7	0.07	3.85	
1226	9.39	68.8	350		13.02	148	6.52	-91.1	0.06	3.84	
1230	9.46	70.0	500		13.05	148	6.52	-102.7	0.06	3.55	
1234	9.46	70.0	500	4 gal	12.42	149	6.52	-115.2	0.04	2.01	
1237	9.48	70.0	500		12.23	149	6.51	-123.4	0.04	1.84	↓
1240	9.48	70.3	500	5 gal	12.20	149	6.51	-127.8	0.04	1.66	mod sulfer odor
1243	9.48	70.3	500		12.16	149	6.51	-131.9	0.04	1.98	↓
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:
SAMPLE TAKEN AT: 1250
strong smell of exhaust from nearby construction site generator

YSI # 0851 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHL-10

SCREEN INTERVAL DEPTH: 17.8-41.8 ft WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 31.35 ft

DEPTH, POST PUMP INSERTION 31.38 ft

DEPTH SAMPLED: 37 ft REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 15 Nov 04 TIME: 1000

RECORDED BY: JK KM WM PB NM AG SIGNATURE:

SAMPLED BY: JK KM WM PB NM AG SIGNATURE:

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1058	31.48	126.2	600		11.31	125	6.51	205.1	9.69	35.2	
1102	31.45	126.2	600	1.1 gal	12.28	78	6.47	233.4	10.03	21.3	
1105	31.49	126.2	600	1.7 gal	13.59	65	6.43	252.4	10.35	13.6	
1108	31.51	126.2	600	2.1 gal	13.87	63	6.36	268.8	10.33	9.31	
1111	31.52	126.2	600		14.03	62	6.31	281.9	10.33	7.60	
1114	31.52	126.2	600	2.8 gal	13.93	62	6.25	291.4	10.32	6.00	
1117	31.51	126.2	600	3.4 gal	13.96	62	6.18	301.7	10.30	5.63	
1120	31.51	126.2	600	3.8 gal	14.06	62	6.14	307.9	10.27	5.50	4 gal. container
1123	31.51	126.2	600		14.00	62	6.10	314.4	10.27	5.28	
1126	31.51	126.2	600	5.0 gal	14.01	61	6.06	320.9	10.28	5.35	
1129	31.51	126.2	600	5.4 gal	14.00	61	6.02	326.6	10.26	5.03	
1132	31.51	126.3	600		14.00	61	6.01	330.1	10.27	4.52	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1140

YSI # 99E0152 PA TURBIDITY # 904151 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-10C

U.S. Army Corps of Engineers
Groundwater Sampling Log Sheet
Project Name: Shepley's Hill Landfill, Devens, MA

SCREEN INTERVAL DEPTH: 45.7 - 55.7 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 30.15

DEPTH, POST PUMP INSERTION 29.99

DEPTH SAMPLED: 50 ft REFERENCE POINT (PVC) OR CASING (DEPTHS RECORDED BENEATH) 248.42 NGVD

DATE: 11/15/2004 TIME: 0900 start wellsheet

RECORDED BY: JK KM WM (PB) NM AG SIGNATURE: P. Blum[illegible]

SAMPLED BY: JK KM WM (PB) NM AG SIGNATURE: P. Bl[illegible]

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH) BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D.O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0916	30.63	120.2	200	~ 0.5	10.79	413	6.85	168	0.64	5.0	
0921	30.80	120.2	200	~ 0.7 gal	11.32	413	6.95	201	3.7	4.9	
0925	30.82	120.2	200	~ 1 gal	11.60	413	7.00	216.5	~~6.34~~ (PB)	2.7	DO = 0.34 mg/L
0930	30.87	120.2	200	1.4	11.79	415	7.04	238.1	0.26	1.8	
0933	30.89	120.2	180	1.6	11.81	417	7.07	258.1	0.22	1.2	
0944	30.90	120.2	150	2.2	11.96	417	7.13	273	0.17	1.3	
0950	30.90	120.2	150	2.3	12.05	418	7.16	278	0.15	1.4	
0955	30.92	120.2	160	2.5	12.12	419	7.17	280.9	0.14	1.05	
1010	SAMPLE TIME										

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1010

YSI # 01J0851-AC TURBIDITY # 904151 Pump - Grunfos Redi-flow II

GWM WELL # SHL - 11

SCREEN INTERVAL DEPTH: 14.8 - 29.8 WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 19.52

DEPTH, POST PUMP INSERTION 19.02

DEPTH SAMPLED: 25 Feet REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: Nov/16/2004 TIME: 0900 start sheet.

RECORDED BY: JK KM WM (PB) NM AG SIGNATURE: P. Bh

SAMPLED BY: JK KM WM (PB) NM AG SIGNATURE: P. Bh

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0930	19.07	97.3	880	~ 1 gal	14.01	488	5.26	172.5	0.37	38.1	Orange color (18)
0935	19.07	97.3	880	~ 2 gal	14.03	505	6.19	76.4	0.11	16.5	
0938	19.08	95.8	450	~ 3 gal	13.90	512	6.36	-16.8	0.10	9.8	
0942	19.08	95.5	440	2.9 gal	14.63	510	6.40	-71.2	0.07	8.2	
0948	19.07	95.5	440	3.6 gal	14.93	518	6.43	-125.8	0.05	6.5	empty 4 gallons
0954	19.07	95.5	500	4 + 0.2	15.00	520	6.43	-159.4	0.02	5.5	
1000	19.07	94.7	240	5 gal	14.88	521	6.44	-176.7	0.02	606	New range for turbidimeter
1006	19.07	94.7	240	5.5	15.67	519	6.43	-192.8	0.02	5.32	Water seems clear now
1009	19.07	94.7	270	5.8	15.92	525	6.43	-198.8	0.02	4.99	
1013	19.06	94.7	300	6 gal	16.04	525	6.43	-204.1	0.01	5.15	
1016	19.05	94.7	260	6.5	16.09	524	6.43	-207.8	0.01	5.02	
1019	19.05	94.7	300	6.8	16.23	525	6.43	-211.0	0.01	4.95	
1030	SAMPLE TIME.										

	3%	3% +0.1 unit	+10 mv	10%	10%

NOTES:

SAMPLE TAKEN AT: 1030

YSI # 01J085I-AC TURBIDITY # 904151

Pump - Grunfos Redi-flow II

GWM WELL # SHL-19

SCREEN INTERVAL DEPTH: 17.0-32.0 ft WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 23.546 ft

DEPTH, POST PUMP INSERTION 23.57 ft (TAK)

DEPTH SAMPLED: 28 ft REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 15 NOV 04 TIME: 1125

RECORDED BY: JK KM WM (PB) NM AG SIGNATURE: P. Blumer

SAMPLED BY: JK KM WM PB NM AG SIGNATURE: P. Blumer

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1200	23.56	104.5	270	0.8 gal	14.33	215	6.04	13.3	1.96	–	orange tint - initial
1206	23.56	104.5	250	1.4 gal	14.79	212	6.02	11.2	1.89	76	
1210	23.56	104.5	280	1.8	14.96	209	5.98	14.3	0.82	66.3	
1215	23.56	104.4	300	2.2	15.10	208	5.98	24.7	0.34	58.6	still orange/but fainter
1220	23.56	104.5	300	2.6	15.20	207	5.98	29.7	0.22	47.0	
1224	23.56	104.5	280	2.9	15.28	207	5.96	34.1	0.18	42.0	water looking clearer
1227	23.56	104.5	260	3.1	15.44	206	5.93	47.2	0.15	37.2	
1230	23.56	104.5	280	3.4	15.49	204	5.93	61.8	0.14	34.3	
1235	23.56	104.4	300	3.9	15.61	203	5.90	67.8	0.13	31.2	
1240	23.56	104.5	230	(3+1.2)=4.2	15.69	202	5.89	79.6	0.12	27.9	
1246	23.56	104.5	280	4.8	15.77	201	5.86	105.1	0.12	25.1	
1251	23.56	104.5	260	5.1	15.86	201	5.89	113.0	0.12	22.8	
1254	23.56	104.5	240	5.5	15.92	201	5.90	120.4	0.12	21.7	
1258	23.56	104.5	280	5.8	15.97	200	5.90	124.1	0.12	19.6	
1310	SAMPLE TIME										

NOTES:		3%	3%	+0.1 unit +10 mv	10%	10%

SAMPLE TAKEN AT: 1310 hrs

YSI # 01J0851 AC TURBIDITY # 39576

Pump - Grunfos Redi-flow II

GWM WELL # SHL-20

SCREEN INTERVAL DEPTH: 41.0 - 51.0 WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 19.41

DEPTH, POST PUMP INSERTION 19.44

DEPTH SAMPLED 46'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 6 NOV 04 TIME: 0926

RECORDED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy Morrell

SAMPLED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy Morrell

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC * COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
0928	19.44	94.7	100		9.97	584	5.39	289.7	3.54	32.7	
0932	19.47	96.2	500		11.1	588	6.07	243.1	2.16	42.6	
0936	19.47	96.5	475	<1 gal	12.49	596	6.42	189.8	1.20	42.4	
0940	19.48	96.4	475		12.63	609	6.53	151.0	0.99	36.4	
0944	19.48	96.2	475		12.92	612	6.61	87.2	0.78	22.7	
0950	19.48	96.5	475	2 gal	12.99	611	6.63	64.0	0.78	21.3	
0954	19.48	96.6	500		13.04	611	6.63	56.0	0.78	17.6	
0958	19.48	96.5	500	3 gal	13.05	610	6.64	45.8	0.66	15.5	
1002	19.48	96.6	500		13.14	610	6.63	38.9	0.60	14.9	
1006	19.48	96.6	500		13.17	609	6.64	33.6	0.59	14.8	
1010	19.48	96.6	500	4 gal	13.23	610	6.64	30.7	0.59	12.0	
1013	19.48	96.6	500		13.19	610	6.64	27.3	0.59	11.5	
1016	19.48	96.6	500		13.19	609	6.64	25.6	0.58	11.2	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1020

* reading fluctuate wildly - recorded lowest reading in 10sec period

YSI # 0152 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHL-22

SCREEN INTERVAL DEPTH: 106.0 - 116.0 ft WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.29 ft

DEPTH, POST PUMP INSERTION 6.50

DEPTH SAMPLED: 111 ft REFERENCE POINT: (PVC) OR CASING 220.49 (DEPTHS RECORDED BENEATH) wellsheet (PB) ~~236.~~ NGVD

DATE: 16 Nov 04 TIME: 1200 start

RECORDED BY: JK KM WM (PB) NM AG SIGNATURE: P.B.

SAMPLED BY: JK KM WM (PB) NM AG SIGNATURE: P.B.

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3) VOC'S 3 x 40ml glass vials (HCl)

Cyanide 1 x 250ml HDPE (NaOH) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (H2SO4)

TSS 1 x 1L HDPE TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
~~1242~~ 1222hrs	6.70	62.7	240	≃ 3 ~~gal~~ liters	10.36	737	5.91	227.9	1.68	14.4	
1232hrs	6.75	62.7	240	≃ 4 liters	10.48	760	6.59	172.0	1.00	13.6	
1237	6.77	62.7	200	~ 5 liters	10.54	760	6.69	145.8	0.86	4.4	
1244	6.75	62.7	160	~ 9 liters	10.57	758	6.76	117.2	0.69	1.70	New range on turbidimeter
1248	6.76	62.7	200	~ 10 liters	10.61	758	6.77	109.1	0.63	1.05	
1251	6.75	62.7	210	~ 11 liters	10.60	759	6.78	102.7	0.58	0.62	
1254	6.75	62.7	240	~ 11 liters	10.60	758	6.78	98.0	0.55	0.59	
1257	6.75	62.7	200	~ 12+ liters	10.61	757	6.79	92.6	0.51	0.43	
1310	SAMPLE TIME										

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1310

YSI # 99E 0152 AA TURBIDITY # 904151 Pump - Grunfos Redi-flow II

SCREEN DEPTH is from TOPVC. All water levels were measured to TOCasing.

GWM WELL # SHM-96-22B

SCREEN INTERVAL DEPTH: 62.7' - 92.7' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.37'

DEPTH, POST PUMP INSERTION 7.38'

toc = tpvc + 1.21ft

DEPTH SAMPLED: 79 Feet [From TOCasing] REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 16 NOV 04 TIME: 1410

RECORDED BY: JK KM WM (PB) NM AG SIGNATURE: P. Blum

SAMPLED BY: JK KM WM (PB) NM AG SIGNATURE: P. Blum

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)	VOC'S 3 x 40ml glass vials (HCl)
Cyanide 1 x 250ml HDPE (NaOH)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (H2SO4)
TSS 1 x 1L HDPE	TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1441	7,40	65,5	480		10.05	717	7,32	294,6	4,92	50,4	
1445	7,42	65,5	400	~3 l	10,27	728	7,03	291,0	2,17	55,2	
1448	7,41	63,2	260	~4 l	10,35	727	6,95	202.0	1,38	46,0	
1452	7,41	63,2	200	~5 l	10:31	727	6,87	17,2	1,34	32,3	
1458	7,41	63,2	300	~6 l (+?)	10,33	718	6,84	-53,8	1,14	22,5	
1503	7,41	63,2	300	~8 l	10,39	714	6,86	-73,3	0,98	19,6	
1507	7,40	63,2	300	~10 l	10,44	712	6,87	-80,6	0,80	17,2	
1510	7,40	63,2	300	~11 l	10 44	712	6,87	-84,8	0,78	15,4	
1513	7,40	63,2	280	~12 l	10,41	710	6,87	-87,2	0,73	15,0	
1520	SAMPLE TIME.										

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1520 hours

YSI # 99E0152 AA TURBIDITY # 904151 Pump - Grunfos Redi-flow II

GWM WELL # SHM 93 22C

SCREEN INTERVAL DEPTH: 124.3 - 134.3' WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.43'

DEPTH, POST PUMP INSERTION 6.20'

DEPTH SAMPLED: 129'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) NGVD

DATE: 11-16-04 TIME: 1240

RECORDED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy McNeely

SAMPLED BY: JK KM WM PB (NM) AG SIGNATURE: Nancy McNeely

U.S. Army Corps of Engineers

Groundwater Sampling Log Sheet

Project Name: Shepley's Hill Landfill, Devens, MA

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (HNO3)
Cyanide 1 x 250ml HDPE (NaOH)
Anions,Alkalinity,TDS 1 x 500ml HDPE
TSS 1 x 1L HDPE
VOC'S 3 x 40ml glass vials (HCl)
BOD 1 x 1L HDPE
COD 1 x 250mL HDPE (H2SO4)
TOC 2 x 40ml glass vials (H2SO4)

TIME (24hr)	WATER DPTH BELOW MP (feet)	PUMP SETTING	PURGE RATE (ml/min)	CUM. VOLUME PURGED (gal)	WATER TEMP (°C)	SPECIFIC COND. (µS/cm)	pH	ORP/Eh (mv)	D. O. (mg/L)	TURBIDITY (NTU's)	COMMENTS
1419	28.12	120.2	950	14 gal	10.89	436	7.52	-159.0	0.04	2.52	sulfer odor
1424	29.19	119.4	400	15.5	10.91	415	7.49	-202.1	0.06	2.06	" "
1427	29.74	119.4	400	16g	10.88	414	7.49	-220.3	0.07	2.46	light sulfer
1431	29.93	119.4	250		10.73	411	7.49	-227.7	0.08	2.2	
1435	30.12	119.4	250		10.66	412	7.48	-232.0	0.08	2.18	
1438	30.17	119.4	250	16.5	10.64	412	7.48	-235.1	0.08	1.93	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1445

Well has history of poor recharge - a stable water level is found after initially drawing the level down 20-30 ft, so the above readings are taken after drawing down at a higher flowra

YSI # 851 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

APPENDIX C

CHAIN OF CUSTODY FORMS

SEVERN TRENT **STL**

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:
Company: U.S. Army Corps of Engineers
Address: 696 Virginia Road, Concord MA 01742
Contact: Mark Koenig
Phone: 978 318 8312
Fax: 978 318 8663
Contract/Quote:

Invoice to:
Company: same
Address:
Contact:
Phone:
Fax:

Lab Use Only
Due Date:
Temp. of coolers when received (C°): 1 2 3 4 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity ☐

Sampler's Name: Bill Mullen, Paul Young
Sampler's Signature: Paul Young [signature]

Proj. No.: EØ77L
Project Name: Shepley's Hill Landfill LTM

ANALYSIS REQUESTED: VOC 8260B; TOC 9060; TAL Metals 6010B; Cyanide 9010B - Hardness 2340B; Anions 300, Alkalinity 310.1, TDS 160.1; TSS 160.2; BOD5 405.1; COD 410.4

Matrix[1]	Date 2004	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt	250 ml	P/O	VOC 8260B	TOC 9060	TAL Metals 6010B	Cyanide 9010B - Hardness 2340B	Anions 300, Alkalinity 310.1, TDS 160.1	TSS 160.2	BOD5 405.1	COD 410.4		Lab/Sample ID (Lab Use Only)
W	3 MAY	1000		X	SHL-3	3	3		6	3	3	1	1	1	1	1	1		~~CN Sample~~
W	3 MAY	1000		X	SHM-93-10C	3	3		6	3	3	1	1	1	1	1	1		
W	3 MAY	1145		X	SHL-10	3	3		6	3	3	1	1	1	1	1	1		
W	3 MAY	1240		X	SHL-19	3	3		6	3	3	1	1	1	1	1	1		
W	3 MAY	1240		X	SHL-19MS	3	3		3	3	3	1	1	1					
W	3 MAY	1240		X	SHL-19MSD	3	3		2	3	3	1	1						
~~W~~				~~X~~	~~SHL-4~~ PY 5/3/04	~~3~~	~~3~~		~~6~~	~~3~~	~~3~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~	~~1~~		
W	3 MAY	–		X	TRIP BLANK	1				1									

Paul Young [signature]

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Paul Young	5-3-04	1730	FEDEX AIRBILL # 835310232430		

Remarks: CN - Samples preserved w/ NaOH, no ascorbic acid.

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other ________

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT **STL**

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:
Company: U.S. Army Corps of Engineers
Address: 696B Virginia Road
Concord MA 01742
Contact: Mark Koenig
Phone: 978 318 8312
Fax: 978 318 8663
Contract/ Quote:

Invoice to:
Company: Same
Address:
Contact:
Phone:
Fax:

Sampler's Name: Don Hassett, Paul Young
Sampler's Signature: Don Hassett Paul Young

Proj. No.: E0776
Project Name: Shepley's Hill Landfill LTM

Lab Use Only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

Matrix[1]	Date 2004	Time	Comp	Grab	Identifying Marks of Sample(s)	No/Type of Containers[2] VOA	Amber/Clear 1 Liter	250 ml	P/O	VOC 8260B	TOC 9060	TAL Metals 6010B - Hardness 2340B	Cyanide 9010B	Anions 300	Alkalinity 310.1	TSS 160.2	TDS 160.1	BOD 405.1	COD 410.4	Lab/Sample ID (Lab Use Only)
W	11 May	1005		X	SHL-4	3	3		6	3	3	1	1	1	1	1	1			
W		1020		X	SHL-20	3	3		6	3	3	1	1	1	1	1	1			
W		1130		X	SHL-11	3	3		6	3	3	1	1	1	1	1	1			
W		1305		X	SHL-9	3	3		6	3	3	1	1	1	1	1	1			
W		1350		X	SHM-93-22C	3	3		6	3	3	1	1	1	1	1	1			
W		-		-	TRIP BLANK	1				1										
					KAM															

Relinquished by: (Signature)	Date	Time	Received by: (Signature) FEDEX AIRBILL #835310232842	Date	Time
Kathryn Miller	5-4-04	1445			
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time

Remarks: 1 Cooler Shipped

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT **STL**

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:
Company: U.S. Army Corps of Engineers
Address: 696 Virginia Road
Concord MA 01742
Contact: Mark Koenig
Phone: 978 318 8312
Fax: 978 318 8663
Contract/Quote:

Invoice to:
Company: same
Address:
Contact:
Phone:
Fax:

Analysis Requested: VOC 8260B; TOC 9060; TAL metals 6010B - Hardness 2340B; Cyanide 9010B; Anions 300, Alkalinity 310.1, TDS 160.1; TSS 160.2; BOD5 405.1; COD 410.4

Lab Use Only
Due Date:
Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5
Custody Seal N / Y
Intact N / Y
Screened For Radioactivity ☐

Sampler's Name: Paul Young, Jack Keenan, Patrick Simmons
Sampler's Signature: Paul Young, [signature], P. Blu[signature]

Proj. No.: E0776
Project Name: Shepley's Hill Landfill LTM

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	1 L A/G	250 ml	P/O	VOC 8260B	TOC 9060	TAL metals 6010B - Hardness 2340B	Cyanide 9010B	Anions 300, Alkalinity 310.1, TDS 160.1	TSS 160.2	BOD5 405.1	COD 410.4	Lab/Sample ID (Lab Use Only)
W	2004 5 MAY	0950		X	SHL-22	3	3		6	3	3	1	1	1	1	1	1	
W	↓	1020		X	SHM-96-22B	3	3		6	3	3	1	1	1	1	1	1	
W	↓	1130		X	SHL-5	3	3		6	3	3	1	1	1	1	1	1	
W	↓	1240		X	SHM-96-5C	3	3		6	3	3	1	1	1	1	1	1	
W	↓	1320		X	SHM-96-5B	3	3		6	3	3	1	1	1	1	1	1	
W	↓	1320		X	SHL-DUP-04A	3	3		6	3	3	1	1	1	1	1	1	Dup. sample taken
W	↓	1415		X	SHL-EB-04A	3	3		6	3	3	1	1	1	1	1	1	at well #SHM-96-5B
W	↓	—		X	TRIP BLANK	1				1								

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Katherine Miller	5-5-04	1445	FEDEX AIRBILL #835310232419		

Remarks: 2 coolers shipped

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

U.S. ARMY CORPS OF ENGINEERS QA Sample

AMRO Environmental Laboratory Corp
111 Herrick Street, Merrimack NH 03054

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
EP776	Shepley's Hill Landfill LTM

SAMPLERS: *(Signature)*
P BLUMERIS P. Blumeris

STA. NO.	DATE 2004	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260B	TOC 9060	CP10B TAL Metals - 2340B Hardness	Cyanide 9010B	300 Anions, Alkalinity	TSS 160.2	BOD5 405.1	COD 410.4	REMARKS
QA	5 MAY	1320		X	SHM-QA-5B-QA	12	3	3	1	1	1	1	1	1	
	↓	–		X	TRIP BLANK	2	2								

KMM 5-5-04

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Katherine Devlin	5-5-04 1430	FEDEX AIRBILL # 835310232441			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks: Matrix - water; 1 Cooler Shipped	

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

7309

SEVERN TRENT **STL**

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:
Company: V.S. Army Corps of Engineers
Address: 696 Virginia Road
Concord MA 01742
Contact: Mark Koenig
Phone: 978 318 8312
Fax: 978 318 8663
Contract/ Quote:

Invoice to:
Company: Same
Address:
Contact:
Phone:
Fax:

Sampler's Name: Paul Young, Jack Keenan
Sampler's Signature: Jack A. Ke Paul Young

Proj. No.: E#774
Project Name: Shepley's Hill LTM

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No/Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	Lab/Sample ID (Lab Use Only)
~~W~~				X	~~SHM-99-31A~~	3	3		6	NOT Sampled
W		1120		X	SHM-99-31B	3	3		6	
W		1126		X	SHM-99-31C	3	3		6	
W		-		X	TRIP BLANK	2				

ANALYSIS REQUESTED: VOCs 8260B; TOC 9060; TAL metals Hardness 2340B; Cyanide 9010B; Anions 300 - 9010B TDS 160.1; Alkalinity 310.1; TSS 160.2; BOD5 405.1; COD 410.4

Lab Use Only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

KKM 5-6-04

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Katherine Miller	5-6-04	1300	FEDEX AIRBILL #831951198590		
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature	Date	Time

Remarks: 2 Coolers Shipped
1 Cooler w/ samples
1 Cooler w/ unused bottles

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

STL cannot accept verbal changes.
Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT **STL**

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to:
Company: US Army Corps of Engineers	Company: Same
Address: 696 Virginia Road, Concord MA 01742	Address:
Contact: Mark Kwenig	Contact:
Phone: 978 318 8312	Phone:
Fax: 978 318 8663	Fax:
Contract/ Quote:	

Sampler's Name: Patrick Blumeris, Bill Mullen — Sampler's Signature: P. Blum (for Bill Mullen)

Proj. No.: E0776 — Project Name: Shepley's Hill Landfill LTM

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No/Type of Containers[2]: VOA	A/G 1 Lt.	250 ml	P/O	VOCs 8260B	TOC 9060	TAL Metals 6010B, Hardness 2340B	Cyanide 9010B	Anions 300.0, Alkalinity 310.1, TDS 160.1	TSS 160.2	BOD 405.1	COD 410.4	Lab/Sample ID (Lab Use Only)
GW	15 NOV 2004	0955		X	SHL-3	5	-	2	4	3	2	1	1	1	1	1	1	
		1010		X	SHM-93-10C	5	-	2	4	3	2	1	1	1	1	1	1	
		1140		X	SHL-10	5	-	2	4	3	2	1	1	1	1	1	1	
		1310		X	SHL-19	5	-	2	4	3	2	1	1	1	1	1	1	
		1310		X	SHL-19 MS	5	-	1	2	3	2	1	1	1	-	-	-	
		1310		X	SHL-19 MSD	5	-	1	1	3	2	1	1	-	-	-	-	
		1340		X	SHL-4	5	-	2	4	3	2	1	1	1	1	1	1	
		-		X	TRIP BLANK	2					2							
	KAM 11-15-04																	

Lab Use Only
Due Date:

Temp. of coolers when received (C°):

1	2	3	4	5

Custody Seal Intact: N / Y

Screened For Radioactivity: ☐

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Katherine Miller	11-15-04	1500	FED EX AIRBILL # 847870578469		
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Remarks: 2 Coolers Shipped

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil

[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT STL

SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to:
Company: US Army Corps of Engineers	Company: Same
Address: 696 Virginia Road	Address:
Concord MA 01742	
Contact: Mark Kwesig	Contact:
Phone: 978 318 8312	Phone:
Fax: 978 318 8663	Fax:
Contract/ Quote:	

Sampler's Name: Patrick Blumeris, Nancy McNally
Sampler's Signature: P Blu, Nancy McNally

Proj. No.: E0776
Project Name: Sheeleys Hill Landfill LTM
No/Type of Containers²

ANALYSIS REQUESTED: VOCs 8260B; TOC 9060; TAL Metals 6010B, Hardness 2340B; Cyanide 9010B; Anions 300.0, Alkalinity 310.1, TDS 160.1; TSS 160.2; BOD5 405.1; COD 410.4

Lab Use Only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal N / Y
Intact N / Y

Screened For Radioactivity ☐

Matrix¹	Date 2004	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	Lab/Sample ID (Lab Use Only)
GW	16 NOV	1020		X	SHL-20	5	-	2	4	
		1030		X	SHL-11	5	-	2	4	
		1250		X	SHL-9	5	-	2	4	
		1310		X	SHL-22	5	-	2	4	
		1445		X	SHM-93-22C	5	-	2	4	
		1520		X	SHM-96-22B	5	-	2	4	
W		-		X	TRIP BLANK	2				

KAM 11-16-04

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Katherine Miller	11-16-04	1540	FEDEX AIRBILL #847876578394		
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Remarks: 2 Coolers Shipped

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

¹Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
²Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

SEVERN TRENT **STL**
SEVERN TRENT LABORATORIES, INC.

STL Burlington
208 South Park Drive, Suite 1
Colchester, VT 05446 Tel 802 655 1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to:
Company: US Army Corps of Engineers	Company: Same
Address: 696 Virginia Road	Address:
Concord MA 01742	
Contact: Mark Koenig	Contact:
Phone: 978 318 8312	Phone:
Fax: 978 318 8163	Fax:
Contract/ Quote:	

Sampler's Name: Jack Keenan, Nancy McNally Sampler's Signature: Jack A. Keenan, Nancy McNally

Proj. No.: E0776 Project Name: Shepley's Hill Landfill LTM

Matrix[1]	Date 2004	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	VOCs 8260B	TOC 9060	TAL Metals 6010B, Hardness 2340B	Cyanide 9010B	Anions 300.0, Alkalinity 310.1, TDS 160.1	TSS 160.2	BOD5 405.1	COD 410.4	Lab/Sample ID (Lab Use Only)
GW	17 NOV	1005		X	SHM-96-5B	5	-	2	4	3	2	1	1	1	1	1	1	
		1040		X	SHM-96-5C	5	-	2	4	3	2	1	1	1	1	1	1	
		1025		X	SHL-DUP-04B	5	-	2	4	3	2	1	1	1	1	1	1	
		1118		X	SHL-5	5	-	2	4	3	2	1	1	1	1	1	1	
		1150		X	SHL-EB-04B	5	-	2	4	3	2	1	1	1	1	1	1	
W		-		X	TRIP BLANK	2				2								

KAM 11-17-04

Lab Use Only
Due Date:

Temp. of coolers when received (C°): 1 | 2 | 3 | 4 | 5

Custody Seal Intact: N / Y

Screened For Radioactivity: ☐

Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Kathleen Miller	11-17-04	1800	FEDEX AIRBILL #827491009641		
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time
Relinquished by: (Signature)	Date	Time	Received by: (Signature)	Date	Time

Remarks: 2 Coolers Shipped

Client's delivery of samples constitutes acceptance of Severn Trent Laboratories terms and conditions contained in the Price Schedule.

[1]Matrix WW - Wastewater W - Water S - Soil L - Liquid A - Air bag C - Charcoal Tube SL - Sludge O - Oil
[2]Container VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other _____

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1248

STL8234-200 (12/02)

U.S. ARMY CORPS OF ENGINEERS (Contact: Mark Koenig / 9783188312)

QA Sample

AMRO Environmental Laboratory Corp.
111 Herrick Street, Merrimack NH 03054

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
E#776	Shepley's Hill Landfill LTM

SAMPLERS: *(Signature)*

Nancy McNally

~~STA. NO.~~ MATRIX	DATE 2004	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOCs 8260B	TPC 9010	TAL metals 6010B Hardness 2340B	Cyanide 9010B	Anions 300.0 Alkalinity 310.1 TDS 160.1	TSS 160.2	BOD5 405.1	COD 410.4	REMARKS
GW	11/17	1005		X	SHM-96-5B-QA	11	3	2	1	1	1	1	1	1	
W	↓	—		X	TRIP BLANK	2	2								

KMQ 11-17-04

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)* FEDEX AIRBILL #	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Katherine Miller	11-17-04 / 1100	827491009663			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks: Routine Service Report to: US Army Corps of Engineers 696 Virginia Road, Concord MA 01742	

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

Page 1 of 1

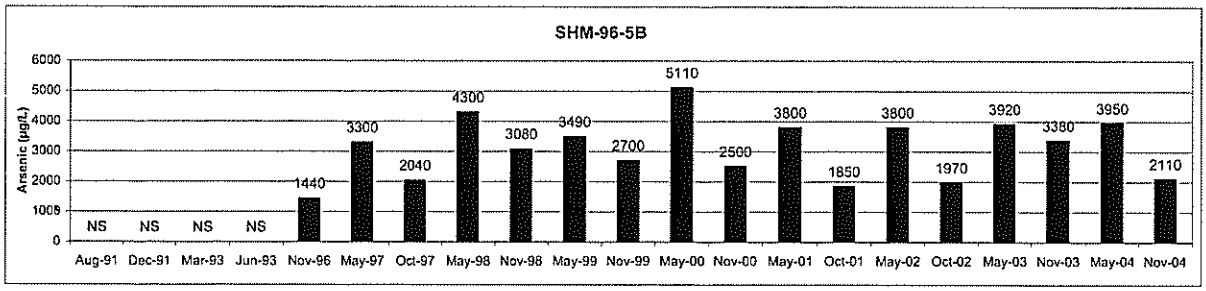
10193

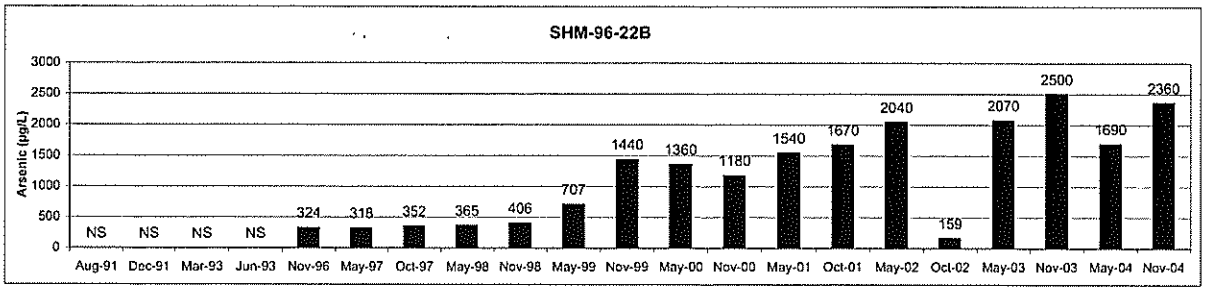
SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

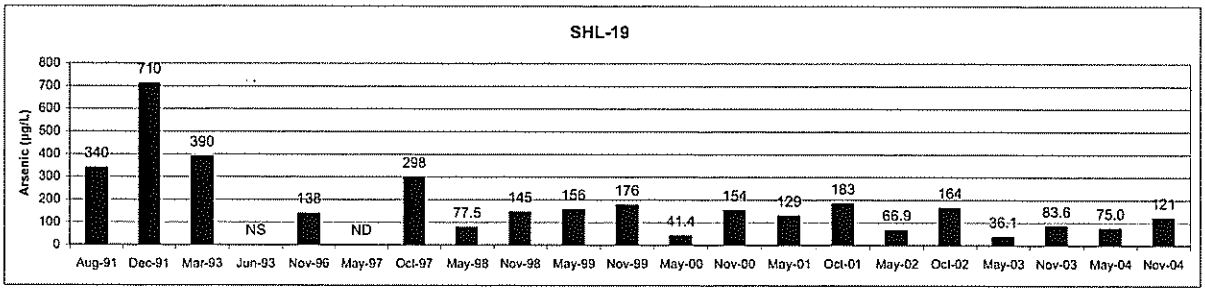
APPENDIX D

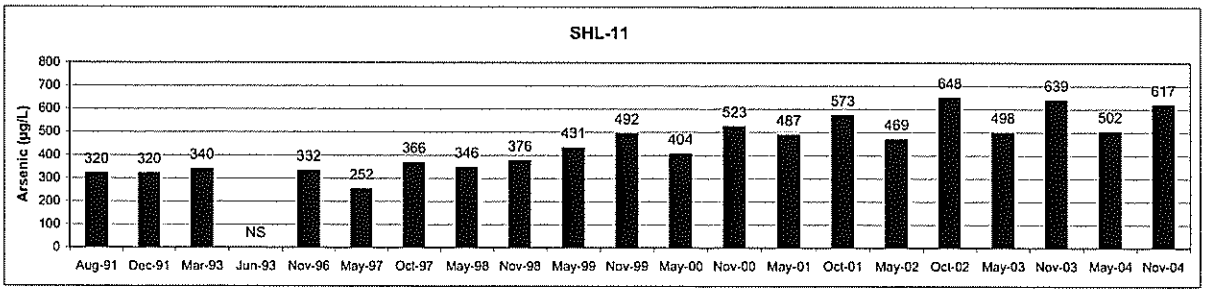
COMPARISON OF ARSENIC RESULTS

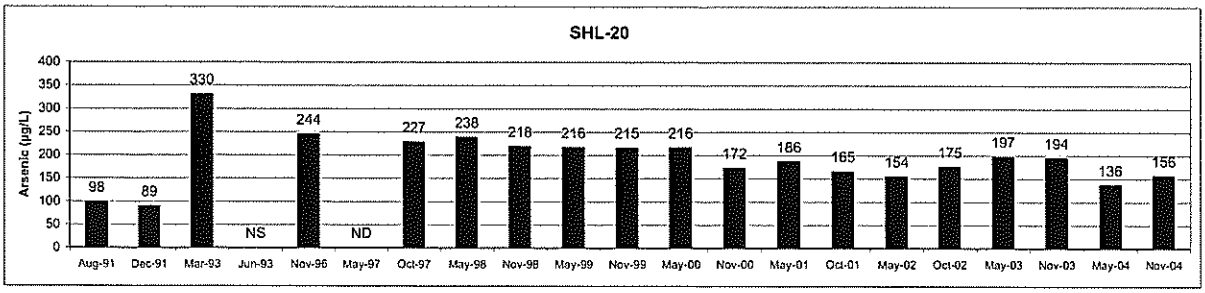
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L









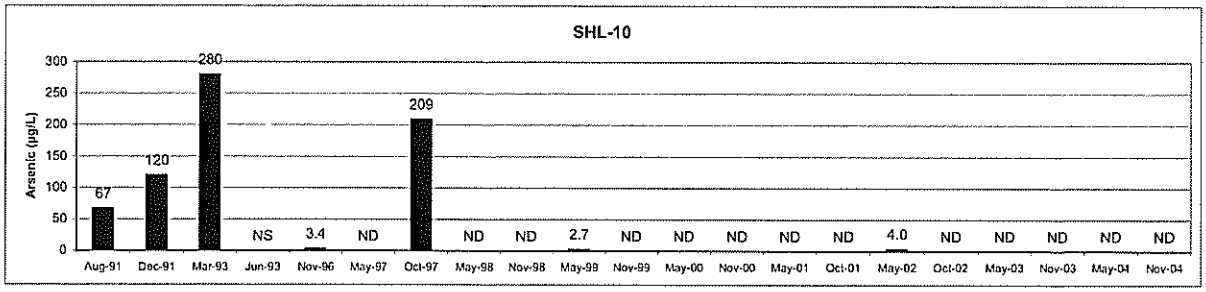


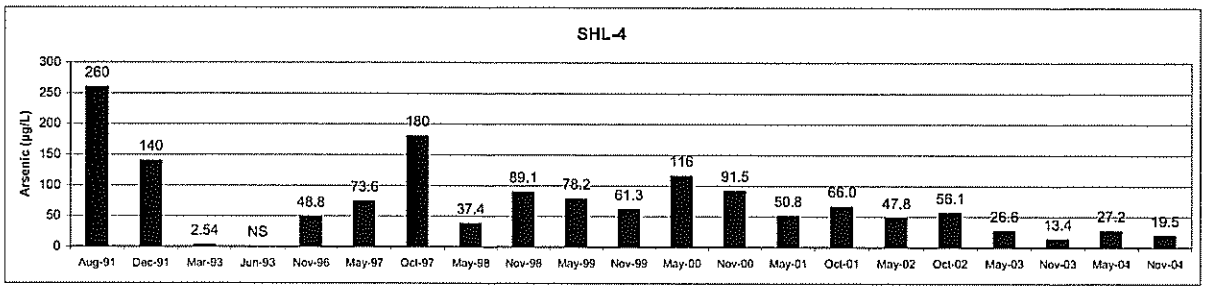
NOTES:

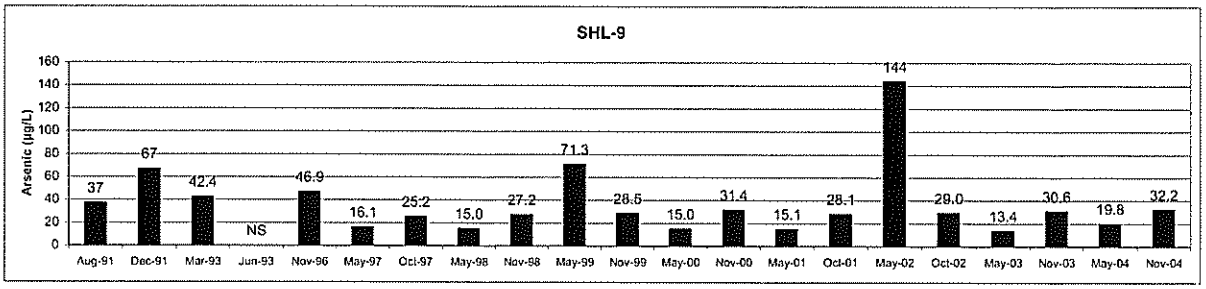
NS: Not Sampled
ND: Not Detected

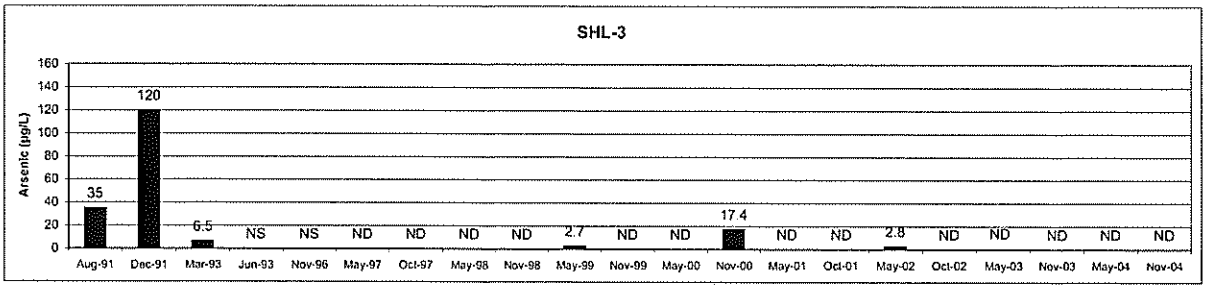
Charts are displayed in order of decreasing historical maximum arsenic concentrations

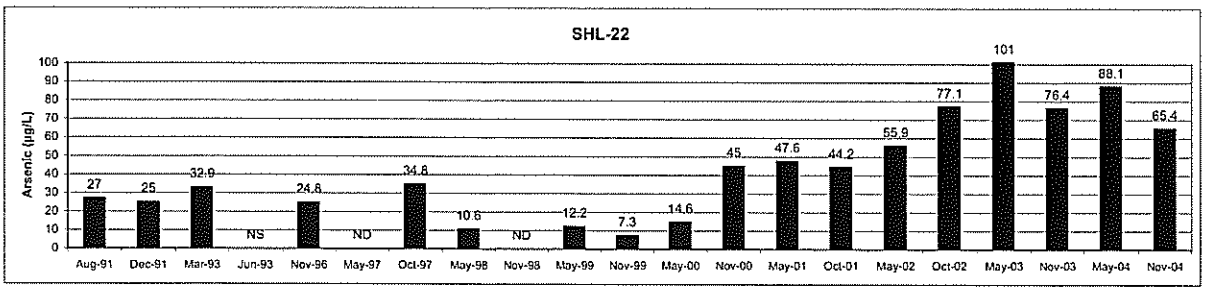
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L









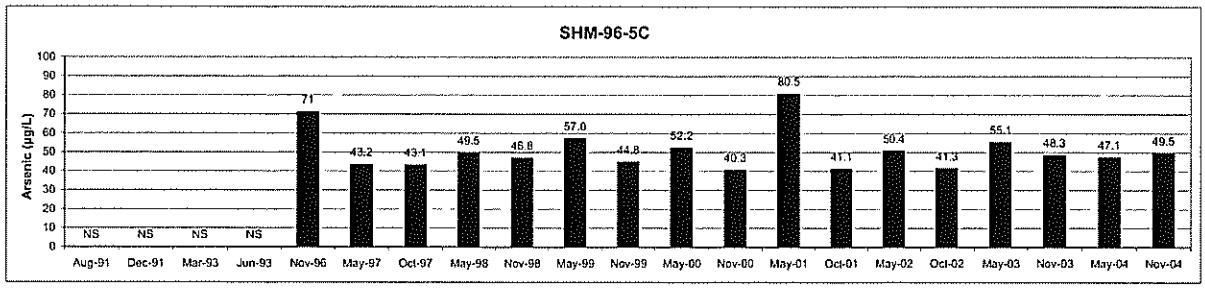


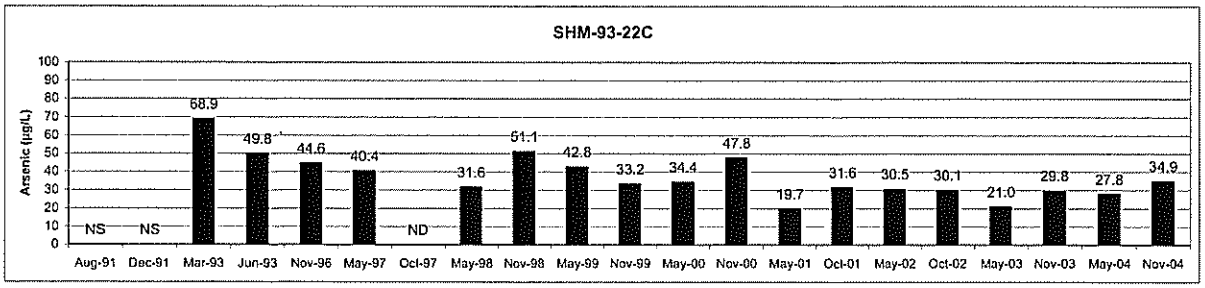
NOTES:

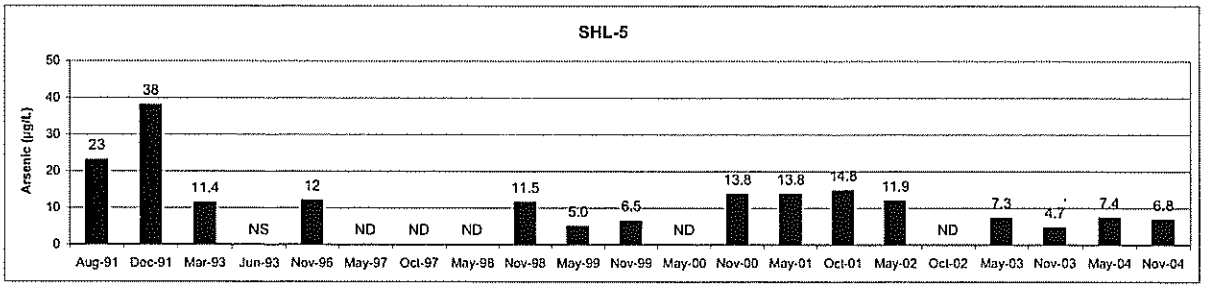
NS: Not Sampled
ND: Not Detected

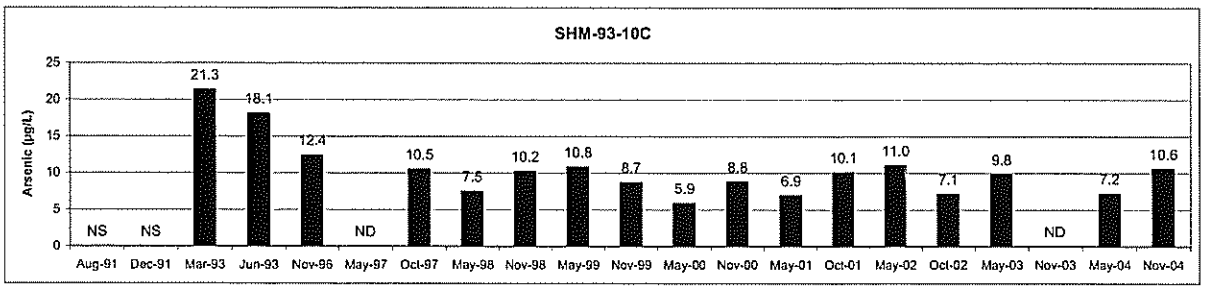
Charts are displayed in order of decreasing historical maximum arsenic concentrations

SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
CLEANUP LEVEL = 50 µg/L









NOTES:

NS: Not Sampled
ND: Not Detected

Charts are displayed in order of decreasing historical maximum arsenic concentrations

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

APPENDIX E

DATA QUALITY EVALUATION REPORTS

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Data Quality Evaluation Report
Spring 2004

Data Validation Report
For
Shepley's Hill Landfill, Devens, MA
Long Term Monitoring Groundwater Samples
Samples Collected May 3rd, 4th, 5th, and 6th, 2004

Introduction

Groundwater samples from sixteen locations were collected on May 3, 4, 5, and 6, 2004. Fourteen were collected from Shepley's Hill Landfill at the former Fort Devens and two from the Molumco Road wells (off-site), Ayer, Massachusetts. Normally, four wells are sampled off of Molumco Road, but monitor well SHM-99-32X was damaged by a snowplow and has not been repaired yet. Also, monitoring well SHM-99-31A was not sampled due to frost heave damage. Therefore these two wells were not sampled. The samples were analyzed at Severn Trent Laboratories (in Colchester, VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). Refer to the Groundwater Analytical Results Table.

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW-846 guidance, with guidelines provided in "Appendix I- Shell for Analytical Chemistry Requirements" of "EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans", dated 1 February 2001, and with EM 200-1-10, "Guidance for Evaluating Performance Based Chemical Data Packages", dated 31 January 2003.

Sample Shipment and Receipt

All sample coolers were packed with ice in the field. Sample shipments were received at the laboratory on May 4, 5, 6, and 7, 2004. All samples were appropriately preserved by the procedures shown in Table 8-1. There are no sample shipment or receipt anomalies associated with these samples.

Holding Times

Samples were prepared and analyzed in accordance with the methods and holding time requirements cited in Table 8-1, except for alkalinity and BOD5, where the 48-hour holding time for BOD5 and the 14-day holding time for alkalinity were marginally exceeded. The following samples were affected for the alkalinity and BOD5 analyses; SHL-22, SHM-96-22B, SHL-5, SHM-96-5B, SHL-DUP-04A, and SHL-EB-04A were performed beyond the method specific holding times. The TDS and BOD5 results for these wells are qualified as "H" for holding time exceedances. Refer to the Groundwater Analytical Results Table.

Volatile Organic Compound (VOC) Analysis

Sixteen groundwater samples were analyzed for VOCs using SW846 method 5030/8260B. In addition to the seventeen groundwater samples, the laboratory analyzed: one field duplicate (SHM-DUP), a duplicate of sample SHM-96-5B); four trip blanks (dated 5/3/04, 5/4/04, 5/5/05 and 5/6/04); and one equipment blank (SHL-EB, dated 5/5/04).

Initial Calibrations: All of the Method 8260B specific initial calibration acceptance criteria were within the acceptance limits for all of the target analytes and surrogates.

Continuing Calibration Verifications: All of the Method 8260B specific continuing calibration verifications were within the acceptance limits of 20% difference for all of the target analytes and surrogates, except for only a few select compounds (acetone, tetrachloroethene, 1,2-dibromo-3-chloropropane) in two out of three of the CCVs performed. These affected compounds will require an additional "J" qualifier to denote an estimated value.

Laboratory Method Blank, Trip Blank and Equipment Blank Results: Target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) or reporting limit (RL) for all the associated method blanks and trip blanks. The three associated method blanks (VBLKI7, VBLKJ2, and VBLKK6) were reported to contain estimated levels of 1,2,4-trichlorobenzene, hexachlorobutadiene, naphthalene, sec-butylbenzene, n-butylbenzene and 1,2,3-trichlorobenzene which were below the PQL or RL. The samples affected were appropriately qualified by the laboratory with a "B", denoting that these target analytes were also detected in their associated method blanks. The four trip blank samples did not have any reported detections below the PQL or RL. The equipment blank sample exhibited methylene chloride contamination at 7.0 ug/L. Since methylene chloride was not detected in any of the samples, the data did not require qualification for this target analyte. All results are acceptable, valid, and useable based on field, shipping and laboratory contamination.

Field Duplicate Sample Results: VOC results for sample SHM-96-5B, and its duplicate, sample SHM-DUP-04A, showed less than 20 % relative percent difference (RPD) for all target analytes detected. The field duplicate sample showed acceptable comparative results.

Surrogate Results: All VOC sample surrogate recoveries are within the laboratory's stated acceptance limits. All results are acceptable based on surrogate recoveries.

Laboratory Control Sample/Laboratory Control Duplicate (LCS/LCSD): The laboratory reported three sets of LCS/LCSD's (identified as OVZG LCS, OVZH LCS and OWAA LCS) were performed with the samples. The laboratory reported that all of the target analytes were within the laboratory's acceptance limits for accuracy and precision, except for a few marginal exceedances. Only 4 out of 168, 4 out of 168, and 0 out of 168 of the target analytes exceeded their percent recoveries for the respective LCS/LCSDs performed. None of these LCS target analyte outages were detected in any of the samples and did not significantly affect the sample results. According to the USACE document EM 200-1-3, Appendix I, "Shell For Analytical Chemistry Requirements", six sporadic marginal failures are allowed to exceed the LCS

acceptance limits for Method 8260B with a list of 84 target analytes. All of the 84 target analytes were spiked into the LCS/LCSD samples. The LCS/LCSD QC sample results support the sample data and all of the VOC results are acceptable, valid, and usable.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results: One set of matrix spike/matrix spike duplicate (MS/MSD) samples was submitted to the laboratory for analysis. The MS/MSD was performed on sample SHL-19. All of the 84 target analytes were spiked into the MS/MSD samples. The laboratory reported that 7 out of 184 of the target analytes were outside of the laboratory's acceptance limits for accuracy, and 0 out of 84 of the values were outside the laboratory's acceptance limits for precision (RPDs). The outages of 2-chloroethyl vinyl ether indicate a low bias to the sample results for this target analytes and are qualified as "UJ". Historically, these compounds have not been reported at the site and the qualified undetected values are not considered significant. The compound 2-chloroethyl vinyl ether exhibited zero percent recoveries in both the matrix spike and the matrix spike duplicate samples, which the laboratory suspects may be attributed to the acid preservation of the sample. The low bias is noted and all results are acceptable, valid, and usable with the stated validation qualifiers. The recoveries of bromomethane, 2-chlorotoluene, and 1,1,2,2-tetrachloroethane exhibited marginally high recoveries in the MS and MSD QC samples, however since none of these compounds were detected in the original sample, the results would not be affected and require no qualification.

Tentatively Identified Compounds (TICs): The laboratory reported that tentatively identified compounds were detected for the volatile organic analyses in samples, SHL-4, SHL-20, SHL-11, SHL-9, SHM-93-22C, Trip Blank, SHL-22, and SHM-96-22B.

Target Analyte List (TAL) Metals Analysis

Sixteen groundwater samples were analyzed for TAL metals using SW846 method 3050A/6010B and mercury by method 7471A. In addition to the sixteen groundwater samples, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B), one matrix spike on sample SHL-19, and one equipment blank (SHL-EB, dated 5/5/04).

Initial Calibration: All of the Method 6010B and 7471A (mercury) specific initial calibration acceptance criteria were within the acceptance limits for all of the target analytes.

Continuing Calibration Verification: All of the Method 6010B and 7471A (mercury) specific continuing calibration verifications were within the acceptance limits of 90-110% recoveries (80-120% for mercury) for all of the target analytes.

Laboratory Preparation Blank and Equipment Blank Results: Target analytes were undetected at levels above the Contract Required Detection Limit (CRDL) for preparation blank and equipment blank samples, except for zinc, which was detected at 30.9 ug/l. Zinc is a common laboratory contaminate and the results were not affected. All results are acceptable, valid and useable based on laboratory and field contamination.

Field Duplicate Sample Results: The results of the metals for sample SHM-96-5B, and its duplicate, sample SHM-DUP, show less than 20% relative percent difference (RPD) for all analytes detected above the CRDL. All results are acceptable for precision.

Laboratory Control Sample: All of the target analytes were within the laboratory's acceptance limits for all of the LCS samples. All results are acceptable, valid and usable.

Matrix Spike (MS) and Post Digestion Spike: One set of matrix spike (MS) and duplicate samples was analyzed for this project. The MS was performed on sample SHL-19S. All MS recoveries are within the 75-125% recovery acceptance limits, except for silver at 151.8% recovery. The laboratory suspects the high recovery was due to a matrix interference. The result for silver on sample SHL-19 will be qualified as 1.0 UJ ug/l. For analytes, which showed concentrations above the CRDL, the duplicate RPDs are within the 20% acceptance limit. All of the metals results for the post digestion spike sample were within the 75-125% recovery acceptance limits. All results are acceptable, valid and useable with the noted qualifier applied.

General Inorganic Analyses

Sixteen groundwater samples were analyzed for general inorganic analyses, including Alkalinity by EPA method 310.1, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride) by EPA method 300.0, Biochemical Oxygen Demand (BOD) by EPA method 405.1, Chemical Oxygen Demand (COD) by EPA method 410.1, Total Hardness by Standard Method 2340B, Total Dissolved Solids (TDS) by EPA method 160.1, Total Suspended Solids (TSS) by EPA method 160.2, Total Organic Carbon (TOC) by SW846 method 9060 and Cyanide by EPA method 335.4. In addition, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) and one equipment blank (SHL-EB, dated 5/4/04).

Method Blank and Equipment Blank Results: All target analytes for all of the general inorganic analyses were undetected at levels above the laboratory's reporting limit (RL) or practical quantitation limit (PQL) for method blank samples, except for sulfate performed on 5-7-04, at 0.33 mg/l and chloride performed on 5-8-04, at 0.25 mg/l. None of the affected sample results required qualifications since the results were greater than five times the associated method blank contamination. The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 5.0 mg/l, chloride at 0.24 mg/l, nitrate at 0.23 mg/l, ortho-phosphate at 0.31 mg/l, alkalinity at 6.1 mg/l, BOD5 at 2.1 mg/l and TOC at 5.1 mg/l. The levels of contamination for TDS and alkalinity did not affect the sample results since they were greater than five times the associated equipment blank contamination. The sample results for nitrate, ortho-phosphate, BOD5 and TOC required qualification as a result of the equipment blank contamination. All of the non-detected results for nitrate, ortho-phosphate, BOD5 and TOC were qualified with "UJ", denoting that they were estimated at the laboratory reporting limits. All of the results detected below the stated level of contamination of the equipment blank for nitrate, ortho-phosphate, BOD5, and TOC were qualified with "J", denoting an estimated value. Refer to the Groundwater Analytical Results Table for an evaluation of the qualified general chemistry results.

Field Duplicate Sample Results: The results of the general inorganic analyses for sample SHM-96-5B, and its duplicate, sample SHM-DUP, showed less than 20% relative percent difference (RPD) for all detected analytes for precision. All of the field duplicate inorganic results are acceptable and useable.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD): All of the LCS/LCSD for the general inorganic analyses were within the laboratory's acceptance limits of 85-115% for accuracy and within 20% RPD for precision, except for nitrate and ortho-phosphate performed on 5/5/04, which exceeded the acceptance limits at 117% and 135%, respectively. The initial calibration verifications and continuing calibration verifications also exhibited percent differences above the acceptance limits for nitrate and ortho-phosphate. Samples SHL-3, SHL-10, SHL-19, SHL-20, and SHL-9 were qualified with "J's", which denotes an estimated concentration for nitrate. Sample SHL-4 was qualified with a "J" for phosphate. The sample results are acceptable, valid, and useable with the noted qualifiers applied.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike and duplicate samples was analyzed for Anions, Alkalinity and TOC. All MS and duplicate results were within the laboratory's acceptance limits for accuracy and precision. The laboratory did not perform any MS/MSD on any of the inorganic parameters and they did not perform matrix spikes on all the requested parameters.

Conclusions

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including sample handling/receipt, holding times, initial calibration, continuing calibration verifications, method blank results, equipment blank results, surrogate recoveries, field duplicates, LCS/LCSD, MS/MSD, precision, accuracy, representativeness, completeness, comparability, and sensitivity), all data may be reported without qualification and was supported by the associated laboratory QC, except as summarized below:

- Volatiles By Method 5030B/8260B: All of the volatile results were valid and acceptable as reported by the STL-VT laboratory. No additional qualification of the sample results were required.

- Metals Analyses: All MS recoveries are within the 75-125% recovery acceptance limits, except for silver at 151.8% recovery. The laboratory suspects the high recovery was due to a matrix interference. The result for silver on sample SHL-19 were be qualified as 1.0 UJ ug/l.

- Alkalinity and Biological Oxygen Demand (BOD5) Analyses: Holding times for alkalinity and BOD5 were exceeded in some cases by as much as 3 days. Alkalinity and BOD5 results for the samples SHL-22, SHM-96-22B, SHL-5, SHM-96-5B, SHL-DUP-04A, and SHL-EB-04A are qualified as "H" for holding time exceedances. The analyses of samples SHL-22, SHM-96-22B, SHL-5, SHM-96-5B, SHL-DUP-04A, and SHL-EB-04A performed on 5/7/04 were 2.5 to 7 hours beyond the method specific holding time. These samples were analyzed

as soon as possible based on the laboratory's defined BOD5 analysis schedule. Refer to the Groundwater Analytical Results Table.

- Nitrate, ortho-phosphate, BOD5 and TOC: The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 5.0 mg/l; chloride at 0.24 mg/l; nitrate at 0.23 mg/l; ortho-phosphate at 0.31 mg/l; alkalinity at 6.1 mg/l; BOD5 at 2.1 mg/l; and TOC at 5.1 mg/l. The levels of contamination for TDS and alkalinity did not affect the sample results since they were greater than five times the associated equipment blank contamination. The sample results for nitrate, ortho-phosphate, BOD5 and TOC required qualification as a result of the equipment blank contamination. All of the non-detected results for nitrate, ortho-phosphate, BOD5 and TOC were qualified with "UJ", denoting that they were estimated at the laboratory reporting limits. All of the results detected below the stated level of contamination of the equipment blank for nitrate, ortho-phosphate, BOD5 and TOC were qualified with "J", denoting an estimated value. Refer to the Groundwater Analytical Results Table for an evaluation of the qualified general chemistry results.

TABLE 8-1

Sample Preparation and Analysis Methods, Containers, Holding Times, and Preservatives

Parameter	Prepa-ration Method	Analysis Method[1]	Sample Container[2]	Minimum Volume	Preservative	Holding Time (VTS)[3]
VOCs	5030B	8260B	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	HCl to pH <2 (No Headspace) 4°+/- 2°C	14 days
Metals [5]	3010A	6010B - Trace ICAP or 7000 series	1-Liter HDPE	300 mL	HNO_3 to pH < 2	180 days (except Hg) 28 days (Hg)
Hardness	NA	SM2340B		100 mL		180 days
Cyanide	NA	335.4	500-mL HDPE	500 mL	NaOH to pH > 12, 4°+/- 2°C	14 days
Anions [6]	NA	300	500-mL HDPE	100 mL	4°+/- 2°C	48 hours for ortho-Phosphate and Nitrate; 28 days for Sulfate and Chloride
Alkalinity	NA	310.1		100 mL		14 days
TDS	NA	160.1		100 mL		48 hours .
COD	NA	410.1	250-mL HDPE	250 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days
BOD5	NA	405.1	1-Liter HDPE	1000 mL	4°+/- 2°C	48 hours
TSS	NA	160.2	1-Liter HDPE	1000 mL	4°+/- 2°C	7 days
TOC	NA	9060	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days

1 "Methods for Chemical Analysis of Water and Wastes", Cincinnati, OH, March 1979, EPA 600-4-79-020. "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", U.S. EPA SW-846, 3rd Edition.
2 Additional sample containers/volume are required for matrix quality control samples.
3 VTS - Verified Time when the Sample was collected.
4 Three vials will be shipped to the laboratory; one will be measured for pH at the laboratory to verify that the sample has been preserved correctly (i.e. pH less than 2).
5 TAL metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.
6 Anions include Nitrate, Sulfate, Orthophosphate and Chloride.

NA = Not Applicable Hg = Mercury

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Data Quality Evaluation Report
Fall 2004

Data Validation Report
For
Shepley's Hill Landfill, Devens, MA
Long Term Monitoring Groundwater Samples
Samples Collected November 15, 16, and 17, 2004

Introduction

Groundwater samples from fourteen locations were collected on November 15, 16, and 17, 2004. The fourteen samples were collected from Shepley's Hill Landfill at the former Fort Devens. Three of the wells near Molumco Road (off-site), Ayer, Massachusetts, were not sampled because the area was flooded. Normally, these three wells are sampled. Monitor well SHM-99-32X, damaged by a snowplow, and monitoring well SHM-99-31A, which was damaged by frost heaves, have not been repaired. The samples were analyzed at Severn Trent Laboratories (in Colchester, VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD5), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). Refer to the Groundwater Analytical Results Table (Table 7-4).

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW-846 guidance, with guidelines provided in "Appendix I- Shell for Analytical Chemistry Requirements" of "EM-200-1-3, Requirements for the Preparation of Sampling and Analysis Plans", dated 1 February 2001, and with EM 200-1-10, "Guidance for Evaluating Performance Based Chemical Data Packages", dated 31 January 2003.

Sample Shipment and Receipt

All sample coolers were packed with ice in the field and shipped to the laboratory by FedEx. Sample shipments were received at the laboratory on November 16, 17, and 18, 2004. All samples were appropriately preserved by the procedures shown in Table 8-1, except for several cyanide samples which required additional sodium hydroxide to adjust the pH to greater than 12. Additional preservative was added by the laboratory upon receipt to the following samples; SHL-20, SHL-11, SHL-22, SHM-96-22B, SHM-96-5B, SHM-96-5C and SHL-DUP-04B. There were no other sample shipment or receipt anomalies associated with these samples.

Holding Times

Samples were prepared and analyzed in accordance with the methods and holding time requirements cited in Table 8-1, except for ortho-phosphate and nitrate, where the 48-hour holding times were exceeded by 7 days for samples SHL-4 and SHL-19. The ortho-phosphate and nitrate results for these two samples are qualified as "H" for holding time exceedances. Refer to the Groundwater Analytical Results Table.

Volatile Organic Compound (VOC) Analysis

Fourteen groundwater samples were analyzed for VOCs using SW846 method 5030/8260B. In addition to the fourteen groundwater samples, the laboratory analyzed: one field duplicate (SHM-DUP), a duplicate of sample SHM-96-5B); three trip blanks (dated 11/15/04, 11/16/04, and 11/17/04); and one equipment blank (SHL-EB, dated 11/17/04).

Initial Calibrations: All of the Method 8260B specific initial calibration acceptance criteria were within the acceptance limits for all of the target analytes and surrogates.

Continuing Calibration Verifications: All of the Method 8260B specific continuing calibration verifications were within the laboratory acceptance limits of 20% difference for all of the target analytes and surrogates, except for only a few select compounds (dichlorodifluoromethane, methyl iodide, vinyl acetate, tetrahydrofuran, tetrachloroethene, and 1,2,3-trichlorobenzene) in the two CCVs performed. Tetrahydrofuran was the only one of these compounds that was detected in samples SHM-96-5B and SHM-96-5C. These affected samples required an additional "J" qualifier to denote an estimated value for tetrahydrofuran.

Laboratory Method Blank, Trip Blank and Equipment Blank Results: Target analytes were undetected at levels above the laboratory's reporting limit (RL) for all the associated method blanks and trip blanks. The associated method blank (VBLKT4) was reported to contain 1,2,3-trichlorobenzene, which was below the RL of 5.0 ug/l, at 1.3 J ug/l. The affected samples were appropriately qualified by the laboratory, with a "B", denoting that this target analyte was also detected in the associated method blank. The three trip blank samples did not have any reported detections below the RL. The equipment blank sample, SHL-EB-04B, exhibited methylene chloride contamination at 12 ug/l. Since methylene chloride was not detected in any of the samples, the data did not require qualification for this target analyte. All results are acceptable, valid, and useable based on field, shipping and laboratory contamination.

Field Duplicate Sample Results: VOC results for sample SHM-96-5B, and its duplicate, sample SHM-DUP-04A, showed less than 20 % relative percent difference (RPD) for all target analytes detected. The field duplicate sample showed acceptable comparative results.

Surrogate Results: All VOC sample surrogate recoveries are within the laboratory's stated acceptance limits. All results are acceptable based on surrogate recoveries.

Laboratory Control Sample/Laboratory Control Duplicate (LCS/LCSD): The laboratory reported two sets of LCS/LCSD's (identified as MCNAB LCS and MCNAC LCS) were performed with the samples. The laboratory reported that all of the target analytes were within the laboratory's acceptance limits for accuracy and precision, except for a few marginal exceedances. Only 6 out of 168 and 5 out of 168 of the target analytes exceeded their percent recoveries for the respective LCS/LCSDs performed. None of these LCS target analyte outages were detected in any of the samples (except for tetrahydrofuran below the RL in sample SHM-96-5B and SHM-96-5C) and did not significantly affect the sample results. According to the

USACE document EM 200-1-3, Appendix I, "Shell For Analytical Chemistry Requirements", six sporadic marginal failures are allowed to exceed the LCS acceptance limits for Method 8260B with a list of 84 target analytes. All of the 84 target analytes were spiked into the LCS/LCSD samples. The LCS/LCSD QC sample results support the sample data and all of the VOC results are acceptable, valid, and usable.

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results: One set of matrix spike/matrix spike duplicate (MS/MSD) samples was submitted to the laboratory for analysis. The MS/MSD was performed on sample SHL-19. All of the 84 target analytes were spiked into the MS/MSD samples. The laboratory reported that 10 out of 168 of the target analytes were outside of the laboratory's acceptance limits for accuracy, and 0 out of 84 of the values were outside the laboratory's acceptance limits for precision (RPDs). The outages of 2-chloroethyl vinyl ether indicate a low bias to the sample results for this target analytes and are qualified as "UJ". Historically, these compounds have not been reported at the site and the qualified undetected values are not considered significant. The compound 2-chloroethyl vinyl ether exhibited zero percent recoveries in both the matrix spike and the matrix spike duplicate samples, which the laboratory suspects may be attributed to the acid preservation of the sample. The low bias is noted and all results are acceptable, valid, and usable with the stated validation qualifiers. The recoveries of vinyl acetate, methacrylonitrile, tetrahydrofuran, and 1,1,2,2-tetrachloroethane exhibited marginally high recoveries in the MS and MSD QC samples, however since none of these compounds were detected in the original sample (except for tetrahydrofuran already qualified with a "J"), the results would not be affected and require no additional qualification.

Tentatively Identified Compounds (TICs): The laboratory reported that tentatively identified compounds were detected for the volatile organic analyses in sample SHL-EB-04B.

Target Analyte List (TAL) Metals Analysis

Fourteen groundwater samples were analyzed for TAL metals using SW846 Method 3050A/6010B and mercury by Method 7471A. In addition to the fourteen groundwater samples, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B), one matrix spike on sample SHL-19, and one equipment blank (SHL-EB, dated 11/17/04).

Initial Calibration: All of the Method 6010B and 7471A (mercury) specific initial calibration acceptance criteria were within the acceptance limits for all of the target analytes.

Continuing Calibration Verification: All of the Method 6010B and 7471A (mercury) specific continuing calibration verifications were within the acceptance limits of 90-110% recoveries (80-120% for mercury) for all of the target analytes.

Laboratory Preparation Blank and Equipment Blank Results: Target analytes were undetected at levels above the Contract Required Detection Limit (CRDL) for preparation blank and equipment blank samples. All results are acceptable, valid and useable based on laboratory and field contamination.

Field Duplicate Sample Results: The results of the metals for sample SHM-96-5B, and its duplicate, sample SHM-DUP, show less than 20% RPD for all analytes detected above the CRDL. All results are acceptable for precision.

Laboratory Control Sample: All of the target analytes were within the laboratory's acceptance limits for all of the LCS samples. All results are acceptable, valid and usable.

Matrix Spike (MS) and Post Digestion Spike: One set of matrix spike (MS) and duplicate samples was analyzed for this project. The MS was performed on sample SHL-19S. All MS recoveries are within the 75-125% recovery acceptance limits. For analytes, which showed concentrations above the CRDL, the duplicate RPDs are within the 20% acceptance limit. All of the metals results for the post digestion spike sample were within the 75-125% recovery acceptance limits. All results are acceptable, valid and useable.

General Inorganic Analyses

Fourteen groundwater samples were analyzed for general inorganic analyses, including Alkalinity by EPA Method 310.1, Anions (Nitrate, ortho-Phosphate, Sulfate, and Chloride) by EPA Method 300.0, Biochemical Oxygen Demand (BOD) by EPA Method 405.1, Chemical Oxygen Demand (COD) by EPA Method 410.1, Total Hardness by Standard Method 2340B, Total Dissolved Solids (TDS) by EPA Method 160.1, Total Suspended Solids (TSS) by EPA Method 160.2, Total Organic Carbon (TOC) by SW846 Method 9060 and Cyanide by EPA method 335.4. In addition, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) and one equipment blank (SHL-EB, dated 11/17/04).

Method Blank and Equipment Blank Results: All target analytes for all of the general inorganic analyses were undetected at levels above the laboratory's reporting limit (RL) for the method blank samples, except for chloride and ortho-phosphate performed on 11-24-04, at 0.31 mg/l and 0.20 mg/l, respectively. None of the chloride sample results required qualifications since the results were greater than five times the associated method blank contamination. All of the affected sample results (SHL-4 and SHL-19) for ortho-phosphate were qualified with a "B", denoting that they were also detected in the method blank performed on 11-24-04. The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 107 mg/l, alkalinity at 6.3 mg/l, BOD5 at 3.1 mg/l, and TOC at 5.7 mg/l. The levels of contamination for TDS, BOD5 and alkalinity affected the sample results since they were greater than five times the associated equipment blank contamination for almost all the samples. The sample results for TDS, BOD5 and TOC required a "B" qualifier, denoting that these target analytes were also detected in the equipment blank. The equipment blank results for TSS, chloride, sulfate, nitrate, ortho-phosphate, COD and hardness were free of contamination. Refer to the Groundwater Analytical Results Table for an evaluation of the qualified general chemistry results.

Field Duplicate Sample Results: The results of the general inorganic analyses for sample SHM-

96-5B, and its duplicate, sample SHM-DUP-04B, showed less than 20% RPD for all detected analytes for precision, except for COD at 35.3% RPD, TDS at 39.9% RPD and TOC at 21.2% RPD. All of the field duplicate inorganic results are acceptable and useable with the noted qualifications.

Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD): All of the LCS/LCSD for the general inorganic analyses were within the laboratory's acceptance limits of 85-115% for accuracy and within 20% RPD for precision, except for the recoveries of ortho-phosphate performed on 11/24/04, which exceeded the acceptance limits at 70% and 75%, respectively. Only a LCS was performed on 11/18/04 for ortho-phosphate, which was recovered above the acceptance limits at 140%. The initial calibration verifications and continuing calibration verifications also exhibited percent differences above the acceptance limits for ortho-phosphate. Several calibration blanks detections of ortho-phosphate above the reporting limit of 0.20 mg/l. All of the ortho-phosphate results were qualified with "J's" or "UJ's", which denotes an estimated concentrations or reporting limits. The sample results are acceptable, valid, and useable with the noted qualifiers applied.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike and duplicate samples was analyzed for Anions and TOC. All MS and duplicate results were within the laboratory's acceptance limits for accuracy and precision, except for sulfate, which was recovered slightly above the acceptance limit of 75-125%, at 126%. The laboratory was not requested to perform any MS/MSDs on any of the inorganic parameters, except TOC, which was not performed or reported. All of the results are valid and useable based on matrix effects and laboratory duplicate precision.

Conclusion

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including sample handling/receipt, holding times, initial calibration, continuing calibration verifications, method blank results, equipment blank results, surrogate recoveries, field duplicates, LCS/LCSD, MS/MSD, precision, accuracy, representativeness, completeness, comparability, and sensitivity), all data may be reported without qualification and was supported by the associated laboratory QC, except as summarized below:

- Volatiles By Method 5030B/8260B: All of the Method 8260B specific continuing calibration verifications were within the acceptance limits of 20% difference for all of the target analytes and surrogates, except for only a few select compounds (dichlorodifluoromethane, methyl iodide, vinyl acetate, tetrahydrofuran, tetrachloroethene, and 1,2,3-trichlorobenzene) in the two CCVs performed. Tetrahydrofuran was the only one of these compounds that was detected in samples SHM-96-5B and SHM-96-5C. These affected samples will require an additional "J" qualifier to denote an estimated value for tetrahydrofuran. The MS/MSD outages of 2-chloroethyl vinyl ether indicate a low bias to the sample results for this target analytes and are qualified as "UJ". Historically, these compounds have not been reported at

the site and the qualified undetected values are not considered significant. The compound 2-chloroethyl vinyl ether exhibited zero percent recoveries in both the matrix spike and the matrix spike duplicate samples, which the laboratory suspects may be attributed to the acid preservation of the sample. The low bias is noted and all results are acceptable, valid, and usable with the stated validation qualifiers.

- Metals Analyses: All of the metals analyses were acceptable and useable as reported by the primary laboratory. No qualification of the metals results were required.

- General Inorganic Chemistry Analyses: The sample results for SHL-4 and SHL-19 for ortho-phosphate were qualified with a "B", denoting that they were also detected in the method blank performed on 11-24-04. The equipment blank was reported to contain the following inorganic target analytes above the reporting limits; TDS at 107 mg/l, alkalinity at 6.3 mg/l, BOD5 at 3.1 mg/l and TOC at 5.7 mg/l. The levels of contamination for TDS, BOD5 and alkalinity affected the sample results since they were greater than five times the associated equipment blank contamination for almost all the samples. The sample results for TDS, BOD5 and TOC required a "B" qualifier, denoting that these target analytes were also detected in the equipment blank. The equipment blank results for TSS, chloride, sulfate, nitrate, ortho-phosphate, COD and hardness were free of contamination. Refer to the Groundwater Analytical Results Table for an evaluation of the qualified general chemistry results.

- The results of the general inorganic analyses for sample SHM-96-5B, and its duplicate, sample SHM-DUP-04B, showed less than 20% relative percent difference (RPD) for all detected analytes for precision, except for COD at 35.3% RPD, TDS at 39.9% RPD and TOC at 21.2 RPD. All of the field duplicate inorganic results are acceptable and useable with the noted qualifications.

- All of the ortho-phosphate results were qualified with "J's" or "UJ's", which denotes an estimated concentrations or reporting limits due to several QC outages in the LCS and calibration blank contamination. The sample results are acceptable, valid, and useable with the noted qualifiers applied.

TABLE 8-1

Sample Preparation and Analysis Methods, Containers, Holding Times, and Preservatives

Parameter	Prepa-ration Method	Analysis Method[1]	Sample Container[2]	Minimum Volume	Preservative	Holding Time (VTS)[3]
VOCs	5030B	8260B	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	HCl to pH <2 (No Headspace) 4°+/- 2°C	14 days
Metals [5]	3010A	6010B - Trace ICAP or 7000 series	1-Liter HDPE	300 mL	HNO_3 to pH < 2	180 days (except Hg) 28 days (Hg)
Hardness	NA	SM2340B		100 mL		180 days
Cyanide	NA	335.4	500-mL HDPE	500 mL	NaOH to pH > 12, 4°+/- 2°C	14 days
Anions [6]	NA	300	500-mL HDPE	100 mL	4°+/- 2°C	48 hours for ortho-Phosphate and Nitrate; 28 days for Sulfate and Chloride
Alkalinity	NA	310.1		100 mL		14 days
TDS	NA	160.1		100 mL		48 hours .
COD	NA	410.1	250-mL HDPE	250 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days
BOD5	NA	405.1	1-Liter HDPE	1000 mL	4°+/- 2°C	48 hours
TSS	NA	160.2	1-Liter HDPE	1000 mL	4°+/- 2°C	7 days
TOC	NA	9060	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days

1 "Methods for Chemical Analysis of Water and Wastes", Cincinnati, OH, March 1979, EPA 600-4-79-020. "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", U.S. EPA SW-846, 3rd Edition.

2 Additional sample containers/volume are required for matrix quality control samples.

3 VTS - Verified Time when the Sample was collected.

4 Three vials will be shipped to the laboratory; one will be measured for pH at the laboratory to verify that the sample has been preserved correctly (i.e. pH less than 2).

5 TAL metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.

6 Anions include Nitrate, Sulfate, Orthophosphate and Chloride.

NA = Not Applicable Hg = Mercury

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

APPENDIX F

CHEMICAL QUALITY ASSURANCE REPORTS

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Chemical Quality Assurance Report
Spring 2004

SHEPLEY'S HILL LANDFILL
LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 5, 2004 - QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-050504

Executive Summary

QA samples from one shipment for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts were analyzed by the QA laboratory, resulting in a total of 101 target analyte determinations. The shipment contained one QA water sample and one trip blank sample and was received in good condition. The data report from the QA laboratory, AMRO, Merrimack, NH, dated 1 June 2004, was used in the comparison. In 40 of these determinations, target analytes were detected by one or both laboratories. Results from the analysis of QA samples were compared with results from analysis of the corresponding primary samples (Reference 12a). The primary and QA samples agreed overall in 99 out of 101 (98.0%) of the comparisons. Primary and QA samples agreed quantitatively in 37 out of 40 (92.5%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. Only two major data discrepancies between results from the primary and QA sample were noted. Refer to Table 1 for a QA split sample data comparison summary.

The QA laboratory's data report was evaluated based on the information that was provided. All of the data comparisons for Methods VOA-8260B, TAL Metals-6010B, CN, Anions, BOD, COD, Alkalinity, TDS, Hardness and TOC were in good overall and quantitative agreement. There were two major discrepancies noted for aluminum and TSS determinations. No obvious explanations could be offered. There was very little bias to any of the QA laboratory's sample results and only a few minor QC deviations were noted in their case narrative. The data is complete, usable and satisfies the DQOs for the project.

The primary laboratory's data report was evaluated based on the information that was provided. As stated above, all of the data comparisons for all of the analyses were in excellent overall and quantitative agreement, except for aluminum and TSS. The primary laboratory's wet chemistry data report has historically lacked some of the information necessary to completely evaluate the batch QC. The primary laboratory has since changed their report format and most of the missing supporting QC information is now present in the report. STL-VT has responded to the Corps request to supply the missing information needed to perform a complete evaluation of the data quality.

The QA and primary laboratory's reporting limits were comparable, except for metals where the QA laboratory's reporting limits were between two and ten times higher. The primary laboratory reported the sample IDs in which tentatively identified compounds (TICs) were

detected. The QA sample SHM-96-5B was reported to contain no TICs. This CQAR is based on the laboratory reporting limits because the detection limits were not always provided or well defined.

QA analyses were performed by AMRO Environmental Laboratories, Inc., 111 Herrick Street, Merrimack, NH, 03054 and Severn Trent Laboratories, Inc., 450 William Pitt Way, Pittsburgh, PA 15238-1330. The primary laboratory was Severn Trent Services, 208 South Park Drive, Suite 1, Colchester, VT, 05446.

Table 1
Quality Assurance Split Sample Data Comparison Summary

		Overall Agreement (1)		Quantitative Agreement (2)	
Method	**Parameter**	**Number**	**Percent**	**Number**	**Percent**
8260B	Volatiles	66/66	100	11/11	100
6020/7471	Metals/Mercury	22/23	95.7	14/15	93.3
9010B	Cyanide	1/1	100	NA	NA
300.0	Anions	4/4	100	3/3	100
410.1	COD	1/1	100	1/1	100
405.1	BOD	1/1	100	NA	NA
310.1	Alkalinity	1/1	100	1/1	100
130.2	Hardness	1/1	100	1/1	100
160.1	TDS	1/1	100	1/1	100
160.2	TSS	0/1	0	0/1	0
9060	TOC	1/1	100	1/1	100
Total		**99/101**	**98.0**	**37/40**	**92.5**

NOTES:
(1) Represents the number and percentage agreement of all determinations including analytes not detected by either laboratory.
(2) Represents the number and percentage agreement of only those determinations where an analyte was detected by at least one laboratory.

TABLE 2
QA ANALYSES PERFORMED

Sample ID	Matrix	Sample Date	ANALYSIS
SHM-96-5B-QA	Water	5-4-04	5030B/8260B-Volatiles 3010A/6010B-ICP Metals, 7470A-Mercury 9010B-Cyanide 300.0-Anions by Ion Chromatography 410.1-COD 405.1-BOD 310.1-Total Alkalinity as CaCO3 2340B-Total Hardness by Calculation 160.1-Total Dissolved Solids (TDS) 160.2-Total Suspended Solids (TSS) 9060-Total Organic Carbon (TOC)
Trip Blank	Water	5-4-04	5030B/8260B-Volatiles

SHEPLEY'S HILL LANDFILL
LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 5, 2004 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-050504

QA Findings

1. QA sample shipping and chain-of-custody deficiencies.

AMRO Environmental Laboratories Corporation, Merrimack, NH, received one shipment containing one QA water sample and a trip blank. The samples were received in good condition on 6 May 2004. Proper sample handling protocols were followed for this shipment, except the cyanide sample container needed to be adjusted for pH at the lab to greater than 12 pH units. Samples from SHM-96-5B-QA have historically required NaOH to be added by the QA laboratory in order to adjust the pH to greater than 12 pH units.

Copies of the chain-of-custody form document and the cooler receipt form are appended to this report for reference.

2. Data comparison for volatiles (VOC) by Method 8260B.

There were 66 volatile determinations. In 11 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 66 (100%) of the cases and quantitative agreement in 11 out of 11 (100%) of the cases. No data discrepancies were noted.

The QA laboratory's target analyte list consisted of 66 volatile compounds which were all analyzed by the primary laboratory whose target analyte list consisted of 84 volatile compounds. The primary laboratory was requested to report the presence of Tentatively Identified Compounds (TIC's) in all the samples. The primary laboratory sample SHM-96-5B was reported to contain no TICs.

2a. Batch QC Evaluation for the QA Laboratory-AMRO.

Holding Times: All of the volatile samples were analyzed within the method prescribed holding times.

Method Blanks: Results of all the method blanks associated with the QA split sample showed no contamination above the laboratory's reporting limit for any target analytes.

Trip Blanks: Results from the trip blank associated with the QA split sample showed no contamination above the laboratory's reporting limit for any of the target analytes.

Laboratory Control Sample: The QA laboratory spiked the LCS with all 66 target analytes. The spiking levels, percent recoveries, and the QC limits were appropriately indicated in the report. The QA laboratory reported that the LCS-5/15/04 was within the acceptance limits for all of the target analytes, except for1,4-dioxane, tertiary butanol, acetone, dibromochloromethane, and bromoform. None of these compounds were detected in any of the samples and there is no effect on the data.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory did not report a matrix spike or matrix spike duplicate sample result.

Surrogates: All of the surrogate recoveries for the samples and the QC samples were within the laboratory's acceptance limits.

2b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: The method blank result associated with the QA sample showed no contamination above or below the laboratory's reporting limits for any of the target analytes.

Trip Blanks: All of the trip blank results for all of the target analytes showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS/LCSDs): The primary laboratory reported that all of the target analytes in the LCS/LCSD were within the acceptance limits for accuracy and precision, except for the following marginal recoveries: OVZG-LCS/LCSD at 0/84 RPDs and 4/168 spike recoveries; OVZH-LCS/LCSD at 0/84 RPDs and 4/168 spike recoveries; and OWAA-LCS/LCSD at 0/84 RPDs and 0/168 spike recoveries. This would not significantly affect the sample results, since none of the compounds were detected in any of the samples. All 84 of the target analytes were spiked into the LCS samples. The amount spiked, percent recoveries and control limits were provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSD): The primary laboratory reported that all of the 84 target analytes were within the laboratory's acceptance limits for accuracy and precision for sample SHL-19MS and SHL-19MSD, except for bromochloromethane, 2-chloroethyl vinyl ether, 2-chlorotoluene and 1,1,2,2-tetrachloroethane. This would not significantly affect the sample results, since none of the compounds were detected in any of the samples. The 2-chloroethyl vinyl ether was not detected in the sample SHL-19 and a low bias to these non-detects would be expected for this sample. These exceedences were properly documented in the case narrative and on the form III's.

Surrogates: All of the surrogate recoveries for the samples and the QC samples were within the laboratory's acceptance limits.

3. The data comparison for ICP metals by Methods 6010B and mercury by 7470A.

There were 22 ICP-metals determinations and one mercury determination. In 16 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 22 (95.7%) of the cases and quantitative agreement in 15 out of 16 (93.8%) of the cases. One major data comparison discrepancy was noted for aluminum in which the QA laboratory reported 330 ug/l and the primary laboratory reported 17.6 U ug/l.

3a. Batch QC Evaluation for the QA Laboratory-AMRO.

Holding times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limits. Trace levels below one half of the reporting limits were reported for cadmium, calcium, chromium, cobalt, copper, iron, manganese, nickel, potassium and zinc. These target analytes should have been qualified by the lab with a "B", denoting that they were also detected in the associated method blank.

Laboratory Control Sample (LCS): The QA laboratory reported that all of the LCS results were within the laboratory's acceptance limits of 80-120%. The QA laboratory provided the spike amount, percent recoveries and the QC limits in all the data reports.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the MS/MSDs were within the laboratory's acceptance limits for accuracy (75-125%) and precision (20% RPD) for all the ICP-metal target analytes, except for iron and thallium, which were marginally below the acceptance limits. A slight low bias to the SHM-96-5B sample result would be expected for these two metals. All of the spike levels, percent recoveries and QC limits were provided in the reports.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results.

3b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding times: All the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all of the target analytes were recovered within the acceptance limits of 75-125% recoveries.

Matrix Spike (MS): The primary laboratory performed a matrix spike on sample SHL-19. The primary laboratory reported that all the target analytes in the MS recoveries were within the

acceptance limits (75-125%) for accuracy, except for silver, which was recovered at 151.8%. This would not affect the sample results since silver was not detected in the SHL-19 sample.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate SHL-19D was within the assumed acceptance limits of 20% RPD for precision for all of the target analytes that were above the CRDL. The primary laboratory did not provide the acceptance limits for laboratory duplicates.

4. Data comparison for cyanide by Method 9010B.

There was one cyanide determination. Cyanide was not detected by either laboratory. There was 100% overall agreement for this determination. No data discrepancy was noted. The QA and primary laboratories reported that the sample SHM-96-5B required additional NaOH preservative to achieve a pH of >12.

4a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: All the samples were analyzed within the method prescribed holding times.

Method Blanks: The method blank result for cyanide showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS result for cyanide was within the laboratory's acceptance limits of 90-110%, at 98.5%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory did not report any MS/MSD results for cyanide and they were not requested to on the C-O-C.

Laboratory Duplicate: The QA laboratory did not reported a duplicate result for SHM-96-5B.

4b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for cyanide.

Laboratory Control Sample (LCS): The primary laboratory did not report any LCS result for cyanide. No evaluation of accuracy could be made for cyanide.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered within the acceptance limits of 75-125% for cyanide at 102.1%.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate sample results (both non-detects) were within the laboratory's acceptance limits for cyanide.

5. Data comparison for anions by Method 300.0.

There were four anion determinations. In three of the determinations, target analytes were detected by one or both laboratories. There was overall agreement in four (100%) of the cases and quantitative agreement in three out of three (100%) of the cases. No data discrepancies were noted.

5a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: All of the samples were analyzed within the method prescribed holding times, except for nitrate, which was only 3 hours outside the 48-hour holding time. The result for nitrate was appropriately qualified by the laboratory with an "H".

Method Blanks: The method blank results for anions showed no contamination above the laboratory's reporting limit. Chloride was detected below the reporting limit of 0.50 mg/l at 0.17 mg/l.

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS results for anions were within the laboratory's acceptance limits of 90-110%. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report..

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD results for anions were within the laboratory's acceptance limits for accuracy at 90-110% and precision at 20% RPD, except for ortho-phosphate at 80.4% and 82% recoveries. A slight low bias to the sample result for ortho-phosphate would be expected. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Duplicate: The QA laboratory did not report any duplicate results for anions.

5b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the anions were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed contamination above the laboratory's reporting limit for all the anions, except nitrate. Refer to the data validation report for the qualification details.

Laboratory Control Samples (LCSs): The primary laboratory reported that all the LCS/LCSD's for anions were within the laboratory acceptance limits for accuracy at 85-115% and precision at 20% RPD, except for nitrate and ortho-phosphate at 117% and 135%, respectively. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike (MS): The primary laboratory did not report any MS results for sample SHL-19MS, although it was requested on the chain-of-custody. The evaluation of matrix effects on the sample could not be determined.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for anions and precision could not be evaluated.

6. Data comparison for COD by Method 410.1.

There was one COD determination. The primary laboratory reported COD at 29.9 mg/L and the QA laboratory reported COD at 38 J mg/l. There was 100% overall and quantitative agreement for this determination.

6a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for COD showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 98.5%. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory was not requested to perform MS/MSDs on the sample SHM-96-5B.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate result for COD.

6b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for COD.

Laboratory Control Sample (LCS/LCSD): The primary laboratory reported that the LCS/LCSD for COD were within the acceptance limits for accuracy (85-1115%) and precision (20% RPD). The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory was not requested to perform MS/MSD's on any of the samples for COD and no evaluation of accuracy and precision based on matrix effects could be made.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for COD.

7. Data comparison for BOD by Method 405.1.

There was one BOD determination. No BOD was detected by either laboratory. There was 100% overall agreement for this determination. No data discrepancy was noted.

7a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for BOD showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS/LCSDs): The QA laboratory reported that the LCS/LCSD recoveries for BOD were within the laboratory's acceptance limits for accuracy of 80-120% and precision at 20% RPD, at 94.5%, 102% and 7.41% RPD, respectively. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSDs are not applicable to BOD analysis. Refer to LCS/LCSD data for accuracy and precision verification.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results for BOD.

7b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for BOD.

Laboratory Control Sample (LCS/LCSDs): The primary laboratory reported that the LCS/LCSD results for BOD were within the acceptance limits for accuracy and precision, at 98% and 100% recoveries with a RPD of 2%. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable to BOD analysis and were not requested on the C-O-C. Refer to the LCS for accuracy verification.

Laboratory Duplicate: The primary laboratory did not provide any laboratory duplicate results for BOD.

8. Data comparison for alkalinity by Method 310.1.

There was one alkalinity determination. Both laboratories detected alkalinity in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted.

8a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for alkalinity showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for alkalinity was within the laboratory's acceptance limits for accuracy (80-120%), at 102%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for alkalinity were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20%RPD), at 104% and 99.8% recoveries with an RPD of 1.3%.

Laboratory Duplicate: The QA laboratory did not report any sample duplicate result for alkalinity.

8b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for alkalinity.

Laboratory Control Sample/LCS Duplicate (LCS/LCSDs): The primary laboratory reported that the LCS/LCSDs for alkalinity were within the acceptance limits of 85-115% for accuracy and within 20% RPD for precision. The spike amount added, percent recoveries, and QC limits were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory reported that the MS for alkalinity was recovered within the acceptance limits of 75-125% at 100.0%.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate results for sample SHL-19DUP were within the acceptance limits of 20% RPD at 0.32%.

9. Data comparison for hardness by calculation by Method 2340B.

There was one hardness determination. Both laboratories detected hardness in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination and no data discrepancy was noted.

9a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for hardness showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for hardness was within the laboratory's acceptance limits for accuracy (80-120%) at 100%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD recoveries for hardness were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20% RPD), at 91% and 99.6%, and 3.14% RPD, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results for hardness.

9b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for hardness.

Laboratory Control Samples (LCS/LCSD's): The primary laboratory did not report any LCS results for hardness. Based on the trace metals results for calcium and magnesium the results were within the acceptance limits.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): The primary laboratory did not report any MS/MSD results for hardness. Based on the trace metals results for calcium and magnesium the results were within the acceptance limits.

Laboratory Duplicate: The primary laboratory reported that the duplicate results for hardness for sample SHL-19 were within the acceptance limits for precision (20% RPD) at 2.9%.

10. Data comparison for TDS and TSS by Methods 160.1 and 160.2.

There was one total dissolved solids determination (TDS) and one total suspended solids (TSS) determination. Both laboratories reported detectable levels of TDS and TSS in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for the TDS determination and 0% overall and quantitative agreement for the TSS determination. One major data discrepancy was noted for the TSS determination where the QA laboratory reported TSS at 14 mg/l and the primary laboratory reported 29.9 mg/l.

10a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding times.

Method Blanks: The method blank results for TDS and TSS showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 90.3% and 103%, respectively. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The QA laboratory did not report any duplicate sample results.

10b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA sample was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for TDS and TSS.

Laboratory Control Sample (LCS/LCSD): The primary laboratory reported that all the LCS/LCSD's for TDS and TSS were within the acceptance limits of 80-120% for accuracy and

20% RPD precision. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19DUP were within the acceptance limits of 20% RPD for TDS and TSS at 0% and 0% RPD's, respectively.

11. Data comparison for total organic carbon (TOC) by Method 9060.

There was one TOC determination. Both laboratories detected TOC in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted. The cooler was at the proper temperature when received at the sub-contracted laboratory, STL-Connecticut.

11a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for TOC showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits for accuracy (85-115%), at 99%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike (MS): The QA laboratory reported that the MS/MSD's for TOC were within the laboratory's acceptance limits for accuracy (75-125%) at 96%.

Laboratory Duplicate: The QA laboratory reported that the laboratory duplicate result for TOC was within the 20% RPD acceptance limit at 0.4%.

11b. Batch QC Evaluation for the Primary-Sub Laboratory-STL-Pittsburgh.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for TOC.

Laboratory Control Sample/Duplicate (LCS/LCSD's): The primary laboratory reported that the LCS/LCSD's for TOC were within the acceptance limits for accuracy (85-115%) at 107% and 103%, and for precision (20% RPD) at 3%. The spike amount added, percent recoveries, and the QC limits were all provided in the report.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): The primary laboratory did not report any

MS/MSD results for TOC and no evaluation of accuracy or precision based on matrix effects could be made. Refer to the LCS/LCSD for accuracy and precision verification.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for TOC.

12. References.

a. Data Reports for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by the primary laboratory, Severn Trent Laboratories, Inc., 208 South Park Drive, Suite 1, Colchester, VT, 05446, were received 7 January 2004. The QA laboratory's data report, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 4 December 2003.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

c. Shell for Analytical Chemistry Requirements, Appendix I of EM 200-1-6, USACE, February 2001.

APPENDIX A
KEY TO COMMENTS ON DATA COMPARISON TABLES

0 - Data agrees if any one of the following applies:

- Both values are less than respective detection limit (N<MDL)
- N_1<MDL_1 and N_2>MDL_2 but <MDL_1*
- Both values are above respective detection limit (N>MDL) and difference between two values satisfies conditions below

For all analyses in a water matrix and for metals analysis in soil:
≤2X difference
For all other analyses:
≤4X difference

1 - Minor contamination by laboratory contaminant
2 - Not tested by both laboratories
3 - Minor data discrepancy, disagreement not serious, if any one of the following applies:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2 * does not exceed the upper limit (described below) defining a minor data discrepancy
- Both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:
2X<difference≤3X
For all other analyses:
4X<difference≤5X

4 - Major data discrepancy, disagreement serious, if any one of the following applies:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2 and MDL_1* exceeds the limit (described below) defining a major data discrepancy
- Both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:
>3X difference
For all other analyses:
>5X difference

MDL = Method Detection Limit
N = Analytical result
* - Not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:
B - detected in method blank
DO - Diluted out
J - estimated value, above MDL but below practical quantitation limit
NA - Not analyzed
ND - Not detected
NR - Not reported

APPENDIX B

DATA COMPARISON TABLES

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01A	CONTRACTORS SAMPLE No.:	569953
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	5/15/04	CONTRACTOR'S ANALYSIS DATE:	5/6/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**5/5/04**		
UNITS:	ug/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Dichlorodifluoromethane	< 5.0	**1.9 J**	< 5.0		0
Chloromethane	< 5.0		< 5.0		0
Vinyl Chloride	< 2.0	**0.51 J**	< 5.0		0
Bromomethane	< 2.0		< 5.0		0
Chloroethane	< 5.0	**2.6 J**	< 5.0	**2.2 J**	0
Trichlorofluoromethane	< 2.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 10		< 5.0	**2.9 J**	0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	< 2.0		< 5.0		0
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 5.0	**0.56 J**	< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 2.0		< 5.0		0
1,2-Dichloroethene (total)	NR	**NR**	< 5.0	**2.3 J**	2
Methyl-t-Butyl Ether	< 2.0	**0.64 J**	< 5.0		0
1,1-Dichloroethane	< 2.0	**1.2 J**	< 5.0	**1.2 J**	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene	< 2.0	**2.4**	< 5.0	**2.3 J**	0
2-Butanone	< 10		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 2.0		< 5.0		0
Tetrahydrofuran	NR		< 50		2
Chloroform	< 2.0		< 5.0		0
1,1,1-Trichloroethane	< 2.0		< 5.0		0
Carbon Tetrachloride	< 2.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene	< 1.0	**0.91 J**	< 5.0		0
1,2-Dichloroethane	< 2.0		< 5.0		0
Trichloroethene	< 2.0		< 5.0		0
1,2-Dichloropropane	< 2.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 2.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 2.0		< 5.0		0
2-Chloroethyl Vinyl Ether	NR		< 5.0		2
cis-1,3-Dichloropropene	< 1.0		< 5.0		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

J=Estimated value greater than one half the reporting limit.

B=Analyte was detected in method blank.

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01A	CONTRACTORS SAMPLE No.:	569953
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/15/04	CONTRACTOR'S ANALYSIS DATE:	5/6/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/5/04
UNITS:	ug/L

Target Analyte	AMRO QA LAB LRL	AMRO RESULTS QA LAB	STL-VT CONTRACTOR LRL	STL-VT RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 10		< 5.0		0
Toluene	< 2.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 2.0		< 5.0		0
Tetrachloroethene	< 2.0		< 5.0		0
2-Hexanone	< 10		< 5.0		0
Dibromochloromethane	< 2.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene	< 2.0	**0.61 J**	< 5.0		0
1,1,1,2-Tetrachloroethane	< 2.0		< 5.0		0
Ethylbenzene	< 2.0		< 5.0		0
Xylene (m,p)	< 2.0		< 5.0		0
Xylene (total)	< 2.0		< 5.0		0
Xylene (o)	< 2.0		< 5.0		0
Styrene	< 2.0		< 5.0		0
Bromoform	< 2.0		< 5.0		0
Isopropylbenzene	< 2.0		< 5.0		0
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	< 2.0		< 5.0		0
1,2,3-Trichloropropane	< 2.0		< 5.0		0
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	< 2.0		< 5.0		0
1,4-Dichlorobenzene	< 2.0	**0.98 J**	< 5.0		0
1,2-Dichlorobenzene	< 2.0		< 5.0		0
1,2-Dibromo-3-Chloropropane	< 5.0		< 5.0		0
1,2,4-Trichlorobenzene	< 2.0		< 5.0		0
Hexachlorobutadiene	< 2.0		< 5.0		0
Naphthalene	< 5.0		< 5.0		0
2,2-Dichloropropane	< 2.0		< 5.0		0
1,1-Dichloropropene	< 2.0		< 5.0		0
1,3-Dichloropropane	< 2.0		< 5.0		0
Bromobenzene	< 2.0		< 5.0		0
n-Propylbenzene	< 2.0		< 5.0		0
2-Chlorotoluene	< 2.0		< 5.0		0
4-Chlorotoluene	< 2.0		< 5.0		0
1,3,5-Trimethylbenzene	< 2.0		< 5.0		0
tert-Butylbenzene	< 2.0		< 5.0		0
1,2,4-Trimethylbenzene	< 2.0		< 5.0		0
sec-Butylbenzene	< 2.0		< 5.0		0
4-Isopropyltoluene	< 2.0		< 5.0		0
n-Butylbenzene	< 2.0		< 5.0		0
1,2,3-Trichlorobenzene	< 2.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
Dibromofloromethane (70-130)	104	Toluene-d8 (88-110)	99
1,2-Dichloroethane-d4 (70-130)	96.6	1,2-Dichloroethane-d4 (72-141)	96
Toulene-d8 (70-130)	100	Bromofluorobenzene (72-122)	108
4-Bromofluorobenzene (70-130)	93.8	1,2-Dichlorobenzene-d4 (69-124)	100

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
J=Estimated value greater than one half the reporting limit.
B=Analyte was detected in method blank.
* = Surrogates outside of acceptable limits

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01B		CONTRACTORS SAMPLE No.:	569953	
QA FIELD ID:	**SHM-96-5B-QA**		CONTRACTORS FIELD ID:	**SHM-96-5B**	
QA ANALYSIS DATE:	5/10/04		CONTRACTOR'S ANALYSIS DATE:	5/11/04	
QA LABORATORY:	AMRO		CONTRACTOR'S LABORATORY:	STL, VT	
EXTRACTION METHOD:	3010A		EXTRACTION METHOD:	3010A	
ANALYSIS METHOD:	6010B, 7000 Series and Hg-7470A		ANALYSIS METHOD:	6010B, Hg-7470A	
	MATERIAL DESCRIPTION:	**WATER**			
	DATE SAMPLED:	**5/5/04**			
	UNITS:	ug/L			

Target Analyte	AMRO QA LAB LRL		**AMRO QA LAB RESULTS**	STL-VT CONTRACTOR LRL		**STL-VT CONTRACTOR RESULTS**	Field Dup	COMPARISON *Dup-RPD's*	CODE	QA split RPD's
Aluminum	< 200		**330**	27.7 U		**17.6 U**	**17.6 U**	*NC*	4	NC
Antimony	< 20		**20 U**	4.8 U		**2.7 U**	2.7 U	*NC*	0	NC
Arsenic	< 5.0	(SW7060A)	**3600**	4.7 U		**3950**	**3890**	*2*	0	9
Barium	< 200		**49 J**	13.5 U		**56.5 B**	**55.5 B**	*1.8*	0	14.2
Beryllium	< 5.0		**0.21 J**	0.30 U		**0.20 U**	0.20 U	*NC*	0	NC
Cadmium	< 5.0		**5.0 U**	0.40 U		**0.30 U**	0.30 U	*NC*	0	NC
Calcium	< 2500		**74000**	305.2 U		**81700**	**80400**	*2*	0	10
Chromium	< 10		**1.8 J**	0.90 U		**2.0 B**	2.5 B	*NC*	0	NC
Cobalt	< 50		**18 J**	2.9 U		**16.6 B**	**16.8 B**	*1.2*	0	8.1
Copper	< 25		**11 J**	2.4 U		**2.0 B**	2.4 B	*NC*	0	NC
Iron	< 100		**36000**	29.9 U		**39000**	**38500**	*1*	0	8
Lead	< 5.0	(SW7421)	**5.0 U**	1.4 U		**3.2**	**2.6 B**	*21*	0	NC
Magnesium	< 2500		**12000**	295.2 U		**12800**	**12600**	*2*	0	6
Manganese	< 15		**8400**	0.90 U		**8910**	**8750**	*2*	0	6
Mercury	< 0.20	(SW7470A)	**0.20 U**	0.10 U	(5-12-04)	**0.10 U**	0.10 U	*NC*	0	NC
Nickel	< 40		**14 J**	13.5 U		**12.4 B**	**13.0 B**	*5*	0	12
Potassium	< 2500		**10000**	327.4 U		**11300**	**11000**	*3*	0	12
Selenium	< 5.0	(SW7740)	**5.0 U**	3.9 U		**3.6 U**	3.6 U	*NC*	0	NC
Silver	< 7.0		**7.0 U**	1.7 U		**1.0 U**	1.0 U	*NC*	0	NC
Sodium	< 2500		**30000**	539 U		**31000**	**30200**	*3*	0	3
Thallium	< 5.0	(SW7841)	**5.0 U**	3.6 U		**3.5 U**	3.5 U	*NC*	0	NC
Vanadium	< 50		**50 U**	3.0 U		**1.4 U**	1.4 U	*NC*	0	NC
Zinc	< 20		**13 J**	2.5 U		**6.5 B**	**7.2 B**	*0*	0	NC

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
U= Not Detected at the Reporting Limit
B= Less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detction Limit (IDL).
J= Analyte detected below quantitation limit.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01		CONTRACTORS SAMPLE No.:	527219	
QA FIELD ID:	**SHM-96-5B-QA**		CONTRACTORS FIELD ID:	**SHM-96-5B**	
QA ANALYSIS DATE:	See Below		CONTRACTOR'S ANALYSIS DATE:	See Below	
QA LABORATORY:	AMRO		CONTRACTOR'S LABORATORY:	STL, VT	
EXTRACTION METHOD:	NA		EXTRACTION METHOD:	NA	
ANALYSIS METHOD:	300.0		ANALYSIS METHOD:	300.0	
		MATRIX:	**WATER**		
		DATE SAMPLED:	**5/5/04**		
		UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Chloride, CL	10 U	(5-7-04)	**24**	1.0 U	(5-18-04)	**28.4**	0	*17*
Nitrate, as N	0.20 U	(5-7-04)	**0.040 JH**	0.20 U	(5-7-04)	**0.20 U**	0	*NC*
Othophosphate, as P	2.5 U	(5-7-04)	**2.5 U**	0.20 U	(5-7-04)	**0.20 U**	0	*NC*
Sulfate, SO4	1.0 U	(5-7-04)	**4.6**	0.20 U	(5-7-04)	**5.6**	0	*20*

SEE APPENDIX A FOR KEY TO COMPARISON CODES

NR= NOT REPORTED

U= Not detected at or above the Reporting Limit

J= Estimated value, below the Reporting Limit

LRL= Laboratory Reporting Limit

H= Method specific holding time exceeded.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01	CONTRACTORS SAMPLE No.:	569953
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	5/10/04	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9010B	ANALYSIS METHOD:	335.4
MATRIX:	**WATER**		
DATE SAMPLED:	**5/5/04**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	AMRO RESULTS QA LAB	STL-VT CONTRACTOR LRL	STL-VT RESULTS CONTRACTOR	USACE COMPARISON CODE	*RPD*
Cyanide (CN)	0.020 U	0.020 U*	0.010 U	0.010 U*	0	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

*Note: Cyanide sample was adjusted for pH to >12 when it was received at the lab.

U= Not detected at or above the Reporting Limit

LRL= Laboratory Reporting Limit

						COMPARISON OF QA & CONTRACTOR RESULTS									
						PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004									
	QA SAMPLE No.:			0405037-01				CONTRACTORS SAMPLE No.:				569953			
	QA FIELD ID:			**SHM-96-5B-QA**				CONTRACTORS FIELD ID:				**SHM-96-5B**			
	QA ANALYSIS DATE:			5/6/04				CONTRACTOR'S ANALYSIS DATE:				5/13/04			
	QA LABORATORY:			AMRO				CONTRACTOR'S LABORATORY:				STL, VT			
	EXTRACTION METHOD:			NA					EXTRACTION METHOD:			NA			
	ANALYSIS METHOD:			410.4					ANALYSIS METHOD:			410.1			
						MATRIX:	**WATER**								
						DATE SAMPLED:	**5/5/04**								
						UNITS:	mg/L								
	Target Analyte			AMRO		**AMRO**		STL-VT			**STL-VT**			USACE	
				QA LAB		**RESULTS**		CONTRACTOR			**RESULTS**			COMPARISON	
				LRL		**QA LAB**		LRL			**CONTRACTOR**			CODE	*RPD*
Chemical Oxygen Demand (COD)				50 U		**38 J**		20.0 U			**29.9**			0	*24*
				SEE APPENDIX A FOR KEY TO COMMENTS											
				NR=NOT REPORTED											
				U= Not detected at or above the Reporting Limit											
				LRL= Laboratory Reporting Limit											

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01		CONTRACTORS SAMPLE No.:	569953	
QA FIELD ID:	**SHM-96-5B-QA**		CONTRACTORS FIELD ID:	**SHM-96-5B**	
QA ANALYSIS DATE:	5/13/04		CONTRACTOR'S ANALYSIS DATE:	5/25/04	
QA LABORATORY:	AMRO		CONTRACTOR'S LABORATORY:	STL, VT	
EXTRACTION METHOD:	NA		EXTRACTION METHOD:	NA	
ANALYSIS METHOD:	310.2		ANALYSIS METHOD:	310.1	
		MATRIX:	**WATER**		
		DATE SAMPLED:	**5/5/04**		
		UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Total Alkalinity as CaCO3	10 U	**310**	20.0 U	**314**	0	*1*

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

H=METHOD PRESCRIBED HOLDING TIME EXCEEDED

LRL= Laboratory Reporting Limit

						COMPARISON OF QA & CONTRACTOR RESULTS									
						PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004									
	QA SAMPLE No.:			0405037-01				CONTRACTORS SAMPLE No.:				569953			
	QA FIELD ID:			**SHM-96-5B-QA**				CONTRACTORS FIELD ID:				**SHM-96-5B**			
	QA ANALYSIS DATE:			5/10/04				CONTRACTOR'S ANALYSIS DATE:				5/11/04			
	QA LABORATORY:			AMRO				CONTRACTOR'S LABORATORY:				STL, VT			
	EXTRACTION METHOD:			NA				EXTRACTION METHOD:				NA			
	ANALYSIS METHOD:			2340B				ANALYSIS METHOD:				2340B			
						MATRIX:	**WATER**								
						DATE SAMPLED:	**5/5/04**								
						UNITS:	mg/L								
	Target Analyte			AMRO		**AMRO**		STL-VT		**STL-VT**			USACE		
				QA LAB		**RESULTS**		CONTRACTOR		**RESULTS**			COMPARISON		
				LRL		**QA LAB**		LRL		**CONTRACTOR**			CODE	*RPD*	
	Total Hardness as CaCO3*			33 U		**230**		1.3 U		**257**			0	*11*	
				SEE APPENDIX A FOR KEY TO COMMENTS											
				NR=NOT REPORTED											
				*Note: Hardness as calculated by the separate determinations of calcium and magnesium, expressed as mg equivalent CaCO3/L by Method 2340B.											
				U= Not detected at the reporting limit											
				LRL= Laboratory Reporting Limit											

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01	CONTRACTORS SAMPLE No.:	569953
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	5/7/04	CONTRACTOR'S ANALYSIS DATE:	5/7/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1
		MATRIX: **WATER**	
		DATE SAMPLED: **5/5/04**	
		UNITS: mg/L	

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Biological Oxygen Demand (5 Day)	2.0 U	2.0 U	1.4 U	1.4 U	0	*NC*

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

U= Not detected at or above the Reporting Limit

NC=Not calculated

LRL= Laboratory Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2004

QA SAMPLE No.:	0405037-01		CONTRACTORS SAMPLE No.:	569953	
QA FIELD ID:	**SHM-96-5B-QA**		CONTRACTORS FIELD ID:	**SHM-96-5B**	
QA ANALYSIS DATE:	5/6/2004(tds+tss)		CONTRACTOR'S ANALYSIS DATE:	5-6-04(tds), 5-10-04(tss)	
QA LABORATORY:	AMRO		CONTRACTOR'S LABORATORY:	STL, VT	
EXTRACTION METHOD:	NA		EXTRACTION METHOD:	NA	
ANALYSIS METHOD:	160.1 and 160.2		ANALYSIS METHOD:	160.1 and 160.2	
		MATRIX:	**WATER**		
		DATE SAMPLED:	**5/5/04**		
		UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Total Dissolved Solids (TDS by 160.1)	10 U	**380**	5.0 U	**408**	0	*7*
Total Suspended Solids (TSS by 160.2)	4.0 U	**14**	0.50 U	**59.5**	*Major* 4	*124*

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

LRL=Laboratory Reporting Limit

U= Not detected at or above the Reporting Limit

					COMPARISON OF QA & CONTRACTOR RESULTS								
					PROJECT:	**SHEPLEY'S HILL LANDFILL, SPRING 2004**							
	QA SAMPLE No.:		206536-1				CONTRACTORS SAMPLE No.:				569953		
	QA FIELD ID:		**SHM-96-5B-QA**				CONTRACTORS FIELD ID:				**SHM-96-5B**		
	QA ANALYSIS DATE:		5/19/04				CONTRACTOR'S ANALYSIS DATE:				5/14/04		
	QA LABORATORY:		STL-Connecticut (subcontracted)				CONTRACTOR'S LABORATORY:				STL, VT		
	EXTRACTION METHOD:		NA				EXTRACTION METHOD:				NA		
	ANALYSIS METHOD:		9060.0				ANALYSIS METHOD:				9060.0		
					MATRIX:	**WATER**							
					DATE SAMPLED:	**5/5/04**							
					UNITS:	mg/L							
	Target Analyte		AMRO		**AMRO**		STL-VT		**STL-VT**			USACE	
			QA LAB		**RESULTS**		CONTRACTOR		**RESULTS**			COMPARISON	
			LRL		**QA LAB**		LRL		**CONTRACTOR**			CODE	*RPD*
Total Organic Carbon (TOC)			1.0 U		4.3		1.0 U		5.5			0	*24*
			SEE APPENDIX A FOR KEY TO COMMENTS										
			NR=NOT REPORTED										
			LRL=Laboratory Reporting Limit										
			U= Not detected at or above the Reporting Limit										

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
(603) 424-2022

Client: US ARMY CORPS OF ENGINEERS
Project Name: SHEPLEY'S HILL LANDFILL LTM
Ship via: (circle one) Fed Ex, UPS, AMRO Courier,
Hand Del., Other Courier, Other:

AMRO ID: 0405039
Date Rec.: 5-6-04
Date Due: 5-13-04

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?	✓			
2. Custody Seals present?	✓			
3. Custody Seals Intact?	✓			
4. Air Bill included in folder if received?	✓			
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 5°			✓	
Samples rec. with ice ✓ ice packs___ neither___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?	✓			
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:				
What samples sent: O/H				
Where sent:				
Date:				
Analysis: TOC				
TAT: STD				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?			✓	
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: CC Date: 5-6-04 Logged in By: CC Date: 5-6-04
Labeled By: CC Date: 5-6-04 Checked By: Date:

NA= Not Applicable

ARMY CORPS OF ENGINEERS QA Sample

AMRO Environmental Laboratory
111 Herrick Street, Merrimack NH 03054

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
E#776	Shepley's Hill Landfill LTM

SAMPLERS: *(Signature)*
P. BLUMERIS P. Blumeris

STA. NO.	DATE 2004	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260B	TOC 9060	6010B TAL Metals - 2340B Hardness	Cyanide 9010B	350 310.1 Nitrate Alkalinity	TSS 160.2	BOD5 405.1	COD 410.4	REMARKS
QA	5 MAY	1320		X	SHM-96-5B-QA	12	3	3	1	1	1	1	1	1	
	↓	-		X	TRIP BLANK	2	2								

5-5-04

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
[illegible]	5-5-04 1430	FEDEX AIRBILL # 835310232441	FEDEX	5-6-04 0920	[illegible]
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks: Matrix = water; 1 Cooler Shipped	

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

7309

SHEPLEY'S HILL LANDFILL
DRAFT 2004 ANNUAL REPORT

Chemical Quality Assurance Report
Fall 2004

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
17 NOVEMBER 2004 - QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-111704

Executive Summary

QA samples from one shipment for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts were analyzed by the QA laboratory, resulting in a total of 101 target analyte determinations. The shipment contained one QA water sample and one trip blank sample, and was received in good condition. The data report from the QA laboratory, AMRO, Merrimack, NH, dated 17 December 2004, was used in the comparison. In 34 of these determinations, target analytes were detected by one or both laboratories. Results from the analysis of QA samples were compared with results from analysis of the corresponding primary samples (Reference 12a). The primary and QA samples agreed overall in 100 out of 101 (99.0%) of the comparisons. Primary and QA samples agreed quantitatively in 33 out of 34 (97.1%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. Only one minor data discrepancies between results from the primary and QA sample were noted. Refer to Table 1 for a QA split sample data comparison summary.

The QA laboratory's data report was evaluated based on the information that was provided. All of the data comparisons for Methods VOAs-8260B, TAL Metals-6010B, CN, Anions, BOD, COD, Alkalinity, TSS, Hardness and TOC were in excellent overall and quantitative agreement. There was one minor discrepancy noted for the TDS determination. No obvious explanations could be offered. There was very little bias to any of the QA laboratory's sample results and only a few minor QC deviations were noted in their case narrative. The data is complete, usable, and satisfies the DQO's for the project.

The primary laboratory's data report was evaluated based on the information that was provided. As stated above, all of the data comparisons for all of the analyses were in excellent overall and quantitative agreement, except for TSS. The primary laboratory's wet chemistry data report has historically lacked some of the information necessary to completely evaluate the batch QC. The primary laboratory has since changed their report format and most of the missing supporting QC information is now present in the report. STL-VT has responded to the Corps request to supply the missing information needed to perform a complete evaluation of the data quality.

The QA and primary laboratory's reporting limits were comparable, except for metals where the QA laboratory's reporting limits were between two and ten times higher. The primary laboratory reported the sample IDs in which tentatively identified compounds (TICs) were detected. The QA sample SHM-96-5B was reported to contain no TICs. This CQAR is based on

the laboratory reporting limits because the detection limits were not always provided or well defined.

QA analyses were performed by AMRO Environmental Laboratories, Inc., 111 Herrick Street, Merrimack, NH, 03054 and Severn Trent Laboratories, Inc., 450 William Pitt Way, Pittsburgh, PA 15238-1330. The primary laboratory was Severn Trent Services, 208 South Park Drive, Suite 1, Colchester, VT, 05446.

Table ES-1
Quality Assurance Split Sample Data Comparison Summary

		Overall Agreement (1)		Quantitative Agreement (2)	
Method	**Parameter**	**Number**	**Percent**	**Number**	**Percent**
8260B	Volatiles	66/66	100	11/11	100
6020/7471	Metals/Mercury	23/23	100	15/15	100
9010B	Cyanide	1/1	100	NA	NA
300.0	Anions	4/4	100	3/3	100
410.1	COD	1/1	100	1/1	100
405.1	BOD	1/1	100	NA	NA
310.1	Alkalinity	1/1	100	1/1	100
130.2	Hardness	1/1	100	1/1	100
160.1	TDS	0/1	0	0/1	100
160.2	TSS	1/1	100	1/1	100
9060	TOC	1/1	100	1/1	100
Total		**100/101**	**99.0**	**33/34**	**97.1**

NOTES:
(1) Represents the number and percentage agreement of all determinations including analytes not detected by either laboratory.
(2) Represents the number and percentage agreement of only those determinations where an analyte was detected by at least one laboratory.

TABLE ES-2
QA ANALYSES PERFORMED

Sample ID	Matrix	Sample Date	ANALYSIS
SHM-96-5B-QA	Water	11-17-04	5030B/8260B-Volatiles 3010A/6010B-ICP Metals, 7470A-Mercury, 7000- Series by GFAA (As, Se, Tl and Pb) 9010B-Cyanide 300.0-Anions by Ion Chromatography 410.1-COD 405.1-BOD 310.1-Total Alkalinity as CaCO3 2340B-Total Hardness by Calculation 160.1-Total Dissolved Solids (TDS) 160.2-Total Suspended Solids (TSS) 9060-Total Organic Carbon (TOC) by STL-CT
Trip Blank	Water	11-17-04	5030B/8260B-Volatiles

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
17 NOVEMBER 2004 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-111704(sample date)

QA Findings

1. QA sample shipping and chain-of-custody deficiencies.

AMRO Environmental Laboratories Corporation, Merrimack, NH, received one shipment containing one QA water sample and a trip blank. The samples were received in good condition on 17 November 2004. Proper sample handling protocols were followed for this shipment, except the cyanide sample container needed to be adjusted for pH at the lab to greater than 12 pH units. The sample SHM-96-5B-QA has historically required additional NaOH to be added by the QA laboratory in order to adjust the pH to greater than 12 pH units.

Copies of the chain-of-custody form document and the cooler receipt form are appended to this report for reference.

2. Data comparison for volatiles (VOC) by Method 8260B.

There were 66 volatile determinations. In 11 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 66 (100%) of the cases and quantitative agreement in 10 out of 10 (100%) of the cases. No data discrepancies were noted.

The QA laboratory's target analyte list consisted of 66 volatile compounds, which were all analyzed by the primary laboratory whose target analyte list consisted of 84 volatile compounds. The primary laboratory was requested to report the presence of Tentatively Identified Compounds (TIC's) in all the samples. The primary laboratory sample SHM-96-5B was reported not to contain any TIC's.

2a. Batch QC Evaluation for the QA Laboratory-AMRO.

Holding Times: All of the volatile samples were analyzed within the method prescribed holding times.

Method Blanks: Results of all the method blanks that were associated with the QA split sample showed no contamination above the laboratory's reporting limit for any of the target analytes.

Trip Blanks: Results of the trip blank that was associated with the QA split sample showed no contamination above the laboratory's reporting limit for any of the target analytes.

Laboratory Control Sample: The QA laboratory spiked the LCS with all of their 66 target analytes. The spiking levels, percent recoveries, and the QC limits were appropriately indicated in the report. The QA laboratory reported that the LCS-11/26/04 was within the acceptance limits for all of the target analytes, except for 15 of the compounds which were marginally outside the acceptance limits. None of these compounds were detected in the sample SHM-96-5B, indicating only a slight low bias to the non-detects for these compounds.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the target analytes were within the acceptance limits for accuracy and precision, except for four compounds. None of these compounds were detected in the sample SHM-96-5B and this would not affect the results.

Surrogates: All of the surrogate recoveries for the samples and the QC samples were within the laboratory's acceptance limits.

2b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: The method blank result associated with the QA sample showed no contamination above or below the laboratory's reporting limits for any of the target analytes.

Trip Blanks: All of the trip blank results for all of the target analytes showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS/LCSDs): The primary laboratory reported that all of the target analytes in the LCS/LCSD were within the acceptance limits for accuracy and precision, except for the following marginal recoveries: MCNAB-LCS/LCSD at 0/84 RPDs and 6/168 spike recoveries, and MCNAC-LCS/LCSD at 0/84 RPDs and 5/168 spike recoveries. This would not significantly affect the sample results, since none of the compounds were detected in any of the samples. All 84 of the target analytes were spiked into the LCS samples. The amount spiked, percent recoveries and control limits were provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSD): The primary laboratory reported that all of the 84 target analytes were within the laboratory's acceptance limits for accuracy and precision for sample SHL-19MS and SHL-19MSD, except for 10 compounds. This would not significantly affect the sample results, since none of the compounds were detected in any of the samples. The 2-chloroethyl vinyl ether was not detected in the sample SHL-19 and a low bias to these non-detects would be expected for this sample. These exceedences were properly documented in the case narrative and on the form III's.

Surrogates: All of the surrogate recoveries for the samples and the QC samples were within the laboratory's acceptance limits.

3. The data comparison for ICP metals by Methods 6010B and mercury by 7470A.

There were 22 ICP-metals determinations and one mercury determination. In 15 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 23 (100%) of the cases and quantitative agreement in 15 out of 15 (100%) of the cases. No major or minor data comparison discrepancies were noted.

3a. Batch QC Evaluation for the QA Laboratory-AMRO.

Holding times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limits. Trace levels below one half of the reporting limits were reported for calcium, copper, iron, manganese, potassium, sodium, mercury and zinc. These target analytes should have been qualified by the lab with a "B", denoting that they were also detected in the associated method blank.

Laboratory Control Sample (LCS): The QA laboratory reported that all of the LCS results were within the laboratory's acceptance limits of 80-120%. The QA laboratory provided the spike amount, percent recoveries, and the QC limits in all the data reports.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the MS/MSDs were within the laboratory's acceptance limits for accuracy (75-125%) and precision (20% RPD) for all the ICP-metal target analytes, except for arsenic due to the high native concentration in the sample SHM-96-5B relative to the spike amount. All of the spike levels, percent recoveries and QC limits were provided in the reports.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results.

3b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding times: All the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all of the target analytes were recovered within the acceptance limits of 75-125% recoveries.

Matrix Spike (MS): The primary laboratory performed a matrix spike on sample SHL-19. The primary laboratory reported that all the target analytes in the MS recoveries were within the acceptance limits (75-125%) for accuracy.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate SHL-19D was within the assumed acceptance limits of 20% RPD for precision for all of the target analytes that were above the CRDL. The primary laboratory did not provide the acceptance limits for laboratory duplicates.

4. Data comparison for cyanide by Method 9010B.

There was one cyanide determination. Cyanide was not detected by either laboratory. There was 100% overall agreement for this determination. No data discrepancy was noted. The QA and primary laboratories reported that the sample SHM-96-5B required additional NaOH preservative to achieve a pH of >12.

4a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: All the samples were analyzed within the method prescribed holding times.

Method Blanks: The method blank result for cyanide showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS result for cyanide was within the laboratory's acceptance limits of 90-110%, at 93.5%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory did not report any MS/MSD results for cyanide and they were not requested to on the C-O-C.

Laboratory Duplicate: The QA laboratory did not reported a duplicate result for SHM-96-5B.

4b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for cyanide.

Laboratory Control Sample (LCS): The primary laboratory did not report any LCS result for cyanide. No evaluation of accuracy could be made for cyanide.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered within the acceptance limits of 75-125% for cyanide at 108.8%.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate sample results (both non-detects) were within the laboratory's acceptance limits for cyanide.

5. Data comparison for anions by Method 300.0.

There were four anion determinations. In three of the determinations, target analytes were detected by one or both laboratories. There was overall agreement in four (100%) of the cases and quantitative agreement in three out of three (100%) of the cases. No data discrepancies were noted.

5a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: All of the samples were analyzed within the method prescribed holding times, except for nitrate, which was only 2 hours outside the 48-hour holding time. The result for nitrate was appropriately qualified by the laboratory with an "H".

Method Blanks: The method blank results for anions showed no contamination above the laboratory's reporting limit. Chloride was detected below the reporting limit of 0.50 mg/l at 0.16 mg/l.

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS results for anions were within the laboratory's acceptance limits of 90-110%. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD results for anions were within the laboratory's acceptance limits for accuracy at 80-120% and precision at 20% RPD, except for nitrate at 102% and 121% recoveries. This would have little impact to the sample results. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Duplicate: The QA laboratory reported the precision for the duplicate results for nitrate at 11.2% RPD.

5b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the anions were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed contamination above the laboratory's reporting limit for all the anions, except ortho-phosphate. Refer to the data validation report for the qualification details.

Laboratory Control Samples (LCSs): The primary laboratory reported that all the LCS/LCSD's for anions were within the laboratory acceptance limits for accuracy at 85-115% and precision at 20% RPD, except for ortho-phosphate at 70%. A low bias to ortho-phosphate would be expected. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike (MS): The primary laboratory did not report any MS results for sample SHL-19MS, but it was requested on the chain-of-custody. The evaluation of matrix effects on the sample could not be determined.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for anions and precision could not be evaluated.

6. Data comparison for COD by Method 410.1.

There was one COD determination. The primary laboratory reported COD at 39.9 mg/L and the QA laboratory reported COD at 40 J mg/l. There was 100% overall and quantitative agreement for this determination.

6a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for COD showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 95%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory was not requested to perform MS/MSDs on the sample SHM-96-5B.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate result for COD.

6b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: All of the samples were analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for COD.

Laboratory Control Sample (LCS/LCSD): The primary laboratory reported that the LCS/LCSD for COD were within the acceptance limits for accuracy (85-115%) and precision (20% RPD). The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory was not requested to perform MS/MSD's on any of the samples for COD and no evaluation of accuracy and precision based on matrix effects could be made.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for COD.

7. Data comparison for BOD by Method 405.1.

There was one BOD determination. No BOD was detected by either laboratory. There was 100% overall agreement for this determination. No data discrepancy was noted.

7a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for BOD showed no contamination above the laboratory's reporting limit.

Laboratory Control Samples (LCS/LCSDs): The QA laboratory did not report any LCS results for BOD. No evaluation of accuracy and precision on a clean matrix could be made.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable to BOD analysis. Refer to LCS/LCSD data for accuracy and precision verification.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results for BOD.

7b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding time.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for BOD.

Laboratory Control Sample (LCS/LCSD's): The primary laboratory reported that the LCS/LCSD results for BOD were within the acceptance limits for accuracy and precision, at 101% and 98% recoveries with a RPD of 2%. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable to BOD analysis and were not requested on the C-O-C. Refer to LCS for accuracy verification.

Laboratory Duplicate: The primary laboratory did not provide any laboratory duplicate results for BOD.

8. Data comparison for alkalinity by Method 310.1.

There was one alkalinity determination. Both laboratories detected alkalinity in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted.

8a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for alkalinity showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for alkalinity was within the laboratory's acceptance limits for accuracy (80-120%), at 100%. All of the spike levels, percent recoveries, and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory was not requested to perform a MS/MSD. Refer to the LCS for an evaluation of accuracy.

Laboratory Duplicate: The QA laboratory did not report any sample duplicate result for alkalinity.

8b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for alkalinity.

Laboratory Control Sample/LCS Duplicate (LCS/LCSDs): The primary laboratory reported that the LCS/LCSDs for alkalinity were within the acceptance limits of 85-115% for accuracy and within 20% RPD for precision. The spike amount added, percent recoveries and QC limits were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory did not any MS/MSD results
Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results.

9. Data comparison for hardness by calculation by Method 2340B.

There was one hardness determination. Both laboratories detected hardness in the QA

sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination and no data discrepancy was noted.

9a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for hardness showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for hardness was within the laboratory's acceptance limits for accuracy (80-120%) at 98.1%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD recoveries for hardness were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20% RPD), at 98.6% and 102%, and 1.28% RPD, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results for hardness.

9b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding time.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for hardness.

Laboratory Control Samples (LCS/LCSD's): The primary laboratory did not report any LCS results for hardness. Based on the trace metals results for calcium and magnesium the results were within the acceptance limits.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): The primary laboratory did not report any MS/MSD results for hardness. Based on the trace metals results for calcium and magnesium the results were within the acceptance limits.

Laboratory Duplicate: The primary laboratory reported that the duplicate results for hardness for sample SHL-19 were within the acceptance limits for precision (20% RPD) at 1.6%.

10. Data comparison for TDS and TSS by Methods 160.1 and 160.2.

There was one total dissolved solids determination (TDS) and one total suspended solids (TSS) determination. Both laboratories reported detectable levels of TDS and TSS in the QA sample SHM-96-5B. There was 0% overall and quantitative agreement for the TDS determination and 100% overall and quantitative agreement for the TSS determination. One major data discrepancies were noted for the TDS determination in which the QA laboratory reported TDS at 430 mg/l and the primary laboratory reported 151 mg/l.

10a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding times.

Method Blanks: The method blank results for TDS and TSS showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 85.9% and 98.5%, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The QA laboratory did not report any duplicate sample results.

10b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

Holding Times: The QA sample was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for TDS and TSS.

Laboratory Control Sample (LCS/LCSD): The primary laboratory reported that all the LCS/LCSD's for TDS and TSS were within the acceptance limits of 80-120% for accuracy and 20% RPD precision. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19DUP were within the acceptance limits of 20% RPD for TDS and TSS at 2% and 1% RPD's, respectively.

11. Data comparison for total organic carbon (TOC) by Method 9060.

There was one TOC determination. Both laboratories detected TOC in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted. The cooler was at the proper temperature when received at the sub-contracted laboratory, STL-Connecticut.

11a. Batch QC Evaluation for the QA laboratory-AMRO.

Holding Times: The QA sample was analyzed within the method prescribed holding time.

Method Blanks: The method blank results for TOC showed no contamination above the laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits for accuracy (85-115%), at 100%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike (MS): The QA laboratory reported that the MS for TOC were within the laboratory's acceptance limits for accuracy (75-125%) at 112%.

Laboratory Duplicate: The QA laboratory reported that the laboratory duplicate result for TOC was within the 20% RPD acceptance limit at 1.4%.

11b. Batch QC Evaluation for the Primary-Sub Laboratory-STL-Pittsburgh.

Holding Times: The QA split sample SHM-96-5B was analyzed within the method prescribed holding times.

Method Blanks: All of the method blank results showed no contamination above the laboratory's reporting limit for TOC.

Laboratory Control Sample/Duplicate (LCS/LCSD's): The primary laboratory reported that the LCS/LCSD's for TOC were within the acceptance limits for accuracy (85-115%) at 92% and 90%, and for precision (20% RPD) at 2.2%. The spike amount added, percent recoveries and the QC limits were all provided in the report.

Matrix Spike/Matrix Sipke Duplicate (MS/MSDs): The primary laboratory did not report any MS/MSD results for TOC and no evaluation of accuracy or precision based on matrix effects could be made. Refer to the LCS/LCSD for accuracy and precision verification.

Laboratory Duplicate: The primary laboratory reported non-detects for the sample and duplicate results for TOC.

12. References.

a. Data Reports for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by the primary laboratory, Severn Trent Laboratories, Inc., 208 South Park Drive, Suite 1, Colchester, VT, 05446, were received 17 December 2004. The QA laboratory's data report, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 15 December 2004.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

c. Shell for Analytical Chemistry Requirements, Appendix I of EM 200-1-6, USACE, February 2001.

APPENDIX A
KEY TO COMMENTS ON DATA COMPARISON TABLES

0 - Data agrees if any one of the following applies:

- Both values are less than respective detection limit (N<MDL)
- N_1<MDL_1 and N_2>MDL_2 but <MDL_1*
- Both values are above respective detection limit (N>MDL) and difference between two values satisfies conditions below

For all analyses in a water matrix and for metals analysis in soil:
≤2X difference

For all other analyses:
≤4X difference

1 - Minor contamination by laboratory contaminant
2 - Not tested by both laboratories
3 - Minor data discrepancy, disagreement not serious, if any one of the following applies:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2 * does not exceed the upper limit (described below) defining a minor data discrepancy
- Both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:
2X<difference≤3X

For all other analyses:
4X<difference≤5X

4 - Major data discrepancy, disagreement serious, if any one of the following applies:

- N_1<MDL_1 and N_2>MDL_2 and the difference between values N_2 and MDL_1* exceeds the limit (described below) defining a major data discrepancy
- Both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:
>3X difference
For all other analyses:
>5X difference

MDL = Method Detection Limit
N = Analytical result
* - Not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank
DO - Diluted out
J - estimated value, above MDL but below practical quantitation limit
NA - Not analyzed
ND - Not detected
NR - Not reported

APPENDIX B

DATA COMPARISON TABLES

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2004

QA SAMPLE No.:	0411129-01A	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/26/04	CONTRACTOR'S ANALYSIS DATE:	11/24/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: ug/L

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Dichlorodifluoromethane	< 5.0	**2.7 J**	< 5.0		0
Chloromethane	< 5.0		< 5.0		0
Vinyl Chloride	< 2.0		< 5.0		0
Bromomethane	< 2.0		< 5.0		0
Chloroethane	< 5.0	**2.9 J**	< 5.0	**2.4 J**	0
Trichlorofluoromethane	< 2.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 10		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	< 2.0		< 5.0		0
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 5.0	**0.56 J**	< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 2.0		< 5.0		0
1,2-Dichloroethene (total)	NR	**NR**	< 5.0	**2.2 J**	2
Methyl-t-Butyl Ether	< 2.0	**0.63 J**	< 5.0		0
1,1-Dichloroethane	< 2.0	**1.2 J**	< 5.0	**1.1 J**	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene	< 2.0	**2.4**	< 5.0	**2.3 J**	0
2-Butanone	< 10		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 2.0		< 5.0		0
Tetrahydrofuran	< 10		< 50	**3.7 J**	0
Chloroform	< 2.0		< 5.0		0
1,1,1-Trichloroethane	< 2.0		< 5.0		0
Carbon Tetrachloride	< 2.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene	< 1.0	**0.59 J**	< 5.0		0
1,2-Dichloroethane	< 2.0		< 5.0		0
Trichloroethene	< 2.0		< 5.0		0
1,2-Dichloropropane	< 2.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 2.0		< 5.0		0
1,4-Dioxane	< 50		< 250		2
Bromodichloromethane	< 2.0		< 5.0		0
2-Chloroethyl Vinyl Ether	NR		< 5.0		2
cis-1,3-Dichloropropene	< 1.0		< 5.0		0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
J=Estimated value greater than one half the reporting limit.
B=Analyte was detected in method blank.

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2003

QA SAMPLE No.:	0411129-01A	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/26/04	CONTRACTOR'S ANALYSIS DATE:	11/24/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B
MATERIAL DESCRIPTION:	WATER		
DATE SAMPLED:	11/17/04		
UNITS:	ug/L		

Target Analyte	AMRO QA LAB LRL	AMRO RESULTS QA LAB	STL-VT CONTRACTOR LRL	STL-VT RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 10		< 5.0		0
Toluene	< 2.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 2.0		< 5.0		0
Tetrachloroethene	< 2.0		< 5.0		0
2-Hexanone	< 10		< 5.0		0
Dibromochloromethane	< 2.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene	< 2.0	**0.72 J**	< 5.0		0
1,1,1,2-Tetrachloroethane	< 2.0		< 5.0		0
Ethylbenzene	< 2.0		< 5.0		0
Xylene (m,p)	< 2.0		< 5.0		0
Xylene (total)	< 2.0		< 5.0		0
Xylene (o)	< 2.0		< 5.0		0
Styrene	< 2.0		< 5.0		0
Bromoform	< 2.0		< 5.0		0
Isopropylbenzene	< 2.0		< 5.0		0
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	< 2.0		< 5.0		0
1,2,3-Trichloropropane	< 2.0		< 5.0		0
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	< 2.0		< 5.0		0
1,4-Dichlorobenzene	< 2.0	**1.1 J**	< 5.0		0
1,2-Dichlorobenzene	< 2.0		< 5.0		0
1,2-Dibromo-3-Chloropropane	< 5.0		< 5.0		0
1,2,4-Trichlorobenzene	< 2.0		< 5.0		0
Hexachlorobutadiene	< 2.0		< 5.0		0
Naphthalene	< 5.0		< 5.0		0
2,2-Dichloropropane	< 2.0		< 5.0		0
1,1-Dichloropropene	< 2.0		< 5.0		0
1,3-Dichloropropane	< 2.0		< 5.0		0
Bromobenzene	< 2.0		< 5.0		0
n-Propylbenzene	< 2.0		< 5.0		0
2-Chlorotoluene	< 2.0		< 5.0		0
4-Chlorotoluene	< 2.0		< 5.0		0
1,3,5-Trimethylbenzene	< 2.0		< 5.0		0
tert-Butylbenzene	< 2.0		< 5.0		0
1,2,4-Trimethylbenzene	< 2.0		< 5.0		0
sec-Butylbenzene	< 2.0		< 5.0		0
4-Isopropyltoluene	< 2.0		< 5.0		0
n-Butylbenzene	< 2.0		< 5.0		0
1,2,3-Trichlorobenzene	< 2.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
Dibromofloromethane (70-130)	100	Toluene-d8 (88-110)	100
1,2-Dichloroethane-d4 (70-130)	93.8	1,2-Dichloroethane-d4 (72-141)	93
Toulene-d8 (70-130)	103	Bromofluorobenzene (72-122)	108
4-Bromofluorobenzene (70-130)	97.4	1,2-Dichlorobenzene-d4 (69-124)	98

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
J=Estimated value greater than one half the reporting limit.
B=Analyte was detected in method blank.
* = Surrogates outside of acceptable limits

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2004

QA SAMPLE No.:	0411129-01B	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/22/2004, Hg=11-29-04	CONTRACTOR'S ANALYSIS DATE:	12-3-04, Hg=11-19-04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	3010A	EXTRACTION METHOD:	3010A
ANALYSIS METHOD:	6010B, 7000 Series and Hg-7470A	ANALYSIS METHOD:	6010B, Hg-7470A
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**11/17/04**		
UNITS:	ug/L		

Target Analyte	AMRO QA LAB LRL		**AMRO QA LAB RESULTS**	STL-VT CONTRACTOR LRL	**STL-VT CONTRACTOR RESULTS**	Field Dup	*Field Dup-RPD's*	COMPARISON CODE	QA split RPD's
Aluminum	< 200		**85.3 J**	27.7 U	35.4 U	35.4 U	*NC*	0	NC
Antimony	< 20		20 U	4.8 U	5.9 U	5.9 U	*NC*	0	NC
Arsenic	< 5.0	(SW7060A)	**2000**	4.7 U	**2110**	**2240**	*6*	0	*5*
Barium	< 200		**39.6 J**	13.5 U	**43.7 B**	45.8 U	*NC*	0	7.4
Beryllium	< 5.0		**0.198 J**	0.30 U	0.50 U	0.50 U	*NC*	0	NC
Cadmium	< 5.0		5.0 U	0.40 U	0.84 B	1.1 B	*27*	0	NC
Calcium	< 2500		**78500**	305.2 U	**92900**	**95900**	*3*	0	17
Chromium	< 10		**3.60 J**	0.90 U	**0.90 U**	0.90 U	*NC*	0	NC
Colbolt	< 50		**12.8 J**	2.9 U	**10.6 B**	**11.1 B**	*4.6*	0	9.4
Copper	< 25		**10.2 J**	2.4 U	**2.3 U**	2.3 U	*NC*	0	NC
Iron	< 100		**19400**	29.9 U	**21600**	**22400**	*4*	0	11
Lead	< 5.0	(SW7421)	1.5 J	1.4 U	**1.2 U**	**1.9 B**	*NC*	0	NC
Magnesium	< 2500		**12700**	295.2 U	**14000**	**14300**	*2*	0	10
Manganese	< 15		**10200**	0.90 U	**10800**	**11100**	*3*	0	6
Mercury	< 0.20	(SW7470A)	0.0702 J	0.10 U	0.10 U	0.10 U	*NC*	0	NC
Nickel	< 40		**10.5 J**	13.5 U	**7.8 B**	**8.0 B**	*3*	0	30
Potassium	< 2500		**9070**	327.4 U	**10800**	**10800**	*0*	0	17
Selenium	< 5.0	(SW7740)	5.0 U	3.9 U	3.1 U	3.1 U	*NC*	0	NC
Silver	< 7.0		1.62 J	1.7 U	0.90 U	0.90 U	*NC*	0	NC
Sodium	< 2500		**31500**	539 U	**32200**	**33100**	*3*	0	2
Thallium	< 5.0	(SW7841)	5.0 U	3.6 U	7.9 U	7.9 U	*NC*	0	NC
Vanadium	< 50		50 U	3.0 U	4.0 U	4.0 U	*NC*	0	NC
Zinc	< 20		**15.8 J**	2.5 U	**6.6 B**	**5.4 B**	*20*	0	82

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
U= Not Detected at the Reporting Limit
B= Less than the Contract Required Detection Limit (CRDL).
but greater than the Instrument Detection Limit (IDL).
J= Analyte detected below quantitation limit.

COMPARISON OF QA & CONTRACTOR RESULTS
SHEPLEY'S HILL LANDFILL, FALL 2004

Anions

QA SAMPLE No.:	0411129-01B	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	See Below	CONTRACTOR'S ANALYSIS DATE:	See Below
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	300.0	ANALYSIS METHOD:	300.0

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte		AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**		USACE COMPARISON CODE	*RPD*
Chloride, Cl		5.0 U	(12-7-04)	**26**		1.0 U	(11-24-04)	**27.3**		0	*5*
Nitrate, as N		0.20 U	(11-19-04)	**0.038 JH**		0.20 U	(11-18-04)	**0.26**		0	*NC*
Othophosphate, as P	(by E405.1)	0.050 U	(11-17-04)	**0.050 U**		0.20 U	(11-18-04)	**0.20 UJ**		0	*NC*
Sulfate, SO4		1.0 U	(12-7-04)	**5.2**		0.20 U	(11-24-04)	**7.5**		0	*36*

SEE APPENDIX A FOR KEY TO COMPARISON CODES
NR= NOT REPORTED
U= Not detected at or above the Reporting Limit
J= Estimated value, below the Reporting Limit
LRL= Laboratory Reporting Limit
H= Method specific holding time exceeded.

Cyanide (CN)

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/29/04	CONTRACTOR'S ANALYSIS DATE:	11/19/2004
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9010B	ANALYSIS METHOD:	335.4

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**		USACE COMPARISON CODE	*RPD*
Cyanide (CN)	0.020 U		**0.020 U***		0.010 U		**0.010 U***		0	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
*Note: Cyanide sample was adjusted for pH to >12 when it was received at the lab.
U= Not detected at or above the Reporting Limit
LRL= Laboratory Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS
SHEPLEY'S HILL LANDFILL, FALL 2004

Chemical Oxygen Demand (COD)

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/29/04	CONTRACTOR'S ANALYSIS DATE:	11/22/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4	ANALYSIS METHOD:	410.1

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Chemical Oxygen Demand (COD)	50 U		**40 J**		20.0 U		**39.9**	0	*0*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
U= Not detected at or above the Reporting Limit
LRL= Laboratory Reporting Limit
J= Estimated value, below the Reporting Limit

Total Alkalinity as CaCO3

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	12/1/04	CONTRACTOR'S ANALYSIS DATE:	11/19/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.2	ANALYSIS METHOD:	310.1

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Total Alkalinity as CaCO3	5.0 U		**320**		1.0 U		**344**	0	*7*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
H=METHOD PRESCRIBED HOLDING TIME EXCEEDED
LRL= Laboratory Reporting Limit
U= Not detected at or above the Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS
SHEPLEY'S HILL LANDFILL, FALL 2004

Total Hardness as CaCO3*

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/22/04	CONTRACTOR'S ANALYSIS DATE:	12/2/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	2340B	ANALYSIS METHOD:	2340B

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**		USACE COMPARISON CODE	*RPD*
Total Hardness as CaCO3*	17 U		250		1.6 U		290		0	*15*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
*Note: Hardness as calculated by the separate determinations of calcium and magnesium, expressed as mg equivalent CaCO3/L by Method 2340B.
U= Not detected at the reporting limit
LRL= Laboratory Reporting Limit

Biological Oxygen Demand (5 Day)

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/19/04	CONTRACTOR'S ANALYSIS DATE:	11/19/04
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**		USACE COMPARISON CODE	*RPD*
Biological Oxygen Demand (5 Day)	2.0 U		2.0 U		1.4 U		1.4 UB		0	*NC*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
U= Not detected at or above the Reporting Limit
NC=Not calculated
LRL= Laboratory Reporting Limit
B= Analyte also detected in the associated method blank

COMPARISON OF QA & CONTRACTOR RESULTS
SHEPLEY'S HILL LANDFILL, FALL 2004

Total Dissolved Solids (TDS by 160.1)
Total Suspended Solids (TSS by 160.2)

QA SAMPLE No.:	0411129-01	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/19/04	CONTRACTOR'S ANALYSIS DATE:	11-21-04(tds), 11-22-04(tss)
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	160.1 and 160.2	ANALYSIS METHOD:	160.1 and 160.2

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**		USACE COMPARISON CODE	*RPD*
Total Dissolved Solids (TDS by 160.1)	10 U		**430**		5.0 U		**151**	*minor*	3	*96*
Total Suspended Solids (TSS by 160.2)	4.0 U		**14**		0.50 U		**25.6**		0	*59*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
LRL=Laboratory Reporting Limit
U= Not detected at or above the Reporting Limit

Total Organic Carbon (TOC)

QA SAMPLE No.:	208101-1	CONTRACTORS SAMPLE No.:	598943
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/23/04	CONTRACTOR'S ANALYSIS DATE:	11/19/04
QA LABORATORY:	STL-Connecticut (subcontracted)	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9060.0	ANALYSIS METHOD:	9060.0

MATRIX: **WATER**
DATE SAMPLED: **11/17/04**
UNITS: mg/L

Target Analyte	AMRO QA LAB LRL		**AMRO RESULTS QA LAB**		STL-VT CONTRACTOR LRL		**STL-VT RESULTS CONTRACTOR**	USACE COMPARISON CODE	*RPD*
Total Organic Carbon (TOC)	1.0 U		**3.8**		1.4 U		**3.8 B**	0	*0*

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
LRL=Laboratory Reporting Limit
U= Not detected at or above the Reporting Limit
B= Analyte also detected in the associated method blank

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
(603) 424-2022

Client: USARCCI
Project Name: EP776 SITE PLEX'S HILLLANDFILL
Ship via: (circle one) Fed Ex, UPS, AMRO Courier,
Hand Del., Other Courier, Other:

AMRO ID: 0411129
Date Rec.: 11-18-04
Date Due: 11-26-04

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?	✓			
2. Custody Seals present?	✓			
3. Custody Seals Intact?	✓			
4. Air Bill included in folder if received?	✓			
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 5°				
Samples rec. with ice ✓ ice packs ___ neither ___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?	✓			
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:	✓			
What samples sent: 01 #				
Where sent: STL-CT				
Date: 11-18-04				
Analysis: TOC				
TAT: STD				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?			✓	
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: SC Date: 11-18-04 Logged in By: CC Date: 11-18-04
Labeled By: CC Date: 11-18-04 Checked By: MG Date: 11-19-04

NA= Not Applicable

U.S. ARMY CORPS OF ENGINEERS (Contact: Mark Koenig / 978-318-8312)

QA Sample

AMRO Environmental Laboratory Corp.
111 Herrick Street, Merrimack NH 03054

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
E#776	Shepley's Hill Landfill LTM

SAMPLERS: *(Signature)*
Nancy McNally

~~STA. NO.~~ MATRIX	DATE 2004	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOCs 8260B	TOC 9060	TAL metals 6010B, Hardness 2340B	Cyanide 9010B	Anions 300.0?, Alkalinity 310.1, TDS 160.1	TSS 160.2	BOD5 405.1	COD 410.4	REMARKS
GW	17 NOV	1005		X	SHM-96-5B-QA	11	3	2	1	1	1	1	1	1	AMRO # 0411129
W	↓	—		X	TRIP BLANK	2	2								

VAM 11-17-04

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Katherine Miller	11-17-04 / 1100	FEDEX AIRBILL # 827491009663		11/18/04 / 9:10	S. Cahir
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	
				1 COOLER SHIPPED	

Report to: US Army Corps of Engineers
696 Virginia Road, Concord MA 01742

Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

DASE 1 OF 1

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Appendix G

Comment Response Package

RESPONSE TO
EPA Comments (dated March 16, 2006) on the
Draft 2004 Annual Report
Shepley's Hill Landfill
Long Term Monitoring & Maintenance
Devens, Massachusetts
August 2005

The EPA comments are italicized below, with the Army's responses shown immediately below each comment,

General Comments:

1. *Throughout the report, the 2005 Five-Year Review is referred to as "upcoming" and refers to evaluations that are to be completed in the 2005 Five-Year Review (refer to pages ES-2, 2, 3, 12, and 20). Since the 2005 Five-Year Review was finalized in September 2005 and the Annual Report will be finalized in April 2006, please update the Annual Report throughout to accurately reflect the status of the 2005 Five-Year Review and the Five-Year Review evaluations and conclusions related to Shepley's Hill Landfill.*

   RESPONSE: The text of the 2004 AR addresses the site conditions and circumstances as they existed in the 2004. The Five-Year Review was subsequently completed in September of 2005. We gracefully submit that actions (i.e. the Five-Year Review) occurring subsequent to 2004 would more appropriately be documented in the 2005 AR.

2. *In the 2005 Annual Report, the Army will need to include a discussion on the implementation of the extraction and treatment system and the Comprehensive Site Assessment (CSA) and Corrective Action Alternatives Analysis (CAAA) and how these efforts fit within the context of the overall remedy for SHL. In addition, the 2005 Annual Report should consider the reevaluation of the methods used to assess cleanup progress. Changes to the evaluation criteria may be needed. If not in the 2005 Annual Report, changes to the evaluation criteria may need to be addressed through the CSA/CAAA.*

   RESPONSE: Concur, cited items will be addressed in the 2005 AR.

Specific Comments:

3. *Page 7, Section 5.0, Last Para, Groundwater Elevations: EPA does not agree with the assertion that, "the model analysis of northerly ground water flow is still valid." Rather, EPA's presentation to the RAB/BCT on June 9, 2005 offered a different conclusion, with a greater degree of eastward flowing groundwater than modeled flow-lines would suggest. In any case, we strongly recommend that future long-term monitoring reports categorize and present groundwater data according to hydrostratigraphic units (water table aquifer, deep*

overburden aquifer, bedrock aquifer, etc.). Head data should be contoured and presented for each of these hydrostratigraphic intervals.

RESPONSE: Concur, future reports will categorize and present groundwater data according to hydrostratigraphic units and head data will be contoured and presented for each of the hydrostratigraphic intervals.

4. *Page 8, Section 6.0, 3rd Para, Groundwater Sampling: What is the current status/timetable regarding repair of the damaged wells, SHM-99-31A and SHM-99-32X?*

Response: Well SHM-99-32X, which was severely damaged in a collision, was repaired in February 2005, and has been sampled since. Well SHM-99-31A has not had any repairs performed on it, as collecting samples there have not recently been a difficulty. The problem at that well in the past (May 2003 and May 2004) was apparently due to freeze-thaw action in the surrounding soil (being located in a wetland area), causing a slight bend in the 2-inch PVC well that sometimes prevented the passage of a sampling pump. The problem was never experienced during fall sampling events, suggesting that through the course of the year, the previous winter's effect was naturally corrected. If the current sampling protocol results in no such difficulty, no repairs are necessary.

5. *Page 10, Section 6.2, 2nd bullet, Sampling: Although it is indicated in the "UPDATE" that a sample was successfully collected from SHM-99-31A, it is not clear whether the well remains damaged. See comment 4 above.*

Response: Please see response to Comment 4, above.

6. *Page 14, Section 7.3.2, 1st Para: Is the obstruction reported at SHM-99-31A the result of frozen water in the casing (a temporary condition), or actual damage to the well. Please clarify. See previous comments.*

Response: Please see response to Comment 4, above

7. *Page 19, Section 9.1, Conclusions, 1st Bullet: EPA questions the adequacy of the monitoring well network, particularly in the vicinity of Red Cove, as noted in comments on the Draft Data Gaps Analysis Report. In addition, see comment 3 above. Additional analysis of groundwater flow is needed. In particular, groundwater elevations will need to be collected at all available monitoring points, and head data needs be contoured, evaluated and presented for each hydrostratigraphic interval (e.g., water table aquifer, deep overburden aquifer, bedrock aquifer, etc.). EPA requests that this information be included in future Annual Reports.*

RESPONSE: Concur, will address in future ARs.

8. *Page 19, Section 9.2, Recommendations, 1st Bullet: In accordance with the "new" condition of the extraction and treatment system, it is suggested that an overarching table be created to*

identify specific wells, monitoring frequencies, analytes, and other pertinent aspects for monitoring to be conducted for treatment system "performance monitoring" and routine "long-term monitoring". Future annual LTM reports should include this table and explanatory information.

RESPONSE: Concur, will address in future ARs.

9. *Page 20, Section 9.2, Recommendations, 1st Bullet: EPA concurs with this recommendation (see comment 7 above).*

RESPONSE: Concur.

DEPARTMENT OF THE ARMY
BASE REALIGNMENT AND CLOSURE
ATLANTA FIELD OFFICE
1347 THORNE AVENUE SW, BLDG 243
FORT MCPHERSON, GEORGIA 30330-1062

17 January 2006

ARMY DO
RTCS
'04 SHLF AR

Reply to the order of
BRAC Environmental Office
DAIM-BO-A-DV
30 Quebec Street, Box 100
Devens, MA 01432

Ms. Lynne Welsh
Massachusetts Department of Environmental Protection
627 Main Street
Worcester, MA 01605

Re: Draft 2004 Annual Report
Shepley's Hill Landfill
Devens, MA
August 2005

Dear Ms. Welsh:

Enclosed please find the Army's response to MADEP comments dated November 4, 2005 on the above referenced document. If you have any questions or comments, please feel free to contact me at (978)796-2205.

Sincerely,

Robert J. Simeone
BRAC Environmental Coordinator

Cc: Ginny Lombardo, Ron Ostrowski, Randy Godfrey

Comments below are from letter dated November 4, 2005, from D. Lynn Welsh, Massachusetts Department of Environmental Protection, to Ben Goff, BRAC Environmental Office, RE: Draft 2004 Annual Report – Shepley's Hill Landfill (AR), August 2005. *USACE Shepley's Hill Landfill (SHL) Team responses to these comments are italicized.*

Comments

MassDEP has two major concerns with the information provided in the AR. These same concerns were expressed in comments made on the recently completed SHL section of the 2005 Five Year Review.

C1.) The first is the presence of landfill gas greater than 25% of the LEL at 15 of the 22 vents sampled. At ten vents, exhibiting elevated LEL, oxygen readings are greater than five percent. These are potential explosive conditions and should be taken into consideration when doing any work on the SHL cap. MassDEP is recommending the Army consider active gas management and would like this issue included in the CSA/CAAA.

MassDEP also notes that the presence of oxygen greater than a percent or two at the vents is an indication that air is getting into the landfill mass. This may be instructive in evaluating cap integrity.

Response: The methane production is the result of the natural degradation of the organics from within the soils and sediments excavated and placed in the landfill. The construction records from the Closure Report indicate that the passive gas venting system has collection piping in a 100-ft by 100-ft grid system. Methane enters this system and passively vents to the atmosphere depending on the barometric pressure differential between the inside of the liner-covered landfill and the surface atmosphere. The methane is trapped at the top layer of the landfill by the cap system, and dissipated to the atmosphere via the venting system when the surface atmospheric pressure drops below the barometric pressure beneath the cap.

When the opposite is true (higher pressure at the surface than within the cap), oxygen enters the landfill through the vents. Furthermore, the landfill is not fully encapsulated (i.e., has no base liner), resulting in a vadose zone in the landfill system where gases could potentially migrate through. The explosive conditions have been taken into consideration when performing maintenance mowing on the cap system. However, once the methane exhausts outside of the candy cane vent, it dissipates readily into the atmosphere. Cap integrity in relationship to oxygen present is not a concern since the landfill is not fully encapsulated.

The landfill gas monitoring data for 11/5/02, 11/17/03, and 11/16/04 indicate variable results rather than consistently high levels of methane. Over 100% LEL was measured in 8 vents in 2002 and 9 vents in 2004. However, a sample from only one vent (V-9)

displayed a reading over 100% LEL in 2003. Atmospheric conditions were similar during the sampling period in each year.

The preceding discussion of methane generation and migration mentioned two particular migration pathways for methane gas: through the vadose zone in the landfill system, and through ambient air outside the methane vents. With respect to the former, it is important to recognize that the data show that potentially explosive levels of methane are not migrating to the house located to the northwest of the landfill on Scully Road. Gas samples collected from GV-1 (see Figure 3-1) did not contain detectable methane in 2002, 2003, or 2004. Further, data collected previously from LGP-01-01 through LGP-01-04 (designated as PVG-1through PVG-4 in the data tables) , also on the northwestern side of the landfill, showed no detectable methane and 0%LEL during the last three annual monitoring rounds. And, as you know, additional gas probes are being installed and sampled at the southern portion of the landfill to further evaluate the potential for gas migration off site.

With respect to the second migration pathway, through ambient air, see attached S. Harvey Letter dated 23 September 2004.

With respect to the need for active gas management, the CSA/CAAA will include an assessment of whether landfill gas measurements warrant action based on all available data.

C2.) MassDEP second concern is the method in which the groundwater elevation data is evaluated. We recommend that the hydraulic monitoring results be evaluated based on the horizon they measure, such as, water table, mid-aquifer and deep. The EPA presentation of such data categorization, at the June 2005 BCT and RAB meetings indicated that the contouring of water level measurements of similar horizons did not demonstrate a change in groundwater flow direction. Instead the flows generally mimicked pre-capped groundwater directions. This has implications for the conceptual site model and the groundwater model results being used to evaluate site remediation methods and MassDEP would like this confirmed in follow on Army work in the CSA.

Response: AMEC is aware of MassDEP recommendation and concerns stated above. AMEC will act on this recommendation as part of the CSA.

MEMORANDUM FOR: Eng/Plan Div, H. Farrell McMillan 23 September 2004

SUBJECT: Landfill Gas Vent Monitoring

1. On 15 September 2004 Mr. Patrick Blumeris and I collected real-time air monitoring data from landfill gas vents at the Devens Consolidated Landfill (DCL) and Shepley's Hill Landfill. The monitoring was undertaken in an effort to further evaluate high methane gas readings observed in November 2003 at many of the vents at each of these landfills. The gas vents were monitored for methane, oxygen, carbon dioxide, and percent lower explosive limit (%LEL) utilizing a Landtec GA-90 multi-gas meter. Air velocity readings from each of the vent openings were obtained using an Alnor CompuFlow Thermo Anemometer. Weather conditions consisted of sunny skies with temperatures in the low 70^0s. In the morning, the winds were light and variable which became more brisk in the afternoon.

2. At Shepley's Landfill, the gas vents selected for monitoring were those that historically showed elevated methane readings (nine of the ~~22 total~~ vents). Eight of the nine vents indicated methane gas concentrations ranging from 6% to 24%, with the %LEL readings greater than 100%. However, no methane gas was detected within one foot downwind of the gas vents and air velocity readings noted at each of the vents were minimal. Refer to Attachment 1. At the DCL Landfill, all eleven gas vents were monitored with little to no methane gas detected (methane gas concentrations ranged from 0 to 1%). Again, the air velocity readings indicated minimal gas flow from the vents. Refer to Attachment 2.

3. Although the monitoring results indicate high methane gas concentrations at several of the gas vents at Shepley's Landfill, it does not appear to be negatively impacting the area immediately adjacent to the vents. This may be due in part to the minimal flow noted at the vent openings. Thus, it does not appear that future site maintenance work (e.g., grass mowing and trimming) will be significantly affected. However, as a safety precaution, it is recommended that a small "safe area" of one-foot radius be established around each of the vents where no grass mowing or trimming will occur.

4. Please note that future gas vent monitoring conducted by NAE personnel should involve only the use of instruments that are rated as intrinsically safe and are operated by qualified personnel. Should you have any questions, please feel free to contact me.

Sheila Harvey

Sheila Harvey
Industrial Hygienist

Encl
Attachment 1
Attachment 2

cc:
Eng/Plan, M. Geib
Eng/Plan, E. Matthews
Eng/Plan, P. Blumeris
Eng/Plan, S. Michalak
PPMD, R. Godfrey
SO, P. Sumner

ATTACHMENT 1

Shepley's Landfill Gas Vent Monitoring September 15, 2004
Landtech GA-90; cal w/15% CH4 and with 15% CO2

Vent ID	Diameter	Monitoring Location	% Methane	% Carbon Dioxide	% Oxygen	% Lower Explosive Limit	Velocity	Smell?	Corroded?
	inches		% CH4	% CO2	% O2	% LEL	fpm		
18	6	at opening	24	17	8	>100	90	Y	
		1 ft downwind	0	0	20.8	0%			
15	6	in vent	21	22.5	0.6	>100	220	Y	
		1 ft downwind	0 - 0.2	0 - 0.2	20.6	2%			
14	4	in vent	11	8	9	>100	50		
		1 ft downwind	0	0	20.6	0%			
13	4	in vent	1.5	1	19	8%	40		
		1 ft downwind	0	0	20.6	0%			
12	4	in vent	6	10	5	>100	60		
		1 ft downwind	0	0	20.6	0%			
9	4	in vent	11	18	0.4	>100	80	Y	Y
		1 ft downwind	0	0	20.8	0%			
4	4	in vent	5.5	15.5	2.8	>100	50	Y	
		1 ft downwind	0	0	20.6	0%			
3	4	in vent	18	22	0.2	>100	50		
		1 ft downwind	0.5	0.5	20.5	6%			
6	4	in vent	11	19	0.5	>100	150 fluctuating		
		1 ft downwind	0	0	21	0%			

NOTE: Readings taken one-foot downwind of vent opening.

ATTACHMENT 2

DCL Gas Vent Monitoring September 15, 2004
Landtech GA-90; cal w/15% CH4 and with 15% CO2

Vent ID	Diameter	Monitoring Location	% Methane	% Carbon Dioxide	% Oxygen	% of Lower Expl Limit	Velocity	Smell?
	inches		% CH4	% CO2	% O2	% LEL	fpm	
1	6	1 ft downwind	0	0	21.5	NT	NT	
		at vent	0	0	21.1	0%	70	
2	6	1 ft downwind	0	0	21	NT	NT	
		at vent	0	0	21	0%	60	
3	6	1 ft downwind	0	0	21.3	NT	NT	
		at vent	0	0	21.1	0%	60	
4	6	1 ft downwind	0	0	21.1	NT	NT	
		at vent	0	0.4	21.1	0%	40	
5	6	1 ft downwind	0	0	21	NT	NT	Y
		at vent	0.4	0.1	20.3	6%	60	
6	6	1 ft downwind	0	0	21.1	NT	NT	
		at vent	1	0.1	20.6	6%	60	
7	6	1 ft downwind	0	0	21.4	NT	NT	
		at vent	0	0	21.3	0%	40	
8	6	1 ft downwind	0	0	21.4	NT	NT	
		at vent	0	0	21.3	0%	60	
9	6	1 ft downwind	0	0	21.4	NT	NT	Y
		at vent	1	0.4	20.4	20 - 22%	40	
10	6	1 ft downwind	0	0	21.3	NT	NT	
		at vent	0	0	21.2	0%	50	
11	6	1 ft downwind	0	0	21.2	NT	NT	
		at vent	0	0.5	19.8	0%	30	

NOTES: Readings taken one foot from vent: attempted to take these downwind of the vent opening.
NT: Not tested: LEL was not tested one-foot downwind of the vent if methane concentration was zero.
NT: Not tested: exhaust speeds were not checked one-foot downwind of vent.
Wind: Note that there were gusts of wind especially at the top of the landfill.
Windspeed: was measured once, at 2000 fpm.
Sampling Sequence: 2,4,5,6,3,1,9,7,8,10,11.