2000 ANNUAL REPORT

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

May 2001

PREPARED BY:

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

US Army Corps
of Engineers
New England District

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C# 13 8.4
May 2001

DEPARTMENT OF THE ARMY
DEVENS RESERVE FORCES TRAINING AREA
DEVENS, MASSACHUSETTS, 01432

REPLY TO
ATTENTION OF

May 29, 2001

BRAC Environmental Office

Mr. David Heislein, HLA
107 Audobon Road
Wakefield, MA 01880

Dear Mr. Heislein:

Enclosed for your records, pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments Reauthorization Act of 1986, is the following document:

2000 Annual Report
Long Term Monitoring Plan
Shepley's Hill Landfill
Devens Reserve Forces Training Area
Devens, Massachusetts

If you have any questions regarding this matter, you may contact me at (978) 796-3114.

Sincerely,

James C. Chambers
BRAC Environmental Coordinator

Enclosures

DEPARTMENT OF THE ARMY
NEW ENGLAND DISTRICT, CORPS OF ENGINEERS
696 VIRGINIA ROAD
CONCORD, MASSACHUSETTS 01742-2751

REPLY TO
ATTENTION OF

COPY FOR YOUR INFORMATION

May 29, 2001

Engineering Management

Subject: 2000 Annual Report, Shepley's Hill Landfill, Long Term Monitoring

Mr. Jim Chambers
BRAC Environmental Coordinator
Box 100
30 Quebec Street
Devens, Massachusetts 01432-4429

Dear Mr. Chambers:

The U.S. Army Corps of Engineers, New England District has completed preparation of the 2000 Annual Report for Shepley's Hill Landfill in accordance with the Long Term Monitoring and Maintenance Plan.

Enclosed please find five copies for your review. Additionally, we have forwarded copies of the subject document as follows:

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Harvard Public Library	1 Copy
Hazen Memorial Library	1 Copy
Lancaster Public Library	1Copy
Mr. V. Bonilla, FORSCOM	3 Copies
Mr. T. Poole, EMO	Executive Summary
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Ms. J. Brattstrom, USAEC	2 Copy
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Mr. D. MacIver	Executive Summary
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Ms. K. Bourassa, Town of Shirley	1 Copy
Mr. L. Guercio, Town of Shirley	Executive Summary
Ms. L. Wallace, Town of Harvard	Executive Summary
Mr. J. Petrin, Town of Harvard	Executive Summary
Ms. J. Corenzwit, Town of Ayer	Executive Summary
Mr. C. Sullivan, Town of Ayer	Executive Summary
Ms. A. Turner, Town of Lancaster	Executive Summary

If you have any questions, please call me at (978) 318-8627.

Sincerely,

Enclosures

David Margolis, P.E.
Engineering Manager

SHEPLEY'S HILL LANDFILL
2000 ANNUAL REPORT

SHEPLEY'S HILL LANDFILL
DEVENS, MASSACHUSETTS

May 2001

SHEPLEY'S HILL LANDFILL 2000 ANNUAL REPORT

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont.)

TABLES

FIGURES

APPENDICES

EXECUTIVE SUMMARY

This annual report has been prepared to document the monitoring and maintenance activities conducted at the Shepley's Hill Landfill in Devens, Massachusetts as required by the Record of Decision (ROD) for areas of contamination 4, 5, and 18 (ABB-ES, Oct 1995). This report was developed by the U.S. Army Corps of Engineers (USACE), New England District (NAE).

This report documents the results of the fifth year (2000) of the Long Term Monitoring and Maintenance conducted in accordance with the approved Long Term Monitoring and Maintenance Plan (SWEC, May 1996). Activities conducted as part of the Long Term Monitoring and Maintenance Plan include a yearly inspection of the landfill cover, yearly landfill gas vent monitoring, as well as semi-annual groundwater sampling. Post closure monitoring is required for a period of thirty years.

An annual landfill inspection was conducted and observations were made regarding the vegetative cover, vegetation types, erosion, settlement, and general condition of the various features. The landfill is in fair condition, and appears to be functioning adequately. The cover surface was noted to contain areas of sparse vegetation, intrusive vegetation and settlement. Intermittent standing water, erosion, overgrown areas and wetlands plants were observed in isolated areas within drainage swales. The access roads on the cap are in good condition. The security fence was noted to be in need of some repair. There were no conditions observed which would immediately jeopardize the integrity of the landfill cap. Combustible gas readings were collected from eighteen gas vents on the landfill. The gas readings are within the parameters of a mature landfill. The vents are functioning properly.

The fifth year of long-term groundwater sampling was performed on the fourteen compliance point monitoring wells located adjacent to the landfill on the north and east. 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 volatile organic compounds, inorganics, and general water quality parameters.

In accordance with the Record of Decision, the effectiveness of the selected Alternative SHL-2 is determined by evaluating groundwater sampling results from two groups of monitoring wells. Wells are designated as either Group 1 or Group 2 wells. Group 1 wells are wells where all chemical of concern concentrations have historically met or been below cleanup levels established in the Record of Decision. Group 2 wells are wells where chemical of concern concentrations have exceeded cleanup levels. In the Long Term Monitoring and Maintenance Plan, all existing wells were designated as Group 2 wells and the three new wells that were installed in 1996 were to be designated after the first round of sampling. During the first five-year site review (August 1998) six monitoring wells (SHL-3, SHL-5, SHL-9, SHL-22, SHL-93-10C, and SHL-93-22C) achieved cleanup levels for all chemicals of concern and were reclassified as Group 1 wells. All other wells, including the three new wells, are classified as Group 2 wells. Monitoring will continue to assure that cleanup levels are maintained over time in Group 1 wells. Well designations will be reviewed again during the second five-year review.

Of the chemicals of concern established in the Record of Decision, only those chemicals which present a carcinogenic risk were considered trigger chemicals in the Long Term Monitoring and Maintenance Plan. The trigger chemicals are arsenic, dichlorobenzenes, and 1,2-dichloroethane. Therefore, the

evaluation of effectiveness of Alternative SHL-2 is based on the reduction of carcinogenic risk, rather than reduction of chemical concentrations, as a measure of progress toward attainment of cleanup goals. This approach prevents a situation in which failure to attain a concentration reduction goal for a minor contributor to risk (i.e. 1,2-dichloroethane) overshadows the achievement of a 50-percent reduction of concentration of a higher carcinogenic risk (arsenic). Risk reduction was evaluated during the first five-year review in August 1998. However, for annual reports, contaminant concentrations will be referenced against the cleanup levels as a benchmark. It should be noted that the majority of the risk present at Shepley's Hill Landfill is due to arsenic in the groundwater.

Arsenic was the only trigger chemical detected above cleanup levels during the 2000 sampling events. Analytical results from the 2000 groundwater sampling events (Tables 7-2 and 7-3) have indicated the presence of arsenic above the cleanup level in wells SHM-96-5B, SHM-96-22B, SHL-11, SHL-20, SHL-19, SHL-4 and SHM-96-5C. The 2000 monitoring year results were compared to previous year's data. A comparison of arsenic concentrations found during the year of 2000 with historical data indicates that there has been a general decrease in arsenic concentrations, except for at wells SHM-96-5B, SHL-11, SHL-22 and SHM-96-22B.

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. In accordance with the *Final Work Plan, Supplemental Groundwater Investigation at Shepley's Hill Landfill, Devens Reserve Forces Training Area, Devens, Massachusetts* (HLA, February 1999) the work included: a hydrogeologic assessment of groundwater recharge potential along the western edge of the landfill, characterization of groundwater flow and quality immediately north of Shepley's Hill Landfill, updating and refining the groundwater model for Shepley's Hill Landfill, and analyzing rock samples for naturally occurring arsenic. This work is ongoing and a report will follow.

The 2000 landfill inspection identified additional corrective actions required to maintain the landfill cap. These include: regrade and reseed/riprap eroded areas; clear unwanted vegetation in drainage channels; remove trees from landfill cap; place stone aprons around gas vents; repair and regrade catch basins; repair the perimeter fence and conduct a topographic survey of the landfill to determine extent of settling and potential improvements in surface drainage. Corrective actions for landfill cap maintenance will be conducted within the next year. Overall the landfill is in fair condition and is functioning adequately.

The next round of groundwater sampling will be conducted in May 2001.

1.0 INTRODUCTION

This annual report has been prepared to document the monitoring and maintenance procedures conducted at the Shepley's Hill Landfill in Devens, Massachusetts based on the Record of Decision (ROD) (ABB-ES Oct 1995) for Shepley's Hill Landfill Areas of Contamination 4, 5, and 18. This report was developed by the U.S. Army Corps of Engineers (USACE), New England District (NAE).

The Long Term Monitoring and Maintenance Plan (LTMMP) (SWEC, May 1996) for Shepley's Hill Landfill outlines the landfill closure monitoring and maintenance procedures. These procedures include a semi-annual groundwater sampling program to monitor contaminants, and an annual visual inspection and gas emission monitoring of the landfill cap. This report documents the fifth year of the long term monitoring. The first two years of monitoring were conducted by Stone & Webster Environmental Technology & Services (SWEC). From 1998 through 2000, monitoring has been conducted by NAE. Post closure monitoring is required for a period of thirty years.

2.0 LANDFILL CAP MAINTENANCE ACTIVITIES

The Record of Decision for the Shepley's Hill Landfill required monitoring and maintenance of the landfill cap based on observations made during the annual inspections. Based on recommendations made from the 1996 and 1997 inspections, improvements and repairs were performed during 1998 to properly maintain the cap, as previously reported. The only maintenance activities performed during 1999 and 2000 include mowing of the landfill vegetative cover and drainage swales. There were no other cap maintenance improvements or repairs performed during these two years. The recommended maintenance items listed in the previous annual report did not pose an immediate risk to the integrity of the landfill cap, and are considered non-critical maintenance procedures. For cost effectiveness purposes, maintenance activities of this non-critical nature will be conducted approximately every two years, as warranted. In the event that repair needs are identified which would prevent immediate damage to the cap, they will be conducted expeditiously.

3.0 LANDFILL CAP MONITORING ACTIVITIES

The Shepley's Hill Landfill at Devens, Massachusetts was inspected on 30 October 2000 and 1 November 2000 by personnel from the U.S. Army Corps of Engineers (USACE), New England District (NAE). Features of the landfill inspected included the cap, the drainage system, the gas vent system, access roads, and the 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 (see plan pocket). A narrative of the findings of this inspection follows. Descriptions of observations begin at the northern extremity of the landfill and continue in a counter-clockwise direction.

- The northern half of the cap has many areas of standing water. A topographic survey of the landfill will have to be conducted in the near future and compared to the as-built topography to determine settlement areas. In conjunction with the existing drainage system, the topo and settlement findings will be the basis of corrective action for the extensive areas of standing water.

- On the west side near gas vent #9, a shallow sloped area is undergoing mild erosion. Vegetation is not well established and minor erosion is forming shallow gullies. The placement of topsoil and seed, with a surface treatment of broadcast hay or straw, should be sufficient to repair this area and stop the erosion process.

- 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. This rim of this catch basin should be lowered to the surrounding grade.

- Catch basin #7 near the southwest corner of the site is substantially overgrown by the adjacent vegetation and will soon be completely overgrown and hidden from view. The catch basin is partially filled with many small pieces of PVC pipe. This catch basin should be cleared of encroaching vegetation and the PVC pipe pieces should be removed.

- The concrete headwall drainage structure at the terminus of the catch basin and underground conduit system on the south side is overgrown with vegetation, including some larger woody species, 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 should be cleared, accumulated sediment should be removed, and the channel should be regraded as required to properly drain. The channel should then be reseeded or riprap should be placed, depending on water velocities.

- 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 should be cleared of wetland vegetation and regraded as needed to properly drain all areas of standing water. Depending on water velocities, the channel should then be reseeded or riprap should be placed.

- 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 woody vegetation and wetland species. It appears to be silted in and has a large area of standing water. This reach of the drainage swale should be cleared of all vegetation and accumulated silt and sand, and regraded to drain properly. Seeding, or riprap placement, should follow, depending on water velocities.

- The eastern drainage swale has some minor vegetation growth and sand accumulation. The swale should be cleared.

- To the north of the gas vent #13 are several small trees. The trees should be removed and the area reseeded as necessary.

- The area in the vicinity of gas vent #12 is low and poorly graded. This is a large area, extending toward gas vents #14, #15, #16 and the access road. The area is often too wet to mow and is subject to encroachment of woody plants and wetland species. The area is very rutted due to vehicular traffic on the cap. The area should be surveyed, regraded and a drainage swale should be placed to convey water to the existing drainage swale to the east.

- In the vicinity of the new rock channel on the east side, there are large areas with sparse vegetation. The soil in the bare areas is mostly sand and is eroded to a depth of 12 inches in some areas. During the fall of 1998, hydroseeding of some of these barren areas was performed, but very little germination has occurred. 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.

- To the east of gas vents # 11 and # 8 is a small stand of trees. These trees should be removed from the cap.

- To the east of gas vents # 11 and # 8 on the west bank of the swale is an area that is eroded to a depth of approximately 12 inches. This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion.

- To the east of gas vents # 8 and # 5 on the hill above Plow Shop Pond is an area that is eroded to a depth of approximately 6 inches. This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion.

- The access roads on the site are in good condition. Work was performed on these roads in the Fall of 1998 to upgrade the surface. 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. The security fence should be repaired, with all missing fence sections, including gates, replaced or repaired.

- The gas vents are in good condition. All screens and pipes are in functional condition and no repairs are required at this time. A stone apron should be placed around the vents to prevent future burrowing from animals.

A summary of Corrective Action measures for the Landfill Cap is 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 to determine whether methane, hydrogen sulfide, or volatile organic compounds have accumulated in the subsurface of the landfill site.

The fifth annual landfill gas sampling was conducted on 30 October and 1 November 2000. The weather on 30 October was overcast and rainy, with temperatures in the 40's (F) and the barometric pressure was 754 mm of mercury and rising. The weather on 1 November 20000 was sunny, with temperatures in the 50s (F), and the barometric pressure was 759 mm of mercury and falling. Gas samples were field analyzed for the following parameters using the listed equipment:

Parameter	Equipment
Total Volatile Organic Compounds (VOC)	HNu Photoionization Detector (PID) with a 10.6 eV lamp
Percent Oxygen	Industrial Scientific TMX 412 Combustible Gas Indicator (CGI)
Hydrogen Sulfide (ppm)	CGI
Percent Lower Explosive Limit (LEL)	CGI
Carbon Monoxide (ppm)	CGI
Percent Carbon Dioxide	Landtec Gem 500, GA-90 landfill gas monitor
Percent Methane	Landtec Gem 500, GA-90 landfill gas monitor

The CGI and the Landtec GA-90 were both calibrated in the shop by U.S. Environmental. The PID was calibrated in the field to 248 ppm isobutylene and 0 ppm.

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 a MSA LC 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 MSA pump and turned on. The readings were recorded on the Landfill Gas Monitoring form (Appendix B) after they had stabilized. The locations of the gas vents are shown in Figures 3-1 and 4-1.

This year the sampling round was conducted over a two day period. The readings recorded, although from different vents, were generally higher on the second day of sampling. The dissimilar results can be attributed generally to changes in barometric pressure, although the vents sampled on the second day generally exhibit higher readings historically. On 30 October the barometric pressure was rising and on 1 November the barometric pressure was dropping.

The results from both days of sampling can be found on Table 1 in Appendix B. The following is a brief summary of the results. VOCs were detected in V-16 (30 ppm) and V-17 (40 ppm). No other gas vent wells tested positive for VOC's . The oxygen levels ranged from 21.0% (Vent # 2) to 0% (Vent # 14) using the GA-90. No gas vent wells tested positive for hydrogen sulfide, reading 0 for all wells. LEL readings ranged from 0% in many of the wells to over 100% LEL in Vent Nos. 13, 14, 15, 17, and 18. Carbon monoxide registered 0 in all gas vent wells. Carbon dioxide ranged from 29.2 ppm (Vent # 17) to 0.1 ppm (Vents # 8, #11). Methane ranged from 41.0 ppm (Vent # 14) to 0 ppm in many of the wells sampled on 30 October. There was a gaseous odor at nearly all the vent wells sampled on 1 November.

The gas readings are within the parameters of a mature landfill. The vents are functioning properly. The scenario of high atmospheric pressure to low atmospheric pressure results in a venting of landfill gas into the atmosphere. This was the case on 1 November. The scenario of low atmospheric pressure to high atmospheric pressure results in air intrusion into the upper portion of the landfill. This would account for the lower gas readings on 30 October. 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 off-site migration of landfill gases; however, due to the high LEL 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.

5.0 GROUNDWATER ELEVATIONS

Groundwater elevations were collected from each well during groundwater sampling activities. The depth to groundwater was subtracted from the elevation of the reference point to determine the elevation of the groundwater at each location. Table 5-1 lists the water level elevations for each well for each sampling round. Also indicated on that table is the screened interval for each well, indicating where the surrounding groundwater interfaces with each well. Figure 5-1 shows a cross-section of the wells in the monitored area that has generally shown the highest levels of chemicals of concern. During each sampling event, groundwater elevations were recorded on the first day of sampling for all wells scheduled to be sampled. Groundwater levels measured during May 2000 were consistently higher than those measured in October 2000. This is most likely due to the above average precipitation the area experienced for early spring, and below average summer and fall precipitation. The mean drop in groundwater elevation (from spring to fall reading) was 1.7-feet, and ranged from 0.6 to 3.3-feet. Compared to the year before, spring 2000 levels were consistently higher than spring 1999, and fall 2000 levels were lower than fall 1999 levels. This follows since more of the area's 1999 precipitation fell in the later months of the year.

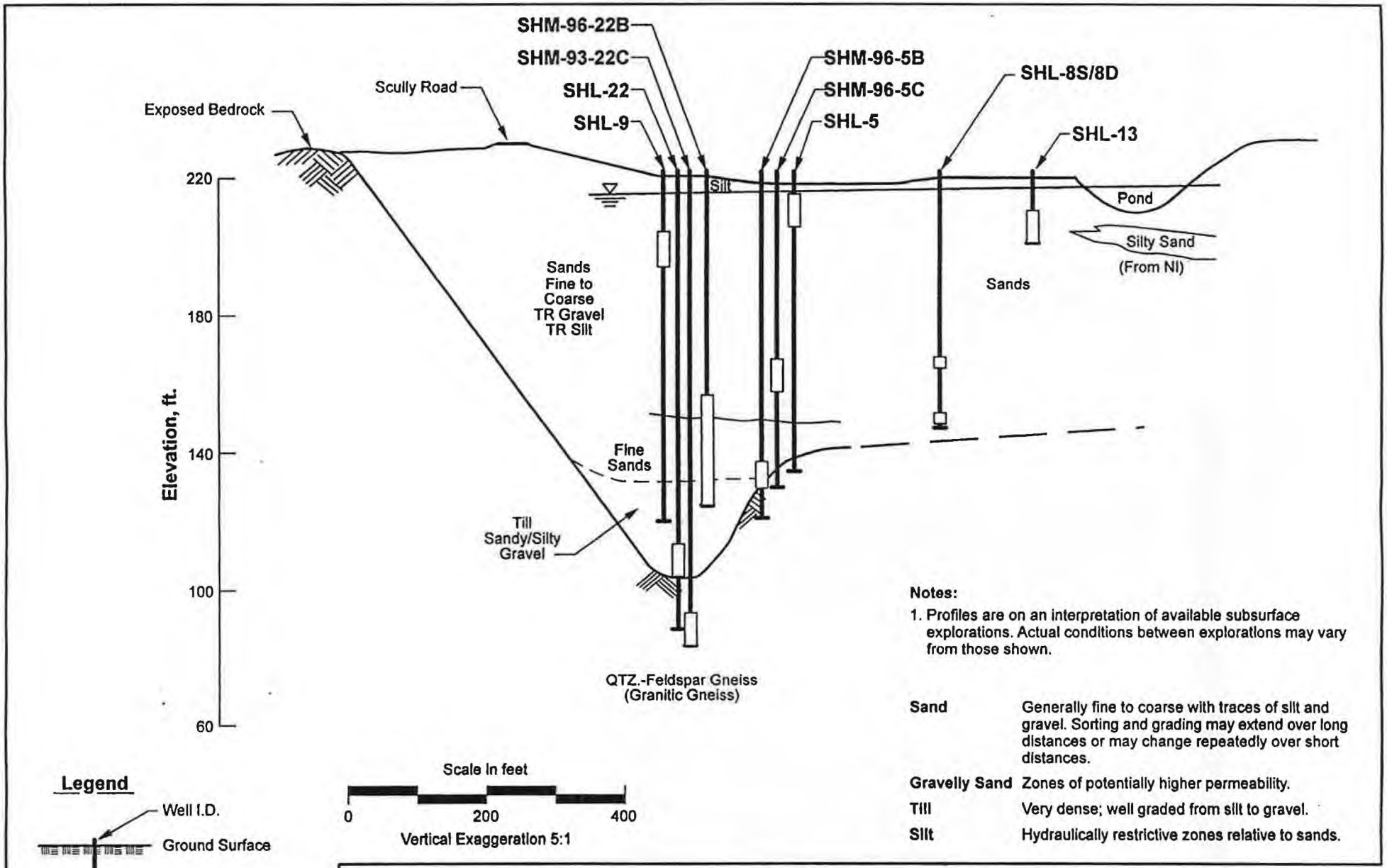
In addition to these semi-annual groundwater measurements, regular groundwater measurements of all Shepley's Hill Landfill wells have been conducted by Harding ESE (formerly ABB-ES and HLA) since 1992. During the first 5-year review (SWEC, August 1998), groundwater elevations were re-evaluated to identify hydraulic gradients and to confirm changes due to the construction of the landfill cap. It was determined that the landfill cap has reduced the volume of water beneath the cap, resulting in a more northerly groundwater flow (SWEC, 1998). Groundwater flow patterns will be re-evaluated during the next 5-year review.

In light of data collected for the first Five-Year Review performed in accordance with the Record of Decision for the Shepley's Hill Landfill Operable Unit, Harding ESE continues to perform supplemental groundwater investigations which include, in part, a hydrogeologic assessment to obtain additional data to evaluate the effectiveness of the selected remedial action.

TABLE 5-1
Monitoring Wells and Elevations

		Groundwater Elevations (Ft NGVD)	
Well Identification	Screened Interval	May 8, 2000	October 30, 2000
SHL-3	213.4-223.4	218.68	217.66
SHL-4	213.0-223.0	218.42	217.79
SHL-5	203.4-213.4	216.77	213.48
SHM-96-5B	128.5-138.5	215.42	213.20
SHM-96-5C	158.5-168.5	215.41	213.19
SHL-9	197.8-207.8	215.25	212.91
SHL-10	211.2*-231.0	218.51	217.30
SHM-93-10C	192.7-202.7	219.14	218.10
SHL-11	206.5-221.5	217.85	217.26
SHL-19	209.3-224.3	218.93	217.67
SHL-20	185.8-195.8	217.98	217.36
SHL-22	104.5-114.5	215.23	212.93
SHM-96-22B	127.6-157.6	215.18	212.91
SHM-93-22C	87.3-97.3	215.25	212.94

* Previous records show well SHL-10 having a bottom elevation of 207.0 NGVD. Recent field observations have revealed that refusal is met at 211.2 NGVD.



Notes:

1. Profiles are on an interpretation of available subsurface explorations. Actual conditions between explorations may vary from those shown.

Sand	Generally fine to coarse with traces of silt and gravel. Sorting and grading may extend over long distances or may change repeatedly over short distances.
Gravelly Sand	Zones of potentially higher permeability.
Till	Very dense; well graded from silt to gravel.
Silt	Hydraulically restrictive zones relative to sands.

Harding Lawson Associates
Engineering and
Environmental Services

Geologic Cross Section
Shepley's Hill Landfill
Devens Reserve Forces Training Area
Devens, MA

FIGURE
5-1

DRAWN:	JOB NUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
BGF	09931	W9903003(b)		03/99	07/12/00

6.0 GROUNDWATER SAMPLING

Groundwater sampling activities at the landfill are conducted semi-annually. Groundwater sampling activities for the fifth year were conducted in the spring (May 8, 9 and 11, 2000) and in the fall (October 30, November 1 - 2, 2000). Precipitation events delayed sampling on May 10 and October 31, 2000. Wells are designated as either Group 1 or Group 2 wells. Wells which have historically attained cleanup goals are given a Group 1 designation. Wells which have not historically attained cleanup goals are designated as Group 2 wells. Initially, all existing wells were designated as Group 2 wells and the three new wells that were installed in 1996 were to be designated during the first five-year site review (SWEC, August 1998). During the first five-year site review, six wells (SHL-3, SHL-5, SHL-9, SHL-22, SHL-93-10C, and SHL-93-22C) achieved cleanup levels for all chemicals of concern and were reclassified as Group 1 wells. All other wells, including the three new wells, were classified as Group 2 wells. These group designations are presented in Table 6-1, located at the end of this section. Well designations will be reviewed again during the second five-year review.

6.1 Preparation for Sampling

Wells sampled as part of the long term monitoring program included SHL-3, SHL-4, SHL-5, SHL-9, SHL-10, SHL-11, SHL-19, SHL-20, SHL-22, SHM-93-10C, SHM-93-22C, SHM-96-22B, SHM-96-5B, and SHM-96-5C. Locations of the wells are shown on Figures 4-1 and 6-1. Sampling activities were coordinated with the Devens BRAC office and the contract laboratory prior to commencement of sampling. The contract laboratory was contacted approximately three weeks prior to sampling and was requested to prepare and deliver sampling bottles, quality assurance bottles and coolers to New England District approximately one week prior to the sampling event. Bottles were checked to insure that they complied with the requirements of the sampling program. Sampling equipment (including the YSI water quality meters and the teflon lined tubing) was reserved for rental/purchase from U.S. Environmental and picked up in the days preceding the sampling event. NAE used their own Grunfos Rediflow II pumps, controllers, Heron water level indicators, HF Scientific DRT-15CE turbidity meters, and portable generator for the sampling. 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

The fifth year of sampling was conducted by NAE on May 8, 9 and 11, 2000 and later on October 30, November 1 - 2, 2000. 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 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 to a depth between the top of the water level and the bottom of the screen.

Once the pumping was initiated, at least one volume greater than the stabilized drawdown volume plus the extraction tubing volume was purged. 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 C. All water quality parameters, except turbidity, were monitored using a flow-thru cell and a Sonde-YSI water meter (YSI 600 XLM). Turbidity samples were not collected from the flow through cell due to the silt buildup which can occur in the cell. A Y-connector was set up before the flow through cell to take the turbidity readings. Sampling was conducted when required purge volumes were met and 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.

- In cases where the water level was lower than the top of the screen, the pumps were lowered to approximately midpoint between the water level and the bottom of the screen. This procedure occurred at several wells during each event.

- Well SHL-3 is developing a history of difficulty when attempts to stabilize the sample stream are made. Further investigation of the cause will be made in 2001, but it is believed that material within the well may be blocking flow through the pump. Symptoms include purge rates that diminish within a few minutes consistently, while no considerable drawdown of the water surface is noted. Since the requirements of the sampling procedure can not be met (parameter stabilization), results for this well may be suspect.

- During the spring 2000 sampling event, the pH detector on one of the two water meters in use ceased to function. As a result pH readings are not available for the spring 2000 sampling of wells SHL-11 and SHL-19. Review of pH readings taken with this meter, prior to the problem being discovered, shows that the last well monitored (SHL-10) had uncharacteristically low pH readings. Therefore, these readings should be disregarded. When the meter was checked using calibration standards at the end of the day, readings indicated that the pH probe was not functioning properly anymore. Records show that the meter was apparently functioning fine until it was used at well SHL-10, which was

the last well of the day where that meter was in service. After the problem was confirmed the next day, the probe was replaced. The USACE data from spring 1998 through fall 2000 shows that this well has normally stabilized at a pH of 6.8 to 7.1 (while the questionable data from the spring of 2000 stabilized at 4.6).

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 (started 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 rinser.

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

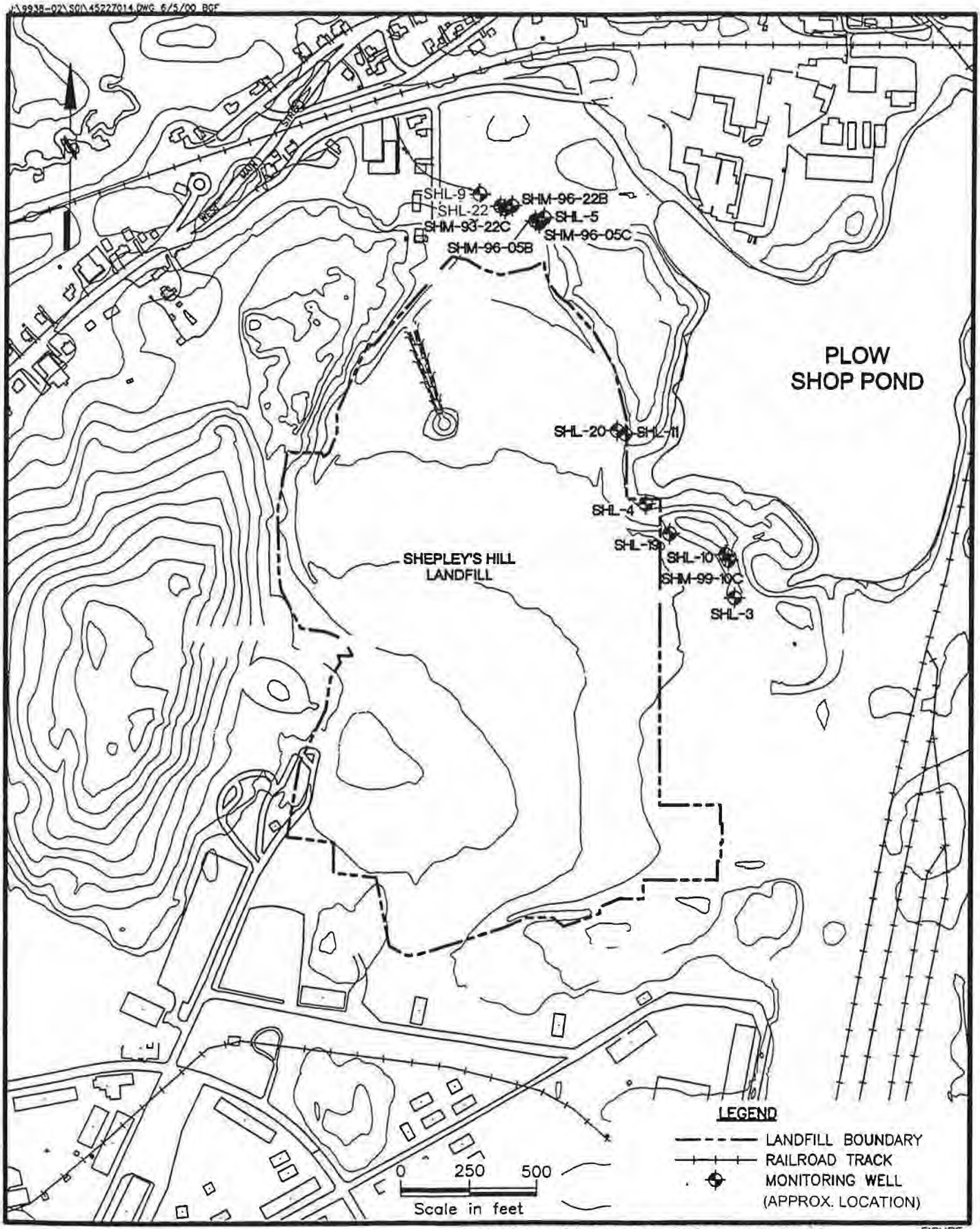
- The pump was then submersed in a riser filled with deionized water and at least 1 to 2 gallons were pumped through.

- 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.

TABLE 6-1
Monitoring Well Designations

Monitoring Well Identification	Well Designation (Based on Final Five Year Review, SWEC, Aug 1998)
SHL-3	Group 1
SHL-4	Group 2
SHL-5	Group 1
SHL-9	Group 1
SHL-10	Group 2
SHM-93-10C	Group 1
SHL-11	Group 2
SHL-19	Group 2
SHL-20	Group 2
SHL-22	Group 1
SHM-93-22C	Group 1
SHM-96-22B	Group 2
SHM-96-5B	Group 2
SHM-96-5C	Group 2



Harding Lawson Associates
Engineering and
Environmental Services

LONG-TERM MONITORING PLAN WELLS
SHEPLEY'S HILL LANDFILL
DEVENS RFTA, DEVENS, MA

FIGURE
6-1

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED DATE
RDC	45227		5/25/00	6/00

7.0 LABORATORY TESTING

Groundwater was sampled in fourteen monitoring well locations using the low-flow method in accordance with the procedures outlined in the approved Long Term Monitoring and Maintenance Plan, Shepley's Hill Landfill (SWEC, May 1996). Samples were sent to Severn Trent Laboratories (formerly Intertek Testing Services Environmental Laboratories) in Colchester, Vermont for analysis. The samples were collected on May 8, 9, 11 and later on October 30 and November 1, 2, 2000. Samples were placed in containers compatible with the intended analysis and properly preserved prior to shipment to the laboratory. Each sealed container was placed in a leakproof plastic bag and placed in a strong thermal ice chest (cooler) filled with bubble wrap packing material, or equivalent, to ensure sample integrity during shipment. Ice was added to cool samples to no more than 4^0 C. Chains of Custody (COCs) were used to identify and document the samples being shipped (copies are included in Appendix D). 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.

7.1 Analyses

Water analyses were conducted according to EPA methods 8260B for volatile organics, 6010B/7470A for TAL metals, and as follows for general chemistry analyses, including chemical oxygen demand by method 410.1, biochemical oxygen demand by method 405.1, hardness by method 130.2, alkalinity by method 310.1, cyanide by method 9010, anions by method 300.0, total dissolved solids by method 160.1, and total suspended solids by method 160.2. These analyses were conducted at all wells. Table 7-1 indicates the analysis and procedures used for groundwater samples collected at Shepley's Hill Landfill.

7.2 Results

The approach for evaluating the effectiveness of the remedy is presented in the Record of Decision (ABB-ES, 1995). Of the chemicals of concern identified in the ROD, only those chemicals which present carcinogenic risk were considered trigger chemicals in the Long Term Monitoring and Maintenance Plan (SWEC, May 1996). The trigger chemicals are arsenic, dichlorobenzenes, and 1,2-dichloroethane. Therefore, the evaluation of effectiveness of Alternative SHL-2 is based on the reduction of carcinogenic risk, rather than reduction of contamination, as a measure of progress toward attainment of cleanup. This approach prevents a situation in which failure to attain a concentration reduction goal for a minor contributor to risk (i.e., 1,2-dichloroethane) overshadows the achievement of a 50 percent reduction of concentration of a higher carcinogenic risk (arsenic). Risk reduction was evaluated during the first five-year review in August 1998. However, for the annual reports the contaminant concentrations will be referenced against the cleanup levels as a benchmark. It should be noted that the majority of the risk present at Shepley's Hill landfill is due to arsenic in the groundwater.

Arsenic was the only trigger chemical detected above cleanup levels at the site during the 2000 sampling events. Analytical results for groundwater analyses are presented in Tables 7-2 and 7-3, for the spring and fall rounds, respectively.

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	USEPA 8260B
Inorganics Aluminum Arsenic Barium Cadmium Chromium Copper Cyanide (wet chemistry) Iron Lead Manganese Mercury Nickel Selenium Sodium Silver Zinc	USEPA 6010B except Cyanide by USEPA 9010 and Mercury by USEPA 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	 USEPA 130.2 USEPA 160.1 USEPA 160.2 USEPA 300.0 USEPA 300.0 USEPA 300.0 USEPA 310.1 USEPA 405.1 USEPA 410.1
General Parameters (field determination) pH Temperature Specific Conductance Dissolved Oxygen Oxygen Reduction Potential Turbidity	

USEPA - U.S. Environmental Protection Agency

TABLE 7-2
Groundwater Analytical Results - May 8, 9 & 11, 2000 Sampling Event
Shepley's Hill Landfill
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	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	LEVEL (1)															
	ug/L															
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	5.6	<5.0	<5.0	<5.0	<5.0	<5.0	4.1 J	<5.0	<5.0	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	<5.0	<5.0	1.3 J	1.4 J	1.4 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.8 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.2 J	1.2 J	1.5 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	1.3 J	1.0 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.4 J	2.3 J	2.4 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.6 J	2.7 J	2.0 J
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	3.3 J	3.3 J	2.7 J	<5.0	<5.0	<5.0	1.5 J	<5.0	1.6 J	2.9 J	3.3 J	1.4 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	1.6 J	1.6 J	<5.0	<5.0	<5.0	<5.0	1.8 J	<5.0	3.9 J	<5.0	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	<2.5	**116**	<2.5	**5,110**	**5,040**	**52.2**	15.0	<2.5	5.9 J	**404**	41.4	**216**	14.6	**1,360**	34.4
Barium	2,000 (2)	<10.7 N	34.7 JN	<10.7 N	67.5 JN	65.2 JN	55.8 JN	12.9 JN	<10.7 N	<10.7 N	116 JN	<10.7 N	111 JN	12.2 JN	97.9 JN	76.1 JN
Cadmium	5 (2)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	0.33 J	<0.30	0.35 J	<0.30	<0.30	<0.30	0.33 J	<0.30	0.34 J
Chromium	100	10.2	2.6 J	3.6 J	4.0 J	2.5 J	4.2 J	3.5 J	6.7 J	4.0 J	3.3 J	2.6 J	4.0 J	3.3 J	3.1 J	4.2 J
Copper	1,300 (3)	27.7 N	2.9 JN	4.7 JN	12.8 JN	5.8 JN	9.5 JN	4.4 JN	17.2 JN	4.4 JN	4.6 JN	12.1 JN	4.6 JN	4.9 JN	7.1 JN	9.0 JN
Iron	9,100	648	**9,400**	2,130	**45,000**	**44,400**	**67,000**	3,620	176	91.1 J	**71,300**	6,110	**10,500**	396	**96,800**	437
Lead	15	2.4 J*	2.8 J*	4.4 *	2.7 J*	3.3 *	3.1 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	<2.3 *	3.4 *	2.7 J*
Manganese	1,715	17.4	826	506	**11,200**	**11,100**	**4,460**	482	7.1 J	40.6	**3,220**	925	**8,640**	830	**2,290**	586
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	4.8 J	<2.9	<2.9	17.5 J	16.2 J	4.6 J	<2.9	<2.9	<2.9	11.7 J	<2.9	14.7 J	7.4 J	6.7 J	<2.9
Selenium	50 (2)	<4.0	<4.0	<4.0	<4.0	4.8 J	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0	<4.0
Silver	40 (4)	3.8 J	4.6 J	5.1 J	6.4 J	4.7 J	7.8 J	5.2 J	5.0 J	6.3 J	5.8 J	4.2 J	5.0 J	4.6 J	5.6 J	4.8 J
Zinc	2,000 (4)	15.2 J	3.2 J	6.9 J	3.6 J	2.6 J	2.3 J	4.5 J	2.1 J	2.8 J	1.7 J	3.0 J	2.9 J	15.4 J	3.2 J	7.4 J
Aluminum	6,870	535	49.9 J	400	73.3 J	49.4 J	63.7 J	119 J	231	142 J	48.8 J	54.2 J	50.4 J	41.3 J	33.9 J	69.1 J
Sodium	20,000	692 J	3,460 J	1,950 J	**45,700**	**44,500**	**35,300**	1,300 J	617 J	8,040	**40,400**	981 J	**48,400**	**51,700**	**45,000**	**23,700**
GENERAL CHEMISTRY																
Alkalinity	-	3,000 *	47,000 *	33,000 *	400,000 *	316,000 *	296,000 *	48,000 *	9,000 *	192,000 *	232,000 *	21,000 *	344,000 *	436,000 *	340,000 *	252,000 *
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	2,200
Chloride	-	1,200 *	6,900 *	1,700 *	52,500 *	53,500 *	50,600 *	4,200 *	1,600 *	30,500 *	50,100 *	2,100 *	59,300 *	67,800 *	61,100 *	44,600 *
Chemical Oxygen Demand	-	<5,000	<5,000	20,000	20,000	18,000	24,000	12,000	<5,000	6,000	24,000	<5,000	<5,000	6,000	36,000	<5,000
Cyanide (Total)	200 (2)	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Hardness	-	8,000	54,000	32,000	330,000	330,000	330,000	62,000	13,000	226,000	192,000	24,000	72,000	440,000	270,000	300,000
Nitrate as Nitrogen	10,000 (2)	300	300	<200	<200	<200	<200	<200	400	<200	<200	500	<200	<200	<200	300
Sulfate	500,000 (2)	3,400 N	9,900 N	2,000 N	5,200 N	5,200 N	4,400 N	10,500 N	3,900 N	22,700 N	4,400 N	7,200 N	8,500 N	5,200 N	4,400 N	18,000 N
Total Dissolved Solids	-	32,000	71,000	68,000	473,000	474,000	401,000	78,000	59,000	299,000	344,000	36,000	507,000	577,000	460,000	385,000
Total Suspended Solids	-	3,100	4,900	2,000 B	54,200	52,700	67,800	3,400	19,800	12,900	36,700	7,600	13,200	2,300 B	99,800	5,100

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. -

B = Value within 5 times of the amount detected in the equipment blank sample

J = Value below the Contract Required Detection Limit or Practical Quantitation Limit

N = Matrix spike sample recovery outside acceptance limits

*** = Duplicate analysis Relative Percent Difference outside acceptance limits**

(1) Cleanup values as developed in the ROD (unless otherwise 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

TABLE 7-3
Groundwater Analytical Results - Oct 30, Nov 1-2, 2000 Sampling Event
Shepley's Hill Landfill
Devens, Massachusetts
(SHEET 1 of 1)

	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
PARAMETERS	**CLEANUP**	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
	LEVEL (1)															
	ug/L															
VOLATILES (8260)																
Xylenes	10,000 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Acetone	3,000 (4)	3.2 J	<5.0	<5.0	<5.0	2.2 J	2.9 J	<5.0	<5.0	<5.0	2.5 J	<5.0	2.3 J	<5.0	5.4	<5.0
2-Butanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Benzene	5 (2)	<5.0	1.7 J	<5.0	<5.0	<5.0	1.4 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.5 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	1.4 J	1.3 J	1.3 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.7 J	1.3 J	1.2 J
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	2.3 J	2.2 J	1.8 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.3 J	2.4 J	1.9 J
1,2-Dichloroethene (total)	70 (2)	<5.0	2.9 J	<5.0	3.0 J	2.8 J	3.0 J	<5.0	<5.0	<5.0	1.9 J	<5.0	1.8 J	2.4 J	2.9 J	1.4 J
1,2-Dichloroethane	5	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0	<5.0	<5.0	1.3 J	<5.0	<5.0	<5.0	<5.0	2.3 J	<5.0	2.9 J	1.4 J	1.7 J	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
METALS (6010)																
Arsenic	50	17.4 N	**91.5 N**	13.8 N	**2,500 N**	**2,610 N**	40.3 N	31.4 N	<4.2 N	8.8 N	**523 N**	**154 N**	**172 N**	45.0 N	**1,180 N**	47.8 N
Barium	2,000 (2)	10.5	107	9.7	48.9	51.0	58.7	16.8	5.0	6.6	112	23.6	109	13.2	80.4	80.9
Cadmium	5 (2)	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30	<0.30
Chromium	100	1.3	1.0	1.3	<1.0	<1.0	<1.0	4.3	1.5	1.6	<1.0	<1.0	<1.0	1.1	<1.0	<1.0
Copper	1,300 (3)	5.4	<1.8	<1.8	<1.8	4.2	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Iron	9,100	5,250	**14,800**	5,100	**25,100**	**26,300**	**55,100**	**10,600**	50.3	98.3	**88,000**	**29,300**	**10,600**	905	**71,600**	870
Lead	15	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8	<1.8
Manganese	1,715	530	1,110	720	**12,800**	**12,900**	**5,520**	564	<1.5	37.4	**3,120**	**4,090**	**8,390**	1,300	**1,970**	505
Mercury (7470A)	2 (2)	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Nickel	100	<3.4	16.2	4.9	15.6	16.4	6.6	3.7	3.8	6.4	4.4	8.8	15.8	9.5	8.0	<3.4
Selenium	50 (2)	<3.7 N	<3.7 N	<3.7 N	6.6 N	<3.7 N	<3.7 N	<3.7 N	<3.7 N	<3.7 N	4.5 N	3.8 N	4.0 N	<3.7 N	3.8 N	<3.7 N
Silver	40 (4)	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6	<1.6
Zinc	2,000 (4)	<3.5	9.2	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	<3.5	4.9	<3.5	11.9	<3.5	<3.5
Aluminum	6,870	196 *	229 *	279 *	12.4 J *	21.2 J *	34.1 *	130 *	14.7 *	28.4 *	76.8 *	20.8 *	49.4 *	40.8 *	32.9 *	24.6 *
Sodium	20,000	16,300	**20,600**	3,690	**40,200**	**42,400**	**37,800**	2,380	974	8,250	**36,300**	3,350	**43,500**	**48,000**	**58,100**	**23,600**
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	25,000	168,000	57,000	392,000	380,000	320,000	84,000	25,000	184,000	252,000	84,000	424,000	22,000	344,000	28,000
Biochemical Oxygen Demand	-	<2,000	<2,000	<2,000	3,500	<2,000	<2,000	3,500	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000
Chloride	-	1,400	31,600	1,400	55,700	52,700	57,200	4,000	1,200	31,700	49,000	3,200	57,600	69,000	55,700	48,700
Chemical Oxygen Demand	-	<5,000	36,000	14,000	8,000 J	20,000 J	66,000	14,000	<5	<5	20,000	<5	6,000	8,000	22,000	58,000
Cyanide (Total)	200 (2)	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N	<10.0 N
Hardness as CaCO3	-	28,000	145,000	70,000	410,000	350,000	220,000	70,000	24,000	230,000	190,000	60,000	380,000	430,000	230,000	300,000
Nitrate as Nitrogen	10,000 (2)	600	300	<200	<200	<200	<200	<200	400	<200	<200	<200	<200	<200	200	<200
Sulfate	500,000 (2)	10,000	8,000	4,100	5,300	5,200	4,900	11,800	3,600	20,800	<0.2	15,800	9,100	3,900	3,400	15,700
Total Dissolved Solids	-	62,000	241,000	100,000	494,000	490,000	391,000	126,000	39,000	297,000	386,000	142,000	535,000	586,000	447,000	368,000
Total Suspended Solids	-	3,100	17,800	1,600 B	44,200	39,500	49,600	1,100 B	2,000 B	2,100 B	63,200	6,400	13,400	2,200 B	112,000	4,100

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance. -

B = Value within 5 times of the amount detected in the equipment blank sample

J = Estimated Value

N= Matrix Spike sample recovery outside acceptance limits

* = Duplicate analysis Relative Percent Difference outside acceptance limits

(1) Cleanup values as developed in the ROD (unless otherwise 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

This table presents detectable concentrations of chemical contaminants, or where concentrations were not detected the value is recorded as less than the detection limit. These results are compared against the applicable cleanup level or MCL if there is no established cleanup level. Results of wet chemistry analyses are also included in the table. The results of sampling are summarized below.

7.2.1 Results for Samples Collected Spring 2000

Volatile Organic Compounds (VOCs) were analyzed in the fourteen monitoring wells. None of the wells had detectable concentrations of VOCs above the established cleanup levels for any of the trigger chemicals (or any of the chemicals of concern). The only trigger VOC detected was 1,4-dichlorobenzene, which was found in monitoring wells SHM-96-5B (1.6 J µg/L), SHL-11 (1.8 J µg/L) and SHL-20 (3.9 J µg/L). The trigger compounds 1,2-dichloroethane, 1,2-dichlorobenzene and 1,3-dichlorobenzene were not detected in any of the wells. Non-trigger VOCs detected at levels below MCLs in groundwater samples include acetone (5.6 µg/L or less), benzene (1.9 J µg/L or less), methyl-t-butyl ether (1.7 J µg/L or less), 1,1-dichloroethane (2.7 J µg/L or less), and total 1,2-dichloroethene (3.3 J µg/L or less).

Of the identified chemicals of concern for metals, only arsenic was identified as a trigger chemical. Arsenic was detected at concentrations greater than the cleanup level of 50 µg/L in the following monitoring wells: SHL-4 (116 µg/L), SHM-96-5B (5,110 µg/L), SHM-96-5C (52.2 µg/L), SHL-11 (404 µg/L), SHL-20 (216 µg/L), and SHM-96-22B (1,360 µg/L). A duplicate sample from well SHM-96-5B had a concentration of 5,040 µg/L. The only other chemicals of concern (non-trigger) detected at concentrations above the cleanup levels were iron, manganese, and sodium. Iron was detected at levels above its cleanup level of 9,100 µg /L at wells SHL-4, SHM-95-5B, SHM-96-5C, SHL-11, SHL-20, and SHM-96-22B, with the maximum detected (96,800 µg/L) at well SHM-96-22B. Wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, and SHM-96-22B had concentrations of manganese above the cleanup level of 1,715 µg /L. The maximum value detected for manganese was 11,200 µg /L at SHM-96-5B. Sodium was detected at levels above its cleanup level of 20,000 µg /L at wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, SHL-22, SHM-96-22B, and SHM-93-22C with the maximum detected (51,700 µg/L) at well SHL-22.

7.2.2 Results for Samples Collected Fall 2000

Volatile Organic Compounds (VOCs) were analyzed in the fourteen monitoring wells. None of the wells had detectable concentrations of VOCs above the established cleanup levels for any of the trigger chemicals (or any of the chemicals of concern). The only trigger VOC detected was 1,4-dichlorobenzene, which was found in monitoring wells SHM-96-5B (1.3 J µg/L), SHL-11 (2.3 J µg/L), SHL-20 (2.9 J µg/L), SHL-22 (1.4 J µg/L), and SHM-96-22B (1.7 J µg/L). The trigger compounds 1,2-dichloroethane, 1,2-dichlorobenzene and 1,3-dichlorobenzene were not detected in any of the wells. Non-trigger VOCs detected at levels below MCLs in groundwater samples include acetone (5.4 µg/L or less), benzene (1.9 J µg/L or less), methyl-t-butyl ether (1.7 J µg/L or less), 1,1-dichloroethane (2.4 J µg/L or less), and total 1,2-dichloroethene (3.0 J µg/L or less).

Of the identified chemicals of concern for metals, only arsenic was identified as a trigger chemical. Arsenic was detected at concentrations greater than the cleanup level of 50 µg/L in the following

monitoring wells: SHL-4 (91.5 N µg/L), SHM-96-5B (2,500 N µg/L), SHL-11 (523 N µg/L), SHL-19 (154 N µg/L), SHL-20 (172 N µg/L), and SHM-96-22B (1,180 N µg/L). A duplicate sample from well SHM-96-5B had a concentration of 2,610 N µg/L. The only other chemicals of concern (non-trigger) detected at concentrations above the cleanup levels were iron, manganese, and sodium. Iron was detected at levels above its cleanup level of 9,100 µg /L at wells SHL-4, SHM-95-5B, SHM-96-5C, SHL-9, SHL-11, SHL-19, SHL-20, and SHM-96-22B, with the maximum detected (88,000 µg/L) at well SHL-11. Wells 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 1,715 µg /L. The maximum value detected for manganese was 12,900 µg /L at SHM-96-5B. Sodium was detected at levels above its cleanup level of 20,000 µg /L at wells SHL-4, SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, SHL-22, SHM-96-22B, and SHM-93-22C with the maximum detected (58,100 µg/L) at well SHM-96-22B.

Tables 7-2 and 7-3 summarize the monitoring wells that had contaminant concentrations above the cleanup levels during the 2000 monitoring period. These values were compared to previous year's data. A comparison of arsenic concentrations detected above the cleanup levels during the 2000 period with historical data is presented in Table 7-4. The comparison indicates the following:

General decrease in arsenic concentrations except for at wells SHM-96-5B, SHL-11, SHL-22 and SHM-96-22B. Wells SHM-96-5C, SHL-9, and SHL-20 indicated no definitive change over historic values. It should be noted that 8 of the 14 wells were below the MCL cleanup level for the last round of sampling. The wells below the cleanup levels are wells SHL-3, SHL-5, SHM-96-5C, SHL-9, SHL-10, SHM-93-10C, SHL-22, and SHM-93-22C. Refer to Appendix E for a graphical comparison of arsenic concentrations in monitoring wells for the previous and current sampling periods.

Table 7-4
Comparison of Historic Arsenic Results
Shepley's Hill Landfill Groundwater Monitoring

Well ID	Arsenic (u g/L)												
	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
SHL-3	35	**120**	6.5	NS	NS	<10	<10	<5	<5.4	2.7 B	<1.9	<2.5	17.4
SHL-4	**260**	**140**	2.54	NS	48.8	**73.6 J**	**180**	37.4	**89.1**	**78.2**	**61.3**	**116**	**91.5**
SHL-5	23	38	11.4	NS	12	<10	<10	<5	11.5	5.0 B	6.5	<2.5	13.8
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**
SHM-96-5C	NS	NS	NS	NS	**71**	43.2	43.1	49.5	46.8	**57.0**	44.8	**52.2**	40.3
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
SHL-10	**67**	**120**	**280**	NS	3.4 B	<10	**209**	<5	<5.4	2.7 B	<1.9	<2.5	<4.2
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
SHL-11	**320**	**320**	**340**	NS	**332**	**252 J**	**366**	**346**	**376**	**431**	**492**	**404**	**523**
SHL-19	**340**	**710**	**390**	NS	**138**	<10	**298**	**77.5**	**145**	**156**	**176**	41.4	**154**
SHL-20	**98**	**89**	**330**	NS	**244**	<10	**227**	**238**	**218**	**216**	**215**	**216**	**172**
SHL-22	27	25	32.9	NS	24.8	<10	34.8	10.6	<5.4	12.2 B	7.3	14.6	45
SHM-96-22B	NS	NS	NS	NS	**324**	**318 J**	**352**	**365**	**406**	**707**	**1,440**	**1,360**	**1,180**
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

Notes:

J: Estimated value
B: Detected in associated blank
NS: Not sampled
Bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 u g/L)

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 below. 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 7-3 and are also discussed below. One trip blank sample was collected per shipped cooler, and submitted for VOC analysis only to evaluate potential cross-contamination of samples during transport. No chemicals of concern were detected in the trip blanks.

8.2 Laboratory Quality Control

One set of QA samples were also collected by the sampling team and sent to the designated QA laboratory (an independent testing laboratory) in the form of duplicates for each sampling round. The QA samples represent approximately 10% of the groundwater samples collected. A QA sample was collected during each sampling round at well SHM-96-5B and analyzed for the full suite of analytical parameters. QA samples were collected, packaged and shipped in the same manner as the other groundwater samples. Appendix F presents the Chemical Quality Assurance Report (CQAR) which provides a statistical comparison of the primary and QA laboratory results for each sampling round. Also presented in Appendix F is the Chemical Data Quality Assessment Report, which provides an overall assessment of results presented in the CQAR's, and their impact on data usability for both sampling rounds.

8.3 Data Evaluation

Fourteen groundwater samples were collected from Shepley's Hill Landfill at Devens, MA during each round of sampling. The samples were analyzed at Severn Trent Laboratories (formerly Intertek Testing Services) in Colchester, VT for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (including Nitrate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), and Cyanide. The spring samples were collected on May 8, 9 and 11, 2000, and the fall samples on October 30, November 1 and 2, 2000 (see Groundwater Analytical Results Tables in Section 7).

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW846 guidance and/or with guidelines provided in the USACE Methods Compendium document.

All sample coolers were packed with ice packs and ice in the field. Sample shipments were received at the laboratory on May 9, 10 and 12, 2000, for the spring sampling, and October 31, November 2 and 3, 2000 for the fall sampling. All samples were appropriately preserved by the procedures shown in Table 8-1. There were no sample shipment or receipt anomalies associated with these samples.

Samples were extracted and analyzed in accordance with the methods and holding time requirements cited in Table 8-1.

8.3.1 Data Evaluation for Samples Collected Spring 2000

Volatile Organic Compound (VOC) Analysis

Fourteen groundwater samples were analyzed for VOCs using SW846 method 8260B. In addition, the laboratory analyzed: one field duplicate (SHM-DUP), a duplicate of sample SHM-96-5B); three trip blanks (dated 05/08/00, 05/09/00, and 05/11/00); and one equipment blank (SHL-EB, dated 05/11/00).

Laboratory Method Blank, Trip Blank and Equipment Blank Results: Target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) for method blank, trip blank, and equipment blank samples. All results are acceptable.

Field Duplicate Sample Results: The results of the VOCs for sample SHM-96-5B, and its duplicate, sample SHM-DUP, show less than 20 % relative percent difference for all detected analytes. The field duplicate sample shows acceptable comparative results.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results: One set of matrix spike/matrix spike duplicate (MS/MSD) samples was analyzed for this project. Most MS/MSD recoveries and relative percent differences (RPD) are within the laboratory's acceptance limits for VOC analysis. Twelve out of 84 spiked compounds showed MS and/or MSD recoveries which were slightly outside the acceptance range. Eleven of these exceedances are not considered to impact the results, as recovery of these compounds was not significantly outside of the acceptance range. These analytes were not detected in the field samples and are not site-specific contaminants (i.e., not summarized on the Groundwater Analytical Results Table in section 2), therefore, no action was taken. The compound, 2-Chloroethylvinylether, showed 0% recovery in both the MS and MSD sample. The laboratory report states that the acid preservative may have degraded this analyte. As this analyte is not a site-specific contaminant (and not summarized on the Groundwater Analytical Results Table in section 2), no action was taken.

Target Analyte List (TAL) Metals Analysis

Fourteen groundwater samples were analyzed for TAL metals using SW846 method 6010B or 7000 series methods. In addition, the laboratory analyzed: one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B); and one equipment blank (SHL-EB, dated 05/11/00).

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.

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 for all analytes detected above the CRDL. The field duplicate sample shows acceptable comparative results.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike (MS) and duplicate samples was analyzed for this project. All MS recoveries are within the 75-125 % recovery acceptance limits, except Barium (70%) and Copper (138%). Barium and Copper results are qualified with "N", indicating that the MS recovery limits are outside the acceptance limits. For analytes which showed concentrations above the CRDL, the duplicate RPDs are within the 20% RPD acceptance limits for metals analysis, except for Lead (200% RPD). Lead results are qualified, "*", indicating that duplicate sample RPD values are outside of the acceptance limits. These values should be considered to be estimated due to these quality control exceedances.

General Inorganic Analyses

Fourteen groundwater samples were analyzed for general inorganic analyses, including Alkalinity by EPA method 310.1, Anions (Nitrate, 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 EPA method 130.2, Total Dissolved Solids (TDS) by EPA method 160.1, Total Suspended Solids (TSS) by EPA method 160.2, and Cyanide by SW846 method 9010. In addition, the laboratory analyzed: one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B); and one equipment blank (SHL-EB, dated 05/11/00).

Laboratory Preparation Blank and Equipment Blank Results: All target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) for preparation blank samples. The equipment blank sample showed detectable levels of TSS (600 ug/L). Sample values which are within five times of the amount detected in the equipment blank are qualified with a "B", indicating potential blank interference.

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 for all detected analytes, except Alkalinity which showed 23% RPD between the original and field duplicate sample result. As a result of the exceedance of RPD criteria for Alkalinity, all samples are qualified with a "*", indicating that the duplicate sample RPD values are outside the acceptance limits. Other field duplicate results show acceptable comparative results.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike samples was analyzed for Anions and Alkalinity. All MS recoveries are within the laboratory's acceptance limits (75-125 % recovery) except Sulfate (72% recovery). Sulfate results are qualified with "N", indicating that the MS recovery limits are outside the acceptance limits. One set of duplicate samples was analyzed for Anions, Alkalinity, Hardness, and TDS. All RPD values are within the laboratory's acceptance limits (20% RPD) except Chloride (40% RPD). Chloride results are qualified with "*", indicating that the duplicate sample RPD values are outside the acceptance limits.

Conclusion

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including holding times, blank sample results, surrogate recoveries, and MS/MSD recoveries), all data may be reported without qualification, except as summarized below:

- Metals and General Inorganic Analyses: MS recoveries are outside the acceptance limits for Barium, Copper, and Sulfate. These values are qualified with "N", indicating that the MS recovery limits are outside the acceptance limits. These values should be considered as estimated due to these quality control exceedances.

- Metals and General Inorganic Analyses: Duplicate RPD values are outside the acceptance limits for Lead, Alkalinity, and Chloride. These results are qualified, "*", indicating that duplicate sample RPD values are outside of the acceptance limits. These values should be considered as estimated due to these quality control exceedances.

- General Inorganic Analyses: The equipment blank sample showed detectable levels of TSS (600 ug/L). Sample values which are within five times of the amount detected in the equipment blank are qualified with a "B", indicating potential blank interference, on the Groundwater Analytical Results table.

8.3.2 Data Evaluation for Samples Collected Fall 2000

Volatile Organic Compound (VOC) Analysis

Fourteen groundwater samples (SHL-3, SHL-4, SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-10, SHL-93-10C, SHL-11, SHL-19, SHL-20, SHL-22, SHM-96-22B and SHM-93-22C) were analyzed for VOCs using SW846 method 8260B. In addition, the laboratory analyzed one field duplicate, SHL-DUP, a duplicate of sample SHM-96-5B (dated 11-02-00); three trip blanks (dated 10-30-00, 11-01-00 and 11-02-00) and one equipment blank, SHL-EB (dated 11-02-00).

Laboratory Method Blank, Trip Blank and Equipment Blank Results: Target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) for method blank, trip blank, and equipment blank samples. All results are acceptable.

Field Duplicate Sample Results: The results of the VOCs for sample SHM-96-5B, and its duplicate, sample SHL-DUP have no results above the laboratory's practical quantitation limit for any compound. Therefore, the field duplicate sample shows acceptable comparative results.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSD) Results: One set of matrix spike/matrix spike duplicate (MS/MSD) samples was analyzed for this project. Most MS/MSD recoveries and relative percent differences (RPD) are within the laboratory's acceptance limits for VOC analysis. Five out of 84 spiked compounds showed MS and/or MSD recoveries, which were slightly outside the acceptance range. Four of these exceedances are not considered to impact the results, as recovery of these compounds was not significantly outside of the acceptance range. These analytes were not detected in the field samples and are not site-specific contaminants (i.e., not summarized on the Groundwater Analytical Results Table in Section 7), therefore, no action was taken. The compound, 2-chloroethylvinylether, showed 0% recovery in both the MS and MSD sample. The laboratory report states that the acid preservative may have degraded this analyte. As this analyte is not a site-specific contaminant (and not summarized on the Groundwater Analytical Results Table in Section 7), no action was taken.

Target Analyte List (TAL) Metals Analysis

Fourteen groundwater samples were analyzed for TAL metals using SW846 method 6010B or 7000 series methods. In addition, the laboratory analyzed: one field duplicate (SHL-DUP, a duplicate of sample SHM-96-5B); and one equipment blank (SHL-EB, dated 11-02-00).

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.

Field Duplicate Sample Results: The results of the metals for sample SHM-96-5B, and its duplicate, sample SHL-DUP, show less than 20 % relative percent difference for all analytes detected above the CRDL except for aluminum which had an RPD of 52%. Therefore the aluminum result is estimated, "J", in Table 7-3 for the positive detects in both the sample and duplicate.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike (MS) and duplicate samples was analyzed for this project. All MS recoveries are within the 75-125 % recovery acceptance limits, except arsenic (64%), selenium (74%) and cyanide (46%). Arsenic, selenium and cyanide are qualified with "N" in Table 7-3, indicating that the MS recovery limits are outside the acceptance limits. For analytes, which showed concentrations above the CRDL, the duplicate RPDs are within the 20% RPD acceptance limits for metals analysis, except for aluminum (52%). Aluminum results are qualified in Table 7-3 with "*", indicating that duplicate sample RPD values are outside of the acceptance limits. These values should be considered as estimated due to these quality control exceedances.

General Inorganic Analyses

Fourteen groundwater samples were analyzed for general inorganic analyses, including alkalinity by EPA method 310.1, anions (nitrate, 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 EPA method 130.2, Total Dissolved Solids (TDS) by EPA method 160.1, Total Suspended Solids (TSS) by EPA method 160.2, and cyanide by SW846 method 9010B. In addition, the laboratory analyzed: one field duplicate (SHL-DUP, a duplicate of sample SHM-96-5B); and one equipment blank (SHL-EB, dated 11/02/00).

Laboratory Preparation Blank and Equipment Blank Results: All target analytes were undetected at levels above the laboratory's Practical Quantitation Limit (PQL) for preparation blank samples. The equipment blank sample showed detectable levels of TSS (600 ug/L) and TDS (7000 ug/L). Sample values, which are within five times of the amount detected in the equipment blank (3000 ug/L for TSS and 35000 ug/L for TDS) are qualified with a "B" in Table 7-3, indicating potential blank interference. The equipment blank, SHL-EB, was analyzed outside the allowed holding time for nitrate and orthophosphate (refer to the paragraph above on holding times).

Field Duplicate Sample Results: The results of the general inorganic analyses for sample SHM-96-5B and its duplicate, sample SHL-DUP, showed less than 20 % relative percent difference for all detected analytes, except COD which showed 86% RPD between the original and field duplicate sample result. As a result of the exceedance of RPD criteria for COD, both samples are qualified with a "J" in Table 7-3, indicating that they are estimated values. The results for the sample and duplicate for BOD show one non-detect and one positive detect. Since the positive result is within 5 times the quantitation limit, where analytical variability is greatest, the BOD results are not qualified. The results for the sample and duplicate for orthophosphate also show one non-detect and one positive detect. Orthophosphate was not detected in the field samples and is not a site-specific contaminant contaminants (not summarized on the Groundwater Analytical Results Table in section 7). Also, the positive detect is within 5 times the quantitation limit, where analytical variability is greatest, therefore the orthophosphate results do not need to be qualified. Other field duplicate results show acceptable comparative results.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike samples was analyzed for anions and alkalinity. All MS recoveries are within the laboratory's acceptance limits (75-125 % recovery). One set of duplicate samples was analyzed for anions, alkalinity, hardness and TDS. All RPD values are within the laboratory's acceptance limits (20% RPD).

Conclusion

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including holding times, blank sample results, surrogate recoveries and MS/MSD recoveries), all data may be reported without qualification, except as summarized below:

- Metals Analyses: MS recoveries are outside the acceptance limits for arsenic, selenium and cyanide. These values are qualified with "N", indicating that the MS recovery limits are outside the acceptance limits. These values should be considered as estimated due to these quality control exceedances.

- Metals and General Inorganic Analyses: Duplicate RPD values are outside the acceptance limits for aluminum and COD. These results are qualified, "*", indicating that duplicate sample RPD values are outside of the acceptance limits. These values should be considered as estimated due to these quality control exceedances.

- General Inorganic Analyses: The equipment blank sample showed detectable levels of TSS (600 ug/L) and TDS (7000 ug/L). Sample values, which are within five times of the amount detected in the equipment blank, are qualified with a "B", indicating potential blank interference, on the Groundwater Analytical Results Table.

TABLE 8-1

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

Parameter	Prepar-ation 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 less than 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 less than 2	180 days (except Hg) 28 days (Hg)
Hardness	NA	130.2		100 mL		180 days
Cyanide	NA	9010B	500-mL HDPE	500 mL	NaOH to pH greater than 12 plus Ascorbic Acid in excess 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 less than 2, 4+/- 2°C	28 days
BOD	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

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 is required for matrix quality control samples.
3 VTS - Verified Time when the Sample was collected.
4 Two vials will be shipped to the laboratory; one will be measured for pH in the field 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, and Chloride.

NA = Not Applicable

9.0 CORRECTIVE ACTION

Corrective actions are primarily regrading and reseeding eroded areas and clearing unwanted vegetation in drainage channels. The following areas 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, (2) Place topsoil over the sandy area lacking vegetation on the east side near the new riprap channel, and (3) Remove trees from the landfill cap. Along with the corrective actions listed in the report, it is recommended that the following be performed: (1) Place stone aprons around gas vents to discourage animals from burrowing, (2) Repair and regrade around the catch basins on the south side of the landfill, and (3) Resurvey the landfill to 1-foot contours, and review in conjunction with the existing drainage system to determine why water is ponding on the northern half, and how long it remains before draining.

With the exception of the repairs mentioned above, and the other repairs recommended in the report, the landfill is in fair condition and appears to be functioning adequately.

APPENDIX A

LANDFILL MAINTENANCE CHECKLIST

APPENDIX A
Landfill Maintenance Checklist

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

DATE: 30 October 2000
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. A large area on the southern section was not mowed. In this area, the vegetation was 18 to 24 inches high.	1. See specific comments under the sections that follow.	SAT
	2. There are several areas where settlement is occurring.	2. Survey and compare to original.	SAT
	3. There are trees growing on the cap by gas vent #13 and to the east of gas vents #11 and #8.	3. Remove trees from cap area and reseed as necessary.	UNSAT
Vegetative Growth	1. On the west side there is a large area with sparse vegetation.	1. This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion.	UNSAT
	2. In the vicinity of the drainage ditch on the west side, there are large areas with very sparse or no vegetation. The soil is exposed where erosion control blankets were previously placed.	2. This area should be hydroseeded until vegetation is established.	UNSAT
Landfill Gas Vent Wells	1. The gas vents are in good condition. All screens and pipes are in functional condition and no repairs are required at this time.	1. Stone aprons placed around the gas vents to prevent animals from burrowing.	SAT

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Drainage Swales	1. Most of the drainage swale on the south side is being invaded by woody species. There are also intermittent zones of standing water indicating a lack of proper channel slope and drainage.	1. The south side drainage swale should be cleared of woody vegetation and regraded as needed to properly drain all areas of standing water. Depending on water velocities, the channel should then be reseeded or riprap should be placed.	UNSAT
	2. 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 heavily overgrown with woody 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.	2. This reach of the drainage swale should be cleared of the obstruction, all vegetation and accumulated silt and sand, and regraded to drain properly. Seeding, or riprap placement, should follow, depending on water velocities. Survey the swale to determine how to promote proper drainage.	UNSAT
	3. In the drainage swale between gas vent #3 and #4 is being invaded by wetland species.	3. Remove wetland species by mowing or hand clearing, and hydroseed.	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, including some larger woody species, 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.	UNSAT
Catch Basins	1. Catch Basin #2 near the entrance to the site has a broken surface grate.	1. The surface grate should be replaced.	UNSAT
	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.	2. The rim of this catch basin should be lowered to meet the surrounding grade.	UNSAT
	3. Catch basin #7 near the southwest corner of the site is substantially overgrown by the adjacent vegetation and will soon be completely overgrown and hidden from view. The catch basin is partially filled with many small pieces of PVC pipe.	3. This catch basin should be cleared of encroaching vegetation and the PVC pipe pieces should be removed.	UNSAT

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Settlement	1. It seems apparent that many areas of the landfill are settling. The extent and its effect on the function of the landfill is unknown. Many large areas of standing water were observed in many areas of the landfill.	1. A topography survey should be conducted and compared to the original as-built topo. This will indicate where and how much settlement is taking place.	SAT
Erosion	1. On the west side near gas vent #9, a shallow sloped area is undergoing mild erosion. Vegetation is not well established and minor erosion is forming shallow gullies.	1. The placement of topsoil and seed, with erosion control should be sufficient to repair this area and stop the erosion process.	UNSAT
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, with all missing fence sections, including gates, replaced or repaired.	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.	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; The following areas 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;

(2) Remove trees from landfill cap.

Along with the corrective actions listed in the report, the following is recommended:

(1) Place stone aprons around gas vents to discourage animals from burrowing,

(2) Repair and regrade around the catch basins on the south side of the landfill,

(3) Conduct topographic survey of entire landfill and compare to original topo survey. Determine corrective action for standing water based upon this information and existing drainage system in-place at landfill.

General Comments: With the exception of the items mentioned above , and the other recommended repairs, the landfill is in fair condition and appears to be functioning adequately.

APPENDIX B

LANDFILL GAS MONITORING FORMS

APPENDIX B
Landfill Gas Monitoring

Form to be completed in indelible ink *Monitoring is to be performed annually*

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 10/30-11/1/00

ORGANIZATION: CENAE-EP WEATHER: 10/30 – Rainy, 40's 11/1 – Sunny 50's

BAROMETER: 10/30 754 mm Hg TIME: 0900 BAROMETER: 11/1 759 mm Hg TIME: 0900
757 mm Hg TIME: 1500 754 mm Hg TIME: 1200

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	0.0	8.3	0	0	0	9.5	1.0	10/30/00
V-2	0.0	21.0	0	0	0	2.6	1.3	"
V-3	0.0	11.5	0	7	0	7.9	5.8	"
V-4	0.0	17.4	0	0	0	1.7	0.5	"
V-5	0.0	16.3	0	0	0	2.4	0	"
V-6	0.4	11.6	0	4	0	7.2	3.1	"
V-7	0.0	18.1	0	0	0	1.0	0	"
V-8	0.0	19.3	0	0	0	0.1	0	"
V-9	0.0	19.0	0	0	0	0.2	0	"
V-10	0.0	19.1	0	0	0	0.2	0	"
V-11	0.0	19.3	0	0	0	0.1	0	"
V-12	0.0	4.9	0	20	0	8.2	2.7	"
V-13	0.0	0.1	0	>100	0	14.5	19.1	11/1/00 Odor
V-14	0.0	0	0	>100	0	26.6	41.0	11/1/00 Odor
V-15	0.0	0.1	0	>100	0	26.6	27.7	11/1/00 Odor
V-16	30	0.5	0	68	0	21.8	14.6	11/1/00 Odor
V-17	40	0.1	0	>100	0	29.2	32.0	11/1/00 Odor
V-18	0.0	0.2	0	>100	0	30	39.5	11/1/00 Odor

CALIBATION INFORMATION:

Instrument: PID, 10.6 eV lamp

Results: 0.0/248 ppm isobutylene Calibrated by: Kullberg

Instrument: Industrial Scientific TMX 412 CGI

Results: 0.7% Pentane, 50% LEL, 14%/ 21% O_2, 29ppm H_2S, 50 ppm CO Calibrated by: US Environmental Co

Instrument: Landtech Gem 500 GA-90

Results: 4% O2, 15% CO2, 15% CH4 Calibrated by: US Environmental Co

APPENDIX C

GROUNDWATER FIELD ANALYSIS FORMS

Groundwater Field Analysis Forms
Spring 2000

GWM well # SHL3

SCREENED INTERVAL DEPTH: 25.1-35.1'

H2O LEVEL: PRE PUMP INSERTION 29.82' (from top of casing)

POST PUMP INSERTION 29.83' " " " "

DEPTH SAMPLED: JAK 34' 33

DATE: 5/8/00 TIME: 0900

SAMPLED BY: SS JK PY SIGNATURE: Paul Young

RECORDED BY: SS JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
09:37	30.34	118.0	500		12.21	23.0	5.85	207.2	12.20	5.8	clear
0944	30.24	118.0	300	1	14.82	22.0	5.70	205.1	11.36	5.9	
0952	30.25	+HR. 118.5 JAK	200		17.30	22.0	6.11	173.1	10.81	6.3	back flushed first*
1000	30.40	121.7	350		18.50	23.0	6.11	170.2	11.43	6.4	back flushed first
1005	30.08	162.0	150	2	17.03	22.0	6.11	180.6	11.52	3.3	
1011	30.39	118.5	300		19.49	22.0	6.13	170.9	11.12		back flushed first
1020	29.95	161.0	250	3	19.60	22.0	6.07	180.4	11.31	5.9	back flushed first
Shut off pump, removed to inspect, reinserted @ same depth (post pump insertion water level = 29.80')											
1038	30.69	119.5	900		16.19	22.0	589	198.5	12.38	14.9	
1041	30.78	119.5	900	4	14.41	22.0	5.78	201.7	12.51	5.2	
1045	30.44	117.0	400		14.06	21.0	5.86	198.4	12.43	3.6	
1048	30.24	117.0	300	5	14.95	21.0	5.95	194.6	12.20	3.7	flow slowing

NOTES: 3% 1.6 3% +0.1 unit +10 mv 10% 10%

SAMPLE TAKEN AT: 1055 hours

Saturated Screen Volume Required: ~~9.2~~ gallons (Screen Not fully Saturated)

YSI # 107 TURBIDITY # 75 Pump - Grunfos Redi-flow II

* each back flush due to flow stopping

GWM well # SHL-4

SCREENED INTERVAL DEPTH: 5.7-15.7 feet

H2O LEVEL: PRE PUMP INSERTION 10.29 feet

POST PUMP INSERTION 10.29 feet

DEPTH SAMPLED: 12.5 Feet

DATE: 5/9/00 TIME: 8:58

SAMPLED BY: SS JK PY SIGNATURE:

RECORDED BY: SS JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0913	10.35	68.2	900		11.77	182.0	5.65	-21.9	0.63	21.6	orange S.S.
0917	10.33	66.9	400	1	11.99	183.0	6.09	-38.3	0.42	8.7	clear
0920	10.33	66.8	500		13.21	181.0	6.18	-41.0	0.39	5.5	
0923	10.33	66.6	400	2	13.44	182.0	6.23	-42.1	0.37	3.6	
0927	10.32	66.6	400		13.01	180.0	6.23	-42.4	0.38	3.4	vial fogging (turbidity)
0931	10.32	66.7	400	3	14.05	179.0	6.24	-42.9	0.38	2.8	
0935	10.31	66.6	300		14.51	178.0	6.24	-43.5	0.38	3.4	
0938	10.30	66.6	200		15.50	175.0	6.26	-47.9	0.42	4.6	flow stopped
0944	10.31	72.8	300	4	17.01	170.0	6.28	-51.5	0.65	5.6	flow stopped, backflush
0953	10.31	67.3	550	5	12.15	173.0	6.25	-53.7	0.36	14.1	
0956	10.33	69.2	800	5 OAK	12.79	172.0	6.26	-49.2	0.25	9.8	
1000	10.32	67.7	500	6	12.72	167.0	6.23	-46.4	0.28	4.7	
1004	10.31	67.7	200		13.90	164.0	6.25	-46.2	0.26	4.5	flow stopped
1010	10.32	70.0	300	7	13.30	170.0	6.27	-49.9	0.43	4.2	
1014	10.32	90.2	200		15.29	161.0	6.29	-50.7	0.30	3.8	
1020	10.34	69.2	800	8	13.64	167.0	6.33	-52.2	0.29	4.8	flow stop, backflush
1027	10.35	69.8	800	9	12.81	162.0	6.28	-47.0	0.30	2.5	
1031	10.34	69.8	850	10	12.13	162.0	6.27	-46.7	0.29	2.5	
1035	10.35	69.6	800	11 10 OAK	12.14	158.0	6.26	-44.4	0.31	2.9	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1045

Saturated Screen Volume Required: 1.6 gallons

Sun effecting temp readings

YSI # 148 TURBIDITY # 75

Pump - Grunfos Redi-flow II

GWM well # SHL - 5

SCREENED INTERVAL DEPTH: 5.1 - 15.1 Feet

H2O LEVEL: PRE PUMP INSERTION 1.72 Feet

POST PUMP INSERTION 1.71 Feet

DEPTH SAMPLED: 10 Feet

DATE: 5/11/00 TIME: 1330

SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young

RECORDED BY: SS (JK) PY SIGNATURE: Jack R

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1352	2.28	38.1	800		10.36	74.	6.04	5.5	0.94	11.5	orange SS
1355	2.30	38.1	800	1 gallon	10.17	74	5.92	2.7	0.64	4.6	
1400	2.12	35.5	500	2	10.31	73	5.88	0.4	0.51	2.4	
1407	2.12	35.4	500		10.93	74	5.86	-2.5	0.40	2.3	
1410	2.12	35.5	500	3	10.99	74	5.86	-3.4	0.37	2.2	
1414	2.12	35.4	500		10.90	74	5.85	-3.7	0.36	2.6	
1418	2.12	35.5	500	4	11.10	74	5.84	-4.1	0.36	1.6	

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

SAMPLE TAKEN AT: 1425 2x Saturated Screen Volume Required: 3.2 gallons

YSI # 148 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHM-96-5B

SCREENED INTERVAL DEPTH: 81.3 - 91.3 Feet

H2O LEVEL: PRE PUMP INSERTION 4.39 Feet

POST PUMP INSERTION 4.14 Feet

DEPTH SAMPLED: 86 Feet

DATE: 5/11/00 TIME: 1130

SAMPLED BY: SS JK PY SIGNATURE:

RECORDED BY: SS JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1135	4.54	58.0	500		10.15	629	5.93	-54.2	4.04	6.8	
1140	4.65	48.6	350		9.89	808	6.24	-150.3	2.23	5.7*	
1145	4.68	48.6	400	1 gallon	9.96	839	6.53	-165.7	1.75	2.1	
1150	4.66	48.6	400		10.08	845	6.63	-175.4	1.69	2.0	
1155	4.65	48.6	450	2 gallons	10.15	851	6.67	-180.8	1.67	1.5	
1200	4.65	48.6	400		10.17	852	6.71	-182.6	1.57	1.3	
1205	4.65	48.6	400	3 gallons	10.16	853	6.71	-183.7	1.64	5.5	
1210	4.65	48.6	400	~~4 gallons~~	10.16	853	6.73	-184.2	1.57	2.3	
1215	4.65	48.6	400	4 gallons	10.16	853	6.73	-185.0	1.56	3.8	
1220	4.65	48.6	400	5 gallons	10.18	855	6.72	-184.9	1.65	3.7	
1225	4.65	48.6	400		10.20	855	6.73	-184.7	1.83	3.4	
1230	4.65	48.6	400	6 gallons	10.20	855	6.74	-185.2	1.72	2.9	
1235	4.65	48.6	400	6.5 gallons	10.27	856	6.73	-186.1	1.71	2.7	
					✓	✓	✓	✓	✓		

NOTES: ±0.3 3% ±25 3% +0.1 unit +10 mv 10% ±0.1 <5 10%

SAMPLE TAKEN AT: 1235 Saturated Screen Volume Required: 13

Dup and QA Samples also taken at this well

YSI # 148 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHM-96-5C

SCREENED INTERVAL DEPTH: 50.8 - 60.8 Feet

H2O LEVEL: PRE PUMP INSERTION 3.83 Feet

POST PUMP INSERTION 3.82 Feet

DEPTH SAMPLED: 56 Feet

DATE: 5/11/00 TIME: 1130

SAMPLED BY: SS (JK) PY SIGNATURE: Jack A. K

RECORDED BY: SS (JK) PY SIGNATURE: Jack A. K

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1240	3.90	47.7 Hz	600		9.62	732	6.03	-0.6	5.29	2.5	clear
1245	3.90	47.6	600	1 gallon	9.93	847	6.43	-52.5	7.21	2.3	
1250	3.90	47.7	600		10.03	851	6.46	-56.4	8.09	2.8	
1253	3.90	47.8	600	2	10.04	852	6.47	-57.1	8.52	3.0	
1256	3.90	47.8	550		10.05	852	6.47	-57.2	8.76	3.8	
1259	3.90	47.7	550	3	10.06	851	6.48	-57.6	9.17	2.4	
1303	3.90	47.8	600	4	10.11	850	6.48	-55.1	9.42	2.3	
1308	3.90	47.8	550		10.10	850	6.48	-56.4	9.86	2.2	
1312	3.90	47.7	600	5	10.11	849	6.49	-56.2	10.04	1.9	
1317	3.90	47.8	600		10.13	848	6.48	-55.7	10.38	1.6	
1320	3.90	47.8	550	6	10.12	848	6.48	-55.9	10.24	1.6	
1323	3.90	47.6	650	6 1/2	10.19	846	6.48	-55.8	10.78	1.1	

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

SAMPLE TAKEN AT: 1325 2x Saturated Screen Volume Required: 13.0 gallons

YSI # 107 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHL 9

SCREENED INTERVAL DEPTH: 15.0 - 25.0 feet

H2O LEVEL: PRE PUMP INSERTION 7.96 feet

POST PUMP INSERTION 7.50 feet

DEPTH SAMPLED: 20.0 feet

DATE: 5/9/00 TIME: 1350

SAMPLED BY: SS (JK) PY SIGNATURE: Jack ARK

RECORDED BY: SS (JK) PY SIGNATURE: Jack ARK

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1359	7.65	59.3	400	1	11.40	80	5.55	150.0	0.88	36.5	reddish brown susp. solids
1404	7.66	59.5	400		12.11	85	5.96	133.7	0.64	57.3	
1410	7.67	59.4	400		12.49	87	6.06	121.2	0.37	29.0	
1415	7.67	59.2	300	2	12.30	102	6.10	108.4	0.46	16.0	
1420	7.67	59.5	400		12.25	108	6.13	94.8	0.36	14.2	
1425	7.67	59.5	400	3	12.29	111	6.16	78.7	0.33	7.5	backwashed
1432	7.70	59.8	500	4	11.63	119	6.18	47.5	0.27	8.3	
1437	7.70	59.8	500		11.75	122	6.24	35.4	0.26	6.3	
1440	7.70	59.8	500	5	11.79	124	6.27	26.7	0.24	5.5	
1444	7.70	59.8	500		11.77	125	6.26	21.3	0.24	4.8	
1447	7.70	59.8	500		11.69	127	6.27	17.0	0.24	6.5	
1450	7.70	59.8	500	6	11.81	130	6.29	11.2	0.24	4.9	
1452	7.70	59.8	500		11.67	127	6.26	7.3	0.24	4.7	
1455	7.71	59.8	500	7	11.83	130	6.30	2.8	0.23	4.2	
1500	7.71	59.7	500		12.01	132	6.32	-1.7	0.25	3.1	
1504	7.71	59.8	500	8	11.92	133	6.31	-3.3	0.24	3.6	
~~1508~~											

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

SAMPLE TAKEN AT: 1510 2xSaturated Screen Volume Required: 3.2 gallons

ORP not stabilized, shows constant trend toward negative, took samples

YSI # 148 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHL-10
SCREENED INTERVAL DEPTH: 17.8 - 37.6
H2O LEVEL: PRE PUMP INSERTION 30.25'
POST PUMP INSERTION 30.25'
DEPTH SAMPLED: 34'
DATE: 5/8/00 TIME: 1320
SAMPLED BY: SS JK PY SIGNATURE: Paul Young
RECORDED BY: SS JK PY SIGNATURE:

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

SAMPLE METHOD: EPA LOW STRESS METHOD
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1425	30.24	118.0	400	1	14.52	32.0	4.59	156.3	12.39	4.8	clear
1430	30.25	118.0	400		15.31	33.0	4.81	146.6	12.27	4.6	
1434	30.20	117.2	250		15.99	33.0	4.95	144.4	12.12	5.7	
1438	30.19	117.2	150	2	16.44	34.0	5.04	144.0	11.92	5.7	
1441	30.19	118.0	250		17.22	35.0	5.01	142.2	11.71	4.8	
1445	30.18	118.0	200		18.12	35.0	4.98	141.4	11.45	2.0	
1450	30.19	121.8	150		18.72	35.0	4.94	142.3	12.30	3.4	
1455	30.18	169.7 ~~128.7~~	700		19.55	34.0	5.00	140.3	11.21	8.5	
1500	30.25	169.7	350	3	18.77	33.0	4.84	122.8	11.39	5.5	flow stopped, backwashed
1511	30.18	187.7	150		20.24	~~29.9 20.24~~	4.83	131.0	10.76	7.7	flow stopped, backwashed
1518	30.29	121.5	1000	4	22.96	35.0	4.66	94.6	10.66	12.5	
1522	30.24	118.7	250		17.95	34.0	4.65	129.6	11.13	7.5	
1525	30.20	118.7	200		17.53	33.0	4.63	137.7	11.21	7.7	
1528	30.21	118.7	200	5	17.71	34.0	4.63	140.9	11.11	6.5	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1530 Saturated Screen Volume Required: 2.4 gallons

Got to near stabilization, sampled while still flowing

NOTE; WELL Depth IS 37.6' not 41.8' AS stated.

YSI # 107 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHM-93-10C Sheet 1/2

SCREENED INTERVAL DEPTH: 45.7 - 55.7 feet

H2O LEVEL: PRE PUMP INSERTION 29.28 feet

POST PUMP INSERTION 29.09 feet

DEPTH SAMPLED: 51 feet

DATE: 5/8/00 TIME: 0930

SAMPLED BY: SS JK PY SIGNATURE: Paul Young

RECORDED BY: SS JK PY SIGNATURE: Jack Ahern

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1115	29.89	122.5	700		12.14	469.0	6.51	-10.8	4.27	16.9	Clear
1122	30.40	121.3	400	1	13.30	470.0	6.71	-33.0	2.73	18.9	
1126	30.39	120.8	400		13.71	471.0	6.86	-39.5	2.04	17.1	
1130	30.40	120.0	300	2	13.94	469.0	6.92	-37.8	1.85	14.8	
1133	30.35	120.2	300		13.98	473.0	7.02	-38.1	1.67	15.5	
1142	30.36	121.0	500	3	13.93	472.0	7.10	-66.4	1.04	6.4	
1146	30.51	121.3	500		14.32	472.0	7.13	-89.6	0.74	4.7	
1150	30.58	121.3	400	4	14.35	471.0	7.16	-100.3	0.64	4.1	
1155	30.61	121.3	400		14.44	4720	7.20	-111.9	0.54	4.3	
1200	30.64	121.3	400		14.42	472.0	7.20	-113.7	0.50	2.7	
1204	30.66	121.3	400	5	14.47	472.0	7.22	-118.7	0.48	3.1	
1207	30.67	121.3	400		14.53	472.0	7.23	-121.6	0.45	3.7	
1211	30.68	121.3	400	6	14.57	471.0	7.23	-122.2	0.42	2.7	
1218	30.70	121.3	400		14.61	472.0	7.26	-124.8	0.38	3.0	
1225	30.71	121.3	400		14.74	471.0	7.29	-129.9	0.37	2.71	
1230	30.71	121.3	400		14.77	* ~~378.0~~	7.29	-132.1	0.35	2.39	
1235	30.72	121.3	400		14.80	* ~~378.0~~	7.30	-131.0	0.34	2.33	
1240	30.72	121.3	400	8.5	14.88	* ~~378.0~~	7.32	-128.8	0.34	2.73	VIAL FOGGING UP (turbidity)
1250	30.73	121.3	400		14.70	470.0	7.31	-125.9	0.30	1.7	
1255	30.73	121.3	400	10	14.82	469.0	7.33	-126.1	0.30	2.1	continued

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

SAMPLE TAKEN AT: 2*Saturated Screen Volume Required: 13.0 gal

* read conductivity by mistake.

YSI # 107 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHM-93-10C Sheet 2/2

SCREENED INTERVAL DEPTH: 45.7-55.7 feet

H2O LEVEL: PRE PUMP INSERTION 29.28 feet

POST PUMP INSERTION 29.09 feet

DEPTH SAMPLED: 51 feet

DATE: 5/8/00 TIME: 0930

SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young

RECORDED BY: SS (JK) PY SIGNATURE: Jon A. K

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1300	30.75	121.3	400		14.96	469.0	7.33	-128.0	0.30	1.7	continuation
1305	30.75	121.3	400	11	14.99	469.0	7.34	-127.2	0.28	1.6	
1310	30.75	121.3	400		14.90	469.0	7.33	-124.2	0.29	1.9	
1315	30.76	121.3	400	12	14.93	469.0	7.36	-129.1	0.29	1.4	
1320	30.77	121.3	400		15.04	469.0	7.36	-131.3	0.29	0.9	
1325	30.77	121.3	400	13	14.99	468.0	7.36	-128.5	0.28	1.4	

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

SAMPLE TAKEN AT: 1330 hours 2x Saturated Screen Volume Required: 13.0 gal

YSI # 107 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # ShL - 11

SCREENED INTERVAL DEPTH: 14.8 – 29.8 Feet

H2O LEVEL: PRE PUMP INSERTION 18.47 Feet

POST PUMP INSERTION 18.46 Feet

DEPTH SAMPLED: 24 Feet

DATE: 5/9/00 TIME: 1200

SAMPLED BY: (SS) JK PY SIGNATURE:

RECORDED BY: SS JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1205	18.41	90.5	700		13.08	663	–	35.0	2.45	900	Very Rusty Orange
1210	18.41	90.5	600	1 gallon	13.06	671	–	21.3	2.61	80	
1215	18.41	90.5	600	2 gallons	13.39	679	–	7.2	3.43	54	
1220	18.41	90.6	600		12.83	714	–	-10.3	3.63	42	
1225	18.42	90.6	600	3 gallons	13.415	715	–	-20.4	4.12	18	
1230	18.42	90.6	600		13.58	720	–	-27.1	4.07	9.9	
1235	18.42	90.6	600	4 gallons	13.63	740	–	-30.2	4.44	9.8	
1240	18.42	90.6	600	5 gallons	13.62	730	–	-33.3	4.6	10.1	
					✓ ±0.4 3%	✓ ±21 3%		✓ +0.1 unit	✓ +10 mv	✓ ±0.4 10%	✓ ±1 10%	

NOTES:

SAMPLE TAKEN AT: 1240

Saturated Screen Volume Required: 3.5 gallons (Screen not fully saturated)

Note: Ph bulb broke earlier in day, thurbor, ph readings not taken (will fix for next day)

YSI # 107 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHL-19

SCREENED INTERVAL DEPTH: 17-32 feet

H2O LEVEL: PRE PUMP INSERTION 22.41 feet

POST PUMP INSERTION 22.42 feet

DEPTH SAMPLED: 25 Feet

DATE: 5/9/00 TIME: 0830

SAMPLED BY: (SS) JK PY SIGNATURE:

RECORDED BY: (SS) JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0930	22.41	100.3	400		12.08	113.0	–	-0.4	7.41	90	orange Tint
0935	22.41	101.8	700	1 gallon	11.30	112.0	–	4.0	5.00	70	
0940	22.41	101.8	800	2 gallons	11.56	113.0	–	-0.8	4.32	41	
0945	22.41	101.8	800	3 gallons	11.49	116.0	–	10.5	3.34	28	
0950	22.41	101.8	800	4 gallons	11.52	106.0	–	24.2	2.46	22	
0955	22.41	101.8	800	5 gallons	11.52	105.0	–	26.4	2.49	16	
1000	22.41	101.8	800	6 gallons	11.62	98.0	–	30.4	2.45	150	orange Tint again
1005	22.41	101.8	800	7 gallons	11.54	93.0	–	34.0	2.40	56	
1010	22.41	101.8	800	8 gallons	11.53	93.0	–	36.8	2.61	17	
1015	22.41	101.8	800	9 gallons	11.54	88.0	–	48.5	2.92	11	
1020	22.41	101.8	800	10 gallons	11.54	83.0	–	52.4	3.18	9.6	
1025	22.41	101.8	800	11 gallons	11.64	81.0	–	52.9	3.27	7.0	
1030	22.41	101.8	800	12 gallons	11.58	80.0	–	54.2	3.40	7.5	
1035	22.41	101.8	800	13 gallons	11.56	82.0	–	55.9	3.46	6.9	Sample taken
					✓	✓		✓	✓		

NOTES: ±0.3 3% ±2.4 3% +0.1 unit +10 mv ±0.3 10% ±0.7 10%

SAMPLE TAKEN AT: 1035 Saturated Screen Volume Required: 12 gallons

Note: Ph Bulb on YSI #107 broke during day therefore, ph readings not taken - will fix ph bulb this evening

YSI # 107 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHL-20

SCREENED INTERVAL DEPTH: 41.0 - 51.0 feet

H2O LEVEL: PRE PUMP INSERTION 18.84 feet

POST PUMP INSERTION 18.84 feet

DEPTH SAMPLED: 46.0 feet

DATE: 5/9/00 TIME: 11:55

SAMPLED BY: SS (JK) PY SIGNATURE:

RECORDED BY: SS (JK) PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1209	18.86	93.6	300		13.77	822.0	6.39	-60.9	1.64	6.9	Clear
1215	18.89	95.1	800	1	14.07	829.0	6.37	-65.4	1.37	7.1	
1220	18.89	94.3	600		14.10	831.0	6.37	-65.5	1.27	5.4	
1223	18.88	94.3	600	2	14.31	821.0	6.42	-66.4	1.31	4.1	
1228	18.88	94.3	600	3	14.37	830.0	6.40	-66.6	1.26	4.7	
1231	18.88	94.2	600		14.47	830.0	6.40	-67.7	1.34	3.2	
1233	18.88	94.3	600	4	14.46	830.0	6.39	-68.1	1.27	2.6	
1237	18.88	94.3	600		14.52	831.0	6.40	-67.9	1.34	2.3	
1242	18.88	94.3	600	5	14.44	832.0	6.30	-68.9	1.38	2.2	
1247	18.88	94.3	600	6	14.26	833.0	6.39	-68.9	1.33	2.4	
1251	18.88	94.3	600	6 1/2	14.26	834.0	6.42	-69.4	1.24	1.7	

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

NOTES:

SAMPLE TAKEN AT: 1255

2x Saturated Screen Volume Required: 13 gal

YSI # 148 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHL-22
SCREENED INTERVAL DEPTH: 106.0 - 116.0
H2O LEVEL: PRE PUMP INSERTION 5.21 feet
POST PUMP INSERTION 4.93 feet
DEPTH SAMPLED: 111 feet
DATE: 5/11/00 TIME: 0835
SAMPLED BY: SS (JK) PY SIGNATURE:
RECORDED BY: SS (JK) PY SIGNATURE:

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0925	5.64	61.0	400		9.17	798	6.60	144.8	4.41	22.1	clear
0934	5.73	61.0	400	1 gallon	9.42	908	6.73	-37.5	2.96	9.0	
0938	5.74	61.0	400		9.56	916	6.74	-81.9	2.43	2.8	
0943	5.76	61.0	450	2	9.63	918	6.79	-94.4	2.23	1.8	
0949	5.77	61.0	450		9.68	919	6.79	-98.2	2.62	2.2	
0954	5.78	61.0	450	3	9.84	919	6.80	-98.5	2.37	1.4	
0959	5.80	61.0	450		10.09	919	6.81	-100	2.07	0.9	
1004	5.83	61.0	500	4	9.95	921	6.81	-99.9	2.11	0.9	
1008	5.86	61.0	500		10.08	921	6.82	-100.2	1.71	0.9	
1014	5.84	60.2	450	5	10.16	920	6.83	-100.1	1.83	0.9	
1017	5.81	60.2	450		10.19	920	6.83	-100.1	1.82	0.8	
1020	5.81	60.2	450	6	10.23	921	6.82	-100.2	1.72	0.8	
1024	5.81	60.2	450	6½	10.31	920	6.83	-99.8	1.52	0.8	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1030 2 x Saturated Screen Volume Required: 13.0

YSI # 148 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM well # SHM-96-223

SCREENED INTERVAL DEPTH: 63 - 93 Feet

H2O LEVEL: PRE PUMP INSERTION 5.08 Feet

POST PUMP INSERTION 5.06 Feet

DEPTH SAMPLED: 78 Feet

DATE: 5/11/05 TIME: 0830

SAMPLED BY: SS (JK) PY SIGNATURE: Jack A K

RECORDED BY: SS (JK) PY SIGNATURE: Jack A. K

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1045	5.11	57.7	800		8.67	862	7.72	203.1	7.71	35	Yellowish Color
1050	5.10	56.8	650	1 gallon	9.22	960	6.45	-101.7	7.53	16	
1055	5.10	56.8	650	2	9.61	987	6.67	-102.7	8.91	17	
1100	5.10	56.8	700	3	9.70	987	6.71	-104.1	9.54	11.7	
1105	5.10	56.8	700	4	9.73	987	6.72	-105.1	9.88	9.8	
1110	5.10	56.8	700	5	9.80	988	6.72	-105.8	10.39	10.7	clearing
1115	5.11	56.8	700	6	9.81	987	6.72	-106.4	10.61	10.9	
1120	5.11	56.8	700	7	9.91	989	6.73	-107.5	10.89	8.5	
1125	5.11	56.8	750	8	9.81	989	6.74	-110.5	10.90	7.1	
1130	5.11	56.8	850	9	9.78	997	6.79	-121.8	10.99	4.7	
1135	5.09	53.8	450	10	9.94	997	6.82	-126.5	10.47	4.7	
1140	5.10	55.7	650	11	9.57	997	6.81	-125.1	11.08	4.8	
1143	5.10	55.8	700		9.80	998	6.81	-125.8	11.30	3.9	
1146	5.10	55.7	700	12	9.78	999	6.82	-127.0	11.40	4.1	
1149	5.10	55.9	700	13	9.78	998	6.82	-127.8	11.49	4.2	

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

SAMPLE TAKEN AT: 1155 2xSaturated Screen Volume Required: 9.6 Gallons

YSI # 107 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHM-93-22C

SCREENED INTERVAL DEPTH: 124 - 134 Feet

H2O LEVEL: PRE PUMP INSERTION 6.30 Feet

POST PUMP INSERTION 4.90 Feet

DEPTH SAMPLED: 129

DATE: 5/11/00 TIME: 0815

SAMPLED BY: SS JK PY SIGNATURE:

RECORDED BY: SS JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - 500ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - 1L HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0915	7.30	77.8	1800	1 gallon	9.98	605	7.52	-48.6	1.58	4.8	Greyish, cloudy water
0920	9.12	77.8	1500	2 gallons/3gal	10.00	602	7.57	-74.6	1.90	6.1	Sulfur odor
0925	11.02	77.8	800	4 gallons/5 gallons	10.19	599	7.61	-118.8	2.37	5.8	
0930	13.86	88.0	1100	6 gallons	10.39	597	7.61	-142.1	2.64	6.8	
0935	15.80	99.1	1500	7 gallons/8 gallons	10.55	597	7.61	-152.9	3.06	6.7	
0940	18.45	98.8	800	9 gallons/10 gallons	10.49	598	7.62	-164.4	3.31	6.3	
0945	19.80	98.8	500		10.27	599	7.62	-167.7	3.78	5.4	
0950	20.45	98.8	350		10.16	600	7.61	-166.2	4.00	5.5	
0955	20.95	98.8	200	11 gallons	10.15	599	7.61	-165.9	4.20	6.0	
1000	21.15	98.8	150		10.20	600	7.61	-163.3	4.52	5.8	Flow stopped
1005	22.20	104.5	750	12 gallons	10.14	600	7.60	-156.7	4.26	5.3	
1010	23.10	104.5	400	13 gallons	10.64	604	7.60	-162.8	4.61	5.3	
1015	23.35	104.5	250		10.56	603	7.61	-163.4	4.86	5.5	
1018	23.35	104.5	200	14 gallons	10.82	603	7.60	-165.3	4.89	5.6	
1021	23.35	104.5	200		10.83	603	7.60	-164.2	5.00	5.5	
1024	23.35	104.5	200	14.5 gallons	10.87	603	7.60	-164.0	5.03	5.6	

NOTES: ±0.3 3% ±18 3% +0.1 unit +10 mv 10% 10%

±0.9

SAMPLE TAKEN AT: 1025 Saturated Screen Volume Required: 13

Well has history of minimal to no recharge until drawn down to 20 feet below PVC.

Therefore Well will be drawn down to 20 feet and then try to stabilize with lower flow rate.

YSI # 101 TURBIDITY # 76 Pump - Grunfos Redi-flow II

At 1005 Drawdown = 22.2 - 6.30 feet = 15.9 Feet x 0.652 gal/foot = 10.5 gallons, compared to 12 purged (little recharge)

Groundwater Field Analysis Forms
Fall 2000

GWM Well # SHL-3 diam = 2"

SCREENED INTERVAL DEPTH: 25 - 35 feet (from top casing)

H2O LEVEL: PRE PUMP INSERTION 30.84 feet "

POST PUMP INSERTION 30.80 feet "

DEPTH SAMPLED: 34 feet " Ref. P.t. top of casing 248.5 NGVD

DATE: 10/30/00 TIME: 1310

SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young

RECORDED BY: SS JK (PY) SIGNATURE: Paul Young

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions, Alkalinity, TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH * BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1140	31.11	117.6	250		12.10	58.00	6.7	87	8.35	15.4	
1145	31.1	117.6	200		12.66	60.00	6.55	84.1	8.11	6.46	
1150	31.01	117.6	—		14.11	66.00	6.51	84.8	7.89	5.83	Flow stopped
1155	NO READINGS	—	—	—	—	—	—	—	—	—	No Flow AT All - Backflushing pump
1200	31.12	120.5	250		15.7	64.00	6.89	80.9	7.97	7.42	Flow stopped
1205	30.93	130.83	—		18.78	66.00	6.49	90.5	7.87	—	Flow stopped
1210	30.87	165.6	100		18.31	67.00	6.48	88.7	7.75	—	Flow stopped
1215	—	—	—	—	—	—	—	—	—	—	Back Flushed well 2x
1223	31.18	119.8	300		19.38	67.00	6.50	82.1	8.07	3.79	Flow slowed
1228	30.99	129.3	—		22.58	69.00	6.50	85.9	7.29	—	Flow slowed/stopped **
1245	30.96	286.0	—	4½ gal.	18.47	60.00	6.47	101.5	7.62	—	Backflushed 2x

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

NOTES:

SAMPLE TAKEN AT: 1310

Saturated Screen Volume Required:

* from top of casing ** generator stopped could not get well to stabilize, Flow would constantly slow + stopped.

YSI # 153 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM well # SHL-4 diam = 2"

SCREENED INTERVAL DEPTH: 5.7'-15.7' Ref. PT

H2O LEVEL: PRE PUMP INSERTION 10.92' PVC

POST PUMP INSERTION 10.91' 225.71

DEPTH SAMPLED: 14' NGVD

DATE: 10/30/00 TIME: 1500

SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young

RECORDED BY: SS JK (PY) SIGNATURE: Paul Young

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions, Alkalinity, TDS 1- 500ml HDPE COD 1 ~~1L~~ 250 HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1416	10.95	73.7	500		11.65	415	6.32	8.6	2.04	46.0	ORANGE color
1421	10.95	73.7	550		13.34	417	6.28	5.8	1.94	26.2	water clearing up
1426	10.96	73.7	550		13.81	415	6.10	4.7	1.54	12.2	
1431	10.96	73.7	600	3gal	13.77	412	6.26	4.5	1.22	6.81	
1436	10.96	73.7	600		13.74	408	6.28	5.7	1.05	4.40	
1441	10.97	73.7	600	5gal	13.66	404	6.24	5.4	0.88	2.76	
1446	10.97	73.7	600		13.66	401	6.23	5.0	0.74	1.82	
1451	10.97	73.7	600		13.62	399	6.23	4.1	0.63	1.24	
1456	10.97	73.7	600	7.5gal	13.60	399	6.21	4.4	0.56	1.20	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: 1500

Saturated Screen Volume Required:

YSI # 153 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM well: SHL-5 diam=2"

SCREENED INTERVAL DEPTH: 5.1-15.1 feet Ref. Pt. PVC 218.53 NGVD

H2O LEVEL: PRE PUMP INSERTION 4.96 feet

POST PUMP INSERTION 4.93 feet

DEPTH SAMPLED: 11 FEET

DATE: 11/2/00 TIME: 0830

SAMPLED BY: SS (JK) PY SIGNATURE:

RECORDED BY: SS (JK) PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY * NTU's	COMMENTS
0925	5.56	58.7	800		12.01	129	5.72	91.0	~1.18		slightly brown
0930	5.52	58.0	600	1 gal	12.73	131	5.74	79.3	1.17	2.10	
0935	5.52	58.0	600	2 gal	12.97	131	5.74	77.2	5.35	0.72	
0943	5.53	58.0	500	3 gal	13.09	131	5.74	76.0	1.04		
0946	5.62	58.0	600	4 gal	13.15	131	5.74	75.0	0.99	0.74	
0954	5.48	57.2	450		13.07	131	5.73	73.6	0.82		
0957	5.47	57.1	450	5 gal	13.47	131	5.75	70.5	0.61	0.97	
1002	5.48	57.2	450		13.47	131	5.75	69.3	0.58		
1005	5.48	57.2	450	6 gal	13.50	131	5.75	68.1	0.62	0.66	
1008	5.48	57.2	450	6½ gal	13.56	131	5.76	66.8	0.51	0.60	

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

SAMPLE TAKEN AT: 1010 Saturated Screen Volume Required:

* only have one operating turbidity meter - sharing, so will miss some readings

153 75

YSI # TURBIDITY # Pump - Grunfos Redi-flow II

GWM well: SHM-96-5B diam=4"
SCREENED INTERVAL DEPTH: 81.3 - 91.5 Ref. Pt.
H2O LEVEL: PRE PUMP INSERTION 6.59 feet PVC.
POST PUMP INSERTION 6.59 feet 219.81
DEPTH SAMPLED: 86 feet NGVD
DATE: 11/2/00 TIME: 1155
SAMPLED BY: SS JK PY SIGNATURE:
RECORDED BY: SS JK PY SIGNATURE:

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2),
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1207	7.20	61.0	600	1 gal	11.39	755	6.06	-30.6	2.21	1.37	clear
1213	7.21	61.0	800	2 gal	11.36	811	6.47	-49.2	0.30	2.22	
1216	7.22	59.0	500		11.53	824	6.51	-52.1	1.92	1.92	
1220	7.01	58.8	400		11.86	837	6.54	-53.8	1.35	1.94	
1223	6.95	58.7	400	3 gal	11.92	840	6.56	-55.1	0.87	1.34	
1227	6.97	59.8	500		11.95	841	6.57	-41.6	0.88	1.59	
1230	7.02	59.8	500	4 gal	11.78	841	6.56	-55.3	0.78	1,51	
1234	7.12	59.8	700		11.69	840	6.55	-56.2	0.69	1.58	
1238	7.08	59.8	450	5 gal	11.79	838	6.56	-57.4	0.61	1.53	
1242	7.02	59.8	500		11.88	840	6.57	-57.9	0.65	1.04	
1245	7.02	59.8	500	6 gal	11.87	841	6.57	-58.2	0.65	0.97	
1248	7.02	59.9	500	6½ gal	11.94	840	6.58	-58.8	0.63	1.02	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1250 Saturated Screen Volume Required:

153 YSI # 75 TURBIDITY #

Pump - Grunfos Redi-flow II

GWM well: SHM-96-5C diam = 4"
SCREENED INTERVAL DEPTH: 50.8 - 60.8 feet
H2O LEVEL: PRE PUMP INSERTION 6.06 feet
POST PUMP INSERTION 6.06 feet
DEPTH SAMPLED: 56 feet
DATE: 11/2/00 TIME: 1150
SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young
RECORDED BY: SS JK (PY) SIGNATURE: Paul Young

Ref. Pt. PVC 219.25 NGVD

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1055	6.1	56.8	400		12.32	294	6.54	-51.1	5.38	3.61	
1100	6.1	56.8	400		11.03	704	6.38	-47.8	1.86	0.86	
1105	6.1	56.8	400		11.30	786	6.40	-54.3	1.14	0.58	
1110	6.1	56.8	400		11.54	822	6.39	-56.2	1.02	0.45	
1115	6.1	56.8	400		11.64	854	6.37	-58.1	0.90	0.34	
1120	6.1	56.8	400		11.63	852	6.37	-59.3	0.84	0.55	
1125	6.1	56.8	400	3 gal.	11.67	854	6.37	-59.7	0.82	0.30	
1130	6.1	56.8	400		11.77 *	862	6.36	-60.8	0.83	0.46	
1135	6.1	56.8	400	4 gal	11.88 *	860	6.35	-61.3	0.79	0.45	
1140	6.1	56.8	400	4.5 gal	11.94 *	865	6.35	-61.5	0.79	0.45	

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

NOTES:
SAMPLE TAKEN AT: 1150
Saturated Screen Volume Required: N/A

*Highe temp. due to sun.

YSI # 134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM w.. SHL-9 diam=2"

SCREENED INTERVAL DEPTH: 16.3-26.3

H2O LEVEL: PRE PUMP INSERTION 9.90

POST PUMP INSERTION 9.91

DEPTH SAMPLED: 21'

DATE: 11-01-00 TIME: 1155

SAMPLED BY: SS BW NM (PY) SIGNATURE: Paul Young

RECORDED BY: SS BW NM (PY) SIGNATURE: Paul Young

Ref. Pt. PVC 222.84 NGVD

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~1L~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1125	10.13	73.7	550		11.66	165	6.6	-49.2	3.40	1.95	
1130	10.11	73.7	600		12.59	179	6.53	-55.5	2.54	1.43	
1135	10.12	73.7	600		12.67	184	6.53	-58.4	2.07	0.78	
1140	10.12	73.7	600		12.75	186	6.52	-59.9	1.74	0.82	
1145	10.12	73.7	600		12.87	186	6.49	-60.8	1.54	0.79	
1150	10.12	73.7	500	4gal	12.93	186	6.46	-62.3	1.32	<1.0	

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

SAMPLE TAKEN AT: 1155 Saturated Screen Volume Required:

YSI # 153 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM well # SHL -10 diam = 2"
SCREENED INTERVAL DEPTH: 17.8 - 37.6 Feet
H2O LEVEL: PRE PUMP INSERTION 31.46 Feet
POST PUMP INSERTION 31.46 feet
DEPTH SAMPLED: 35 feet
DATE: 10/30/00 TIME: 1000
SAMPLED BY: ~~SS~~ JK PY SIGNATURE:
RECORDED BY: ~~SS~~ JK PY SIGNATURE:
Ref. Pt: PVC 248.76 NGVD

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions, Alkalinity, TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0920	31.55	118.7	250		9.44	143	7.00	206.8	10.27	2.0	
0925	31.50	120.0	600		9.69	131	6.94	212.6	9.70	1.8	
0930	31.53	120.2	500		12.84	75	7.01	224.8	10.33	2.0	
0935	31.53	120.2	500		13.20	74	6.98	239.8	10.31	2.3	
0940	31.53	120.2	500		13.61	71	6.96	253.3	10.29	2.5	
0945	31.53	120.2	500		13.66	71	6.96	254.1	10.29	2.0	
0950	31.55	120.2	550	4 gallons	13.81	69	6.95	263.9	10.26	0.56	
0955	31.56	120.2	550		13.72	69	6.94	266.4	10.25	<1	
1000	31.56	119.5	400		13.54	69	6.94	268.1	10.25	<1	
1005	31.53	119.5	400	5 gallons	14.06	70	6.93	260.0	10.09	0.60	
1008	31.53	119.5	200		14.19	69	6.94	264.0	10.04	<1	
1011	31.48	119.5	100	5.5 gallons	13.76	69	6.85	203.6	10.10	<1	
1014	31.53	169.0	200		14.01	68	6.92	265.9	10.10	<1	
1018	31.53	169.0	250		14.90	68	6.93	264.1	9.90	<1	
1023	31.53	169.0	200	6 gallons	17.83	68	6.94	247.3	9.50	<1	
1026	31.58	169.0	200		18.10	69	6.95	235.4	9.86	<1	flow stopped off
1029	31.53	208.8	300		17.17	68	6.95	233.0	9.87	<1	
1032	31.58	118.7	300	7 gallons	17.53	69	6.94	234.7	10.05		
1035	31.53	118.7	200		17.65	69.00	6.94	236.7	9.98		
1038	31.46	118.7	150		17.02	69	6.94	239.4	9.97		

NOTES: ±0.4 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1055 Saturated Screen Volume Required: ±2' ±1.0 <5

YSI # 177 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM Well # SHL-10 (Cont.)
SCREENED INTERVAL DEPTH:
H2O LEVEL: PRE PUMP INSERTION
POST PUMP INSERTION
DEPTH SAMPLED:
DATE: 10/30/01 TIME:
SAMPLED BY: SS JK PY SIGNATURE:
RECORDED BY: SS JK PY SIGNATURE:

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L.	TURBIDITY NTU's	COMMENTS
1042	31.56	120.2	500	8 gal	18.17	69	6.95	239.2	9.66	<1	
1045	31.56	120.2	500		16.41	68	6.96	242.8	9.99	<1	
1048	31.56	120.2	500		14.02	67	6.93	252.8	10.37	<1	
1051	31.56	120.2	500	9 gal	13.87	67	6.93	255.4	10.38	<1	
1054	31.56	120.2	500		13.83	67	6.93	256.9	10.39	<1	

NOTES:
SAMPLE TAKEN AT: 1055

±0.4 3% ±2 3% +0.1 unit +10 mv 10% ±1 10%
Saturated Screen Volume Required:

YSI # 177 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHm-93-10C diam=4"
SCREENED INTERVAL DEPTH: 46-56 feet
H2O LEVEL: PRE PUMP INSERTION 30.32 feet
POST PUMP INSERTION 30.12 feet
DEPTH SAMPLED: 51 feet
DATE: 10/30/00 TIME: 1045
SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young
RECORDED BY: SS JK (PY) SIGNATURE: Paul Young

Ref. Pt. PVC 248.42 NGVD

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions, Alkalinity, TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0928			600								
0930	31.22	122.5	450		10.58	443.00	7.37	206.7	1.43	4.50	
0935	31.26	122.8	400		11.17	442.00	7.45	192.0	1.23	7.38	
0940	31.36	122.8	350		11.86	443	7.49	182.0	1.23	5.74	
0945	31.4	122.8	350		12.26	444	7.52	170.0	1.11	4.98	
0951	31.44	122.7	350		12.47	444	7.53	158.5	0.93	2.85	
0955	31.45	122.8	350		12.55	445	7.53	151.0	0.95	2.66	
1000	31.48	122.8	350		12.66	445	7.53	140.6	0.91	2.10	
1005	31.5	122.8	350		12.78	445	7.53	132.5	0.78	1.57	
1010	31.51	122.8	325	4 gal.	12.79	446	7.53	112.5	0.71	1.39	
1015	31.52	122.8	350		12.79	446	7.53	75.8	0.69	1.19	
1020	31.51	122.8	350		12.81	446	7.53	65.9	0.62	1.08	
1025	31.51	122.8	400		12.94	446	7.53	64.1	0.67	1.08	
1030	31.53	122.8	350		13.03	446	7.53	78.6	0.59	0.94	
1035	31.55	122.8	350		13.14	446	7.53	74.1	0.55	1.02	
1040	31.56	122.8	350	6 1/2 gal	13.20	447	7.53	71.7	0.53	1.00	
					3%		3% +0.1 unit	+10 mv	10%	10%	

NOTES:
SAMPLE TAKEN AT: 1045
Saturated Screen Volume Required:

YSI # 153 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM well SHL-11 diam = 2"

SCREENED INTERVAL DEPTH: 14.8 - 29.8 feet Ref. Pt.

H2O LEVEL: PRE PUMP INSERTION 19.05 feet PVC

POST PUMP INSERTION 19.05 feet 236.34

DEPTH SAMPLED: 25 feet NGVD

DATE: 11/1/00 TIME: 1030

SAMPLED BY: SS JK PY SIGNATURE: Paul Young

RECORDED BY: SS JK PY SIGNATURE: Paul Young

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinlty,TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0832	19.07* PY	94.0	300		10.92	705	6.38	-106.1	3.32	58.3	reddish brown sed
0840	19.07	95.8	—	—	—	—	—	—	—	—	YSI STOPPED (#17 CHANGED OUT working.
	NO READINGS	From 0840 to 0936 on purging									
0936	PY ~~19.68~~ 19.08	89.5	900		13.51	766	6.43	-68.6	3.82	6.61	
0941	PY ~~19.69~~ 19.1	89.5	900		14.48	775	6.43	-75.2	1.83	2.87	
0946	PY ~~19.66~~ 19.07	87.6	300		13.86	777	6.43	-70.9	1.47	—	GENGRATOR STOPPED - BACKFlushed
1002	19.07	92.5	400		14.12	765	6.43	-64.2	3.34	6.29	
1007	19.07	92.5	400	4 gal	15.33	772	6.47	-66.4	2.61	2.29	
1013	19.07	92.5	400		16.15	775	6.45	-67.9	2.23	1.97	
1018	19.07	92.5	400		16.21	775	6.44	-67.5	1.98	1.67	
1023	19.07	92.5	350	5gal	16.15	774	6.43	-68.2	1.80	1.68	

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

SAMPLE TAKEN AT: 1030 Saturated Screen Volume Required:

~~* Readings taken From Top of Protective casing PY 10/1/00~~

YSI # 153 TURBIDITY # 75 Pump - Grunfos Redi-flow II

(09 1023)

GWM well # SHL - 19 diam = 4"

SCREENED INTERVAL DEPTH: 17 - 32 feet Ref. Pt. PVC

H2O LEVEL: PRE PUMP INSERTION 23.67 feet 241.34 NGVD

POST PUMP INSERTION ~~23.67 feet~~ 23.67 feet

DEPTH SAMPLED: 28 feet

DATE: 10/30/07 TIME: 12

SAMPLED BY: (SS) JK PY SIGNATURE:

RECORDED BY: (SS) JK PY SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions, Alkalinity, TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1215	23.69	108.6	550	1 gal.	10.49	213	6.35	47.4	5.98	420	Rust colored
1220	23.69	109.0	800	2 gal.	11.06	226.0	6.38	29.5	2.48	384	
1225	23.69	109.1	800	3 gal.	12.32	236.0	6.40	6.9	1.51	324	Generator stopped
1235	23.69	109.0	1800	4 gal	11.68	232.	6.39	1.8	1.32	245	Restarted
1240	23.69	106.4	1000		12.10	232	6.36	-13.0	0.45	186	
1245	23.69	106.8	1000	5 gal.	12.38	233	6.35	-18.5	0.37	151	
1250	23.69	106.8	900	6 gal. /2min	12.48	233	6.34	-21.5	0.30	120	
1255	23.69	106.0	800	8 gal.	12.46	233	6.32	-23.3	0.25	52	
1300	23.69	106.0	800	9 gal	12.73	232	6.31	-24.7	0.22	35	
1305	23.69	106.0	800	10 gal	12.71	231	6.31	-24.6	0.22	32	
1310	23.69	106.0	800	11 gal	12.60	230	6.28	-24.3	0.20	21.8	
1315	23.69	106.0	900	12 gal	12.64	229	6.27	-23.9	0.18	18.2	
1320	23.69	106.0	900	13 gal	12.62	228	6.27	-23.7	0.17	14.3	
1325	23.69	106.0	900	~~15~~ 14 gal	12.66	228	6.26	-23.4	0.17	12.1	
1330	23.69	106.0	900	15 gal	12.62	226	6.25	-22.5	0.16	9.5	
1335	23.69	106.0	900	16 gal.	12.62	225	6.25	-21.8	0.16	8.8	
1340	23.69	106.0	900	17 gal.	12.57	225	6.24	-21.5	0.15	7.9	
1345	23.69	106.0	900	18 gal.	12.58	225	6.24	-21.3	0.15	7.5	

NOTES: ±0.4 3% ±7 3% +0.1 unit +10 mv ±.02 10% ±0.9 10%

SAMPLE TAKEN AT: 1345 Saturated Screen Volume Required: ✓ ✓ ✓ ✓ ✓

MS/MSD Samples also taken at this well.

YSI # 177 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM well # SHL-20 diam=4"

SCREENED INTERVAL DEPTH: 41.0 - 51.0 feet

H2O LEVEL: PRE PUMP INSERTION 19.47'

POST PUMP INSERTION 19.49'

DEPTH SAMPLED: 46 feet

DATE: 11/1/00 TIME: 0920

SAMPLED BY: SS JK PY SIGNATURE: Paul Young

RECORDED BY: SS JK PY SIGNATURE: Paul Young

Ref. Pt: PVC 236.84 NGVD

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0825	19.49	95.9	400		10.97	744	6.48	12.9	2.55	15.5	
0830	19.5	95.9	400		11.46	789	6.50	-8.5	1.14	9.9	
0835	19.5	95.9	400		12.24	807	6.53	-13.8	0.97	9.6	
0840	19.5	96.0	550		12.61	814	6.53	-17.5	0.85	7.83	NO READINGS Between 0840 + 0855 hours
0855	19.52	96.0	650	4 gal.	12.92	817	6.55	-15.7	0.84	5.36	
0900	19.5	95.5	350		13.00	818	6.55	-15.6	0.61	4.57	
0905	19.49	95.5	250		12.70	820	6.55	-21.6	0.59	3.96	
0910	19.49	95.5	250		12.52	822	6.54	-23.5	0.61	4.16	
0915	19.49	95.5	250	5.25 gal	12.53	821	6.54	-24.0	0.65	3.54	

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

NOTES:

SAMPLE TAKEN AT: 0920

Saturated Screen Volume Required:

YSI # 153 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM Well # SHL-22 diam = 4"

SCREENED INTERVAL DEPTH: 106.0 - 116.0 feet Ref. Pt. PVC

H2O LEVEL: PRE PUMP INSERTION 7.51' 220.45' NGVD

POST PUMP INSERTION 7.33'

DEPTH SAMPLED: 111'

DATE: 11/1/00 TIME: 1330

SAMPLED BY: SS (JK) PY SIGNATURE: [signature]

RECORDED BY: SS (JK) PY SIGNATURE: [signature]

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*

SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)

CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)

Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)

BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1350	8.14	67.3	500	2 gal	11.12	905	6.56	5.0	0.42	2.09	clear
1355	8.07	66.2	300	3 gal	11.09	906	6.77	-10.0	0.80	2.06	
1400	7.98	66.2	400		11.14	906	6.83	-10.3	0.99	1.63	
1404	7.98	66.2	400	4 gal	11.04	905	6.84	-7.2	0.72	1.32	
1409	7.98	66.2	400		11.03	904	6.85	1.9	0.84	1.38	generator stalled
1419	7.88	66.2	400		11.03	910	6.91	-3.8	2.85	2.12	
1423	7.92	66.2	400	5 gal	10.89	907	6.89	-0.3	0.90	1.68	
1426	7.94	66.2	350		10.91	906	6.89	-2.1	0.83	1.90	
1429	7.94	66.2	400		10.92	904	6.90	-6.5	1.04	1.53	
1432	7.94	66.2	400	6 gal	10.94	904	6.90	-7.5	0.70	1.50	
1435	7.94	66.2	350		10.95	904	6.90	-7.2	0.86	1.23	
1438	7.94	66.2	400	6⅔ gal	10.95	903	6.90	-4.1	0.93	1.30	

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

SAMPLE TAKEN AT: 1440 Saturated Screen Volume Required:

134 YSI #

75 TURBIDITY #

Pump - Grunfos Redi-flow II

GWM well .. SHM-96-22B diam=4"
SCREENED INTERVAL DEPTH: 62.7-92.7 feet Ref. Pt.
H2O LEVEL: PRE PUMP INSERTION 7.36 feet PVC
POST PUMP INSERTION 7.34 feet 220.27
DEPTH SAMPLED: 78 feet NGVD
DATE: 11/2/00 TIME: 1020
SAMPLED BY: SS JK(PY) SIGNATURE: Paul Young
RECORDED BY: SS JK(PY) SIGNATURE: Paul Young

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

SAMPLE METHOD: *EPA LOW STRESS METHOD*
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0900	7.36	65.8	350		10.60	865	9.40	164.8	3.74	67.8	
0905	7.36	65.8	325		10.63	880	7.33	35.6	2.11	39.4	slight orange color
0910	7.36	65.8	350		10.74	897	6.83	-104.3	1.93	32.1	
0915	7.36	65.8	400		10.87	902	6.70	-105.2	1.79	25.1	
0920	7.37	65.8	400		10.87	903	6.70	-108.8	1.56	19.7	
0925	7.37	65.8	400		10.91	902	6.70	-109.1	1.46	18.5	
0930	7.37	65.8	400	3.25 gal.	10.92	904	6.73	-113.9	1.22	16.4*	*
0935	7.37	65.8	450		11.00	902	6.71	-116.2	1.11	—	
0940	7.37	65.8	450		11.03	906	6.72	-115.7	1.03	16.1	
0945	7.37	65.8	500	5 gal.	11.07	912	6.71	-114.9	0.99	—	
0950	7.38	65.8	550		11.12	925	6.71	-121.7	0.93	4.86	
0955	7.37	64.3	300		11.20	932	6.72	-122.7	0.87	—	lowered pump speed
1000	7.37	64.3	300		11.29	935	6.73	-123.1	0.88	2.89	
1005	7.37	64.3	300		11.17	941	6.70	-122.9	0.88	—	
1010	7.37	64.3	350		11.16	940	6.70	-123.7	0.85	4.73	
1015	7.37	64.3	350	7.75 gal	11.20	936	6.71	-126.0	0.88	4.79	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1020 Saturated Screen Volume Required: N/A

* ONLY 1 TURBIDITY METER IS IN OPERATION, SWITCHING OFF W/ METERS (EVERY) OCCASIONAL DATA GAPS WILL OCCUR.

YSI # 134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM Well # SHM-93-22C diam=4"
SCREENED INTERVAL DEPTH: 124-134 feet
H2O LEVEL: PRE PUMP INSERTION 8.6 feet
POST PUMP INSERTION ~~7.03~~ 7.03 feet
DEPTH SAMPLED: 129 feet
DATE: 11/1/00 TIME: 1345
SAMPLED BY: SS JK (PY) SIGNATURE: Paul Young
RECORDED BY: SS JK (PY) SIGNATURE: Paul Young

Ref. PT. PVC 221.55' NGVD

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

SAMPLE METHOD: EPA LOW STRESS METHOD
SAMPLE BOTLES: METALS/hardnss 1 - 1L HDPE (ph<2)
CYANIDE 1 - ~~500~~ 250ml HDPE (ph>12) VOC'S 3 - 40ml VOA's (ph<2)
Anions,Alkalinity,TDS 1- 500ml HDPE COD 1 - ~~1L~~ 250ml HDPE (ph<2)
BOD 1 - 1L HDPE TSS 1 - 1L HDPE

TIME 24hr	WATER DPTH * BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H20 TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
			~13gal →								
	27.2 STARTING Depth										
1251	27.73	115.7	300		11.3	580	7.15	-111.5	2.25	<1.0	
1256	27.97	115.7	275		11.29	583	7.52	-117.1	1.03	<1.0	
1301	28.1	115.7	250		11.41	577	7.60	-119.6	0.97	<1.0	
1306	28.16	115.7	250		11.45	587	7.62	-118.3	1.00	<1.0	
1311	28.2	115.7	200		11.45	598	7.62	-116.8	1.05	<1.0	
1316	28.23	115.7	200		11.44	603	7.62	-115.6	1.09	<1.0	
1321	28.24	115.7	200		11.43	597	7.61	-113.8	1.11	<1.0	
1326	28.25	115.7	200		11.38	611	7.61	-111.4	1.17	<1.0	
1331	28.26	115.7	200		11.33	611	7.61	-108.5	1.05	<1.0	
1336	28.26	115.7	200		11.30	611	7.60	-108.0	1.05	<1.0	
1341	28.26	115.7	200	~~49~~ 19gal	11.28	611	7.60	-107.5	1.01	<1.0	

NOTES: 3% 3% +0.1 unit +10 mv 10% 10%
SAMPLE TAKEN AT: 1345 Saturated Screen Volume Required:

*Well has history of minimal to no re-charge until drawn down to 20 feet below PVC. Therefore, well will be drawn down to 20 feet below the PVC. before attempting to stabilize at a lower purge rate. (20' to 27')

YSI # 153 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

APPENDIX D

CHAIN OF CUSTODY FORMS

Severn Trent Laboratories
208 South Park Drive, Suite 1, Colchester, VT 05446 Tel: (802) 655-120.

CHAIN OF CUSTODY RECORD

Report to:
Company: US Army Corps of Engrs
Address: 696 Virginia Road
Concord, MA 01742
Contact: Marie Wojtas
Phone: 978-318-8175
Fax: 978-318-8663
Contract/Quote #: EØ776

Invoice to
Company:
Address:
Contact:
Phone:
PO/SO #:

Analysis Requested: VOC's - 8260B; Metals - 6010B, Hardness - 130.2; Cyanide - 9010B; Anions - 300, Alkalinity - 310.1, TDS - 160.1; COD - HACH 8000; BOD - 405.1; TSS - 160.2

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: Steve Simmer, Jack Keenan, Paul Young
Sampler's Signature: Paul Young, [signature]

Proj. No.: EØ776
Project Name: Shepley's Hill LTM&M

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	VOC's - 8260B	Metals - 6010B, Hardness - 130.2	Cyanide - 9010B	Anions - 300, Alkalinity - 310.1, TDS - 160.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	Lab Sample ID (Lab Use Only)
W	5/8/00	1055		X	SHL-3	3		1	5	3	1	1	1	1	1	1	
W	5/8/00	1330		X	SHM-93-10C	3		1	5	3	1	1	1	1	1	1	
W	5/8/00	1530		X	SHL-10	3		1	5	3	1	1	1	1	1	1	
W	5/8/00	-		X	TRIPBLANK	2		—	—	2	—	—	—	—	—	—	

Paul Young

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Paul Young	5/8/00	1800	Fed Ex Air Bill #8134/8842768	5/8/00	1800
			[signature]	5-9-00	0945

Remarks

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 SD - Solid 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 1L + 500 ml

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

Severn Trent Laboratories
Committed To Your Success
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 Engrs
Address: 696 Virginia Road
Concord, MA 01742
Contact: Marie Wojtas
Phone: 978-318-8175
Fax: 978-318-8663
Contract/ Quote #: EQ776

Invoice to
Company:
Address:
Contact:
Phone:
PO/SO #:

Sampler's Name: Steve Simmer, Jack Keenan
Sampler's Signature:

Proj. No.: EQ776
Project Name: Shepley's Hill LTM&M

ANALYSIS REQUESTED

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	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt	250 ml	P/O	VOCs - 8260B	Metals - 6010B Hardness - 130.2	Cyanide - 9010B	Anions - 300, Alkalinity - 310.1, TDS - 160.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	Lab Sample ID (Lab Use Only)
W	5/9/00	1035		X	SHL-19	3		1	5	3	1	1	1	1	1	1	
W	5/9/00	1035		X	SHL-19MS	3		1	2	3	1	1	1	—	—	—	
W	5/9/00	1035		X	SHL-19MSD	3		1	1	3	1	1	—	—	—	—	
W	5/9/00	1045		X	SHL-4	3		1	5	3	1	1	1	1	1	1	
W	5/9/00	1240		X	SHL-11	3		1	5	3	1	1	1	1	1	1	
W	5/9/00	1255		X	SHL-20	3		1	5	3	1	1	1	1	1	1	
W	5/9/00	1510		X	SHL-9	3		1	5	3	1	1	1	1	1	1	
W	5/9/00	—		X	TRIP BLANK	2		—	—	2	—	—	—	—	—	—	
					Paul Young												

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Paul Young	5/9/00	1730	Fed Ex Air Bill #812779205690	5/9/00	1730
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature) Scott	Date: 5/10/00	Time: 0930

Remarks

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 SD - Solid L - Liquid A - Air 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 1L Asamb

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

Committed To Your Success

55 South Park Drive, Colchester, VT 05446 Tel: (802) 655-1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to
Company: U.S. Army Corps of Engrs.	Company:
Address: 696 Virginia Road, Concord, MA 01742	Address:
Contact: Marie Wojtas	Contact:
Phone: 978-318-8175	Phone:
Fax: 978-318-8663	PO/SO #:
Contract/ Quote #: E0776	

Sampler's Name: Steve Simmer, Brian Wise, Jack Keenan

Sampler's Signature:

Proj. No.: E0776

Project Name: Shapley Hill LTM&M

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	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2] VOA	A/G 1 Lt.	250 ml	P/O	ANALYSIS REQUESTED VOCs - 8260B	Metals - 6010B; Hardness - 130.2	Cyanide - 9010B	Anions 300	Alkalinity - 310.1	COD - HACH 8000	BOD - 405.1	TDS - 160.1	TSS - 160.2	Lab Sample ID (Lab Use Only)
W	5/11/00	1025		X	SHM-93-22C	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1030		X	SHL-22	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1155		X	SHM-96-22B	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1235		X	SHM-96-5B	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1235		X	SHM-DUP	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1325		X	SHM-96-5C	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1425		X	SHL-5	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	1440		X	SHL-EB	3		1	5	3	1	1	1	1	1	1			
W	5/11/00	-		X	TRIP BLANK	2		-	-	2	-	-	-	-	-	-			
	Paul Young																		

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Paul Young	5/11/00	1800	FED EX AIR BILL #812779205680	5/11/00	1800
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
				5-12-00	0900

Remarks

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; SD - Solid; 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 1L + 500ml

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

Severn Trent Laboratories
208 South Park Drive, Suite 1, Colchester, VT 05446 Tel: (802) 655-1203

Committed to Your Success

CHAIN OF CUSTODY RECORD

Report to:
Company: US Army Corps of Engineers
Address: 696 Virginia Road
Concord, MA 01742
Contact: Marie Wojtas
Phone: 978-318-8175
Fax: 978-318-8663
Contract/ Quote #: E0776

Invoice to
Company:
Address:
Contact:
Phone:
PO/SO #:

Sampler's Name: Paul Young, Steve Simmer
Sampler's Signature: Paul Young

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

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	VOC's - 8260B	TAL Metal's - 6010B, Hardness - 130.2	Cyanide - 9010B	Anions - 300, Alkalinity - 310.1, TDS - 160.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	Lab Sample ID (Lab Use Only)
W	10/29/02	1055		X	SHL-10	3			6	3	1	1	1	1	1	1	
W	10/30/02	1045		X	SHM-93-10C	3			6	3	1	1	1	1	1	1	
W	10/30/02	1310		X	SHL-3	3			6	3	1	1	1	1	1	1	
W	10/30/02	1345		X	SHL-19 - ~~dup~~	3			6	3	1	1	1	1	1	1	
W	10/30/02	345		X	SHL-19-MS	3			3	3	1	1	1				
W	10/30/02	1345		X	SHL-19-MSD	3			2	3	1	1					
W	10/30/02	1500		X	SHL-4	3			6	3	1	1	1	1	1	1	
W	10/30/02	N/A		X	Tr. & Blank	1				1							

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 ☐

0004

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Kathleen Muller	10-30-02	1600			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
				10-31-02	0930

Remarks

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 SD - Solid L - Liquid A - Air C - Charcoal tube SL - Sludge O - Oil

[2] Containers: VOA - 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O - Plastic or other 250ml, 500ml, 1L

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

Environmental Inc. 208 South Park Drive, Suite 1, Colchester, VT 05446 Tel. (802) 655-12 CHAIN OF CUSTODY RECORD

Report to:	Invoice to
Company: US Army Corps of Engineers	Company:
Address: 696 Virginia Road, Concord, MA 01742	Address:
Contact: Marie Mojtas	Contact:
Phone: 978-318-8175	Phone:
Fax: 978-318-8663	PO/SO #:
Contract/ Quote #: E∅776	

Sampler's Name: Paul Young, Jack Keenan — Sampler's Signature: Paul Young, Jack Keenan

Proj. No.: E∅776 — Project Name: Shepley's Hill LTM+M

ANALYSIS REQUESTED: VOC's - 8260B; TAL Metals - 6010B, Hardness - 130.2; Cyanide - 9010B; Anions - 300, Alkalinity - 310.1, TDS - 160.1; COD - HACH 8000; BOD - 405.1; TSS - 160.2

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	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	11-01-00	0920		X	SHL20	3			6	3005
W	11-01-00	1030		X	SHL11	3			6	
W	11-01-00	1155		X	SHL9	3			6	
W	11-01-00	1345		X	SHM-93-22C	3			6	
W	11-01-00	1440		X	SHL22	3			6	
				X	Trip Blank	1				

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
William Miller	11-01-00	1550	AIRBILL # FEDEX 812779205716			
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature) Jerry Sik	Date: 11-2-00	Time: 0930	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 SD Solid L - Liquid A Air Bag C - Charcoal tube SL - Sludge O Oil

[2] Containers: VOA 40 ml vial A/G - Amber / Or Glass 1 Liter 250 ml - Glass wide mouth P/O Plastic or other 250ml, 500ml, 1L

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

Severn Trent Laboratories
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:
Address: 696 Virginia Road, Concord, MA 01742	Address:
Contact: Marie Wojtas	Contact:
Phone: 978-318-8175	Phone:
Fax: 978-318-8663	PO/SO #:
Contract/ Quote #: EP776	

Sampler's Name: Jack Keenan, Paul Young
Sampler's Signature: Jack Keenan, Paul Young

Proj. No.: EP776
Project Name: Shepley's Hill LTM & M
No./Type of Containers²

ANALYSIS REQUESTED: VOC's - 8260B; TAL Metals - 6010B, Hardness - 130.2; Cyanide - 9010B; Ammonia - 350, Alkalinity - 310.1, TDS - 160.1; COD - HACH 8000; BOD - 405.1; TSS - 160.2

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	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt	250 ml	P/O	Lab Sample ID (Lab Use Only)
W	11-02-00	1020		X	SHM-96-22B	3			6	00000
W	11-02-00	1010		X	SHL5	3			6	
W	11-02-00	1150		X	SHM-96-5C	3			6	
W	11-02-00	1250		X	SHM-96-5B	3			6	
W	11-02-00	1250		X	SHLDUP	3			6	
W	11-02-00	1400		X	SHL EB	3			6	
W	11-02-00	NA		X	Trip Blank	1				

Katherine Miller

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Katherine Miller	11-02-00	1430	Airbill # 812779205705 FEDEX		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
			Jack L Dotti	11/3/00	1015
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, SD - Solid, L - Liquid, A - , g, C - Charcoal tube, SL - Sludge, O - Oil

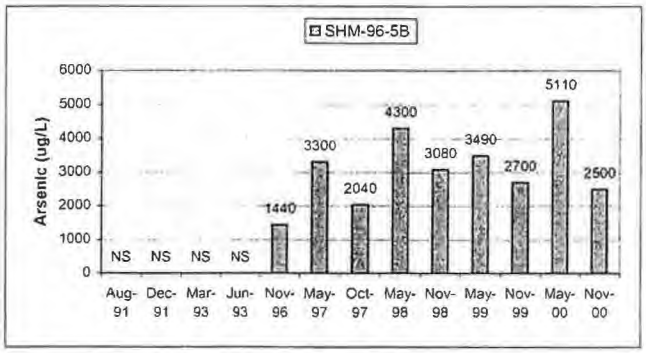
² Containers: VOA - 40 ml vial, A/G - Amber / Or Glass 1 Liter, 250 ml - Glass wide mouth, P/O - Plastic or other 250 ml, 500ml, 1L

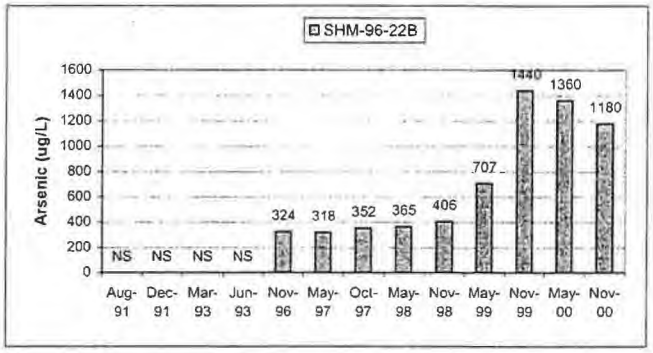
STL cannot accept v changes. Please Fax written changes to (802) 655-1248

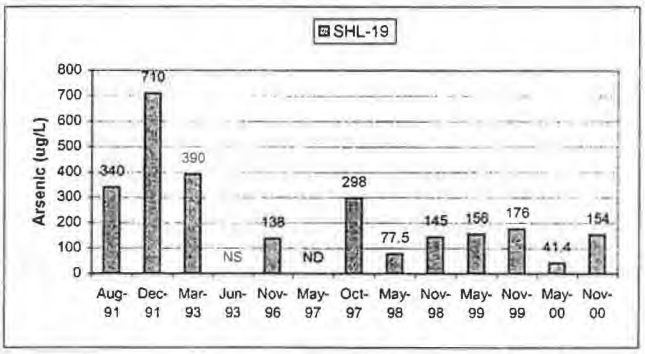
APPENDIX E

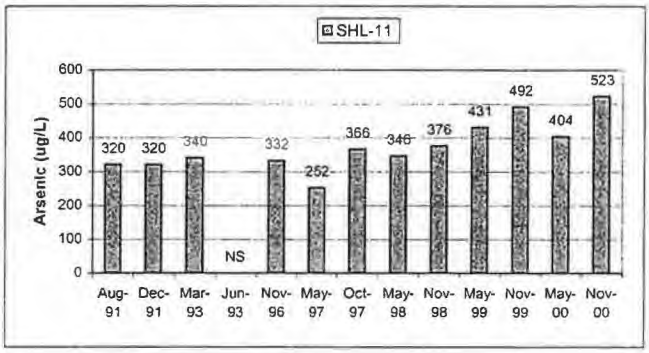
COMPARISON OF ARSENIC RESULTS

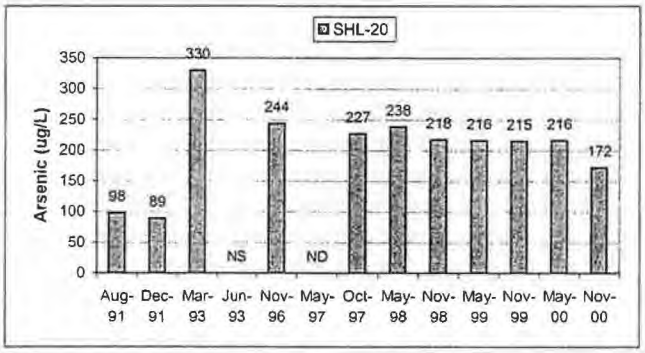
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
(CLEANUP LEVEL = 50 ug/l)

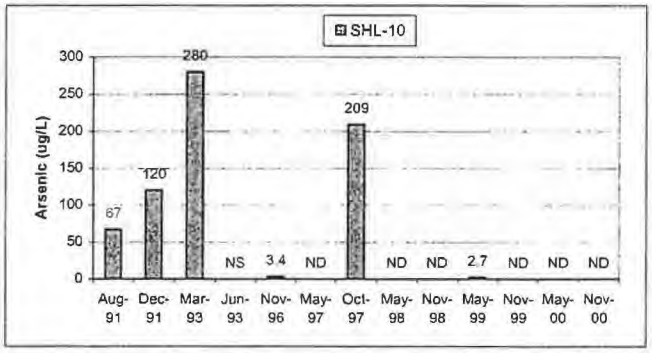


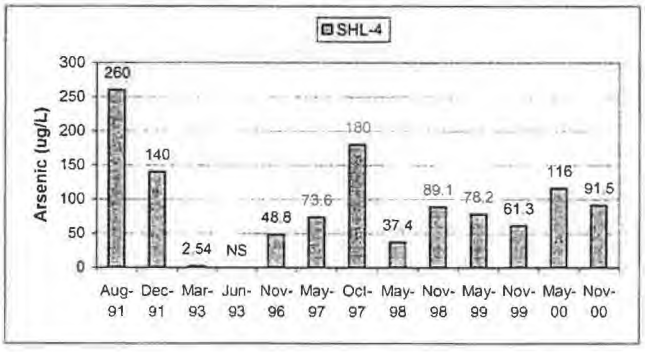


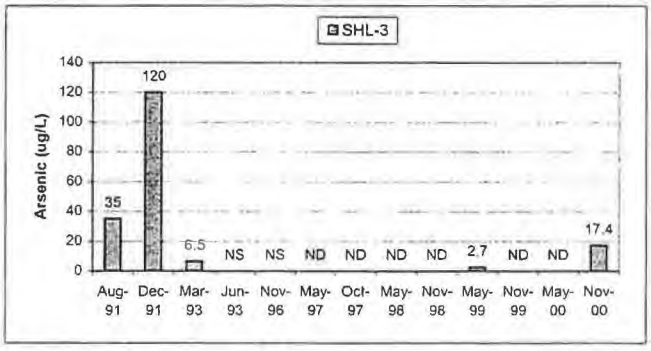








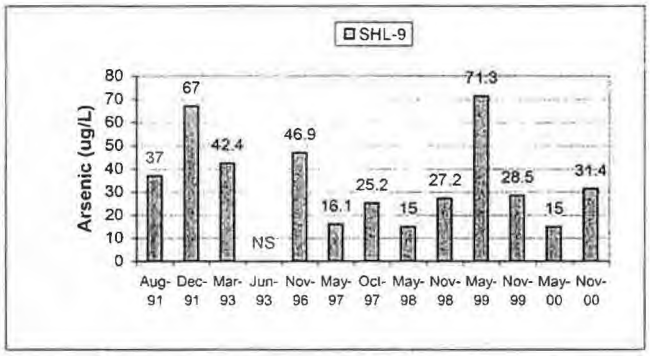


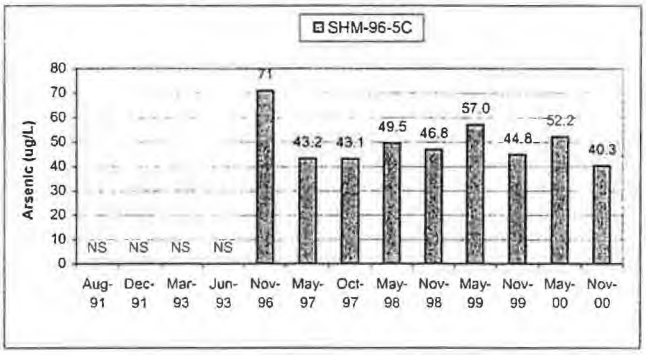


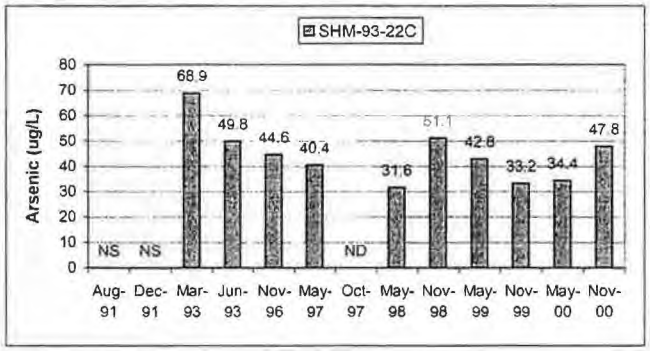
NOTES:

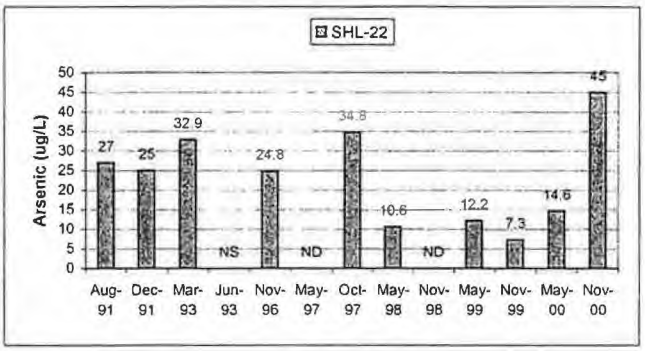
NS: Not Sampled
ND: Not Detected

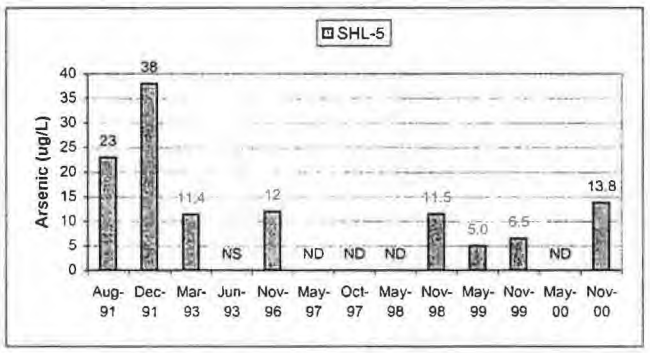
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATIONS CHARTS
(CLEANUP LEVEL = 50 ug/l)

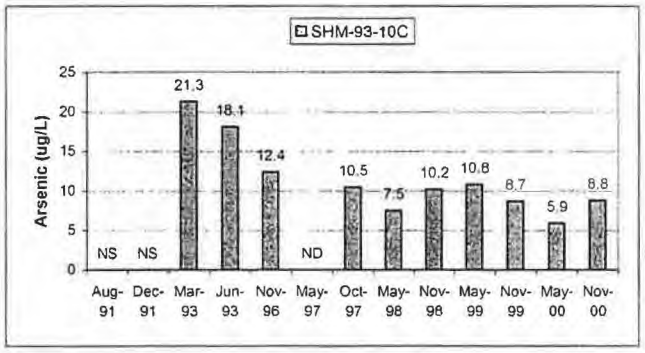












NOTES:

NS: Not Sampled
ND: Not Detected

APPENDIX F

QUALITY ASSURANCE REPORTS

Chemical Data Quality Assurance Report
2000

NEW ENGLAND DISTRICT - GEOTECHNICAL & WATER MANAGEMENT BRANCH
CHEMICAL DATA QUALITY ASSESSMENT REPORT

Project:	Shepley's Hill Landfill, Long Term Groundwater Monitoring (Samples collected May and November 2000)
Location:	Devens, MA
Reference:	Chemical Quality Assurance Report No. E766-092600, dated 26 September 2000 and No. E766-041301, dated 13 April 20001
Contractor:	New England District, US Army Corps of Engineers, Concord, MA
Prepared By:	Marie Wojtas, project chemist, CENAE-EP-HC
CDQAR Date:	17 May 2001

The Chemical Quality Assurance Reports (CQAR) No. E0766-092600 and E0766-041301 for the long term groundwater monitoring project at Shepley's Hill Landfill, Devens, MA were reviewed. The following comments apply to the overall data assessment for two field sampling events which occurred in May and November 2000. The CQARs include comparison of two groundwater samples (one from each sampling event) analyzed for Volatile Organic Compounds (VOCs), Total Metals, Cyanide, Anions, Chemical Oxygen Demand, Biological Oxygen Demand, Alkalinity, Hardness, Total Dissolved Solids, and Total Suspended Solids.

1. Data Useability: The primary laboratory and quality assurance (QA) laboratory data show adequate comparability. The primary laboratory data is useable for the intended purpose. The project objective for this data is for long term groundwater monitoring purposes, and data is compared to the Record of Decision (ROD) and other associated regulatory cleanup goals. The primary contaminant of concern at this site is Arsenic. The QA laboratory data support the primary laboratory data which was used by USACE-NAE to prepare the annual and semi-annual groundwater analytical reports.

2. Data Quality Objectives (DQOs): DQOs for the project have been satisfied. The following paragraphs summarize the most significant data comparability issues. No immediate corrective action is necessary for these items. Future sampling events will continue to be compared to QA laboratory data to verify the accuracy of the primary laboratory data, as described below.

a. Metals Analysis – Data Discrepancies: There are one major (chromium) and four minor (two for thallium, one for selenium, and one for zinc) data discrepancies for Metals. In all cases, both laboratories are reporting values which are significantly below the cleanup goal (where one exists). Therefore, these discrepancies are not considered to be significant, but will continue to be monitored for future sampling events.

Corrective Action: The data discrepancies noted are not considered to significantly impact the data interpretation, but will continue to be monitored for future sampling events.

b. Chemical Oxygen Demand (COD) Analysis – Data Discrepancies: There is one minor data discrepancy for COD for the samples collected in November 2000. The contract laboratory results are lower than reported in the May 2000 sampling round. There is no associated regulatory standard for COD and the discrepancy is not considered to significantly impact the data interpretation.

Corrective Action: The discrepancy is noted, and will continue to be monitored for future sampling events.

3. Contract Compliance: The primary laboratory met contractual obligations for this project. The QA laboratory met most contractual obligations except that they reported a slightly different target analyte list for metals than requested. This will be corrected for future sampling events. Overall, the primary and QA laboratory results compare satisfactorily, and the results obtained from the May and November 2000 sampling events are consistent and reasonable. Both laboratories reported satisfactory supporting quality control data.

Chemical Quality Assurance Report
Spring 2000

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-092600

May 11, 2000 SAMPLING EVENT

PREPARED BY
THE
ENVIRONMENTAL ENGINEERING
AND
GEOLOGY SECTION
ENGINEERING/PLANNING DIVISION

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

SEPTEMBER 26, 2000

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 11, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-092600

TABLE OF CONTENTS

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 11, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-021100

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 76 target analyte determinations. The shipment contained two QA water samples and was received in good condition. The data report from STL (Severn Trent Laboratories), dated 15 June 2000 was used in the comparison. In 31 of these determinations 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 10A). The primary and QA samples agreed overall in 73 out of 76 (96.0%) of the comparisons. Primary and QA samples agreed quantitatively in 28 out of 31 (90.3%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. One major and two minor discrepancies between results from the primary and QA samples 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's-8260, TAL Metals-6010, CN, Anions, COD, BOD, Alkalinity, Hardness and TDS were in good overall and quantitative agreement. There were only three data discrepancies noted for metals. All the other quantitative results compared almost identically for all of the target analytes that were reported as hits. There was very little bias to any of the sample results and the data appears to be complete and useable. There was one major discrepancy for the chromium result in which the QA laboratory reported 1.1 B ug/L and the primary laboratory reported 4.0 B ug/L. Based on the evaluation of both laboratory's QC data, no reasonable explanation can be offered for this major discrepancy.

The primary laboratory's data report was evaluated based on the information that was provided. As stated above, all of the data comparisons for the majority of the analyses were in good overall and quantitative agreement. The rest of the sample results for all of the analyses were supported by the QC data and appear to be complete and useable. The QA laboratory's reporting limits for volatiles was approximately five times lower than the primary laboratory's volatile reporting limits. Both laboratories should be given a specific target analyte list for metals so they are both analyzing the same metals. The primary laboratory reported the samples in which tentatively identified compounds (TIC's) were detected, but did not specify their possible identification or the number of TIC's detected in each sample. This CQAR is based on the laboratory reporting limits because the detection limits were not provided.

QA analyses were performed by Quanterra Environment, Services, 880 Riverside Parkway, West Sacramento, CA, 95605 and CLS Labs, 3249 Fitzgerald Road, Rancho Cordova, CA, 95742 (see Table 2 for analyses performed by the QA lab). The primary laboratory was Severn Trent Laboratories, 55 South Park Drive, Colchester, VT, 05446.

Table 1
Quality Assurance Split Sample
Data Comparison Summary

Project: Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, November 2, 1999 Sampling Event

Test Parameter	Overall Agreement (1)		Quantitative Agreement (2)	
	Number	Percent	Number	Percent
VOC	47/47	100	8/8	100
METALS	15/18	83.3	12/15	80.0
CYANIDE	1/1	100	NA	NA
ANIONS	4/4	100	3/3	100
COD	1/1	100	1/1	100
BOD	1/1	100	NA	NA
ALKALINITY	1/1	100	1/1	100
HARDNESS	1/1	100	1/1	100
TDS	1/1	100	1/1	100
TSS	1/1	100	1/1	0
Total	73/76	96.0	28/31	90.3

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	5-11-00	VOC,METALS,CN, ANIONS,COD,BOD,ALK, HARDNESS,TDS,TSS
TRIP BLANK	WATER	5-11-00	VOC

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 11, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-092600

QA Findings

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

One shipment containing two QA water samples was received by Quanterra Environmental Services, West Sacramento, CA, on 12 May 2000. Proper sample handling protocols were followed for this shipment.

A copy of the chain-of-custody form document and cooler receipt form is appended to this report for reference.

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

There were 47 volatile determinations. In seven of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 47 (100%) of the cases and quantitative agreement in eight out of eight (100%) of the cases. No major or minor data discrepancy was noted.

The QA laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank and the trip blank were free of contamination above the laboratory's reporting limit for all of the target analytes, except for 1,2,3-trichlorobenzene at 0.16 J ug/L in the trip blank and acetone at 1.3 J ug/L in the method blank. All of the samples, LCS/LCSD's, method blank, and trip blank surrogates recoveries were within the laboratory's acceptance limits. All of the LCS/LCSD's target analytes were also within the acceptance limits for accuracy and precision. The QA laboratory only spiked five of the target analytes into the LCS/LCSD. The QA laboratory was not requested to perform MS/MSD's and no evaluation of accuracy and precision due to matrix effects could be determined. All of the samples were analyzed within the required holding times. The QA laboratory's reporting limits were approximately five times lower than the primary laboratory.

The primary laboratory's QC samples contained all the necessary information and a complete evaluation was performed. The method blanks and the trip blanks were free of contamination above the laboratory reporting limit for all of the target analytes. The surrogates for both the samples and the laboratory's QC samples were all within the acceptance limits. The primary laboratory reported that the MS/MSD's performed on sample MW-SHL-19-00 were

within the acceptance limits for all 84-target analytes for precision and 23 out of 168 target analytes recoveries were outside the acceptance limits for accuracy. All of the target analytes in the LCS's were recovered within the acceptance limits, except in zero out of 84 of the cases, five out of the 84 cases and five out of the 84 cases, for the three respective LCS's analyzed. All of the LCS outages were recovered above the acceptance limits. All of the samples were analyzed within the required holding times.

The primary laboratory was also requested by the USACE project chemist, Marie Wojtas, to report the number of tentatively identified compounds (TIC's) found in each sample and report the findings in the case narrative. The primary laboratory reported that TIC's were detected in the following samples: SHM-93-10C, SHL-10, SHL-20, SHM-93-22C, SHL-22, SHM-96-22B, SHM-96-5B, SHM-DUP, SSHM-96-5C, SHL-5, SHM-99-32X, and SHM-99-31C. Sample SHM-96-5B was also the QA sample. The number of TIC's that were in each sample and their possible identification were not discussed in the case narrative.

3. Data comparison for TAL metals by Method 6010 and mercury by Method 7470.

There were 18 metals determinations. In 15 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 15 (83.3%) of the cases and quantitative agreement in 12 out of 15 (80.0%) of the cases. One major and two minor data discrepancies were noted.

The major data discrepancy occurred in sample SHM-96-5B-QA-00 in which the QA laboratory reported chromium at 1.1 B ug/L and the primary laboratory reported 4.0 B ug/L. The first minor discrepancy occurred in sample SHM-96-5B-QA-00 in which the QA laboratory reported thallium at < 10.0 ug/L and the primary laboratory reported 27.2 ug/L. The second minor discrepancy occurred in sample SHM-96-5B-QA-00 in which the QA laboratory reported zinc at 8.2 B ug/L and the primary laboratory reported 3.6 B ug/L.

The primary laboratory's QC data report contained all of the necessary QC information and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The primary laboratory reported that the LCS recoveries were within the acceptance limits for all of the target analytes. The primary laboratory performed a matrix spike and a matrix duplicate on sample SHL-19-00. The matrix spike recoveries were all within the acceptance limits of 75-125%, except for barium and copper. All of the spike levels, percent recoveries and QC limits were appropriately indicated on all of the QC reports. All of the samples were analyzed within the required holding times.

The QA laboratory's QC data were within the acceptance limits for all the target analytes and a complete evaluation was performed. The method blanks were free of contamination above the reporting limits. The QA laboratory reported that the LCS/LCSD's were within the acceptance limits for both accuracy and precision. All of the spike levels, percent recoveries and QC limits were appropriately indicated on all of the QC reports. The QA laboratory reported all

of the metals were analyzed by Method 6010 Trace-ICP, except for mercury, which was analyzed for by Method 7470-Hg Cold Vapor. All of the samples were analyzed within the required holding times.

4. Data comparison for total cyanide by Method 9010B.

There was one cyanide determination. There was 100% overall agreement in that cyanide was not detected by either laboratory. No major or minor data discrepancies were noted.

The primary laboratory's QC data were within the acceptance limits for cyanide and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The LCS's recovery was not reported. The matrix spike was recovered within the acceptance limits at 102.0%. The matrix duplicate and the original sample were reported below the laboratory's reporting limit. The sample was analyzed within the required holding time.

All of the QA laboratory's QC data were within acceptance limits and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The LCS/LCSD's were within the acceptance limits for both accuracy and precision. The QA laboratory analyzed the sample by modified Method 9012A, instead of Method 9010B as indicated on the chain of custody. The sample was analyzed within the required holding time.

5. The data comparison for anions by Method 300.0.

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

The QA laboratory's QC data were all within the acceptance limits and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS was within the acceptance limits for all of the target analytes for both accuracy and precision and the spiking levels were also indicated. The QA laboratory was not requested to perform a MS/MSD on any of the samples and no evaluation of accuracy or precision based on matrix effects could be made. All of the samples were analyzed within the required holding times.

The primary laboratory's QC data were all within the acceptance limits and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS recoveries were within the acceptance limits. The primary laboratory reported that the matrix spike and the matrix duplicate appeared to be within the laboartory's acceptance limits, but no QC limits were provided. All of the samples were analyzed within the required holding times.

6. Data comparison for COD by Method 410.4 and BOD by Method 405.1.

There was one COD and one BOD determination. In both the COD and BOD determinations, there was 100% overall and quantitative agreement. There were no major or minor data discrepancies noted.

The primary laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank was free of contamination for both the COD and BOD results above the laboratory's reporting limit. The LCS recoveries for COD and BOD were both within the laboratory's acceptance limits. The primary laboratory did not report any MS/MSD's results. The samples were analyzed within the required holding times.

The QA laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The LCS/LCSD's for COD were within the acceptance limits for both accuracy and precision. The QA sample was analyzed within the required holding times of 48 hours. The QA laboratory's contracted lab (CLS Labs) performed the BOD analysis. The method blank, LCS and duplicate were all within the acceptance limits.

7. The data comparison for alkalinity by Method 310.1.

There was one alkalinity determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC samples were within the acceptance limit for alkalinity and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The QA laboratory reported that the LCS/LCSD's were within the acceptance limits for both accuracy and precision. There were no MS/MSD's performed for alkalinity and no evaluation of matrix effects could be determined. All of the samples were analyzed within the required holding times.

The primary laboratory's QC samples were all within the acceptance limit for alkalinity and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The primary laboratory reported that the LCS's were within the acceptance limits. The primary laboratory reported that the duplicate and the matrix spike results were within the QC limits. All of the samples were analyzed within the required holding times.

8. Data comparison for total hardness by Method 130.2.

There was one hardness determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC samples were within the acceptance limit for hardness and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The QA laboratory reported that the LCS/LCSD's were within the laboratory's acceptance limits for both accuracy and precision. All of the samples were analyzed within the required holding times.

The primary laboratory's QC samples were within the acceptance limit for total hardness and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The primary laboratory reported that the LCS was within the laboratory's acceptance limits. The primary laboratory reported that the duplicate and matrix spike were within the QC limits.

9. Data comparison for TDS by Method 160.1 and TSS by Method 160.2.

There was one TDS and one TSS determination. In the TDS determination, there was 100% overall and quantitative agreement. No major or minor data discrepancies were reported. In the TSS determination, there was 100% overall and quantitative agreement. No data discrepancies were noted.

The primary laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS recoveries for TDS and TSS were both within the laboratory's acceptance limits. The primary laboratory did not report any MS/MSD sample results, but the duplicate was within the QC limits. The samples were analyzed within the required holding times.

The QA laboratory's QC data were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS/LCSD's were within the acceptance limits for both accuracy and precision. All of the samples were analyzed within the required holding times.

10. References.

a. Data Report for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by Severn Trent Laboratories, dated 15 June 2000.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/23/00	CONTRACTOR'S ANALYSIS DATE:	5/17/00
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 5/11/00
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Dichlorodifluoromethane	< 1.0		< 5.0		0
Chloromethane	< 1.0		< 5.0		0
Vinyl Chloride		0.63 J	< 5.0		0
Bromomethane	< 1.0		< 5.0		0
Chloroethane		2.8		3.0 J	0
Trichlorofluoromethane	< 1.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 2.0		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	NR		< 5.0		2
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 1.0		< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 1.0		< 5.0		0
1,2-Dichloroethene (total)	NR			3.3 J	2
Methyl-t-Butyl Ether	NR			1.2 J	2
1,1-Dichloroethane		2.3		2.4 J	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene		3.0		3.1 J	0
2-Butanone	< 2.0		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 1.0		< 5.0		0
Tetrahydrofuran	NR		< 50		2
Chloroform	< 1.0		< 5.0		0
1,1,1-Trichloroethane	< 1.0		< 5.0		0
Carbon Tetrachloride	< 1.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene		1.3		1.3 J	0
1,2-Dichloroethane	< 1.0		< 5.0		0
Trichloroethene	< 1.0		< 5.0		0
1,2-Dichloropropane	< 1.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 1.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 1.0		< 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

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/23/00	CONTRACTOR'S ANALYSIS DATE:	5/17/00
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B
MATERIAL DESCRIPTION:	WATER		
DATE SAMPLED:	5/11/00		
UNITS:	ug/L		

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 2.0		< 5.0		0
Toluene	< 1.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 1.0		< 5.0		0
Tetrachloroethene	< 1.0		< 5.0		0
2-Hexanone	NR		< 5.0		2
Dibromochloromethane	< 1.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene		0.36 J	< 5.0		0
1,1,1,2-Tetrachloroethane	< 1.0		< 5.0		0
Ethylbenzene	< 1.0		< 5.0		0
Xylene (total)	< 1.0		< 5.0		0
Styrene	< 1.0		< 5.0		0
Bromoform	< 1.0		< 5.0		0
Isopropylbenzene	NR		< 5.0		2
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	NR		< 5.0		2
1,2,3-Trichloropropane	NR		< 5.0		2
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	NR		< 5.0		2
1,4-Dichlorobenzene		1.3		1.6 J	0
1,2-Dichlorobenzene		0.21 J	< 5.0		0
1,2-Dibromo-3-Chloropropane	< 2.0		< 5.0		0
1,2,4-Trichlorobenzene	< 1.0		< 5.0		0
Hexachlorobutadiene	< 1.0		< 5.0		0
Naphthalene	< 1.0		< 5.0		0
2,2-Dichloropropane	< 1.0		< 5.0		0
1,1-Dichloropropene	< 1.0		< 5.0		0
1,3-Dichloropropane	< 1.0		< 5.0		0
Bromobenzene	NR		< 5.0		2
n-Propylbenzene	NR		< 5.0		2
2-Chlorotoluene	NR		< 5.0		2
4-Chlorotoluene	NR		< 5.0		2
1,3,5-Trimethylbenzene	NR		< 5.0		2
tert-Butylbenzene	NR		< 5.0		2
1,2,4-Trimethylbenzene	NR		< 5.0		2
sec-Butylbenzene	NR		< 5.0		2
4-Isopropyltoluene	NR		< 5.0		2
n-Butylbenzene	NR		< 5.0		2
1,2,3-Trichlorobenzene	< 1.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
4-Bromofluorobenzene (70-130)	101	Toluene-d8 (88-110)	90
1,2-Dichloroethane-d4 (70-130)	99	1,2-Dichloroethane-d4 (72-141)	80
Toulene-d8 (70-130)	102	Bromofluorobenzene (72-122)	94
		1,2-Dichlorobenzene-d4 (69-124)	88

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
* = Surrogates outside of acceptable limits

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5-(14+15)-00	CONTRACTOR'S ANALYSIS DATE:	6/9/00
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	3010A	EXTRACTION METHOD:	3010A
ANALYSIS METHOD:	6010B,Hg-7470A	ANALYSIS METHOD:	6010, Hg-7470

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/11/00
UNITS:	ug/L

PARAMETER	QA LAB LRL		RESULTS QA LAB	CONTRACTOR LRL		RESULTS CONTRACTOR	COMPARISON CODE
Aluminum	NR					73.3	2
Antimony	< 10			< 4.6			0
Arsenic			4800			5110	0
Barium			65			67.5 B	0
Beryllium	< 5.0					3.2 B	0
Cadmium	< 5.0			< 0.30			0
Calcium	NR					115000	2
Chromium			1.1 B			4.0 B	4
Colbolt			19 B			23.3 B	0
Copper	< 25					12.8 B	0
Iron			44300			45000	0
Lead	< 5.0					2.7 B	0
Manganese			10800			11200	0
Mercury	< 0.20	(5-19-00)		< 0.10	(5-16-00)		0
Molybdenum			4.1 B			NR	2
Nickel			20 B			17.5 B	0
Potassium	NR					12300	2
Selenium	< 5.0			< 4.0			0
Silver	< 5.0					6.4 B	0
Thallium	< 10					27.2	3
Vanadium	< 50					7.0 B	0
Zinc			8.2 B			3.6 B	3

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

B= Estimated result that is less than the RL.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/12/00	CONTRACTOR'S ANALYSIS DATE:	5/19/00
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9012A	ANALYSIS METHOD:	9010

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 5/11/00

UNITS: ug/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Cyanide (CN)	< 10.0		< 10.0		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-00-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/12/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	300.0	ANALYSIS METHOD:	300.0

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 5/11/00

UNITS: mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Chloride, CL		48.7 Q		53.5	0
Nitrate, as N		0.076	< 0.2		0
Othophosphate, as P	< 0.20		< 0.2		0
Sulfate, SO4		3.8		5.2	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

Q=Elevated reporting limit due to high analyte level.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/18/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4-COD	ANALYSIS METHOD:	410.1-COD

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/11/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chemical Oxygen Demand (COD)		28.0		18	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/17/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	CLS LABS	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/11/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Biological Oxygen Demand (5 Day)	< 1.0		< 2.0		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/17/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.1	ANALYSIS METHOD:	310.1

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 5/11/00

UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Alkalinity as CaCO3		395		316	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/23/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	130.2	ANALYSIS METHOD:	130.2

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/11/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Hardness as CaCO3		346		330	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2000

QA SAMPLE No.:	G0E120203-001	CONTRACTORS SAMPLE No.:	417777
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/16/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	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

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 5/11/00

UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Dissolved Solids (TDS by 160.1)		486		474	0
Total Suspended Solids (TSS by 160.2)		56.0		52.7	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

Severn Trent Laboratories
55 South Park Drive, Colchester, VT 05446 Tel: (802) 655-1203

CHAIN OF CUSTODY RECORD

Report to:	Invoice to
Company: U.S. Army Corps of Engrs	Company:
Address: 696 Virginia Road, Concord, MA 01742	Address:
Contact: Marie Wojtas	Contact:
Phone: 978 318-8175	Phone:
Fax: 978 318-8663	PO/SO #:
Contract/Quote #: EØ776	

Sampler's Name: Steve Sommer, ~~Brian Weir~~ Jack Keenan
Sampler's Signature: [signature]

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 ☐

Proj. No.: EØ776
Project Name: Shepley's Hill LTM&M

ANALYSIS REQUESTED: VOC's - 8260B; Metals - 6010B, Hardness - 130.2; Cyanide - 9010B; Anions - 300, Alkalinity - 310.1, TDS - 160.1; COD - HACH 8000; BOD - 405.1; TSS - 160.2

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	VOA	A/G 1 Lt.	250 ml	P/O	VOC's - 8260B	Metals - 6010B, Hardness - 130.2	Cyanide - 9010B	Anions - 300, Alkalinity - 310.1, TDS - 160.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	Lab Sample ID (Lab Use Only)
W	5/11/00	1235		X	SHM-96-5BQA	3		1	5	3	1	1	1	1	1	1	
W	5/11/00	—		X	TRIP BLANK	2		—	—	2	—	—	—	—	—	—	

Paul Young

RECEIVED IN GOOD CONDITION UNDER COC
MAY 12 2000
INI: [initials]

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	Remarks
Paul Young	5/11/00	1800	FED EX Air Bill # 812779205749	5/11/00	1800	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature) [signature]	5-12-00	1200	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:	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 SD - Solid 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 1L + 500 mL

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

[redacted]

Chain of Custody Record

B: Sequoia

Quanterra

QUA 4124 0797

Client	Project Manager	Date	Chain of Custody Number
STL - SAC	Dilma Brooks	5-12-00	26981
Address 880 Riverside Prkwy	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page** ____ **of** ____
City W. Sac / **State** CA / **Zip Code**	**Site Contact**	**Lab Contact**	
Project Name USACOE	**Carrier/Waybill Number**		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH		Analysis (Attach list if more space is needed): X BOD	Special Instructions/ Conditions of Receipt
60E170203-1	5-11-00	1235	X				X							X	SA05193-01

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ____

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1		5-12-00	1300		5/12/00	13:25
2						
3						

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

LOT RECEIPT CHECKLIST

STL Sacramento

Committed to Your Success

CLIENT US Army Corp PM DB LOG # 3167

LOT# (QUANTIMS ID) 60E120203 QUOTE# 30186 LOCATION W26A VB

		Initials	Date
DATE RECEIVED	5-12-00 TIME RECEIVED 950	AS	5/12/00
DELIVERED BY	☒ FEDEX ☐ CA OVERNIGHT ☐ CLIENT ☐ AIRBORNE ☐ GOLDENSTATE ☐ DHL ☐ UPS ☐ BAX GLOBAL ☐ GO-GETTERS ☐ QES COURIER ☐ OTHER		
CUSTODY SEAL STATUS	☒ INTACT ☐ BROKEN ☐ N/A		
CUSTODY SEAL #(S)			
SHIPPPING CONTAINER(S)	☒ STL ☐ CLIENT ☐ N/A		
TEMPERTURE RECORD (IN °C)	IR 1 ☒ 2 ☐		
COC #(S)			
TEMPERATURE BLANK			
AMBIENT TEMPERATURE	2°C		
pH MEASURED	☐ YES ☐ ANOMALY ☒ N/A		
LABELED BY			
LABELS CHECKED BY			
SHORT HOLD TEST NOTIFICATION	SAMPLE RECEIVING WETCHEM ☐ N/A	SW	
☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL	☒ N/A	AS	
☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES	☐ N/A		
☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °-6 °C)	☒ N/A		
☐ WET ICE ☐ BLUE ICE ☐ GEL PACK			
☐ PM NOTIFIED ☐ NO COOLING AGENTS USED			

Notes:

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

QA185 3/00 PAS

Chemical Quality Assurance Report
Fall 2000

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-041301

NOVEMBER 2, 2000 SAMPLING EVENT

PREPARED BY
THE
GEOLOGY
AND
CHEMISTRY SECTION
ENGINEERING/PLANNING DIVISION

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

APRIL 13, 2001

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
NOVEMBER 2, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-041301

TABLE OF CONTENTS

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
NOVEMBER 2, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-041301

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 76 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, STL-West Sacramento (Severn Trent Laboratories), dated 12 December 2000 was used in the comparison. In 26 of these determinations 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 10a). The primary and QA samples agreed overall in 74 out of 76 (97.4%) of the comparisons. Primary and QA samples agreed quantitatively in 24 out of 26 (92.3%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. No major and two minor discrepancies between results from the primary and QA samples 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's-8260, TAL Metals-6010, CN, Anions, COD, BOD, Alkalinity, Hardness, TSS and TDS were in good overall and quantitative agreement. There were only two minor data discrepancies noted for the metals analysis of thallium and selenium. The QA laboratory did not perform all of the TAL metals as requested on the chain-of-custody and no comparison could be made on aluminum, calcium, magnesium, potassium and sodium. The QA laboratory was requested to provide this additional data that should be available from their simultaneous trace-ICAP instrument data files. If these results are obtained, they will be added to this report at a later date. All the other quantitative results for all analyses compared closely. There was very little bias to any of the sample results and the data appears to be complete and useable.

The primary laboratory's data report was evaluated based on the information that was provided. As stated above, all of the data comparisons for the majority of the analyses were in good overall and quantitative agreement. The sample results for all of the analyses were supported by the QC data and appear to be reasonably complete and useable. The QA laboratory's reporting limits for volatiles was approximately five times lower than the primary laboratory's volatile reporting limits. The primary laboratory did not report the samples in which tentatively identified compounds (TIC's) were detected. Historically, the primary

laboratory has been requested to provided the number of TIC's detected in each sample. 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 Severn Trent Laboratories, 208 South Park Drive, Suite 1, Colchester, VT, 05446. The primary laboratories were Severn Trent Services, 880 Riverside Parkway, West Sacramento, CA, 95605-1500 and Sequoia Analytical, 819 Striker Avenue, Suite 8, Sacramento, CA 95834.

Table 1
Quality Assurance Split Sample
Data Comparison Summary

Project: Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, November 2, 2000 Sampling Event

Test Parameter	Overall Agreement (1)		Quantitative Agreement (2)	
	Number	Percent	Number	Percent
VOC	47/47	100	9/9	100
METALS	16/18	88.9	7/9	77.8
CYANIDE	1/1	100	NA	NA
ANIONS	4/4	100	2/2	100
COD	1/1	100	1/1	100
BOD	1/1	100	1/1	100
ALKALINITY	1/1	100	1/1	100
HARDNESS	1/1	100	1/1	100
TDS	1/1	100	1/1	100
TSS	1/1	100	1/1	100
Total	**74/76**	**97.4**	**24/26**	**92.3**

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	11-2-00	VOC,METALS,CN, ANIONS,COD,BOD,ALK, HARDNESS,TDS,TSS
TRIP BLANK	WATER	11-2-00	VOC

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
NOVEMBER 2, 2000 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-041301

QA Findings

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

One shipment containing one QA water sample and one trip blank sample was received by Severn Trent Services, West Sacramento, CA, on 3 November 2000. Proper sample handling protocols were followed for this shipment.

A copy of the chain-of-custody form document and cooler receipt form is appended to this report for reference.

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

There were 47 volatile determinations. In nine of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 47 (100%) of the cases and quantitative agreement in nine out of nine (100%) of the cases. No major or minor data discrepancy was noted.

The QA laboratory's QC and samples were evaluated based on the information that was provided. The method blank and the trip blank were free of contamination above the laboratory's reporting limit for all of the target analytes, except for trichlorofluoromethane at 1.9 ug/L in the trip blank. All of the samples, LCS/LCSD's, method blank, and trip blank surrogates recoveries were within the laboratory's acceptance limits. All of the LCS/LCSD's target analytes were also within the acceptance limits for accuracy and precision. The QA laboratory only spiked five of the target analytes into the LCS/LCSD. The QA laboratory was not requested to perform MS/MSD's and no evaluation of accuracy and precision due to matrix effects could be made. All of the samples were analyzed within the required holding times. The QA laboratory's reporting limits were approximately five times lower than the primary laboratory.

The primary laboratory's QC samples contained all the necessary information and a complete evaluation was performed. The trip blanks were free of contamination above the laboratory reporting limit for all of the target analytes, except for estimated levels of hexachorobutadiene, naphthalane and 1,2,3-trichlorobenzene which were also detected in the method blanks. Trip blank 2 was free of contamination above the laboratory's reporting limit for all of the target analytes, except for trichlorofluoromethane at 1.4 J ug/L which was also reported in the QA laboratory's trip blank at 1.9 ug/L. The surrogates for the samples and the laboratory's

QC samples were all within the acceptance limits. The primary laboratory reported that the MS/MSD's performed on sample MW-SHL-19-00 were outside the acceptance limits for precision in one out of 84 of the cases and seven out of 168 target analytes recoveries were outside the acceptance limits for accuracy. All of the target analytes in the LCS's were recovered within the acceptance limits, except in two out of 84 of the cases, two out of the 84 cases and two out of the 84 of the cases, for the three respective LCS's analyzed. All of the samples were analyzed within the required holding times.

The primary laboratory has historically been requested by the USACE project chemist, Marie Wojtas, to report the number of tentatively identified compounds (TIC's) found in each sample and report the findings in the case narrative. The primary laboratory did not supply any information regarding TIC's in their case narrative.

3. Data comparison for TAL metals by Method 6010 and mercury by Method 7470.

There were 18 metals determinations. In nine of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 16 (88.9%) of the cases and quantitative agreement in seven out of nine (77.8%) of the cases. No major and two minor data discrepancies were noted.

The first minor data discrepancy occurred in sample SHM-96-5BQA in which the QA laboratory reported selenium at 14 ug/L and the primary laboratory reported 6.6 ug/L. The second minor discrepancy occurred in sample SHM-96-5BQA in which the QA laboratory reported thallium at 7.3 B ug/L and the primary laboratory reported 19.4 ug/L.

The primary laboratory's QC and sample results were evaluated based on the information that was provided. The method blanks were free of contamination above the reporting limit for all of the target analytes. The primary laboratory reported that the LCS recoveries were within the acceptance limits for all of the target analytes. The primary laboratory performed a matrix spike and a matrix duplicate on sample SHL-19-00. The matrix spike recoveries were all within the acceptance limits of 75-125%, except for arsenic and selenium. The post digestion spike performed on this sample was marginally above the control limits for copper. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QC report. All of the samples were analyzed within the required holding times.

The QA laboratory's QC data was within the acceptance limits for all the target analytes, except only 18 of the 23 TAL metals were analyzed. The method blanks were free of contamination above the reporting limits. The QA laboratory reported that the LCS and the MS/MSD's were within the acceptance limits for both accuracy and precision. All of the spike levels, percent recoveries and QC limits were appropriately indicated on all of the QC reports. The QA laboratory reported all of the metals were analyzed by Method 6010B Trace-ICP, except for mercury, which was analyzed for by Method 7470-Mercury Cold Vapor. All of the samples were analyzed within the required holding times.

4. Data comparison for total cyanide by Method 9010B.

There was one cyanide determination. There was 100% overall agreement in that cyanide was not detected by either laboratory. No major or minor data discrepancies were noted.

The primary laboratory's sample and QC data was evaluated based on the information that was provided. The method blank was free of contamination above the laboratory's reporting limit. The LCS's recovery was not reported. The matrix spike was recovered below the acceptance limits of (75-125%) at 46.3% and indicates a low bias to the sample result. The post digestion spike was recovered at 101.4%. The matrix duplicate and the original sample were reported below the laboratory's reporting limit. The sample was analyzed within the required holding time.

All of the QA laboratory's sample and QC data were within acceptance limits and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The LCS and MS/MSD's were within the acceptance limits for both accuracy and precision. No sample duplicate results were reported for cyanide. The QA laboratory analyzed the sample by modified Method 9012A, instead of Method 9010B as indicated on the chain of custody. The sample was analyzed within the required holding time.

5. The data comparison for anions by Method 300.0.

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

The QA laboratory's QC and sample results were evaluated based on the information that was provided. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS and MS/MSD's were within the acceptance limits for all of the target analytes for accuracy and precision and the spiking levels were also indicated. All of the samples were analyzed within the required holding times.

The primary laboratory's QC data were evaluated based on the information that was provided. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS recoveries appeared to be within reasonable acceptance limits, except for ortho-phosphate which was recovered at 120%, 126%, 139% and 135%. No LCS control limits were provided in the report. The primary laboratory reported that the matrix spike and the matrix duplicate appeared to be within reasonable laboartory's acceptance limits, but no QC limits were provided. All of the samples were analyzed within the required holding times.

6. Data comparison for COD by Method 410.4 and BOD by Method 405.1.

There was one COD and one BOD determination. In both the COD and BOD

determinations, there was 100% overall and quantitative agreement. There were no major or minor data discrepancies noted.

The primary laboratory's QC and samples were evaluated on the information that was provided. The method blanks were free of contamination for both the COD and BOD results, above the laboratory's reporting limit. The LCS recoveries for COD and BOD were within reasonable laboratory's acceptance limits, assuming (90-110%) recoveries. The primary laboratory did not report any matrix spike or matrix duplicate results. The samples were analyzed within the required holding times.

The QA laboratory's QC and samples were evaluated on the information that was provided. The method blanks were free of contamination above the reporting limits for COD and BOD. The LCS for COD was within the acceptance limits for accuracy. The LCS for BOD was slightly above the control limits of (85-115%) at 120% and the duplicate result was within the BOD's acceptance limits for precision. The BOD sample was analyzed within the required holding times of 48 hours. The QA laboratory's subcontracted lab (Sequoia Analytical) performed the BOD analysis.

7. The data comparison for alkalinity by Method 310.1.

There was one alkalinity determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC and samples were evaluated based on the information that was provided. The method blank was free of contamination above the reporting limit. The QA laboratory reported that the LCS/LCSD's were within the acceptance limits for both accuracy and precision. There were no MS/MSD's performed for alkalinity and no evaluation of matrix effects could be made. All of the samples were analyzed within the required holding times.

The primary laboratory's QC and samples were evaluated based on the information that was provided. The method blank was free of contamination above the reporting limit. The primary laboratory reported that the LCS's were within the acceptance limits. The primary laboratory reported that the duplicate and the matrix spike results were within reasonable QC limits, but no control limits were provided. All of the samples were analyzed within the required holding times.

8. Data comparison for total hardness by Method 130.2.

There was one hardness determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC and samples were evaluated based on the information that was provided. The method blank was free of contamination above the laboratory's reporting limit.

The QA laboratory reported that the LCS/LCSD's were within the laboratory's acceptance limits for both accuracy and precision. There were no MS/MSD's performed for hardness and no evaluation of matrix effects could be made. All of the samples were analyzed within the required holding times.

The primary laboratory's QC and samples were evaluated based on the information that was provided. The method blank was free of contamination above the reporting limit. The primary laboratory reported that all LCS's were within the laboratory's acceptance limits. The primary laboratory reported that the duplicate and matrix spike were within reasonable QC limits, but no control limits were provided.

9. Data comparison for TDS by Method 160.1 and TSS by Method 160.2.

There was one TDS and one TSS determination. In the TDS determination, there was 100% overall and quantitative agreement. No major or minor data discrepancies were reported. In the TSS determination, there was 100% overall and quantitative agreement. No data discrepancies were noted.

The primary laboratory's QC and samples were evaluated based on the information that was provided. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS recoveries for TDS and TSS were both within the assumed laboratory's acceptance limits of (90-110%). The primary laboratory did not report any MS/MSD sample results, but the duplicate was within reasonable QC limits. The samples were analyzed within the required holding times.

The QA laboratory's QC and sample results were evaluated based on the information that was provided. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS's were within reasonable acceptance limits for accuracy, but no QC limits were provided.. The duplicate for TDS was within reasonable acceptance limits for precision. All of the samples were analyzed within the required holding times.

10. References.

a. Data Reports for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by the QA laboratory, Severn Trent Laboratories, 208 South Park Drive, Suite 1, Colchester, VT, 05446 and the primary laboratories, Severn Trent Services, 880 Riverside Parkway, West Sacramento, CA, 95605-1500 and Sequoia Analytical, 819 Striker Avenue, Suite 8, Sacramento, CA 95834.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

APPENDIX A
KEY TO COMMENTS ON DATA COMPARISON TABLES

0 - Data agrees if any one of the following apply:

- 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 **soil** 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 apply:

- 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 **soil** analyses:
4X<difference≤5X

4 - Major data discrepancy, disagreement serious, if any one of the following apply:

- 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 **soil** 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 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/16/00	CONTRACTOR'S ANALYSIS DATE:	11/8/00
QA LABORATORY:	STL-Sacramento	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Dichlorodifluoromethane		**2.0**	< 5.0		0
Chloromethane		**9.7**	< 5.0		0
Vinyl Chloride		**0.65 J**	< 5.0		0
Bromomethane	< 1.0		< 5.0		0
Chloroethane		**2.8**		**2.8 J**	0
Trichlorofluoromethane	< 1.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 2.0		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	NR		< 5.0		2
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 1.0		< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 1.0		< 5.0		0
1,2-Dichloroethene (total)	NR			**3.0 J**	2
Methyl-t-Butyl Ether	NR			**1.4 J**	2
1,1-Dichloroethane		**1.9**		**2.3 J**	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene		**2.7**		**3.0 J**	0
2-Butanone	< 2.0		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 1.0		< 5.0		0
Tetrahydrofuran	NR			**5.2 J**	2
Chloroform	< 1.0		< 5.0		0
1,1,1-Trichloroethane	< 1.0		< 5.0		0
Carbon Tetrachloride	< 1.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene		**0.78 J**	< 5.0		0
1,2-Dichloroethane	< 1.0		< 5.0		0
Trichloroethene	< 1.0		< 5.0		0
1,2-Dichloropropane	< 1.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 1.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 1.0		< 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, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/16/00	CONTRACTOR'S ANALYSIS DATE:	11/8/00
QA LABORATORY:	STL-Sacramento	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/00
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 2.0		< 5.0		0
Toluene	< 1.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 1.0		< 5.0		0
Tetrachloroethene	< 1.0		< 5.0		0
2-Hexanone	NR		< 5.0		2
Dibromochloromethane	< 1.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene	< 1.0		< 5.0		0
1,1,1,2-Tetrachloroethane	< 1.0		< 5.0		0
Ethylbenzene	< 1.0		< 5.0		0
Xylene (total)	< 1.0		< 5.0		0
Styrene	< 1.0		< 5.0		0
Bromoform	< 1.0		< 5.0		0
Isopropylbenzene	NR		< 5.0		2
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	NR		< 5.0		2
1,2,3-Trichloropropane	NR		< 5.0		2
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	NR		< 5.0		2
1,4-Dichlorobenzene		**1.2**	< 5.0		0
1,2-Dichlorobenzene	< 1.0		< 5.0		0
1,2-Dibromo-3-Chloropropane	< 2.0		< 5.0		0
1,2,4-Trichlorobenzene	< 1.0		< 5.0		0
Hexachlorobutadiene		**2.7 JB**	< 5.0		0
Naphthalene	< 1.0		< 5.0		0
2,2-Dichloropropane	< 1.0		< 5.0		0
1,1-Dichloropropene	< 1.0		< 5.0		0
1,3-Dichloropropane	< 1.0		< 5.0		0
Bromobenzene	NR		< 5.0		2
n-Propylbenzene	NR		< 5.0		2
2-Chlorotoluene	NR		< 5.0		2
4-Chlorotoluene	NR		< 5.0		2
1,3,5-Trimethylbenzene	NR		< 5.0		2
tert-Butylbenzene	NR		< 5.0		2
1,2,4-Trimethylbenzene	NR		< 5.0		2
sec-Butylbenzene	NR		< 5.0		2
4-Isopropyltoluene	NR		< 5.0		2
n-Butylbenzene	NR		< 5.0		2
1,2,3-Trichlorobenzene	< 1.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
4-Bromofluorobenzene (70-130)	105	Toluene-d8 (88-110)	97
1,2-Dichloroethane-d4 (70-130)	100	1,2-Dichloroethane-d4 (72-141)	109
Toulene-d8 (70-130)	103	Bromofluorobenzene (72-122)	101
		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, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/17/00	CONTRACTOR'S ANALYSIS DATE:	11/27/00
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	3010A	EXTRACTION METHOD:	3010A
ANALYSIS METHOD:	6010B,Hg-7470A	ANALYSIS METHOD:	6010, Hg-7470

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB		CONTRACTOR LRL	RESULTS CONTRACTOR		COMPARISON CODE
Aluminum	NR			< 12.4			2
Antimony	< 10			< 4.6			0
Arsenic		2500			2500		0
Barium		50			48.9 B		0
Beryllium	< 5.0				3.9 B		0
Cadmium	< 5.0			< 0.30			0
Calciuum	NR				112000		2
Chromium	< 5.0			< 1.0			0
Colbolt		14 B			13.2 B		0
Copper	< 25			< 1.8			0
Iron		23500			25100		0
Lead	< 5.0			< 1.8			0
Magnesium	NR				16800		2
Manganese		12800			12800		0
Mercury	< 0.20	(11-28-00)		< 0.10	(11-16-00)		0
Nickel		14 B			15.6 B		0
Potassium	NR				8810		2
Selenium		14			6.6		3
Silver	< 5.0			< 1.6			0
Sodium	NR				40200		2
Thallium		7.3 B			19.4		3
Vanadium	< 50			< 2.0			0
Zinc	< 20			< 3.5			0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

B= Estimated result that is less than the RL.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9012A	ANALYSIS METHOD:	9010

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	11/2/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Cyanide (CN)	< 0.010		< 0.010		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	300.0	ANALYSIS METHOD:	300.0

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chloride, CL		**50.2 Q**		**55.7**	0
Nitrate, as N	< 0.050		< 0.2		0
Othophosphate, as P	< 0.20		< 0.2		0
Sulfate, SO4		**5.2**		**5.3**	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

Q=Elevated reporting limit due to high analyte level.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4-COD	ANALYSIS METHOD:	410.1-COD

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	11/2/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chemical Oxygen Demand (COD)		17.5		8	3

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Biological Oxygen Demand (5 Day)	< 6.00			**3.5**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.1	ANALYSIS METHOD:	310.1

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Alkalinity as CaCO3		**363**		**392**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	130.2	ANALYSIS METHOD:	130.2

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	11/2/00
UNITS:	mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Total Hardness as CaCO3		**350**		**410**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2000

QA SAMPLE No.:	G0K030223-001	CONTRACTORS SAMPLE No.:	436177
QA FIELD ID:	SHM-96-5BQA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	11/3/00	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Sacramento	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

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 11/2/00

UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Dissolved Solids (TDS by 160.1)		**467**		**494**	**0**
Total Suspended Solids (TSS by 160.2)		**50.0**		**44.2**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

Severn Trent Laboratories 880 Riverside Parkway, West Sacramento, CA 95605
~~200 South Park Drive, Suite 1, Colchester, VT 05446 Tel: (802) 655-1203~~ (916) 373-5600

CHAIN OF CUSTODY RECORD

Report to:	Invoice to
Company: US Army Corps of Engineers	Company:
Address: 696 Virginia Road, Concord, MA 01742	Address:
Contact: Marie Wojtas	Contact:
Phone: 978-318-8175	Phone:
Fax: 978-318-8663	PO/SO #:
Contract/ Quote #: EP776	

Sampler's Name: Jack Keenan, Paul Young

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

Proj. No.: EP776

Project Name: Shepley's Hill LTM + M

ANALYSIS REQUESTED: VOC's - 8260B; TAL Metals - 6010B, Hardness - 130.2; Cyanide - 9010B; Anions - 300, Alkalinity - 310.1, TDS - 160.1; COD - HACH 8000; BOD - 405.1; TSS - 160.2

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	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	11-02-00	1250		X	SHM-96-5BQA	3			6	
W	11-02-00	—		X	Trip Blank	1				

KWM

GL

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Katherine Miller	11-02-00	1430	FEDEX AIRBILL # 814805265439		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: 1 COOLER

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; SD - Solid; 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 250ml, 500ml, 1L

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

Chain of Custody Record

SEVERN TRENT SERVICES — Severn Trent Laboratories, Inc.

STL-4124 (0700)

Client	Project Manager	Date	Chain of Custody Number
STL-SAC	Digna Brooks	11-3-00	005299
Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page ____ of ____
City / State / Zip Code	Site Contact	Lab Contact	
Project Name and Location (State)	Carrier/Waybill Number		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	Analysis (Attach list if more space is needed): X BOD	Special Instructions/ Conditions of Receipt
90K0303223-1	11-2-00	1250		X									X	SO11076-01

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months
(A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ____

QC Requirements (Specify)

	Date	Time		Date	Time
1 Relinquished By: Cheryl Hyatt	11-3-00	1230	1. Received By	11-3-00	1230
2 Relinquished By			2. Received By		
3 Relinquished By			3. Received By		

Comments

DISTRIBUTION: TE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

LOT RECEIPT CHECKLIST

STL Sacramento

CLIENT USACOE PM DB LOG # 6335

LOT# (QUANTIMS ID) 90K030223 QUOTE# 30186 LOCATION W22C VA

				Initials	Date
DATE RECEIVED 11-3-00	TIME RECEIVED 0925			GC	11-3-00
DELIVERED BY	☒ FEDEX	☐ CA OVERNIGHT	☐ CLIENT		
	☐ AIRBORNE	☐ GOLDENSTATE	☐ DHL		
	☐ UPS	☐ BAX GLOBAL	☐ GO-GETTERS		
	☐ STL COURIER	☐ B & B	☐ OTHER		
CUSTODY SEAL STATUS	☒ INTACT	☐ BROKEN	☐ N/A		
CUSTODY SEAL #(S)	TAPE				
SHIPPPING CONTAINER(S)	☐ STL	☒ CLIENT	☐ N/A		
TEMPERTURE RECORD (IN °C)	IR 1☐	2 ☒	☐ OTHER		
COC #(S)					
TEMPERATURE BLANK					
AMBIENT TEMPERATURE	4°				
COLLECTOR'S NAME:	☑ Verified from COC		☐ Not on COC		
pH MEASURED	☐ YES	☐ ANOMALY	☑ N/A		
LABELED BY				CD	
LABELS CHECKED BY				AN	
SHORT HOLD TEST NOTIFICATION		SAMPLE RECEIVING			
		WETCHEM	☐ N/A	KW	
☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL			☑ N/A	CD	
☑ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES			☐ N/A		
☐ Clouseau	☐ TEMPERATURE EXCEEDED (2 °-6 °C)		☑ N/A	GC	11-3-00
☐ WET ICE	☐ BLUE ICE	☐ GEL PACK			
☐ PM NOTIFIED	☐ NO COOLING AGENTS USED				

Notes:

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

QA185 8/00 NEK

APPENDIX G

GROUNDWATER ANALYTICAL DATA

3.5 inch diskette (not included in all reports)

APPENDIX H

REFERENCES

APPENDIX H

REFERENCES

Stone & Webster Environmental Technology & Services, 1996. *Long Term Monitoring and Maintenance Plan, Shepley's Hill Landfill,* Fort Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England Division. March

Stone & Webster Environmental Technology & Services, 1997. *Shepley's Hill Landfill, Annual Report 1996* , Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England Division. April

Stone & Webster Environmental Technology & Services, 1998. *Final Five Year Review, Shepley's Hill Landfill, Long Term Monitoring,* Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England District. August

Harding Lawson Associates, 1999. *Final Work Plan – Supplemental Groundwater Investigation at Shepley's Hill Landfill,* Devens Reserve Forces Training Area, Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England District. February

Harding Lawson Associates, 2000. *Draft Shepley's Hill Landfill Supplemental Groundwater Investigation,* Devens Reserve Forces Training Area, Devens, Massachusetts. Prepared for the U.S. Army Corps of Engineers, New England District. July

U.S. Army Corps of Engineers, New England District (CENAE), 2000. *Semi-Annual Groundwater Analytical Report, Spring 2000, Shepley's Hill Landfill, Long Term Monitoring,* Devens, Massachusetts, September

U.S. Army Corps of Engineers, New England District (CENAE), 2000. *1999 Annual Report, Shepley's Hill Landfill, Long Term Monitoring and Maintenance,* Devens, Massachusetts, March

U.S. Environmental Protection Agency (USEPA) Region 1, 1996. *Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples From Monitoring Wells,* SOP #: GW 0001, Revision 2. July 30.

ABB Environmental Services, Inc. (ABB-ES), 1993. *Final Remedial Investigation Addendum Report,* Fort Devens Feasibility Study for Group 1A Sites. Prepared for the U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland. Portland, Maine. December.

ABB Environmental Services, Inc. (ABB-ES), 1995a. *Final Feasibility Study, Shepley's Hill Landfill Operable Unit,* Fort Devens Feasibility Study for Group 1A Sites. Prepared for the U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland. Portland, Maine. September.

ABB Environmental Services, Inc. (ABB-ES), 1995b. *Record of Decision, Shepley's Hill Landfill Operable Unit,* Fort Devens Feasibility Study for Group 1A Sites. Prepared for the U.S. Army Environmental Center, Aberdeen Proving Ground, Maryland. Portland, Maine. September.

Quanterra

LOT RECEIPT CHECKLIST

QES West Sacramento

CLIENT Severn Trent Labs PM DB LOG # G9E12-9

LOT# (QUANTIMS ID) G9E120181 QUOTE # 30186 LOCATION(S) W22C VA

	Initials	Date
DATE RECEIVED 051299 TIME RECEIVED 0930	RL	051299

DELIVERED BY
- ☒ FEDEX
- ☐ AIRBORNE
- ☐ UPS
- ☐ QES COURIER
- ☐ CA OVERNIGHT
- ☐ GOLDENSTATE
- ☐ BAX GLOBAL
- ☐ OTHER
- ☐ CLIENT
- ☐ DHL
- ☐ GO-GETTERS

CUSTODY SEAL STATUS ☒ INTACT ☐ BROKEN ☐ N/A

CUSTODY SEAL #(S) N/A

SHIPPPING CONTAINER(S) ☒ QUANTERRA ☐ CLIENT ☐ N/A

TEMPERTURE RECORD (IN °C) IR 1 ☐ 2 ☒

COC #(S) N/A

TEMPERATURE BLANK ↓

AMBIENT TEMPERATURE 3°C

pH MEASURED ☐ YES ☐ ANOMALY ☒ N/A

LABELED BY ..... dd ↓

LABELS CHECKED BY ..... ↓

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING

WETCHEM ☐ N/A MC

☐ METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL ☒ N/A DA

☒ COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES ☐ N/A ↓

☐ Clouseau ☐ TEMPERATURE EXCEEDED (2 °-6 °C) ☒ N/A ↓

☐ WET ICE ☐ BLUE ICE ☐ GEL PACK

☐ PM NOTIFIED ☐ NO COOLING AGENTS USED

Notes: 1 of 2 TB w/ bubbles

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

QA185 02/99 RAL

Chemical Quality Assurance Report
Fall 1999

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-021100

NOVEMBER 2, 1999 SAMPLING EVENT

PREPARED BY
THE
ENVIRONMENTAL ENGINEERING
AND
GEOLOGY SECTION
ENGINEERING/PLANNING DIVISION

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

FERUARY 11, 2000

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
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TABLE OF CONTENTS

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
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CHEMICAL QUALITY ASSURANCE REPORT
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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 76 target analyte determinations. The shipment contained two QA water samples and was received in good condition. The data report from STL (Severn Trent Laboratories), dated 1 December 1999 was used in the comparison. In 25 of these determinations 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 10A). The primary and QA samples agreed overall in 72 (94.7%) of the comparisons. Primary and QA samples agreed quantitatively in 21 out of 25 (84.0%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. One major and three minor discrepancies between results from the primary and QA samples were noted. Refer to Table 1 for a QA split sample data comparison summary.

The QA laboratory's QC samples contained all of the necessary information and a complete evaluation was performed. All of the data comparisons for Methods VOA's-8260, TAL Metals-6010, CN, Anions, COD, BOD, Alkalinity, Hardness and TDS were in good overall and quantitative agreement. There were only three minor data discrepancies noted for metals. All the other quantitative results compared almost identically for all of the target analytes that were reported as hits. There was very little bias to any of the sample results and the data appears to be complete and useable, except for the TSS determination. There was one major discrepancy for the TSS result in which the QA laboratory reported 5.0 mg/L and the primary laboratory reported 44.6 mg/L. Based on the evaluation of both laboratory's QC data, no reasonable explanation can be offered for this major discrepancy.

The primary laboratory's data report contained all of the necessary information and a complete evaluation was performed. As stated above, all of the data comparisons for the majority of the analyses were in good overall and quantitative agreement, except for the TSS determination. The rest of the sample results for all of the analyses were supported by the QC data and appear to be complete and useable. The primary laboratory reported the samples in which tentatively identified compounds (TIC's) were detected, but did not specify their possible identification or the number of TIC's detected in each sample. This CQAR is based on the laboratory reporting limits because the detection limits were not provided.

QA analyses were performed by Quanterra Environment, Services, 880 Riverside Parkway, West Sacramento, CA, 95605 and CLS Labs, 3249 Fitzgerald Road, Rancho Cordova, CA, 95742 (see Table 2 for analyses performed by the QA lab). The primary laboratory was Severn Trent Laboratories, 55 South Park Drive, Colchester, VT, 05446.

Table 1
Quality Assurance Split Sample
Data Comparison Summary

Project: Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, November 2, 1999 Sampling Event

Test Parameter	Overall Agreement (1)		Quantitative Agreement (2)	
	Number	Percent	Number	Percent
VOC	47/47	100	7/7	100
METALS	15/18	83.3	8/11	72.7
CYANIDE	1/1	100	NA	NA
ANIONS	4/4	100	2/2	100
COD	1/1	100	1/1	100
BOD	1/1	100	NA	NA
ALKALINITY	1/1	100	1/1	100
HARDNESS	1/1	100	1/1	100
TDS	1/1	100	1/1	100
TSS	0/1	0	0/1	0
Total	72/76	94.7	21/25	84.0

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
MW-SHM-96-5B-QA-99-02	WATER	11/2/99	VOC,METALS,CN, ANIONS,COD,BOD,ALK, HARDNESS,TDS,TSS
TRIP BLANK	WATER	11/2/99	VOC

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
NOVEMBER 2, 1999 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-021100

QA Findings

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

One shipment containing two QA water samples was received by Quanterra Environmental Services, West Sacramento, CA, on 3 November 1999. Proper sample handling protocols were followed for this shipment.

A copy of the chain-of-custody form document and cooler receipt form is appended to this report for reference.

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

There were 47 volatile determinations. In seven of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 47 (100%) of the cases and quantitative agreement in seven out of seven (100%) of the cases. No major or minor data discrepancy were noted.

The QA laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank and the trip blank were free of contamination above the laboratory's reporting limit for all of the target analytes. All of the samples, LCS/LCSD's, method blank, and trip blank surrogates recoveries were within the laboratory's acceptance limits. All of the LCS/LCSD's target analytes were also within the acceptance limits for accuracy and precision. The QA laboratory only spiked five of the target analytes into the LCS/LCSD. The QA laboratory was not requested to perform MS/MSD's and no evaluation of accuracy and precision due to matrix effects could be determined. All of the samples were analyzed within the required holding times. The QA laboratory's reporting limits were approximately five times lower than the primary laboratory.

The primary laboratory's QC samples contained all the necessary information and a complete evaluation was performed. The method blanks and the trip blanks were free of contamination above the laboratory reporting limit for all of the target analytes. The primary laboratory reported 4.8 J ug/L of 2-butanone in the equipment blank. The surrogates for both the samples and the laboratory's QC samples were all within the acceptance limits. The primary laboratory reported that the MS/MSD's performed on sample MW-SHL-19-99-0 were within the acceptance limits for all 84 target analytes for precision and eleven out of 168 target analytes

recoveries were outside the acceptance limits for accuracy. All of the target analytes in the LCS's were recovered within the acceptance limits, except in three out of 84 of the cases, one out of the 84 cases and five out of the 84 cases, for the three respective LCS's analyzed. All of the LCS outages were recovered above the acceptance limits and none of these target analytes were reported in any of the samples. All of the samples were analyzed within the required holding times.

The primary laboratory was also requested by the USACE project chemist, Marie Wojtas, to report the number of tentatively identified compounds (TIC's) found in each sample and report the findings in the case narrative. The primary laboratory reported that TIC's were detected in the following samples: MW-SHM-99-31C, MW-SHM-32X, MW-SHL-22C, MW-SHM-93-22C, MW-SHL-22B, MW-SHM-96-5B, MW-DUP, MW-EB, MW-SHM-96-5C, MW-SHM-93-10C, MW-SHL-11 and MW-SHL-20. The sample MW-SHM-96-5B was also the QA sample. The number of TIC's that were in each sample and their possible identification were not discussed in the case narrative.

3. Data comparison for TAL metals by Method 6010 and mercury by Method 7470.

There were 18 metals determinations. In 11 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 15 (83.3%) of the cases and quantitative agreement in eight out of 11 (72.7%) of the cases. No major and three minor data discrepancies were noted.

The first minor data discrepancy occurred in sample MW-SHM-96-5B-QA-99-0 in which the QA laboratory reported chromium at 1.6 B ug/L and the primary laboratory reported 4.7 B ug/L. The second minor discrepancy occurred in sample MW-SHM-96-5B-QA-99-01 in which the QA laboratory reported thallium at 3.7 B ug/L and the primary laboratory reported < 0.90 ug/L.

The primary laboratory's QC data report contained all of the necessary QC information and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The primary laboratory reported that the LCS recoveries were within the acceptance limits for all of the target analytes. The primary laboratory performed a matrix spike and a matrix duplicate on sample SHL-19-99-01. The matrix spike recoveries were all within the acceptance limits of 75-125%, except for selenium at 151%. The RPD's of the matrix duplicate were less than 20%, except for chromium, copper and thallium. All of the spike levels, percent recoveries and QC limits were appropriately indicated on all of the QC reports. All of the samples were analyzed within the required holding times.

The QA laboratory's QC data were within the acceptance limits for all the target analytes and a complete evaluation was performed. The method blanks were free of contamination above the reporting limits. The QA laboratory reported that the LCS/LCSD's were within the acceptance limits for both accuracy and precision. All of the spike levels, percent recoveries and

QC limits were appropriately indicated on all of the QC reports. The QA laboratory reported all of the metals were analyzed by Method 6010 Trace-ICP, except for mercury, which was analyzed by Method 7470-Hg Cold Vapor. All of the samples were analyzed within the required holding times.

4. Data comparison for total cyanide by Method 9010B.

There was one cyanide determination. There was 100% overall agreement in that cyanide was not detected by either laboratory. No major or minor data discrepancies were noted.

The primary laboratory's QC data were within the acceptance limits for cyanide and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The LCS's recovery was not reported. The matrix spike was recovered within the acceptance limits at 99.0%. The matrix duplicate and the original sample were reported below the laboratory's reporting limit. The sample was analyzed within the required holding time.

All of the QA laboratory's QC data were within acceptance limits and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The LCS/LCSD's were within the acceptance limits for both accuracy and precision. The QA laboratory analyzed the sample by modified Method 9012A, instead of Method 9010B as indicated on the chain of custody. The sample was analyzed within the required holding time.

5. The data comparison for anions by Method 300.0.

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

The QA laboratory's QC data were all within the acceptance limits and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS/LCSD were within the acceptance limits for all of the target analytes for both accuracy and precision and the spiking levels were also indicated. The QA laboratory was not requested to perform a MS/MSD on any of the samples and no evaluation of accuracy or precision based on matrix effects could be made. All of the samples were analyzed within the required holding times.

The primary laboratory's QC data were all within the acceptance limits and a complete evaluation was performed. The method blanks were free of contamination above the reporting limit for all of the target analytes. The LCS recoveries were within the acceptance limits. The primary laboratory reported that the matrix spike and the matrix duplicate were within the

laboartory's acceptance limits, except for ortho phosphate which was recovered at 40% in the MS. All of the samples were analyzed within the required holding times.

6. Data comparison for COD by Method 410.4 and BOD by Method 405.1.

There was one COD and one BOD determination. In both the COD and BOD determinations, there was 100% overall and quantitative agreement. There were no major or minor data discrepancies noted.

The primary laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank was free of contamination for both the COD and BOD results above the laboratory's reporting limit. The LCS recoveries for COD and BOD were both within the laboratory's acceptance limits. The primary laboratory did not report any MS/MSD's results. The samples were analyzed within the required holding times.

The QA laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The LCS/LCSD's were within the acceptance limits for both accuracy and precision. The QA sample was analyzed within the required holding times of 48 hours. The QA laboratory's contracted lab (CLS Labs) performed the BOD analysis.

7. The data comparison for alkalinity by Method 310.1.

There was one alkalinity determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC samples were within the acceptance limit for alkalinity and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The QA laboratory reported that the LCS/LCSD's were within the acceptance limits for both accuracy and precision. There were no MS/MSD's performed for alkalinity and no evaluation of matrix effects could be determined. All of the samples were analyzed within the required holding times.

The primary laboratory's QC samples were all within the acceptance limit for alkalinity and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The primary laboratory reported that the LCS's were within the acceptance limits. The primary laboratory did not report a matrix duplicate result. All of the samples were analyzed within the required holding times.

8. Data comparison for total hardness by Method 130.2.

There was one hardness determination. In this determination, there was 100% overall and 100% quantitative agreement. No major or minor discrepancies were noted.

The QA laboratory's QC samples were within the acceptance limit for hardness and a complete evaluation was performed. The method blank was free of contamination above the laboratory's reporting limit. The QA laboratory reported that the LCS/LCSD's were within the laboratory's acceptance limits for both accuracy and precision. All of the samples were analyzed within the required holding times.

The primary laboratory's QC samples were within the acceptance limit for total hardness and a complete evaluation was performed. The method blank was free of contamination above the reporting limit. The primary laboratory reported that the LCS was within the laboratory's acceptance limits. The primary laboratory did not perform a MS/MSD or matrix duplicate sample. All of the samples were analyzed within the required holding times.

9. Data comparison for TDS by Method 160.1 and TSS by Method 160.2.

There was one TDS and one TSS determination. In the TDS determination, there was 100% overall and quantitative agreement. No major or minor data discrepancies were reported. In the TSS determination, there was 0% overall and quantitative agreement. One major data discrepancy was noted.

The major discrepancy was reported in sample MW-SHM-96-5B-QA-99-02 in which the QA laboratory reported TSS at 5.0 mg/L and the primary laboratory reported 44.6 mg/L.

The primary laboratory's QC samples were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS recoveries for TDS and TSS were both within the laboratory's acceptance limits. The primary laboratory did not report any MS/MSD sample results. The samples were analyzed within the required holding times.

The QA laboratory's QC data were within the acceptance limits for all of the target analytes and a complete evaluation was performed. The method blanks for TDS and TSS were free of contamination above the laboratory's reporting limits. The LCS/LCSD's were within the acceptance limits for both accuracy and precision. All of the samples were analyzed within the required holding times.

10. References.

a. Data Report for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by Severn Trent Laboratories, dated 1 December 1999.

b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.

APPENDIX A
KEY TO COMMENTS ON DATA COMPARISON TABLES

0 - Data agrees if any one of the following apply:

- 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 **soil** 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 apply:

- 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 **soil** analyses:
4X<difference≤5X

4 - Major data discrepancy, disagreement serious, if any one of the following apply:

- 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 **soil** 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 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/15/99	CONTRACTOR'S ANALYSIS DATE:	11/4/99
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Dichlorodifluoromethane	< 1.0		< 5.0		0
Chloromethane	< 1.0		< 5.0		0
Vinyl Chloride		0.62 J	< 5.0		0
Bromomethane	< 1.0		< 5.0		0
Chloroethane		3.0		2.7 J	0
Trichlorofluoromethane	< 1.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 2.0		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	NR		< 5.0		2
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 1.0		< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 1.0		< 5.0		0
1,2-Dichloroethene (total)	NR			3.0 J	2
Methyl-t-Butyl Ether	NR			1.5 J	2
1,1-Dichloroethane		2.4		2.6 J	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene		2.8		2.9 J	0
2-Butanone	< 2.0		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 1.0		< 5.0		0
Tetrahydrofuran	NR		< 50		2
Chloroform	< 1.0		< 5.0		0
1,1,1-Trichloroethane	< 1.0		< 5.0		0
Carbon Tetrachloride	< 1.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene		0.86 J		0.94 J	0
1,2-Dichloroethane	< 1.0		< 5.0		0
Trichloroethene	< 1.0		< 5.0		0
1,2-Dichloropropane	< 1.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 1.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 1.0		< 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

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/15/99	CONTRACTOR'S ANALYSIS DATE:	5/20/99
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 2.0		< 5.0		0
Toluene	< 1.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 1.0		< 5.0		0
Tetrachloroethene	< 1.0		< 5.0		0
2-Hexanone	NR		< 5.0		2
Dibromochloromethane	< 1.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene		0.36 J	< 5.0		0
1,1,1,2-Tetrachloroethane	< 1.0		< 5.0		0
Ethylbenzene	< 1.0		< 5.0		0
Xylene (total)	< 1.0		< 5.0		0
Styrene	< 1.0		< 5.0		0
Bromoform	< 1.0		< 5.0		0
Isopropylbenzene	NR		< 5.0		2
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	NR		< 5.0		2
1,2,3-Trichloropropane	NR		< 5.0		2
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	NR		< 5.0		2
1,4-Dichlorobenzene		1.3	< 5.0		0
1,2-Dichlorobenzene		0.16 J	< 5.0		0
1,2-Dibromo-3-Chloropropane	< 2.0		< 5.0		0
1,2,4-Trichlorobenzene	< 1.0		< 5.0		0
Hexachlorobutadiene	< 1.0		< 5.0		0
Naphthalene	< 1.0		< 5.0		0
2,2-Dichloropropane	< 1.0		< 5.0		0
1,1-Dichloropropene	< 1.0		< 5.0		0
1,3-Dichloropropane	< 1.0		< 5.0		0
Bromobenzene	NR		< 5.0		2
n-Propylbenzene	NR		< 5.0		2
2-Chlorotoluene	NR		< 5.0		2
4-Chlorotoluene	NR		< 5.0		2
1,3,5-Trimethylbenzene	NR		< 5.0		2
tert-Butylbenzene	NR		< 5.0		2
1,2,4-Trimethylbenzene	NR		< 5.0		2
sec-Butylbenzene	NR		< 5.0		2
4-Isopropyltoluene	NR		< 5.0		2
n-Butylbenzene	NR		< 5.0		2
1,2,3-Trichlorobenzene	< 1.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
4-Bromofluorobenzene (70-130)	101	Toluene-d8 (88-110)	98
1,2-Dichloroethane-d4 (70-130)	100	1,2-Dichloroethane-d4 (72-141)	106
Toulene-d8 (70-130)	106	Bromofluorobenzene (72-122)	100
		1,2-Dichlorobenzene-d4 (69-124)	96

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
* = Surrogates outside of acceptable limits

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11-(10+11)-99	CONTRACTOR'S ANALYSIS DATE:	11/16/99
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL
EXTRACTION METHOD:	3010A	EXTRACTION METHOD:	3010A
ANALYSIS METHOD:	6010B,Hg-7470A	ANALYSIS METHOD:	6010, Hg-7470

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Aluminum	NR		< 14.3		2
Antimony	< 10		< 2.7		0
Arsenic		2800		2700	0
Barium		51		51.6	0
Beryllium	< 5.0			4.8 B	0
Cadmium	< 5.0		< 0.30		0
Calciuum	NR			118000	2
Chromium		1.6 B		4.7 B	3
Colbolt		15 B		14.4 B	0
Copper	< 25			1.8 B	0
Iron		26100		26900	0
Lead	< 5.0		< 1.0		0
Manganese		13400		17000	0
Mercury	< 0.20 (11-15-99)		< 0.10 (11-6-99)		0
Molybdenum		2.7 B		NR	2
Nickel		17 B		13.5 B	0
Potassium	NR			9680	2
Selenium	< 5.0		< 2.4		0
Silver	< 5.0		< 1.9		0
Thallium		3.7 B		8.3 B	3
Vanadium	< 50		< 1.5		0
Zinc		3.7 B		7.8 B	3

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/(10+11)/1999	CONTRACTOR'S ANALYSIS DATE:	11/19/99
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9012A	ANALYSIS METHOD:	9010

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Cyanide (CN)	< 10.0		< 10.0		0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/3/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	300.0	ANALYSIS METHOD:	300.0

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chloride, CL		54.4 Q		55.5	0
Nitrate, as N	< 0.050		< 0.2		0
Othophosphate, as P	< 0.20		< 0.2		0
Sulfate, SO4		4.3		4.6	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
Q=Elevated reporting limit due to high analyte level.

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/10/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4-COD	ANALYSIS METHOD:	410.1-COD

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/[illegible]/0
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chemical Oxygen Demand (COD)		21.5		20	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/9/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	CLS LABS	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Biological Oxygen Demand (5 Day)	< 3.0		< 2.0		0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/8/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.1	ANALYSIS METHOD:	310.1

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Alkalinity as CaCO3		395		336	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/17/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	130.2	ANALYSIS METHOD:	130.2

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Hardness as CaCO3		360 Q		355	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 1999

QA SAMPLE No.:	G9K030197-001	CONTRACTORS SAMPLE No.:	402025
QA FIELD ID:	MW-SHM-96-5B-QA-99-02	CONTRACTORS FIELD ID:	MW-SHM-96-5B-99-02
QA ANALYSIS DATE:	11/9/99	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	QUANTERRA	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

MATERIAL DESCRIPTION: WATER
DATE SAMPLED: 11/2/99
UNITS: mg/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Dissolved Solids (TDS by 160.1)		502		542	0
Total Suspended Solids (TSS by 160.2)		5.0		44.6	4

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

Chain of Custody Record

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
US Army Corps of Engineers	Marie Wojtas	11-2-99	42620

Address	Telephone Number (Area Code)/Fax Number	Lab Number	Page
696 Virginia Rd.	978-318-8175 FAX 978-318-8663		Page 1 of 1

City	State	Zip Code	Site Contact
Concord	MA	01742	Steve Simmer

Project Name	Carrier/Waybill Number
Shepley's Hill LTM	FEDEX 814 834906972

Contract/Purchase Order/Quote No.

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative *	Condition on Receipt	VOC-8260B	MTLS-6010B Hardness-130.2	Cyanide-9010B	Anions-300, TDS-160.1 Alkalinity-310.1	COD-HACH 8000	BOD-405.1	TSS-160.2					
MW-SHM-96-5B-QA-99-02	11-2-99	1235	Water	5370mL	plastic/glass	6/3	See bottles	good	3	1	1	1	1	1	1					
Trip Blank	11-2-99	—	Water	80mL	glass	2	HCL	↓	2											
								OK 11-3-99												

KAM 11-2-99

Special Instructions

Possible Hazard Identification

☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal

☐ Return To Client ☐ Disposal By Lab ☐ Archive For ______ Months

Turn Around Time Required

☐ Normal ☐ Rush

QC Level

☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Date	Time		Date	Time
1. Relinquished By: Katherine Miller	11-2-99	1315	1. Received By: B. Jennings	11/03/99	1050
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

* VOC preserved w/ HCL / MTLS - HNO_3 / Cyanide - NaOH / COD - H_2SO_4 /

DISTRIBUTION: ... - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

[redacted] [redacted]

Chain of Custody Record

R5606

Quanterra

QUA-4124 0797

Client: Quanterra	Project Manager: Diana Brooks	Date: 11-3-99	Chain of Custody Number: 28091
Address: 880 Riverside Parkway	Telephone Number (Area Code)/Fax Number	Lab Number	Page ____ of ____
City: W. SAC / State: CA / Zip Code	Site Contact	Lab Contact	Analysis (Attach list if more space is needed)
Project Name: USACOE	Carrier/Waybill Number		Special Instructions/ Conditions of Receipt
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Analysis: BOD														Special Instructions/ Conditions of Receipt
G9K030197-1	11-2-99	1235	X				X							X													

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For ____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☐ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other ____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By: [signature]	11-3-99	1400	1. Received By: [signature]	11/3/99	1700
2. Relinquished By			2. Received By		
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Quanterra

LOT RECEIPT CHECKLIST

QES West Sacramento

CLIENT US Army CoF E PM _____ LOG # 35271

LOT# (QUANTIMS ID) G9K030197 QUOTE # 30186 LOCATION(S) W20A VB

DATE RECEIVED 11/03/99 TIME RECEIVED ~~PST~~ BMT 0920

Initials: BMT Date: 11/03/99

DELIVERED BY
- [x] FEDEX
- [ ] CA OVERNIGHT
- [ ] CLIENT
- [ ] AIRBORNE
- [ ] GOLDENSTATE
- [ ] DHL
- [ ] UPS
- [ ] BAX GLOBAL
- [ ] GO-GETTERS
- [ ] QES COURIER
- [ ] OTHER _____

CUSTODY SEAL STATUS [ ] INTACT [ ] BROKEN [x] N/A

CUSTODY SEAL #(S) _____

SHIPPPING CONTAINER(S) [ ] QUANTERRA [x] CLIENT [ ] N/A

TEMPERTURE RECORD (IN °C) IR 1 [ ] 2 [x]

COC #(S) 47620

TEMPERATURE BLANK _____

AMBIENT TEMPERATURE 0°C

pH MEASURED [ ] YES [ ] ANOMALY [x] N/A

LABELED BY..... ND

LABELS CHECKED BY.....

SHORT HOLD TEST NOTIFICATION

SAMPLE RECEIVING

WETCHEM [x] N/A AK

[ ] METALS NOTIFIED OF FILTER/PRESERVE VIA VERBAL & EMAIL [x] N/A

[ ] COMPLETE SHIPMENT RECEIVED IN GOOD CONDITION WITH APPROPRIATE TEMPERATURES, CONTAINERS, PRESERVATIVES [x] N/A

[x] Clouseau [x] TEMPERATURE EXCEEDED (2 °-6 °C) [ ] N/A

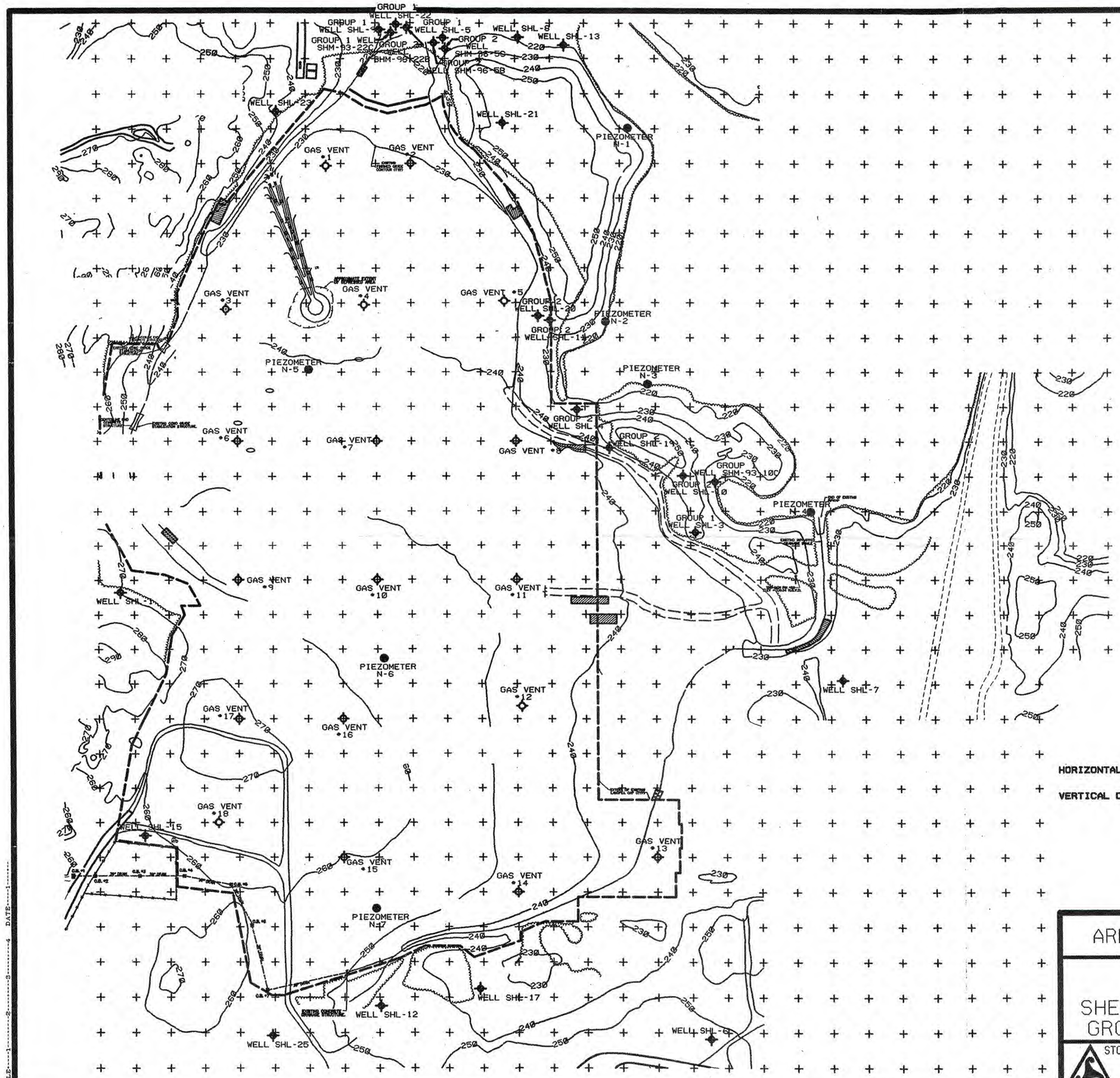
[x] WET ICE [ ] BLUE ICE [ ] GEL PACK

[x] PM NOTIFIED [ ] NO COOLING AGENTS USED

Notes: _____

LEAVE NO SPACES BLANK. USE "N/A" IF NOT APPLICABLE. INITIAL AND DATE ALL "N/A" ENTRIES.

QA185 02/99 RAL



NOTES:

1. THE LOCATIONS OF SHM-96-5B, SHM-96-5C AND SHM-96-22B ARE APPROXIMATED.

HORIZONTAL DATUM: MASSACHUSETTS PLANE COORDINATE SYSTEM MAINLAND ZONE (NAD 1983)

VERTICAL DATUM: NGVD 1929

0 200 400 FEET

1" = 200'-0" HORIZONTAL

ARMY CORPS OF ENGINEERS

FIGURE 4-1
FORT DEVENS
SHEPLEY'S HILL LANDFILL
GROUNDWATER MONITORING

STONE & WEBSTER ENVIRONMENTAL TECHNOLOGY & SERVICES
BOSTON, MASSACHUSETTS

REVISED BY COE, NAE 3/99

FILE---1---2---3---4 DATE---1---

US Army Corps
of Engineers
New England District

Symbol	Description	Date	Appr.
Symbol	Description	Date	Appr.

Designed by:
Drawn by:
Reviewed by:
Submitted by:
Chief, General Engrg Sect

Date: 2/14/01
Design file no.
Drawing code:
File name:
Plot date:
Plot scale:

Rev.

U.S. ARMY ENGINEER DISTRICT
CORPS OF ENGINEERS
CONCORD, MASSACHUSETTS

Devens
Shepley's Hill Landfill
Inspection

FIGURE 3-1

FINDINGS OF INSPECTION
CONDUCTED 31 OCTOBER 2000

Reference
number:

Sheet of