2001 ANNUAL REPORT

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

April 2002

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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 sixth year, 2001, 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 this plan include an annual inspection of the landfill cover, annual landfill gas vent monitoring, and semi-annual groundwater monitoring. 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. In 2001, trees were removed from the edge of the cap, and vegetation was removed from the southern drainage swale. Presently, 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 repair at various locations. There were no conditions observed which would immediately jeopardize the integrity of the landfill cap.

Also in 2001, four soil gas probes were installed just beyond the northwest limits of the landfill cap. Combustible gas readings were collected from eighteen gas vents on the landfill, plus the four new probes. No landfill gas was observed in the probes. The gas readings recorded from the vents were within the parameters of a mature landfill. The vents are functioning properly and are in good condition.

The sixth 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 ROD, only chemicals which present carcinogenic risk are considered trigger chemicals in the Long Term Monitoring Program. The trigger chemicals are arsenic, dichlorobenzenes, and 1,2-dichloroethane. The evaluation of effectiveness of the selected 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-dichlorobenzene) overshadows the achievement of a 50-percent reduction of concentration of a higher carcinogenic risk (i.e., arcenic). 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.

The effectiveness of the selected alternative, SHL-2, is determined by evaluating groundwater sampling results from two groups of monitoring wells, Group 1 and Group 2. 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, SHM-93-10C, SHL-22, and SHM-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 currently classified as Group 2 wells. Monitoring will continue in order to examine if cleanup levels are maintained in Group 1 wells. It should be noted that two of the Group 1 wells (SHL-9 and SHM-93-22C) have exceeded a cleanup level for a trigger chemical (arsenic in both cases) since the first five-year review. No such exceedences occurred in 2001. The next round of groundwater monitoring will be conducted in May 2002.

Arsenic was the only trigger chemical detected above cleanup levels during the 2001 sampling events. Most wells indicate no definitive change over historic arsenic values. Wells SHM-96-5C, SHL-11, SHL-22 and SHM-96-22B all recorded new high arsenic levels in 2001. Of those, wells SHL-11 and SHM-96-22B are showing trends that may be expected to continue rising. Well SHL-20 is showing a slow decline in arsenic levels over the last five years. It should be noted that 8 of the 14 wells were below the arsenic cleanup level for the latest round of sampling. The wells below the cleanup levels are SHL-3, SHL-5, SHM-96-5C, SHL-9, SHL-10, SHM-93-10C, SHL-22, and SHM-93-22C.

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 north of Shepley's Hill Landfill to Nonacoicus Brook, updating and refining the groundwater model for Shepley's Hill Landfill, and analyzing rock samples for naturally occurring arsenic. A draft report is presently under regulatory review.

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 sixth year of the long term monitoring program. The first two years of monitoring, 1996 and 1997, were conducted by Stone & Webster Environmental Technology & Services (SWEC). From 1998 through 2001, 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 a recommendation made in the previous annual report, the following improvements and repairs were made during 2001: trees were removed from the vicinity of Gas Vent #13, the southern perimeter, and the eastern perimeter of the landfill. Normally scheduled maintenance activities performed during 2001 included mowing of the landfill vegetative cover and cutting vegetative growth in drainage swales. Also in 2001, four landfill gas monitoring probes were installed outside the northwest edge of the landfill cap (details can be found in Appendix G). The remaining 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. Maintenance activities of this non-critical nature will continue to be monitored and evaluated. 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 5 December 2001 by personnel from the U.S. Army Corps of Engineers, 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. A narrative of the findings of this inspection follows.

- 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 topography and settlement findings will be the basis of corrective action, if required for the areas which typically have exhibited standing water.

- Catch basin #3 near the Cook 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. This catch basin should be cleared of encroaching vegetation.

- The concrete headwall drainage structure at the terminus of the catch basin and underground conduit system on the south side is overgrown with vegetation and is silting in. The grade of the channel bottom is uneven and standing water is present. Wetland species are becoming established as well. The structure and channel immediately downstream 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 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 northern reach of the eastern drainage swale has some minor vegetation growth and sand accumulation. The swale should be cleared.

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

- 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, most notably at the Cook Street entrance, and continuing over to the dirt road at catch basin #7. Some evidence of off-road vehicles (ATV's, dirt bikes, etc.) using the cap area was observed. On the east side, near groundwater monitoring well SHL-11, the fence has been rolled back and is open. A gate and lock should be added here if permanent access is required. The security fence should be repaired, with all missing fence sections (including gates) replaced or repaired.

- The newly installed gas monitoring probes at the northwest edge of the landfill appear to be in excellent condition, and are secured with locked steel caps.

- The gas vents are in good condition. All screens and pipes are in functional condition and no repairs are required at this time.

A summary of Corrective Action measures for the Landfill Cap is included in Section 9.

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 or are migrating off-site. Four new landfill gas monitoring probes were installed on 7 November 2001. The purpose of the probes is to monitor landfill gas migration from Shepley's Hill Landfill towards Sculley Road. More detailed information on the installation and location of the probes is available in Appendix G of this report.

The sixth annual landfill gas sampling was conducted on 5 December 2001. The weather was warm and sunny, with temperatures in the 60's (F) and the barometric pressure was 29.9 inches 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 after they had stabilized. The locations of the gas vents are shown on Figure 3-1.

The results from the monitoring event can be found in Table 4-1. The following is a brief summary of the results. The perimeter landfill gas monitoring probes (LGP-01-01X , LPG-01-02X, LPG-01-03X, LPG-01-04X) tested negative (0) for VOC's, hydrogen sulfide, carbon monoxide, and methane. Minimal levels of carbon dioxide were detected, ranging from 0 % at LGP-01-01X to 0.8 % at LGP-01-02X. Oxygen levels ranged from 20.3 % at LGP-01-02X to 20.9 % at LGP-01-01X.

The following summarizes the gas vents: VOCs were not detected in any of the gas vent wells. The oxygen levels ranged from 20.8% (Vent # 1) to 0.3% (Vent # 15) using the GA-90. No gas vent wells tested positive for hydrogen sulfide, reading 0 for all wells. LEL readings ranged from 0% in V-1 to over 100% LEL in Vent Nos. 3, 9, 12, 13, 14, 15 ,17, and 18. Carbon monoxide registered 0 in most of the gas vent wells to a high of 4 ppm in V-12. Carbon dioxide ranged from 22.9 ppm (Vent # 15) to 0 ppm (Vent # 1). Methane ranged from 33.1 ppm (Vent # 14) to 0 ppm in V-1.

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. The scenario of low atmospheric pressure to high atmospheric pressure results in air intrusion into upper portion landfill. The scenario during this inspection was likely somewhere in-between. 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 (note that this has been done at the northern end near Sculley Road). The deep screen should extend to just above the saturated zone. The top of shallow screen should be installed at approximately 3 to 5 feet below ground surface.

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, while Figure 5-2 shows the location of that cross-section relative to the landfill. 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 2001 were consistently higher than those measured in October 2001, as is typical for the area. The mean drop in groundwater elevation (from spring to fall reading) was 1.3-feet for the fourteen wells. Compared to the year before, 2001 levels were typically lower than those in 2000, with spring levels receding 0.7-feet on average from the previous year, and fall levels receding 0.3-feet on average. This follows since the area's precipitation total for the year 2001 was one of the lowest on record (lowest 10-percent).

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. Groundwater modeling has suggested that the landfill cap has reduced the volume of water beneath the cap, resulting in a more northerly groundwater flow (SWEC, 1998). 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.

6.0 GROUNDWATER SAMPLING

Groundwater sampling activities at the landfill are conducted semi-annually. Groundwater sampling activities for the sixth year were conducted in the spring (May 14 and 15, 2001) and in the fall (October 29 and 30, 2001). There were no significant precipitation events during either sampling period. 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-93-10C, SHL-22, 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. Also recorded in that table are the occurrences of Group 1 wells that have exceeded cleanup levels since the first five-year site review. There were no such occurrences measured in 2001.

6.1 Preparation for Sampling

Wells sampled as part of the long term monitoring program included SHL-3, SHL-4, SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-10, SHM-93-10C, SHL-11, SHL-19, SHL-20, SHL-22, SHM-96-22B, and SHM-93-22C. Locations of the wells are shown on Figure 3-1. Of these fourteen long-term monitoring wells, the seven at the north end of the landfill (SHL-5, SHM-96-5B, SHM-96-5C, SHL-9, SHL-22, SHM-96-22B and SHM-93-22C) are located in the area predicted to experience the greatest intrusion of groundwater flow from the landfill, as suggested by the modeling results depicted in Figure 6-1.

Sampling activities were coordinated with the Devens BRAC Environmental 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 (NAE's equipment was occasionally supplemented with identical models rented from U.S. Environmental, as required – these instances were noted on the Groundwater Field Analysis Forms). 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 sixth year of sampling was conducted by NAE on May 14 and 15, 2001 and later on October 29 and 30, 2001. 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 B. 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.
- Although past difficulties with maintaining flowrates and achieving stabilization at wells SHL-3 and SHL-10 showed improvement in 2001, an attempt to redevelop both wells is planned prior to the spring sampling of 2002.

- The instrument calibration checks performed at the end of each day of sampling revealed that the oxidation reduction potential (ORP) readings taken with one of the YSI water meters on October 30, 2001 could be questionable. This meter was used to measure ORP at wells SHL-9, SHL-22, SHM-96-22B and SHM-93-22C on that day. However, the data collected at those wells does not appear suspect since the ORP was recorded as no higher than –51.4 mV at any of those wells, while dissolved oxygen (DO) was recorded as no higher than 1.18 mg/L. This data is in agreement with historical data and the relationship between the two parameters dictates that these values are reasonable.

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.

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 in Colchester, Vermont for analysis. The samples were collected on May 14 and 15, 2001, and later on October 29 and 30, 2001. 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 C). Sample custody was initiated by the sampling team upon collection of samples and COC forms were placed in waterproof plastic bags and taped to the inside lid of the cooler. The cooler was sealed with chain-of-custody seals and shipped to the laboratory via overnight delivery. Due to laboratory error that caused some sample to be disregarded, there was insufficient volume to analyze for Total Suspended Solids at well SHL-19 during the fall event.

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 for the spring event, hardness by method 2340B for the fall event, alkalinity by method 310.1, cyanide by method 335.4, anions by method 300.0, total organic carbon by method 9060, total dissolved solids by method 160.1, and total suspended solids by method 160.2. These analyses were conducted at all wells. Note that the change in method used to determine hardness was made in order to eliminate the interference to method 130.2 by other heavy metal ions typically present in some of the wells at the site. 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 Record of Decision, 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 2001 sampling events. Analytical results for groundwater analyses are presented in Tables 7-2 and 7-3, for the spring and fall rounds, respectively.

These tables present detectable concentrations of chemical contaminants. Where concentrations were not detected the value is recorded as less than the detection limit. These results are compared against the applicable 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 2001

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 SHL-11 (2.4 J µg/L) and SHL-20 (3.1 J µg/L). Non-trigger VOCs detected at levels below MCLs in groundwater samples include acetone (4.1 J µg/L or less), benzene (2.0 J µg/L or less), methyl-t-butyl ether (1.5 J µg/L or less), 1,1-dichloroethane (2.1 J µg/L or less), and total 1,2-dichloroethene (2.9 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 (50.8 µg/L), SHM-96-5B (3,800 µg/L), SHM-96-5C (80.5 µg/L), SHL-11 (487 µg/L), SHL-19 (129 µg/L), SHL-20 (186 µg/L), and SHM-96-22B (1,540 µg/L). A duplicate sample from well SHM-96-5B had a concentration of 3,900 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 SHM-95-5B, SHM-96-5C, SHL-11, SHL-19, SHL-20, and SHM-96-22B, with the maximum detected (92,700 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 11,000 µg/L at SHM-96-5B (found in the duplicate sample). 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 and SHM-96-22B with the maximum detected (48,200 µg/L) at well SHL-22.

7.2.2 Results for Samples Collected Fall 2001

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). In fact, none of the four trigger compounds (1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene) were detected in the wells. Non-trigger VOCs detected at levels below MCLs in groundwater samples

include acetone (1.8 JN µg/L or less), benzene (1.9 J µg/L or less), methyl-t-butyl ether (1.2 J µg/L or less), 1,1-dichloroethane (2.0 J µg/L or less), and total 1,2-dichloroethene (2.6 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 (66.0 µg/L), SHM-96-5B (1,850 µg/L), SHL-11 (573 µg/L), SHL-19 (183 µg/L), SHL-20 (165 µg/L), and SHM-96-22B (1,670 µg/L). A duplicate sample from well SHM-96-5B had a concentration of 1,830 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-96-5B, SHM-96-5C, SHL-11, SHL-19 and SHM-96-22B, with the maximum detected (82,200 µg/L) at well SHM-96-22B. 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 SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, SHL-22, SHM-96-22B, and SHM-93-22C with the maximum detected (45,600 µg/L) at well SHL-22.

Tables 7-2 and 7-3 summarize the monitoring wells that had contaminant concentrations above the cleanup levels during the 2001 monitoring period. These values were compared to previous year's data. A comparison of arsenic concentrations detected above the cleanup levels during the 2001 period with historical data is presented in Table 7-4. The comparison indicates the following:

Most wells indicate no definitive change over historic arsenic values. Wells SHM-96-5C, SHL-11, SHL-22 and SHM-96-22B all recorded new high arsenic levels in 2001. Of those, wells SHL-11 and SHM-96-22B are showing trends that may be expected to continue rising. Well SHL-20 is showing a slow decline in arsenic levels over the last five years. 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 SHL-3, SHL-5, SHM-96-5C, SHL-9, SHL-10, SHM-93-10C, SHL-22, and SHM-93-22C. Refer to Appendix D for a graphical comparison of arsenic concentrations in monitoring wells for the previous and current sampling periods.

7.3 Additional Investigation at Well SHM-96-22B

An EPA comment to the 2000 Annual Report noted that arsenic concentrations measured at well SHM-96-22B probably understate the actual highest concentrations in the northwest quadrant of the landfill since this well has a 30-foot screened interval. Therefore, during the fall sampling event of 2001, an additional investigation was attempted at this well.

A YSI 600 XLM water meter was slowly lowered through the entire screened interval of the well, with field readings of temperature, specific conductance, pH, oxidation reduction potential (ORP) and dissolved oxygen (DO) recorded at one-foot intervals, as readings appeared to equilibrate. In addition to the water samples typically collected from the middle of the wetted screen interval (results for which were reported, as usual, in this report), a second set of samples was collected approximately one-foot from the bottom of the screened interval. This location was chosen since

this was where the highest specific conductivity was found (potentially indicating higher concentrations of heavy metals). The intent was to collect samples from different depth intervals without physically sectioning off portions of the screen.

Unfortunately, results were similar between the two sample points for almost all parameters, with the only metal showing a significant change being manganese (1,960 µg/L at the normal sampling location, and 3,730 µg/L near the bottom of the well). Table 7-5 displays the results from the two sample depths, including the final equilibrated field parameter values found at those depths just prior to sampling.

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 E 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 E 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

8.3.1 Data Evaluation for Samples Collected Spring 2001

Introduction

Eighteen groundwater samples were collected from Shepley's Hill Landfill at Fort Devens, MA. Fourteen of these samples are reported in the Shepley's Hill Landfill 2001 Annual Report. The other four samples were collected at Molumco Road (off-site), and will be discussed in supplemental groundwater investigation reports. The samples were analyzed at Severn Trent Laboratories (in Colchester VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). The

samples were collected on May 14, 15, and 16, 2001 (see Groundwater Analytical Results Table in Section 7).

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

Sample Shipment and Receipt

All sample coolers were packed with ice packs and ice in the field. Sample shipments were received at the laboratory on May 15, 16 and 17, 2001. All samples were appropriately preserved by the procedures shown in Table 1. There are no sample shipment or receipt anomalies associated with these samples.

Holding Times

Samples were extracted and analyzed in accordance with the methods and holding time requirements cited in Table 1, except for BOD in which the 48-hour holding time was exceeded by as much as thirteen hours for samples from sampling date 5/14/01. Affected samples are SHL-10, SHM-93-10C, SHL-3, SHL-19, SHL-4, SHL-11 and SHL-20. BOD results for these samples are all less than the reporting limit of 2,000 ug/L. This reporting limit is qualified as estimated "J" as a result of holding time exceedance.

Volatile Organic Compound (VOC) Analysis

Eighteen 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 05/14/01 05/15/01, and 05/16/01); and one equipment blank (SHL-EB, dated 05/15/01).

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: VOC results for sample SHM-96-5B, and its duplicate, sample SHM-DUP, show less than 20 % relative percent difference for all detected target 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 all relative percent differences (RPD) are within the laboratory's acceptance limits for VOC

analysis. Three out of 84 spiked compounds showed MS and MSD recoveries, which were slightly outside the acceptance range. All three of these exceedances are not considered to impact the results, as recoveries were 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. 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

Eighteen 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 05/15/01).

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, except for Copper. The result for copper in the field duplicate (42.8 ug/L) differed greatly from the sample result (<11.0 ug/L). The laboratory was contacted by telephone and verified the values. Since both these results are far below the action level for copper (1,300 ug/L), no redigestion and reanalysis was warranted. As a result of this discrepancy, results for Copper on sample SHM-96-5B and its duplicate SHM-95-5B DUP are qualified with a "J", indicating that the values are estimated.

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. For analytes, which showed concentrations above the CRDL, the duplicate RPDs are within the 20% acceptance limit for metals analysis.

General Inorganic Analyses

Eighteen 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, Total Organic Carbon (TOC) by SW846 method 9060 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 05/15/01).

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 TDS (6,000 ug/L), BOD (3,700 ug/L) and Alkalinity (1,000 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. Since all Alkalinity sample values are greater than five times the concentration found in the equipment blank, all results are unqualified for this parameter. Only two samples have TDS values which are within five times the concentration found in the equipment blank (SHL-3 and SHL-10). TDS values for these samples are qualified with a "B". BOD was reported at 3,700 ug/L in the equipment blank. Since BOD results for all samples were reported as less than the reporting limit, then all results are unqualified for this parameter.

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 Hardness, which showed 46% RPD between the original and field duplicate sample result. As a result of the exceedance of RPD criteria for Hardness, 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 and duplicate samples was analyzed for Anions, TOC, COD, Total Hardness and Alkalinity. All MS recoveries are within the laboratory's acceptance limits except Chemical Oxygen Demand (45.5% recovery), which is below the control criteria. COD results are qualified with "N", indicating that the MS recovery is outside the control limits. One set of duplicate samples was analyzed for Anions, Alkalinity, Hardness, TDS, TSS and TOC. All RPD values are within the laboratory's acceptance limits (20% RPD) except for TSS (46% RPD). All samples are qualified with a "*", 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:

- Biochemical Oxygen Demand Analyses: Holding times for BOD were exceeded by as much as thirteen hours for samples from sampling date 5/14/01, SHL-10, SHM-93-10C, SHL-3, SHL-19, SHL-4, SHL-11 and SHL-20. All results are less than the reporting limit of 2,000 ug/L and are qualified as estimated "J" as a result of holding time exceedance.

- Metals and General Inorganic Analyses: All results for Hardness 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. Field duplicate values

for Copper exhibited a discrepancy between the sample value (<11.0 ug/L) and its duplicate result (42.8 ug/L). These values are qualified as estimated "J".

- General Inorganic Analyses: The equipment blank sample showed detectable levels of TDS (6,000 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. All COD results are qualified with "N", indicating that the MS recovery is outside the control limits. All results for TSS are qualified with "*", indicating that the duplicate sample RPD values are outside the acceptance limits.

8.3.2 Data Evaluation for Samples Collected Fall 2001

Introduction

Eighteen groundwater samples were collected from Shepley's Hill Landfill at Fort Devens, MA. Fourteen of these samples are reported in the Shepley's Hill Landfill 2001 Annual Report. The other four samples were collected at Molumco Road (off-site), and will be discussed in supplemental groundwater investigation reports. One well (SHM-96-22B) was sampled at an additional depth for comparison of parameter variation within that well. The results of this investigation are presented in Section 7 of this report. The samples were analyzed at Severn Trent Laboratories (in Colchester VT) for Volatile Organic Compounds (VOCs), Target Analyte List (TAL) Metals, Alkalinity, Anions (Nitrate, Phosphate, Sulfate, and Chloride), Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), Total Hardness, Total Dissolved Solids (TDS), Total Suspended Solids (TSS), Cyanide and Total Organic Carbon (TOC). The samples were collected on October 29, 30, and 31, 2001 (see Groundwater Analytical Results Table in section 2).

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, standard EPA SW846 guidance and/or guidelines provided in the EPA Contract Laboratory Program (CLP) Data Validation Functional Guidelines.

Sample Shipment and Receipt

All sample coolers were packed with ice in the field. Sample shipments were received at the laboratory on October 30, 31, and November 1, 2001. All samples were appropriately preserved by the procedures shown in Table 1. There are no sample shipment or receipt anomalies associated with these samples.

Holding Times

Samples were extracted and analyzed in accordance with the methods and holding time requirements cited in Table 1, except for BOD in which the 48-hour holding time was exceeded by as much as twelve hours for samples from sampling dates 10/29/01 and 10/31/01. Affected samples are SHL-3, SHL-4, SHL-10, SHM-93-10C, SHL-11, SHL-19, SHM-99-31A, SHM-99-31B, SHM-99-31C, and SHM-99-32X. BOD results for these samples are all less than the

reporting limit of 1,300 – 1,400 ug/L. This reporting limit is qualified as "H" as a result of holding time exceedance.

Volatile Organic Compound (VOC) Analysis

Eighteen 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 10/29/01, 10/30/01, and 10/31/01); and one equipment blank (SHLF-EB, dated 10/31/01). One sample (SHM-96-22B-91.7) was collected at an additional depth not normally monitored for comparison of parameter variation within that well.

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: VOC results for sample SHM-96-5B, and its duplicate, sample SHM-DUP, show less than 20 % relative percent difference for all detected target 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 all relative percent differences (RPDs) are within the laboratory's acceptance limits for VOC analysis. Seventeen out of 84 spiked compounds showed MS and/or MSD recoveries, which are slightly outside the acceptance range. These exceedances are not significantly outside of the acceptance range. Most of 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). For the affected compounds which are site-specific contaminants of concern (Acetone, 2-Butanone, 4-Methyl-2-Pentanone, and 1,2-Dichloroethane) any detected values are qualified with an "N" on the data summary table. The compound 2-Chloroethylvinylether showed 0% recovery in both the MS and MSD sample. 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

Eighteen 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 (SHLF-EB, dated 10/31/01). One sample (SHM-96-22B-91.7) was collected at an additional depth not normally monitored for comparison of parameter variation within that well.

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 most analytes except for Chromium, Copper, Lead, and Silver which show 22%, 123%, 38%, and 32% RPD, respectively. Results for these analytes in both samples are well below the associated regulatory standard. Due to this discrepancy, results for Chromium, Copper, Lead, and Silver in samples SHM-96-5B and SHM-DUP are qualified with a "*", indicating that the RPD values are outside the acceptance limits.

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 for project analytes. For analytes, which showed concentrations above the CRDL, the duplicate RPDs are within the 20% acceptance limit for metals analysis.

General Inorganic Analyses

Eighteen 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 Standard Methods 2340B, Total Dissolved Solids (TDS) by EPA method 160.1, Total Suspended Solids (TSS) by EPA method 160.2, Total Organic Carbon (TOC) by SW846 method 9060 and Cyanide by EPA method 335.4. In addition, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) and one equipment blank (SHLF-EB, dated 10/31/01). One sample (SHM-96-22B-91.7) was collected at an additional depth not normally monitored for comparison of parameter variation within that well.

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 Alkalinity (1,000 ug/L), COD (23,600 ug/L), TDS (7,000 ug/L), TSS (500 ug/L), and TOC (1,400 ug/L). Detected sample values, which are within five times of the amount detected in the equipment blank, are qualified with a "B", indicating potential blank interference. Since all Alkalinity sample values are greater than five times the concentration found in the equipment blank, all results are unqualified for this parameter. All COD values are within fives times of the concentration in the equipment blank, therefore, all values are qualified with a "B". One sample has a TDS value which is within five times the concentration found in the equipment blank (SHL-10). The TDS value for this sample is qualified with a "B". Four samples have TSS values which are within five times the concentration found in the equipment blank (SHL-3, SHL-9, SHL-22, and SHL-93-22C). The TSS values for these samples are qualified with a "B". Thirteen samples have TOC values which are within five times the concentration found in the equipment blank (SHL-4, SHL-96-5B, SHM-DUP, SHM-96-5C, SHM-93-10C, SHL-11, SHL-19, SHL-20, SHL-22, SHL-93-22C, SHM-99-31A, SHM-99-31B, and SHM-99-32X). The TOC values for these samples are qualified with a "B".

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 COD and TOC, which showed 22% and 32% RPD between the original and field duplicate sample results. As a result of the exceedance of RPD criteria for COD and TOC, samples SHM-96-5B and SHM-DUP are qualified with a "*", indicating that the duplicate results are outside the RPD acceptance limits. Other field duplicate results show acceptable comparative results.

Matrix Spike (MS) and Duplicate Results: One matrix spike sample was analyzed for Alkalinity and Anions. All MS recoveries are within the laboratory's acceptance limits (75-125%). One set of duplicate samples was analyzed for Alkalinity, Anions, 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:

- BOD Analyses: Holding times for BOD were exceeded by as much as twelve hours for samples from sampling dates 10/29/01 and 10/31/01. Affected samples are qualified with an "H" as a result of the holding time exceedance.

- VOC Analyses: MS/MSD recoveries are outside acceptance limits for the site-specific contaminants of concern, Acetone, 2-Butanone, 4-Methyl-2-Pentanone, and 1,2-Dichloroethane. Any detected values are qualified with an "N" on the data summary table.

- Metals Analyses: The results of duplicate samples analyzed for metals show greater than 20% RPD for Chromium, Copper, Lead, and Silver. Results for Chromium, Copper, Lead, and Silver in samples SHM-96-5B and SHM-DUP are qualified with a "*", indicating that the RPD values are outside the acceptance limits.

- General Inorganic Analyses: The equipment blank sample showed detectable levels of Alkalinity, COD, TDS, TSS, and TOC. Sample values, which are within five times of the amount detected in the equipment blank are qualified with a "B", indicating potential blank interference.

General Inorganic Analyses: The results of duplicate samples analyzed for metals show greater than 20% RPD for COD and TOC. Results for COD and TOC in samples SHM-96-5B and SHM-DUP are qualified with a "*", indicating that the duplicate results are outside the RPD acceptance limits.

9.0 CORRECTIVE ACTION

Corrective actions consist primarily of regrading and reseeding eroded areas, and clearing unwanted vegetation in drainage channels (see Section 3 for details). The following items 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; and (2) Place topsoil over the sandy area lacking vegetation on the east side along the perimeter of the cap. Further recommendations include: (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 existing drainage system to determine why water is ponding on the northern half, and if it is draining effectively.

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

TABLES

TABLE 4-1
Landfill Gas Monitoring Form

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 12/05/01

ORGANIZATION: CENAE-EP WEATHER: Sunny, 60's,

BAROMETER: 29.9 in Hg TIME: 0900 BAROMETER: 29.8 in 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
GV-1	0.0	20.8	0	0	0	0	0	CGI O2 – 21.0
GV-2	0.0	15.2	0	93	0	4.7	2.4	CGI O2 – 15.0
GV-3	0.0	10.3	0	>100	0	8.3	6.3	CGI O2 – 10.9
GV-4	0.0	14.5	0	61	0	4.4	1.3	CGI O2 – 15.0
GV-5	0.0	15.3	0	5	0	3.6	0.1	CGI O2 – 16.3
GV-6	0.0	14.8	0	37	0	3.9	0.7	CGI O2 – 15.1
GV-7	0.0	16.4	0	31	0	2.4	0.7	CGI O2 – 16.5
GV-8	0.0	14.8	0	50	0	4.2	1.3	CGI O2 – 15.2
GV-9	0.0	6.7	0	>100	0	10.2	9.2	CGI O2 - 10.2
GV-10	0.0	13.8	0	55	0	4.1	1.4	CGI O2 – 14.4
GV-11	0.0	14.7	0	69	0	3.4	2.5	CGI O2 – 15.1
GV-12	0.0	1.2	0	>100	4	13.6	8.0	CGI O2 – 2.5
GV-13	0.0	4.3	0	>100	1	10.1	11.3	CGI O2 – 7.0
GV-14	0.0	1.6	0	>100	2	22.2	33.1	CGI O2 – 3.6
GV-15	0.0	0.3	0	>100	0	22.9	23.4	CGI O2 – 2.1
GV-16	0.0	0.4	0	68	1	19.7	12.5	CGI O2 – 2.3
GV-17	0.0	2.2	0	>100	3	19.6	17.1	CGI O2 – 4.5
GV-18	0.0	3.7	0	>100	0	21.7	29.1	CGI O2 – 6.1
LGP-01-01X	0.0	20.9	0	0	0	0	0	CGI O2 – 20.9
LGP-01-02X	0.0	20.3	0	0	0	0.8	0	CGI O2 – 20.6
LGP-01-03X	0.0	20.7	0	0	0	0.3	0	CGI O2 – 20.8
LGP-01-04X	0.0	20.8	0	0	0	0.1	0	CGI O2 – 20.9

CALIBRATION INFORMATION:
Instrument: PID, 10.6 eV lamp
Results: 0.0/248 ppm isobutylene Calibrated by: Michalak

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

TABLE 5-1
Monitoring Wells and Elevations

Well Identification	Screened Interval (ft NGVD)	Groundwater Elevations (ft NGVD)	
		May 14, 2001	October 29, 2001
SHL-3	213.4-223.4	218.15	217.70
SHL-4	213.0-223.0	218.11	218.03
SHL-5	203.4-213.4	215.12	212.98
SHM-96-5B	128.5-138.5	214.56	213.06
SHM-96-5C	158.5-168.5	214.55	213.03
SHL-9	197.8-207.8	214.43	212.71
SHL-10	211.2*-231.0	217.81	217.44
SHM-93-10C	192.7-202.7	218.64	214.62#
SHL-11	206.5-221.5	217.64	217.42
SHL-19	209.3-224.3	218.27	217.78
SHL-20	185.8-195.8	217.82	217.43
SHL-22	104.5-114.5	214.35	212.79
SHM-96-22B	127.6-157.6	214.32	212.76
SHM-93-22C	87.3-97.3	214.36	212.78

* 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.

\# This value is in question, due to observations of trends and a potential recording error.

TABLE 6-1
Monitoring Well Designations

Monitoring Well Identification	Well Designation (Based on First Five-Year Review, SWEC, Aug 1998)	Exceedances of Cleanup Levels for Trigger Chemicals, Since Achieving Group 1 Status
SHL-3	Group 1	None
SHL-4	Group 2	NA
SHL-5	Group 1	None
SHM-96-5B	Group 2	NA
SHM-96-5C	Group 2	NA
SHL-9	Group 1	71.3 mg/L As (Spring 1999)
SHL-10	Group 2	NA
SHM-93-10C	Group 1	None
SHL-11	Group 2	NA
SHL-19	Group 2	NA
SHL-20	Group 2	NA
SHL-22	Group 1	None
SHM-96-22B	Group 2	NA
SHM-93-22C	Group 1	51.1 mg/L As (Fall 1998)

NA – Not Applicable

TABLE 7-1
Groundwater Sample Analysis and Procedures

PARAMETERS	METHOD
Volatile Organic Compounds Xylenes Acetone 2-Butanone 2-Methyl-2-Pentanone Benzene Methyl-t-Butyl Ether 1,1-Dichloroethane 1,2-Dichloroethene (total) 1,2-Dichloroethane 1,2-Dichlorobenzene 1,3-Dichlorobenzene 1,4-Dichlorobenzene	U.S. Environmental Protection Agency (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 335.4 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 Total Organic Carbon	 USEPA 130.2 (spring 2001), USEPA 2340B (fall 2001) USEPA 160.1 USEPA 160.2 USEPA 300.0 USEPA 300.0 USEPA 300.0 USEPA 310.1 USEPA 405.1 USEPA 410.1 USEPA 9060
General Parameters (field determination) pH Temperature Specific Conductance Dissolved Oxygen Oxygen Reduction Potential Turbidity	

TABLE 7-2
Groundwater Analytical Results - May 14 & 15, 2001 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
	GOAL (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	2.9 J	<5.0	<5.0	<5.0	<5.0	<5.0	2.3 J	<5.0	4.1 J	<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	1.1 J	1.1 J	1.6 J	<5.0	<5.0	<5.0	2.0 J	<5.0	<5.0	<5.0	1.7 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.5 J	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.8 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.1 J	2.1 J	<5.0
1,2-Dichloroethene (total)	70 (2)	<5.0	<5.0	<5.0	2.6 J	2.6 J	2.7 J	<5.0	<5.0	<5.0	2.0 J	<5.0	1.6 J	2.6 J	2.9 J	<5.0
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	<5.0	<5.0	<5.0	<5.0	<5.0	2.4 J	<5.0	3.1 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)																
Aluminum	6,870	<98.5	<98.5	344	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5	<98.5
Arsenic	50	<4.1	**50.8**	13.8	**3,800**	**3,900**	**80.5**	15.1	<4.1	6.9	**487**	**129**	**186**	47.6	**1,540**	19.7
Barium	2,000 (2)	<3.6	61.5	9.6	57.8	59.0	62.8	15.6	4.3	7.2	102	8.3	99.5	13.4	96.8	70.0
Cadmium	5 (2)	0.32	0.81	0.40	0.80	0.79	1.5	0.71	0.42	0.23	1.4	0.44	0.43	0.67	1.5	0.46
Chromium	100	2.0	2.2	1.6	6.2	5.9	3.6	1.6	<1.4	<1.4	2.0	1.7	3.6	1.5	1.4	2.5
Copper	1,300 (3)	<11.0	<11.0	<11.0	<11.0 J	42.8 J	19.3	<11.0	<11.0	<11.0	13.4	<11.0	<11.0	<11.0	16.5	<11.0
Iron	9,100	<61.8	5,960	2,640	**36,700**	**37,600**	**77,500**	4,630	<61.8	<61.8	**73,600**	**12,500**	**9,600**	612	**92,700**	430
Lead	15	<1.3	<1.3	<1.3	2.1	1.5	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	<1.3	1.3	1.6	<1.3
Manganese	1,715	<3.9	1,680	400	**10,800**	**11,000**	**4,700**	444	<3.9	41.1	**2,460**	1,590	**7,840**	1,040	**2,780**	376
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	<7.5	8.8	<7.5	16.7	15.2	<7.5	<7.5	<7.5	<7.5	<7.5	<7.5	11.8	<7.5	<7.5	<7.5
Selenium	50 (2)	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9	<3.9
Silver	40 (4)	<2.4	<2.4	<2.4	2.6	2.4	3.9	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Sodium	20,000	1,540	5,300	2,280	**39,600**	**39,800**	**34,100**	2,310	<1540	8,530	**35,300**	<1540	**42,700**	**48,200**	**43,200**	18,200
Zinc	2,000 (4)	<3.4	8.0	4.9	10.7	12.9	15.3	6.6	<3.4	<3.4	<3.5	7.3	4.8	16.1	18.0	5.8
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	20,000	52,000	30,000	360,000	376,000	376,000	65,000	21,000	15,000	256,000	83,000	380,000	460,000	404,000	188,000
Biochemical Oxygen Demand	-	<2,000 J	<2,000 J	<2,000	<2,000	<2,000	<2,000	<2,000	<2,000 J	<2,000 J	<2,000 J	<2,000 J	<2,000 J	<2,000	<2,000	<2,000
Chloride	-	800	8,100	1,900	49,000	45,600	48,000	2,500	1,100	29,800	41,700	1,200	52,600	59,000	53,100	25,200
Chemical Oxygen Demand	-	16,000 N	8,000 N	16,000 N	<5,000 N	20,000 N	22,000 N	12,000 N	18,000 N	10,000 N	83,000 N	<5,000 N	30,000 N	10,000 N	30,000 N	10,000 N
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	-	18,000 *	82,000 *	34,000 *	90,000 *	144,000 *	300,000 *	76,000 *	20,000 *	232,000 *	184,000 *	28,000 *	20,000 *	472,000 *	150,000 *	196,000 *
Nitrate as Nitrogen	10,000 (2)	210	<200	<200	<200	<200	<200	<200	<200	<200	<200	200	<200	<200	<200	<200
Sulfate	500,000 (2)	3,100	8,200	2,100	4,600	4,700	3,100	8,400	2,600	19,500	620	9,400	9,400	4,200	2,600	12,700
Total Dissolved Solids	-	23,000 B	116,000	60,000	467,000	466,000	434,000	107,000	23,000 B	305,000	401,000	39,000	485,000	551,000	470,000	265,000
Total Suspended Solids	-	500 *	8,300 *	112,000 *	44,100 *	40,400 *	15,500 *	16,300 *	500 *	800 *	39,400 *	17,500 *	19,100 *	3,200 *	116,000 *	1,900 *
Total Organic Carbon	-	<1,000	1,700	8,200	6,700	7,200	8,900	6,500	<1,000	<1,000	5,400	<1,000	3,700	4,900	7,800	4,900
FIELD PARAMETERS																
Dissolved Oxygen (mg/L)	-	11.79	0.18	0.19	0.43	NA	1.12	0.21	11.22	1.29	0.24	0.45	0.23	0.55	0.63	0.39
Oxidation Reduction Potential (mV)	-	215.5	74.1	69.4	-92.5	NA	-64.3	7.2	227.0	143.3	-76.4	-20.6	-18.8	-37.3	-132.0	-130.2

Notes:

Shaded areas with bold numbers indicate cleanup goal exceedance. - **25**

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

NA = Not analyzed

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

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

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

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

Table 7-3
Groundwater Analytical Results - October 29 & 30, 2001 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 (8260B)																
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	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.8 JN	<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	1.3 J	<5.0	<5.0	<5.0	1.2 J	<5.0	<5.0	<5.0	1.9 J	<5.0	<5.0	<5.0	1.1 J	<5.0
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	1.2 J	<5.0	<5.0
1,1-Dichloroethane	70 (4)	<5.0	<5.0	<5.0	1.8 J	1.8 J	1.7 J	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	2.0 J	1.4 J	1.4 J
1,2-Dichloroethene (total)	70 (2)	<5.0	1.6 J	<5.0	2.6 J	2.4 J	2.6 J	<5.0	<5.0	<5.0	1.3 J	<5.0	1.5 J	2.4 J	2.0 J	1.0 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	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<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 (6010B or as noted)																
Aluminum	6,870	<7.7	52.8	307	<7.7	<7.7	<7.7	49.8	<7.7	128	<7.7	<7.7	<7.7	<7.7	<7.7	8.1
Arsenic	50	<1.5	**66.0**	14.8	**1,650**	**1,830**	41.1	28.1	<1.5	10.1	**573**	**183**	**165**	44.2	**1,670**	31.6
Barium	2,000 (2)	<9.0	91.8	13.8	44.6	45.1	52.7	14.0	<9.0	<9.0	104	23.2	102	11.7	96.5	74.8
Cadmium	5 (2)	<0.20	<0.20	<0.20	<0.20	<0.20	0.51	<0.20	<0.20	<0.20	1.0	0.35	<0.20	<0.20	1.3	<0.20
Chromium	100	1.3	<0.70	<0.70	1.6 *	2.0 *	<0.70	<0.70	1.1	2.0	<0.70	0.86	1.2	<0.70	<0.70	<0.70
Copper	1,300 (3)	3.1	1.1	<1.0	<1.0 *	4.2 *	1.2	<1.0	<1.0	<1.0	<1.0	1.5	<1.0	3.8	2.2	27.4
Iron	9,100	111	**11,100**	4,570	**18,000**	**17,800**	**43,900**	8,120	<15.7	161	**76,400**	**31,200**	8,710	618	**82,200**	753
Lead	15	0.72	1.2	<0.60	3.1 *	2.1 *	2.5	<0.60	<0.60	1.4	3.1	2.0	1.9	2.0	3.1	1.5
Manganese	1,715	<1.4	824	349	**12,900**	**12,900**	**4,320**	412	1.5	39.7	**2,880**	**4,100**	**7,720**	1,220	**1,960**	444
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	<2.0	12.2	3.0	13.0	13.5	4.4	<2.0	<2.0	4.9	<2.0	9.0	12.4	8.5	7.7	<2.0
Selenium	50 (2)	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	1.7	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2
Silver	40 (4)	<1.5	<1.5	<1.5	3.3 *	2.4 *	<1.5	<1.5	<1.5	<1.5	<1.5	<1.5	2.7	<1.5	<1.5	<1.5
Sodium	20,000	1,960	17,200	2,660	**38,600**	**38,200**	**34,300**	2,550	1,520	8,880	**33,500**	3,680	**41,000**	**45,600**	**40,300**	**20,700**
Zinc	2,000 (4)	<0.90	4.1	3.2	2.7	2.8	1.3	<0.90	<0.90	<0.90	<0.90	4.7	0.94	13.4	5.6	<0.90
GENERAL CHEMISTRY																
Alkalinity as $CaCO_3$	-	21,000	144,000	42,000	372,000	376,000	312,000	72,000	26,000	192,000	276,000	100,000	364,000	452,000	320,000	228,000
Biochemical Oxygen $Demand_5$	-	<1,300 H	<1,300 H	1,600	<1,300	<1,300	<1,300	<1,300	<1,300 H	<1,300 H	<1,300 H	<1,300 H	<1,300	<1,300	<1,300	1,900
Chloride	-	1,000	29,000	1,700	50,000	49,800	53,100	2,200	1,200	32,100	<200	3,100	50,700	58,000	48,400	34,300
Chemical Oxygen Demand	-	19,800 B	17,800 B	40,000 B	24,000 B*	30,000 B*	34,000 B	72,000 B	9,900 B	11900 B	33,600 B	15,800 B	18,000 B	22,000 B	43,500 B	30,000 B
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 as $CaCO_3$	-	25,900	142,000	37,000	330,000	329,000	252,000	72,100	26,400	235,000	183,000	63,100	340,000	429,000	249,000	259,000
Nitrate as Nitrogen	10,000 (2)	420	590	<200	<200	<200	<200	<200	240	<200	200	<200	<200	<200	220	<200
Sulfate	500,000 (2)	7,200	9,800	2,500	6,200	6,300	5,500	8,200	2,500	20,200	<200	15,800	10,100	4,700	2,200	14,300
Total Dissolved Solids	-	47,000	216,000	70,000	480,000	490,000	367,000	105,000	34,000 B	295,000	360,000	131,000	487,000	550,000	412,000	319,000
Total Suspended Solids	-	500 B	7,700	4,100	34,400	34,600	46,800	800 B	<500	5,000	57,600	NA	13,200	1,800 B	110,000	2,300 B
Total Organic Carbon	-	<1,000	2,800 B	10,100	6,900 B*	5,000 B*	6,400 B	8,200	<1,000	1,400 B	4,500 B	1,500 B	5,600 B	5,000 B	8,300	4,100 B
FIELD PARAMETERS																
Dissolved Oxygen (mg/L)	-	8.13	0.36	0.25	0.14	0.14	0.15	1.18	8.71	1.25	0.26	0.51	0.19	0.86	0.83	1.09
Oxidation Reduction Potential (mv)	-	323.7	28.6	18.1	-73.2	-73.2	-49.8	-91.8	344.7	57.1	-92.5	-31.9	-36.9	-51.4	-189.9	-173.2

Notes:

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

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

H = Holding time exceeded

NA = Not Analyzed

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

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

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

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

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	May-01	Oct-01
SHL-3	35	**120**	6.5	NS	NS	<10	<10	<5	<5.4	2.7 B	<1.9	<2.5	17.4	<4.1	<1.5
SHL-4	**260**	**140**	2.54	NS	48.8	**73.6 J**	**180**	37.4	**89.1**	**78.2**	**61.3**	**116**	**91.5**	**50.8**	**66.0**
SHL-5	23	38	11.4	NS	12	<10	<10	<5	11.5	5.0 B	6.5	<2.5	13.8	13.8	14.8
SHM-96-5B	NS	NS	NS	NS	**1,440**	**3,300 J**	**2,040**	**4,300**	**3,080**	**3,490**	**2,700**	**5,110**	**2,500**	**3,800**	**1,850**
SHM-96-5C	NS	NS	NS	NS	**71**	43.2	43.1	49.5	46.8	**57.0**	44.8	**52.2**	40.3	**80.5**	41.1
SHL-9	37	**67**	42.4	NS	46.9	16.1 J	25.2	15	27.2	**71.3**	28.5	15.0	31.4	15.1	28.1
SHL-10	**67**	**120**	**280**	NS	3.4 B	<10	**209**	<5	<5.4	2.7 B	<1.9	<2.5	<4.2	<4.1	<1.5
SHM-93-10C	NS	NS	21.3	18.1	12.4	<10	10.5	7.5	10.2	10.8 B	8.7	5.9 J	8.8	6.9	10.1
SHL-11	**320**	**320**	**340**	NS	**332**	**252 J**	**366**	**346**	**376**	**431**	**492**	**404**	**523**	**487**	**573**
SHL-19	**340**	**710**	**390**	NS	**138**	<10	**298**	**77.5**	**145**	**156**	**176**	41.4	**154**	**129**	**183**
SHL-20	**98**	**89**	**330**	NS	**244**	<10	**227**	**238**	**218**	**216**	**215**	**216**	**172**	**186**	**165**
SHL-22	27	25	32.9	NS	24.8	<10	34.8	10.6	<5.4	12.2 B	7.3	14.6	45	47.6	44.2
SHM-96-22B	NS	NS	NS	NS	**324**	**318 J**	**352**	**365**	**406**	**707**	**1,440**	**1,360**	**1,180**	**1,540**	**1,670**
SHM-93-22C	NS	NS	**68.9**	49.8	44.6	40.4	<10	31.6	**51.1**	42.8	33.2	34.4	47.8	19.7	31.6

Notes:

J: Estimated value
B: Value within five times of the amount detected in the equipment blank sample
NS: Not sampled
Bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 *u* g/L)

Table 7-5
Groundwater Analytical Results - October 30, 2001
Well SHM-96-22B, Varying Depth
Shepley's Hill Landfill
Devens, Massachusetts

PARAMETERS	Well No. CLEANUP LEVEL (1)	SHM-96-22B mid-screen sample at 142.3-ft NGVD	SHM-96-22B near-bottom sample at 128.6-ft NGVD
	ug/L	ug/L	ug/L
VOLATILES (8260B)			
Xylenes	10,000 (2)	<5.0	<5.0
Acetone	3,000 (4)	1.8 JN	<5.0
2-Butanone	-	<5.0	<5.0
4-Methyl-2-Pentanone	-	<5.0	<5.0
Benzene	5 (2)	1.1 J	1.2 J
Methyl-t-Butyl Ether	70 (4)	<5.0	<5.0
1,1-Dichloroethane	70 (4)	1.4 J	1.9 J
1,2-Dichloroethene (total)	70 (2)	2.0 J	2.7 J
1,2-Dichloroethane	5	<5.0	<5.0
1,3-Dichlorobenzene	600 (2)	<5.0	<5.0
1,4-Dichlorobenzene	5	<5.0	<5.0
1,2-Dichlorobenzene	600	<5.0	<5.0
METALS (6010B or as noted)			
Aluminum	6,870	<7.7	<7.7
Arsenic	50	**1,670**	**1,240**
Barium	2,000 (2)	96.5	91.0
Cadmium	5 (2)	1.3	0.91
Chromium	100	<0.70	<0.70
Copper	1,300 (3)	2.2	2.1
Iron	9,100	**82,200**	**70,600**
Lead	15	3.1	3.0
Manganese	1,715	**1,960**	**3,730**
Mercury (7470A)	2 (2)	<0.10	<0.10
Nickel	100	7.7	7.2
Selenium	50 (2)	<1.2	<1.2
Silver	40 (4)	<1.5	<1.5
Sodium	20,000	**40,300**	**40,900**
Zinc	2,000 (4)	5.6	6.4
GENERAL CHEMISTRY			
Alkalinity as $CaCO_3$	-	320,000	348,000
Biochemical Oxygen $Demand_5$	-	<1,300	<1,300
Chloride	-	48,400	51,100
Chemical Oxygen Demand	-	43,500 B	83,000 B
Cyanide (Total)	200 (2)	<10.0	<10.0
Hardness as $CaCO_3$	-	249,000	285,000
Nitrate as Nitrogen	10,000 (2)	220	<200
Sulfate	500,000 (2)	2,200	2,400
Total Dissolved Solids	-	412,000	449,000
Total Suspended Solids	-	110,000	93,200
Total Organic Carbon	-	8,300	8,900
FIELD PARAMETERS			
Dissolved Oxygen (mg/L)	-	0.83	0.66
Oxidation Reduction Potential (mv)	-	-189.9	-176.6
pH	-	6.96	6.90
Specific Conductivity (uS/cm)	-	901	935
Temperature (° C)	-	10.4	10.5
Turbidity (NTU)	-	23.4	9.0

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

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

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

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

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

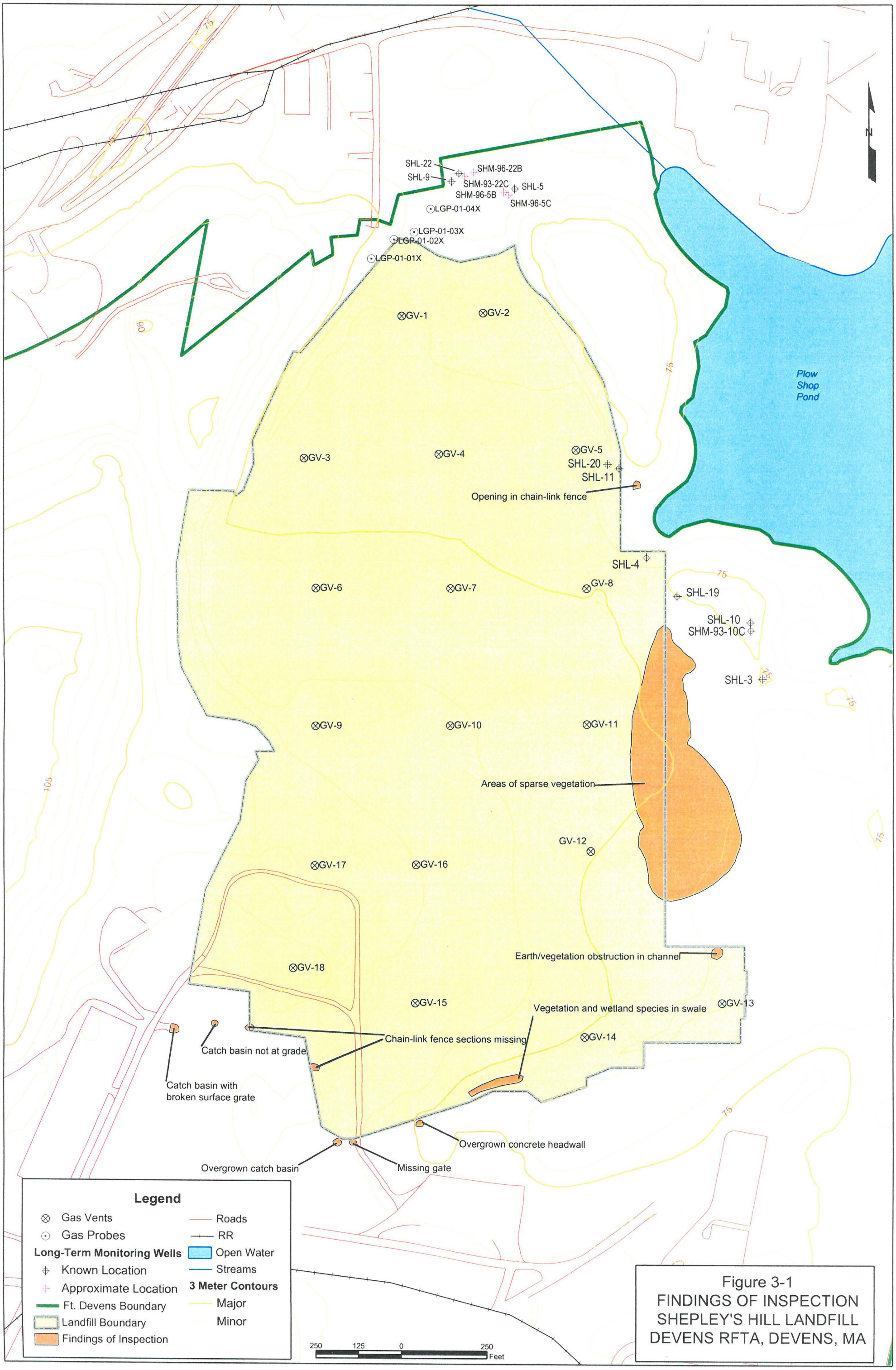
TABLE 8-1
Sample Preparation and Analysis Methods,
Containers, Holding Times, and Preservatives

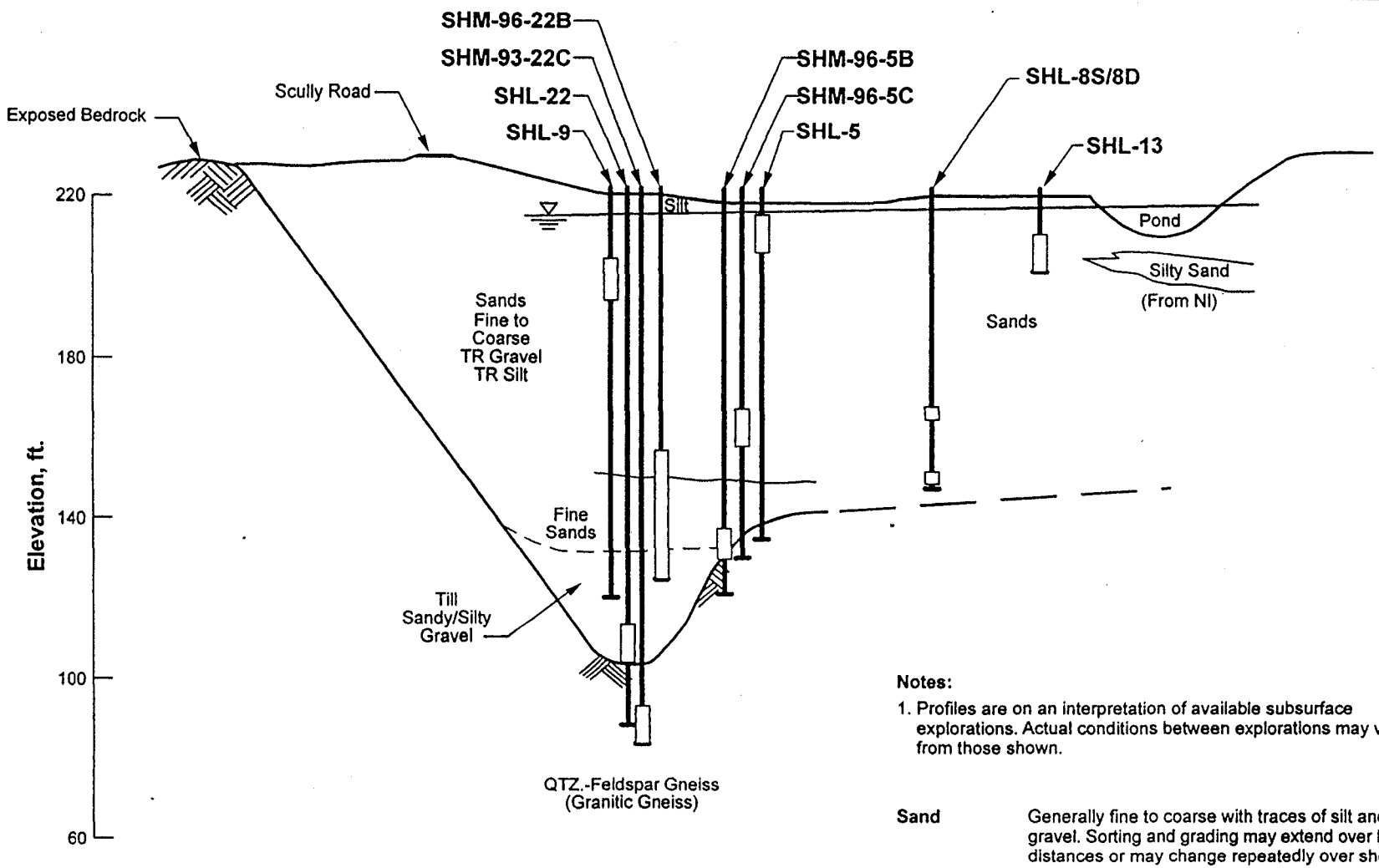
Parameter	Prepa-ration Method[1]	Analysis Method[1]	Sample Container[2]	Minimum Volume	Preservative	Holding Time (VTS)[3]
VOCs	5030B	8260B	3 X 40 mL vials with Teflon septa screw caps [4]	40 mL	HCl to pH <2 (No Headspace) 4°+/- 2°C	14 days
Metals [5]	3010A	6010B - Trace ICAP or 7000 series	1-Liter HDPE	300 mL	HNO_3 to pH < 2	180 days (except Hg) 28 days (Hg)
Hardness [6]	NA	130.2/ SM2340B		100 mL		180 days
Cyanide	NA	9010	500-mL HDPE	500 mL	NaOH to pH > 12, 4°+/- 2°C	14 days
Anions [7]	NA	300	500-mL HDPE	100 mL	4°+/- 2°C	48 hours for ortho-Phosphate and Nitrate; 28 days for Sulfate and Chloride
Alkalinity	NA	310.1		100 mL		14 days
TDS	NA	160.1		100 mL		48 hours
COD	NA	410.1	250-mL HDPE	250 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days
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
TOC	NA	9060	3 X 40 mL vials with Teflon septa screw caps[4]	40 mL	H_2SO_4 to pH < 2, 4°+/- 2°C	28 days

1 "Methods for Chemical Analysis of Water and Wastes", Cincinnati, OH, March 1979, EPA 600-4-79-020. "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", U.S. EPA SW-846, 3rd Edition.
2 Additional sample containers/volume 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 Method 130.2 used Spring 2001, Method SM2340B used Fall 2001. Change in method was made to eliminate the interference to determining Hardness by Method 130.2 from other heavy metal ions.
7 Anions include Nitrate, Sulfate, Orthophosphate and Chloride.

NA = Not Applicable Hg = Mercury

FIGURES


SHL-22
SHL-9
SHM-96-22B
SHM-93-22C
SHL-5
SHM-96-5B
SHM-96-5C
LGP-01-04X
LGP-01-03X
LGP-01-02X
LGP-01-01X
GV-1
GV-2
GV-3
GV-4
GV-5
SHL-20
SHL-11
Opening in chain-link fence
Plow Shop Pond
SHL-4
GV-6
GV-7
GV-8
SHL-19
SHL-10
SHM-93-10C
SHL-3
GV-9
GV-10
GV-11
Areas of sparse vegetation
GV-12
GV-17
GV-16
GV-18
GV-15
GV-13
GV-14
Earth/vegetation obstruction in channel
Vegetation and wetland species in swale
Chain-link fence sections missing
Catch basin not at grade
Catch basin with broken surface grate
Overgrown concrete headwall
Overgrown catch basin
Missing gate
Legend
Gas Vents
Gas Probes
Long-Term Monitoring Wells
Known Location
Approximate Location
Ft. Devens Boundary
Landfill Boundary
Findings of Inspection
Roads
RR
Open Water
Streams
3 Meter Contours
Major
Minor
250 125 0 250
Feet
Figure 3-1
FINDINGS OF INSPECTION
SHEPLEY'S HILL LANDFILL
DEVENS RFTA, DEVENS, MA

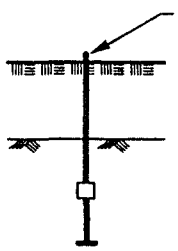


Notes:

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.

Legend



Scale in feet

0 200 400

Vertical Exaggeration 5:1

Harding Lawson Associates
Engineering and
Environmental Services

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

FIGURE
5-1

DRAWN:	JOB NUMBER:	FILE NUMBER:	APPROVED:	DATE:	REVISED DATE:
BGF	09938-02	W9903003(b)		03/99	07/12/00

J:\993B-02\SG\45227010.DWG 5/25/00 RDC

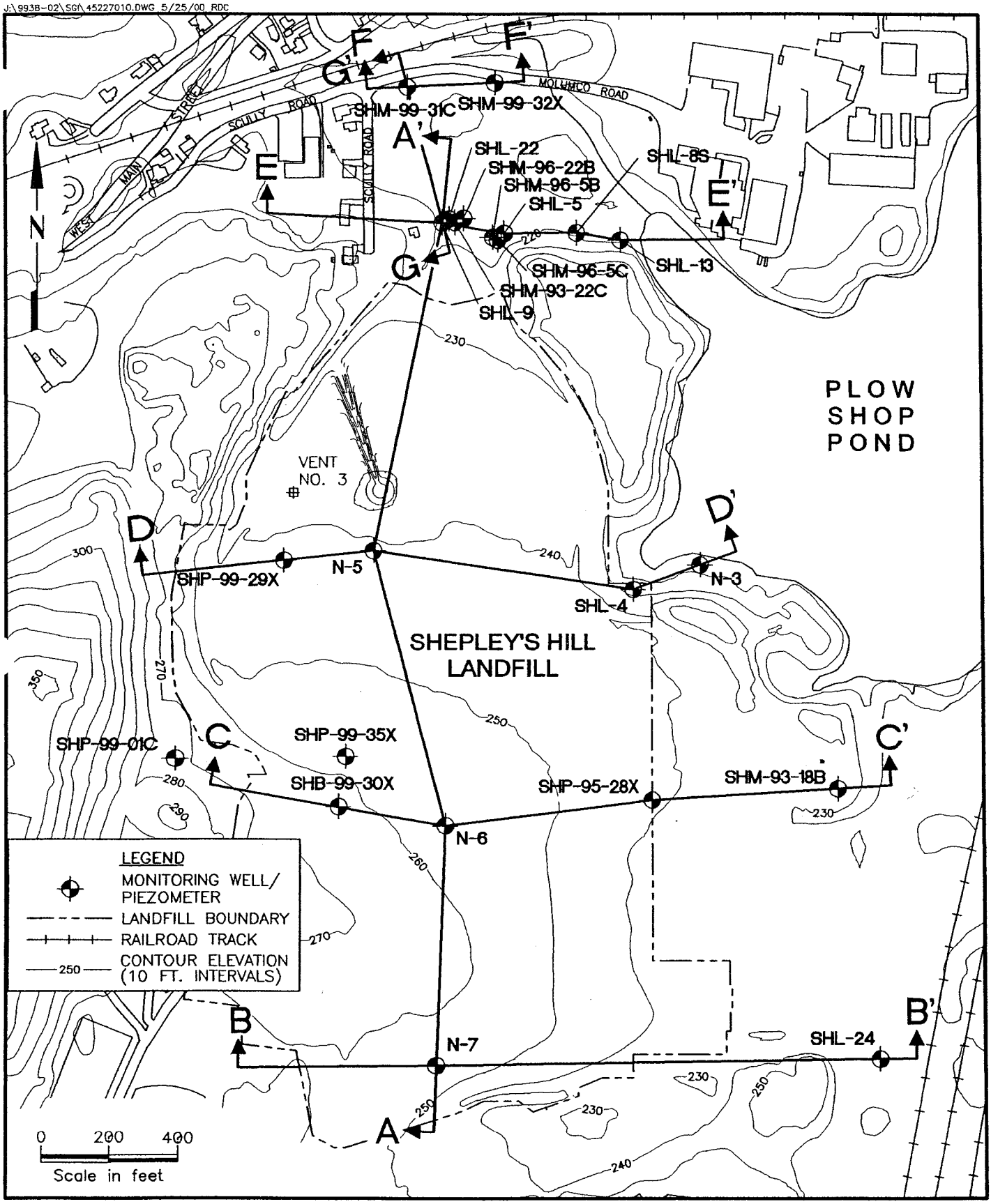


FIGURE 5-2

LOCATION OF GEOLOGIC CROSS-SECTIONS
SHEPLEY'S HILL LANDFILL SUPPLEMENTAL
GROUNDWATER INVESTIGATION
DEVENS RFTA, DEVENS, MA

Harding Lawson Associates
Engineering and
Environmental Services

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

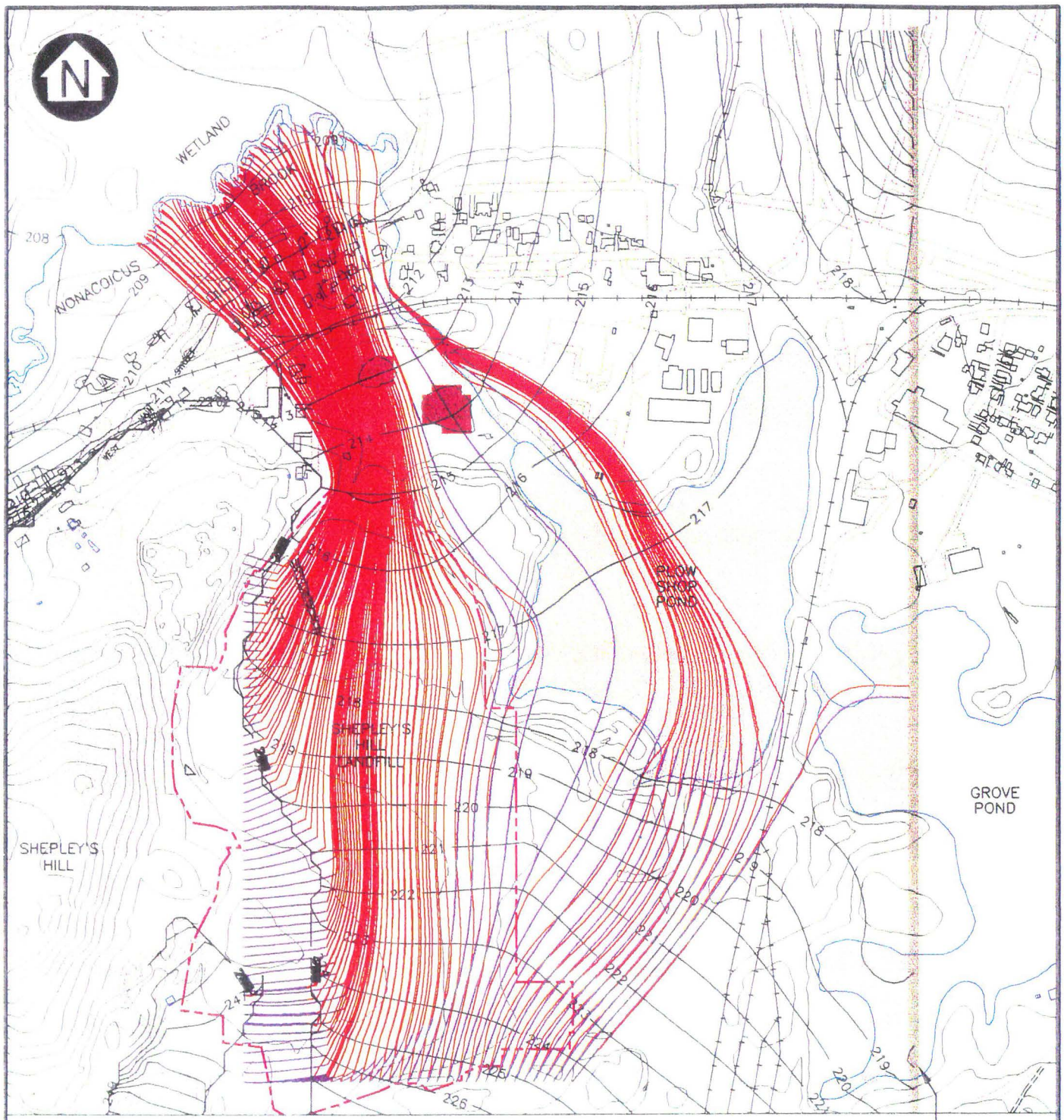


FIGURE 6-1

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

Harding Lawson Associates

9938-02 SGI 45227008.DWG 5/25/00 RDC

APPENDIX A

LANDFILL MAINTENANCE CHECKLIST

APPENDIX A
Landfill Maintenance Checklist

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

DATE: 5 December 2001
INSPECTOR: Jonathan Kullberg & Scott Michalak ORGANIZATION: U.S Army Corps of Engineers, New England District

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Cover Surface	1. Vegetative cover is generally satisfactory except as noted in the comments that follow. Various species growing; mowed to about 8 inches height.	1. See specific comments under the sections that follow.	SAT
	2. There are several areas where possible settlement is occurring.	2. Survey and compare to original.	SAT
	3. Trees have been removed from the vicinity of GV-13, the southern perimeter, and the eastern perimeter	3. Monitor for tree growth in future	SAT
Vegetative Growth	1. In the vicinity of gas vents 8, 11 and 12, the perimeter of the cap has some areas of sparse/eroded vegetation. The soil in the bare areas is mostly sand and is eroded in some areas. The area should be graded to fill in the eroded areas and topsoil should be placed to a depth of 6 inches over the sand to allow grass to grow. The grass should cover areas at least twenty feet beyond the limits of the cap.	1. This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion.	UNSAT
Landfill Gas Vent Wells	1. The gas vents are in good condition. All screens and pipes are in functional condition and no repairs are required at this time.	1. None	SAT

LANDFILL ATTRIBUTE	OBSERVATIONS	RECOMMENDATIONS	SAT/ UNSAT
Drainage Swales	1. Most of the drainage swale on the south side is being invaded by vegetation/wetland species. There are also intermittent zones of standing water indicating a lack of proper channel slope and drainage.	1. The south side drainage swale should be cleared of 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 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
Culverts	1. The concrete drainage structure at the terminus of the catch basin and underground conduit system on the south side is overgrown with vegetation and is silting in. Standing water is present and wetland species are becoming established as well.	1. The structure and channel immediately downstream should be cleaned out and the channel regraded as required to properly drain.	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.	3. This catch basin should be cleared of encroaching vegetation.	UNSAT

Settlement	1. It appears that many areas of the landfill may be settling. The extent and its effect on the function of the landfill is unknown	1. A topographic 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. No substantial erosion observed. Areas along the east side perimeter in the vicinity of GV-8, 11 & 12 have sparse vegetation.	1. Reseed perimeter of cap and establish vegetative cover at least 20 feet beyond cap limits. Continue monitoring east perimeter of cap for advancing erosion in sandy areas	SAT
Access Roads	1. The access roads on the site are in good condition.	1. There are no problems on access roads which warrant repair at this time.	SAT
Security Fencing	1. The perimeter chain-link security fence is in poor condition. Fence sections and gates are missing and unrestricted access to the site is available at many locations. Some evidence of off-road vehicles (ATV's, dirt bikes, etc.) using the turfed cap area was seen.	1. The security fence should be repaired, 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;

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

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

(2) Conduct topographic survey of entire landfill and compare to original topo survey. Determine if corrective action required for historic ponding areas due to settlement or disturbance of drainage system.

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

GROUNDWATER FIELD ANALYSIS FORMS

GWM WELL # SHL-3

SCREEN INTERVAL DEPTH: ~~25.1-35.1 ft~~ ~~11.8-33.5 ft~~ WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 30.80 ft

DEPTH, POST PUMP INSERTION 30.75 ft

DEPTH SAMPLED: 32.5 ft REFERENCE POINT: PVC OR (CASING) 248.5 NGVD

(DEPTHS RECORDED BENEATH)

DATE: 29 Oct 01 TIME: 0820

SAMPLED BY: JK NM KM (DL) PY SIGNATURE: David Lydon

RECORDED BY: JK NM KM (DL) PY SIGNATURE: David Lydon

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H2O TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
0855	31.16	119.1	400	0.75 gal	13.38	60.00	~~6~~.47	341.5	8.37	4.81	clear
0900	31.16	119.2	400	1.25 gal	15.54	60.00	6.42	3~~0~~.3	8.18	2.43	
0905	31.09	119.5	300	1.5 gal	16.90	62.00	6.40	340	8.08	1.84	
0910											Lost flow
0915	31.42	119.5	600	2.5 gal	19.11	60.00	6.43	332.7	8.39	2.43	
0920	31.40	119.5	600	2.75 gal	17.37	63.00	6.38	33~~6~~.4	~~8~~.10	0.80	
0925	31.27	119.5	500	3.0 gal	16.84	63.00	6.37	339.2	8.07	0.79	
0930	31.05	119.5	300	3.25 gal	16.70	64.80	6.37	339.9	8.05	0.52	Lost flow
0942	31.05	125.1	300	4.0 gal	18.60	62.00	6.38	328.7	8.16	1.57	~~20. Surged~~
0947	31.27	120.6	500	4.25 gal	19.21	62.00	6.35	316.1	8.16	1.80	back flushing
0950	31.13	120.6	300	4.5 gal	19.91	63.00	6.36	313.3	8.03	1.63	
0953	30.91	120.6	200	4.75 gal	19.93	64.00	6.37	319.1	7.99	1.92	back flushing
~~1000~~ 0957	31.19	120.6	375	5.00 gal	18.99	64.00	6.39	32~~2~~.5	8.09	1.67	
1003	31.43	120.6	500	5.25 gal	20.21	64.00	6.37	317.1	7.97	2.10	
1004	31.45	120.6	525	6.0 gal	19.75	64.0	6.36	318.1	8.02	1.85	
1007	31.40	120.6	600	6.25 gal	17.28	65.00	6.36	323.7	8.13	1.27	

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

SAMPLE TAKEN AT: 1010 wetted screen volume = $\pi(\frac{1}{12}')^2(35.1'-30.80')(7.48 gal/ft^3) = 0.7$ gal

~~* well is apparently silting in - original screen/well depth was to 41.8 ft~~

YSI # 175 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM WELL # SHL-4

SCREEN INTERVAL DEPTH: 5'7" - 15'7" WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 10.68

DEPTH, POST PUMP INSERTION ~ 10.81

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

DATE: 27 Oct 2021 TIME: 1410 (DEPTHS RECORDED BENEATH) 228.7 MSVD

SAMPLED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNally

RECORDED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNally

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H2O TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1428	10.81	73.0	150		14.37	451	6.26	9.8	2.40	136.1	beige color -
1433	10.80	73.8	400		14.91	451	6.28	14.2	2.46	41.6	
1436	10.80	74.1	400		15.86	450	6.13*	20.6	1.66	29.8	
1440	10.80	74.1	400		15.74	452	6.13	22.2	1.43	18.5	
1443	10.80	74.1	400	1 gal	15.59	443	6.12*	27.2	1.03	11.6	
1446	10.80	74.1	400		15.46	442	6.10	28.7	0.91	10.4	
1450	10.81	74.1	400		15.33	439	6.09*	29.3	0.82	8.1	
1453	10.81	74.1	400	2 gal	15.30	433	6.10*	28.7	0.76	5.4	
1456	10.80	74.1	450		15.07	432	6.11	28.6	0.65	4.9	
1500	10.80	74.1	450	3 gal	15.15	430	6.12	25.1	0.63	4.9	
1503	10.81	74.1	450		15.12	421	6.14*	23.4	0.57	3.2	
1506	10.81	74.1	450		15.09	421.0	6.13*	25.5	0.55	2.7	
1509	10.81	74.1	450	4 gal	15.09	419	6.14*	27.9	0.48	2.3	
1512	10.80	74.1	450		15.07	417	6.15*	24.6	0.42	2.0	
1515	10.80	74.1	450		15.04	416	6.15*	25.4	0.40	1.8	
1518	10.80	74.1	450	5 gal	15.01	414	6.16	23.9	0.41	1.76	
1521	10.80	74.1	450		14.95	413	6.16	25.3	0.39	1.9	
1524	10.80	74.1	450		14.99	410	6.15	28.6	0.36	1.8	

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

SAMPLE TAKEN AT: 1530

wetted screen volume = $\pi(\frac{1}{12}')^2(15.7' - 10.68')(7.481\ gal/ft^3) = 0.8\ gal$

* pH fluctuating wildly from 5.90 - 7.14

YSI # 0055 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-5

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 5.53

DEPTH, POST PUMP INSERTION ~~10~~ 5.58

DEPTH SAMPLED: 10'

DATE: 30 Oct 2001 TIME: 1025

SAMPLED BY: JK (NM) KM DL PY SIGNATURE: Nancy Moriarty

RECORDED BY: JK (NM) KM DL PY SIGNATURE: Nancy Moriarty

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 218.53 NGVD

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml glass vials (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions, Alkalinity, TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass vials

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
1038	5.71	57.6	300		12.54	101.0	5.97	30.7	1.17	6.14	
1042	5.79	57.6	300		13.47	100.0	5.93	27.7	0.41	2.96	
1046	5.75	59.2	400		14.46	101.0	5.94	26.8	0.49	2.28	
1050	5.85	59.1	400	1gal	15.11	101.0	5.93	24.9	0.32	1.81	
1053	5.84	59.2	400		15.06	101.0	5.92	24.4	0.24	1.48	
1056	5.80	59.1	200		15.30	101.0	5.92	20.4	0.27	1.32	
1059	5.78	59.1	100		15.24	101.0	5.92	19.5	0.27	1.49	
1103	5.70	60.7	100	2gal	15.15	101.0	5.91	18.1	0.25	1.37	

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

SAMPLE TAKEN AT: 1114 wetted screen volume = $\pi(\frac{1}{12}')^2(15.1' - 5.53')(7.481\ gal/ft^3) = 1.6\ gal$

YSI # 0134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-5B

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.74'

DEPTH, POST PUMP INSERTION 6.72'

DEPTH SAMPLED: 85 REFERENCE POINT: (PVC) OR CASING

DATE: 30 Oct 2001 TIME: 1404 (DEPTHS RECORDED BENEATH) 319.81 NGVD

SAMPLED BY: JK NM KM DL PY SIGNATURE: Nancy McNally

RECORDED BY: JK NM KM DL PY SIGNATURE: Nancy McNally

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

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
1426	6.72	73.3	1100		10.74	631	6.67	-38.1	3.41	1.70	
1430	7.84	63.2	600	>1gal	10.96	828	6.59	-60.6	0.40	1.00	
1433	7.50	63.2	600	2gal.	11.2	833	6.61	-63.1	0.39	0.69	
1436	7.41	64.5	800		11.26	835	6.62	-64.8	0.37	1.91	
1439	7.50	64.7	850	>3gal	11.20	833	6.63	-66.7	0.26	1.65	
1442	7.54	64.0	900	4gal	11.22	834	6.64	-68.3	0.22	1.10	
1445	7.49	64.0	800	5gal	11.23	836	6.64	-69.4	0.21	0.72	
1449	7.49	64.0	806		11.24	837	6.64	-70.2	0.19	1.00	
1452	7.49	64.0	800	6gal	11.23	833	6.65	-70.9	0.16	1.02	
1455	7.49	64.0	800		11.23	834	6.65	-71.2	0.16	0.96	
1458	7.50	64.0	800	7gal	11.22	836	6.65	-71.9	0.15	0.99	
1501	7.50	64.0	800		11.22	837	6.66	-73.2	0.14	0.95	

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

SAMPLE TAKEN AT: ISD wetted screen volume = $\pi(\frac{3}{12}')^2(91.3' - 81.3')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 0134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

SHM-96-5C

GWM WELL # ~~SHL~~ - 5C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.19

DEPTH, POST PUMP INSERTION 6.2'

DEPTH SAMPLED: 55' REFERENCE POINT: (PVC) OR CASING

DATE: 30 Oct 2001 TIME: 1150 (DEPTHS RECORDED BENEATH) 219.25 NGVD

SAMPLED BY: JK (NM) KM DL PY SIGNATURE: Monagh Morrell

RECORDED BY: JK (NM) KM DL PY SIGNATURE: Monagh Morrell

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

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
1212	6.2	58.7	350		11.63	490	5.99	-15.8	1.85	1.55	
1216	6.25	58.9	325		10.98	759	6.32	-37.7	0.79	1.37	
1220	6.25	60.2	600		11.28	789	6.39	-40.9	0.62	1.19	
1223	6.27	60.2	600	1 gal	11.45	807	6.43	-46.5	0.31	1.21	
1226	6.27	60.2	575		11.37	812	6.44	-48.3	0.27	1.01	
1229	6.26	60.2	600	2 gal	11.36	817	6.45	-50.1	0.22	1.08	
1232	6.26	60.2	600		11.39	823	6.46	-52.2	0.18	1.06	
1235	6.26	60.2	600	3 gal	11.36	825	6.47	-53.2	0.20	0.87	
1238	6.27	60.2	600		11.31	825	6.48	-51.2	0.17	0.94	
1241	6.27	60.2	600		11.31	826	6.48	-50.6	0.16	0.81	
1244	6.27	60.2	600	4 gal	11.33	827	6.48	-49.8	0.15	0.77	

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

SAMPLE TAKEN AT: 1249 wetted screen volume = $\pi(3/12')^2(60.8' - 50.8')(7.481 gal/ft^3) = 6.5$ gal

YSI # 0134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-9

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 10.14'

DEPTH, POST PUMP INSERTION 10.14'

DEPTH SAMPLED: 20 ft REFERENCE POINT: (PVC) OR CASING

DATE: 10/30/01 TIME: 0750 (DEPTHS RECORDED BENEATH) 222.84 NGVD

SAMPLED BY: JK NM KM DL (PY) SIGNATURE: Paul Young

RECORDED BY: JK NM KM DL (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

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

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
0830	10.25	72.6	300		10.57	173	6.30	86.5	3.81	3.33	
0835	10.23	72.6	300		11.65	179	6.45	-40.7	3.10	1.23	
0840	10.23	72.6	300		12.48	183	6.53	-75.2	2.52	1.42	
0845	10.23	72.6	300	4.5 L	12.71	184	6.61	-82.1	2.20	1.43	
0850	10.23	72.6	300		12.79	185	6.62	-85.6	1.71	1.03	
0855	10.23	72.6	300		12.84	185	6.65	-88.5	1.56	1.04	
0900	10.23	72.6	300	9.0 L	12.96	185	6.65	-89.7	1.38	0.93	
0905	10.23	72.6	300		13.03	185	6.65	-90.9	1.30	0.92	
0910	10.23	72.6	300		13.06	184	6.72	-91.6	1.18	1.03	
0915	10.23	72.6	300		13.04	184	6.66	-91.8	1.18	1.04	

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

SAMPLE TAKEN AT: 0920 wetted screen volume = $\pi(\frac{1}{12}')^2(25.0' - 15.0')(28.32\,l/ft^3) = 6.2$ litres

YSI # 3/116 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

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

GWM WELL # SHL-10

SCREEN INTERVAL DEPTH: 17.8-37.6 ft WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 31.32 ft

DEPTH, POST PUMP INSERTION 31.32 ft

DEPTH SAMPLED: 34.5 ft REFERENCE POINT: PVC OR CASING

(DEPTHS RECORDED BENEATH) 248.76 NGVD

DATE: 29OCT01 TIME: 1120

SAMPLED BY: JK NM KM DL PY SIGNATURE:

RECORDED BY: JK NM KM DL PY SIGNATURE:

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml glass vials (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass vials

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
1152	31.40	122.1	600	1 gal	11.3	137.00	6.48	389.9	6.56	1.55	
1157	31.41	122.2	600	1.75	12.59	65.00	6.99	369.0	8.48	0.33	
1202	31.41	122.1	600	2.25	13.13	61.00	6.98	358.4	8.75	0.25	
1207	31.42	122.1	650	3.0	13.20	61.00	6.98	348.2	8.73	0.24	
1212	31.42	122.1	650	4.0	13.20	61.00	6.97	348.8	8.73	0.25	
1217	31.41	121.7	550	5.0	13.18	60.00	6.96	349.4	8.72	0.21	
1222	31.41	121.7	550	5.5	13.52	61.00	6.97	344.7	8.71	0.27	

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

SAMPLE TAKEN AT: 1225 wetted screen volume = $\pi (\frac{1}{12}')^2 (37.6' - 31.32')(7.481\ gal/ft^3) = 1.0\ gal$

YSI # 175 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-10C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 33.8 ft

DEPTH, POST PUMP INSERTION 33.32

DEPTH SAMPLED: 51 ft REFERENCE POINT: (PVC) OR CASING

DATE: 29 Oct 07 TIME: 0830 (DEPTHS RECORDED BENEATH) 248.42 NGVD

SAMPLED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNeil

RECORDED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNeil

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml glass vials (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions, Alkalinity, TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass vials

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
						3%	3% +0.1 unit	+10 mv	10%	10%	
0850	33.32	119.9	450		10.41	507.	7.02	170.2	3.63	17.27	
0855	30.90	119.5	200		10.41	492.	7.17	7.7 160.4	1.82	14.88	
0900	30.87	119.5	200		11.06	487.	7.24	140.5	1.87	11.12	
0905	30.90	119.5	200		11.39	487	7.27	114.5	1.77	11.07	
0909	31.02	119.5	200		11.48	487	7.27	99.0	1.74	8.68	
0912	31.01	119.5	200	1 gal	11.70	487	7.28	79.9	1.51	8.31	
0915	30.9	119.5	200		11.72	488	7.28	66.2	1.44	7.62	
0918	31.04	119.5	200		11.91	487	7.27	59.6	1.50	7.39	
0921	31.01	119.5	200		11.91	488	7.28	57.0	1.39	7.01	
0924	31.05	119.5	200	2 gal	11.94	488	7.29	57.1	1.25	6.84	

NOTES:

SAMPLE TAKEN AT: 0928 wetted screen volume = $\pi (3/12')^2 (55.7' - 45.7')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 0055 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-11

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 18.92 ft

DEPTH, POST PUMP INSERTION 18.94 ft

DEPTH SAMPLED: 25 ft REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 26.34 NGVD

DATE: 29OCT01 TIME: 1415

SAMPLED BY: JK NM KM (DL) PY SIGNATURE: [signature]

RECORDED BY: JK NM KM (DL) 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

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H2O TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1432	18.9	92.8	675	2.0	13.42	799.0	5.85	-38.5	0.87	39.2	
1437	18.95	92.8	700	3.0	14.69	798.0	6.42	-66.8	0.49	8.91	
1442	18.95	92.8	650	4.5	14.85	798.0	6.45	-74.2	0.38	8.92	
1448	18.95	92.8	650	5.5	14.93	798.0	6.46	-78.1	0.34	5.57	
1453	18.95	92.8	650	6.5	14.94	799.0	6.47	-81.0	0.31	5.08	
1457	18.95	92.8	600	7.0	14.98	800.0	6.47	-82.7	0.30	3.68	
1502	18.95	92.8	650	7.5	14.97	800.0	6.48	-84.9	0.29	2.95	
1507	18.96	92.8	650	8.0	15.02	800.0	6.48	-86.8	0.28	1.75	
1512	18.96	92.8	1,000	9.0	14.54	800.0	6.48	-87.8	0.25	1.36	
1515	18.95	92.2	450	9.5	15.15	806.0	6.49	-87.3	0.26	1.23	
1523	18.95	92.3	400	10.0	15.60	800.0	6.50	-88.9	0.29	0.84	
1527	18.95	92.5	500	10.5	15.53	801.0	6.49	-89.6	0.28	0.89	
1532	18.95	92.5	500	11.0	15.35	801.0	6.49	-90.1	0.27	1.04	
1537	18.95	92.5	550	11.5	15.27	800.0	6.49	-91.0	0.26	0.77	
1542	18.95	92.5	500	12.0	15.32	800.0	6.49	-92.3	0.27	0.49	
1546	18.95	92.5	600	12.5	15.20	802.0	6.49	-92.5	0.26	0.34	

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

SAMPLE TAKEN AT: 1548 wetted screen volume = $\pi(\frac{1}{12}')^2(29.8' - 18.92')(7.481\ gal/ft^3) = 1.8\ gal$

YSI # 175 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM WELL # SHL-19

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 23.56

DEPTH, POST PUMP INSERTION 24. 23.60

DEPTH SAMPLED: 29.0 REFERENCE POINT: PVC OR CASING

DATE: 29Oct01 TIME: 1045 (DEPTHS RECORDED BENEATH) 241.34 NGVD

SAMPLED BY: JK NM KM DL PY SIGNATURE: Nancy Merella

RECORDED BY: JK NM KM DL PY SIGNATURE: Nancy Merella

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H2O TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
1104	23.60	103.3	75.		14.12	254	6.67	-61.2	1.82	190.2	rusty colored
1108	23.59	103.7	150		12.67	254.	6.37	-52.6	0.93	147.9	" "
1111	23.60	104.3	350		13.35	250.	6.37	-51.0	0.78	146.2	" "
1115	23.61	104.5	350		14.75	250.	6.38	-42.8	0.80	132.1	" "
1119	23.60	104.5	350		14.78	253.0	6.41	-44.4	0.66	107.6	" "
1122	23.60	104.5	350	1 gal	14.87	253.	6.41	-48.3	0.58	92.1	" "
1125	23.61	104.5	350		14.88	252.0	6.41	-46.9	0.60	82.5	" "
1128	23.60	104.5	350		14.91	252.0	6.41	-43.1	0.61	78.0	" "
1131	23.60	104.5	350	2 gal	14.95	251.	6.39	-44.6	0.59	70.8	" "
1134	23.60	104.5	350		14.96	251.0	6.42	-41.0	0.54	65.4	" "
1137	23.60	104.5	350		15.01	252.	6.41	-41.0	0.52	58.7	" "
1140	23.60	104.5	350	3 gal	14.99	252.	6.40	-41.0	0.53	55.2	slighty rusty tinge
1144	23.60	104.5	350		15.01	251.	6.39	-38.4	0.52	50.3	" "
1147	23.60	104.5	350		15.01	251.	6.39	-36.2	0.52	47.2	" "
1150	23.60	104.5	350	4 gal	15.07	251.	6.38	-36.1	0.52	44.4	" "
1154	23.61	104.5	350		15.07	251.	6.38	-36.5	0.53	40.6	
1158	23.60	104.5	350		15.03	252.	6.37	-35.2	0.52	38.7	
1304	23.60	104.5	350	5 gal	15.05	252.	6.36	-33.4	0.53	30.2	
1307	23.60	104.5	350		15.07	252.	6.35	-32.1	0.52	28.2	
1311	23.60	104.5	350		15.12	252.	6.35	-31.9	0.51	27.6	
					3%	3%	+0.1 unit	+10 mv	10%	10%	

NOTES:

SAMPLE TAKEN AT: ~~SHL~~ NUM 1216 wetted screen volume = $\pi(2/12')^2(32.0' - 23.56')(7.48\ gal/ft^3) = 5.5\ gal$

YSI # 0055 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-20

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 19.40 ft

DEPTH, POST PUMP INSERTION 19.39 ft

DEPTH SAMPLED: 46 ft REFERENCE POINT: (PVC) OR CASING

DATE: 30 Oct 01 TIME: 0815 (DEPTHS RECORDED BENEATH) 236.84 NGVD

SAMPLED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNally

RECORDED BY: JK (NM) KM DL PY SIGNATURE: Nancy McNally

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml glass vials (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass vials

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
					3%	3%	+0.1 unit	+10 mv	10%	10%	
0845	19.39	96.6	800		12.17	626	6.34	183.1	8.23	68.4	
0851	19.44	95.5	600		12.21	793	6.51	-27.8	0.56	50.4	
0855	19.44	95.5	500	1 gal	12.74	807	6.53	-31.8	0.47	36.1	
0859	19.43	95.5	500		13.00	800	6.54	-33.4	0.41	30.7	
0902	19.42	95.5	550	2 gal	13.02	814	6.54	-34.6	0.35	25.9	
0906	19.43	95.5	550		13.11	802	6.54	-35.6	0.31	27.4	
0910	19.42	95.5	550	3 gal	13.08	806	6.55	-36.2	0.23	19.9	
0915	19.42	95.5	550		13.12	814	6.55	-36.0	0.23	13.51	
0920	19.42	95.5	550	4 gal	13.12	810	6.54	-36.6	0.21	13.40	
0925	19.42	95.5	550	5 gal	13.26	800	6.54	-36.7	0.20	13.03	
0929	19.42	955	550		13.33	804	6.55	-36.9	0.19	13.17	

NOTES:

SAMPLE TAKEN AT: 0933

wetted screen volume = $\pi (2\frac{1}{2}')^2 (51.0' - 41.0')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 0134 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

GWM WELL # SHL-22

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.66 ft

DEPTH, POST PUMP INSERTION 7.54 ft

DEPTH SAMPLED: 111 ft REFERENCE POINT: (PVC) OR CASING

(DEPTHS RECORDED BENEATH)

DATE: 30 OCT 01 TIME: 1220 220.45 NGVD

SAMPLED BY: JK NM KM DL (PY) SIGNATURE: Paul Young

RECORDED BY: JK NM KM DL (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

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

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
					3%	3%	+0.1 unit	+10 mv	10%	10%	
1233	7.54	66.6	400		11.55	437	7.67	61.9	3.09	0.51	
1238	8.15	66.6	400	4 L	11.02	899	6.27	-36.3	1.22	1.70	
1243	8.18	65.1	300		11.08	933	6.19	-62.1	1.06	0.82	
1248	8.06	65.1	300	7 L	11.36	933	6.29	-66.4	1.02	0.57	
1253	8.04	65.1	300		11.32	940	6.39	-65.2	1.02	0.46	
1258	8.04	65.1	300		11.27	944	6.41	-63.3	0.97	0.48	
1303	8.04	65.1	300		11.27	944	6.46	-60.8	0.94	0.29	
1308	8.04	65.1	300		11.34	944	6.43	-56.0	0.94	0.38	
1313	8.04	65.1	300		11.34	944	6.42	-53.2	0.89	0.39	
1318	8.04	65.1	300		11.32	944	6.43	-51.4	0.86	0.36	

NOTES:

SAMPLE TAKEN AT: 1325 wetted screen volume = $\pi(3/12')^2(116.0'-106.0')(28.32\ l/ft^3) = 25$ litres

YSI # 2116 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-22B

SCREEN INTERVAL DEPTH: 62.7'-92.7' WELL DIAMETER: 4" (2" screen)

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.51 FT

DEPTH, POST PUMP INSERTION 7.50 FT

DEPTH SAMPLED: 78'

REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 220.27 NGVD

DATE: 10/30/01 TIME: 1435

SAMPLED BY: JK NM KM DL (PY) SIGNATURE: Paul Young

RECORDED BY: JK NM KM DL (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

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml glass vials (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml glass vials

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
1440	7.51	63.1	250		10.95	868	9.12	119.4	2.76	7.13	Light brown color
1445	7.51	63.1	250		10.68	875	9.41	101.2	1.69	12.6	
1450	7.58	63.1	250		10.51	871	9.33	94.2	0.97	22.3	
1455	7.51	63.1	250	3 L	10.52	867	9.07	95.1	0.66	28.6	
1500	7.51	63.1	250		10.57	852	8.58	54.8	0.63	24.2	
1505	7.51	63.1	250		10.50	857	8.08	-324.0	0.70	24.4	
1510	7.51	63.1	250	6 L	10.50	869	7.61	-291.8	0.76	22.2	
1515	7.51	63.1	250		10.48	878	7.33	-255.0	0.78	21.8	
1520	7.51	63.1	250		10.45	889	7.09	-220.9	0.82	20.5	
1525	7.51	63.1	250	9 L	10.44	891	7.04	-208.1	0.79	20.9	
1530	7.51	63.1	250		10.42	895	7.00	-196.0	0.73	22.1	
1535	7.51	63.1	250		10.40	898	6.98	-192.0	0.73	23.6	
1540	7.51	63.1	250	12 L	10.39	900	6.96	-191.3	0.72	23.4	
1545	7.51	63.1	250		10.39	901	6.96	-189.9	0.83	23.4	

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

SAMPLE TAKEN AT: 1550 wetted screen volume = $\pi(\frac{1}{12}')^2(92.7'-62.7')(28.32\ l/ft^3) = 18.5$ Litres

YSI # 3/116 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-22C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 8.76 ft

DEPTH, POST PUMP INSERTION 7.49 ft

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

DATE: 30 OCT 01 TIME: 1030 (DEPTHS RECORDED BENEATH) 221.55 NGVD

SAMPLED BY: JK NM KM DL (PY) SIGNATURE: Paul Young

RECORDED BY: JK NM KM DL (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

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml glass vials

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
1038	25.04	109.7	400		11.52	580	7.18	-133	2.44	2.46	STARTING WATER DEPTH IS 25.04 FT
1043	25.85	109.0	200	2L	11.20	581	7.37	-170.6	1.01	2.03	
1048	25.88	109.0	200		11.31	583	7.48	-178.1	1.25	1.92	
1053	25.88	109.0	150		11.49	586	7.52	-174.6	1.10	1.77	
1058	25.87	109.0	150		11.54	594	7.53	-170.7	1.04	1.61	
1103	25.87	109.0	200		11.47	596	7.54	-174.7	1.06	1.59	
1108	25.84	109.0	200		11.47	596	7.54	-174.6	1.07	1.53	
1113	25.84	109.0	200		11.39	592	7.54	-175.9	1.13	1.52	
1118	25.85	109.0	200		11.40	590	7.53	-175.0	1.12	1.38	
1123	25.86	109.0	150		11.42	588	7.50	-173.2	1.09	1.37	

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

SAMPLE TAKEN AT: 1130 wetted screen volume = $\pi(\frac{2}{12}')^2(134.3'-124.3')(28.32\ l/ft^3) = 25$ litres

* Well has history of minimal to no re-charge until drawn down 20-30 ft below PVC. Therefore, well will be drawn down before attempting to stabilize parameters at a lower purge rate.

YSI # 3116 TURBIDITY # 39576 Pump - Grunfos Redi-flow II

Groundwater Field Analysis Forms
Fall 2001

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

GWM WELL # SHM-93-22C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 7.22 feet

DEPTH, POST PUMP INSERTION ~~@~~ 5.95 feet

DEPTH SAMPLED: 129 feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/15/01 TIME: 0800 (DEPTHS RECORDED BENEATH) 221.55 NGVD

SAMPLED BY: (SS) JK PY BW SIGNATURE:

RECORDED BY: (SS) JK PY BW SIGNATURE:

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) ✓ for 2 samp — VOC'S 3 x 40ml VOA's (ph<2) ✓

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) ✓ — BOD 1 x 1L HDPE ✓

Anions, Alkalinity, TDS 1 x 500ml HDPE ✓ — COD 1 x 250mL HDPE (ph<2) ✓

TSS 1 x 1L HDPE ✓ — TOC 3 x 40 ml VOA's ✓

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	7.45	72.2	1500	1 gal	9.24	287	6.42	161.4	3.95	4.8	Sulfur odor
0836	8.90	72.2	1100	2 gal	9.93	410	7.16	-56.6	0.59	2.8	
0845	11.10	72.2	300	3.5 gal	9.65	402	7.45	-102.2	0.45	3.2	Strong Sulfur odor
0850	13.20	87.9	1800	4 gal	10.59	395	7.50	-111.1	0.40	3.1	Variable flow rate
0855	16.50	104.5	2200	7 gal	10.59	376	7.54	-122.4	0.19	5.3	as well drawn down
0900	19.85	108.2	2000	9 gal	10.52	370	7.55	-122.3	0.19	4.7	
0905	22.50	108.2	1200	11 gal	10.55	369	7.56	-123.3	0.19	4.8	
0910	24.60	108.2	700	12 gal	10.36	371	7.57	-123.8	0.23	4.6	
0915	25.25	108.2	400	12.5 gal	10.14	372	7.58	-124.2	0.22	5.2	Continued Sulfur odor
0920	25.70	108.2	325	13.1 gal	9.80	375	7.58	-124.9	0.29	5.1	
0925	25.95	108.2	200	13.5 gal	9.47	382	7.59	-126.7	0.33	3.8	
0930	26.05	108.2	250	13.9 gal	9.33	385	7.60	-127.7	0.34	2.1	
0935	26.05	108.2	200	14.2 gal	9.28	388	7.60	-129.0	0.35	3.4	
0940	26.05	108.2	200	14.5 gal	9.00	391	7.61	-130.1	0.38	3.1	
0945	26.05	108.2	200	14.8 gal	9.07	391	7.61	-130.2	0.36	2.9	
0950	26.05	108.2	200	15.0 gal	9.05	392	7.60	-130.2	0.34	3.0	Sample taken

NOTES:

SAMPLE TAKEN AT: 0950

± 0.5 ✓ 3% ± 11 ✓ 3% +0.1 unit ✓ +10 mv ✓ ± 0.03 ✓ 10% ≤ 5 ✓ 10%

Note: Well has history of slow/minimal recharge until pumped down to about 20 feet where recharge occurs - will pump down to 20 feet

YSI # on 1581472 TURBIDITY # 75 Pump - Grunfos Redi-flow II

wetted screen volume
$= \pi (2/12')^2 (134.3' - 124.3')(7.481\ gal/ft^3)$
$= 6.5\ gal$

at 9 well drawdown = 19.85 - 5.95 feet = 13.90 feet x 0.6 gal/foot = 9.06 gal vs. purged volume = 9 gal

∴ drawdown = purged volume — minimum

GWM WELL # SHM-96-22B

SCREEN INTERVAL DEPTH: 62.7 - 92.7 feet WELL DIAMETER: 4" (2" Sch 40)

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.00 feet

DEPTH, POST PUMP INSERTION 6.00 feet

DEPTH SAMPLED: 78 feet REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 220.27 NGVD

DATE: 5/15/21 TIME: 10:00

SAMPLED BY: (JK) PY BW SIGNATURE:

RECORDED BY: (JK) PY BW SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml

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
1010	6.05	61.7	850	0.8 gal	7.65	776.0	7.41	186.1	3.07	37	Bromine high
1015	6.06	61.7	850	1.5 gal	9.20	760.0	6.81	-254.1	0.28	29	
1020	6.06	61.7	825	2.5 gal	9.42	851.0	6.82	-134.5	0.34	30	
1025	6.06	61.3	700	3.5 gal	9.34	853.0	6.79	-129.8	0.31	31	Reduced speed
1030	6.06	61.3	700	4.4 gal	9.42	865.0	6.79	-130.9	0.31	29	
1035	6.06	61.3	700	5.5 gal	9.42	879.0	6.81	-137.9	0.31	28	
1040	6.06	61.3	700	6.5 gal	9.41	883	6.81	-139.1	0.30	26	
1045	6.06	61.3	700	7.5 gal	9.43	882	6.82	138.9	0.33	24	
1050	6.06	61.3	700	8.5 gal	9.41	882	6.81	-137.1	0.35	22	
1055	6.06	61.3	700	9.5 gal	9.41	883	6.80	-136.1	0.44	22	Clearer water
1100	6.06	61.3	700	10.2 gal	9.43	883	6.78	-135.1	0.47	19	
1105	6.06	61.3	700	11.0 gal	9.47	882	6.78	-134.5	0.51	15	
1110	6.06	61.3	700	12.0 gal	9.51	881	6.77	-133.7	0.55	14	
1115	6.06	61.3	700	12.9 gal	9.50	882	6.77	-133.5	0.56	13	
1120	6.06	61.3	700	13.8 gal	9.55	881	6.77	-133.1	0.58	11	
1125	6.06	61.3	700	14.7 gal	9.61	880	6.76	-132.8	0.59	10	
1130	6.06	61.3	700	15.6 gal	9.65	880	6.76	-132.4	0.61	8	
1135	6.06	61.3	700	16.5 gal	9.65	880	6.76	-132.2	0.62	7	
1140	6.06	61.3	700	17.4 gal	9.66	880	6.76	-132.0	0.63	8	Sample taken

NOTES:

SAMPLE TAKEN AT: 1140

3% ±0.3 ✓ ±26 ✓ 3% +0.1 unit ✓ +10 mv ✓ 10% ±0.05 ✓ 10%

wetted screen volume = $\pi(\frac{1}{12}')^2(92.7' - 62.7')(7.481\ gal/ft^3) = 4.9\ gal$

YSI # 15814772 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM WELL # SHL-22

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 6.14 feet

DEPTH, POST PUMP INSERTION 6.11 feet

DEPTH SAMPLED: 111 feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/15/01 TIME: 8:15 (DEPTHS RECORDED BENEATH) 220.45 NGVD

SAMPLED BY: SS JK PY (BW) SIGNATURE: Bruce J. Wa

RECORDED BY: SS JK PY (BW) SIGNATURE: Bruce J. Wa

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40mL

TIME 24hr	WATER DPTH BELOW MP feet	PUMP SETTING	PURGE RATE ml/min	CUM. VOLUME PURGED	H2O TEMP C	SPECIFIC CONDUCTANCE	pH	ORP/Eh mv	D. O. mg/L	TURBIDITY NTU's	COMMENTS
955	6.45	62.5	450		8.29	374.0	7.29	-23.1	6.54	3.30	
959	6.67	62.1	400	1 gal.	8.78	791	6.64	-34.4	2.17	1.36	
1004	6.67	62.1	400		8.76	833.0	6.67	-40.9	1.09	1.10	
1008	6.67	62.4	400	1.75 gal	8.83	841.0	6.69	-42.3	0.80	1.07	
1012	6.67	62.2	400		8.91	842.0	6.71	-42.1	0.73	0.98	
1016	6.67	62.1	400	2 gal	8.92	843.0	6.71	-41.4	0.68	0.61	
1020	6.67	62.1	400	2.5 gal.	9.00	843.0	6.71	-38.1	0.57	0.55	
1025	6.67	62.1	400	3 gal.	9.02	843.0	6.72	-37.3	0.55	0.60	

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

SAMPLE TAKEN AT: 1025 wetted screen volume = $\pi (2/12')^2 (116.0' - 106.0')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 157 TURBIDITY # 576 Pump - Grunfos Redi-flow II

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

GWM WELL # SHL-20

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 19.02 feet

DEPTH, POST PUMP INSERTION 19.02 ft

DEPTH SAMPLED: 46 feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/14/01 TIME: 12145 (DEPTHS RECORDED BENEATH) 236.84 NGVD

SAMPLED BY: SS JK PY BW DW SIGNATURE: DWyrod

RECORDED BY: SS JK PY BW SIGNATURE: DWyrod

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3x40ml L

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
12:55	19.13	98.5	1400								START PUMPING
13:02	19.09	96.2	1000								CHANGE SPEED
13:05	19.09	96.2	1000	2.5 gal	12.42	721	5.32	37.0	0.18		ORANGE COLOR
13:08	19.09	96.2	1050	3.5 gal	12.48	715	5.86	1.1	0.61	40.1	
13:11	19.09	96.2	1050		12.61	720	6.21	-11.1	0.52	27.2	
13:14	19.09	96.2	1050	4.7 gal	12.55	718	6.30	-16.8	0.42	18.2	
13:17	19.09	96.2	1050		12.64	718	6.33	-18.0	0.34	16.0	
13:20	19.10	96.2	1050	6.3 gal	12.60	717	6.35	-19.5	0.29	14.2	
13:23	19.10	96.2	1050	8.0 gal	12.55	718	6.36	-19.6	0.26	12.8	
13:26	19.10	96.2	1050		12.64	717	6.38	-18.9	0.25	8.21	
13:29	19.10	96.2	1050	9.0 gal	12.65	719	6.38	-18.8	0.24	6.19	
13:32	19.10	96.2	1050		12.66	718	6.39	-19.7	0.23	6.6	
13:35	19.10	96.22	1050	10.5 gal	12.64	719	6.39	-18.8	0.23	6.8	
13:40											TAKE SAMPLE

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

SAMPLE TAKEN AT: 13:40

wetted screen volume = $\pi(2\frac{1}{2}')^2(51.0'-41.0')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 472 TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM WELL # SHL-19

SCREEN INTERVAL DEPTH: 17-32 Feet WELL DIAMETER: 4"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 23.08 feet

DEPTH, POST PUMP INSERTION 23.09 feet

DEPTH SAMPLED: 28 Feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/14/01 TIME: 10:00 (DEPTHS RECORDED BENEATH) 241.34 NGVD

SAMPLED BY: SS JK PY (BW) SIGNATURE: Susan J. Kay

RECORDED BY: SS JK PY (BW) SIGNATURE: Susan J. Kay

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml

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
						3%	3% +0.1 unit	+10 mv	10%	10%	
1023	23.08	101.5	450		10.30	114.0	6.94	-52.2	2.63	260	very turbid
1028	23.08	102.6	600		10.45	110.0	6.44	-43.3	0.78	234	
1031	23.08	102.6	600	1 gal.	10.69	109.0	6.37	-41.8	0.44	210	
1035	23.08	102.6	600		10.95	109.0	6.32	-40.1	0.35	183	
1039	23.08	102.6	600	2 gal.	10.90	106.0	6.28	-30.6	0.27	134	
1043	23.08	102.6	600		10.92	105.0	6.25	-36.3	0.25	116	
1046	23.08	102.6	600	3 gal.	10.87	106.0	6.21	-37.2	0.23	99	
1049	23.08	102.6	600		10.89	104.0	6.18	-37.9	0.22	79	
1054	23.08	102.6	600	4 gal.	10.96	97.00	6.16	-30.5	0.22	63.4	
1058	23.08	102.6	600		10.88	94.00	6.15	-32.8	0.24	53.7	
1102	23.08	102.6	600	5 gal.	10.75	94.00	6.14	-31.4	0.27	39.5	
1105	23.09	102.6	600		10.78	92.0	6.17	-26.6	0.29	35.7	
1109	23.09	102.6	600	6 gal.	10.76	89.0	6.19	-26.3	0.33	30.5	
1112	23.09	102.6	600	7 gal.	10.83	89.0	6.17	-23.8	0.37	26.1	
1115	23.09	102.6	600		10.79	85.0	6.17	-21.9	0.42	25.3	
1118	23.09	102.6	600	7.75 gal	10.78	84.0	6.18	-20.6	0.45	24.8	

NOTES:

SAMPLE TAKEN AT: 1120 wetted screen volume = $\pi(3/12')^2(32.0' - 23.07')(7.481\ gal/ft^3) = 5.8\ gal$

YSI # 158 TURBIDITY # 76 Pump - Grunfos Redi-flow II

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

GWM WELL # SHL-11

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 18.70

DEPTH, POST PUMP INSERTION 18.69

DEPTH SAMPLED: 22' REFERENCE POINT: (PVC) OR CASING

DATE: 5-14-01 TIME: 1300 (DEPTHS RECORDED BENEATH) 1236.34 NGVD

SAMPLED BY: SS JK PY (BW) SIGNATURE: Bruce J. Hoy

RECORDED BY: SS JK PY (BW) SIGNATURE: Bruce J. Hoy

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40mL

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	18.71	92.5	600	1 gal	11.53	627.0	6.09	-41.4	0.57	51.5	slug of rust
1304	18.71	92.5	600		12.83	649	6.12	-52.4	0.42	67.5	
1308	18.71	92.5	600	2 gal.	13.04	649	6.13	-55.9	0.35	39.5	
1312	18.71	92.5	600		13.18	662	6.14	-62.0	0.30	28.3	
1316	18.71	92.5	600	3 gal.	13.04	662	6.16	-64.0	0.28	22.0	
1320	18.71	92.5	600		13.30	666	6.15	-67.5	0.27	19.4	
1323	18.71	92.5	600	4 gal.	13.00	671	6.16	-69.8	0.26	15.3	
1326	18.71	92.5	600		13.28	672	6.16	-71.5	0.25	15.6	
1329	18.71	92.5	600	5 gal.	13.28	674	6.14	-73.0	0.25	14.3	
1332	18.71	92.5	600		13.24	676	6.13	-74.1	0.24	12.4	
1335	18.71	92.5	600		13.31	676	6.14	-75.0	0.24	11.8	
1338	18.71	92.5	600	6 gal.	13.32	678	6.14	-76.4	0.24	11.2	

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

SAMPLE TAKEN AT: 1340 wetted screen volume = $\pi(\frac{1}{12}')^2(29.8'-18.70')(7.481\ gal/ft^3) = 1.8\ gal$

YSI # 158 TURBIDITY # 576 Pump - Grunfos Redi-flow II

GWM WELL # SHM-93-10C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 29.78 feet

DEPTH, POST PUMP INSERTION 29.55 feet

DEPTH SAMPLED: 50 feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/14/01 TIME: 0815 (DEPTHS RECORDED BENEATH) 248.42 NGVD

SAMPLED BY: SS JK PY (BW) SIGNATURE: Bruce J. Way

RECORDED BY: SS JK PY (BW) SIGNATURE: Bruce J. Way

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml VOA

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
835	30.16	117.2	300		10.15	454	6.72	184.6	3.27	1.55	
840	30.27	117.2	300		10.64	444	7.04	173.7	1.92	1.83	
845	30.33	116.8	200	1 gal.	11.37	422	7.19	162.4	1.76	1.50	
850	30.33	116.8	200		11.60	422	7.24	160.0	1.72	1.62	
853	30.33	116.8	200		11.49	423	7.25	160.0	1.69	1.24	
857	30.33	116.8	200		11.31	423	7.28	155.1	1.53	1.22	
900	30.33	116.8	200		11.26	423	7.28	152.6	1.57	1.20	
904	30.33	116.8	200	1.5 gal	11.34	422	7.29	150.2	1.45	1.24	
907	30.33	116.8	200		11.44	422	7.30	148.7	1.44	1.20	
910	30.33	116.8	200	1.75 gal	11.65	421	7.30	146.2	1.46	1.23	
915	30.33	116.8	200		11.85	422	7.31	144.8	1.38	1.22	
918	30.33	116.8	200	2 gal.	12.01	422	7.30	143.3	1.29	1.20	

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

SAMPLE TAKEN AT: 920 wetted screen volume = $\pi(3/12')^2(55.7'-45.7')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 158 TURBIDITY # 76 Pump - Grunfos Redi-flow II

GWM WELL # SHL-10

SCREEN INTERVAL DEPTH: 17.8 - 37.6 WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 30.95 [redacted]

DEPTH, POST PUMP INSERTION 30.95

DEPTH SAMPLED: 35 feet REFERENCE POINT (PVC OR CASING)

DATE: 5/14/01 TIME: 0800 (DEPTHS RECORDED BENEATH) 248.76 NGVD

SAMPLED BY: SS JK PY BW DW SIGNATURE: DJ Wood

RECORDED BY: SS JK PY BW SIGNATURE: DJ Wood

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2)	VOC'S 3 x 40ml VOA's (ph<2)
Cyanide 1 x 250ml HDPE (ph>12 + AscAc)	BOD 1 x 1L HDPE
Anions,Alkalinity,TDS 1 x 500ml HDPE	COD 1 x 250mL HDPE (ph<2)
TSS 1 x 1L HDPE	TOC 3 x 40ml L

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
0846	31.28	121.7	1000	3.5 gal	9.95	38.00	6.37	202.7	11.06	0.77	
0852	31.27	121.7	1000	4.5 gal	10.14	36.00	6.41	210.3	10.27	0.44	
0855	31.25	121.8	1000	6.0 gal	10.23	36.00	6.43	217.7	11.23		
0859	31.25	121.8	1000	6.7 gal	10.24	37.0	6.42	220.6	11.22	0.28	
0902	31.25	121.8	1000		10.24	37.0	6.43	222.4	11.22	0.32	
0905	31.25	121.8	1000	7.8 gal	10.19	37.0	6.42	223.0	11.23		
0908	31.25	121.8	1000	8.0 gal	10.27	37.0	6.46	225.0	11.21	0.31	
0912	31.25	121.8	1000	9.0 gal	10.25	37.0	6.41	227.0	11.22	0.36	
0913											Took Sample

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

SAMPLE TAKEN AT: 0915 wetted screen volume = $\pi(\frac{1}{12}')^2(37.6' - 30.95')(7.481\ gal/ft^3) = 1.1\ gal$

YSI # 00D0472 TURBIDITY # 39575 Pump - Grunfos Redi-flow II

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

GWM WELL # SHL-9

SCREEN INTERVAL DEPTH: 15 - 25 feet WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 8.49

DEPTH, POST PUMP INSERTION 8.46

DEPTH SAMPLED: 20 feet REFERENCE POINT: (PVC) OR CASING

DATE: 5/15/01 TIME: 0830 (DEPTHS RECORDED BENEATH) 222.84 NGVD

SAMPLED BY: SS JK PY (BW) SIGNATURE: Steven J. King

RECORDED BY: SS JK PY (BW) SIGNATURE: Bruce J. Hoy

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3x40mL

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
~~0838~~	8.74	63.6	350		7.63	93.0	6.10	110.6	1.76	31.5	slug of rust
842	8.81	64.3	500	1 gal	8.27	92.0	6.06	88.4	0.70	29.8	@ initial start
846	8.81	64.2	500		8.84	94.0	6.11	72.3	0.54	18.2	
849	8.81	64.3	500		8.96	96.0	6.14	61.1	0.46	14.4	
853	8.81	64.3	500	2 gal.	9.09	96.0	6.17	48.9	0.39	13.2	
856	8.81	64.3	500		9.19	106.0	6.19	33.6	0.31	9.33	
859	8.81	64.3	500	3 gal.	9.28	111.0	6.22	22.0	0.25	10.5	
902	8.81	64.3	500		9.30	119.0	6.24	15.8	0.25	7.24	
905	8.81	64.3	500		9.31	120.0	6.25	12.4	0.21	7.02	
908	8.81	64.3	500	4 gal.	9.33	129.0	6.26	9.3	0.21	7.40	
911	8.81	64.3	500		9.38	134.0	6.27	7.2	0.21	7.02	

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

SAMPLE TAKEN AT: 915 wetted screen volume = $\pi(\frac{1}{12}')^2(25.0'-15.0')(7.481\ gal/ft^3) = 1.6\ gal$

YSI # 157 TURBIDITY # 576 Pump - Grunfos Redi-flow II

GWM WELL # SHm-96-5C

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 4.75 Feet

DEPTH, POST PUMP INSERTION 4.75 Feet

DEPTH SAMPLED: 55 Feet REFERENCE POINT: (PVC) OR CASING

(DEPTHS RECORDED BENEATH)

DATE: 5/14/01 TIME: 1200 219.25 NGVD

SAMPLED BY: (SS) JK PY BW SIGNATURE:

RECORDED BY: (SS) JK PY BW SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40 ml

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
1220	4.90	59.0	1300	1 gal	9.34	261	6.66	-24.2	2.44	16	reduced pump speed
1225	4.88	56.5	1300	2.5 gal	10.08	853	6.36	-54.7	0.71	10	"
1230	4.86	54.2	900	3.5 gal	10.12	861	6.36	-58.3	0.94	3.6	"
1235	4.83	52.8 53.1	800	4 gal	10.17	860	6.36	-61.3	0.99	6.5	
1240	4.83	53.1	800	5 gal	10.22	860	6.36	-62.1	1.08	4.0	
1245	4.83	52.7	750	6 gal	10.19	860	6.35	-62.8	1.04	3.8	
1250	4.83	52.7	750	7 gal	10.21	855	6.35	-63.4	1.07	3.6	
1255	4.83	52.7	750	8 gal	10.23	851	6.35	-63.8	1.09	3.4	
1300	4.83	52.7	750	9 gal	10.24	850	6.34	-64.1	1.09	3.0	
1305	4.83	52.7	750	10 gal	10.24	851	6.34	-64.3	1.11	3.3	
1310	4.83	52.7	750	11 gal	10.24	851	6.34	-64.3	1.12	3.2	Sample taken

NOTES:

SAMPLE TAKEN AT: 1310

3% ±0.3 ✓ 3% ±26 ✓ ±0.1 unit ✓ ±10 mv ✓ 10% ±0.1 ✓ 10% <5 ✓

wetted screen volume = $\pi(3/12')^2(60.8'-50.8')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 158/ATR TURBIDITY # 75 Pump - Grunfos Redi-flow II

GWM WELL # SHM-96-5B

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 5.30'

DEPTH, POST PUMP INSERTION 4.75'

DEPTH SAMPLED: 85 feet REFERENCE POINT: (PVC) OR CASING

(DEPTHS RECORDED BENEATH) 219.81 NGVD

DATE: 5/15/01 TIME: 1130

SAMPLED BY: SS JK PY (BW) SIGNATURE: Brian J. Wagner

RECORDED BY: SS JK PY (BW) SIGNATURE: Brian J. Wagner

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40ml

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	5.56	52.7	300		9.31	621.0	5.87	-42.4	3.26	3.55	
1140	5.58	53.5	400		9.14	741.0	6.48	-77.7	1.55	1.75	
1145	5.60	53.5	400	1 gal.	9.48	760.0	6.56	-83.3	0.83	1.68	
1148	5.60	53.5	400		9.57	764.0	6.59	-85.6	0.72	1.55	
1152	5.61	53.5	400	2 gal.	9.64	770.0	6.62	-88.6	0.58	0.80	
1156	5.61	53.5	400		9.65	772.00	6.64	-90.0	0.52	0.76	
1200	5.61	53.5	400	2.5 gal.	9.69	769.0	6.64	-91.3	0.48	1.08	
1204	5.61	53.5	400		9.72	771.0	6.65	-92.0	0.45	.97	
1208	5.61	53.5	400	3 gal	9.71	772.0	6.65	-92.5	0.43	.91	

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

SAMPLE TAKEN AT: 1210 wetted screen volume = $\pi(\frac{2}{12}')^2(91.3' - 81.3')(7.481\ gal/ft^3) = 6.5\ gal$

YSI # 157 TURBIDITY # 576 Pump - Grunfos Redi-flow II

GWM WELL # SHL-5

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 3.50 feet

DEPTH, POST PUMP INSERTION 3.47'

DEPTH SAMPLED: 10 feet REFERENCE POINT: (PVC) OR CASING (DEPTHS RECORDED BENEATH) 218.53 NGVD

DATE: 5/15/01 TIME: 1300

SAMPLED BY: SS JK PY (BW) SIGNATURE: Susan J. Ka

RECORDED BY: SS JK PY (BW) SIGNATURE: Susan J. Ka

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions,Alkalinity,TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3x40ml L

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
1305	3.96	49.0	750		8.05	67.0	6.37	61.7	2.74	60.5	
1310	3.95	47.8	500	1 gal	9.14	64.0	5.88	81.1	.50	14.8	
1314	3.91	47.8	500		9.48	65.0	5.79	79.1	.40	6.15	
1318	3.91	47.8	500	2 gal	9.65	66.0	5.75	77.2	.30	4.02	
1322	3.91	47.8	500		9.80	66.0	5.73	75.1	.25	4.87	
1326	3.91	47.8	500	3 gal.	9.86	66.0	5.72	72.7	.22	5.13	
1330	3.91	47.8	500	3.5 gal.	9.88	69.8	5.71	69.4	.19	4.79	

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

SAMPLE TAKEN AT: 1335 wetted screen volume = $\pi(\frac{1}{12}')^2(15.1' - 5.1')(7.48 \text{ gal/ft}^3) = 1.6$ gal

YSI # 157 TURBIDITY # 576 Pump - Grunfos Redi-flow II

GWM WELL # SHL - 4

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

H2O LEVEL: DEPTH, PRE PUMP INSERTION 10.60 Feet

DEPTH, POST PUMP INSERTION 10.60 Feet

DEPTH SAMPLED: 13 Feet REFERENCE POINT: (PVC) OR CASING

(DEPTHS RECORDED BENEATH) 228.71 NGVD

DATE: 5/14/01 TIME: 10:15

SAMPLED BY: SS JK PY BW D W SIGNATURE:

RECORDED BY: SS JK PY BW SIGNATURE:

US Army Corps of Engineers

Groundwater Sampling Log Sheet

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

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40mL

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 2" well
11:01	10.72	72.6	1600 ml								START PUMP & BROWN INITIALLY
11:05	10.68	69.0	850		10.71	185	5.90	70.3	0.32		ADJUSTED SETTING
11:08	10.68	68.8	850		11:07	185	5.89	70.7	0.31	5.65	
11:01	10.68	68.8	850	11 liters	11:18	185	5.88	70.4	0.27	6.52	
11:14	10.68	68.8	850	13 liters	11:18	185	5.87	71.1	0.24	5.71	
11:17	10.68	68.8	850	16 liters	11:14	185	5.86	71.9	0.22	4.19	
11:20	10.68	68.8	850		11.02	185	5.85	73.6	0.20	3.49	
11:23	10.68	68.8	850	20 liters	11.15	186	5.86	73.7	0.19	1.97	
11:26	10.68	68.8	850	24 liters	11.21	186	5.85	73.1	0.18	1.78	
11:29	10.68	68.8	850	26 liters	11.21	186	5.84	74.1	0.18	1.63	
11:30											TAKE SAMPLE

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

SAMPLE TAKEN AT: 11:30 wetted screen volume = $\pi(\frac{1}{2}')^2(15.7' - 10.60')(28.32\ l/ft^3) = 3$ litres

YSI # 472 TURBIDITY # 75 Pump - Grunfos Redi-flow II

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

GWM WELL # SHL-3

SCREEN INTERVAL DEPTH: 25.1 - 35.1 feet WELL DIAMETER: 2"

H2O LEVEL: DEPTH, PRE PUMP INSERTION 30.35

DEPTH, POST PUMP INSERTION 30.35

DEPTH SAMPLED: 34 feet

REFERENCE POINT: PVC OR CASING (DEPTHS RECORDED BENEATH) 248.5 NGVD

DATE: 5/14/01 TIME: 0900

SAMPLED BY: SS JK PY BW SIGNATURE: DJWood

RECORDED BY: SS JK PY BW SIGNATURE: DJWood

SAMPLE METHOD: EPA LOW STRESS METHOD

Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml VOA's (ph<2)

Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE

Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250mL HDPE (ph<2)

TSS 1 x 1L HDPE TOC 3 x 40mL

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 2" well
0945	30.99	125.1	400		10.83	33.0	6.54	206.5	12.06		START PUMPING
0951			<500ml		11.34	32.0	6.50	204.6	11.64	7.72	CLOUDY TURBID
0955	31.25	181.3	600ml		11.53	31.0	6.47	171.2	11.45		PUMP STOPPED DUE
1003			<100ml								FLOW SLOWING DOWN
1008	32.38	124.0	1100	16 LITERS	9.85	29.0	6.46	171.8	11.83		~~INCREASE~~ PUMP SPEED
10:13	32.25				9.41	29.0	6.43	184.1	11.85	SURGE PUMP	PUMP STOPPED
10:16	32.23		1100		9.35	29.0	6.43	192.7	11.80	0.84	CLEAR
10:19		124.0	1100	25 liters	9.35	29.0	6.45	201.3	11.79	0.34	
10:22	32.23	124.0	1100		9.32	29.0	6.38	206.8	11.82	0.40	
10:25	32.23	124.0	1100	33 liters	9.28	29.0	6.40	208.3	11.75	0.35	
10:28	32.23	124.0	1100	34 liters	9.29	29.0	6.41	212.2	11.79	0.26	
10:30	32.23	124.0	1100	38 LITERS	9.23	29.00	6.40	215.5	11.99	0.27	
10:32											TAKE SAMPLE

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

SAMPLE TAKEN AT: 1032 wetted screen volume = $\pi(1/12')^2(35.1' - 30.35')(28.32 \text{ Liters/ft}^3) = 3$ Liters

YSI # 00D0472 TURBIDITY # 75 Pump - Grunfos Redi-flow II

Groundwater Field Analysis Forms
Spring 2001

APPENDIX C

CHAIN OF CUSTODY FORMS

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

CHAIN OF CUSTODY RECORD

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

Sampler's Name: Brian WAZ, Don WOOD
Sampler's Signature: Brian J. Waz / D J Wood

Proj. No.: E0776
Project Name: Shepley's Hill LTM '01

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 ☐

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; TOC 9060

Matrix[1]	Date	Time	Comp	Grab	Identifying Marks of Sample(s)	No./Type of Containers[2]: VOA	40ml A/G + Lt. Amb	250 ml	P/O	Lab Sample ID (Lab Use Only)
W	5-14-01	0915		X	SHL-10	3	3	1	5	
W	5-14-01	0920		X	SHm-93-10C	3	3	1	5	
W	5-14-01	1032		X	SHL-3	3	3	1	5	
W	5-14-01	1120		X	SHL-19	3	3	1	5	
W	5-14-01	1120		X	SHL-19MS	3	3	1	2	
W	5-14-01	1120		X	SHL-19MSD	3	3	1	1	
W	5-14-01	1130		X	SHL-4	3	3	1	5	
W	5-14-01	1390		X	SHL-11	3	3	1	5	
W	5-14-01	1340		X	SHL-20	3	3	1	5	
W	5-14-01	—		X	Trip Blank	3				

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Katherine Miller	5-14-01	1415	FEDEX AIRBILL # 814805265370		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks: 3 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 - 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

U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
E0776	SHEPLEY'S HILL LTM + MM

SAMPLERS: *(Signature)* Paul Jorem

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC - 8260B	TAL METALS - 6010B HARDNESS - 130.2	CYANIDE - 9010B ARSENIC - 7060, TDS - 160.1 ALKALINITY - 310.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	TOC - 9060	REMARKS
	5/15/01	0915		X	SHL-9	12	3	1	1	1	1	1	3	
	5/15/01	0950		X	SHM-93-22C	12	3	1	1	1	1	1	3	
	5/15/01	1025		X	SHL-22	12	3	1	1	1	1	1	3	
	5/15/01	1140		X	SHM-96-22B	12	3	1	1	1	1	1	3	
	5/15/01	1210		X	SHM-96-5B	12	3	1	1	1	1	1	3	
	5/15/01	1210		X	SHM-DUP-01	12	3	1	1	1	1	1	3	
	5/15/01	1310		X	SHM-96-5C	12	3	1	1	1	1	1	3	
	5/15/01	1335		X	SHL-5	12	3	1	1	1	1	1	3	
	5/15/01	1400		X	EB-5B	12	3	1	1	1	1	1	3	
	5/15/01	-	-	-	TRIP BLANK	1	1							
		Paul Jorem												
					5/15/01									

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Paul Jorem	5/15/01 1700	Fed. Express Airbill # 814805265369			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	3 coolers shipped

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

7303

U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
CØ776	SHEPLEY'S HILL LTM + M

SAMPLERS: *(Signature)* Susan J. Hay

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC - 8260B	TAL METALS - 6010B HARDNESS - 130.2	CYANIDE - 9010B METALS-200.7 TDS-160.1 ALKALINITY - 310.1	COD - HACH 8000	TOC - 9060	REMARKS
	5/15/01	1210		X	SHM-96-SB-QA	12	3	1	1	1	3	
	5/15/01	—		X	TRIP BLANK	1	1	—	—	—	—	

Paul Young
5/15/01

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Paul Young	5/15/01 1700	FEDERAL EXP. AIRBILL # 814805265380			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)*	Date / Time	Remarks	

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

7307

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 Eng
Address: 696 Virginia Rd.
Concord, MA 01742
Contact: Marie Wojtas
Phone: 978-318-8175
Fax:
Contract/ Quote #:

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

Sampler's Name: Nancy McNally, David Lubiano, Jack Keenan
Sampler's Signature: David Lubiano, Nancy McNally

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

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	40ml A/G w/ Lt. Glass	250 ml	P/O	VOCs-8260B	Metals-6010B / Hardness 2340B	Cyanide 9010B	Anions-300, Alkalinity 310.1, TDS 160.1	COD HACH 8000	BOD 405.1	TSS 160.2	TOC 9060	Lab Sample ID (Lab Use Only)
W	29 OCT 2001	0928		X	SHM-93-10C	3	3	1	5	3	1	1	1	1	1	1	3	
W		1010		X	SHL-3	3	3	1	5	3	1	1	1	1	1	1	3	
W		1216		X	SHL-19	3	3	1	5	3	1	1	1	1	1	1	3	
W		1216		X	SHL-19MS	3	-	0	3	3	1	1	1	-	-	-	-	
W		1216		X	SHL-19MSD	3	-	0	2	3	1	1	-	-	-	-	-	
W		1225		X	SHL-10	3	3	1	5	3	1	1	1	1	1	1	3	
W		1530		X	SHL-4	3	3	1	5	3	1	1	1	1	1	1	3	
W		1548		X	SHL-11	3	3	1	5	3	1	1	1	1	1	1	3	
W		-		X	TRIP BLANK	1				1								

KAM

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Katherine Miller	10-29-01	1630	FEDEX AIRBILL # 831951198579		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

Remarks
2 Coolers Shipped

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

[1] Matrix: WW - Wastewater W - Water S - Soil 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 P/O - Plastic or other

STL cannot accept verbal changes. Please Fax written changes to (802) 655-1...

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: US Army Corps of Engr.
Address: 696 Virginia Rd.
Concord, MA 01742
Contact: Marie Wojtas
Phone: 978-318-8175
Fax:
Contract/ Quote #:

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

Sampler's Name: Nancy McNally, Paul Young
Sampler's Signature: Nancy McNally, Paul Young

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

ANALYSIS REQUESTED: VOCs-8260B; Metals-6010B / Hardness @ 314.0B; Cyanide 9010B; Anions 300; Alkalinity 310.1; TDS 160.1; COD HACH 8000; BOD 405.1; TSS 160.2; TOC 9060

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	1 liter A/G Lt. glass	250 ml	P/O	Lab Sample ID (Lab Use Only)
W	30 Oct 01	0933		X	SHL-20	3	3	1	5	
W		0920		X	SHL-9	3	3	1	5	
W		-		X	TRIP BLANK	1				
W		1119		X	SHL-5	3	3	1	5	
W		1130		X	SHM-93-22C	3	3	1	5	
W		1249		X	SHM-96-5C	3	3	1	5	
W		1325		X	SHL-22	3	3	1	5	
W		1510		X	SHM-96-5B	3	3	1	5	
W		1510		X	SHM-DUP-01-02	3	3	1	5	
W		1550		X	SHM-96-223-78'	3	3	1	5	
W		1700		X	SHM-96-223-91.7'	3	3	1	5	

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Katherine Miller	10-30-01	1720	FEDEX AIRBILL # 814805265347		
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Date:	Time:

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 _____

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

U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	NO. OF CONTAINERS	VOC 8260B	Metals 6010B / Hardness 239	Cyanide 9010B	Anions 300.0 Fluoride 340.1, TDS	COD Hach 8000	BOD #405.1	TSS 160.2	TOC 9060	REMARKS
	SHIPLEY'S HILL LTM + M										
SAMPLERS: (Signature)											

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION									
	30 OCT 2001	1510		X	SHM-96-SB-QA	12	3	1	1	1	1	1	1	3
	↓	—		X	TRIP BLANK	1	1							

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Kathleen Miller	10-30-01 1630	FEDEX AIRBILL # 831951196234			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				1 Cooler Shipped to AMRL	

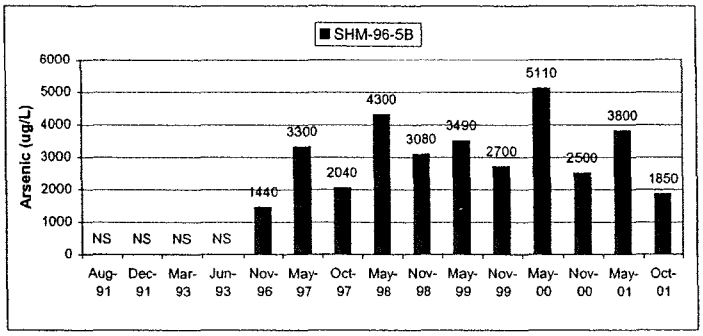
Distribution: Original Accompanies Shipment; Copy 1 to Sample Custodian; Copy 2 to Coordinator Field Files

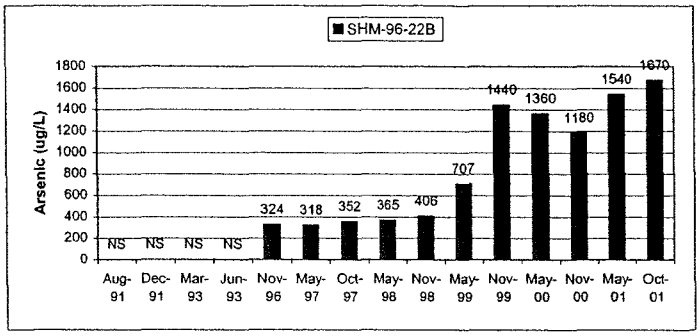
7889

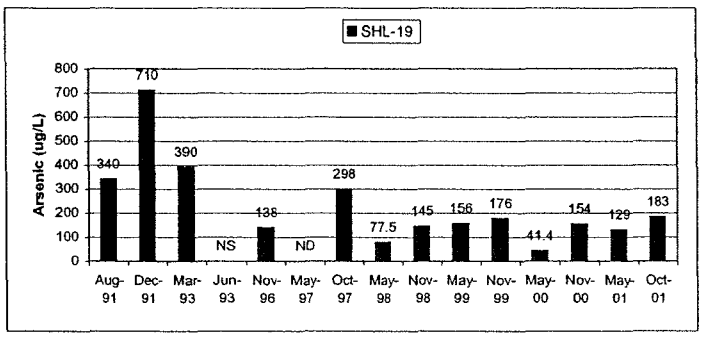
APPENDIX D

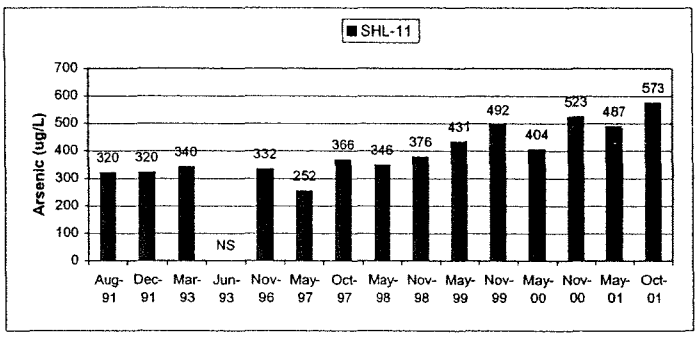
COMPARISON OF ARSENIC RESULTS

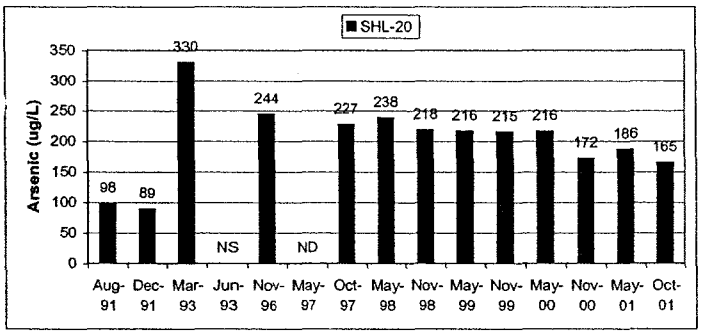
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATION CHARTS
(CLEANUP LEVEL = 50 ug/l)

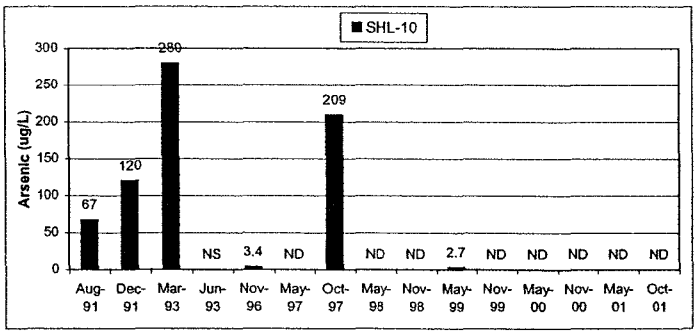


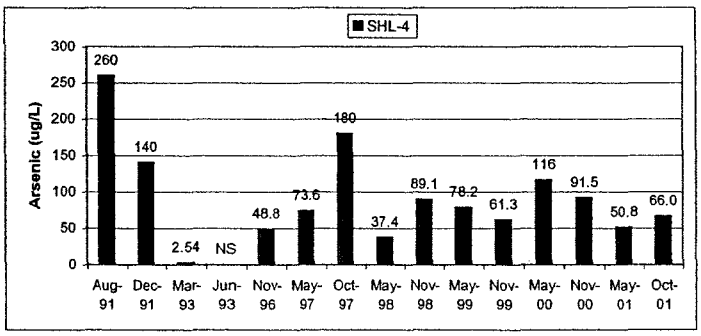


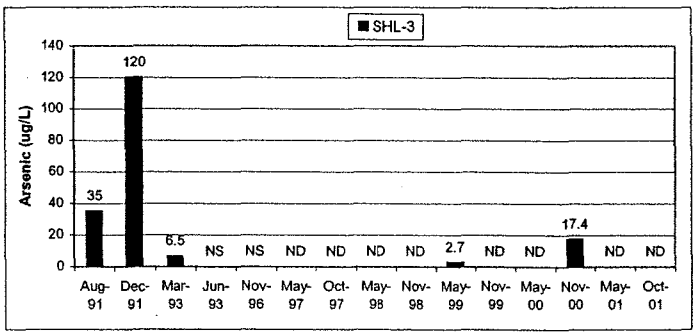










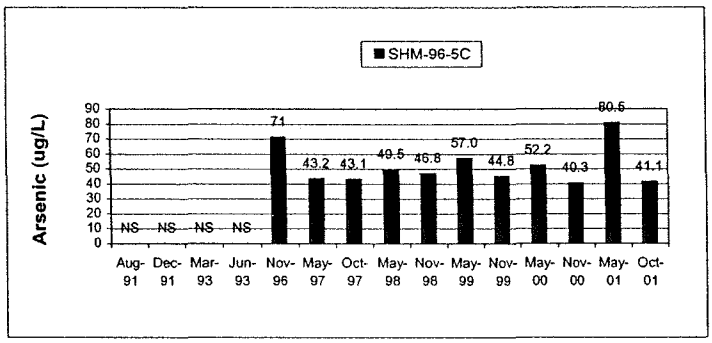


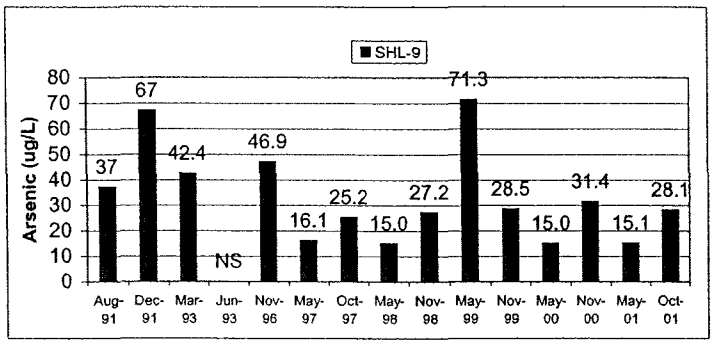
NOTES:

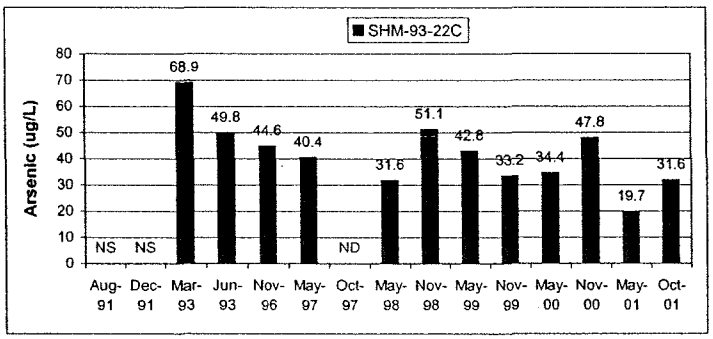
NS: Not Sampled
ND: Not Detected

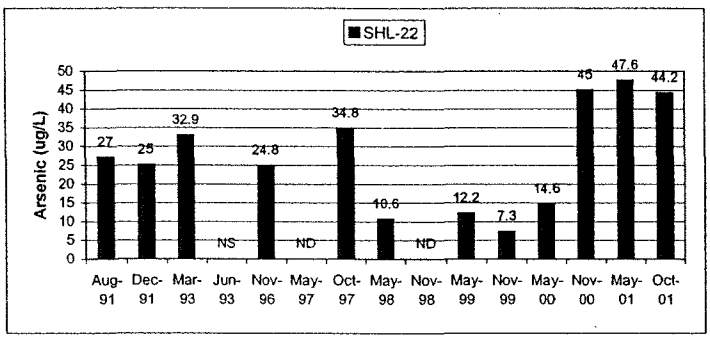
Charts are displayed in order of decreasing historical maximum arsenic concentrations

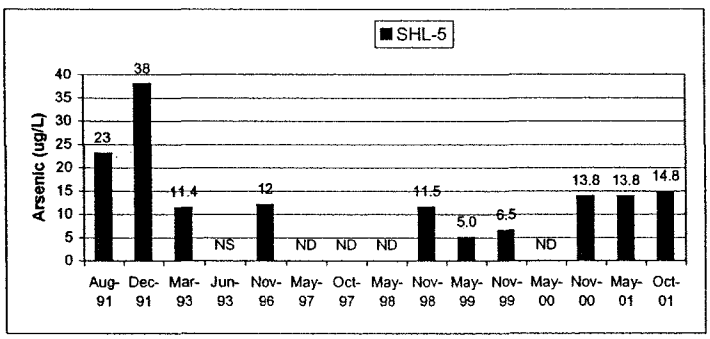
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING
HISTORIC ARSENIC CONCENTRATIONS CHARTS
(CLEANUP LEVEL = 50 ug/l)

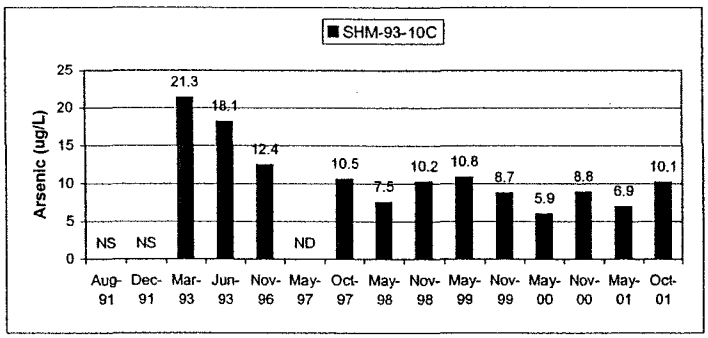












NOTES:

NS: Not Sampled
ND: Not Detected

Charts are displayed in order of decreasing historical maximum arsenic concentrations

APPENDIX E

QUALITY ASSESSMENT AND ASSURANCE REPORTS

Chemical Data Quality Assessment Report
2001

NEW ENGLAND DISTRICT – HTRW/GEOTECHNICAL ENGINEERING BRANCH
CHEMICAL DATA QUALITY ASSESSMENT REPORT

Project:	Shepley's Hill Landfill, Long Term Groundwater Monitoring (Samples collected May and October 2001)
Location:	Devens, MA
Reference:	Chemical Quality Assurance Report No. E766-062701, dated 29 June 2001 and No. E766-020802, dated 8 February 2002
Contractor:	New England District, US Army Corps of Engineers, Concord, MA
Prepared By:	Marie Wojtas, project chemist, CENAE-EP-HC
CDQAR Date:	18 March 2002

The Chemical Quality Assurance Reports (CQAR) No. E0766-062701 and E0766-020802 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 October 2001. 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, Total Suspended Solids, and Total Organic Carbon.

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. Corrective action for the Hardness issue has been implemented (as shown in the October 2001 sampling event). No further corrective action is necessary for the data discrepancies. 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 is one major data discrepancy for Zinc. Both laboratories are reporting values which are significantly below the cleanup goal. Therefore, this discrepancy is not considered to be significant and is attributed to sample matrix and laboratory variability.

Corrective Action: The data discrepancy noted is not considered significant with

respect to interpretation of trends or actions. No corrective action is needed.

b. Total Hardness – Data Discrepancies: There is one major data discrepancy for Total Hardness for the samples collected in May 2001. The discrepancy was attributed to differences in methodology between the primary and QA laboratory. There is no associated regulatory standard for Hardness and the discrepancy is not considered to significantly impact the data interpretation with respect to site objectives.

Corrective Action: Due to the data discrepancy attributed to differences in methodology between the primary and QA laboratory, the primary laboratory was directed to use the same method as the QA laboratory after the first round (May 2001) of sampling. The QA laboratory's method is considered to be more accurate and better suited to groundwater samples at this site. The data showed acceptable comparison in the second round of sampling (October 2001). This method will continue to be used by both laboratories for future sampling events.

b. Total Suspended Solids (TSS) Analysis – Data Discrepancies: There is one major data discrepancy for TSS. There is no associated regulatory standard for TSS and the discrepancy is not considered to be significant with respect to site actions. The discrepancy is attributed to sample matrix and laboratory variability.

Corrective Action: The data discrepancy noted is not considered to significantly impact the data interpretation with respect to site objectives. No corrective action is needed.

3. Contract Compliance: The primary and QA laboratory met contractual obligations for this project. The primary laboratory was directed to change their methodology for Hardness analysis for the second round of sampling due to data discrepancies noted after the first round of sampling. Overall, the primary and QA laboratory results compare satisfactorily, and the results obtained from the May and October 2001 sampling events are consistent and reasonable. Both laboratories reported satisfactory supporting quality control data.

Chemical Quality Assurance Report
Spring 2001

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-062701

MAY 15, 2001 SAMPLING EVENT

PREPARED BY
THE
GEOLOGY
AND
CHEMISTRY SECTION
ENGINEERING/PLANNING DIVISION

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

JUNE 29, 2001

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 15, 2001 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-062901

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SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 15, 2001 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-062901

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 100 target analyte determinations. The shipment contained one QA water sample and one trip blank sample and was received in good condition. The data report from the QA laboratory, AMRO, Merrimack, NH, dated 15 June 2001, was used in the comparison. In 32 of these determinations target analytes were detected by one or both laboratories. Results from the analysis of QA samples were compared with results from analysis of the corresponding primary samples (Reference 12a). The primary and QA samples agreed overall in 98 out of 100 (98.0%) of the comparisons. Primary and QA samples agreed quantitatively in 30 out of 32 (93.8%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. Two major and no 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, TDS and TOC were in good overall and quantitative agreement. There were two major data discrepancies noted in the hardness and TSS comparisons. The major discrepancy for hardness occurred in sample SHM-96-5B in which the QA laboratory reported 300 mg/L hardness and the primary laboratory reported 90 mg/L. The QA laboratory reported hardness by the calculation of the separate determinations of calcium and magnesium from the ICP-metals by 6010B, expressed as mg equivalents of calcium carbonate per liter. This is the preferred method for determining hardness and yields the higher accuracy compared to Method 130.2 which employs an EDTA titration method. Also, some metal ions interfere by causing fading or indistinct end points or by stoichiometric consumption of EDTA. If higher concentrations of heavy metals are present (Al, Ba, Cd, Co, Cu, Fe, Pb, Mn, Ni, Sr and Zn), the method recommends determining calcium and magnesium by a non-EDTA method and obtain hardness by calculation. Since calcium and magnesium were requested for all the samples, it is highly recommended that hardness be determined from the 6010B calcium and magnesium metals results to avoid this possible interference in the future monitoring. No reasonable explanation could be offered for the major discrepancy noted in the TSS comparison. All the other quantitative results for all analyses compared closely. There was very little bias to any of the QA laboratory's sample results and only a few minor QC deviations were noted in their case narrative. The data 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 primary laboratory's wet chemistry data report lacked some of the information necessary to completely evaluate the batch QC. Their data report lacked the analysis dates needed to verify holding time compliance and the QC limits for accuracy and precision were not provided for most wet chemistry methods. The primary laboratory did provided the missing information upon request by the USACE. Although there were numerous minor QC outages documented in the primary laboratory's case narrative, the sample results appear to be comparable, reasonably complete and useable.

The QA and primary laboratory's reporting limits were comparable, except for thallium and COD which were not detected in the QA sample. The primary laboratory reported the sample ID's in which tentatively identified compounds (TIC's) were detected. This CQAR is based on the laboratory reporting limits because the detection limits were not always provided or well defined.

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

Table 1
Quality Assurance Split Sample
Data Comparison Summary

Project: Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts,
May 15, 2001 Sampling Event

		Overall Agreement (1)		Quantitative Agreement (2)	
Method	**Parameter**	**Number**	**Percent**	**Number**	**Percent**
8260B	Volatiles	65/65	100	7/7	100
6020/7471	Metals/Mercury	23/23	100	17/17	100
9010B	Cyanide	1/1	100	NA	NA
300.0	Anions	4/4	100	3/3	100
410.1	COD	1/1	100	NA	NA
405.1	BOD	1/1	100	NA	NA
310.1	Alkalinity	1/1	100	1/1	100
130.2	Hardness	0/1	0	0/1	0
160.1	TDS	1/1	100	1/1	100
160.2	TSS	0/1	0	0/1	0
9060	TOC	1/1	100	1/1	100
Total		**98/100**	**98.0**	**30/32**	**93.8**

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	5-15-01	5030B/8260B-Volatiles 3010A/6010B-ICP Metals, 7470A-Mercury 9010B-Cyanide 300.0-Anions by Ion Chromatography 410.1-COD 405.1-BOD 310.1-Total Alkalinity as CaCO3 130.2-Total Hardness 160.1-Total Dissolved Solids (TDS) 160.2-Total Suspended Solids (TSS) 9060-Total Organic Carbon (TOC)
Trip Blank	Water	5-15-01	5030B/8260B-Volatiles

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
MAY 15, 2001 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-062901

QA Findings

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

AMRO Environmental Laboratories Corporation, Merrimack, NH, received one shipment containing one QA water sample and a trip blank. The samples were received in good condition on 16 May 2001. Proper sample handling protocols were followed for this shipment.

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

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

There were 65 volatile determinations. In seven of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 65 (100%) of the cases and quantitative agreement in seven out of seven (100%) of the cases. No data discrepancies were noted.

The QA laboratory's target analyte list consisted of 65 volatile compounds which were all analyzed by the primary laboratory's whose target analyte list consisted of 84 volatile compounds.

2a. Batch QC Evaluation for the QA Laboratory.

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

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

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

Laboratory Control Samples: The QA laboratory spiked the LCS with all of their 65 target analytes. The spiking levels, percent recoveries and the QC limits were appropriately indicated in the report. The QA laboratory reported that the LCS, V-3 010517A, was within the acceptance

limits for all target analytes except in three out of 65 of the cases. According to the "Shell for Analytical Chemistry Requirements", Version 1.0, 2 November 1998, a target analyte list of 65 compounds would allow five sporadic marginal failures (SMF) to fall in the expanded recovery range of (60-140%). The sample results would not be affected, since this requirement was met and the outages were only slightly above and below the acceptance limits.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the five target anlytes that were spiked in the MS and MSD were within the acceptance limits for accuracy and precision.

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

2b. Batch QC Evaluation for the Primary Laboratory.

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

Method Blanks: The method blank result associated with the QA sample showed no contamination above the laboratory's reporting limits, except for 1,2,4-trichlorobenzene at 1.0 J ug/L, hexachlorobutadiene at 1.8 J ug/L, naphthalene at 1.5 ug/L and 1,2,3-trichlorobenzene at 1.4 J ug/L which were detected in VBLKC3. These target analytes were not detected in the QA sample SHM-96-5B-QA.

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

Laboratory Control Sample (LCS/LCSDs): The primary laboratory reported that all of the target analytes in the LUTB-LCS/LCSD, were within the acceptance limits for accuracy and precision, except for the following:

LUTB-LCS/LCSD (water) 5-15-01	RDP= 0 out of 84 outside QC limits % Recoveries= 2 out of 168 outside QC limits, 1,1-dichloropropene (72-124%) at 126% and 126%

All 84 of the target analytes were spiked into the LCS and LCSD samples. The amount spiked, percent recoveries and control limits were provided in the report. None of the target analytes that were outside of the acceptable limits were detected in any of the associated samples.

Matrix Spike/Matrix Spike Duplicate (MS/MSD): The primary laboratory reported that all of the five target analytes were within the acceptance limits for accuracy and precision, except for the following:

SHL-19-MS/MSD (water) 5-15-01	RDP= 0 out of 84 outside QC limits % Recoveries= 8 out of 168 below outside QC limits

All 84 of the target analytes were spiked into the MS/MSD's. The amount spiked, percent recoveries and control limits were provided in the report. None of the target analytes that were outside of the acceptable limits were detected in any of the associated samples.

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

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

There were 22 ICP-metals determinations and one mercury determination. In 17 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 23 (100%) of the cases and quantitative agreement in 17 out of 17 (100%) of the cases. No data discrepancies were noted.

3a. Batch QC Evaluation for the QA Laboratory.

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

Method Blanks: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limit. Iron was detected below the reporting limit of 100 ug/L, at 66.1 ug/L.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the MS/MSDs were within the laboratory's acceptance limits for accuracy and precision for all the ICP-metal target analytes, except for arsenic and selenium. The arsenic outages were due to the high sample concentration relative to the spike concentration and the selenium outages were possibly due to a matrix interference. All of the spike levels, percent recoveries and QC limits were provided in the reports.

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

3b. Batch QC Evaluation for the Primary Laboratory.

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

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

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory reported that all the target analytes in the MS/MSD's results were within the acceptance limits for accuracy and precision.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate SHL-19D was within the acceptance limits for precision for all of the target analytes.

4. Data comparison for cyanide by Method 9010B.

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

4a. Batch QC Evaluation for the QA laboratory.

Holding Times: The QA sample SHM-96-5B-QA was analyzed two days outside the method prescribed holding time. This should not significantly affect the sample results.

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

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS result for cyanide was within the laboratory's acceptance limits of 90-110%, at 101%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for cyanide were within the laboratory's acceptance limits for accuracy and precision. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Sample: The QA laboratory did not report any laboratory duplicate results for cyanide.

4b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS): The primary laboratory reported that all the LCS's for cyanide were within the acceptance limits at 104.2% and 105.8%. The spike amount added and the percent recoveries were all provided in the report, but no QC limits were provided.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered below the acceptance limits of 75-125% for cyanide at 58.4%.

Duplicate Sample: The primary laboratory reported that the duplicate sample results were within the laboratory's acceptance limits.

5. Data comparison for anions by Method 300.0.

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

5a. Batch QC Evaluation for the QA laboratory.

Holding Times: The QA sample was analyzed one hour beyond the 48 hour method prescribed holding time for nitrate and o-phosphate. This should not affect the sample results.

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

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for anions were within the laboratory's acceptance limits for accuracy and precision. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

5b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS's for anions were within the assumed acceptance limits of 90-110% . The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered within the assumed acceptance limits of 80-120% for all the anions.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate results were within reasonable acceptance limits for precision.

6. Data comparison for COD by Method 410.1.

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

6a. Batch QC Evaluation for the QA laboratory.

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

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

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 106%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for COD were within the laboratory's acceptance limits of 80-120% for accuracy and precision, at 96.3% and 99.4% with a RPD of 3.18%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

6b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS's for COD were within the assumed acceptance limits of 90-110% . The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered below the assumed acceptance limits of 80-120% at 45.5%. The laboratory suspects this anomaly is due to the nature of the sample matrix. This would indicate a low bias to this sample result.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate precision at 0% RPD, but the laboratory's RPD acceptance limits were not provided.

7. Data comparison for BOD by Method 405.1.

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

7a. Batch QC Evaluation for the QA laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The QA laboratory reported that the LCS/LCSD recoveries for BOD (98.6%/76.8%) were outside the laboratory's RPD acceptance limits of 20% at 24.9% due to a low recovery in the LCSD. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

Laboratory Duplicate: The QA laboratory reported that the laboratory duplicate BOD was within the laboratory's acceptance limits of 20% at 11.8%. The duplicate for the BOD batch QC was performed on another clients sample.

7b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS/LCSD's for BOD were within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided for accuracy and precision.

Matrix Spike (MS): MS/MSD's are not applicable to BOD analysis. Refer to LCS/LCSD for accuracy and precision verification.

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

8. Data comparison for alkalinity by Method 310.1.

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

8a. Batch QC Evaluation for the QA laboratory.

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

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

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for alkalinity was within the laboratory's acceptance limits at 104%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for alkalinity were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20%RPD), at 93% and 94% recoveries with an RPD of 0.242%.

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

8b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS/LCSD's for alkalinity were within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided for accuracy and precision.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): The primary laboratory reported that the MS for alkalinity was recovered within the assumed acceptance limits of 80-120% at 97.1%.

Duplicate Sample: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits at 1.2% RPD. No QC limits for precision were provided.

9. Data comparison for hardness by Method 130.2.

There was one hardness determination. Both laboratories detected hardness in the QA sample SHM-96-5B. There was 0% overall and quantitative agreement for this determination and a major data discrepancy was noted.

The major discrepancy occurred in sample SHM-96-5B in which the QA laboratory reported 300 mg/L hardness and the primary laboratory reported 90 mg/L. The QA laboratory reported hardness by the calculation of the separate determinations of calcium and magnesium from the ICP-metals by 6010B, expressed as mg equivalents of calcium carbonate per liter. This is the preferred method for determining hardness and yields the higher accuracy compared to Method 130.2 which employs an EDTA titration method. Also, some metal ions interfere by causing fading or indistinct end points or by stoichiometric consumption of EDTA. If higher concentrations of heavy metals are present (Al, Ba, Cd, Co, Cu, Fe, Pb, Mn, Ni, Sr and Zn), the method recommends determining calcium and magnesium by a non-EDTA method and obtain hardness by calculation. Since calcium and magnesium were requested for all the samples, it is highly recommended that hardness be determined from the 6010B calcium and magnesium metals results to avoid this possible interference in the future monitoring. The following table compares the primary labs hardness by Method 130.2 to hardness by calculation:

Sample ID	6010B Calculated Hardness (mg/L)	Hardness by 130.2 (mg/L)
SHL-10	17.6	20.0
SHM-93-10C	240	232
SHL-3	13.3	18.0
SHL-19	23.0	28.0
SHL-4	80.8	82.0
SHL-11	193	184
SHL-20	**341**	**20.0**
SHL-9	68.2	76.0
SHM-93-22C	201	196
SHL-22	450	472
SHM-96-22B	**289**	**150**
SHM-96-5B	**313**	**90.0**
SHM-DUP-01	**316**	**144**
SHM-96-5C	288	300
SHL-5	30.3	34.0
EB-5B	0	< 2.0

9. (continued)

Sample ID	6010B Calculated Hardness (mg/L)	Hardness by 130.2 (mg/L)
SHM-99-32X	349	356
SHM-99-31C	392	400
SHM-99-31A	27.6	28.0
SHM-99-31B	128	124

The four samples in bold-faced print represent data discrepancies that are most likely the result of heavy metal interference with the EDTA titration Method 130.2.

9a. Batch QC Evaluation for the QA laboratory.

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

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

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for hardness were within the laboratory's acceptance limits for accuracy (75-125%) and precision (20%RPD), at 95.9% and 93.8% recoveries with an RPD of 0.639%.

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

9b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS's for hardness was within the assumed acceptance limits of 90-110% at 100%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): The primary laboratory reported that the MS for hardness was recovered within the assumed acceptance limits of 80-120% at 93.3%. The primary laboratory did not perform hardness on the sample SHL-19MSD which was requested on the chain-of-custody and no evaluation of precision could be made on this sample.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate results for SHL-19 were within reasonable acceptance limits at 6.9% RPD. No QC limits for precision were provided.

10. Data comparison for TDS and TSS by Method 310.1.

There was one total dissolved solids determination (TDS) and one total suspended solids (TSS) determination. Both laboratories reported detectable levels of TDS and TSS in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for the TDS determination and 0% overall and quantitative agreement for the TSS determination. One major data discrepancy was noted for the TSS determination.

The major discrepancy occurred in sample SHM-96-5B-QA in which the QA laboratory reported TSS at 14 mg/L and the primary laboratory reported 44.1 mg/L.

10a. Batch QC Evaluation for the QA laboratory.

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

Method Blanks: The method blank results for TDS and TSS showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 98.1% and 100%, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The QA laboratory reported that the TDS and TSS laboratory duplicates were within the laboratory's acceptance limits of 20% RPD at 11.8% and 0%, respectively.

10b. Batch QC Evaluation for the Primary Laboratory.

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

Method Blanks: All of the method blank results showed no contamination above the laboratory's

reporting limit for alkalinity.

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all the LCS/LCSD's for TDS and TSS were within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided for accuracy and precision.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits for TDS at 0% RPD. The duplicate sample results for SHL-19 were above the assumed RPD QC limit of 20% at 45.6%. The laboratory suspects this anomaly was due to the nature of the sample matrix. The laboratory also stated that the sample volume from another container was used for the TSS duplicate analysis and may have contributed to the elevated RPD. No QC limits for precision were provided.

11. Data comparison for total organic carbon (TOC) by Method 9060.

There was one TOC determination. Both laboratories detected TOC in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted. The cooler was at ambient temperature when received at the sub-contracted laboratory, STL Pittsburgh, PA.

11a. Batch QC Evaluation for the QA laboratory.

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

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

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits at 103%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for TOC were within the laboratory's acceptance limits for accuracy (72-136%) and precision (20%RPD), at 108% and 106% recoveries with an RPD of 1.9%.

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

11b. Batch QC Evaluation for the Primary Laboratory.

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

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

Laboratory Control Samples (LCS): The primary laboratory reported that the LCS for TOC was within the assumed acceptance limits of 90-110% at 108.1. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): The primary laboratory reported that the MS for TOC was recovered within the assumed acceptance limits of 80-120% at 101%. The primary laboratory did not perform TOC on the sample SHL-19MSD which was requested on the chain-of-custody and no evaluation of precision could be made on this sample.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits at 0% RPD. No QC limits for precision were provided.

12. References.

a. Data Reports for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by the primary laboratory, Severn Trent Laboratories, Inc., 208 South Park Drive, Suite 1, Colchester, VT, 05446, were received 19 June 2001. The QA laboratory's data reports, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 20 June 2001.

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

c. Shell for Analytical Chemistry Requirements, Version 1.0, USACE, 2 November 1998.

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 :
$\leq$2X difference

For **all** other analyses:
$\leq$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
:
2X<difference$\leq$3X

For **all** other analyses:
4X<difference$\leq$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
:
>3X difference

For **all** other analyses:
>5X difference

MDL = Method Detection Limit
N = Analytical result
* - not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank
DO - Diluted out
J - estimated value, above MDL but below practical quantitation limit
NA - Not analyzed
ND - Not detected
NR - Not reported

APPENDIX B

DATA COMPARISON TABLES

COMPARISON OF QA & CONTRACTOR RESULTS — Page 1 of 2

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01A	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/17/01	CONTRACTOR'S ANALYSIS DATE:	5/22/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Dichlorodifluoromethane		**1.9 J**	< 5.0		0
Chloromethane	< 5.0		< 5.0		0
Vinyl Chloride	< 2.0		< 5.0		0
Bromomethane	< 2.0		< 5.0		0
Chloroethane		**2.9 J**		**2.5 J**	0
Trichlorofluoromethane	< 2.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 10		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	< 2.0		< 5.0		0
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 5.0		< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 2.0		< 5.0		0
1,2-Dichloroethene (total)	NR			**2.6 J**	2
Methyl-t-Butyl Ether		**0.97 J**	< 5.0		0
1,1-Dichloroethane		**2.2**		**1.8 J**	0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene		**2.8**		**2.4 J**	0
2-Butanone	< 10		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 2.0		< 5.0		0
Tetrahydrofuran	NR		< 50		2
Chloroform	< 2.0		< 5.0		0
1,1,1-Trichloroethane	< 2.0		< 5.0		0
Carbon Tetrachloride	< 2.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene		**0.96 J**		**1.1 J**	0
1,2-Dichloroethane	< 2.0		< 5.0		0
Trichloroethene	< 2.0		< 5.0		0
1,2-Dichloropropane	< 2.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 2.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 2.0		< 5.0		0
2-Chloroethyl Vinyl Ether	NR		< 5.0		2
cis-1,3-Dichloropropene	< 1.0		< 5.0		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

J=Estimated value greater than one half the reporting limit.

B=Analyte was detected in method blank.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01A	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/17/01	CONTRACTOR'S ANALYSIS DATE:	5/22/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: WATER

DATE SAMPLED: 5/15/01

UNITS: ug/L

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
4-Methyl-2-pentanone	< 10		< 5.0		0
Toluene	< 2.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 2.0		< 5.0		0
Tetrachloroethene	< 2.0		< 5.0		0
2-Hexanone	< 10		< 5.0		2
Dibromochloromethane	< 2.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene	< 2.0		< 5.0		0
1,1,1,2-Tetrachloroethane	< 2.0		< 5.0		0
Ethylbenzene	< 2.0		< 5.0		0
Xylene (m,p)	< 2.0		< 5.0		0
Xylene (total)	< 2.0		< 5.0		0
Xylene (o)	< 2.0		< 5.0		0
Styrene	< 2.0		< 5.0		0
Bromoform	< 2.0		< 5.0		0
Isopropylbenzene	< 2.0		< 5.0		0
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	< 2.0		< 5.0		0
1,2,3-Trichloropropane	< 2.0		< 5.0		0
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	< 2.0		< 5.0		0
1,4-Dichlorobenzene		**1.4 J**	< 5.0		0
1,2-Dichlorobenzene	< 2.0		< 5.0		0
1,2-Dibromo-3-Chloropropane	< 5.0		< 5.0		0
1,2,4-Trichlorobenzene	< 2.0		< 5.0		0
Hexachlorobutadiene	< 2.0		< 5.0		0
Naphthalene	< 5.0		< 5.0		0
2,2-Dichloropropane	< 2.0		< 5.0		0
1,1-Dichloropropene	< 2.0		< 5.0		0
1,3-Dichloropropane	< 2.0		< 5.0		0
Bromobenzene	< 2.0		< 5.0		0
n-Propylbenzene	< 2.0		< 5.0		0
2-Chlorotoluene	< 2.0		< 5.0		0
4-Chlorotoluene	< 2.0		< 5.0		0
1,3,5-Trimethylbenzene	< 2.0		< 5.0		0
tert-Butylbenzene	< 2.0		< 5.0		0
1,2,4-Trimethylbenzene	< 2.0		< 5.0		0
sec-Butylbenzene	< 2.0		< 5.0		0
4-Isopropyltoluene	< 2.0		< 5.0		0
n-Butylbenzene	< 2.0		< 5.0		0
1,2,3-Trichlorobenzene	< 2.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
Dibromofloromethane (85-118)	105	Toluene-d8 (88-110)	99
1,2-Dichloroethane-d4 (75-124)	101	1,2-Dichloroethane-d4 (72-141)	104
Toulene-d8 (86-111)	101	Bromofluorobenzene (72-122)	103
4-Bromofluorobenzene (76-113)	97.4	1,2-Dichlorobenzene-d4 (69-124)	104

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

J=Estimated value greater than one half the reporting limit.

B=Analyte was detected in method blank.

* = Surrogates outside of acceptable limits

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01B	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/22/01	CONTRACTOR'S ANALYSIS DATE:	6/1/01
QA LABORATORY:	AMRO	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: 5/15/01

UNITS: ug/L

PARAMETER	QA LAB LRL		RESULTS QA LAB	CONTRACTOR LRL		RESULTS CONTRACTOR	COMPARISON CODE
Aluminum	< 200			< 98.5			0
Antimony	< 20			< 3.1			0
Arsenic			**4300**			**3800**	0
Barium			**60 J**			**57.8 B**	0
Beryllium	< 5.0					**0.33 B**	0
Cadmium	< 5.0					**0.80 B**	0
Calciuum	**95000**					**99900**	0
Chromium	< 10					**6.2 B**	0
Colbolt			**19 J**			**17.5 B**	0
Copper	< 25			< 11.0			0
Iron			**35000**			**36700**	0
Lead	< 5.0					**2.1 B**	0
Magnesium			**15000**			**15400**	0
Manganese			**11000**			**10800**	0
Mercury	< 0.20	(5-18-01)		< 0.10	(5-29-01)		0
Nickel			**19 J**			**16.7 B**	0
Potassium	**9800**					**11600**	0
Selenium	< 5.0			< 3.9			0
Silver	< 7.0					**2.6 B**	0
Sodium	**38000**					**39600**	0
Thallium	< 5.0			< 73.0			0
Vanadium	< 50					**2.3 B**	0
Zinc			**20**			**10.7 B**	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

B= Less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detction Limit (IDL).

J= Analyte detected below quantitation limit.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01C	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/31/01	CONTRACTOR'S ANALYSIS DATE:	5/22/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9010B	ANALYSIS METHOD:	335.4

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
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

*Note: Cyanide was analyzed two days outside the holding time.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01D	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	See Below	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	CL and SO4 by 300.0	ANALYSIS METHOD:	300.0
	Nitrate by 353.2, o-PO4 by 365.2		
MATERIAL DESCRIPTION:	WATER		
DATE SAMPLED:	5/15/01		
UNITS:	mg/L		

PARAMETER		QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Chloride, CL	(5-25-01)		**42**		**49.0**	**0**
Nitrate, as N	(5-17-01)	< 0.20*		< 0.20		0
Othophosphate, as P	(5-17-01)		**0.25***	< 0.30		0
Sulfate, SO4	(5-18-01)		**4.3**		**4.6**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

*=The 48 hour holding time was exceeded by 1 hour.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01E	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/24/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4	ANALYSIS METHOD:	410.1

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	mg/L

PARAMETER	QA LAB RESULTS	QA LAB LRL	CONTRACTOR RESULTS	CONTRACTOR LRL	COMPARISON CODE
Chemical Oxygen Demand (COD)	< 50		< 5.0		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01F	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/17/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	mg/L

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

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01D	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/29/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.1	ANALYSIS METHOD:	310.1

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Total Alkalinity as CaCO3		**370**		**360**	**0**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01D	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/22/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	6010B	ANALYSIS METHOD:	130.2

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Total Hardness as CaCO3		300		90*	4

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

*Note: Hardness as calculated by the separate determinations of calcium and magnesium, expressed as mg equivalent CaCO3/L equals 312 mg/L.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	0105167-01D and G	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5-(19+16)-2001	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	160.1 and 160.2	ANALYSIS METHOD:	160.1 and 160.2

MATERIAL DESCRIPTION:	WATER
DATE SAMPLED:	5/15/01
UNITS:	mg/L

PARAMETER	QA LAB LRL	QA LAB RESULTS	CONTRACTOR LRL	CONTRACTOR RESULTS	COMPARISON CODE
Total Dissolved Solids (TDS by 160.1)		**500**		**467**	**0**
Total Suspended Solids (TSS by 160.2)		**14**		**44.1**	**4**

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, SPRING 2001

QA SAMPLE No.:	C1E210170-001	CONTRACTORS SAMPLE No.:	453837
QA FIELD ID:	SHM-96-5B-QA	CONTRACTORS FIELD ID:	SHM-96-5B
QA ANALYSIS DATE:	5/24/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL, Pittsburgh	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9060	ANALYSIS METHOD:	9060
MATERIAL DESCRIPTION:	WATER		
DATE SAMPLED:	5/15/01		
UNITS:	mg/L		

PARAMETER	QA LAB LRL	RESULTS QA LAB	CONTRACTOR LRL	RESULTS CONTRACTOR	COMPARISON CODE
Total Organic Carbon (TOC)		6.7		6.7	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

0105167

PROJ. NO.	PROJECT NAME
CP776	SHEPLEY'S HILL LTM+M

SAMPLERS: (Signature) Susan J. Hay

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC - 8260B	TAL METALS - 6010B HARDNESS - 130.2	CYANIDE - 9010B ANIONS - 300	ALKALINITY - 310.1	COD - HACH 8000	BOD - 405.1	TSS - 160.2	TOC - 9060	REMARKS
	5/15/01	1210		X	SHM-96-5B-9A	12	3	1	1	1	1	1	1	3	
	5/15/01	—		X	TRIP BLANK	1	1	—	—	—	—	—	—	—	

Paul Young 5/15/01

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Paul Young	5/15/01 1700	FEDERAL EXP. AIRBILL # 814805265380			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
		C Cearley	5/16/01 10:05		

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

7307

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
~~(603) 424-2022~~

Client: USACE
Project Name: E0776 SHEPLEY'S HILL
Ship via: (circle one) Fed Ex., UPS, AMRO Courier, LTM + M
Hand Del., Other Courier, Other:

AMRO ID: 0105167
Date Rec.: 5-16-01
Date Due: 5-29-01

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?	✓			
2. Custody Seals present?	✓			one seal
3. Custody Seals Intact?	✓			
4. Air Bill included in folder if received?	✓			
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 3°				
Samples rec. with ice ✓ ice packs ___ neither ___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?	✓			
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:	✓			
What samples sent: OIH				
Where sent: STL - PITTSBURGH				
Date: 5-18-01				
Analysis: TOC				
TAT: STD				
21. Information entered into:				
Internal Tracking Log?	✓			
Dry Weight Log?			✓	
Client Log?		✓		
Composite Log?			✓	
Filtration Log?			✓	

Received By: CC Date: 5-16-01 Logged in By: CC Date: 5-17-01
Labeled By: CC Date: 5-17-01 Checked By: [signature] Date: 5-17-01

NA= Not Applicable

Chemical Quality Assurance Report
Fall 2001

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-020802

OCTOBER 30, 2001 SAMPLING EVENT

PREPARED BY
THE
GEOLOGY
AND
CHEMISTRY SECTION
ENGINEERING/PLANNING DIVISION

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

FEBRUARY 8, 2002

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
OCTOBER 30, 2001 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-020802

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SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
OCTOBER 30, 2001 - QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-020802

Executive Summary

QA samples from one shipment for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts were analyzed by the QA laboratory, resulting in a total of 101 target analyte determinations. The shipment contained one QA water sample and one trip blank sample and was received in good condition. The data report from the QA laboratory, AMRO, Merrimack, NH, dated 14 December 2001, was used in the comparison. In 32 of these determinations target analytes were detected by one or both laboratories. Results from the analysis of QA samples were compared with results from analysis of the corresponding primary samples (Reference 12a). The primary and QA samples agreed overall in 100 out of 101 (99.0%) of the comparisons. Primary and QA samples agreed quantitatively in 29 out of 30 (96.7%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. One major and no 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-6010B, CN, Anions, COD, BOD, Alkalinity, TDS, TSS, hardness and TOC were in good overall and quantitative agreement. There was one major data discrepancies noted in the metals comparison which occurred in sample SHM-96-5B in which the QA laboratory reported zinc at 21 ug/L and the primary laboratory reported 2.7 B ug/L. This should not significantly affect the usability of the metals data.

The primary laboratory (STL-VT) was requested by the Corps to report hardness by the calculation of the separate determinations of calcium and magnesium from the ICP-metals by 6010B, expressed as mg equivalents of calcium carbonate per liter. This is the preferred method for determining hardness and yields the higher accuracy compared to Method 130.2, which employs an EDTA titration method. It appears that the previous discrepancies noted in the hardness results were caused by certain metal ions which interfere by causing fading, indistinct end points or by stoichiometric consumption of EDTA. If higher concentrations of heavy metals are present (Al, Ba, Cd, Co, Cu, Fe, Pb, Mn, Ni, Sr and Zn), the method recommends determining calcium and magnesium by a non-EDTA method and obtain hardness by calculation. This method change appears to have resolved the past hardness data discrepancies noted between the QA and primary laboratories. Refer to Section 9, page 13, Data Comparison

for hardness by calculation by Method 2340B, for a more detailed discussion. All the other quantitative results for all analyses compared closely. There was very little bias to any of the QA laboratory's sample results and only a few minor QC deviations were noted in their case narrative. The data 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 primary laboratory's wet chemistry data report lacked some of the information necessary to completely evaluate the batch QC. Their data report lacked the analysis dates needed to verify holding time compliance, and the QC limits for accuracy and precision were not provided for most wet chemistry methods. The primary laboratory did not provide the missing information. Although there were numerous minor QC outages documented in the primary laboratory's case narrative, the sample results appear to be comparable, reasonably complete, and useable. The missing information is most likely available, but it just wasn't included in STL-VT's report format. The Corps has requested that the missing information be included in their future reports so that a more complete evaluation can be performed.

The QA and primary laboratory's reporting limits were comparable, except for thallium and COD which were not detected in the QA sample. The primary laboratory reported the sample ID's in which tentatively identified compounds (TIC's) were detected. The QA sample SHM-96-5B was also reported to contain TIC's. This CQAR is based on the laboratory reporting limits because the detection limits were not always provided or well defined.

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

Table 1
Quality Assurance Split Sample
Data Comparison Summary

Project: Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, October 30, 2001 Sampling Event

		Overall Agreement (1)		Quantitative Agreement (2)	
Method	**Parameter**	**Number**	**Percent**	**Number**	**Percent**
8260B	Volatiles	66/66	100	6/6	100
6020/7471	Metals/Mercury	22/23	95.7	15/16	93.8
9010B	Cyanide	1/1	100	NA	NA
300.0	Anions	4/4	100	3/3	100
410.1	COD	1/1	100	NA	NA
405.1	BOD	1/1	100	NA	NA
310.1	Alkalinity	1/1	100	1/1	100
130.2	Hardness	1/1	100	1/1	100
160.1	TDS	1/1	100	1/1	100
160.2	TSS	1/1	100	1/1	100
9060	TOC	1/1	100	1/1	100
Total		**100/101**	**99.0**	**29/30**	**96.7**

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	10-30-01	5030B/8260B-Volatiles 3010A/6010B-ICP Metals, 7470A-Mercury 9010B-Cyanide 300.0-Anions by Ion Chromatography 410.1-COD 405.1-BOD 310.1-Total Alkalinity as CaCO3 2340B-Total Hardness by Calculation 160.1-Total Dissolved Solids (TDS) 160.2-Total Suspended Solids (TSS) 9060-Total Organic Carbon (TOC)
Trip Blank	Water	10-30-01	5030B/8260B-Volatiles

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING
DEVENS, MASSACHUSETTS
OCTOBER 30, 2001 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT
No. E0776-020802

QA Findings

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

AMRO Environmental Laboratories Corporation, Merrimack, NH, received one shipment containing one QA water sample and a trip blank. The samples were received in good condition on 31 October 2001. Proper sample handling protocols were followed for this shipment, except the cyanide sample container needed to be adjusted for pH at the lab.

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

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

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

The QA laboratory's target analyte list consisted of 66 volatile compounds which were all analyzed by the primary laboratory whose target analyte list consisted of 84 volatile compounds. The primary laboratory was requested to report the presence of Tentatively Identified Compounds (TIC's) in all the samples. QA sample SHM-96-5B-QA was reported to contain TIC's.

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

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

Method Blanks: Results of all the method blanks that were associated with the QA split samples showed no contamination above the laboratory's reporting limit for any of the target analytes, except for carbon disulfide which was detected below the reporting limit of 2.0 ug/L at 0.74 J ug/L.

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

Laboratory Control Samples: The QA laboratory spiked the LCS with all of their 66 target analytes. The spiking levels, percent recoveries and the QC limits were appropriately indicated in the report. The QA laboratory reported that the LCS, V-3 011106A, was within the acceptance limits for all of the target analytes. According to the "Shell for Analytical Chemistry Requirements", Version 1.0, 2 November 1998, a target analyte list of 66 compounds would allow five sporadic marginal failures (SMF) to fall in the expanded recovery range of (60-140%). The sample results would not be affected, since this requirement was met.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the five target anlytes that were spiked in the MS and MSD were within the acceptance limits for accuracy and precision. The MS/MSD's samples reported were from another client's project.

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

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

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

Method Blanks: The method blank results associated with the QA sample showed no contamination above the laboratory's reporting limits, except for 1,2,4-trichlorobenzene at 1.0 J ug/L, hexachlorobutadiene at 1.6 J ug/L, naphthalene at 1.6 ug/L, and 1,2,3-trichlorobenzene at 1.8 J ug/L which were detected in the method blank samples VBLKK4 and VBLKK7. These target analytes were not detected in the QA sample SHM-96-5B-QA and were below the reporting limit of 5.0 ug/L. Method blank VBLKK7 also contained isobutyl alcohol at 11 J ug/L.

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

Laboratory Control Sample (LCS/LCSDs): The primary laboratory reported that all of the target analytes in the LSQC/LSQD-LCS/LCSD, were within the acceptance limits for accuracy and precision, except for the following:

NSQC-LCS/LCSD (water) 10-30-01	RDP= 0 out of 84 outside QC limits % Recoveries= 1 out of 168 outside QC limits,
NSQD-LCS/LCSD (water) 10-30-01	RDP= 0 out of 84 outside QC limits % Recoveries= 11 out of 168 outside QC limits,

All 84 of the target analytes were spiked into the LCS and LCSD samples. The amount spiked, percent recoveries and control limits were provided in the report. None of the target analytes that were marginally below the acceptable limits were detected in any of the associated samples. This may indicate a slight low bias to these analytes around the reporting limit. According to the

"Shell for Analytical Chemistry Requirements", Version 1.0, 2 November 1998, a target analyte list of 84 compounds would allow six sporadic marginal failures in the range of 60-140% recoveries before re-extraction and analysis of the entire analytical batch should occur. This requirement was met.

Matrix Spike/Matrix Spike Duplicate (MS/MSD): The primary laboratory reported that all of the five target analytes were within the acceptance limits for accuracy and precision, except for the following:

SHL-19-MS/MSD (water) 10-30-01	RDP= 0 out of 84 outside QC limits % Recoveries= 26 out of 168 below outside QC limits

All 84 of the target analytes were spiked into the MS/MSD's. The amount spiked, percent recoveries and control limits were provided in the report. None of the target analytes that were below the acceptable limits were detected in any of the associated samples and the outages may be attributed to matrix effects.

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

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

There were 22 ICP-metals determinations and one mercury determination. In 16 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 22 (95.7%) of the cases and quantitative agreement in 15 out of 16 (93.8%) of the cases. One major data discrepancy was noted.

The major data discrepancy occurred in sample SHM-96-5B-QA in which the primary laboratory reported zinc at 2.7 B ug/L and the QA laboratory reported 21 ug/L.

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

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

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

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that all of the MS/MSDs were within the laboratory's acceptance limits for accuracy and precision for all the

ICP-metal target analytes, except for thallium which was recovered at 57.0% and 56.7%. The thallium outages were possibly due to a matrix interference. All of the spike levels, percent recoveries and QC limits were provided in the reports.

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

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

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

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

Laboratory Control Samples (LCS/LCSDs): The primary laboratory reported that all of the target analytes were recovered within the assumed acceptance limits of 80-120% recoveries. The primary laboratory did not provide LCS acceptance limits in their report.

Matrix Spike (MS): The primary laboratory performed a matrix spike on sample SHL-19. The primary laboratory reported that all the target analytes in the MS recoveries were within the acceptance limits (75-125%) for accuracy, except for thallium which was recovered at 58.0%. The post digestion spike recovery also indicated a slight low recovery for thallium at 63.9%. The data indicates a low bias to the sample results for thallium at the reporting limit, since thallium was not detected in any of the samples.

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

4. Data comparison for cyanide by Method 9010B.

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

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

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

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

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS result for cyanide was within the laboratory's acceptance limits of 90-110%, at 97.5%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

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

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

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

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

Laboratory Control Sample (LCS): The primary laboratory reported the LCS for cyanide was within the assumed acceptance limits of 90-110% at 106.9%. The spike amount added and the percent recoveries were all provided in the report, but no QC limits were provided.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered within the acceptance limits of 75-125% for cyanide at 91.1%.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate sample results were within the laboratory's acceptance limits.

5. Data comparison for anions by Method 300.0.

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

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

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

Method Blanks: The method blank results for anions showed no contamination above the laboratory's reporting limit, except for ortho-phosphate which was detected below the reporting limit of 0.10 mg/L at 0.02mg/L.

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS results for anions were within the laboratory's acceptance limits of 90-110%, except that no LCS results for otho-phosphate were provided. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS for

anions were within the laboratory's acceptance limits for accuracy. The QA laboratory did not provide any MSD results and precision could not be determined. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Laboratory Duplicate: The QA laboratory reported that all the anions laboratory duplicate results were within the acceptance limits of 20% RPD.

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

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

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

Laboratory Control Samples (LCSs): The primary laboratory reported that all the LCS's for anions were within the assumed acceptance limits of 90-110% . The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided. No LCSD was provided and no evaluation of precision could be made.

Matrix Spike (MS): The primary laboratory reported that the MS sample SHL-19MS was recovered within the assumed acceptance limits of 80-120% for all the anions. No acceptance limits were provided for the matrix spike.

Laboratory Duplicate: The primary laboratory reported that the laboratory duplicate results were within reasonable acceptance limits for precision, but no acceptance limits were provided.

6. Data comparison for COD by Method 410.1.

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

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

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

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

Laboratory Control Samples (LCS): The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 98%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for COD were within the laboratory's acceptance limits of 80-120% for accuracy and

precision, at 102% and 102% with a RPD of 0.433%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

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

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

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

Laboratory Control Sample (LCS): The primary laboratory reported that the LCS for COD was within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided. No LCSD was provided and no evaluation of precision could be made.

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

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for COD and no evaluation of precision could be made.

7. Data comparison for BOD by Method 405.1.

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

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

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

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

Laboratory Control Samples (LCS/LCSDs): The QA laboratory reported that the LCS/LCSD recoveries for BOD were within the laboratory's acceptance limits for accuracy and precision at 95.5% and 98.8% recoveries, with a RPD of 3.43%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

Laboratory Duplicate: The QA laboratory did not report any laboratory duplicate results for BOD and no evaluation of precision could be made.

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

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

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

Laboratory Control Sample (LCS): The primary laboratory reported that all the LCS's for BOD were within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided. Precision could not be evaluated because no LCSD was performed for the BOD analysis.

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

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

8. Data comparison for alkalinity by Method 310.1.

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

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

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

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

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for alkalinity was within the laboratory's acceptance limits of 80-120% at 104%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for alkalinity were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20%RPD), at 104% and 104% recoveries with an RPD of 0%.

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

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

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

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

Laboratory Control Sample (LCS): The primary laboratory reported that the LCS for alkalinity was within the assumed acceptance limits of 90-110% at 106.3. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided for accuracy and precision. Precision could not be evaluated because no LCSD was performed for alkalinity.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory reported that the MS for alkalinity was recovered within the assumed acceptance limits of 80-120% at 86.8%. No acceptance limits were provided for accuracy and precision. Precision could not be evaluated because no MSD was requested on the C-O-C for alkalinity.

Laboratory Duplicate: The primary laboratory reported the laboratory duplicate results for sample SHL-19 were within reasonable acceptance limits at 4.1% RPD. No QC limits for precision were provided.

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

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

The primary laboratory was requested to perform hardness by the calculation of the separate determinations of calcium and magnesium from the ICP-metals by 6010B (Method 2340B), expressed as mg equivalents of calcium carbonate per liter. The results of the 15 May 2001 QA sampling event indicated a major discrepancy which occurred in sample SHM-96-5B in which the QA laboratory reported 300 mg/L hardness and the primary laboratory reported 90 mg/L. The QA laboratory reported hardness by Method 2340B. This is the preferred method for determining hardness and yields the higher accuracy compared to Method 130.2 which employs an EDTA titration method. Also, some metal ions interfere by causing fading or indistinct end points or by stoichiometric consumption of EDTA. If higher concentrations of heavy metals are present (Al, Ba, Cd, Co, Cu, Fe, Pb, Mn, Ni, Sr and Zn), the method recommends determining calcium and magnesium by a non-EDTA method and obtain hardness by calculation. Previous sampling events have indicated several data discrepancies when the calculated hardness was

compared to hardness by titration, Method 130.2. Hardness will be determined from the 6010B calcium and magnesium metals (Method 2340B) results to avoid this possible interference in the future long term monitoring testing. The following table compares the primary lab's hardness by Method 130.2 to hardness by calculation and to the October 2001 sampling event results:

Sample ID	Calculated Hardness 5-15-01 (mg/L)	Hardness by 130.2 5-15-01 (mg/L)	Calculated Hardness 10-30-01 (mg/L)
SHL-10	17.6	20.0	26.4
SHM-93-10C	240	232	235
SHL-3	13.3	18.0	25.9
SHL-19	23.0	28.0	63.1
SHL-4	80.8	82.0	142
SHL-11	193	184	183
SHL-20	**341**	**20.0**	**340 (As=165)**
SHL-9	68.2	76.0	72.1
SHM-93-22C	201	196	259
SHL-22	450	472	429
SHM-96-22B-91.7'	**289**	**150**	**285 (As=1240)**
SHM-96-5B	**313**	**90.0**	**330 (As=1850)**
SHM-DUP-01	**316**	**144**	**329 (As=1830)**
SHM-96-5C	288	300	252
SHL-5	30.3	34.0	37.0
EB-5B	0	< 2.0	< 1.6
SHM-99-32X	349	356	373
SHM-99-31C	392	400	408
SHM-99-31A	27.6	28.0	29.4
SHM-99-31B	128	124	122

The four samples in bold-faced print represent the historical data discrepancies that were most likely the result of heavy metal interference with the EDTA titration Method 130.2. The results from the hardness by calculation from 15 May 2001 compare reasonably close to the results from the hardness by calculation from 30 October 2001.

9a. Batch QC Evaluation for the QA laboratory-AMRO.

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

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

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for hardness was within the laboratory's acceptance limits of (80-120%) at 102%. All of the spike

levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for hardness were within the laboratory's acceptance limits for accuracy (75-125%) and precision (20%RPD), 102% and 103% recoveries with an RPD of 0.284%.

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

9b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

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

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

Laboratory Control Samples (LCS/LCSD's): The primary laboratory did not report any LCS results for hardness. No evaluation of method performance (accuracy and precision) on an interference free matrix could be made.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): The primary laboratory did not report any MS/MSD results for hardness. No evaluation of accuracy and precision based on matrix effects could be made. The primary laboratory did not provide hardness results on the samples SHL-19MS and MSD which were requested on the chain-of-custody.

Laboratory Duplicate: The primary laboratory did not report any laboratory duplicate results for hardness for SHL-19. No QC limits for precision were provided.

10. Data comparison for TDS and TSS by Methods 160.1 and 160.2.

There was one total dissolved solids determination (TDS) and one total suspended solids (TSS) determination. Both laboratories reported detectable levels of TDS and TSS in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for the TDS determination and 100% overall and quantitative agreement for the TSS determination. No data discrepancies were noted for the TDS and TSS determinations.

10a. Batch QC Evaluation for the QA laboratory-AMRO.

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

Method Blanks: The method blank results for TDS and TSS showed no contamination above the laboratory's reporting limits.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 102% and 105%, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The QA laboratory reported that the TDS and TSS laboratory duplicates were within the laboratory's acceptance limits of 20% RPD at 0.426% and 10%, respectively.

10b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

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

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

Laboratory Control Sample (LCS): The primary laboratory reported that all the LCS's for TDS and TSS were within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided for accuracy and precision. No LCSD's were performed and no evaluation of precision could be made.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): MS/MSD's are not applicable for TDS and TSS.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits for TDS at 1.5% RPD. No duplicate sample result for TSS was provided. No QC limits for precision were provided.

11. Data comparison for total organic carbon (TOC) by Method 9060.

There was one TOC determination. Both laboratories detected TOC in the QA sample SHM-96-5B. There was 100% overall and quantitative agreement for this determination. No data discrepancy was noted. The cooler was at the proper temperature when received at the sub-contracted laboratory, STL Pittsburgh, PA.

11a. Batch QC Evaluation for the QA laboratory-AMRO.

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

Method Blanks: The method blank results for TOC showed no contamination above the

laboratory's reporting limit.

Laboratory Control Sample (LCS): The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits at 97%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for TOC were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20%RPD), at 99% and 103% recoveries with an RPD of 3.5%.

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

11b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

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

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

Laboratory Control Samples (LCS's): The primary laboratory reported that the LCS's for TOC was within the assumed acceptance limits of 90-110%. The spike amount added and percent recoveries were all provided in the report, but the QC limits were not provided. No LCSD's were provided and no evaluation of precision could be made.

Matrix Spike/Matrix Sipke Duplicate(MS/MSDs): The primary laboratory did not provide any MS/MSD results for TOC and no evaluation of accuracy and precision based on matrix effects could be made.

Laboratory Duplicate: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits at 0% RPD. No QC limits for precision were provided.

12. References.

a. Data Reports for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts, prepared by the primary laboratory, Severn Trent Laboratories, Inc., 208 South Park Drive, Suite 1, Colchester, VT, 05446, were received 28 November 2001. The QA laboratory's data report, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 17 December 2001.

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

c. Shell for Analytical Chemistry Requirements, Version 1.0, USACE, 2 November 1998.

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 :
$\leq$2X difference

For **all** other analyses:
$\leq$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
:
2X<difference$\leq$3X

For **all** other analyses:
4X<difference$\leq$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
:
>3X difference

For **all** other analyses:
>5X difference

MDL = Method Detection Limit
N = Analytical result
* - not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank
DO - Diluted out
J - estimated value, above MDL but below practical quantitation limit
NA - Not analyzed
ND - Not detected
NR - Not reported

APPENDIX B

DATA COMPARISON TABLES

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECTSHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01A	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	11/6/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: **WATER**
DATE SAMPLED: **10/30/01**
UNITS: ug/L

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Dichlorodifluoromethane	< 5.0		< 5.0		0
Chloromethane	< 5.0		< 5.0		0
Vinyl Chloride	< 2.0		< 5.0		0
Bromomethane	< 2.0		< 5.0		0
Chloroethane					0
Trichlorofluoromethane	< 2.0		< 5.0		0
Acrolein	NR		< 5.0		2
Freon TF	NR		< 5.0		2
1,1-Dichloroethene	< 1.0		< 5.0		0
Acetone	< 10		< 5.0		0
Methyl Iodide	NR		< 5.0		2
Carbon Disulfide	< 2.0		< 5.0		0
Allyl Chloride	NR		< 5.0		2
Methylene Chloride	< 5.0		< 5.0		0
Acrylonitrile	NR		< 5.0		2
trans-1,2-Dichloroethene	< 2.0		< 5.0		0
1,2-Dichloroethene (total)	NR				2
Methyl-t-Butyl Ether			< 5.0		0
1,1-Dichloroethane					0
Vinyl Acetate	NR		< 5.0		2
Chloroprene	NR		< 5.0		2
cis-1,2-Dichloroethene					0
2-Butanone	< 10		< 5.0		0
Proionitrile	NR		< 20		2
Methacrylonitrile	NR		< 5.0		2
Bromochloromethane	< 2.0		< 5.0		0
Tetrahydrofuran	NR		< 50		2
Chloroform	< 2.0		< 5.0		0
1,1,1-Trichloroethane	< 2.0		< 5.0		0
Carbon Tetrachloride	< 2.0		< 5.0		0
Isobutyl Alcohol	NR		< 250		2
Benzene			< 5.0		0
1,2-Dichloroethane	< 2.0		< 5.0		0
Trichloroethene	< 2.0		< 5.0		0
1,2-Dichloropropane	< 2.0		< 5.0		0
Methyl Methacrylate	NR		< 5.0		2
Dibromomethane	< 2.0		< 5.0		0
1,4-Dioxane	NR		< 250		2
Bromodichloromethane	< 2.0		< 5.0		0
2-Chloroethyl Vinyl Ether	NR		< 5.0		2
cis-1,3-Dichloropropene	< 1.0		< 5.0		0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
J=Estimated value greater than one half the reporting limit.
B=Analyte was detected in method blank.

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01A	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	11/6/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	5030B	EXTRACTION METHOD:	5030B
ANALYSIS METHOD:	8260B	ANALYSIS METHOD:	8260B

MATERIAL DESCRIPTION: **WATER**
DATE SAMPLED: **10/30/01**
UNITS: ug/L

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
4-Methyl-2-pentanone	< 10		< 5.0		0
Toluene	< 2.0		< 5.0		0
trans-1,3-Dichloropropene	< 1.0		< 5.0		0
Ethyl Methacrylate	NR		< 5.0		2
1,1,2-Trichloroethane	< 2.0		< 5.0		0
Tetrachloroethene	< 2.0		< 5.0		0
2-Hexanone	< 10		< 5.0		0
Dibromochloromethane	< 2.0		< 5.0		0
1,2-Dibromoethane	< 2.0		< 5.0		0
Chlorobenzene	< 2.0		< 5.0		0
1,1,1,2-Tetrachloroethane	< 2.0		< 5.0		0
Ethylbenzene	< 2.0		< 5.0		0
Xylene (m,p)	< 2.0		< 5.0		0
Xylene (total)	< 2.0		< 5.0		0
Xylene (o)	< 2.0		< 5.0		0
Styrene	< 2.0		< 5.0		0
Bromoform	< 2.0		< 5.0		0
Isopropylbenzene	< 2.0		< 5.0		0
cis-1,4-Dichloro-2-butene	NR		< 5.0		2
1,1,2,2-Tetrachloroethane	< 2.0		< 5.0		0
1,2,3-Trichloropropane	< 2.0		< 5.0		0
trans-1,4-Dichloro-2-butene	NR		< 5.0		2
1,3-Dichlorobenzene	< 2.0		< 5.0		0
1,4-Dichlorobenzene			< 5.0		0
1,2-Dichlorobenzene	< 2.0		< 5.0		0
1,2-Dibromo-3-Chloropropane	< 5.0		< 5.0		0
1,2,4-Trichlorobenzene	< 2.0		< 5.0		0
Hexachlorobutadiene	< 2.0		< 5.0		0
Naphthalene	< 5.0		< 5.0		0
2,2-Dichloropropane	< 2.0		< 5.0		0
1,1-Dichloropropene	< 2.0		< 5.0		0
1,3-Dichloropropane	< 2.0		< 5.0		0
Bromobenzene	< 2.0		< 5.0		0
n-Propylbenzene	< 2.0		< 5.0		0
2-Chlorotoluene	< 2.0		< 5.0		0
4-Chlorotoluene	< 2.0		< 5.0		0
1,3,5-Trimethylbenzene	< 2.0		< 5.0		0
tert-Butylbenzene	< 2.0		< 5.0		0
1,2,4-Trimethylbenzene	< 2.0		< 5.0		0
sec-Butylbenzene	< 2.0		< 5.0		0
4-Isopropyltoluene	< 2.0		< 5.0		0
n-Butylbenzene	< 2.0		< 5.0		0
1,2,3-Trichlorobenzene	< 2.0		< 5.0		0

SURROGATE RECOVERIES (%)	QA		PRIMARY
Dibromofloromethane (85-118)	105	Toluene-d8 (88-110)	102
1,2-Dichloroethane-d4 (75-124)	109	1,2-Dichloroethane-d4 (72-141)	92
Toulene-d8 (86-111)	103	Bromofluorobenzene (72-122)	104
4-Bromofluorobenzene (76-113)	101	1,2-Dichlorobenzene-d4 (69-124)	102

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 2001

QA SAMPLE No.:	0110296-01B	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	11/7/01
QA LABORATORY:	AMRO	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: **10/30/01**
UNITS: ug/L

Target Analyte	AMRO QA LAB LRL		**AMRO QA LAB RESULTS**	STL-VT CONTRACTOR LRL		**STL-VT CONTRACTOR RESULTS**	COMPARISON CODE
Aluminum	< 200		[redacted]	7.7 U		[redacted]	0
Antimony	< 20		[redacted]	2.2 U		[redacted]	0
Arsenic	< 5.0	(SW7060A)	[redacted]	1.5 U		[redacted]	0
Barium	< 200		[redacted]	9.0 U		[redacted]	0
Beryllium	< 5.0		[redacted]	0.20 U		[redacted]	0
Cadmium	< 5.0		[redacted]	0.20 U		[redacted]	0
Calciuum	< 2500		[redacted]	319 U		[redacted]	0
Chromium	< 10		[redacted]	0.70 U		[redacted]	0
Colbolt	< 50		[redacted]	2.5 U		[redacted]	0
Copper	< 25		[redacted]	1.0 U		[redacted]	0
Iron	< 100		[redacted]	15.7 U		[redacted]	0
Lead	< 5.0	(SW7421)	[redacted]	0.60 U		[redacted]	0
Magnesium	< 2500		[redacted]	195 U		[redacted]	0
Manganese	< 15		[redacted]	1.4 U		[redacted]	0
Mercury	< 0.20	(SW7470A)	[redacted]	0.10 U	(11-13-01)	[redacted]	0
Nickel	< 40		[redacted]	2.0 U		[redacted]	0
Potassium	< 2500		[redacted]	NR		[redacted]	0
Selenium	< 5.0	(SW7740)	[redacted]	1.2 U		[redacted]	0
Silver	< 7.0		[redacted]	1.5 U		[redacted]	0
Sodium	< 2500		[redacted]	570 U		[redacted]	0
Thallium	< 5.0	(SW7841)	[redacted]	4.8 U		[redacted]	0
Vanadium	< 50		[redacted]	2.1 U		[redacted]	0
Zinc	< 20		[redacted]	0.90 U		[redacted]	4

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED
ND= Not Detected at the Reporting Limit
U= Not Detected at the Reporting Limit
B= Less than the Contract Required Detection Limit (CRDL), but greater than the Instrument Detction Limit (IDL).
J= Analyte detected below quantitation limit.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01C	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/9/01	CONTRACTOR'S ANALYSIS DATE:	11/6/01
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9010B	ANALYSIS METHOD:	335.4

MATERIAL DESCRIPTION: **WATER**

DATE SAMPLED: **10/30/01**

UNITS: mg/L

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Cyanide (CN)	< 0.010	[redacted]	< 0.010	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

*Note: Cyanide sample was adjusted for pH to >12 at the lab.

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01D	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	See Below	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	300.0	ANALYSIS METHOD:	300.0

MATERIAL DESCRIPTION:	**WATER**
DATE SAMPLED:	**10/30/01**
UNITS:	mg/L

Target Analyte		AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Chloride, CL	(11-1-01)	< 10	[redacted]	< 0.20	[redacted]	0
Nitrate, as N	(10-31-01)	< 0.20	[redacted]	< 0.20	[redacted]	0
Othophosphate, as P	(11-1-01)	< 0.50	[redacted]	< 0.20	[redacted]	0
Sulfate, SO4	(10-31-01)	< 5.0	[redacted]	< 0.20	[redacted]	0

SEE APPENDIX A FOR KEY TO COMPARISON CODES
NR= NOT REPORTED
ND= Not detected at the Reporting Limit
J= Estimated value, below the Reporting Limit
LRL= Laboratory Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01E	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	410.4	ANALYSIS METHOD:	410.1
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**10/30/01**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Chemical Oxygen Demand (COD)	< 50	[redacted]	< 5.0	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

ND= Not Detected at the Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01F	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/1/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	405.1	ANALYSIS METHOD:	405.1
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**10/30/01**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Biological Oxygen Demand (5 Day)	< 2.0	[redacted]	< 0.20	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01D	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/2/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	310.1	ANALYSIS METHOD:	310.1

MATERIAL DESCRIPTION:	**WATER**
DATE SAMPLED:	**10/30/01**
UNITS:	mg/L

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Total Alkalinity as CaCO3	< 2.0	[redacted]	< 1.0	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01B	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	6010B (2340B)	ANALYSIS METHOD:	6010B (2340B)
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**10/30/01**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Total Hardness as CaCO3*	< 33	[redacted]	NR	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

*Note: Hardness as calculated by the separate determinations of calcium and magnesium, expressed as mg equivalent CaCO3/L by Method 2340B.

COMPARISON OF QA & CONTRACTOR RESULTS

PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	0110296-01D (TSS-01G)	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11-(2 and 5)-01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	AMRO	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	160.1 and 160.2	ANALYSIS METHOD:	160.1 and 160.2
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**10/30/01**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Total Dissolved Solids (TDS by 160.1)	< 10	[redacted]	< 5.0	[redacted]	0
Total Suspended Solids (TSS by 160.2)	< 4.0		< 0.50		0

SEE APPENDIX A FOR KEY TO COMMENTS

NR=NOT REPORTED

LRL=Laboratory Reporting Limit

COMPARISON OF QA & CONTRACTOR RESULTS
PROJECT: SHEPLEY'S HILL LANDFILL, FALL 2001

QA SAMPLE No.:	C1K020329-001	CONTRACTORS SAMPLE No.:	469923
QA FIELD ID:	**SHM-96-5B-QA**	CONTRACTORS FIELD ID:	**SHM-96-5B**
QA ANALYSIS DATE:	11/6/01	CONTRACTOR'S ANALYSIS DATE:	NR
QA LABORATORY:	STL-Pittsburgh(Sub)	CONTRACTOR'S LABORATORY:	STL, VT
EXTRACTION METHOD:	NA	EXTRACTION METHOD:	NA
ANALYSIS METHOD:	9060.0	ANALYSIS METHOD:	9060.0
MATERIAL DESCRIPTION:	**WATER**		
DATE SAMPLED:	**10/30/01**		
UNITS:	mg/L		

Target Analyte	AMRO QA LAB LRL	**AMRO RESULTS QA LAB**	STL-VT CONTRACTOR LRL	**STL-VT RESULTS CONTRACTOR**	COMPARISON CODE
Total Organic Carbon (TOC)	< 1.0	[redacted]	< 1.0	[redacted]	0

SEE APPENDIX A FOR KEY TO COMMENTS
NR=NOT REPORTED

APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

U.S. ARMY CORPS OF ENGINEERS

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME
	SHEPLEY'S HILL LTM + M

SAMPLERS: *(Signature)*
Nancy McNally

STA. NO	DATE	TIME	COMP	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOC 8260B	Metals 6010B / Hardness 314.0	Cyanide 9010B	Anions 300.0 Alkalinity 310.1	COD Hach 8000	BOD 405.1	TSS-160.2	TOC-9060	REMARKS
	30 Oct 2001	1510		X	SHM-96-5B-QA	12	1	1	1	1	1	1	1	3	
	1			X	TRIP BLANK	1	1								

KAM

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Katherine Ridder	10-30-01 1630	FEDEX Air Bill # 831951196234			
Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
Relinquished by: *(Signature)*	Date / Time	Received for Laboratory by: *(Signature)* Nicole Bonde	Date / Time 10/31/01	8:40	Remarks 1 cooler shipped to AMRO.

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

7889

AMRO Environmental Laboratories Corporation

SAMPLE RECEIPT CHECKLIST

111 Herrick Street
Merrimack, NH 03054
~~(603) 424-2022~~

Client: U.S. Army Corps of Engineers
Project Name: Shepley's Hill LTM E, M
Ship via: (circle one) Fed Ex., UPS, AMRO Courier,
Hand Del., Other Courier, Other:

AMRO ID: 0110296
Date Rec.: 10-31-01
Date Due: 11-12-01

Items to be Checked Upon Receipt	Yes	No	NA	Comments
1. Army Samples received in individual plastic bags?	✓			
2. Custody Seals present?	✓			
3. Custody Seals Intact?	✓			
4. Air Bill included in folder if received?	✓			
5. Is COC included with samples?	✓			
6. Is COC signed and dated by client?	✓			
7. Laboratory receipt temperature. TEMP = 4°				
Samples rec. with ice ✓ ice packs ___ neither ___				
8. Were samples received the same day they were sampled?		✓		
Is client temperature 4°C ± 2°C?	✓			
If no obtain authorization from the client for the analyses.				
Client authorization from: Date: Obtained by:				
9. Is the COC filled out correctly and completely?	✓			
10. Does the info on the COC match the samples?	✓			
11. Were samples rec. within holding time?	✓			
12. Were all samples properly labeled?	✓			
13. Were all samples properly preserved?	✓			CN needs adjust
14. Were proper sample containers used?	✓			
15. Were all samples received intact? (none broken or leaking)	✓			
16. Were VOA vials rec. with no air bubbles?	✓			
17. Were the sample volumes sufficient for requested analysis?	✓			
18. Were all samples received?	✓			
19. VPH and VOA Soils only:			✓	
Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight container)				
Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfate, E=EnCore, B=Bulk				
If M or SB:				
Does preservative cover the soil?				
If NO then client must be faxed.				
Does preservation level come close to the fill line on the vial?				
If NO then client must be faxed.				
Were vials provided by AMRO?				
If NO then weights MUST be obtained from client				
Was dry weight aliquot provided?				
If NO then fax client and inform the VOA lab ASAP.				
20. Subcontracted Samples:				
What samples sent: C/TT				
Where sent: STL - PITTSBURGH				
Date: 11-1-01				
Analysis: TCC				
TAT: STD				
21. Information entered into:				
Internal Tracking Log?				
Dry Weight Log?			✓	
Client Log?			✓	
Composite Log?			✓	
Filtration Log?			✓	

Received By: NB Date: 10-31-01 Logged in By: CC Date: 11-1-01
Labeled By: CC Date: 11-1-01 Checked By: MG Date: 11-2-01

NA= Not Applicable

APPENDIX F

GROUNDWATER ANALYTICAL DATA

3.5 inch diskette (not included in all reports)

APPENDIX G

LETTER REGARDING INSTALLATION OF LANDFILL GAS MONITORING PROBES

Harding ESE
A MACTEC COMPANY

Harding ESE, Inc.
511 Congress Street
P.O. Box 7050
Portland, ME 04112-7050
Telephone: 207/775-5401
Fax: 207/772-4762
Home Page: www.mactec.com

January 11, 2002

Mr. David Margolis
U.S. Army Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Subject: **Installation of Landfill Gas Monitoring Probes**
Shepleys Hill Landfill
Devens RFTA, Devens, MA

Dear Mr. Margolis:

On November 7, 2001, Harding ESE and its subcontractor, Environmental Drilling, Inc., installed four landfill gas monitoring probes at the northwest edge of Shepley's Hill Landfill as directed by USACE. These probes were located to monitor landfill gas migration from Shepley's Hill Landfill towards Sculley Road in Ayer. The probes were installed by Geoprobe at depths and at a horizontal spacing consistent with the Massachusetts Landfill Technical Guidance Manual, revised May 1997.

Enclosed is a figure showing the surveyed locations of the probes and a second figure showing typical construction details. The location and elevation coordinates of the points are listed below.

Description	North	East	Ground Elevation
LGP-01-01X	567264.5354	573388.7461	241.80
LGP-01-02X	567281.4696	573505.5082	235.01
LGP-01-03X	567344.7430	573587.1202	231.30
LGP-01-04X	567405.3548	573663.4810	222.69

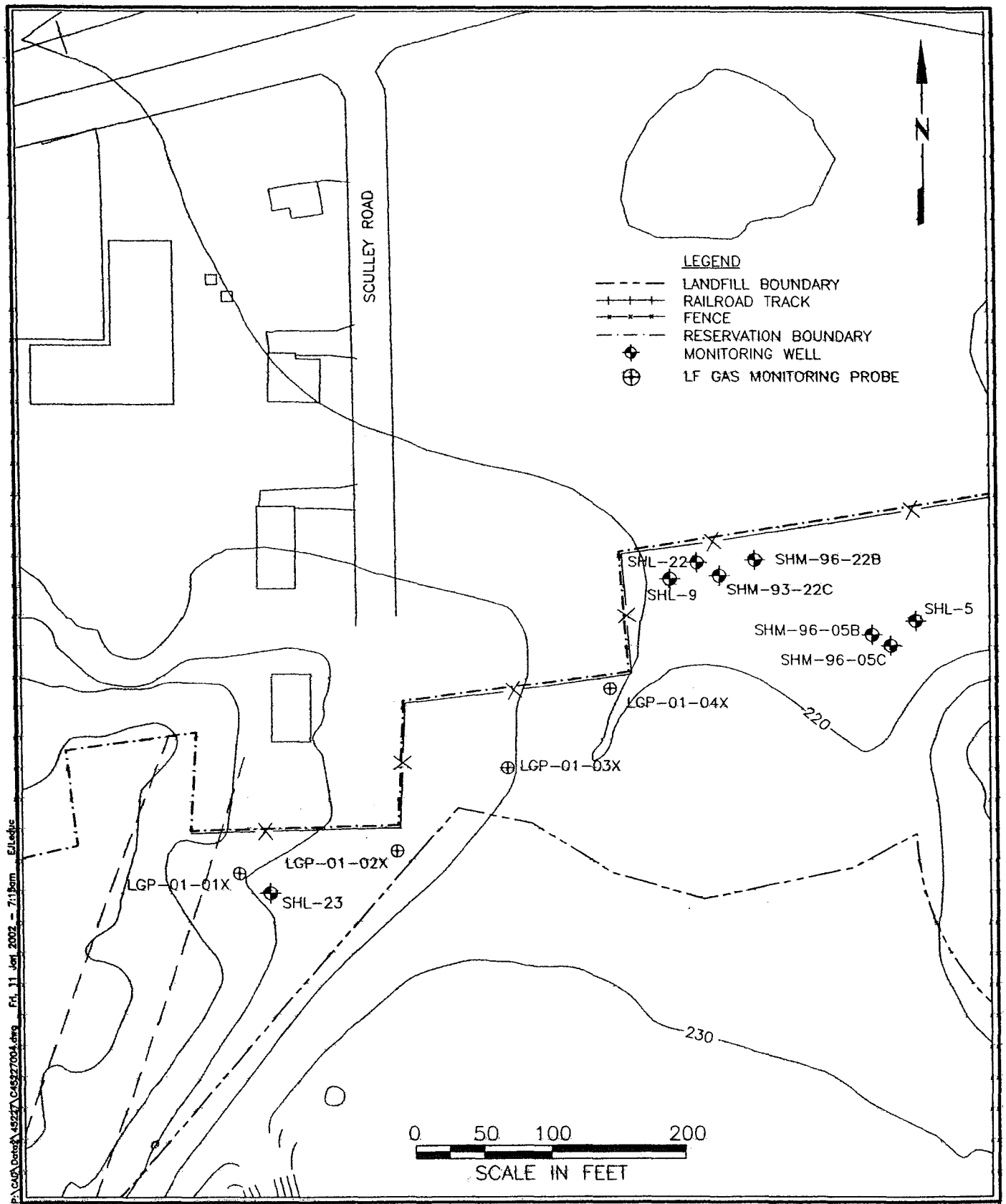
1. Survey by Martinage Engineering Associates, Inc. Reading, Massachusetts, January 2002.
2. Coordinates based on survey points established by Golden Land Survey and noted as Massachusetts Coordinate System. Elevations are NGVD Datum.

Please contact me if you have any questions concerning the landfill gas monitoring points, this leter, or the enclosed figures.

Sincerely,
Harding ESE, Inc.
A MACTEC Company

Stanley W. Reed, P.E.
Project Manager

enc.



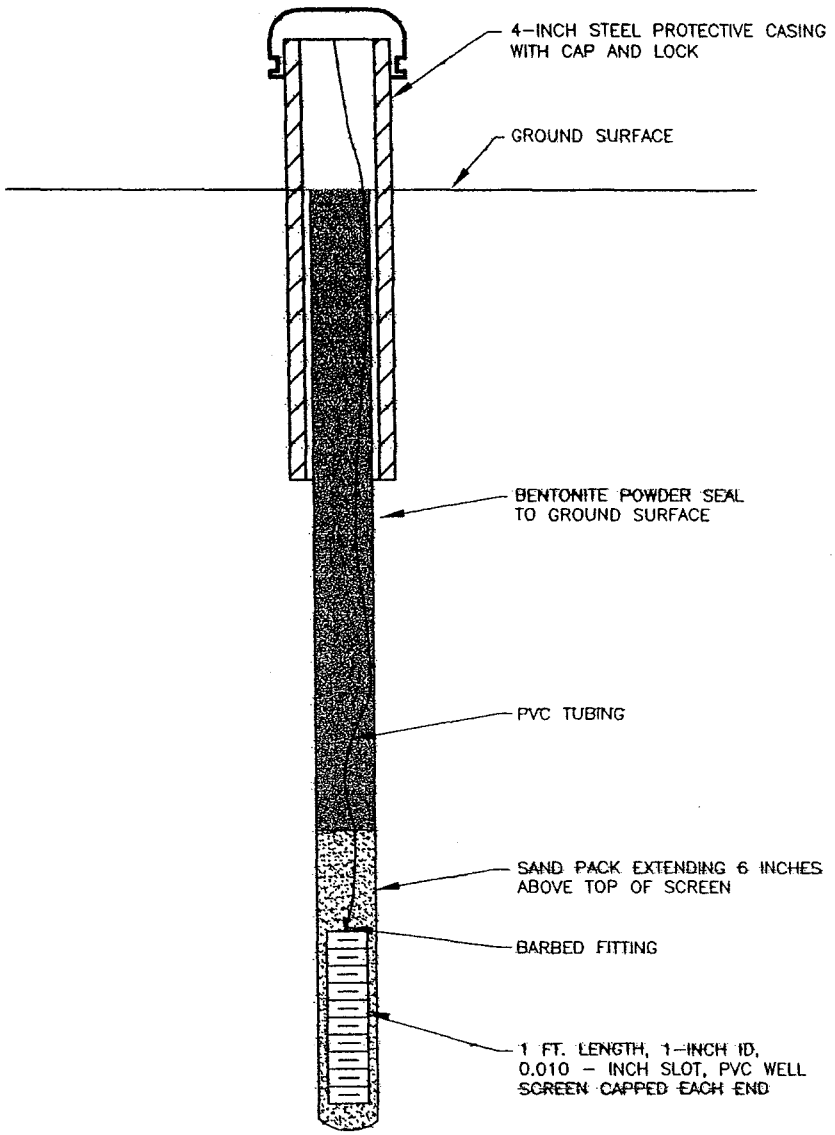
P:\CAD\Data\45227\C45227004.dwg Fri, 11 Jan 2002 - 7:19am EJLedue

Harding ESE
A MACTEC COMPANY

LANDFILL GAS MONITORING PROBE LOCATIONS
SHEPLEY'S HILL LANDFILL
DEVENS RFTA, DEVENS MA.

DRAWING C-1 1/2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
EJL	45227/9938-03		01/10/02	



NOTE:
SCREENED INTERVALS

LGP-01-01X	5 TO 6 Ft. bgs
LGP-01-02X	5 TO 6 Ft. bgs
LGP-03-01X	5 TO 6 Ft. bgs
LGP-01-04X	3 TO 4 Ft. bgs

NOT TO SCALE

P:\CAD\Data2\45227\C45227005.dwg, Fri, 11 Jan 2002 - 3:04pm, EJLeduc

Harding ESE
A MACTEC COMPANY

TYPICAL DETAIL
LANDFILL GAS MONITORING PROBE
SHEPLEY'S HILL LANDFILL
DEVENS RFTA, DEVENS MA.

DRAWING C-2
2/2

DRAWN	PROJECT NUMBER	APPROVED	DATE	REVISED DATE
EJL	45227/9938-03		01/11/02	

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

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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.

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