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APRIL 2, 2003

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Dear Ms. Dagdiglan:

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

2002Annual Report Shepley's Hill Landfill Devens Reserve Forces Training Area Devens, Massachusetts

If you have any questions regarding this matter, you may contact me at (978) 796-2205.

Sincerely,

Benjamin F. Goff

BRAC Environmental Coordinator

Enclosures

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. 2002 ANNUAL REPORT

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

March 2003

PREPARED BY:

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



US Army Corps of Engineers New England District

SHEPLEY'S HILL LANDFILL 2002 ANNUAL REPORT

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TABLE OF CONTENTS

| Section | <u>Title</u> | Page |
|-------------------|---|------|
| F | EXECUTIVE SUMMARY | 1 |
| 1.0 I | NTRODUCTION | 4 |
| 2.0 I | LANDFILL CAP MAINTENANCE ACTIVITIES | 5 |
| 3.0 I | LANDFILL CAP MONITORING ACTIVITIES | 6 |
| 4.0 I | LANDFILL GAS MONITORING RESULTS | 8 |
| 5.0 | GROUNDWATER ELEVATIONS | 10 |
| 6.0 | GROUNDWATER SAMPLING | 11 |
| 6.1 6.2 6.3 | Preparation for Sampling Sampling Equipment Decontamination | 12 |
| | LABORATORY TESTING | |
| 7.1 7.2 | Analyses | |
| 7.2.1 7.2.2 | Results for Samples Collected Spring 2002 | |
| 8.0 | QUALITY CONTROL | 19 |
| 8.1 8.2 | Field Quality ControlLaboratory Quality Control | |
| 8.3 | Data Evaluation | |
| 8.3.1 8.3.2 | = | |
| 90 (| CODDECTIVE ACTION | 25 |

SHEPLEY'S HILL LANDFILL 2002 ANNUAL REPORT

TABLE OF CONTENTS (Cont.)

TABLES

| Table 4-1 Table 5-1 Table 6-1 Table 7-1 Table 7-2 Table 7-3 Table 7-4 Table 7-5 Table 7-6 Table 8-1 | Landfill Gas Monitoring Monitoring Well Specifications and Groundwater Elevations Monitoring Well Designations Groundwater Sample Analysis and Procedures Groundwater Analytical Results – May 2002 – Compliance Point Wells Groundwater Analytical Results – May 2002 – Additional Wells Groundwater Analytical Results – October 2002 – Compliance Point Wells Groundwater Analytical Results – October 2002 – Additional Wells Comparison of Historic Arsenic Results Sample Preparation and Analysis Methods |
|---|--|
| | FIGURES |
| Figure 3-1 Figure 5-1 Figure 5-2 Figure 6-1 | Findings of Inspection - Shepley's Hill Landfill, Devens RFTA, Devens, MA Geologic Cross Section - reprinted from: Draft Shepley's Hill Landfill Supplemental Groundwater Investigation Location of Geologic Cross Sections - reprinted from: Draft Shepley's Hill Landfill Supplemental Groundwater Investigation Modeled Particle Tracks, Present Day Conditions - reprinted from: |
| | Draft Shepley's Hill Landfill Supplemental Groundwater Investigation APPENDICES |
| Appendix A Appendix B Appendix C Appendix D Appendix E Appendix F Appendix G | Landfill Maintenance Checklist Groundwater Field Analysis Forms Chain of Custody Forms Comparison of Arsenic Results Chemical Quality Assurance Reports Groundwater Analytical Data References |

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 seventh year, 2002, 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. 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 at the site are in good condition. The security fence was noted to be in need of repair at various locations. No significant difficulties were encountered with the monitoring of gas vents/probes or groundwater wells that are part of the Long Term Monitoring Program. There were no conditions observed which would immediately jeopardize the integrity of the landfill cap.

In 2002, normally scheduled maintenance activities included mowing of the landfill vegetative cover and cutting of vegetative growth in drainage swales. Additionally, a topographic survey of the landfill was conducted and compared to as-built topography to determine settlement patterns and drainage issues. The resulting analysis and conclusions were detailed in a draft feasibility study report submitted to the Army by the USACE under separate cover. Some of the findings of the current inspection will be addressed in that report, including recommendations concerning fencing on the perimeter of the landfill.

As part of the monitoring of the landfill, readings were collected from eighteen gas vents on the landfill, plus four probes just north of the landfill enabling a check for landfill gases migrating through the soil and off of the cap. The gas readings recorded from the vents were within the parameters of a mature landfill. No landfill gas was observed in the probes. The next round of gas monitoring will be conducted in the fall of 2003.

Additionally, 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. Samples were also similarly collected at four off-site groundwater monitoring wells, not part of the Long Term Monitoring Program, for comparison. It should be noted that one of the four off-site wells (SHM-99-32X) could not be sampled in the fall due to extensive damage to the well casing. However, all fourteen compliance point wells were monitored during both the spring and fall.

In accordance with the ROD, only chemicals that 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 three of the Group 1 wells (SHL-9, SHL-22 and SHM-93-22C) have exceeded a cleanup level for a trigger chemical at least once since the first five-year review – arsenic in all cases. In 2002, two of those wells, SHL-9 and SHL-22, had such exceedances.

Arsenic was the only trigger chemical detected above cleanup levels during the 2002 sampling events. Most wells indicated no definitive change over historic arsenic values, including SHM-96-5B, which continues to record the highest levels of the wells monitored (tending to rise in the spring). Wells SHL-9, SHL-11, SHL-22 and SHM-96-22B all recorded new high arsenic levels in 2002. Of those wells, SHL-11, SHL-22 and SHM-96-22B are showing trends that may be expected to continue rising. However, well SHM-96-22B, which typically shows one of the highest arsenic levels, also recorded a new low arsenic level in the fall. Data collected in the coming years will reveal the significance, or lack thereof, of this anomaly. Similarly, the historical peak value determined for well SHL-9 in the spring was uncharacteristic. Well SHL-20 continues to show a slow decline

in arsenic levels. It should be noted that seven of the fourteen compliance point wells were below the arsenic cleanup level for the latest round of sampling. The next round of groundwater monitoring will be conducted in the spring of 2003.

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.

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 seventh 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 2002, 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, a topographic survey of the landfill was conducted in 2002 and compared to as-built topography to determine settlement patterns and drainage issues. The analysis and conclusions are detailed in a draft feasibility study report submitted to the Army by the USACE under separate cover. provides a set of alternatives to reduce the potential for water to pond, migrate and/or infiltrate through the existing cap. Some of the findings of the current inspection (refer to Section 3.0, Landfill Cap Monitoring Activities) will be addressed in that report, including recommendations concerning fencing on the perimeter of the landfill. Normally scheduled maintenance activities performed during 2002 included mowing of the landfill vegetative cover and cutting vegetative growth in drainage swales. 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 November 2002 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.

- Catch Basin #3 near the Cooke Street entrance to the site is not set at grade. Soil excavation in this area has left the rim of the grate about six to eight inches higher than the surrounding ground. This rim of this catch basin should be lowered to the surrounding grade.
- Catch basin #7 near the southwest corner of the site is substantially overgrown by the adjacent vegetation and will soon be completely overgrown and hidden from view. 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 reaches of the eastern drainage swale have 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 extend at least twenty feet past the limits of the cap.
- The access roads on the site are in good condition. There are no problems on access roads that warrant repair at this time.
- Portions of the perimeter chain-link security fence are in poor condition. Fence sections and gates are missing and unrestricted access to the site is available at several locations, most notably at the Cook Street entrance, and continuing over to the dirt road at catch basin number 7. Some evidence of off-road vehicles (ATV's, dirt bikes, etc.) using the cap area was seen. On the east side near monitoring well SHL-11, the fence has been rolled back and is open. A gate and lock 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. Currently the entire perimeter fencing system is under review, and recommendations are forthcoming.
- The gas monitoring probes installed in 2001 at the northwest edge of the landfill appear to be in excellent condition, 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 are included in Section 9.0.

4.0 LANDFILL GAS MONITORING RESULTS

The purpose of the landfill gas monitoring program is to establish long-term trends with regard to gas production and venting. A combustible gas survey was performed 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. This is the second annual report including data from those probes. The purpose of the probes is to monitor landfill gas migration from Shepley's Hill Landfill towards Sculley Road.

The seventh annual landfill gas sampling was conducted on 5 November 2002. The weather was sunny, with temperatures in the 50's (F), and the barometric pressure was 29.92 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. Once stabilization was reached, readings were recorded as displayed in Table 4-1. The locations of the gas vents and probes are shown in Figure 3-1.

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 0.2 % at LGP-01-01X to 1.4 % at LGP-01-02X. Oxygen levels ranged from 19.3 % at LGP-01-02X to 20.2% at LGP-01-01X.

The following summarizes the gas vent results. VOCs were not detected in any of the gas vent wells. The oxygen levels ranged from 20.7% (Vent # 16) to 2.2% (Vent # 14) using the GA-90. No gas vent wells tested positive for hydrogen sulfide, reading 0 for all wells. LEL readings ranged from 0% in V-1 to over 100% LEL in Vent Nos. 3, 4, 6, 9, 13, 14, 15 and 18. Carbon monoxide registered 0 in all of the gas vent wells and vents. Carbon dioxide ranged from 19 ppm (Vent # 18) to 0 ppm (Vent # 12). Methane ranged from 23.5 ppm (Vent # 18) 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 the upper portion of the 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). Gas monitoring probes should also be installed at the southern perimeter of the site along the commercial properties. The LEL readings along the southern perimeter, including gas vents 13, 14, 15, and 18 have consistently registered LEL readings above 100%.

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 included in that table, for reference, are the geological interfaces of the wells, and the elevation of the screened interval for 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 compliance point wells scheduled to be sampled. Groundwater elevations measured during May 2002 were consistently higher than those measured in October 2002, as is typical for the area. The mean drop in groundwater elevation (from spring to fall reading) was 1.1-feet for the fourteen wells. Groundwater levels in 2002 were typically higher than those in the prior year, with spring levels rising an average 0.4-feet from the previous spring, and fall levels rising 0.6-feet on average. This indicates a partial recovery from low levels caused by low precipitation totals in 2001.

In addition to these semi-annual groundwater measurements, regular groundwater measurements of all Shepley's Hill Landfill wells were conducted by Harding ESE (formerly ABB-ES and HLA) from 1992 until 1999. During the first 5-year review (SWEC, August 1998), groundwater elevations were re-evaluated to identify hydraulic gradients and to confirm changes due to the construction of the landfill cap. Groundwater modeling has suggested that the landfill cap has reduced the volume of water beneath the cap, resulting in a more northerly groundwater flow (SWEC, 1998). Groundwater flow patterns will be reevaluated 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 undertook supplemental groundwater investigations that included, 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, for the seventh consecutive year, was conducted in the spring (May 20 and 21, 2002) and in the fall (October 28 through 30, 2002). There were no significant precipitation events during either sampling event. During the week prior to the spring sampling event, approximately three inches of precipitation fell in the area, while approximately one inch fell in the week before the fall event. 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, 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, were classified as Group 2 wells. These group designations are presented in Table 6-1, as well as the occurrences of Group 1 wells that have exceeded cleanup levels for trigger chemicals since the first five-year site review. During 2002, two of the Group 1 wells were determined to contain such levels of arsenic (clean-up level = 50 µg/L): SHL-9 was found to contain 144 μg/L in the spring, and SHL-22 was found to contain 55.9 B μg/L and 77.1 μg/L in the spring and fall, respectively.

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 YSI water quality meters, portable generators, Solinst water level indicators, and 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 Grundfos Rediflow II pumps, controllers, Heron water level indicators, and HF Scientific DRT-15CE turbidity meters for the sampling events (NAE's equipment is occasionally supplemented with identical or similar models rented from U.S. Environmental, as required – these instances are noted on the Groundwater Field Analysis Forms where appropriate). All equipment was inventoried and tested to ensure

it was accounted for and functioning. The well logs of each of the wells to be sampled were reviewed by the field team prior to the scheduled event to determine tubing requirements, and brought to the landfill during the sampling event to confirm the screened intervals.

6.2 Sampling

The seventh year of sampling was conducted by NAE on May 20 and 21, 2002 and later on October 28 through 30, 2002. Monitoring wells were purged and sampled in accordance with EPA's Low Stress (low flow) Purging and Sampling Procedure for the Collection of Groundwater Samples from Monitoring Wells (July 1996) using an adjustable rate, low flow submersible pump. Teflon lined tubing was used for sample collection and was disposed after each well was sampled.

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

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

- To ensure precision of water level measurements, well casings that had faded marks or no marks were remarked.
- None of the pre-preserved sample bottles required pH adjustments after they were filled with the water samples.
- 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.

- Past difficulties with maintaining flowrates and achieving stabilization at wells SHL-3 and SHL-10 showed improvement in 2002, after an attempt to redevelop both wells was made on April 15, 2002 by NAE personnel.
- 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 quality meters on October 29, 2002 could be questionable. This meter was used to measure ORP at wells SHL-11, SHL-22 and SHM-96-22B on that day (in the order listed). However, only the ORP readings taken at the last well, SHM-96-22B, appear possibly circumspect after reviewing historical ORP data (indicating the readings may be somewhat high biased) and concurrent dissolved oxygen (DO) readings (indicating nothing conclusive). Even so, the readings taken at SHM-96-22B may be valid, as the discrepancy from the limited historical data is not exceedingly large. For the other two wells, the readings are in good agreement with historical data and the relationship between ORP and DO dictates that these values are reasonable.
- During the fall sampling round, ground water sampling well SHM-99-32X, which is located outside the landfill (off of Molumco Road), was found damaged. Apparently, a vehicle collided with the well with a force great enough to destroy the bollards and severely bend the well casing. As such, a sample from this well could not be collected. This well is not among the fourteen compliance point wells at Shepley Hill Landfill, but it is one of four extra wells that have been historically sampled for comparison. Restoration of this well will be addressed in 2003.

6.3 Equipment Decontamination

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

- Upon removal of the pump from the well following sample collection, the pump was submersed in a 4-inch PVC riser containing potable water and detergent (Alconox) solution. At least 1 to 2 gallons of the detergent solution was pumped through (starting the pump at a low flow rate, as in sampling, and increased to a higher speed).
- The pump was removed and sprayed with potable water to minimize the transfer of soap to the 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 at 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. For the spring event, the fourteen compliance point samples were collected on May 20 and 21, 2002, with four additional samples collected off-site on May 22, 2002. For the fall event, the fourteen compliance point samples were collected on October 28 through 30, 2002, with three additional samples collected off-site on October 31, 2002. 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 4° C or just below. Chains of Custody (COCs) were used to identify and document the samples being shipped (copies are included in Appendix C). Sample custody was initiated by the sampling team upon collection of samples and COC forms were placed in waterproof plastic bags and taped to the inside lid of the cooler. The cooler was sealed with chain-of-custody seals and shipped to the laboratory via overnight delivery.

7.1 Analyses

Water analyses were conducted according to SW846 methods 8260B for volatile organics, 6010B/7470A for TAL metals, and as follows for general chemistry analyses: chemical oxygen demand by EPA method 410.1, biochemical oxygen demand by EPA method 405.1, hardness by Standard Method 2340B, alkalinity by EPA method 310.1, cyanide by EPA method 335.4, anions by EPA method 300.0, total organic carbon by SW846 method 9060, total dissolved solids by EPA method 160.1, and total suspended solids by EPA method 160.2. These analyses were conducted at all fourteen compliance point wells. As reported in the previous annual report, starting with the fall event of 2001, the method used to determine hardness was changed to Standard Method 2340B in order to eliminate the interference to EPA method 130.2 from other heavy metal ions typically present in some of the wells at the site. Table 7-1 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 that 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 2002 sampling events. Analytical results for groundwater analyses of samples collected at the fourteen compliance point wells are presented in Tables 7-2 and 7-4, for the spring and fall rounds, respectively. Tables 7-3 and 7-5 present additional data collected beyond the requirements of the Long Term Monitoring and Maintenance Plan, determined from samples taken at off-site wells near Molumco Road. Historical arsenic data for the fourteen compliance point wells, plus the additional wells, may be found in Table 7-6.

Refer to Appendix D for a graphical comparison of historical arsenic concentrations in compliance point monitoring wells. Most wells indicated no definitive change over previous arsenic values, including SHM-96-5B, which continues to record the highest levels of the wells monitored (tending to be higher in the spring). Wells SHL-9, SHL-11, SHL-22 and SHM-96-22B all recorded new high arsenic levels in 2002. Of those wells, SHL-11, SHL-22 and SHM-96-22B are showing trends that may be expected to continue rising. However, well SHM-96-22B, which typically shows one of the highest arsenic levels, also recorded a new low arsenic level in the fall. Data collected in the coming years will reveal the significance, or lack thereof, of this anomaly. Similarly, the historical peak value determined for well SHL-9 in the spring was uncharacteristic. Well SHL-20 continues to show a slow decline in arsenic levels.

Tables 7-2 through 7-5 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 the spring and fall events are summarized below.

7.2.1 Results for Samples Collected Spring 2002

Volatile Organic Compounds (VOCs), metals and general chemistry parameters were analyzed in eighteen groundwater monitoring wells in the spring of 2002. These wells consisted of the fourteen compliance point wells at the landfill site, plus four additional wells near Molumco Road.

None of the eighteen wells had detectable concentrations of the four VOC trigger chemicals (1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene). Therefore, none of the established cleanup levels were exceeded for these parameters. Furthermore, none of the other VOCs analyzed were detected above cleanup levels at any of the wells.

Of the identified chemicals of concern for metals, only arsenic was declared a trigger chemical for this site. Arsenic was detected at concentrations greater than the cleanup level of 50 μ g/L in the following compliance point monitoring wells: SHM-96-5B (3,800 μ g/L), SHM-96-5C (50.4 B μ g/L), SHL-9 (144 μ g/L), SHL-11 (469 μ g/L), SHL-19 (66.9 μ g/L), SHL-20 (154 μ g/L), SHL-22 (55.9 B μ g/L) and SHM-96-22B (2,040 μ g/L). The duplicate sample (collected from well SHM-96-5B) had a concentration of 3,830 μ g/L.

The other chemicals of concern (those not designated as trigger chemicals) detected at concentrations above cleanup levels were also metals (iron, manganese, and sodium). Metal chemicals of concern that were not found to exceed cleanup levels at any of the wells include aluminum, chromium, lead and nickel. Iron was detected at levels above its cleanup level of 9,100 μg/L at compliance point wells SHM-95-5B, SHM-96-5C, SHL-9, SHL-11, SHL-19, and SHM-96-22B, with the maximum detected (92,000 μg/L) at well SHM-96-22B. Compliance point wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-19, and SHL-20 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. Sodium was detected at levels above its cleanup level of 20,000 μg/L at compliance point wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, SHL-22 and SHM-96-22B with the maximum detected (43,700 μg/L) at well SHL-22.

The same four chemicals of concern were those found to be above the landfill's cleanup levels at some of the four off-site monitoring wells near Molumco Road. Of these four wells, SHM-99-31C was indicated as having the highest levels of each of these parameters (345 μ g/L arsenic, 54,100 μ g/L iron, 7,720 μ g/L manganese and 47,600 μ g/L sodium). The sodium concentration determined here is higher than at any of the fourteen compliance point monitoring wells.

7.2.2 Results for Samples Collected Fall 2002

Volatile Organic Compounds (VOCs), metals and general chemistry parameters were analyzed in seventeen groundwater monitoring wells in the fall of 2002 (the fourteen compliance point wells at the landfill site, plus three additional wells near Molumco Road), with the following exceptions noted. Due to laboratory error, VOCs, mercury and total organic carbon samples collected at one of the Molumco Road wells, SHM-99-31C, were not analyzed. An eighteenth well, which is normally monitored during these events, could not be accessed for sample collection due to recent severe damage to the well casing (apparently caused by a vehicular collision). This well, SHM-99-32X, is also located near Molumco Road. All fourteen compliance point wells were sampled and analyzed for all required parameters.

None of the sixteen wells analyzed for VOCs were determined to have concentrations of the four VOC trigger chemicals (1,2-dichloroethane, 1,2-dichlorobenzene, 1,3-dichlorobenzene and 1,4-dichlorobenzene) above the established cleanup levels. The only well found to have a detectable concentration of any these four VOCs was SHL-11 (2.0 J µg/L 1,4-

dichlorobenzene). Furthermore, none of the other VOCs analyzed were detected above cleanup levels at any of the wells.

Of the identified chemicals of concern for metals, only arsenic was declared a trigger chemical for this site. Arsenic was detected at concentrations greater than the cleanup level of 50 μ g/L in the following compliance point monitoring wells: SHL-4 (56.1 μ g/L), SHM-96-5B (1,970 μ g/L), SHL-11 (648 μ g/L), SHL-19 (164 μ g/L), SHL-20 (175 μ g/L), SHL-22 (77.1 μ g/L) and SHM-96-22B (159 μ g/L). The duplicate sample (collected from well SHM-96-5B) had a concentration of 1,960 μ g/L.

The other chemicals of concern (those not designated as trigger chemicals) detected at concentrations above cleanup levels were also metals (iron, manganese, and sodium). Metal chemicals of concern that were not found to exceed cleanup levels at any of the wells include aluminum, chromium, lead and nickel. Iron was detected at levels above its cleanup level of 9,100 μ g/L at compliance point wells SHM-95-5B, SHM-96-5C, SHL-11, SHL-19, and SHL-20, with the maximum detected (64,500 μ g/L) at well SHL-11. Compliance point wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-19, SHL-20 and SHL-22 had concentrations of manganese above the cleanup level of 1,715 μ g/L. The maximum value detected for manganese was 13,000 μ g/L at SHM-96-5B. Sodium was detected at levels above its cleanup level of 20,000 μ g/L at compliance point wells SHM-96-5B, SHM-96-5C, SHL-11, SHL-20, SHL-22 and SHM-96-22B with the maximum detected (114,000 μ g/L) at well SHM-96-22B.

The same four chemicals of concern were those found to be above the landfill's cleanup levels at some of the three off-site monitoring wells near Molumco Road. Of these three wells, SHM-99-31C was indicated as having the highest levels of each of these parameters $(332 \mu g/L \text{ arsenic}, 45,500 \mu g/L \text{ iron}, 6,740 \mu g/L \text{ manganese} \text{ and } 47,200 \mu g/L \text{ sodium}).$

8.0 QUALITY CONTROL

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

8.1 Field Quality Control

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

8.3 Data Evaluation

8.3.1 Data Evaluation for Samples Collected Spring 2002

Eighteen groundwater samples were collected at or near Shepley's Hill Landfill, Fort Devens, MA. Fourteen of these samples were collected at the landfill, and the remaining four samples were collected near Molumco Road. 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 20, 21, and 22, 2002 (see Tables 7-2 and 3).

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.

8.3.1.1 Sample Shipment and Receipt, Spring Event

All sample coolers were packed with ice in the field. Sample shipments were received at the laboratory on 21, 22, and 23 May 2002. All samples were appropriately preserved by the procedures shown in Table 8-1. There are no sample shipment or receipt anomalies associated with these samples.

8.3.1.2 Holding Times, Spring Event

Samples were extracted and analyzed in accordance with the methods and holding time requirements cited in Table 8-1, except for BOD in which the 48-hour holding time was exceeded by between one to seven hours for samples SHL-3, SHL-4, SHL-10, SHM-93-10C, SHL-11, SHL-19, SHL-20, SHM-99-31A, SHM-99-31B, and SHM-99-32X. All such results are consequently qualified.

8.3.1.3 Volatile Organic Compound (VOC) Analysis, Spring Event

In addition to the regular sample complement, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B); three trip blanks (dated 5/20/02, 5/21/02, and 5/22/02); one equipment blank (EB-5B, taken 5/21/02), and one MS/MSD (SHL-19 MS and SHL-19 MSD).

<u>Laboratory Method Blank, Trip Blank and Equipment Blanks</u>: Although there were some analytes detected at levels above the reporting limits, none were for the site-specific contaminants of concern. All results are consequently without qualifications.

<u>Laboratory Control Sample (LCS)</u>: Although there were some analytes with recoveries outside limits for all three of the LCS results, none of these exceedances were for the site-specific contaminants of concern, with the sole exception of 4-methyl-2-pentanone (for one LCS). Nevertheless, although positive bias for this analyte would normally be anticipated, since 4-methyl-2-pentanone was not detected in any potentially affected samples, all results are consequently without qualification.

<u>Field Duplicate Sample</u>: Sample results for SHM-96-5B, and its duplicate, sample SHM-DUP-02A, are within limits and no qualifications have been applied.

<u>Surrogates</u>: All recoveries are within acceptance limits and no qualifications have been applied.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD)</u>: One MS/MSD pair was analyzed for this project. Although there were four analytes whose recoveries were outside limits, none of these exceedances were for the site-specific contaminants of concern and no qualifications have been applied.

8.3.1.4 Target Analyte List (TAL) Metals Analysis, Spring Event

In addition to the regular sample complement, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) along with one equipment blank (EB-5B, taken 5/21/02), and one MS/MSD (SHL-19 MS and SHL-19 MSD).

Laboratory Preparation Blank and Equipment Blank: Relative to the site-specific contaminants of concern, Pb, Se, and Zn were detected at levels less than the Contract Required Detection Limit (CRDL) but greater than the reporting limit (RL) for the preparation blank. In addition, Cd, Cr, Cu, Pb, Na, Se, and Zn were also detected in the equipment blank sample at levels less than the CRDLs but greater than the RLs. Finally, As and Mn were also detected in the equipment blank but at levels above both the CRDLs and the RLs. All results for these metals are qualified for those sample data concentrations within five times that of the greater of the preparation blank or the equipment blank value.

<u>Laboratory Control Sample (LCS)</u>: Since all analyte recoveries were within limits, no qualifications have been applied.

<u>Field Duplicate Sample</u>: For reported concentrations within five times the reporting limit, then the comparison was judged to be acceptable if the values were within two times the RL. As such, the precision is acceptable and no qualifications have been applied.

Matrix Spike (MS) and Duplicate (MSD): One set of (MS/ MSD) was analyzed for this project. All precision and accuracy calculations are within the acceptance limits for project analytes and no qualifications have been applied.

8.3.1.5 General Inorganic Analyses, Spring Event

In addition to the regular sample complement, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) along with one equipment blank (EB-5B, taken 5/21/02), and one MS (SHL-19 MS). In addition, a laboratory repeat of sample SHL-19 was also performed.

<u>Laboratory Preparation Blank and Equipment Blank</u>: No target analytes were detected for preparation blanks. The equipment blank showed detectable levels of Alkalinity (4.0 mg/L) and COD (26 mg/L), but since no corresponding concentrations for sample results are within five times that of these equipment blank values, no qualifications have been applied.

<u>Field Duplicate Sample</u>: Of all matrix duplicate results, only COD exceeded precision limits. Consequently, COD results for samples SHM-96-5B and SHM-96-5B-DUP are qualified.

Matrix Spike (MS) and Duplicate: Of all MS/MSD results, there were no exceedances of precision or accuracy and no qualifications have been applied.

8.3.1.6 Conclusion, Spring Event

Laboratory reports were reviewed for adherence to acceptable laboratory practices. Based on the data evaluation elements reviewed (including holding times, blank sample results, field duplicate results, surrogate recoveries, and MS/MSD recoveries), all necessary analytical data qualifications have been applied as summarized in Table 7-2, Table 7-3, and as enumerated above.

8.3.2 Data Evaluation for Samples Collected Fall 2002

Seventeen total groundwater samples were collected. Fourteen were collected from Shepley's Hill Landfill at the former Fort Devens and three from the Molumco Road wells (off-site), Ayer, Massachusetts. 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 28, 29, 30 and 31, 2002 (see Tables 7-4 and 5).

The results were evaluated for acceptability in accordance with the laboratory's defined acceptance limits, with standard EPA SW846 guidance, with guidelines provided in the "Interim Chemical Data Quality Management (CDQM) Policy for USACE Hazardous, Toxic and Radioactive Waste (HTRW) Projects", dated 23 November 1998, and/or EM 200-1-10 (DRAFT/Final), "Guidance for Evaluating Performance Based Chemical Data Packages".

8.3.2.1 Sample Shipment and Receipt, Fall Event

All sample coolers were packed with ice in the field. Sample shipments were received at the laboratory on October 29, 30, 31 and November 1, 2002. All samples were appropriately preserved by the procedures shown in Table 8-1. There are no sample shipment or receipt anomalies associated with these samples.

8.3.2.2 Holding Times, Fall Event

Samples were prepared and analyzed in accordance with the methods and holding time requirements cited in Table 8-1, except for TDS in which the 48-hour holding time was exceeded by as much as three days in some cases. All samples for TDS are affected. TDS results for all samples are qualified as "H" for holding time exceedance.

8.3.2.3 Volatile Organic Compound (VOC) Analysis, Fall Event

Sixteen groundwater samples were analyzed for VOCs using SW846 method 8260B. As a result of an error at the laboratory, sample SHM-99-31C was not analyzed for volatiles. In

addition to the sixteen groundwater samples, the laboratory analyzed: one field duplicate (SHM-DUP), a duplicate of sample SHM-96-5B); four trip blanks (dated 10/28/02, 10/29/02, 10/30/02 and 10/31/02); and one equipment blank (SHL-EB, dated 10/30/02).

<u>Laboratory Method Blank, Trip Blank and Equipment Blank Results</u>: Target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) for method blank, trip blank. The equipment blank sample exhibited acetone contamination at 5.7 ug/L. Since no acetone was detected in any of the samples, data is reported unqualified. All results are acceptable.

<u>Field Duplicate Sample Results</u>: 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.

<u>Surrogate Results</u>: 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 submitted to the laboratory for analysis. As a result of an error at the laboratory, the MS/MSD samples for volatile analysis were not analyzed. In the absence of this information, the LCS/LCSD was reviewed and found to be in control for all project specific target analytes. Since the LCS/LCSD was in control, and surrogate spike recoveries were all acceptable and the fact that historically spike recovery for the project target analytes has not typically been a problem, all data is acceptable and usable.

8.3.2.4 Target Analyte List (TAL) Metals Analysis, Fall Event

Seventeen groundwater samples were analyzed for TAL metals using SW846 method 6010B or 7000 series methods. Through an error at the laboratory, sample SHM-99-31C was not analyzed for mercury. In addition to the seventeen groundwater samples, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B), and one equipment blank (SHL-EB, dated 10/30/02).

<u>Laboratory Preparation Blank and Equipment Blank Results</u>: Target analytes were undetected at levels above the Contract Required Detection Limit (CRDL) for preparation blank and equipment blank samples. All results are acceptable.

<u>Field Duplicate Sample Results</u>: 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. All results are acceptable.

Matrix Spike (MS) and Duplicate Results: One set of matrix spike (MS) and duplicate samples were 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. All results are acceptable.

8.3.2.5 General Inorganic Analyses, Fall Event

Seventeen groundwater samples were analyzed for general inorganic analyses, including Alkalinity by EPA method 310.1, Anions (Nitrate, Sulfate, and Chloride) by EPA method 300.0, Biochemical Oxygen Demand (BOD) by EPA method 405.1, Chemical Oxygen Demand (COD) by EPA method 410.1, Total Hardness by Standard Method 2340B, Total Dissolved Solids (TDS) by EPA method 160.1, Total Suspended Solids (TSS) by EPA method 160.2, Cyanide by EPA method 335.4, and Total Organic Carbon (TOC) by SW846 method 9060 with the following exception: due to an error at the laboratory, analysis of TOC was not performed for sample SHM-99-31C. In addition to the seventeen groundwater samples, the laboratory analyzed one field duplicate (SHM-DUP, a duplicate of sample SHM-96-5B) and one equipment blank (SHL-EB, dated 10/30/02).

<u>Laboratory Preparation Blank and Equipment Blank Results</u>: All target analytes were undetected at levels above the laboratory's practical quantitation limit (PQL) for preparation blank samples.

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. As a result of the exceedance of RPD criteria for COD and TOC, sample SHM-96-5B, and its duplicate 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.

8.3.2.6 Conclusion, Fall Event

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, field duplicates, and MS/MSD recoveries), all data may be reported without qualification, except as summarized below:

- Total Dissolved Solids (TDS) Analysis: Holding times for TDS were exceeded in some cases by as much as several days. All samples for TDS analysis are affected. All results are qualified as estimated "H" as a result of holding time exceedance.
- Chemical Oxygen Demand (COD) Analysis and Total Organic Carbon (TOC) Analysis
 The results of sample SHM-96-5B and it's duplicate for both of these parameters exhibited greater than 20% RPD. Therefore, results for the sample and duplicate are qualified, "*", indicating that duplicate sample RPD values are outside of the acceptance limits.

9.0 CORRECTIVE ACTION

Options for corrective action have been detailed in a draft report titled "Draft Cap Drainage Report, Shepleys Hill Landfill, Devens RFTA, Ayer, MA" and dated January 2003, which was submitted to the Army by the USACE. Implementation of the selected options should improve the drainage and function of the landfill cap. The following items should be addressed before the next inspection or as provided for in the final recommendations in the report cited above: (1) Repair and replace the security fence and gates as required to control access to the site; (2) Place topsoil and seed over the sandy area lacking vegetation on the east side along the perimeter of the cap. Along with the corrective actions listed above, it is recommended to: (1) Install additional landfill gas monitoring probes along the commercial property at the south side of the landfill; (2) Repair and regrade around the catch basins on the south side of the landfill.

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



TABLE 4-1 Landfill Gas Monitoring

INSPECTOR: Kullberg/Michalak TITLE: Civil Engineer DATE: 11/05/02

ORGANIZATION: CENAE-EP WEATHER: Sunny, 50 d F,

BAROMETER: 29.92 in Hg TIME: 1050 BAROMETER: 29.86 in Hg TIME: 1330

| Vent | VOC | O_2 | H ₂ S | LEL | CO | CO ₂ | CH4 | Remarks |
|-------|-----|-------|------------------|------|-----|-----------------|-------|---------------|
| No. | ppm | % | ppm | % | ppm | % | % | |
| | PID | GA-90 | CGI | CGI | CGI | GA-90 | GA-90 | |
| V-1 | 0.0 | 18.3 | 0 | 0 | 0 | 1.2 | 0 | CGI O2 – 18.9 |
| V-2 | 0.0 | 18.1 | 0 | 75 | 0 | 1.3 | 1.4 | CGI O2 – 18.1 |
| V-3 | 0.0 | 10.7 | 0 | >100 | 0 | 5.7 | 3.4 | CGI O2 – 10.7 |
| V-4 | 0.0 | 14.1 | 0 | >100 | 0 | 4 | 0.9 | CGI O2 – 14.0 |
| V-5 | 0.0 | 18.8 | 0 | 0 | 0 | 0.8 | 0 | CGI O2 – 19.0 |
| V-6 | 0.0 | 15.4 | 0 | >100 | 0 | 3.4 | 2.8 | CGI O2 – 15.9 |
| V-7 | 0.0 | 18.0 | 0 | 16 | 0 | 0.8 | 0.2 | CGI O2 – 18.3 |
| V-8 | 0.0 | 16.1 | 0 | 40 | 0 | 2.4 | 0.6 | CGI O2 – 16.3 |
| V-9 | 0.0 | 7.2 | 0 | >100 | 0 | 14.7 | 19.8 | CGI O2 – 9.3 |
| V-10 | 0.0 | 17.8 | 0 | 9 | 0 | 0.6 | 0 | CGI O2 – 17.7 |
| V-11 | 0.0 | 16.3 | 0 | 62 | 0 | 1.5 | 1 | CGI O2 – 16.5 |
| V-12 | 0.0 | 20.5 | 0 | 0 | 0 | 0 | 0 | CGI O2 – 20.7 |
| V-13 | 0.0 | 9.3 | 0 | >100 | 0 | 6.3 | 4.9 | CGI O2 – 9.0 |
| V-14 | 0.0 | 2.2 | 0 | >100 | 0 | 15.7 | 18.6 | CGI O2 – 2.0 |
| V-15 | 0.0 | 4.2 | 0 - | >100 | 0 | 12.2 | 10.6 | CGI O2 – 4.4 |
| V-16 | 0.0 | 20.7 | 0 | 0 | 0 | 0 | 0 | CGI O2 – 20.9 |
| V-17 | 0.0 | 14.9 | 0 | 17 | 0 | 3 | 0.5 | CGI O2 – 19.2 |
| V-18 | 0.0 | 3.2 | 0 | >100 | 0 | 19 | 23.5 | CGI O2 – 3.4 |
| PGV-1 | 0.0 | 20.2 | 0 | 0 | 0 | 0.2 | 0 | CGI O2 – 21.7 |
| PGV-2 | 0.0 | 19.3 | 0 | 0 | 0 | 1.4 | 0 | CGI O2 – 19.5 |
| PGV-3 | 0.0 | 20.2 | 0 | 0 | 0 | 0.6 | 0 | CGI O2 – 20.3 |
| PGV-4 | 0.0 | 20.2 | 0 | 0 | 0 | 0.2 | 0 | CGI O2 – 21.7 |

CALIBRATION INFORMATION:

Instrument: PID, 10.6 eV lamp

Results: 0.0/248 ppm isobutylene Calibrated by: Michalak

Instrument: Industrial Scientific TMX 412 CGI

Results: 53% LEL Methane/Pentane, 14%, 20.9% O₂, 26 ppm H₂S, 54 ppm CO Calibrated by: US Environmental Co

Instrument: <u>Landtech Gem 500 GA-90</u> Results: 20.9% O2, 15% CO2, 15% CH4

Calibrated by: US Environmental Co

TABLE 5-1
Monitoring Well Specifications and Groundwater Elevations

| | | | Groundwater Elevations (feet NGVD) | | | | | | |
|------------------------|---------------------|-------------------------------------|------------------------------------|---------------------|--|--|--|--|--|
| Well Identification | Description | Screened Interval (feet NGVD) | May 20, 2002 | October 28, 2002 | | | | | |
| SHL-3 | Water Table | 213.4-223.4 | 218.27 | 217.61 | | | | | |
| SHL-4 | Water Table | 213.0-223.0 | 218.48 | 217.89 | | | | | |
| SHL-5 | Water Table | 203.4-213.4 | 216.19 | 215.60 | | | | | |
| SHM-96-5B | Base of Sand/Till | 128.5-138.5 | 214.94 | 213.47 | | | | | |
| SHM-96-5C | Water Table | 158.5-168.5 | 214.91 | 213.44 | | | | | |
| SHL-9 | Water Table | 197.8-207.8 | 215.10 | 213.23 | | | | | |
| SHL-10 | Water Table | 210.1*-231.0 | 218.18 | 217.26 | | | | | |
| SHM-93-10C | Bedrock | 192.7-202.7 | 218.79 | 218.09 | | | | | |
| SHL-11 | Water Table | 206.5-221.5 | 217.64 | 217.22 | | | | | |
| SHL-19 | Water Table | 209.3-224.3 | 219.14 | 217.98 | | | | | |
| SHL-20 | Base of Till | 185.8-195.8 | 217.74 | 217.24 | | | | | |
| SHL-22 | Base of Till | 104.5-114.5 | 214.74 | 213.19 | | | | | |
| SHM-96-22B | Sand/Till Interface | 127.6-157.6 | 214.70 | 213.18 | | | | | |
| SHM-93-22C | Bedrock | 87.3-97.3 | 214.75 | 213.20 | | | | | |

^{*} Records show well SHL-10 having an as-built bottom elevation of 207.0 NGVD. Recent field observations have revealed that fine material has collected in the bottom of the well, causing refusal to be met at 211.2 NGVD prior to this year. On 15 April 2002, an attempt was made to redevelop the well, with over a foot of the material being removed. At that point, the amount of material continuing to resuspend, allowing removal, was minimal.

TABLE 6-1 Monitoring Well Designations

| | Well Designation | Exceedances of Cleanup Levels |
|---------------------|---------------------------|-------------------------------|
| Monitoring | (Based on First Five-Year | for Trigger Chemicals, Since |
| Well Identification | Review, SWEC, Aug 1998) | Achieving Group 1 Status |
| | 100000,000 | |
| SHL-3 | Group 1 | None |
| SHL-4 | Group 2 | Not Applicable |
| SHL-5 | Group 1 | None |
| SHM-96-5B | Group 2 | Not Applicable |
| SHM-96-5C | Group 2 | Not Applicable |
| SHL-9 | Group 1 | 71.3 µg/L As (Spring 1999) |
| | | 144 μg/L As (Spring 2002) |
| SHL-10 | Group 2 | Not Applicable |
| SHM-93-10C | Group 1 | None |
| SHL-11 | Group 2 | Not Applicable |
| SHL-19 | Group 2 | Not Applicable |
| SHL-20 | Group 2 | Not Applicable |
| SHL-22 | Group 1 | 55.9 B μg/L As (Spring 2002) |
| | | 77.1 µg/L As (Fall 2002) |
| SHM-96-22B | Group 2 | Not Applicable |
| SHM-93-22C | Group 1 | 51.1 μg/L As (Fall 1998) |

As - Arsenic

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

TABLE 7-1

Groundwater Sample Analysis and Procedures

| PARAMETERS | METHOD |
|---|-----------------------------|
| | |
| Volatile Organic Compounds | |
| Xylenes | SW846 8260B |
| Acetone | 3 W 040 0200D |
| 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 | |
| Inorganics | |
| Aluminum | SW846 6010B |
| Arsenic | |
| Barium | except Cyanide by EPA 335.4 |
| Cadmium | |
| Chromium | and Mercury by SW846 7470A |
| Copper | |
| Cyanide (wet chemistry) | |
| Iron | |
| Lead | |
| Manganese | |
| Mercury | |
| Nickel Selenium | |
| Sodium | |
| Silver | |
| Zinc | |
| General Parameters (laboratory determination) | |
| 77 -1 | |
| Hardness | SM 2340B |
| Total Dissolved Solids | EPA 160.1 |
| Total Suspended Solids Chloride | EPA 160.2 |
| Nitrate as N | EPA 300.0 |
| Sulfate | EPA 300.0 |
| Alkalinity | EPA 300.0 |
| Biochemical Oxygen Demand – 5 day | EPA 310.1 EPA 405.1 |
| Chemical Oxygen Demand | EPA 403.1 EPA 410.1 |
| Total Organic Carbon | SW846 9060 |
| | 511010 2000 |
| General Parameters (field determination) | |
| pН | |
| Temperature | |
| Specific Conductance | |
| Dissolved Oxygen | |
| Oxygen Reduction Potential | |
| Turbidity | |

Table 7-2

Groundwater Analytical Results - May 20 & 21, 2002 Sampling Event Shepley's Hill Landfill Compliance Point Wells Devens, Massachusetts

(Sheet 1 of 1)

| | Well No. | SHL-3 | SHL-4 | SHL-5 | SHM-96-58 | 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 | μg/L | μg/L | μg/L | μg/L | μg/L | μg/L | µg/L | μg/L | μg/L | µg/L | μg/L | µg/L | μg/L | μg/L | μg/L |
| | LEVEL (1) | | | | | | | | | | | | | L | | |
| | µg/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 | <5.0 | <5.0 |
| 2-Butanone | - 1 | <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 | 1.0 J | 1.1 J | 1.4 J | <5.0 | <5.0 | <5.0 | 2.1 J | <5.0 | 1.4 J | <5.0 | 1.6 J | <5.0 |
| Methyl-t-Butyl Ether | 70 (4) | <5.0 | <5.0 | <5.0 | 1.0 J | 1.1 J | 1.6 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 1.5 J | 1.1 J | 1.2 J |
| 1,1-Dichloroethane | 70 (4) | <5.0 | <5.0 | <5.0 | 1.8 J | 1.8 J | 1.8 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 2.2 J | 2.3 J | 1.6 J |
| 1,2-Dichloroethene (total) | 70 (2) | <5.0 | <5.0 | <5.0 | 2.7 J | 2.7 J | 2.8 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 1.0 J | 2.7 J | 3.2 J | 1.2 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) | | | | | | | | | | | | <u></u> | | | | |
| Aluminum | 6,870 | <19.8 | <19.8 | 248 | <19.8 | <19.8 | <19.8 | 229 | <19.8 | 21.2 | <19.8 | <19.8 | <19.8 | <19.8 | <19.8 | <19.8 |
| Arsenic | 50 | 2.8 B | 47.8 B | 11.9 B | 3,800 | 3,830 | 50.4 8 | 144 | 4.0 B | 11.0 B | 469 | 66.9 | 154 | 55.9 B | 2,040 | 30.5 B |
| Barium | 2,000 (2) | 8.6 | 23.2 | 10.0 | 60.1 | 60.9 | 55.9 | 17.5 | <6.3 | 8.1 | 101 | 15.6 | 94.7 | 15.8 | 100 | 68.8 |
| Cadmium | 5 (2) | 1.2 B | 1.1 B | 1.3 B | 1.1 B | 0.94 B | 1.3 B | 1.4 B | 1.4 B | 1.4 B | 1.4 B | 1.3 B | 1.4 B | 1.6 B | 1.3 B | 1.2 B |
| Chromium | 100 | 5.1 B | 3.1 B | 2.9 B | 3.2 B | 2.7 B | 2.9 B | 2.5 B | 3.1 B | 2.9 B | 2.3 B | 2.1 B | 3.0 B | 4.0 B | 1.8 B | 4.7 B |
| Copper | 1,300 (3) | 4.2 B | 2.4 B | 3.8 B | 2.9 B | 4.2 B | 4.3 B | 2.5 B | 2.7 B | 2.4 B | 2.0 B | 1.9 B | 3.4 B | 4.0 B | 3.0 B | 2.3 B |
| Iron | 9,100 | 30.4 | 1,520 | 1,110 | 40,100 | 39.600 | 49,200 | 19,300 | <17.0 | 71.1 | 55,400 | 13,900 | 7,010 | 605 | 92,000 | 916 |
| Lead | 15 | 1.8 B | 2.2 B | 2.0 B | <0.80 | 1.8 B | 2.0 B | 4.2 B | 2.8 B | 1.8 B | 1.1 B | 1.1 B | 1.6 B | 1.1 B | <0.80 | 1.2 B |
| Manganese | 1,715 | 14.3 B | 573 | 289 | 11,000 | 10,900 | 4,110 | 446 | 1,3 B | 45.4 B | 2,010 | 2,280 | 5,950 | 1,370 | 1,680 | 425 |
| 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 | 5.5 | 4.3 | 3.3 | 15.2 | 14.9 | 6.2 | <2.8 | <2.8 | 3.7 | 4.9 | 8.8 | 11.7 | 12.6 | 9.1 | 3.5 |
| Selenium | 50 (2) | <2.0 | 4.5 B | 3.5 B | 4.4 B | 2.4 B | 3.3 B | 3.8 B | 5.2 B | <2.0 | 4.2 B | 3.2 B | 6.3 B | 2.8 B | 8.7 B | 4.5 B |
| Silver | 40 (4) | 3.0 | 1.6 | 2.4 | 2.1 | 3.1 | 3.0 | <1.2 | <1.2 | 1.3 | <1.2 | 1.8 | 2.1 | 2.4 | <1.2 | 1,5 |
| Sodium | 20,000 | 1,340 B | 6,370 | 2,340 B | 36,600 | 37,000 | 34,000 | 2,380 B | 1,380 B | 8,620 | 27,600 | 2,570 B | 34,000 | 43,700 | 35,900 | 18,800 |
| Zinc | 2,000 (4) | 5.1 B | 4.3 B | 5.1 B | 8.9 B | 8.8 B | 29.3 | 6.2 B | 2.8 B | 3,6 B | 8.9 B | 5.8 B | 5.4 B | 21.3 B | 12.0 B | 4.4 B |
| GENERAL CHEMISTRY | | | | | | | | | | | | | | | | |
| Alkalinity as CaCO ₃ | - | 5,000 | 39,000 | 33,000 | 348,000 | 336,000 | 320,000 | 68,000 | 4,000 | 188,000 | 228,000 | 38,000 | 280,000 | 440,000 | 312,000 | 232,000 |
| Biochemical Oxygen Demand ₅ | - | <1,300 H | <1,300 H | <1,300 | <1,300 | <1,300 | <1,300 | <1,300 | <1,300 H | <1,300 H | 1,200 H | <1,300 H | <1,300 H | <1,300 | <1,300 | 2,200 |
| Chloride | | 720 | 4,700 | 1,100 | 41,200 | 39,600 | 49,000 | 1.500 | 800 | 32,800 | 31,000 | 1.300 | 42,000 | 52,600 | 45,700 | 36,800 |
| Chemical Oxygen Demand | - | <5,000 | <5,000 | 37,500 | 43,500 * | 148,000 * | 53,400 | 53,400 | <5.000 | 8,100 | 14,100 | <5,000 | 16,100 | 67,200 | 53,400 | 33,600 |
| 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 | | 9,500 | 31,000 | 28,200 | 304,000 | 301,000 | 258,000 | 68,400 | 18,400 | 237,000 | 162,000 | 37,400 | 250,000 | 433,000 | 249,000 | 238,000 |
| Nitrate as Nitrogen | 10,000 (2) | 400 | 220 | <200 | <200 | <200 | <200 | <200 | 1.900 | <200 | 210 | 220 | 380 | <200 | 220 | <200 |
| Sulfate | 500,000 (2) | 2,700 | 8,700 | 2,900 | 5,400 | 5,400 | 3,700 | 9,700 | 2,100 | 19,800 | 530 | 12,800 | 8,800 | 4.900 | 1.800 | 12,400 |
| Total Dissolved Solids | 300,000 (2) | 23,000 | 65.000 | 61.000 | 438,000 | 452.000 | 398.000 | 91,000 | 43.000 | 326,000 | 314.000 | 76,000 | 371,000 | 547,000 | 412,000 | 320,000 |
| Total Suspended Solids | | 2,300 | 11,100 | 1,200 | 59,500 | 61,700 | 53,400 | 35,500 | <500 | 1,700 | 37,400 | 7,200 | 9,000 | 1,900 | 104,000 | 2,400 |
| Total Organic Carbon | | <1.000 | 2,300 | 6,500 | 5,100 | 5,600 | 6,300 | 6,700 | <1,000 | <1,000 | 4,200 | <1,000 | 3,500 | 4,300 | 6,800 | 3,400 |
| . J.a. C. garilo Carbon | <u> </u> | | 1 2,300 | L 0,000 | 1 3,100 | 1 3,000 | 1 0,300 | 0,100 | 1 1,000 | 1 71,000 | 4,200 | 1 -1,000 | 1 3,300 | 1 4,000 | 1 0,000 | 0,700 |
| FIELD READINGS (units as no | ted below) | | | | | | | | | | | | | | | |
| | | () · | | | | | | | | | | | - | | The second secon | PA |

| TICED INCADINGS (UIIIS as 110) | eu below) | | | | | | | | | | | | | | | |
|------------------------------------|-----------|-------|-----|------|-------|-------|-------|-------|-------|------|-------|------|------|------|-------|--------|
| Dissolved Oxygen (mg/L) | | 11.0 | 0.3 | 0.2 | 0.4 | 0.4 | 0.3 | 0.3 | 10.4 | 0.8 | 0.4 | 1.9 | 0.2 | 6.8 | 0.4 | 0.4 |
| Oxidation Reduction Potential (mv) | | 232.2 | 6.5 | 93.5 | -40.8 | -40.8 | -53.9 | -19.4 | 255.6 | 65.6 | -54.7 | 53.2 | 29.2 | 63.1 | -75.8 | -111.3 |
| pH | - | 6.5 | 6.5 | 5.2 | 6.6 | 6.6 | 6.5 | 6.5 | 6.8 | 7.1 | 6.5 | 5.9 | 6.4 | 6.6 | 6.6 | 7.6 |
| Specific Conductivity (µS/cm) | - | 26 | 114 | 67 | 816 | 816 | 832 | 151 | 47 | 479 | 659 | 154 | 627 | 921 | 848 | 548 |

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance -

- B = value within 5 times of the greater amount detected in the equipment or preparation blank samples
- J = estimated value
- N = Matrix Spike sample recovery outside acceptance limits
- * = duplicate analysis Relative Percent Difference outside acceptance limits
- H = holding time exceeded
- 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 - May 22, 2002 Sampling Event Molumco Road Wells (RE: Shepley's Hill Landfill) Ayer, Massachusetts

(Sheet 1 of 1)

| | Well No. | SHM-99-31A | SHM-99-31B | SHM-99-31C | SHM-99-32X | |
|--|-------------|------------|------------|------------|------------|--|
| PARAMETERS | CLEANUP | μg/L | μg/L | μg/L | μg/L | |
| | LEVEL (1) | | | | | |
| | μg/L | | | | | |
| VOLATILES (8260B) | | | | | | |
| Xylenes | 10,000 (2) | <5.0 | <5.0 | <5.0 | <5.0 | |
| Acetone | 3,000 (4) | <5.0 | <5.0 | <5.0 | <5.0 | |
| 2-Butanone | - | <5.0 | <5.0 | <5.0 | <5.0 | |
| 4-Methyl-2-Pentanone | - | <5.0 | <5.0 | <5.0 | <5.0 | |
| Benzene | 5 (2) | <5.0 | 2.1 J | 1.5 J | <5.0 | |
| Methyl-t-Butyl Ether | 70 (4) | <5.0 | <5.0 | 1.7 J | 2.0 J | |
| 1,1-Dichloroethane | 70 (4) | <5.0 | <5.0 | 2.0 J | 2.0 J | |
| 1,2-Dichloroethene (total) | 70 (2) | <5.0 | <5.0 | 2.5 J | 2.8 J | |
| 1,2-Dichloroethane | 5 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 1,3-Dichlorobenzene | 600 (2) | <5.0 | <5.0 | <5.0 | <5.0 | |
| 1,4-Dichlorobenzene | 5 | <5.0 | <5.0 | <5.0 | <5.0 | |
| 1,2-Dichlorobenzene | 600 | <5.0 | <5.0 | <5.0 | <5.0 | |
| METALS (6010B or as noted) | | | | | | |
| Aluminum | 6,870 | 80.7 | <19.8 | <19.8 | 21.4 | |
| Arsenic | 50 | 16.6 B | 75.1 | 345 | 176 | |
| Barium | 2,000 (2) | 9.0 | 71.3 | 103 | 55.5 | |
| Cadmium | 5 (2) | 0.73 B | 0.77 B | 1.1 B | 1.2 B | |
| Chromium | 100 | 2.0 B | 1.8 B | 2.3 B | 1.8 B | |
| Copper | 1,300 (3) | 1.7 B | 1.7 B | 3.2 B | 3.1 B | |
| Iron | 9,100 | 4,670 | 25,400 | 54,100 | 51,900 | |
| Lead | 15 | 1.3 B | 1.9 B | <0.80 | 1.5 B | |
| Manganese | 1,715 | 386 | 2,780 | 7,720 | 3,960 | |
| Mercury (7470A) | 2 (2) | 0.40 | <0.10 | <0.10 | <0.10 | |
| Nickel | 100 | <2.8 | <2.8 | 17.5 | 8.8 | |
| Selenium | 50 (2) | <2.0 | <2.0 | 9.3 B | 4.7 B | |
| Silver | 40 (4) | 1.4 | 1.4 | 2.4 | 1.4 | |
| Sodium | 20,000 | 9,130 | 14,200 | 47,600 | 40,600 | |
| Zinc | 2,000 (4) | 4.8 B | 8.5 B | 12.2 B | 7.6 B | |
| GENERAL CHEMISTRY | | | | | | |
| Alkalinity as CaCO ₃ | - | 196,000 | 4,000 | 432,000 | 388,000 | |
| Biochemical Oxygen Demand ₅ | - | <1,300 H | 2,000 H | <1,300 | <1,300 H | |
| Chloride | - | 6,300 | 19,800 | 60,100 | 60,000 | |
| Chemical Oxygen Demand | - | 14,100 | 22,200 | 36,300 | 28,200 | |
| Cyanide (Total) | 200 (2) | <10.0 | <10.0 | <10.0 | <10.0 | |
| Hardness as CaCO ₃ | - | 26,100 | 145,000 | 391,000 | 334,000 | |
| Nitrate as Nitrogen | 10,000 (2) | <200 | <200 | <200 | <200 | |
| Sulfate | 500,000 (2) | 8,000 | 2,800 | 2,100 | 2,300 | |
| Total Dissolved Solids | | 72,000 | 243,000 | 584,000 | 507,000 | |
| Total Suspended Solids | - | 1,200 | 8,900 | 60,000 | 36,900 | |
| Total Organic Carbon | - | 4,200 | 5,800 | 7,100 | 5,300 | |

| FIELD READINGS (units as noted | below) | | | | |
|------------------------------------|--------|------|------|-------|-------|
| Dissolved Oxygen (mg/L) | - | 0.2 | 0.4 | 0.4 | 0.3 |
| Oxidation Reduction Potential (mv) | - | 51.7 | 32.6 | -72.1 | -62.8 |
| pH | - | 5.8 | 5.3 | 6.6 | 6.5 |
| Specific Conductivity (µS/cm) | - | 103 | 407 | 1,053 | 939 |

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance -

25

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

J = estimated value

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

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
- $\hbox{(3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used } \\$
- (4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

TABLE 7-4

Groundwater Analytical Results - October 28-30, 2002 Sampling Event Shepley's Hill Landfill Compliance Point Wells 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-98-22B | SHM-93-22C |
|--|--|-----------------|----------------|-----------------|-------------------|-------------------|-----------------|-----------------|--------------|-----------------|-----------------|----------------|-----------------|---|--|----------------|
| PARAMETERS | CLEANUP | μg/L | μg/L | μg/L | µg/L | μg/L | μg/L. | μg/L | μg/L | μg/L | μg/L | μg/L | μg/L | μg/L | µg/L | µg/L |
| | LEVEL (1) | | | | | | | | F - F | | | | | 1 | 1 | |
| | µg/L | · | | | | | | | | | | | | | | |
| VOLATILES (8260B) | l bar | | | | | | | | | | | | | | | |
| 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 | <5.0 | <5.0 |
| 2-Butanone | | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| 4-Methyl-2-Pentanone | - 1 | <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 | < 5.0 | <5.0 | 0.92 J | <5.0 | <5.0 | <5.0 | 2.0 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 |
| Methyl-t-Butyl Ether | 70 (4) | <5.0 | <5.0 | <5.0 | 1.0 J | 0.98 J | 1.2 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 1.2 J | <5.0 | 1.0 J |
| 1,1-Dichloroethane | 70 (4) | <5.0 | <5.0 | <5.0 | 1.6 J | 1.6 J | 1.9 J | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | <5.0 | 1.9 J | <5.0 | 1.3 J |
| 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 | <5.0 | <5.0 | 1.4 J | 2.4 J | <5.0 | 1.2 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 | 2.0 J | <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) | | | | | | | | | | | | | | ļ <u>. </u> | | |
| Aluminum | 6,870 | <16.1 | <16.1 | 199 | 20.0 | 19.0 | <16.1 | 60.0 | <16.1 | 38.3 | <16.1 | <16.1 | <16.1 | <16.1 | 18,4 | 21.1 |
| Arsenic | 50 | <3.2 | 56.1 | <3.2 | 1,970 | 1,960 | 41.3 | 29.0 | <3.2 | 7.1 | 648 | 184 | 175 | 77.1 | 159 | 30.1 |
| Barium | 2,000 (2) | <9.2 | 46.0 | 15.9 | 45.6 | 45.6 | 56,4 | 14.2 | <9.2 | <9.2 | 112 | 25.0 | 105 | 12.7 | <9.2 | 72.7 |
| Cadmium | 5 (2) | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 | 0.46 | <0.30 | <0.30 | <0.30 | <0.30 | <0.30 |
| Chromium | 100 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 | <4.6 |
| Copper | 1,300 (3) | 1.9 | <1.8 | <1.8 | 5.8 | <1.8 | <1.8 | <1.8 | <1.8 | 11.3 | <1.8 | <1.8 | 19.6 | <1.8 | <1.8 | <1.8 |
| Iron | 9,100 | <22.6 | 4,380 | 1,120 | 18,700 | 18,700 | 44,800 | 8,430 | <22.6 | 52.8 | 64,500 | 27,600 | 9,100 | 707 | 446 | 778 |
| Lead | 15 | <1.1 <2.5 | <1.1 436 | <1.1 259 | <1.1 | <1.1 12,800 | <1.1 4.110 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 | <1.1 7.200 | <1.1 1.760 | <1.1 | <1.1 |
| Manganese Mercury (7470A) | 1,715 | | | | 13,000 | | | 484 | <2.5 | 46.9 | 1,990 | 3,400 | | | 11.9 | 407 |
| Nickel | 2 (2) 100 | <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 |
| Selenium | 50 (2) | <13.5 <3.9 | <13.5 <3.9 | <13.5 <3.9 | <13.5 6.3 | <13.5 6.0 | <13.5 6.8 | <13.5 | <13.5 | <13.5 | <13.5 | <13.5 | <13.5 8.9 | <13.5 <3.9 | <13.5 | <13.5 |
| Silver | 40 (4) | <1.4 | <1.4 | <1.4 | <1.4 | 5.0 <1.4 | <1.4 | <3.9 <1.4 | <3.9 <1.4 | <3.9 <1.4 | 4.4 <1.4 | 4.5 <1.4 | <1.4 | <1.4 | 4.2 <1.4 | <3.9 <1.4 |
| Sodium | 20,000 | 1,570 | 2,640 | 2,180 | 36,200 | 35.800 | 35,400 | 2.560 | 1,520 | 8,180 | <1.4 29,800 | 4.240 | 35.600 | 45,500 | 114,000 | 19.500 |
| Zinc | 2,000 (4) | <6.9 | <6.9 | <6.9 | 8.9 | 7.3 | <6.9 | <6.9 | <6.9 | <6.9 | 7.5 | 7.9 | <6.9 | 16.4 | <6.9 | <6.9 |
| GENERAL CHEMISTRY | 2,000 (4) | 10.9 | 0.9 | - 10.3 | 0.5 | 7.3 | ~0.9 | \0.3 | \0.9 | <u> </u> | 7.5 | 7.9 | \0.9 | 10.4 | \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ | <u> </u> |
| Alkalinity as CaCO ₃ | I | 24,900 | 86,100 | 32.600 | 367.000 | 366.000 | 307,000 | 54.000 | 27.300 | 200,000 | 218.000 | 75,800 | 263,000 | 378,000 | 193,000 | 121,000 |
| Biochemical Oxygen Demands | | <1,500 | <1.500 | <1.500 | <1.500 | <1,500 | <1,500 | <1,500 | | | | <1,500 | <1,500 | <1,500 | | |
| Chloride | · | | | | | | | | <1,500 | <1,500 | <1,500 | | | L | <1,500 | 1,500 |
| Chemical Oxygen Demand | | 1,200 27,500 | <200 | 2,100 | 42,200 | 41,200 | 45,600 | 1,800 | <200 | 31,700 | 28,900 | 3,100 | 44,000 | 48,000 | 45,500 | 36,100 |
| Cyanide (Total) | 200 (2) | <10.0 | 19,600 | 35,200 <10.0 | 87,900 * <10.0 | 13,700 * <10.0 | 41,000 <10.0 | 25,500 <10.0 | 11,800 | 23,500 | 37,300 | 29,400 | 21,600 <10.0 | 17,600 <10.0 | 39,200 | 17,600 |
| Hardness as CaCO ₃ | ZUU (Z) | | | | | | | | <10.0 | <10.0 | <10.0 | <10.0 | | | <10.0 | <10.0 |
| <u> </u> | 1 | 29,700 | 90,600 | 38,900 | 315,000 | 314,000 | 246,000 | 74,500 | 29,400 | 228,000 | 183,000 | 62,800 | 284,000 | 437,000 | 28,000 | 246,000 |
| Nitrate as Nitrogen | 10,000 (2) | 400 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 | <200 |
| Sulfate Total Discolude Salida | 500,000 (2) | 7,500 | 11,400 | 13,000 | 6,300 | 6,300 | 6,600 | 10,700 | 2,600 | 18,700 | 390 | 13,600 | 11,600 | 5,600 | 2,900 | 13,500 |
| Total Dissolved Solids Total Suspended Solids | | 53,000 H | 123,000 H | 99,000 H | 467,000 H | 475,000 H | 382,000 H | 148,000 H | 48,000 H | 312,000 H | 336,000 H | 130,000 H | 462,000 H | 565,000 H | 395,000 H | 350,000 H |
| Total Organic Carbon | - | <500 <1,000 | 1,100 2,200 | 7,000 8,100 | 26,900 5,400 * | 25,600 4,200 * | 44,400 6.400 | <500 8,300 | 900 | 1,600 <1,000 | 58,700 4,000 | 9,900 1,200 | 11,000 2,100 | 1,600 4,100 | 700 4,000 | 4,100 3,400 |
| FIELD READINGS (units as no | tad balaus | | | <u> </u> | | 7,200 | <u> </u> | 0,000 | -1,000 | 1,000 | 7,000 | 1,200 | 21100 | 1 7,100 | 1 7,000 | 1 0,700 |
| | rea pelow) | 7.0 | 1 00 | 0.0 | | 2.2 | ~ ~ | | | | | | | | T . | 1 |
| Dissolved Oxygen (mg/L) Oxidation Reduction Potential (mv) | 1 | 7.9 | 0.3 | 0.6 | 0.3 | 0.3 | 0.3 | 0.1 | 9.4 | 0.5 | 0.6 | 0.3 | 0.3 | 0.8 | 0.4 | 0.5 |
| DH Oxidation Reduction Potential (mv) | 1 | 209.9 | 28.0 | 27.5 | -62.7 | -62.7 | -55.8 | -46.9 | 219.4 | -5.3 | -46.3 | -6.9 | -31.1 | 7.4 | 14.4 # | -135.1 |
| Specific Conductivity (µS/cm) | | 6.3 67 | 6.1 221 | 5.7 94 | 6.6 846 | 6.6 846 | 6.5 822 | 6.6 182 | 6.9 | 7.5 491 | 6.5 756 | 6.5 254 | 6.5 751 | 6.6 927 | 8.7 824 | 7.5 549 |
| opeonic Conductivity (parciti) | | 0/ | 1 441 | 74 | 040 | 040 | 022 | 182 | 68 | 491 | 756 | 254 | 101 | j 921 | 824 | 049 |

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance -

25

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

= value circumspect due to potential field equipment failure

NS = not sampled NA = not analyzed

- (1) Cleanup values as developed in the ROD (unless otherwised noted)
- (2) No cleanup value was developed so the Federal Maximum Contamination Level was used
- (3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used
- (4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

J = estimated value

N = Matrix Spike sample recovery outside acceptance limits

^{* =} duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

TABLE 7-5

Groundwater Analytical Results - October 31, 2002 Sampling Event Molumco Road Wells (RE: Shepley's Hill Landfill) Ayer, Massachusetts

(Sheet 1 of 1)

| | Well No. | SHM-99-31A | SHM-99-31B | SHM-99-31C | SHM-99-32X |
|------------------------------------|-------------|------------|------------|------------|------------|
| PARAMETERS | CLEANUP | μg/L | μg/L | μg/L | μg/L |
| | LEVEL (1) | | | | i |
| | µg/L | | | | |
| VOLATILES (8260B) | | | | | |
| Xylenes | 10,000 (2) | <5.0 | <5.0 | NA | NS |
| Acetone | 3,000 (4) | <5.0 | <5.0 | NA | NS |
| 2-Butanone | - | <5.0 | <5.0 | NA | NS |
| 4-Methyl-2-Pentanone | + | <5.0 | <5.0 | NA | NS |
| Benzene | 5 (2) | <5.0 | 1.7 J | NA | NS |
| Methyl-t-Butyl Ether | 70 (4) | <5.0 | <5.0 | NA | NS |
| 1,1-Dichloroethane | 70 (4) | <5.0 | <5.0 | NA | NS |
| 1,2-Dichloroethene (total) | 70 (2) | <5.0 | <5.0 | NA | NS |
| 1,2-Dichloroethane | 5 | <5.0 | <5.0 | NA | NS |
| 1,3-Dichlorobenzene | 600 (2) | <5.0 | <5.0 | NA | NS |
| 1,4-Dichlorobenzene | 5 | <5.0 | <5.0 | NA | NS |
| 1,2-Dichlorobenzene | 600 | <5.0 | <5.0 | NA | NS |
| METALS (6010B or as noted) | | | | | |
| Aluminum | 6,870 | 54.1 | 22.7 | <16.1 | NS |
| Arsenic | 50 | 11.6 | 71.1 | 332 | NS |
| Barium | 2,000 (2) | <9.2 | 63.4 | 98.0 | NS |
| Cadmium | 5 (2) | <0.30 | <0.30 | <0.30 | NS |
| Chromium | 100 | <4.6 | <4.6 | <4.6 | NS |
| Copper | 1,300 (3) | 3.5 | <1.8 | <1.8 | NS |
| Iron | 9,100 | 3,760 | 19,500 | 45,500 | NS |
| Lead | 15 | 1.2 | <1.1 | <1.1 | NS |
| Manganese | 1,715 | 655 | 2,270 | 6,740 | NS |
| Mercury (7470A) | 2 (2) | <0.10 | <0.10 | NA | NS |
| Nickel | 100 | <13.5 | <13.5 | 13.5 | NS |
| Selenium | 50 (2) | <3.9 | <3.9 | <3.9 | NS |
| Silver | 40 (4) | <1.4 | <1.4 | <1.4 | NS |
| Sodium | 20,000 | 8,200 | 11,600 | 47,200 | NS |
| Zinc | 2,000 (4) | <6.9 | <6.9 | <6.9 | NS |
| GENERAL CHEMISTRY | | | | | |
| Alkalinity as CaCO ₃ | - | 23,800 | 155,000 | 448,000 | NS |
| Biochemical Oxygen Demand₅ | - | <1,500 | 1,900 | <1,500 | NS |
| Chloride | - | 8,400 | 16,200 | 61,800 | NS |
| Chemical Oxygen Demand | - | 11,800 | 37,300 | 51,000 | NS |
| Cyanide (Total) | 200 (2) | <10.0 | <10.0 | <10.0 | NS |
| Hardness as CaCO ₃ | - | 26,000 | 123,000 | 382,000 | NS |
| Nitrate as Nitrogen | 10,000 (2) | <200 | <200 | <200 | NS |
| Sulfate | 500,000 (2) | 14,200 | 3,500 | 2,500 | NS |
| Total Dissolved Solids | | 45,000 H | 208,000 H | 575,000 H | NS |
| Total Suspended Solids | - | 1,500 | 2,200 | 49,300 | NS |
| Total Organic Carbon | - | 3,800 | 5,900 | NA | NS |
| FIELD READINGS (units as note | ed below) | | | | |
| Dissolved Oxygen (mg/L) | | 0.2 | 0.5 | 0.3 | NS NS |
| Oxidation Reduction Potential (mv) | | -15.2 | -4.8 | -94.8 | NS |
| 1 | | | | | |

Notes:

Shaded areas with bold numbers indicate cleanup level exceedance -

25

6.7

1,059

NS

NS

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

5.9

104

6.1

362

J = estimated value

Specific Conductivity (µS/cm)

N= Matrix Spike sample recovery outside acceptance limits

* = duplicate analysis Relative Percent Difference outside acceptance limits

H = holding time exceeded

NS = not sampled

NA = not analyzed

- (1) Cleanup values as developed in the ROD (unless otherwised noted)
- (2) No cleanup value was developed so the Federal Maximum Contamination Level was used
- (3) No cleanup value was developed so the Massachusetts Maximum Contamination Level was used
- (4) No cleanup value was developed so the Massachusetts Contingency Plan GW-1 standard was used

Table 7-6 Comparison of Historic Arsenic Results Shepley's Hill Landfill and Molumco Road Groundwater Monitoring

| Landfill Compliance Point | Arsenic (ug/L) | | | | | | | | | | | | | | | | |
|---------------------------|----------------|--------|--------|--------|--------|---------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Monitoring Well ID | Aug-91 | Dec-91 | Mar-93 | Jun-93 | Nov-96 | May-97 | Oct-97 | May-98 | Nov-98 | May-99 | Nov-99 | May-00 | Nov-00 | May-01 | Oct-01 | May-02 | Oct-02 |
| SHL-3 | 35 | 120 | 6.5 | NS | NS | <10 | <10 | <5 | <5.4 | 2.7 B | <1.9 | <2.5 | 17.4 | <4.1 | <1.5 | 2.8 B | <3.2 |
| SHL-4 | 260 | 140 | 2.54 | NS | 48.8 | 73.6 J | 180 | 37.4 | 89.1 | 78.2 | 61.3 | 116 | 91.5 | 50.8 | 66.0 | 47.8 B | 56.1 |
| SHL-5 | 23 | 38 | 11.4 | NS | 12 | <10 | <10 | <5 | 11.5 | 5.0 B | 6.5 | <2.5 | 13.8 | 13.8 | 14.8 | 11.9 B | <3.2 |
| SHM-96-5B | NS | NS | NS | NS | 1,440 | 3,300 J | 2,040 | 4,300 | 3,080 | 3,490 | 2,700 | 5,110 | 2,500 | 3,800 | 1,850 | 3,800 | 1,970 |
| SHM-96-5C | NS | NS | NS | NS | 71 | 43.2 | 43.1 | 49.5 | 46.8 | 57.0 | 44.8 | 52.2 | 40.3 | 80.5 | 41.1 | 50.4 B | 41.3 |
| SHL-9 | 37 | 67 | 42.4 | NS | 46.9 | 16.1 J | 25.2 | 15 | 27.2 | 71.3 | 28.5 | 15.0 | 31.4 | 15.1 | 28.1 | 144 | 29.0 |
| SHL-10 | 67 | 120 | 280 | NS | 3.4 B | <10 | 209 | <5 | <5.4 | 2.7 B | <1.9 | <2.5 | <4.2 | <4.1 | <1.5 | 4.0 B | <3.2 |
| SHM-93-10C | NS | NS | 21.3 | 18.1 | 12.4 | <10 | 10.5 | 7.5 | 10.2 | 10.8 B | 8.7 | 5.9 J | 8.8 | 6.9 | 10.1 | 11.0 B | 7.1 |
| SHL-11 | 320 | 320 | 340 | NS | 332 | 252 J | 366 | 346 | 376 | 431 | 492 | 404 | 523 | 487 | 573 | 469 | 648 |
| SHL-19 | 340 | 710 | 390 | NS | 138 | <10 | 298 | 77.5 | 145 | 156 | 176 | 41.4 | 154 | 129 | 183 | 66.9 | 164 |
| SHL-20 | 98 | 89 | 330 | NS | 244 | <10 | 227 | 238 | 218 | 216 | 215 | 216 ' | 172 | 186 | 165 | 154 | 175 |
| SHL-22 | 27 | 25 | 32.9 | NS | 24.8 | <10 | 34.8 | 10.6 | <5,4 | 12,2 B | 7.3 | 14.6 | 45.0 | 47.6 | 44,2 | 55,9 B | 77.1 |
| SHM-96-22B | NS | NS | NS | NS | 324 | 318 J | 352 | 365 | 406 | 707 | 1,440 | 1,360 | 1,180 | 1,540 | 1,670 | 2,040 | 159 |
| SHM-93-22C | NS | NS | 68.9 | 49.8 | 44.6 | 40.4 | <10 | 31.6 | 51.1 | 42.8 | 33.2 | 34.4 | 47.8 | 19.7 | 31.6 | 30.5 B | 30.1 |

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

Notes:

J: estimated value

B: value within five times of the greater amount detected in the equipment or preparation blank samples

NS: not sampled

^{*:} Molumco Road monitoring wells are not compliance point wells - data is provided for comparison purposes bold numbers indicate cleanup level exceedances (MCL cleanup level is 50 ug/L)

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

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

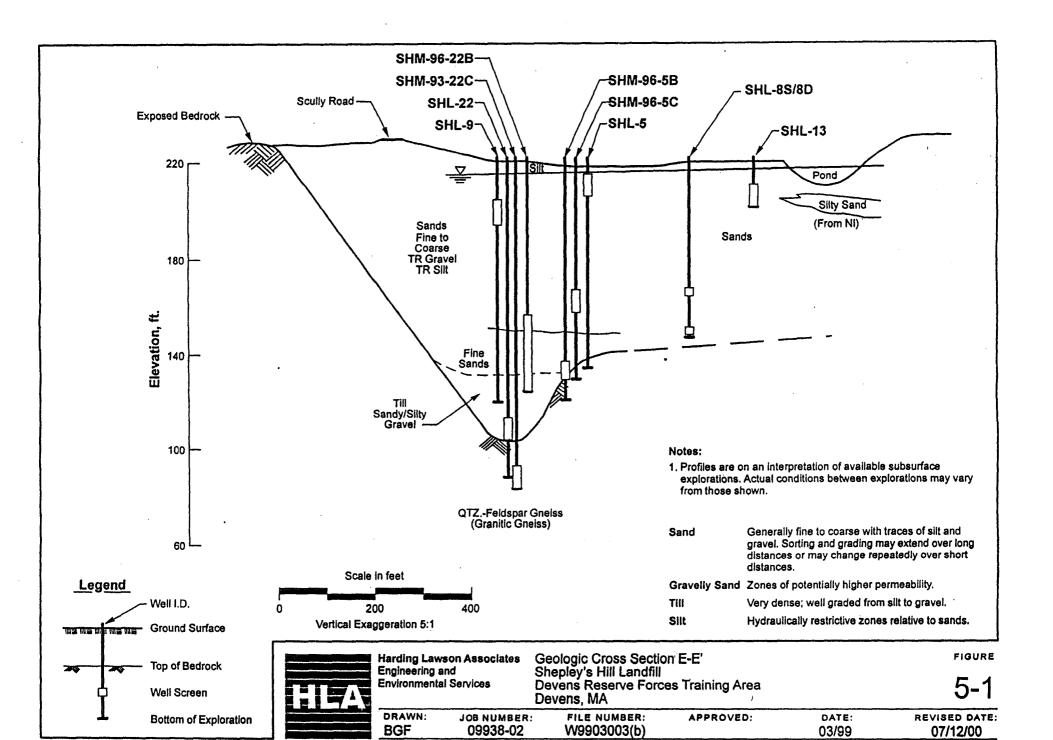
- 1 "Methods for Chemical Analysis of Water and Wastes", Cincinnati, OH, March 1979, EPA 600-4-79-020.
 "Test Methods for Evaluating Solid Waste, Physical and Chemical Methods", U.S. EPA SW-846, 3rd Edition.
 "Standard Methods for the Examination of Water and Wastewater", APHA/AWWA/WPCF, 17th Edition.
- 2 Additional sample containers/volume is required for matrix quality control samples.
- 3 VTS Verified Time when the Sample was collected.
- 4 Two vials will be shipped to the laboratory; one will be measured for pH in the field to verify that the sample has been preserved correctly (i.e. pH less than 2).
- 5 TAL metals include Aluminum, Antimony, Arsenic, Barium, Beryllium, Cadmium, Calcium, Chromium, Cobalt, Copper, Iron, Lead, Magnesium, Manganese, Mercury, Nickel, Potassium, Selenium, Silver, Sodium, Thallium, Vanadium, and Zinc.
- 6 Anions include Nitrate, Sulfate, Orthophosphate and Chloride.

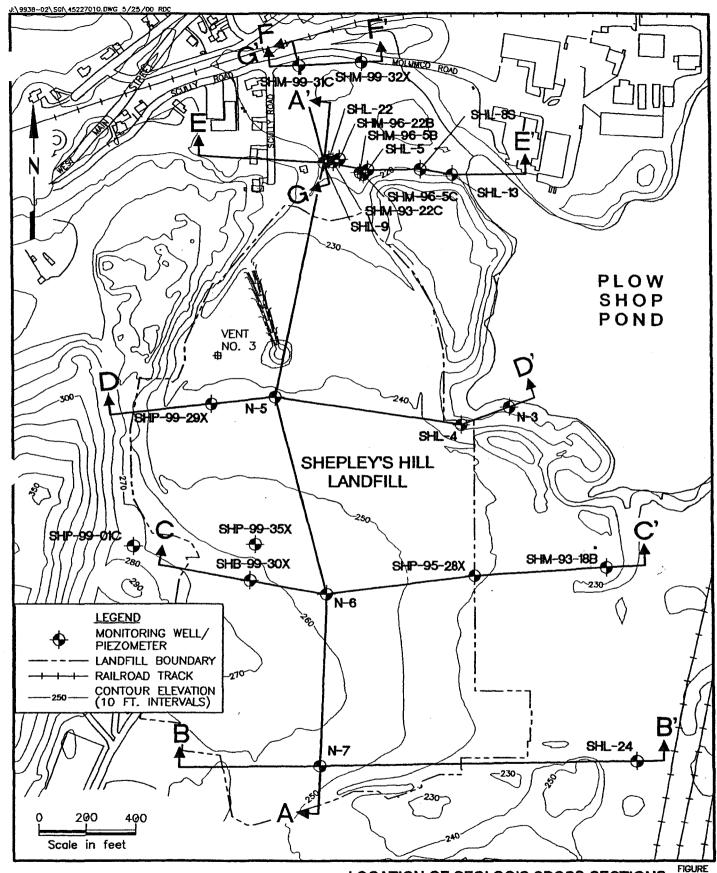
NA = Not Applicable

Hg = Mercury

FIGURES









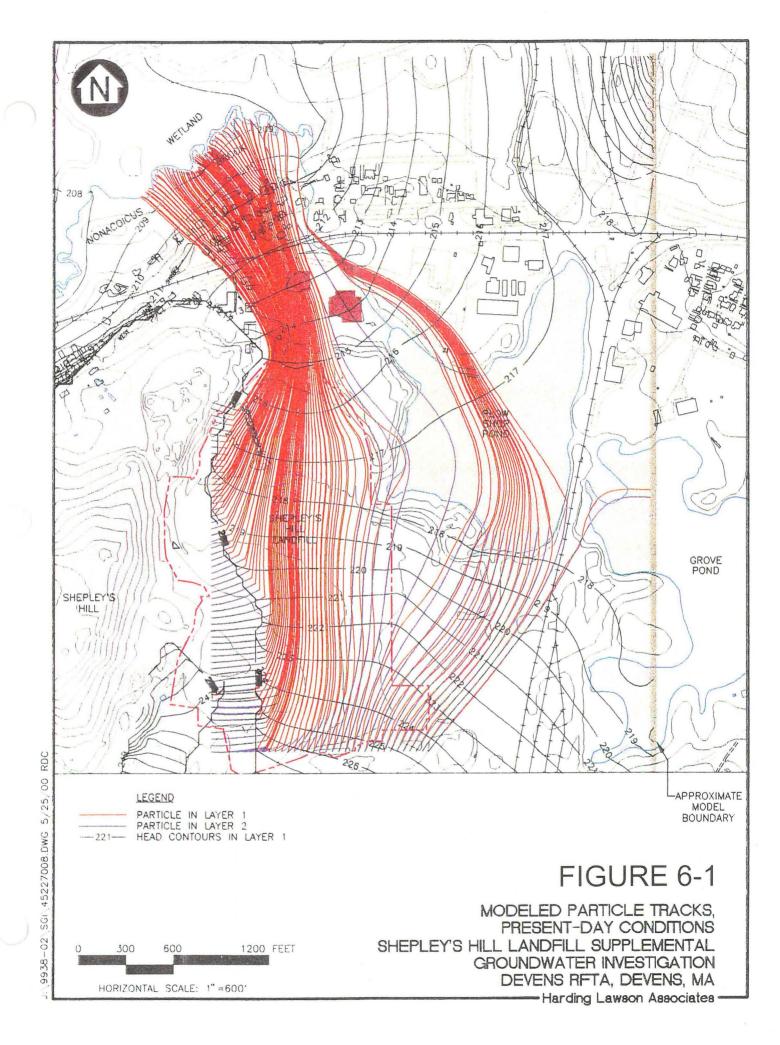
Harding Lawson Associates

Engineering and Environmental Services

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

 DRAWN
 JOB NUMBER
 APPROVED
 DATE
 REVISED DATE

 RDC
 45227
 5/25/00
 00/00/00



APPENDIX A LANDFILL MAINTENANCE CHECKLIST

APPENDIX A Landfill Maintenance Checklist

To be completed in indelible ink.

Inspections are to be performed annually.

DATE: 5 November 2002

INSPECTOR: Jonathan Kullberg & Scott Michalak

ORGANIZATION: U.S Army Corps of Engineers, New England District

| LANDFILL ATTRIBUTE | OBSERVATIONS | RECOMMENDATIONS | SAT/ UNSAT |
|-------------------------|--|--|---------------|
| Cover Surface | Vegetative cover is generally satisfactory except as noted in the comments that follow. Various species growing; mowed to about 8 inches height. There are several areas where possible settlement is occurring. | See specific comments under the sections that follow. Survey and compare to original. | SAT |
| | 3. Trees have been removed from the vicinity of GV-13, the southern perimeter, and the eastern perimeter GV-13 area is unmowed. | 3. Monitor for tree growth in future 4. GV-13 area should be mowed during future maintenance. | 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 cover should extend at least twenty feet beyond the limits of the cap. | This area should be reseeded, with hay or straw placed on the surface, to prevent further erosion. | UNSAT |
| Landfill Gas Vent Wells | 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 | 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 (note – this task is underway). | 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. | 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. | 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 was conducted and compared to the original as-built topo. This indicated where and how much settlement has taken 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. | 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. | 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;

(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 are recommended:

- (1) Repair and regrade around the catch basins on the south side of the landfill,
- (2) Based upon recent topographic survey conducted, determine if corrective action required for historic ponding areas due to settlement or disturbance of drainage system. Note that feasibility study is being conducted to determine options to address this and other problems.

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

Groundwater Field Analysis Forms Spring 2002

| GWM | WELL# | SHL- | 3 | | | US A | rmy (| Corps | of En | gineers | 3 | |
|---|---|---------------|------------|------------------|---------------|-----------------|-----------|------------|----------|-------------|-------------------------|--|
| II. | INTERVAL DEPTH | | | WELL DIAMETER: | 2" | Grou | ndwate | er Samp | ling Lo | g Sheet | | |
| H2O LEVI | EL: DEPTH, PRE PL | JMP INSERTION | 30 73' | • | | Project N | lame: S | Shepley's | Hill Lan | dfill, Deve | ns, MA | |
| | DEPTH, POST PU | | | | | SAMPLE METHO | DD: EPA L | OW STRES | S METHO | D | | |
| DEPTH S | | 33 ′ | | REFERENCE POINT: | PVC OR CASING | Metals/Hardness | 1 x 1L H | DPE (ph<2) | | VOC'S 3 x 4 | I0ml glass vials (ph<2) | |
| DATE: 20 TIME: 0855 (DEPTHS RECORDED BENEATH) 248. SNGVD Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE | | | | | | | | | | | HDPE | |
| SAMPLED BY: JK DL PY BW MK SIGNATURE; SUCKET Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250ml HDPE (ph<2) | | | | | | | | | | `` ` h | | |
| RECORD | ED BY: JK DL PY | BWMK | SIGNATURE | Busing | | TSS_1 x 1L HDF | <u> </u> | | | TOC 3 x 40n | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. YOLUME | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | |
| te go | | | | | 1 | | | | 4. | | | |
| 1100 | 30.60 | 118.7 | 300 | | 11.23 | 38 | 7.14 | 213.4 | // .7/ | 50.2 | 70 | |
| 1104 | 30.50 | 118.6 | 200 | ·5 gal | 11.91 | 32 | 6,59 | 183.8 | 11.03 | 25.2 | dropping off | |
| 1108 | 30.4 | 118.5 | | J | 14.14 | 29 | 6,60 | 187.7 | 16.73 | - | Surged Dump | |
| 1615 | 30.0 | 118.7 | 500 | 1.25 gal. | 16.01 | 38 | 6.57 | 167.2 | 10.61 | 10,7 | , 'm' | |
| 11 18 | 30.7 | 118.2 | 500 | , | 14,12 | 27 | 6.58 | 196.6 | 10.74 | 7.14 | dropping off | |
| 1121 | 30,55 | 119.1 | 250 | 2 901 | 13,93 | 27 | 6.56 | 212.3 | 10.67 | | Surged pump | |
| 1126 | 30.78 | 119.1 | 500 | | 15.01 | 27 | 6.50 | 189.2 | 10.51 | 9.53 | , , | |
| 1129 | 30.75 | [19.1 | 500 | 2.75 gal | 14.32 | 27 | 6.54 | 192.3 | 10 73 | 5.80 | | |
| 1132 | 30,70 | 119.1 | 500 | 3.25 gal | 13.81 | 27 | 6.52 | 202.2 | 10.71 | 4,49 | | |
| 1135 | 30.70 | 119.1 | 450 | 4 gal. | 13.71 | 27 | 6.51 | 208.2 | 10,68 | 3.79 | | |
| 1140 | 30.61 | 119.1 | 250 | | 13.84 | 26 | 6.52 | 213,4 | 10.61 | 3.58 | dropping oft | |
| 1143 | 31.15 | 12/13 | 1000 | 5.25 | 13,40 | 27 | 6.50 | 212.4 | 10.98 | 4,50 | Surged! | |
| (148 | 31.19 | 121.5 | 1800 | 6.50 | 12,10 | 26 | 6.47 | 225.1 | 10,9) | 4.52 | | |
| 1152 | 31.20 | 121.8 | 850 | 5 0 | 12.00 | 26 26 | 6,46 | 229.8 | | | | |
| 1155 | 31.20 | 121.3 | 850 | 7,25 | 11,96 | 8 | 6.45 | 232.2 | 10.76 | 3.90 | | |
| | | | | | | | | | | | | |
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| | | | | | | | | | | | | |
| NOTES: 3% 3% +0.1 unit +10 my 10% 10% | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| SAMPLE | SAMPLE TAKEN AT: 1157 Wetted screen volume = TT (12')2 (35.1'-30.23') (7.481 gal/ff3) = 0.8 gal | | | | | | | | | | | |

| | | | | | | | | ~ | | | | | |
|---------------------|------------------|---------------|------------|---------------------------|---------------|---|-----------|-------------|-------------------|--------------|------------------------|--|--|
| GWN | WELL# | SHL- | Ц | | | US Army Corps of Engineers | | | | | | | |
| SCREEN | INTERVAL DEPTH | | 15.7 | WELL DIAMETER: | ۵″ | Grou | ndwate | er Samp | ling Lo | g Sheet | | | |
| 1 | EL: DEPTH, PRE P | UMP INSERTION | 1 10.23 | | | Project N | lame: S | Shepley's | Hill Lan | dfill, Deve | ns, MA | | |
| | DEPTH, POST P | | | | • | SAMPLE METHO | DD: EPA I | OW STRES | S METHO | D | | | |
| DEPTH S | | 13′ | | REFERENCE POINT | PVO OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | | |
| 1 | 20 May 20 | | 1300 | (DEPTHS RECORDED BENEATH) | 228.71 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L l | HDPE | | |
| SAMPLE | | Y BY MK | SIGNATURE: | Busu 4! | 19n | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | | | mL HDPE (ph<2) | | |
| RECORD | ED BY: JK DL PY | (B) MK | SIGNATURE: | Duan A | Nay | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | | |
| 1318 1321 | 10.30 | 88.1 | 700 | | 11, 83 | 126 | 6.69 | \$5-21.8 | | 175.2 | Very turbid | | |
| 1321 | 10:36 | 68.1 | 950 | 1.75 gal. | 11.68 | 120 | 6.63 | -12.2 | 0.56 | 95.7 | muddy water | | |
| 1323 | 10, 30 | 68.1 | 950 | 3.5 421 | 11.38 | 118 | 6,58 | -4.6 | 0.40 | | Appearance | | |
| 1328 | 10.30 | 68.1 | 950 | , | 11.35 | 116 | 6.57 | -1.3 | 0.37 | 40.7 | | | |
| 15:51 | 10.30 | 68.1 | 950 | 4,25 gal | 11.3Z | 116 | 6,56 | 0,7 | 0.33 | 17.2 | | | |
| 1334 | 10.30 | 68.1 | 950 | 5,25 89) | 11,35 | 115 | 6.55 | 2,8 | 0,34 | 9,6 | | | |
| 137 1940 1943 | 10.30 | 68,1 | 950 | 6,25 gal | 11.32 | 114 | 6.54 | 3.7 | 0.31 | 5.6 | | | |
| 340 | 10,30 | 68.1 | 950 | 7,25 gal | 11.30 | 114 | 6.54 | 4,9 | 0.30 | 3.6 | | | |
| (343 | 10.30 | 68.1 | 950 | | 11.28 | 114 | 6,54 | 5,6 | 0.31 | 2.8 | | | |
| 1346 | 10,30 | 68.1 | 950 | 8 gal | 11,28 | 114 | 6,54 | 6.6 | 0,29 | 2.5 | | | |
| 1349 | 10.30 | 68.1 | 900 | J | 11,28 | 114 | 6.54 | 6.5 | 0.28 | 2.1 | | | |
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| NOTES: | | | <u> </u> | <u> </u> | 3% | 20/ | +0.1 unit | +10 my | 10% | 10% | | | |
| | TAKEN AT: 13 | 51 | We | thed screen v | | TT (5,1)21 | 15.7 | 10.21 |)/7.481 | an/f43) | = 0.9 991 | | |
| | | | | | | | | | , , , , , , , , , | Jarres | J | | |
| | | | | | | | | | | | | | |

| GWM | WELL# | ح ال | 16-5 | | US A | rmy (| Corps | of En | gineers | 3 | | |
|-----------|--|---------------|------------|---------------------------|--|-------------------|--|-------------|----------|---------------|------------------------|--|
| ll | INTERVAL DEPTI | | | WELL DIAMETER: | a " | Grou | ındwate | er Samp | oling Lo | g Sheet | | |
| {I | EL: DEPTH, PRE P | | | _ | | Project N | lame: S | Shepley's | Hill Lan | idfill, Dever | ns, MA | |
| | | UMP INSERTION | | | • | SAMPLE METHO | OD: EPA L | OW STRES | SS METHO | DD | | |
| DEPTH S | | 10' | | REFERENCE POINT: | PVQ OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) | |
| I) | 5/21/02 | TIME: | 1355 | (DEPTHS RECORDED BENEATH) | 213.33NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | scAc) | BOD 1 x 1L | | |
| SAMPLED | | Y BW(MK) | SIGNATURE: | Mark R. Koenie | <u> </u> | Anions,Alkalinity | | 500ml HDPE | : | | mL HDPE (ph<2) | |
| RECORD | ED BY: JK DL P | Y BW (MK) | SIGNATURE: | mark R. Koe | nig | TSS 1 x 1L HDF | PE | | | TOC 3 x 40m | ıl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | 1.0 | mv | mg/L | NTU's | | |
| 1355 | 2.65' | 41.8 | 350 | 1.1 gal | 10.47 | 64 | 5.38 | 102.8 | 0.64 | 2,22 | | |
| 1400 | 2.651 | 41.8 | 380 | 1.6 | 10.67 | 65 | 5.29 | 101.1 | 0.43 | 1.06 | | |
| 1405 | 2.651 | 41.8 | 380 | 2.0 | 10.65 | 66 | 5,21 | 100.5 | 0.25 | 0.90 | | |
| 1410 | 2.65' | 41.8 | 380 | 2.5 | 10.82 | 66 | 5.11 | 100.1 | 0.20 | 0,93 | | |
| 1415 | 2,65' | 41.8 | 380 | 3.0 | 10.98 | 66 | 5.08 | 98.3 | 0.26 | 2.01 | | |
| 1418 | 2.65' | 41.8 | 380 | 3,3 | 10.96 | 90 | 5.09 | 98.2 | 0.42 | 1.20 | | |
| 1422 | 2,651 | 41.8 | 380 | 3,6 | 11.08 | 67 | 5.06 | 97.2 | 0.45 | 1.23 | | |
| 1426 | 2,651 | 141.8 | 380 | 4.0 | 11.15 | 6 F | 5.01 | 96.7 | 0.36 | | | |
| 1431 | 2.651 | 14/.8 | 380 | 4,3 | 10.87 | 6 t | 5.01 | 95.3 | 0.16 | 0.82 | | |
| 1435 | 2.651 | 41.8 | 380 | 4.7 | 10.72 | 67 | 5.08 | 95.0 | 0.25 | 0.87 | | |
| 1438 | 2.651 | 41.8 | 380 | 5.0 | 10.66 | 67 | 5.16 | 93.5 | 0.24 | 0.72 | | |
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| NOTES: | | | | | 3% | | +0.1 unit | | 10% | | , | |
| SAMPLE | MPLE TAKEN AT: 1444 wethod screen volume = TP(+2')2(15.1'-5.1')(7.481 gal/f43) = 1.6 gal | | | | | | | | | | | |
| | | | - | | | | | | 0 | , | -3 | |
| | | | | | | | - | | | | | |
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| GWM | WELL# | SHM- | | US A | rmy (| Corps | of En | gineers | 5 | | |
|-------------|------------------|-------------|--|--------------------------|--------------|---------------------------------------|-----------|---|----------|-------------|---|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER | · 4" | Grou | indwate | er Samp | ling Lo | g Sheet | |
| 11 | EL: DEPTH, PRE P | | | - | | Project N | Name: S | Shepley's | Hill Lan | dfill, Deve | ns, MA |
| | DEPTH, POST P | | | | _ | SAMPLE METHO | OD: EPA I | OW STRES | S METHO | OD | |
| DEPTH S. | | 861 | | REFERENCE POINT | | Metals/Hardness | 1 x 1L H | DPE (ph<2) | | | 10ml glass vials (ph<2) |
| DATE: | 21 Man 2002 | TIME: | 1430 | (DEPTHS RECORDED BENEATH | 219,8/NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L | |
| SAMPLE | | A BM WK | SIGNATURE: | Mark R. K | | Anions,Alkalinity | | 500ml HDPE | | |)mL HDPE (ph<2) |
| RECORD | ED BY: JK DL PY | / BW(MK) | SIGNATURE: | Mark R. F | benix | TSS 1 x 1L HDF | E | | | TOC 3 x 40n | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | |
| 1523 | 4.88' | 52.2 | 350 | 0.2 gal | 9.77 | 675 | 6.07 | -34.2 | 2.30 | 2.55 | |
| 1540 | 5.21 | 52,2 | 350 | 1.0 gal | 9.80 | 763 | 6.32 | -36.4 | 1.08 | 2.44 | |
| 1545 | 5.21 | 52,2 | 360 | 1,2 | 9,85 | 795 | 6.44 | 37.7 | 0.55 | الع والحد | <i>≳.</i> 10 |
| 1549 | 5.21 | 52,2 | 360 | 1.6 | 9.83 | 805 | 6.50 | -38.6 | 0.45 | 3.05 | |
| 1553 | 5.21 | 52.2 | 360 | 2.1 | 9.81 | 811 | 6.55 | -39.4 | 0.38 | 1.57 | |
| 1557 | 5,21 | 52,2 | 350 | 2.6 | 9.83 | 818 | 6.57 | -39.6 | 0.47 | 1.59 | |
| 1602 | 5 -> 5.11 | <u>52.0</u> | 360 | 3.0 | 9.66 | 816 | 6.60 | -40.8 | 0.37 | 0.95 | |
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| NOTES: | | 7 A C 31 | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | |
| SAMPLE | TAKEN AT: 🗡 | 106 16 | 06 | welled = | | | | | | | /A23) = 6.5 qa/ |
| | | | | | | | | <u> </u> | | J^{-} | 1 3 |
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| CREEN INTERVAL DEPTH: 50.8'- CO.8 WELL DIAMETER: 4" US Army Corps of Engineers Groundwater Sampling Log Sheet | | | | | | | | | | | | |
|---|---|--|---|--|---|---|---|--|--|--|--|--|
| INTERVAL DEPTH | | | | 4" | | • | - | | _ | | | |
| | | 4.3 | .4' | | | | | | | ns, <mark>MA</mark> | | |
| DEPTH, POST PL | JMP INSERTION | | | • | SAMPLE METHO | OD: EPA L | OW STRES | S METHO | D | | | |
| AMPLED: | 551 | | | PVC)OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | | |
| 5/21/02 | TIME: | 1435 | (DEPTHS RECORDED BENEATH) | | | | | | BOD 1 x 1L | 1 | | |
| | | | bokerid 7 | | i e | | 00ml HDPE | | | mL HDPE (ph<2) | | |
| DBY: JKOLPY | BW MK | SIGNATURE: | David 2 | ulwa | TSS 1 x 1L HDF | Έ | | | TOC 3 x 40n | nl glass vials | | |
| WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | |
| BELOW MP feet | SETTING | ml/mln | PURGED | TEMP C | CONDUCTANCE | <u></u> | mv | mg/L | NTU's | *************************************** | | |
| | | 550 | , | | 479 | 6.16 | -26.3 | | | | | |
| | | 550 | 1-Ogal | 10.00 | | 6.34 | | | | | | |
| | | | J A | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | 3.0gal | | | | | | | | | |
| | | | <i></i> | | | | | | | | | |
| | | | 4.09ck | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | 5.03al | | | | | | | | | |
| <u> </u> | 62.1 | 550 | | 10.42 | 832 | 6.46 | -53.4 | 0.28 | 1.53 | | | |
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| | | | | 20/ | 20/ | 40.1 1154 | ±10 my | 100/ | 100/ | | | |
| | | | | | | | | | | | | |
| mill LE TAILLY AT. 1) (4 WETTER Screen Volume = 11(72) (60.8-50.8) (7.48/gal/ff3) = 6.3 gal | | | | | | | | | | | | |
| | | 3 | | | | | | | | | | |
| | | | | | | | | | | | | |
| | INTERVAL DEPTH EL: DEPTH, PRE PU DEPTH, POST PU AMPLED: 6 21 02 DBY: JKDL PY ED BY: JKDL PY WATER DPTH BELOW MP feet 4,40 4,40 4,40 4,40 4,40 4,40 4,40 4,4 | INTERVAL DEPTH: 5 EL: DEPTH, PRE PUMP INSERTION DEPTH, POST PUMP INSERTION AMPLED: 55' S 21 02 TIME: D BY: JKDL PY BW MK ED BY: JKDL PY BW MK WATER DPTH PUMP BELOW MP feet SETTING 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 4,40 52.7 | INTERVAL DEPTH: 50.8'- C0.8 EL: DEPTH, PRE PUMP INSERTION DEPTH, POST PUMP INSERTION AMPLED: 55' 5 21 02 TIME: 1435 DBY: JKDL PY BW MK SIGNATURE: ED BY: JKDL PY BW MK SIGNATURE: WATER DPTH BELOW MP feet SETTING WIMIN 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 | INTERVAL DEPTH: 50.8'- CO.8' WELL DIAMETER: EL: DEPTH, PRE PUMP INSERTION 4.34' DEPTH, POST PUMP INSERTION 4.34' AMPLED: 55' S 21 02 TIME: 1435 D BY: JKDL PY BW MK SIGNATURE: 10EPTHG RECORDED BENEATH) WATER DPTH PUMP PUMP PURGE RATE CUM. VOLUME PURGED 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 4.40 52.7 550 5.03al | INTERVAL DEPTH: 50.8'- 60.8' WELL DIAMETER: 4" EL: DEPTH, PRE PUMP INSERTION | STORY CO. 8 WELL DIAMETER: 4" Group Project N | Solution Solution | Company Comp | STERVAL DEPTH: | SO S / - CO S WELL DIAMETER: 4" Groundwater Sampling Log Sheet Size Copper Property P | | |

YSI# 0150851

TURBIDITY# 39575

| GWM | WELL# | | US A | rmy (| Corps | of En | gineers | 6 | | | |
|--|------------------|---------------|------------|---------------------------|--------------|--------------------|-----------|-------------|----------|--------------|------------------------|
| il . | INTERVAL DEPTH | SHL- | 2" | Grou | ndwate | er Samp | ling Lo | g Sheet | | | |
| 13 | EL: DEPTH, PRE P | | | 7 | | Project N | lame: S | Shepley's | Hill Lan | dfill, Deve | ns, MA |
| | | UMP INSERTION | | | | SAMPLE METHO | DD: EPA L | OW STRES | S METHO | D | |
| DEPTH S | | 201 | | REFERENCE POINT | PVOOR CASING | Metals/Hardness | 1 x 1L HI | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) |
| DATE: | 5/21/02 | | 0955 | (DEPTHS RECORDED BENEATH) | 222. 54 NGVD | Cyanide 1 x 250 | mi HDPE (| (ph>12 + As | cAc) | BOD 1 x 1L l | HDPE |
| SAMPLE | | Y BW MK | SIGNATURE: | I wid Leely | /'C | Anions, Alkalinity | TDS 1 x 5 | 600ml HDPE | | COD 1 x 250 | mL HDPE (ph<2) |
| F 8 | ED BY: JK OL P | | SIGNATURE: | David Lu | lucian | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | |
| 0955 | 8,41 | 64.3 | 550 | | 8.91 | 118 | 5.94 | 64.5 | 2.34 | 22,9 | |
| 0959 | 8.29 | 63.5 | 400 | 1.050 | 9.31 | 126 | 6.25 | 35.2 | 1.3/ | 15.7 | |
| 1003 | 8.29 | 63.6 | 425 | / ' | 9.80 | 136 | 6.39 | 13,2 | 0-87 | 6.48 | |
| 1009 | 8.29 | 63.6 | -2.4 | 0.59 | 4.45 | | | | | | |
| 1013 | 8.25 | 63.6 | 425 | | 16.63 | 143 | 6.47 | -7.5 | 0.50 | 3.83 | |
| 1018 | 8.29 | 63.6 | 450 | 3.09af | 10.11 | 146 | 6.48 | -11.0 | 0.44 | 3.2/ | |
| 1023 | 8.28 | 67.6 | 425 | | 10.12 | 148 | 6.48 | -14.8 | 0.38 | 2.52 | |
| 1026 | 8.29 | 63.6 | 400 | 4.09al | 10.17 | 149 | 6.49 | -16.7 | 0.37 | 2.79 | |
| 1029 | 8.29 | 63.6 | 425 | , / | 10-11 | 150 | 6.49 | -17.7 | 0.35 | 2.32 | |
| 1032 | F.29 | | | | 10.08 | 15-1 | 6.50 | -19.4 | 0.33 | 2.89 | |
| | | | | | | | | | | | |
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| لـــــــــــــــــــــــــــــــــــــ | | | | | | | | | | | |
| NOTES: | | . / | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | |
| SAMPLE | TAKEN AT: | 1035 | | wetted screen | volume = | =TT (121)21 | 25.0% | 15.01)(| 7.4819 | al/H3) = | 1. Le gal |
| | | | | | | - | | | J | , | J |
| | | | | | | | | | | | |

| 31 | WELL# | SHL-1 | 0 | | | 1 | • | • | | gineers | 3 | | |
|---------|---|---------------|------------|---------------------------|-------------|-------------------|--|------------|-------------|--------------|--|--|--|
| SCREEN | INTERVAL DEPTH | 17.8-3 | 8.5-7 | WELL DIAMETER: | ス" | | | | | g Sheet | | | |
| | EL: DEPTH, PRE P | | | | | Project N | Name: S | Shepley's | Hill Lan | dfill, Deve | ns, MA | | |
| | DEPTH, POST P | JMP INSERTION | 30.57 | | | SAMPLE METH | OD: EPA l | OW STRES | | | | | |
| DEPTH S | AMPLED: | 3 <i>5</i> ′ | | REFERENCE POINT | | Metals/Hardness | | | | | 0ml glass vials (ph<2) | | |
| DATE: 5 | 20 May 2002 | TIME: | 0835 | (DEPTHS RECORDED BENEATH) | | Cyanide 1 x 250 | | | | BOD 1 x 1L l | To the second se | | |
| SAMPLED | BY: JK DL P | | SIGNATURE: | Buall 1. 1 | | Anions,Alkalinity | | 500ml HDPE | | | mL HDPE (ph<2) | | |
| RECORD | ED BY: JK DL PY | BWMK | SIGNATURE: | hurden 1 | 1/2/ | TSS 1 x 1L HDF | PE | | | TOC 3 x 40n | nl glass vials | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM, VOLUME | #30 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | |
| 24hr | BELOW MP feet | SETTING | ml/mln | PURGED | TEMP C | CONDUCTANCE | <u> </u> | mv | mg/L | NTU's | | | |
| 923 | 30.68 | 118.7 | 400 | .5 gel | 10.66 | 54 | 6.91 | 228.8 | | 7.8 | | | |
| 927 | 30.68 | 118.7 | 400 | | 11.97 | 48 | 6.72 | 228.6 | 10.67 | 4,10 | | | |
| 930 | 30.65 | 118.7 | 400 | 1991 | 13.44 | 47 | 6.72 | 228.8 | | | | | |
| 955 | 30.65 | 118.7 | 400 | <u> </u> | 14.26 | 47 | 6.78 | 235.1 | 10.45 | 1.72 | | | |
| 938 | 30.65 | 118.7 | 400 | 2 gal. | 14.44 | 47 | | | 10,44 | | | | |
| | 942 30.65 118 7 400 14.43 47 6,79 242.9 10.44 1.50 945 20.65 118.7 400 2.5 gal, 14.60 47 6.77 247.6 10.38 1.70 | | | | | | | | | | | | |
| 945 | 30.65 | | 400 | | | | | 250.1 | | | | | |
| 948 | 30.65 | 118.7 | 400 | 3921. | 14.43 | 47 | 6.77 | 251.9 | 10.40 | 0.95 | | | |
| | 30.65 | 118,7 | 400 | 4901, | 14,28 | 47 | 6.77 | 255.1 | 10.17 | 0.29 | | | |
| 958 | 30.65 | 118.7 | 400 | | 14.13 | 45 | 6.75 | 255.6 | 10,30 | 0,70 | | | |
| 1003 | 50.63 | 110.1 | 100 | 4.5 gal | 17.15 | | 6. 13 | 900.0 | 14,57 | 0,10 | | | |
| | | | | | | | <u> </u> | | | | | | |
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| | | <u> </u> | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| NOTES: | | | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | | |
| SAMPLE | TAKEN AT: / | 007 | we | etted screen vo | dune = | 丁(た)2(3 | 8.51- | 30.581) | (7.481 | 9al/f4) | = 1.3 aal | | |
| 4. | | | | | | | | | · · · · · · | , , | | | |
| Thothon | n of well has | been filling | w/sil+(?) | - depth was rec | ently rest | ned to 38. | 5. Orig | nel nell | death is | 5 41.8 dow | n from gvc. | | |
| | | • | , / | , | J | | | | 7 | | | | |
| 2/01// | | | | | | | | | | | | | |
| YSI# D | 150851 | TURBIDITY # | 76 | | Pump - Grui | nfos Redi-flow I | İ | | | | | | |
| | | | | | | | | | | | | | |

| GWM | WELL# | < UM - | 93-100 | | | US A | rmy (| Corps | of En | gineers | 3 | |
|--|------------------|---------------|------------|---|---------------|-------------------|-----------|-------------|--------------|---------------|------------------------|--|
| 13 | INTERVAL DEPTH | 1 45 7- | 557 | WELL DIAMETER: | 4" | Grou | indwate | er Samp | oling Lo | g Sheet | | |
| H2O LEVI | EL: DEPTH, PRE P | UMP INSERTION | 129/03 | _ | | Project N | Name: S | Shepley's | Hill Lar | ndfill, Dever | ns, MA | |
| | DEPTH, POST P | UMP INSERTION | 29, 29 | | - | SAMPLE METH | OD: EPA l | OW STRES | SS METHO | OD | | |
| DEPTH S | | 51' | | REFERENCE POINT | PVC OR CASING | Metals/Hardness | 1 x 1L HI | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | |
| 13 | 20 May 2002 | | 0845 | (DEPTHS RECORDED BENEATH) | 248.424GVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | scAc) | BOD 1 x 1L H | 4 | |
| | BY: JKOLP | | SIGNATURE: | Kand Fee | J | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | = | | mL HDPE (ph<2) | |
| RECORD | ED BY: JK DI P | BW MK | SIGNATURE: | David Lell | 4 | TSS 1 x 1L HDF | PE | | | TOC 3 x 40m | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | (H2O | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | |
| 0924 | 29.97 | 118.7 | 750 | | 11.01 | 484 | 6.89 | 86.5 | 4,25 | 6.52 | | |
| 0927 | 30. Ú | 118.3 | 200 | | 10.86 | 480 | 7.01 | 74.0 | 2.54 | 565 | | |
| 0931 | 30.11 | 117.9 | 100 | | 11,65 | 480 | 7.04 | 73.3 | 1.21 | 5.64 | | |
| 0936 | 36.11 | 117.8 | 100 | 482 | 7.05 | 68.5 | 1.05 | 6.75 | | | | |
| 0940 30.11 117.8 100 1.0 11.90 482 7.05 67.9 1.01 5.46 | | | | | | | | | | | | |
| 0944 | 30.4 | 117.9 | 100 | | 11.74 | 481 | 7.05 | 67.Y | 0.99 | | | |
| 0948 | 30.12 | 118.0 | 100 | | 16.76 | 480 | 7,07 | 67.7 | 0.89 | 5.42 | - | |
| 0952 | 20.13 | 117.8 | 100 | | 11.63 | 480 | 7.10 | 66.4 | 0.85 | 4.40 | | |
| 0953 | 30.15 | 117.9 | 100 | 2.0 | 11.04 | 479 | 7.11 | 65.5 | | 3.79 | | |
| 1000 | 30.15 | ((7.0 | 100 | | 10,77 | 479 | 7.12 | 65.6 | 0.76 | 2.1.1 | | |
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| | | | | | | | | | | | | |
| NOTES: | | , , | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | |
| SAMPLE | TAKEN AT: | 100 | <u> </u> | wetted sc | reen volu | ne = T (3/2 | 2/55. | 7-45.7 | 1 () (1.4 | 481 apl/ft3 |) = 6.5 gal | |
| | | | | | | | | | | 71 | | |
| | · | | | <u>, , , , , , , , , , , , , , , , , , , </u> | | | | | | | | |
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| GWM | I WELL# | SHL-11 | | | | US A | rmy (| Corps | of En | gineers | } |
|----------|-------------------|---------------|------------|--|--------------|-------------------|-------------|-------------|----------|--------------|------------------------|
| | INTERVAL DEPTH | | 9.8 | WELL DIAMETER: | 2" | Grou | ındwate | er Samp | ling Lo | g Sheet | |
| H2O LEV | EL: DEPTH, PRE PU | JMP INSERTION | 18.70 | - | | | | | | ndfill, Deve | ns, MA |
| | DEPTH, POST PU | JMP INSERTION | 18.70 | | | SAMPLE METH | | | SS METHO | | |
| DEPTH S | AMPLED: | 24 | | REFERENÇE POINT | PVOOR CASING | Metals/Hardness | 5 1 x 1L HI | OPE (ph<2) | | | 0ml glass vials (ph<2) |
| DATE: a | 20May 2002 | TIME: | 500 (3pm) | (DEPTHS RECORDED BENEATH) | 7 236. NGVD | Cyanide 1 x 250 | ml HDPE | ph>12 + As | cAc) | BOD 1 x 1L | |
| SAMPLE | | >*×~ | SIGNATURE: | Bucu & M | y - | Anions,Alkalinity | TDS 1 x 5 | 600ml HDPE | | | mL HDPE (ph<2) |
| RECORD | ED BY: JK DL PY | (BW) MK | SIGNATURE: | Buan 4. | Da _ | TSS 1 x 1L HDF | PE | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pH | ORP/Eh | D.O. | TURBIDITY | COMMENTS |
| 24hr | BELOW MP feet | SETTING | m!/min | PURGEO | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | |
| 3120 | 18.75 | 91.7 | 900 | | 10.72 | 629 | 5.64 | -19.7 | 1.03 | 45,9 | Rusty |
| 3160 | 18 75 | 91,7 | 900 | 2 gcl. | 11.07 | 641 | 6.23 | -34.6 | 0.74 | 29.2 | |
| 310 | 18.75 | 91.7 | 950 | 2.5 gal | 17.14 | 646 | 6.36 | -40.1 | 0.61 | 8.2 | |
| 3220 | 18.75 | 91.7 | 950 | J | 11.18 | 651 | 6.43 | -44.6 | 0,53 | 13.7 | |
| 3250 | 18,75 | 91.7 | 950 | 4901. | 11,19 | 646 | 6,44 | -46.8 | 0.48 | 13.1 | |
| 3280 | 18.75 | 91,7 | 950 | J | 11,19 | 652 | 6.46 | -48.1 | 0.45 | 13.4 | |
| 3310 | 18.75 | 91.7 | 900 | 4,75 991. | 11,20 | 652 | 6.47 | -49.5 | 0,43 | 7,3 | |
| 334°p | 18.75 | 71,7 | 900 | | 11,22 | 654 | 6:48 | -51.0 | 041 | 4.6 | |
| 3370 | 18.75 | 91.7 | 900 | 6 gal. | 11.22 | | | | | | |
| 3400 | 18.75 | 91.7 | 900 | | 11,23 | 652 | 6.48 | -51.6 | | | |
| 3420 | 18,75 | 91.7 | 900 | 7 gal. | 11.21 | 656 | 6.49 | -53.5 | | | |
| 345 p | 18.75 | 91.7 | 900 | | 11.21 | 656 | 6.49 | -548 | | | |
| 348p | (8.75 | 91.7 | 900 | 8 gal. | 11, 18 | 65 9 | 6.49 | -54,7 | 0.39 | 3.2 | |
| ļ | | _ | | | | | | | | | |
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| | | | | | | | | | | | |
| NOTES: | | | <u> </u> | <u> </u> | 3% | ۱ | +0.1 unit | +10 my | L10% | 10% | |
| | TAKEN AT: | 35 | Opn | wetted scree | | | | | | | 1=18001 |
| | | - 20 | - pro | were sere | v noin | c = n (72) | / (d -1.) | 5 18.70 | J JC 1.7 | organ /Tt | 1- 110 gal |
| | | | | | | | | | | | |
| | | | | | | | | | | | |

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| GWM | I WELL # | SHL-1 | | | | US A | rmy (| Corps | of En | gineers | } | |
|--|---|---------|-------------|---------------------------|---------------|-------------------|--------|---------|---------------|----------------|------------------------|--|
| | INTERVAL DEPTH | | | WELL DIAMETER: | 4" | Grou | ndwate | er Samp | ling Lo | g Sheet | | |
| u | EL: DEPTH, PRE PL | | | | | | | | | dfill, Dever | ns, MA | |
| 1,20 22 | | | 72,20 | / | | SAMPLE METHO | | | | | | |
| DEPTH S. | | 27 | 0, | REFERENCE POINT | PVC OR CASING | 1 | | | | | 0ml glass vials (ph<2) | |
| DATE: | 20Man 2002 | TIME: | 1140 | (DEPTHS RECORDED BENEATH) | | Cyanide 1 x 250 | | | cAc) | BOD 1 x 1L H | HDPE | |
| SAMPLE | | | SIGNATURE: | David I | | Anions,Alkalinity | | | | COD 1 x 250 | mL HDPE (ph<2) | |
| } | ED BY: JK DL PY | | SIGNATURE: | (1 devid of | dus | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | l glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pН | ORP/Eh | D. O . | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | темр с | CONDUCTANCE | | mv | mg/L | NTU's | | |
| 1200 | 22.22 | 101.6 | 400 | | 10.95 | 239 | 5.94 | 17.6 | 2.43 | 65.3 | | |
| 1204 | 22.23 | 101.6 | 400 | <u> </u> | 11.71 | 229 | 5.96 | 17.7 | 1.48 | 72.2 | | |
| 1207 22.23 101.6 400 1.0 gal 12.04 233 5.96 19.1 1.09 66.3 | | | | | | | | | | | | |
| 1210 22.23 101.5 400 12.30 232 5.95 22.5 0.86 63.2 | | | | | | | | | | | | |
| 1214 | 22,23 | 101.5 | 400 | 2.0gal | 12.43 | 220 | 5.94 | 26.4 | 0.77 | 55.4 | | |
| 12/8 | 22.23 | 101.6 | 400 | | 12.14 | 216 | 5.94 | 30.3 | 0.72 | 49. | | |
| 1223 | 92.27 | 101.5 | 450 | | 12.39 | 202 | 5.93 | 73.0 | 0.68 | 40-7 | | |
| 1227 | 22.23 | 101.5 | 425 | 3.09al | 12.50 | 197 | 5,92 | 35.4 | 0.70 | 37.4 | | |
| 1230 | 22.23 | 101.5 | 425 | | 12.44 | 191 | 5,92 | 38.4 | 0.84 | 36.8 | | |
| 1234 | 02.23 | 101.5 | 450 | 4.05al | 12.47 | 185 | 5,90 | 40.6 | 0.97 | 34.4 | | |
| 1239 | 82,23 | 101.5 | 450 | | 12.45 | 180 | 5.90 | 43.4 | 1.18 | 33.3 | | |
| 1243 | 22.23 | 101.5 | 425 | 5.0 gal | 12-43 | 175 | 5.88 | 45.7 | 1.40 | 34.4 | | |
| 1248 | 02,23 | 101.5 | 425 | | 12.26 | 166 | 5.87 | 48.4 | 1.64 | 30.1 | | |
| 1252 | 72.23 | 101.5 | 400 | 6.0gal | 12.26 | 163 | 5.89 | 49.3 | 1.72 | 28.2 | | |
| 1255 | 02,23 | 101.5 | 425 | J | 12.38 | 1.62 | 5,91 | 49, 9 | 1.78 | 29.5 | | |
| 1258 | 22.23 | 101.5 | 400 | 7.09al | 12.49 | 159 | 5.90 | 51.1 | 1.87 | 27.1 | | |
| 1301 | 72.27 | | 450 | | 12.49 | 157 | 5.92 | 51.9 | 1.94 | a 3.7 | | |
| 1304 | 22.23 | | | | 12.63 | 154 | 5,86 | 53.2 | 1.94 | 21.7 | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| NOTES: | NOTES: 3% 3% +0.1 unit +10 mv 10% 10% | | | | | | | | | | | |
| SAMPLE | SAMPLE TAKEN AT: py 12 (0.49a) = 6.49a) wetted screen volume = T(3/2')2(32.0'-22.20')(7.4819a1/ft) = 6.49a) | | | | | | | | | | | |
| | - 0 | | | | | | | | | 5-7 | J | |
| | | | | | | | | | | | | |

YSI# 9 8 FO769 TURBIDITY# 75

| GWIV | I WELL # | SHLZ | <u></u> | | | US A | rmy (| Corps | of En | gineers | 3 | |
|----------|---|--------------|--|---------------------------|--------------|-------------------|--------------|-------------|-----------|--------------|------------------------|--|
| | INTERVAL DEPTH | | <u> </u> | WELL DIAMETER: | 411 | Grou | ındwate | er Samp | ling Lo | g Sheet | | |
| 11 | EL: DEPTH, PRE P | | | • | | Project N | Name: S | Shepley's | Hill Lan | dfill, Deve | ns, MA | |
| | | | # 19.05 | / | , | SAMPLE METH | OD: EPA L | OW STRES | S METHO | DD | | |
| DEPTH S | | 46' | | REFERENCE POINT: | FVOOR CASING | 12 | | | | | 0ml glass vials (ph<2) | |
| DATE: | 5/20/02 | TIME: | 1509 | (DEPTHS RECORDED BENEATH) | 736.84 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L i | HDPE | |
| SAMPLE | | Y BW MK | SIGNATURE: | Christ Ly | 1110 | Anions,Alkalinity | | | | COD 1 x 250 | mL HDPE (ph<2) | |
| | ED BY: JKODP | | SIGNATURE: | () Les | hias | TSS 1 x 1L HDF | PE | | | TOC 3 x 40m | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/mln | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | |
| 1509 | 19.10' | 95.1 | 300 | | 12.61 | 591 | 6.23 | 78,7 | 2.97 | 92.9 | | |
| 1514 | 17.10' | 75.1 | 300 | | 11.96 | 606 | 6.26 | | 1.68 | 56,5 | | |
| 1517 | 19.10 | 95.1 | 300 | 1,05al | 614 | 6.28 | 27.8 | 1.07 | 43.7 | | | |
| 1521 | 19.10 | 95.1 | 300 | | 13,00 | 617 | 6.29 | 29.9 | 0.78 | 34.3 | | |
| 1525 | 19.10 | 95.1 | 250 | 2.05al | 13.07 | 619 | 6.31 | 36.4 | 0.72 | 30.3 | | |
| 1528 | 19.10 | 95.8 | 400 | | 13.10 | 620 | 6.31 | 33,9 | 0.43 | 27.1 | | |
| 1532 | 19.10 | 95.8 | 400 | | 13.28 | 620 | 6.31 | 33.8 | 0.28 | 23.5 | | |
| 1537 | 19.10 | 95.8 | 400 | | 13.25 | 623 | 6.33 | 32,5 | 0.26 | 17.8 | | |
| 1542 | 19.10 | 95.8 | 400 | | 13.23 | 624 | 6.34 | 31.5 | 0.22 | 16. | | |
| 1545 | 19.10 | 75-8 | 400 | ,,, | 13.20 | 625 | 6.34 | 31.3 | 0.27 | 15.9 | | |
| 1550 | 19.12 | 95.8 | 400 | 4.0421 | 13.22 | 626 | 6.35 | 30,3 | 0.20 | 12.10 | | |
| 1553 | 19.12 | 95.8 | 400 | , ° | 13.24 | 427 | 4.36 | 29.9 | 0.20 | 12.4 | | |
| 1556 | 14.12 | 95.8 | 400 | 3.0 gal | 13.24 | 427 | 6.36 | 29.2 | 0.20 | 11.7 | | |
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| NOTES: | | | | | 30/ | 20/ | 101.1-14 | 110 mi | 100/ | 400/ | | |
| | NOTES: 3% 3% +0.1 unit +10 mv 10% 10% SAMPLE TAKEN AT: (600) wetted screen volume = $T(3/2)^2(51.0^2 - 41.0^2)(7.481 \text{ gal}/ft^3) = 6.5 \text{ gal}$ | | | | | | | | | | | |
| | 1 | | | Merco Sincen | wilme = | 11 (72) | (31.0 | 71.0 / | 1,7819 | m/th) | w.s gui | |
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| GWM | WELL# | SHL- | 7.2 | | | US A | rmy (| Corps | of En | gineers | 3 | | | |
|---------|------------------|---------|------------|---------------------------|---------------|-------------------|-----------|-------------|---------|--------------|-------------------------|--|--|--|
| ll . | INTERVAL DEPTH | | 111/2 | WELL DIAMETER: | 4" | Grou | indwate | er Samp | ling Lo | g Sheet | | | | |
| | EL: DEPTH, PRE P | | | _ | | | | | | idfill, Deve | ns, MA | | | |
| | DEPTH, POST P | | | | • | SAMPLE METHO | OD: EPAL | OW STRES | S METHO | DD | | | | |
| DEPTH S | | 111 | | REFERENCE POINT: | PVQ OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | I0ml glass vials (ph<2) | | | |
| DATE: | 21 May 02 | TIME: | 0915 | (DEPTHS RECORDED BENEATH) | ZZO, 45 MGVD | Cyanide 1 x 250 | ml HDPE (| (ph>12 + As | cAc) | BOD 1 x 1L I | HDPE | | | |
| SAMPLE | BY: JKDLP | Y BW MK | SIGNATURE: | Mark R. Keening | | Anions,Alkalinity | | | | COD 1 x 250 | mL HDPE (ph<2) | | | |
| RECORD | ED BY: JK DL PY | BW WK | SIGNATURE: | mark R. Koenia | | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials | | | |
| TIME | WATER OPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D, O. | TURBIDITY | COMMENTS | | | |
| 24hr | BELOW MP feet | SETTING | mi/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | | | |
| 1000 | 5.87 | 59.1 | 100 | 0.3 | 10.33 | 561 | 7.08 | 57.0 | 68.7 | 1.53 | | | | |
| 1005 | 6.01 | 60.3 | 320 | 0.7 | 9.82 | 845 | 6.39 | 45.3 | 28.8 | 1.02 | | | | |
| 1010 | 6.13 | 61.3 | 320 | 1,0 | 10.11 | 906 | 6,40 | 50.0 | 17.2 | 0.73 | | | | |
| 1014 | Co.14 | 61.3 | 300 | 1.2 | 10.16 | 914 | 6.40 | 54.9 | 13.8 | 0.65 | | | | |
| 1019 | 6.14 | 61,3 | 300 | 1,6 | 10.16 | | | | | | | | | |
| 1023 | 6.15 | 61.3 | 300 | 2,0 | 10,16 | 922 | 6.45 | 59.6 | 10.5 | 0.55 | | | | |
| 1027 | 6.15 | 61.3 | 300 | 2.2 | 10.11 | 925 | 6,46 | 60.6 | 9.7 | 0.41 | | | | |
| 1031 | 6.15 | 61.3 | 300 | 2.6 | 9.85 | 921 | 6.54 | 62-1 | 9.1 | 0.37 | | | | |
| 1035 | 6.16 | 61.3 | 300 | 3,0 | 10.08 | 915 | 6.60 | 62.0 | 8.1 | 0.34 | | | | |
| 1038 | 6.16 | 61.3 | 300 | 3.3 | 10.00 | 921 | 6,61 | 62.5 | 7.3 | 0.39 | | | | |
| 1042 | 6.16 | 61.3 | 300 | 3,8 | 10.29 | 921 | 6.59 | 63.1 | 6.8 | 0.45 | | | | |
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| NOTES: | | 216 | | | 3% | | +0.1 unit | | 10% | 10% | | | | |
| SAMPLE | TAKEN AT: / | 047 | wett | ed serven volu | me = TI | (3/21)2(116 | 01-104 | 0.51) (7. | 48/ gal | /f43) = | 6.5 ga) | | | |
| | | | | | | | | | - 3 7 | , – | J | | | |
| | | | | | | | | | | | | | | |

| GWM | WELL# | SHM | -96-22B | | | 3 | • | • | | _ | } | |
|---------|--|---------------|------------|---------------------------|-------------|---|-----------|-------------|----------|--------------|------------------------|--|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 4" | Project Name: Shepley's Hill Landfill, Devens, MA | | | | | | |
| | EL: DEPTH, PRE PU | | 5,59' | • | (2"screen) | Project N | lame: S | shepley's | Hill Lan | dfill, Dever | ns, MA | |
| | DEPTH, POST PO | JMP INSERTION | | ı | | SAMPLE METHO | DD: EPA L | OW STRES | S METHO | D | | |
| DEPTH S | AMPLED: | 78' | | REFERENCE POINT:(| | | | | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | |
| DÄTE: | 21 May 02 | | 1210 | (DEPTHS RECORDED BENEATH) | 220.27 NGVD | Cyanide 1 x 250 | ml HDPE (| ph>12 + Asc | | | 1 | |
| SAMPLE | BY: JKDLP | BW MK | SIGNATURE: | mark R. Kee | níg | Anions,Alkalinity | TDS 1 x 5 | 00ml HDPE | | | " ' | |
| RECORD | ED BY: JK DL PY | BW (MK) | SIGNATURE: | mark R. Koe | | TSS 1 x 1L HDP | E | | | TOC 3 x 40m | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рH | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | | | | | | | |
| 1210 | 5.58 | 58.7 | 240 | 0,2 gal | 9.12 | | | | | | Do recorded in % | |
| 1215 | 5.61 | 59.8 | 350 | 1,0 | 9.33 | | | | | | | |
| 1220 | 5.61 | 59.8 59.0 | 380 400 | | | | | | | | | |
| 1225 | 5.62 | | | | | | | | | | | |
| 1230 | 5.62 | 59.8 | 400 | 2.2 | 9.44 | | | | | | | |
| 1235 | 5.62 | 59.8 | 400 | 2.6 | 9.50 | | 6.67 | | | 19.7 | | |
| 1239 | 5.62 | 59.8 | 400 | 3,1 | 9.55 | | 6.66 | | | | | |
| 1243 | 5.62 | 59.8 | 400 | 3.7 | 9,58 | | 6.66 | | | | 20 mg/l | |
| 1247 | 5.62 | 59-8 | 420 | 4,1 | 9.60 | | | | | | | |
| 1251 | 5,62 | 59.8 | 420 | 4.5 | 9,63 | 848 | 6.61 | -75.8 | 0.387% | 19.7 | 4 | |
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| L | | | | | | | | | | | | |
| NOTES: | TES: 3% 3% +0.1 unit +10 mv 10% 10% MPLE TAKEN AT: 1254 wetted screen volume = $T(12')^2(92.7'-62.7')(7.48)(92)(64^3) = 4.9 ga)$ | | | | | | | | | | | |
| SAMPLE | TAKENAT: / | <u> -97</u> | wette | d screen volv | me = TI | (12) (925 | 7-62.7 | (7.48 | 1 gal/f | $(4^3) = 4$ | .9 ga | |
| • | | | | | | | | | • • | | J | |
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| GWM | WELL# | SH | m-93-229 | | US A | rmy (| Corps | of En | gineers | 3 | | | | |
|--|---|---------------|--------------|---------------------------|----------------|-------------------|-----------|-------------|----------|--------------|------------------------|--|--|--|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 4" | | | | | g Sheet | | | | |
| 13 | EL: DEPTH, PRE PL | | 6.8 | - | | Project N | lame: S | Shepley's | Hill Lan | dfill, Deve | ns, MA | | | |
| | DEPTH, POST P | JMP INSERTION | 5.8 | r ' | | SAMPLE METHO | | | S METHO |)D | | | | |
| DEPTH SA | AMPLED: | TAK+29.0 | - 130.01 130 | REFERENCE POINT: | (FVC)OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | | | |
| DATE: | 5 21 02 | TIME: | 1100 | (DEPTHS RECORDED BENEATH) | 221.55 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | | BOD 1 x 1L I | | | | |
| SAMPLED | | | SIGNATURE: | Jan V | | Anions,Alkalinity | | 500ml HDPE | | | mL HDPE (ph<2) | | | |
| RECORD | ED BY: (JB) DL PY | BW MK | SIGNATURE: - | Jacob. L | | TSS 1 x 1L HDF | E | | | TOC 3 x 40n | nl glass vials | | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | pH | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | <u> </u> | | | |
| 1/33 | 13.44 | 103.7 | /800 | 4 901 | 10.57 | 650 | 7.54 | -126.2 | 0.47 | 1.23 | Cleer | | | |
| 1138 | 17.45 | 100.0 | 1300 | 7 900 | 10.56 | 638 | 7.57 | -131,8 | 0.37 | 1.42 | (Slight Hydrogen | | | |
| 1145 | 20.56 | 100.2 | 700 | 9 gal | 10.41 | 627 | 7.60 | -134.2 | 0-37 | 1.32 | Sulfide odar) | | | |
| 1154 23.05 109.0 900 11 5 at 10.87 587 7.62 -136.8 0.30 1,50 | | | | | | | | | | | | | | |
| | 1204 25.42 112.7 800 13 401 10.47 520 7.58 -131.0 0.30 1.56 | | | | | | | | | | | | | |
| II | | | | | | | | | | | | | | |
| 1219 | 27.29 | | | 1580 | 10.38 | 519 | | | 0.32 | | | | | |
| 1225 | 27.42 | 113.8 | 200 | - | 10.31 | 543 | 7.58 | -)22./ | 0.34 | 1.70 | | | | |
| 1229 | 27.48 | 113.8 | | | (0.6) | 533 | 7.58 | -118.8 | 0.34 | 1.79 | | | | |
| 11-1-1 | 27.51 | | 150 150 | 11 0 | 9.98 | 539 547 | 7.58 | -114-3 | 0.38 | 1.60 | | | | |
| 1242 | 27.53 | 113.8 | | legal | | | | -111.0 | | 1.61 | | | | |
| 12-10 | 1246 27.53 113.8 150 9.93 548 7.58 -111.3 0.39 1.74 | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | |
| NOTES: | | | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | | | |
| SAMPLE | MPLE TAKEN AT: 1250 welled screen volume = TT(3/2')2(134.3'-124.3')(7.481gal/ft3) = 6.5gal | | | | | | | | | | | | | |
| | , | | | | | | | | | | | | | |
| Well | Vell has history of limited to no re-charge until the water level is drawn down 20-30ft, so | | | | | | | | | | | | | |
| | _ | | | | | | | | | | , - | | | |
| YSI# 01 | 20821 | TURBIDITY # | 75 | until that | Pump - Grur | nfos Redi-flow II | #2 | | | | | | | |

| GWN | WELL# | SHM-9 | 9-31A | | | 11 | _ | • | | gineers | 3 | |
|--|-----------------------------------|---------------|-------------|---------------------------|-----------------|--------------------------------------|-----------|------------|--------------------------|---------------|------------------------|--|
| SCREEN | INTERVAL DEPTH | | 5.3 | WELL DIAMETER: | 2" | Grou | ndwate | r Samp | ling Lo | g Sheet | | |
| H2O LEV | EL: DEPTH, PRE P | | 1.82 | - | | Project N | lame: S | hepley's | Hill Lan | dfill, Deve | ns, MA | |
| | DEPTH, POST PL | JMP INSERTION | | | _ | SAMPLE METHOD: EPA LOW STRESS METHOD | | | | | | |
| DEPTH S | AMPLED: | 11' | | REFERENCE POINT | PVC OR CASING | Metals/Hardness | 1 x 1L H | PE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | |
| DATE: | 22 May 200 | , TIME: | 0935 | (DEPTHS RECORDED BENEATH) | 215.09 NGVD | Cyanide 1 x 250 | ml HDPE (| ph>12 + As | cAc) | BOD 1 x 1L I | | |
| SAMPLE | | BW MK | SIGNATURE: | mark-R. Koe | enig. | Anions, Alkalinity | TDS 1 x 5 | 00ml HDPE | | COD 1 x 250 | mL HDPE (ph<2) | |
| RECORDED BY: JK DL PY BW MK SIGNATURE: | | | | mark R. Ko | TSS 1 x 1L HDPE | | | | TOC 3 x 40ml glass vials | | | |
| TIME WATER DPTH PUMP PURGE RATE | | | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D, O. | TURBIDITY | COMMENTS | | |
| 24hr | BELOW MP feet | SETTING | mi/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | |
| 1206 | 1.83 | 34.8 | 450 | 0.6 gal | 10.79 | 104 | 5.90 | 60,4 | 1.14 | 6.57 | | |
| 1211 | 2.10 | 34.8 | 450 | 1.2 | 10.76 | 103 | 5.85 | 60.7 | 0.58 | 4.32 | | |
| 1215 | 2.10 | 34.8 | 450 | 1.8 | 10.87 | /03 | 5.84 | 59.8 | 0.47 | 3.70 | | |
| 1220 | 2,10 | 34.8 | 450 | 2,2 | 10.99 | /03 | 5.83 | 57.4 | 0.30 | 1.45 | | |
| 1224 | 2,10 | 34,8 | 450 | 2.0 | 11.00 | /03 | 5.82 | 55.4 | 0.27 | 1.34 | | |
| 1228 | 2.10 | 34.8 | 450 | 3,2 | 10.97 | 103 | 5.82 | 54.3 | 0,24 | 0,97 | | |
| 1232 | 2.10 | 34.8 | 450 | 3.8 | 11.00 | 103 | 5.83 | 53.3 | 0.22 | 0.80 | | |
| 1236 | 2,10 | 34.8 | 450 | 4,1 | 11.00 | /03 | 5.82 | 52.7 | 10.20 | 0.85 | | |
| 1240 | 2.10 | 34,8 | 450 | 4.5 | 10.96 | 103 | 5.83 | 51.7 | 0.19 | 0.86 | | |
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| NOTES: | | 1511 | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | |
| SAMPLE | TAKEN AT: $/\mathcal{S}_{\gamma}$ | 44 | <u>wei</u> | ted screen v | oline = | T(42) | 15-7-5 | 5.7//7 | 1.481 441 | $1/(4^3) = 1$ | ,60 aal | |
| | ···· • | | | | | | | | J | | J | |
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| GWM | WELL# | dll.m.d | G-212 | | | US A | rmy (| Corps | of En | gineers | 3 | |
|---|--|---------|------------|---------------------------|-------------------|---|------------|--------|-------|----------------|------------------------|--|
| li . | | | 19-31B | WELL DIAMETER: | 2" | Groundwater Sampling Log Sheet | | | | | | |
| | INTERVAL DEPTH | | | - WELL DIAMETER. | | Project Name: Shepley's Hill Landfill, Devens, MA | | | | | | |
| ILIZO ELVI | DEPTH, POST P | | | | • | SAMPLE METHO | | | | | | |
| DEPTH S | | 57' | · | REFERENCE POINT | PVC OR CASING | łf . | | | | | 0ml glass vials (ph<2) | |
| DATE: | 5/22/02 | TIME: | 1/00 | (DEPTHO RECORDED BENEATH) | | Cyanide 1 x 250 | | | cAc) | BOD 1 x 1L | HDPE | |
| SAMPLE | | Y BW MK | SIGNATURE: | Courid Lee | Anions,Alkalinity | TDS 1 x 5 | 600ml HDPE | | | mL HDPE (ph<2) | | |
| | | | | | | | PE | | | TOC 3 x 40n | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mν | mg/L | NTU's | | |
| 122-1 | 2.95 | 38-7 | 450 | | 10.72 | 352 | 5.46 | 23.1 | a.70 | 2.61 | clear | |
| 1230 | 2.96 | 39.6 | 500 | 1 gal | 10.95 | 358 | 5.47 | 23.9 | 2.36 | 3.12 | | |
| 1236 | 2.90 | 39.6 | 500 | a | 10,95 | 376 | 5.42 | 25.9 | 1.69 | 1.87 | | |
| 1241 | 2.96 | 39.6 | 500 | | 10,99 | 381 | 5.40 | 27.4 | 1.38 | 1.63 | | |
| 1244 | 2-96 | 39.6 | 200 | 3 | 11.12 | 389 | 5.38 | 29.0 | 1.03 | 1.62 | | |
| 1250 | 2.95 | 39.6 | 500 | 4 | 11.02 | 375 | 5.36 | 31.0 | 0.72 | 1.53 | | |
| 1254 | 2.96 | 37.6 | 450 | | 11.03 | 397 | 5.34 | 31.2 | 0.63 | 0.93 | | |
| 1257 | 2.96 | 39.6 | 450 | 5.0 gal | 11.03 | 401 | 6.32 | 32.2 | 0.54 | 0.78 | | |
| 1300 | 2.96 | 39.7 | 450 | | 11.09 | 403 | 5.31 | 32.3 | 0.46 | 0.73 | | |
| 1304 | 2.95 | 39.6 | 450 | | 11.09 | 407 | 3.71 | 3≥.6 | 0.41 | 0.62 | | |
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| NOTES: 3% 3% +0.1 unit +10 mv 10% 10% SAMPLE TAKEN AT: 1307 wetted screen volume = $T(t_2)^2(62.3'-52.3')(7.48 qa /ft^3) = 1.6 qa $ | | | | | | | | | | | | |
| | | | | | | | | | | <i>J</i> / · · | 3 | |
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YSI# TURBIDITY# 39576

Pump - Grunfos Redi-flow II

| H20 LEVEL: DEPTH, PRE PLIMP INSERTION 3, 3, 3 | GWM | WELL# | SHM- | 99-310 | | | US Army Corps of Engineers | | | | | | | |
|--|--|-------------------|---------------|--------------|---------------------------|----------------|--------------------------------|-----------|------------|---------------|-------------|-----------------|------------------|--|
| H20 LEVEL: DEPTH, PRE PUMP INSERTION 3 . 3 / 2 | SCREEN | INTERVAL DEPTH | 70.1'- | 80.1 | WELL DIAMETER: | 2" | Groundwater Sampling Log Sheet | | | | | | | |
| DEPTH SAMPLED: 75 REFERENCE POINT: (Prob. CASINO) Metals/Hardness 1 x 1L HDPE (ph<2) VOC'S 3 x 40ml glass vials (ph<2) DATE: 21 May 1002 2. TIME: 09.5 | H2O LEVE | EL: DEPTH, PRE PU | JMP INSERTION | 3.23 | _ | _ | <u> </u> | | | | | ns, MA | | |
| DEPTH SAMPLED: 75 | | DEPTH, POST PU | JMP INSERTION | 3.22 | | ~ | SAMPLE METHO | OD: EPA L | OW STRES | S METHO | D | | | |
| SAMPLED BY: GMOL PY BW MK RECORDED BY: GMOL PY BW MK SIGNATURE: SIGNATURE: TSS 1x 1L HDPE TIME WATER DPTH PHUN PHUNGE RATE BELOW MP field SETTING MINITION PURGED TEMP C CONDUCTANCE MINITION MITUS 09572 3.48 44.8 7.00 1 a.d. 9.99 10.94 6.32 -30.2 137 30.9 CMART MINITION MITUS 09573 3.37 34.5 550 J 10.15 10.53 6.50 -70.7 0.69 6.16 1002 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 10.34 10.50 6.59 -73.1 0.48 1.97 1014 3.36 39.2 400 4 10.44 10.51 6.60 -70.1 0.48 1.97 1017 3.36 39.2 400 4 10.44 10.53 6.60 -70.1 0.49 1.73 | DEPTH SA | | | | REFERENCE POINT: | (PVC)OR CASING | Metals/Hardness | 1 x 1L HC | OPE (ph<2) | | VOC'S 3 x 4 | 40ml glass | vials (ph<2) | |
| SAMPLED BY: GMOL PY BW MK RECORDED BY: GMOL PY BW MK SIGNATURE: SIGNATURE: TSS 1x 1L HDPE TIME WATER DPTH PHUN PHUNGE RATE BELOW MP field SETTING MINITION PURGED TEMP C CONDUCTANCE MINITION MITUS 09572 3.48 44.8 7.00 1 a.d. 9.99 10.94 6.32 -30.2 137 30.9 CMART MINITION MITUS 09573 3.37 34.5 550 J 10.15 10.53 6.50 -70.7 0.69 6.16 1002 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 10.34 10.50 6.59 -73.1 0.48 1.97 1014 3.36 39.2 400 4 10.44 10.51 6.60 -70.1 0.48 1.97 1017 3.36 39.2 400 4 10.44 10.53 6.60 -70.1 0.49 1.73 | DATE: | 22 May 200 | Z_ TIME: | 0925 | (DEPTHS RECORDED BENEATH) | 215-5 ZNGVD | Cyanide 1 x 250 | ml HDPE (| ph>12 + As | cAc) | | | | |
| TOC 3 x 40ml glass vials TOC 3 x 40ml glass vials vials TOC 3 x 40ml | | | | | FackA.K | | Anions,Alkalinity, | TDS 1 x 5 | 00ml HDPE | | | | | |
| TIME 2411 BELOW ME 1664 SETTING MINIMIN PURGED TEMP C CONDUCTANCE PH ORPICA NO. TURBIDITY NO. 9 CRAC MINIMIN PURGED TEMP C CONDUCTANCE PH ORPICA NO. 9 CRAC MINIMIN N | RECORDE | ED BY: (JK) DL PY | BW MK | SIGNATURE: - | Paces ! | -: | TSS 1 x 1L HDF | E | | | TOC 3 x 40r | nl glass vi | als | |
| 0952 3.48 44.8 700 1 aal 9.99 1044 6.32 -30.2 1.37 20.9 (PAR With HE 0.957) 3.37 34.5 550 0 10.15 1053 6.50 -70.7 0.68 6.16 1002 3.36 39.2 400 2 10.32 10.51 6.57 -74.1 0.55 3.63 1006 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 3 10.38 10.50 6.59 -73.2 0.51 3.00 1014 3.36 39.2 400 10.44 10.51 6.60 -70.1 0.48 1.97 10.47 3.36 39.2 400 4 10.44 10.53 6.60 -70.1 0.46 1.73 10.47 10.53 6.60 -70.1 0.46 1.73 10.47 10.53 6.60 -70.1 0.47 1.73 10.47 10.53 6.60 -70.1 0.47 1.73 10.55 10 | TIME | WATER DPTH | PUMP | PURGE RATE | 7/ | H20 | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | C | OMMENTS | |
| 0957 3.37 39.5 550 U 10.15 1053 6.50 -70.7 0.68 616 1002 3.36 39.2 400 2 10.32 1051 6.57 -74.1 0.55 3.63 1006 3.36 39.2 400 10.34 1050 6.59 -73.2 0.51 3.00 1010 3.36 39.2 400 3 10.38 1052 660 -71.0 0.48 1.97 1014 3.36 39.2 400 4 1051 6.60 -70.1 0.46 1.73 1017 3.36 39.2 400 4 10.44 1051 6.60 -70.1 0.46 1.73 1019 3.36 39.2 400 4 10.44 1053 6.60 -72.1 0.44 2.13 | 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | | |
| 1007 3.36 39.2 400 2 10.32 10.51 6.57 -74.1 0.55 3.63 1006 3.36 39.2 400 10.34 10.50 6.59 -73.2 0.57 3.00 1010 3.36 39.2 400 3 10.38 10.52 660 -71.0 0.48 1.97 1014 3.36 39.2 400 10.44 10.51 6.60 -70.1 0.46 1.73 1017 3.36 39.1 400 4 10.44 10.53 6.60 -72.1 0.44 2.13 | 0952 | 3.48 | 44.8 | 700 | 1 aal | 9.99 | 1044 | 6.32 | -30.2 | 1.37 | 20.9 | CHAT | My 21. 4 pt 26.2 | |
| 1006 3.36 39.2 400 10.37 1050 6.59 -73,2 0.5-1 3.00 1010 3.36 39.2 400 3 10.38 1052 660 -71.0 0.48 1.97 1014 3.36 39.2 400 10.44 1051 6.60 -70.1 0.46 1.73 1017 3.36 39.2 400 4 10.44 1053 6.60 -72.1 0.44 2.13 | 0957 | 3.37 | 39.5 | 220 | J | 10.15 | 1053 | 6.50 | -70.7 | 0.68 | | | | |
| 1010 3.36 39.2 400 3 10.38 1052 600 -71.0 0.48 1.97 1014 3.36 39.2 400 10.44 1051 6.60 -70.1 0.46 1.73 1017 3.36 39.2 400 4 10.44 1053 6.60 -72.1 0.44 2.13 | 1002 | 3.36 | 39.2 | 400 | 2 | 10.32 | 1051 | 6.57 | -74.1 | 0.55 | 3.63 | ļ | | |
| 1014 3.34 39.2 400 10.44 1051 6.60 -70.1 0.46 1.73 (***7 3.36 39.2 400 4 10.44 1053 6.60 -70.1 0.46 1.73 | 1000 | 3.36 | 39.2 | 400 | | 10.34 | 1050 | 6.59 | -73,2 | 0.5-1 | 3.00 | | | |
| 7.7 3.36 39.2 400 4 10.44 10.53 6.60 -72.1 2.44 2.13 | 1010 | 3.36 | 39.2 | | 3 | /0.38 | 1052 | 6.60 | | | | | | |
| | 1014 | 3.36 | 39.2 | 400 | | 10.44 | 1051 | 6.60 | -70.1 | 0.46 | 1.73 | | | |
| | 1017 | 3.36 | 39.1 | 400 | 4 | 10.44 | 1053 | 6.100 | -72.1 | 0.44 | 2.13 | <u> </u> | | |
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| NOTES | | | | | | | | | | | | <u> </u> | | |
| NOTES. | | | | | | | | | | | | | | |
| | لـــــــــــــــــــــــــــــــــــــ | | | <u> </u> | | | | | | | | <u> </u> | | |
| | NOTES: | | | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | > | | |
| SAMPLE TAKEN AT: /020 wetled screen volume = TT (1/21)2(80.21-70.21) (7.481 gas/ft3) = 1.6 gas | SAMPLE | TAKEN AT: / o | 20 | | wether scre | en volu | x= T(/21 |) (80.2 | 21-70.2 | <u>~)(7.1</u> | 481 gas/f | 23)= | 1.6 gal | |
| 3 / 3 | | | | | | | | | | | <i>O</i> / | | J | |
| | | | | | | | | | | | | | | |

| GWM | WELL# | - U 00 | 99-22 V | | | US A | rmy (| Corps | of En | gineers | 3 | | |
|--|----------------|---------------|------------|---------------------------|--|---|-----------|------------------|-------------|--------------|---------------------------------------|--|--|
| | | <u> </u> | 99-32X | WELL DIAMETER: | ວ" | | • | • | | g Sheet | | | |
| H2O I EVE | INTERVAL DEPTH | IMP INSERTION | 8.70 | 7 | | Project Name: Shepley's Hill Landfill, Devens, MA | | | | | | | |
| | DEPTH, POST P | | | | | SAMPLE METHO | OD: EPA L | OW STRES | S METHO | DD | | | |
| DEPTH SA | • | 791 | | REFERENCE POINT: | PVC OR CASING | Metals/Hardness | 1 x 1L HI | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | | |
| lł. | 22 May 2002 | | 0900 | (DEPTHS RECORDED BENEATH) | ZZI.95 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L l | | | |
| SAMPLED | | Y BW MK | SIGNATURE: | Savid Leets | | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | | | mL HDPE (ph<2) | | |
| | DBY: JK DLPY | BW MK | SIGNATURE: | Juil Kul | TSS 1 x 1L HDPE TOC 3 x 40ml glass vials | | | | | | | | |
| TIME WATER DPTH PUMP PURGE RATE COM. VOLUME 7120 SPECIFIC PIT ON THE STATE COM. VOLUME 7120 SPECIFIC PIT ON THE STATE COM. | | | | | | | | | | | COMMENTS | | |
| 24hr | BELOW MP feet | SETTING | ml/min | PURGED | TEMP C | CONDUCTANCE | | mv | mg/L | NTU's | | | |
| 0949 | 8.75 | 66.2 | 300 | | 9,87 | 819 | 6.04 | -40.8 | 1.67 | 23.2 | | | |
| 0955 | 8.76 | 66.2 | 300 | 1.0gal | 9.90 | 781 | 6.32 | -53.5 | | 15.9 | | | |
| 0759 | 8.75 | 66.2 | 300 | | 10.05 | 921 | 636 | -55.2 | | 10.2 | | | |
| 1003 | 8.75 | 106.7 | 300 | | 10.29 | 933 | 6.44 | -57,3 | 0.46 | 7.91 | | | |
| 1008 | 8.75 | 66.2 | 300 | 2.0 gal | 10.39 | 933 | 6.47 | -589 | 0.44 | 5.35 | | | |
| 1012 | 4.74 | 66.2 | 300 | | 10.41 | 938 | 6.48 | -60.1 | 0.38 | 4.12 | | | |
| 1016 | 8.74 | 66.2 | 300 | | 10.49 | 939 | | -62.0 | | 3.89 | | | |
| 1023 | 8.74 | 66.2 | 300 | 3.09al | 10.55 | 939 | 6.50 | -61.8 | 0.30 | 3.32 | | | |
| 1030 | 8.74 | 66.2 | 300 | 3.09ax | 10.56 | 939 | 6.30 | -62,5 | | 3,43 | | | |
| 10 | 8.73 | 66.2 | 300 | | 10.61 | 939 | 6.51 | -62.8 | | 3.32 | | | |
| 10 | 0, 1) | 60.2 | 700 | | 70307 | | 6.31 | -66.0 | 0.00 | المرازين | | | |
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| NOTES: | | _ | | | 3% | | +0.1 unit | | 10% | 10% | | | |
| SAMPLE | TAKEN AT: | 1039 | | metted screen | r volume | = T(Tz') | (84.1 | -74.1 <u>(</u>) | (7.481 | gal/ft3) | = 1.6 gal | | |
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Groundwater Field Analysis Forms Fall 2002

| | OMMANUTUR CALL 2 | | | | | | | | | | | |
|--|---|---------------|------------|------------------|-----------|--------------------------------------|-----------|-----------|-----------|-----------------------|------------------------|--|
| GWM | SWM WELL# SHL-3 U.S. Army Corps of Engineers Groundwater Sampling Log Sheet | | | | | | | | | | | |
| SCREEN | INTERVAL DEPTH | 1: 25.1- | 351 ft | WELL DIAMETER: | 2" | | | | | | | |
| H2O LEVI | EL: DEPTH, PRE P | UMP INSERTION | 30.39 | Ft. | | Proje | ect Nam | e: Sheple | ey's Hill | Landfill, D | evens, MA | |
| | DEPTH, POST P | UMP INSERTION | 30,85 | £4 | | SAMPLE METHOD: EPA LOW STRESS METHOD | | | | | | |
| DEPTH S | AMPLED: | 344 | | REFERENCE POINT: | | | | | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | |
| DATE: | DATE: 250c+02 TIME: c1900 (DEPTHS RECORDED BENEATH) 248.5 NGVD Cyanide 1 x 250ml HDPE (ph>12 + AscAc) BOD 1 x 1L HDPE | | | | | | | | | | | |
| SAMPLED BY: JK KM DL PYMB WM SIGNATURE: Mark R. Kolma Anions, Alkalinity, TDS 1 x 500ml HDPE COD 1 x 250ml HDPE (ph<2) | | | | | | | | | | | •• | |
| RECORD | ED BY: JK KM D | LPYMBWM | SIGNATURE: | Mark R. Keery | 9 | TSS 1 x 1L HDF | Έ | | | TOC 3 x 40m | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | |
| 0932 | 31.92 | 122.0 | 800 | 1.0 | 15.02 | 68 | 6.16 | 219.1 | | \$ 0.82 | | |
| 0940 | 31.68 | 122.0 | 750 | 210 | 15.18 | 68 | 6.26 | 218.8 | | g/l 0,29 | | |
| 0945 | 31.14 | 121.2 | 420 | 2,8 | 15.98 | 67 | 6,28 | 215.3 | 7.86 | | | |
| 0950 | 31.24 | 121,2 | 200 | 3.1 | 16.75 | 67 | 6,27 | 2/3.0 | 7.82 | 0.30 | | |
| 0952 | 31.52 | 123.7 | 500 | 3,8 | 19.50 | 67 | 6.28 | 203.1 | 7.85 | 6.35 | Increased pump/ | |
| 1002 | 31.36 | 123.9 | 200 | 4, [| 17.30 | 68 | 6.29 | 206.2 | 7.87 | 0.41 | 77 | |
| 1006 | 31.62 | 121.8 | 600 | 4.9 | 16.59 | 68 | 6.27 | 204,0 | 8.00 | 0.27 | Backflushed | |
| 1010 | 31.60 | 121.8 | 500 | 5.3 | 16.03 | 67 | 6.26 | 209.9 | 7.93 | 0.35 | | |
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| NOTES: | | <u> </u> | | <u> </u> | <u> </u> | <u> </u> | <u> </u> | .10 | 4000 | 100/ | | |
| | TAKEN AT: | 1013 | h a lla A | Streen Volume | 3% | 2/2/2/3% | +0.1 unit | +10 mv | 10% | 10% | 7 001 | |
| OAIVIF LE | TARENAI. | | werted 4 | otren volume | = 11 (7) | 2) (35.1 | - 30.84 | 9 /(1.18 | 19a / H | t ³) 5 0. | 7 gal | |
| | | | | | | | | | | | - | |

| GWN | I WELL# | SHL- | 4 | | | | J.S. A | rmv C | orps | of Engi | neers | | | |
|-----------|---|-------------|--------------|--------------------------|---------------------------------------|-------------------|---|------------|---------|-------------|-------------------------|--|--|--|
| 1 | INTERVAL DEPTH | | "- 15.7" | WELL DIAMETER | a" | 1 | | • | • | ing Log S | | | | |
| ti . | EL: DEPTH, PRE P | | | | | Proi | | | | | evens, MA | | | |
| | DEPTH, POST P | | | | _ | | | | | / STRESS ME | | | | |
| DEPTH S | AMPLED: | 14.0 |) | REFERENCE POINT: | : (PVQ) OR CASING | Metals/Hardness | | | | | 40ml glass vials (ph<2) | | | |
| DATE: | 10-28-02 | TIME: | 1415 | (DEPTHS RECORDED BENEATH | | Cyanide 1 x 250 | | | scAc) | BOD 1 x 1L | HDPE | | | |
| SAMPLE | BY: JK KM E | L PYMBWM | SIGNATURE: | mark R. Koe | nia. | Anions,Alkalinity | ,TDS 1 x ! | 500ml HDPE | • | COD 1 x 250 | mL HDPE (ph<2) | | | |
| RECORD | ED BY: JK KM D | L PAYMK JVM | SIGNATURE: | Mark R. Kom | if . | TSS 1 x 1L HDF | PE | | | TOC 3 x 40r | nl glass vials | | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. Q. | TURBIDITY | COMMENTS | | | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | | | |
| 1435 | 10.86 | 70.0 | 450 | 1.2 | 14.82 | 295 | 5.92 | 46.1 | 0.57 | 18.3 | Heavey Brown TSS | | | |
| 1440 | 10.83 | 70.0 | 450 | 1.8 | 14.98 | 279 | 6.02 | 36.0 | 0.43 | 6.3 | Ü | | | |
| 1445 | 10.84 | 70.0 | 450 | 2.5 | 15,05 | 257 | 6.05 | 33.3 | 0.36 | 3.3 | | | | |
| 1449 | 449 10.85 70.0 450 2.9 15.16 242 6.06 31.7 0.33 1.7 | | | | | | | | | | | | | |
| 1453 | 10.86 | 70.0 | 450 | 3,3 | 14.97 | 229 | 6.07 | 30.9 | 0.34 | 1.20 | | | | |
| 1457 | 10.86 | 70.0 | 440 | 3.8 | 15.10 | 224 | 6,07 | 29.7 | 0.31 | 0.73 | | | | |
| 1501 | 10.86 | 70.0 | 440 | 4.3 | 15,22 | 223 | 6,08 | 28.3 | 0.32 | 0.53 | | | | |
| 1504 | 10.86 | 70,0 | 440 | 4,8 | 15,19 | 221 | 6.08 | 28.0 | 0.31 | 0.52 | | | | |
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| NOTES: 3% | | | | | | | 3% 3% +0.1 unit +10 mv 10% 10% $T(\frac{1}{2})^{2}(15.7' - 10.82')(7.4813a1)ft^{3}) = 0.89a1$ | | | | | | | |
| SAMPLE | TAKEN AT: | 1009 | we | thed screen volu | me = T | (1/2) (15.7 | 1-10.82 | 1)(7.48 | Igal fi | (3) = 0. | 8991 | | | |
| well | casing broken | | | | | v / | | • | | | | | | |
| | J | | | | · · · · · · · · · · · · · · · · · · · | | | | | | | | | |

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|---------|---|---------------------|------------|---------------------------|---------------|-------------------|-----------|------------|-------------|--------------|---|--|--|
| GWM | WELL# | SHL- | 5 | | | U | I.S. A | rmy C | orps (| of Engi | neers | | |
| | INTERVAL DEPTH | | 151 ft | WELL DIAMETER: | 2" | | | | | ng Log S | | | |
| H | EL: DEPTH, PRE PU | | | - | | . Proje | ect Name | e: Shepl | ey's Hill | Landfill, D | evens, MA | | |
| | | | 1 3 12 ft | | • | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD | | |
| DEPTH S | | 10 fee | | REFERENCE POINT: | PVC OR CASING | Metals/Hardness | 1 x 1L HC | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | | |
| DATE: | 3000002 | TIME: | 0815 | (DEPTHS RECORDED BENEATH) | 718.53NGVD | Cyanide 1 x 250 | mi HDPE (| ph>12 + As | cAc) | BOD 1 x 1L I | HDPE | | |
| SAMPLE | | L PY (MB) WM | SIGNATURE: | marker. Koi | ems | Anions,Alkalinity | TDS 1 x 5 | i00ml HDPE | Ē | COD 1 x 250 | mL HDPE (ph<2) | | |
| RECORD | ED BY: JK KM DI | _ PY (MK) WM | SIGNATURE: | Mark R. Ko | | TSS 1 x 1L HDF | 'E | | | TOC 3 x 40m | nl glass vials | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | | |
| 0914 | 3.41 | 47,5 | 440 | 0.5 | 10.13 | 84 | 5.55 | 55.9 | 1.07 | 3.98 | | | |
| 0918 | 3,42 | 47.5 | 440 | 1.0 | 10.49 | 85 | 5.69 | 54.6 | 0.86 | 1.11 | | | |
| 0922 | 3,47 | 47.5 | 450 | 1.3 | 10.73 | 86 | 5.61 | 50.9 | 0.85 | 0.89 | | | |
| 0926 | 0926 3.47 47.5 500 1.8 10.90 87 5.62 46.2 0.74 0.82 | | | | | | | | | | | | |
| 0930 | 3.49 | 47.5 | 500 | 2.2 | 11,00 | 89 | 5.64 | 41.9 | 0.67 | 0.78 | · · · · · · · · · · · · · · · · · · · | | |
| 0934 | _3,51 | 47.5 | 500 | 2,8 | 11.01 | 91 | 5.65 | 37.7 | 0.62 | 0.73 | | | |
| 0938 | 3,51 | 47.5 | 500 | 3.2 | 11.03 | 9.3 | 5.67 | 33.6 | 0.61 | 0.63 | | | |
| 0942 | 3.51 | 47.5 | 500 | 3.8 | 11,07 | 94 | 5.67 | 31.2 | 0.60 | 0.58 | | | |
| 0946 | 3.51 | 47.5 | 500 | 4,2 | 11.07 | 94 | 5.68 | 27.5 | 0.61 | 0.59 | | | |
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| NOTES: | | | | | 3% | 3% | +0.1 unit | +10 my | 10% | 10% | | | |
| | TAKEN AT: | 1050 | ار مدر ۱ | ted screen vo | /2000 D | サノといっしい | 5.1/-5 | 11/17 | HRIOAL | 1943) = 1 | .6 gal | | |
| * | | <u> </u> | | THE BLIEBLE VO | COPPLE - | VI (1/4) (V | <u> </u> | · / / (| | 1-0 / | • | | |

| GWM | WELL# | SHM-0 | 7h-5B | | | U | | _ | • | of Engi | |
|---------|------------------|---------------|-------------|---------------------------|------------|-------------------|-----------|-------------------|-----------|-------------|------------------------|
| H | INTERVAL DEPTH | | 91.3 ft | WELL DIAMETER: | 41 | | | | | ing Log S | |
| H2O LEV | EL: DEPTH, PRE P | | | [+ | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA |
| | DEPTH, POST P | UMP INSERTION | | | • | | SAMPLE | METHOD: | EPA LOW | / STRESS ME | THOD |
| DEPTH S | AMPLED: | 8 ધ્ર | | REFERENCE POINT: | | | | | | VOC'S 3 x 4 | 0ml glass vials (ph<2) |
| DATE: | 30 007 02 | TIME: | 1030 | (DEPTHS RECORDED BENEATH) | 219,8/NGVD | Cyanide 1 x 250 | mi HDPE | (ph>12 + As | cAc) | BOD 1 x 1L1 | HDPE |
| SAMPLE | BY: JK KM D | L PY MK (WM) | SIGNATURE: | note I not | h. | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | • | COD 1 x 250 | mL HDPE (ph<2) |
| RECORD | ED BY: JK KM D | | SIGNATURE: | holom & hel | | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (mi/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1115 | 6.81 | 61.9 | 600 | | 10.36 | 424 | 7.16 | -213 | 5.27 | 3,52 | |
| 1/19 | 6.81 | 62.0 | 600 | 1,25 gzl | 10.69 | 746 | 6,61 | -49.7 | 0.65 | 2,32 | |
| 1/23 | 6,83 | 61.9 | 520 | | 10.26 | 821 | 6.64 | -55,0 | 0.47 | j.87 | |
| 1126 | 6.23 | 61.9 | 570 | 2.8 98 | 10.88 | 842 | 6.64 | -57.6 | 0.39 | 1,80 | Ancket EMATIED |
| 1131 | 6.83 | 62.0 | 600 | | 10.91 | 845 | 6.64 | -60:5 | 0.35 | 2.16 | |
| 1/34 | 6.83 | 62.0 | 600 | | 10.95 | 846 | 6,64 | -61.7 | 0.32 | 2.17 | |
| 11,38 | 6.83 | 62.1 | 600 | 4.8 gal (757al) | 10.89 | 846 | 6.64 | -62,7 | 0.31 | 1,52 | |
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| NOTES: | | 1 | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | |
| SAMPLE | TAKEN AT: | 1141 | wetted s | = T/ (1/2" |)2(91.3'-8 | <u>1.3')(7</u> | 481 gal/ | $f_{\ell}^{3}) =$ | 10.5 90 | <i>\</i> | |
| | | | | | | | | 7 / | | J | |
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|---------|------------------|---------------|------------|---------------------------|--------------|--------------------|-----------|-------------|--------------------|--------------|------------------------|
| GWN | 1 WELL# | SHM- | 96-5°C | | U | I.S. A | rmy C | orps | of Engi | neers | |
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 4" | | Groun | dwater | Sampli | ing Log S | heet |
| H2O LEV | EL: DEPTH, PRE P | UMP INSERTION | 5.76 | | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA |
| | DEPTH, POST P | UMP INSERTION | | | • | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD |
| DEPTH S | SAMPLED: | 56 F | | REFERENCE POINT: | | | | | | VOC'S 3 x 4 | 0ml glass vials (ph<2) |
| DATE: | 30 0CT 02 | | 0835 | (DEPTHS RECORDED BENEATH) | 7.19 25 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L I | HDPE |
| SAMPLE | D BY: (JK)KM D | L PY MKOVIND | | Daens. 10 | | Anions, Alkalinity | TDS 1 x 5 | 500ml HDPE | į | COD 1 x 250 | mL HDPE (ph<2) |
| il e | ED BY: JK KM D | | SIGNATURE: | hall nul | | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 0010 | 5.80 | 57.6 | 560 | 1 nal | 10:27 | 810 | 6.45 | -49.6 | 0.59 | 1.17 | |
| 0014 | 5.81 | 57.6 | 560 | 7 | 10,59 | 818 | 6,47 | -48.9 | 0.41 | 0,37 | |
| 0918 | 5.81 | 57.6 | 550 | | 10.72 | 820 | 6.48 | -51,2 | 0.36 | 0.36 | |
| 0929 | 5.82 | 57.6 | 550 | 39a1 | 10.84 | 820 | 6.48 | -54.2 | 0.28 | 0.27 | |
| 0932 | 5.82 | 57.6 | 550 | 3gal 4gal | 10.83 | 822 | 6.47 | -55.8 | 0.27 | 0.23 | |
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| NOTES: | | | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | |
| SAMPLE | TAKEN AT: 0 | 135 | wetted | Screen volum | re = 11/ | 3/2') (60.8' | -50.8 | 1)(7.48 | 19al/- | $(4^3) = 6.$ | 5921 |
| | | | | | | | | | y - r - | | J |
| | | | | | | | | | | | |

| GWM | WELL# | SHL- | 9 | | | U.S. Army Corps of Engineers Groundwater Sampling Log Sheet | | | | | | |
|----------|------------------|---------------|------------|----------------------------|---------------|---|-----------|-------------|---------------------|--------------|------------------------|--|
| | INTERVAL DEPTH | | | WELL DIAMETER: | 2" | | | | | | | |
| H2O LEVI | EL: DEPTH, PRE P | UMP INSERTION | 9.60 ft | , | | Proje | | | | | evens, MA | |
| | DEPTH, POST P | UMP INSERTION | | | • | | | | EPA LOW | STRESS ME | | |
| DEPTH S | AMPLED: | 20 f | | REFERENCE POINT: | PVC OR CASING | Metals/Hardness | 1 x 1L HI | OPE (ph<2) | | | 0ml glass vials (ph<2) | |
| DATE: | 29 oct 02 | TIME: | 1430 | (DEPTHS RECORDED BENEATH) | 222.84 NGVD | Cyanide 1 x 250 | mi HDPE | (ph>12 + As | cAc) | BOD 1 x 1L l | | |
| SAMPLE | | LPYMBWM | SIGNATURE: | | enia | Anions,Alkalinity | | 500ml HDPE | : | | mL HDPE (ph<2) | |
| RECORD | ED BY: JK KM DI | LPY(MR)WM | SIGNATURE: | M.R.K. | 0 | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | 7.77 | (mv) | (mg/L) | (NTU's) | | |
| 1141 | 9.71 | 67.9 | 380.ml | 0,8 | 12.64 | 172 | 6.49 | -31.9 | 0.45 | 0.87 | Hydrogen sulfide od | |
| 1145 | 9.81 | 69.2 | 520 | 1.5 | 12.76 | 181 | 6.56 | -40.5 | 0.27 | 0.72 | | |
| 1152 | 9.81 | 69,2 | 520 | 2.1 | 12.40 | 180 | 6.56 | -41.9 | 0,20 | 0.67 | | |
| 1156 | 9.81 | 69.2 | 520 | 2,6 | 12.28 | 179 | 6.56 | -42.4 | 0.17 | 0.54 | | |
| 1200 | 9.81 | 69,2 | 520 | 3.2 | 12,22 | 180 | 6.56 | -43, F | 0.15 | 0.26 | 1000 | |
| 1204 | 9.80 | 69,2 | 520 | 2,8 | 12,17 | 181 | 4.56 | -44.8 | 017 | 0.24 | MT bucket @ 45al | |
| 1308 | 4.80 | 69.2 | 520 | 4.2 | 12.17 | 181 | 6.56 | -45.7 | 0.13 | 0.21 | | |
| 12/2 | 9.80 | 69,2 | 520 | 5.0 5.5 | 12,17 | 182 | 6,56 | -46,9 | 011 | 0,22 | | |
| 12/6 | 9.80 | 69.2 | 520 | 2.5 | 12,14 | 182 | 6.56 | 76, 1 | $\mathcal{O}_{i,j}$ | 0,20 | | |
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| NOTES: | | 1220 | | | 3% | +0.1 unit | +10 mv | 10% | 10% | | | |
| SAMPLE | TAKEN AT: | 1220 | wetted | screen volum | a = 77 (. | / (25.0° | -15.0 | 167.481 | 941/CH | 3) = 1.6 | 90/ | |
| | | | | screen volum Vote: X We | U Casin | ig broke | n at | lock | | | <i></i> | |
| | | | | | | 0 | | | | | | |

| GWN | I WELL# | SHL | -10 | | | U | I.S. A | rmy C | orps | of Engi | neers |
|--------------|------------------|---------------|---------------|---------------------------|--------------|-------------------|-----------|------------|-----------|---------------|-------------------------|
| SCREEN | INTERVAL DEPTH | 1: 17.8-3 | A.Y filt | WELL DIAMETER: | 7." | | Groun | dwater | Sampli | ng Log S | Sheet |
| H2O LEV | EL: DEPTH, PRE P | UMP INSERTION | TAB2: 31,5 | - - o ft | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA |
| l l. | DEPTH, POST P | | | | - | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD |
| DEPTH S | AMPLED: | 36 ft | | REFERENCE POINT: | PV OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | 10ml glass vials (ph<2) |
| DATE: | 280ct 02 | TIME: | 1005 | (DEPTHS RECORDED BENEATH) | | | | | cAc) | BOD 1 x 1L | HDPE |
| SAMPLE | BY: JK KM D | L PYM)WM | SIGNATURE: | Mark R. Koes | | Anions,Alkalinity | | | | COD 1 x 250 | mL HDPE (ph<2) |
| RECORD | ED BY: JK KM D | L PAMK WM | SIGNATURE: | Mark R Koe | un E. | TSS 1 x 1L HDF | PE | | | TOC 3 x 40n | nl glass vials |
| TIME | WATER OPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gai) | TEMP (°C) | COND, (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1144 | 31.65 | 123.8 | 610 | 0.6 | 12.24 | 97 | 6.71 | 284.6 | 8,15 | 0.90 | |
| 1151 1156 | 31.71 | 123.8 | 610 | 1.8 | 13,29 | 77 | 6.89 | 253,6 | 9.37 | | |
| 1156 | 31.70 | 123.8 | 580 | 2.5 | 13.36 | 74 | 6.89 | 246.1 | 9.39 | 0.21 | |
| 1200 | 31,70 | 123.8 | 580 | 3,2 | 13,31 | 72 | 6.88 | 240.0 | 9.40 | 0.15 | |
| 1204 | 31,70 | 123.8 | 580 | 3.8 | 13.36 | 72 | 6.88 | 236,1 | 9.34 | 0.07 | |
| 1209 | 31, 70 | 123.8 | 560 | 4,2 | 13, 39 | 7-1 | 6.87 | 230.9 | 9.33 | 0.05 | |
| 1213 | 31.70 | 123.8 | 560 | 4.8 | 13.27 | 70 | 6.88 | 228.6 | | 0.07 | |
| 1216 | 31.70 | 123.2 | 560 | 5.2 | 13.34 | 69 | 6.87 | 225.8 | | 0.08 | |
| 1220 | 31.70 | 123.2 | 560 | 5.8 | 13.29 | 68 | 6.86 | 222.1 | | | |
| 1224 | 31.70 | 123.2 | 560 | 6.4 | 13.26 | 68 | 6.87 | 219.4 | 9.40 | 0.03 | |
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| | | | <u> </u> | | | | | | | | |
| NOTES: | TAI/511 A. | 1227 | | .1 | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | |
| | TAKEN AT: | 1227 | | Hed screen vol | me= I | $(1/2')^{2}(38.$ | 4-31. | 501)(7. | 48192/4 | $(2^3)^2 .1$ | 991 |
| * Well | has history | of Silling | in - attempts | have been mad | de to ren | ove material | יטינעשוני | shy - reco | ords hav | د سال عن | 1 to 41.8 ft. |
| | | J | | | | | | 7 | | | J |

| GWN | 1 WELL# | 5HM- | 93-100 | | | U | I.S. A | rmy C | orps | of Engil | neers | | | |
|---------|---|---------------|---------------------------------------|---------------------------|----------------|-------------------|-----------------------------|--------------|-----------|--------------|------------------------|--|--|--|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 4" | | Groun | dwater | Sampli | ng Log S | heet | | | |
| | EL: DEPTH, PRE P | | | Ēŧ | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA | | | |
| | DEPTH, POST P | UMP INSERTION | | | • | | | | | STRESS ME | THOD | | | |
| DEPTH S | | 51 | | REFERENCE POINT: | VC)OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) | | | |
| DATE: | 2802+02 | TIME: | 0940 | (DEPTHS RECORDED BENEATH) | 248.4 2NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L l | | | | |
| SAMPLE | BY: JKKM | PY MK WM | SIGNATURE: | David Lub | | Anions,Alkalinity | - | 600ml HDPE | Ē | | mL HDPE (ph<2) | | | |
| RECORD | EDBY: JKKM(Ď | D PY MK WM | SIGNATURE: | David Luly | | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | | | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | | | |
| 1002 | 30.65 | 118.7 | 150 | | 10.95 | 493 | 7.57 | -7.9 | 1.46 | 7.87 | | | | |
| 1007 | 30.85 | 119.5 | 350 | | 11.29 | 486 | 7,51 | -5.9 | 0.86 | 10.92 | | | | |
| 1010 | 30.90 | 119.1 | 150 | ļ | 12,07 | 486 | 7.51 | -3.6 | 0.54 | 6.77 | | | | |
| (020 | 820 30.94 119 150 19al 12.22 490 7.55 -4.2 0.71 5.07 018 30.99 119 150 12.19 490 7.54 -4.2 0.62 4.42 | | | | | | | | | | | | | |
| LVVJ | | | | | | | | | | | | | | |
| (029 | 31,00 | /(9. / | 160 | | | | | | | | | | | |
| 1032 | 31.00 | 117.1 | 100 | | 12.57 | 490 | 7.56 | -3.9 | 0.51 | | | | | |
| 1035 | 91.01 | 119.1 | 100 | | 12.78 | 489 | 7.56 | -4.2 | 10.65 | 3,39 | | | | |
| 1039 | 31.02 | 119.1 | 100 | | 12.18 | 491 | 7.59 | -5.5 -4.8 | 0.50 | 2.91 | | | | |
| 1043 | 31.03 | (19.1 | 100 | 2 7 al | 12.8 | 490 | 7.53 | -4,0 -52 | 0.58 | 2 62 | | | | |
| 1049 | 31.03 | 117.1 | (02) | | 12.71 | 491 | 7.53 | -5.3 | 0.54 | 2.25 | • | | | |
| 7097 |) (00 / | | | | 10.11 | 7.0 | 1.77 | | 0.57 | <u> </u> | | | | |
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| NOTES: | | | | ed Sercen volum | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | | | |
| SAMPLE | TAKEN AT: | 056 | weth | .7-45 | 7 (1. | 481 921 | (A) = (| 6.5941 | | | | | | |
| | | | | | - J | , <u> </u> | - - - | | | | | | | |
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| GWM | WELL# | SI | L-11 | | | U | I.S. A | rmy C | orps | of Engi | neers | |
|---------------|---|---------------------------------------|------------|---|---------------|-------------------|-----------|-------------|-----------|-------------|----------------|--|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 2" | | | | | ing Log S | | _ |
| | EL: DEPTH, PRE P | | | <u> </u> | | Proje | | | | Landfill, D | | Α |
| : | DEPTH, POST P | UMP INSERTION | | | | | SAMPLE | METHOD: | EPA LOW | STRESS ME | | |
| DEPTH S | AMPLED: | 251 | | REFERENCE POINT | | | | | | VOC'S 3 x 4 | _ | als (ph<2) |
| DATE: | 10/24/02 | TIME: | 6350 | (DEPTHS RECORDED BENEATH) | 23-60.34 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L | | |
| SAMPLE | BY: JK KM(C | PY MK WM | SIGNATURE: | David Lu | wl | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | = | COD 1 x 250 | | h<2) |
| RECORD | EDBY: JKKMQ | L) PY MK WM | SIGNATURE: | David Le | wh | TSS 1 x 1L HDF | Έ | | | TOC 3 x 40n | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMM | ENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | |
| 8-55 | 19.13 | 93.3 | 300 | | 12.38 | 677 | 6.17 | -34.1 | 0.86 | 74.5 | Rust al | |
| 1000 | 19.13 | 94.0 | 450 | Igal | 14.57 | 714 | 6.41 | -41.3 | 0.61 | 76.2 | pirst 46 | ren clea |
| 1004 | 19.13 | 94.0 | 500 | , , , , , , , , , , , , , , , , , , , | 14.43 | 727 | 6.46 | -41.9 | 0.57 | 38.6 | | |
| 1052 | 19.13 | 94.0 | 500 | Jan. | 15,03 | 736 | 6.46 | -43,8 | | 25.6 | | |
| 1013 | 19,13 | 94.0 | 500 | - 0 | 14.99 | 747 | 4.48 | -44.3 | 0 51 | 15.4 | | |
| 1013 | 19.13 | 94.0 | 500 | 39al | 14.98 | 148 | 6.49 | -44.2 | 0.53 | 10-83 | | |
| 1021 | 19.13 | 94.0 | 450 | | 14.96 | 151 | 6.49 | -44.7 | 0.53 | 10.42 | | |
| 1025 | 19.13 | 94.0 | 500 | 4 gal | 15.03 | 752 | 6.48 | -44.8 | 0.52 | 7.85 | | |
| 1028 | 19,13 | 94.0 | 500 | - 0 | 15,13 | 752 | 6.48 | -45.3 | 0.52 | 5.64 | | |
| 1032 | 19.13 | 93.9 | 500 | 55al | 15.11 | 75 Y | | -45.6 | 0.53 | 4.45 | | |
| 1035 | $-\frac{19.13}{12}$ | 94.0 | 450 | . , , , , , , , , , , , , , , , , , , , | 15.04 | 757 | 6.48 | -45.5 | 0.56 | 4,49 | | |
| 1038 | 19.13 | 94.0 | 500 | 6 5al | 15.15 | 756 | 6.40 | -46.3 | 0.56 | 4.69 | | |
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| NOTES: | | | 1 | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | |
| | TES: 3% +0.1 unit +10 my 10% 10% APLE TAKEN AT: $(04)^2$ welfed screen value = $T(\frac{1}{2})^2(29.8'-19.13')(\frac{7.418}{7.488}7.4819a1/ft^3) = 1.79a1$ | | | | | | | | | | | |
| | | | WENTED! | alleun Volume | <u> </u> | . / (310 | 1 (113) | (T. 11 0 | (, 10 / 4 | 741/11 | |) |
| | | | , | | | | | | | | | |

YSI# COD (98

TURBIDITY# 39515

Pump - Grunfos Redi-flow II

| GWM | WELL# | SHL | 19 | | | U | I.S. A | rmy C | orps | of Engi | neers | | | |
|----------|--|---------------|------------|---------------------------|-------------|-------------------|-----------|-------------|-----------|-------------|-------------------------|--|--|--|
| SCREEN | INTERVAL DEPTH | 1: 17.0 | 1-32.0' | WELL DIAMETER: | 44 | | Groun | dwater | Sampli | ing Log S | Sheet | | | |
| H2O LEVI | EL: DEPTH, PRE P | UMP INSERTION | 23,3 | -6 ' | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA | | | |
| | DEPTH, POST P | UMP INSERTION | | | | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD | | | |
| DEPTH S. | AMPLED: , | 28 | 7 | REFERENCE POINT: | | | | | | VOC'S 3 x 4 | 40ml glass vials (ph<2) | | | |
| DATE: | 10/28/02 | | 1238 | (DEPTHS RECORDED BENEATH) | 241.34 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L | HDPE | | | |
| SAMPLE | | DPY MK WM | SIGNATURE: | Marid & | ul | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | • | | 0mL HDPE (ph<2) | | | |
| RECORD | EDBY: JKKM(D | DPY MK WM | SIGNATURE: | Harih Ku | | TSS 1 x 1L HDF | PE | | | TOC 3 x 40r | nl glass vials | | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | | | |
| 1251 | 13.37 | 104.5 | 400 | | 12.03 | 257 | 6.65 | -14.6 | 1.19 | 61.4 | red-orange fines | | | |
| 1255 | 33.37 | 104.5 | 400 | | 13.67 | 256 | 6.59 | -9.3 | 0.63 | 51.8 | | | | |
| 1259 | 23.37 | 104.5 | 400 | 1gal | 14,46 | 259 | 4.59 | -8.2 | 0.46 | 56.3 | | | | |
| 1305 | 305 23.37 104.5 400 14.62 241 6.57 -7.3 0.32 51.6 | | | | | | | | | | | | | |
| 1309 | 309 23.37 104.5 400 2gal 14.80 260 6.56 -6.3 0.30 44.1 | | | | | | | | | | | | | |
| 1313 | 23.37 | 104.5 | 400 | U | 14.83 | 760 | 6.55 | -6.le | 0.28 | 38.8 | | | | |
| 1317 | 23.37 | 104.5 | 400 | 3991 | 14.94 | 259 | 6.54 | -6.8 | 0.26 | 37.7 | | | | |
| 1320 | 23.37 | 104.5 | 400 | ٥ | 15.00 | 257 | 6.53 | -6.4 | 0,27 | 32.4 | | | | |
| 1323 | 23.37 | 104.5 | 400 | | 14.93 | 257 | 6.51 | -6.2 | 0.26 | 31.7 | | | | |
| 1326 | 23.37 | 104,5 | 400 | 4921 | 15.06 | 254 | 6.51 | -6.9 | 0.27 | 29.9 | | | | |
| | | <u> </u> | | 0 | | | | | | | | | | |
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| 10755 | | | | | | | | | | | | | | |
| NOTES: | TAI/EN AT 105 | 9 6 | .1 - | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | | | | |
| SAMPLE | TAKEN AT: 1330 wested screan volume = T(3/2)2(32.0'-23.36')(7.4619a1/ft3) = 5.69a1 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
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| GWN | I WELL # | SHL | -20 | | | Ū | .S. A | rmy C | orps | of Engi | neers | | | |
|----------|--|---------------|------------|--------------------------|--------------|-------------------|----------|----------------|---------|--------------|------------------------|--|--|--|
| H | INTERVAL DEPTH | | ,0'-51.0 | / WELL DIAMETER: | : 4" | | Groun | dwater | Sampli | ing Log S | heet | | | |
| 11 | EL: DEPTH, PRE P | | | | | Proje | | | | | evens, MA | | | |
| | DEPTH, POST P | UMP INSERTION | | | | | | | EPA LOW | / STRESS ME | | | | |
| DEPTH S | AMPLED: | 46' | | REFERENCE POINT: | EVOOR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) | | | |
| DATE: | 10-29-02 | TIME: | 0945 | (DEPTHS RECORDED BENEATH | | Cyanide 1 x 250 | mi HDPE | (ph>12 + As | cAc) | BOD 1 x 1L l | | | | |
| SAMPLE | | L PY MIN WM | SIGNATURE: | mark R. Kon | enis | Anions,Alkalinity | | 500ml HDPE | | | mL HDPE (ph<2) | | | |
| RECORD | ED BY: JK KM D | L PY MIOWM | SIGNATURE: | Mark R. Koo | nia | TSS 1 x 1L HDF | 'E | | | TOC 3 x 40m | | | | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | | | |
| | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | 111 | (mv) | (mg/L) | (NTU's) | | | | |
| 0950 | | 98.1 | 620 | 1,2 | 12.57 | 776 | 6.45 | -16.9 | 0.78 | 7.21 | | | | |
| 0959 | 19.61 | 97.0 | 480 | 2.2 | 12.58 | 771 | 6.49 | -21.7 -23.7 | | 5.17 | | | | |
| 1004 | 08 19.61 97.0 500 3.4 12.95 761 6.51 -25.7 0.36 4.63 | | | | | | | | | | | | | |
| | 12 19.61 92.0 500 4.0 13.00 758 6.52 -26.9 0.33 6.71 MT bucket@4.0ged | | | | | | | | | | | | | |
| 1017 | | | | | | | | | | | | | | |
| 1021 | 19.61 | 97.0 | 500 | 4,9 | 13.08 | 753 | 6,52 | -29.9 | | | | | | |
| 1024 | 19.61 | 97,0 | 500 | 5,3 | 13.12 | 751 | 6.52 | -31.1 | | | | | | |
| | 77,4 | 1 7 7 | 1000 | | 19-10- | | 0.55 | | 0111 | | | | | |
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| NOTES: | | <u> </u> | <u> </u> | <u> </u> | 20/ | 20/ | ±0.1 | +10 my | 100/ | 109/ | | | | |
| | ES: $3\% + 0.1 \text{ unit} + 10 \text{ mV} = 10\%$ IPLE TAKEN AT: 1029 welfed streen where $= TI(3/2')^2(51.0' - 41.0')(7.481941/42^3) = 6.5 ga/$ | | | | | | | | | | | | | |
| | | <u>val</u> | wern | so street toth | mo = 0 | 1 (12) (3 | 1.0 7 | ·· | · 10/94 | 1/22-0 | 0.0 900 | | | |
| SKI O' | LB0141 | | # 39541 | | | | | | | | | | | |
| YSI# | | TURBIDITY # | # | | Pump - Gru | nfos Redi-flow II | | | | | | | | |

| GWM | WELL# | SHL. | . <u>22</u> | | | U | I.S. A | rmy C | orps | of Engi | neers |
|---------------|------------------|---------------|-------------|---------------------------|--|---|-----------|------------|-------------|----------------|------------------------|
| H | INTERVAL DEPTH | | 0-116.0 | WELL DIAMETER: | 4" | | | | | ng Log S | |
| 14 | EL: DEPTH, PRE P | | | . | | Proje | | | | | evens, MA |
| | DEPTH, POST P | UMP INSERTION | | (| _ | | | | EPA LOW | STRESS ME | THOD |
| DEPTH S | AMPLED: | | , | REFERENCE POINT: | (PVC)OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) |
| DATE: | 10/29/02 | TIME: | 1130 | (DERTHS RECORDED BENEATH) | 7 20.45 NGVD | Cyanide 1 x 250 | ml HDPE (| ph>12 + As | | BOD 1 x 1L l | |
| SAMPLED | | DPY MK WM | SIGNATURE: | (David Fred | | Anions,Alkalinity | | 600ml HDPE | Ē | | mL HDPE (ph<2) |
| RECORD | EDBY: JKKM(DI | ()PY MK WM | SIGNATURE: | Maria Lul | | TSS 1 x 1L HDF | E | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | pН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (mi/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1203 | 7.58 | 64.7 | 300 | | 10.62 | 876 | 5.32 | 14.9 | 48.88 | 4,39 | |
| 1206 | 7.53 | 64.7 | 150 | | 10.75 | 915 | 6.31 | 4.4 | 1,20 | 2.22 | |
| 1210 | 7.55 | 66.2 66.3 | 300 | (gal | (0.77 | 929 | 6.59 | 3.0 | 1.08 | 1.63 | |
| 1215 | 0.68 | | | | | | | | | | |
| 1220 | 7.68 | 66.2 | 300 | η | 10-87 | 928 | 6.61 | 5.3 | 0-86 | 0.55 | |
| 1224 | 7.68 | 66.2 | 300 | 2 gal | 10.88 | <u>827</u> | 6.61 | 6.3 | 0.80 | 0.50 | |
| 1227 | 7.67 | | | | 10.86 | 927 | 6.61 | 7.4 | 0.79 | 0.38 | |
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| NOTES: | | | <u> </u> | retted screen | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | _ |
| SAMPLE | TAKEN AT: | 1235 | h | retted screen : | whene = | $= T (3/2')^2$ | (116.0' | -106.01 |) (7.48 | 1 gal A23 |)=65 941 |
| | | | | | | | | | | - | J |
| | | | | | ······································ | | | | | | |

YSI # 00 D 6 9 8

TURBIDITY# 39515

Pump - Grunfos Redi-flow II

| GWN | VM WELL# 5HM-9G-みみB U.S. Army Corps of Engineers | | | | | | | | | | | |
|---------|--|---------------|------------|---------------------------|---------------|-------------------|-----------|-------------|-----------|--------------|------------------------|--|
| SCREEN | INTERVAL DEPTH | | 7-92,7' | WELL DIAMETER: | 4" | | | | | ng Log S | | |
| H2O LEV | EL: DEPTH, PRE PL | | | ·- | 12" 5Creen | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA | |
| | DEPTH, POST P | JMP INSERTION | | | . | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD | |
| DEPTH S | AMPLED: | 77' | | REFERENCE POINT: | PVO OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) | |
| DATE: | 10/29/02 | TIME: | 1409 | (DEPTHS RECORDED BENEATH) | 220.27NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L I | | |
| SAMPLE | | PY MK WM | SIGNATURE: | Warriet Re | Jan - | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | | | mL HDPE (ph<2) | |
| RECORD | ED BY: JK KM(b) | PY MK WM | SIGNATURE: | David Le | b | TSS 1 x 1L HDF | <u> </u> | | | TOC 3 x 40m | nl glass vials | |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM, VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS | |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | | |
| 1413 | 7.10 | 63.9 | 250 | | 10.12 | 807 | 7.62 | 17.8 | 4.03 | 9.39 | * ORP readings | |
| 1417 | 7.10 | 64.7 | 500 | | 10.75 | 318 | 8.46 | 15.2 | 0.88 | 5.87 | may not be | |
| 1420 | 7.11 | 64.7 | 500 | 1gal | 10.72 | 818 | 8.57 | 14.7 | 0.64 | 5,29 | accurate since | |
| 1424 | 7.11 | 64.7 | 500 | / , | 18.86 | 823 | 8.64 | 14.6 | 0.48 | 5.13 | check of calibration | |
| 1427 | 7.11 | 64.7 | 500 | 2 gal | 10.90 | 824 | 8.67 | 14.6 | 0.43 | 4.44 | of meter after | |
| 1430 | 7.11 | 44.7 | 500 | | 10.92 | 824 | 8.69 | 14.3 | 0.40 | 4.63 | revealed an | |
| 1433 | 7.11 | 64.7 | 500 | 35al | 10.95 | 824 | 8.69 | 14.4* | 0.37 | 4.39 | inaccuracy. | |
| | | | | | | | | | | | 3 | |
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| NOTES: | | 11120 | | | 3% | MF 3% | +0.1 unit | +10 mv | 10% | 10% | | |
| SAMPLE | TAKEN AT: | 1439 | | etted screened | me = 1 | 1 (1/2) 2 (9 | 2.7'-6 | 2.7′)(7 | .48) ga | 1/43) | = 4.9 ge/ | |
| | | | | | | | | | 0 | 7 | | |

| GWN | 1 WELL# | 51 | IM-93-8 | 22C | | L | J.S. A | rmy C | orps | of Engi | neers |
|------------------|------------------|---------------|------------|---------------------------|-------------------|-------------------|-----------|-------------|----------------|-------------|-------------------------|
| SCREEN | INTERVAL DEPTH | | | WELL DIAMETER: | 411 | 1 | Groun | ndwater | Sampl | ing Log S | Sheet |
| | EL: DEPTH, PRE P | | | - | | Proje | ect Nam | e: Shep | ley's Hill | Landfill, D | evens, MA |
| | DEPTH, POST P | UMP INSERTION | | 7 | - | | SAMPLE | METHOD: | EPA LOV | V STRESS ME | THOD |
| DEPTH S | SAMPLED: | 1291 | | REFERENCE POINT: | PVC OR CASING | Metals/Hardness | 1 x 1L H | DPE (ph<2) | | VOC'S 3 x 4 | I0ml glass vials (ph<2) |
| DATE: | 10/29/02 | TIME: | 1220 | (DEPTHS RECORDED BENEATH) | 221.55 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | scAc) | BOD 1 x 1L | HDPE |
| SAMPLE | | LOWK WM | SIGNATURE: | Paul Young | | Anions,Alkalinity | TDS 1x | 500ml HDPl | Ξ | COD 1 x 250 | mL HDPE (ph<2) |
| RECORD | DED BY: JK KM DI | LØMKWM | SIGNATURE: | Paul Young | | TSS 1 x 1L HDF | PE | | | TOC 3 x 40n | nl glass vials |
| TIME | WATER DPTH- | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| /3/3 | 30,87 | 120,6 | 450 | | 10,98 | 574_ | 7,44 | -98,7 | 0.87 | 3,14 | |
| 1318 | 3/132 | 118,7 | py72 125 | , | 10.86 | 530 | 7.49 | -115.5 | 0,60 | 2.73 | |
| 1323 | 31.25 | 118.7 | 150 | | 10.69 | 543 | 7,50 | -122.1 | 0.64 | 2.69 | |
| 1328 | 31.22 | 118.7 | 150 | | 10,68 | 544 | 7,51 | -120,4 | 0,63 | 2,29 | |
| 1333 | 31.30 | 120,2 | 300 | | 10,68 | 545 | 7.51 | -126,6 | 0,63 | 2.26 | |
| 1338 | 31,49 | 119.8 | 200 | 2.0 | 10.45 | 549 | 7,52 | -13017 | 0,65 | 1.82 | |
| 1343 | 31,58 | 119,7 | 200 | | 10,55 | 549 | 7,52 | -132,4 | 0.56 | 1,49 | |
| 1348 | 31,63 | 119.7 | 200 | 3,0 | 10.55 | 549 | 7,53 | -135,1 | 0,51 | 1,53 | |
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| NOTES: SAMPLE | TAKEN AT: | 355 hour | 15 ja | retted screen i | 3% = . samulou | T(¾,′)²(| +0.1 unit | +10 mv | 10% 17.4814 | 10% | = 6.5 aal |
| # Well | | | recharge | therefore e | quilibrat | tion is achie | red on | In afte | - 2VM | o'na wate | er depth down |
| _70~ | 30 below | tra of | PV c C | ppn. 7- PY 10 | gallons were | 2 Dungel Pain | to record | line of la | to (a) [3] | 3 hus | |
| YSI# O | 280141 | TURBIDITY# | 39576 | ppr. 7-14 10 | Pump - Grur | nfos Redi-flow II | | 7 | | | |

| GWM | I WELL# | 5HM- | 99-31 A | | | U | | _ | • | of Engi | |
|---------|-------------------|---------------|------------|---------------------------|----------------|-------------------|-------------|---|---------|----------------------|------------------------|
| 13 | INTERVAL DEPTH | 1: 57-1. | s·7′ | WELL DIAMETER: | 2" | Drois | Groun | dwater | Sampli | ing Log S | heet evens, MA |
| H2O LEV | EL: DEPTH, PRE PI | JMP INSERTION | 3.301 | | | Proje | | | | | |
| | DEPTH, POST P | JMP INSERTION | 3.20 | | ا سمر. | | | | EPA LOW | STRESS ME | |
| DEPTH S | AMPLED: | 11. | • | REFERENCE POINT: | (PVC OR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) |
| DATE: | 31 OCT 02- | TIME: | 0940 | (DEPTHS RECORDED BENEATH) | 215.07 NGVD | Cyanide 1 x 250 | ml HDPE | (ph>12 + As | cAc) | BOD 1 x 1L H | |
| SAMPLE | | | SIGNATURE: | Ban's Zul | | Anions,Alkalinity | TDS 1 x 5 | 500ml HDPE | • | | mL HDPE (ph<2) |
| RECORD | ED BY: JK KM(D) | L PY MK WM | SIGNATURE: | Caril Jul | i | TSS 1 x 1L HDF | PE | | | TOC 3 x 40m | ıl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1012 | 3.39 | 43.0 | 400 | | 12,24 | 105 | 5.46 | 17.9 | 0.81 | 25,0 | |
| 10:6 | 3.38 | 43.€ | 45C | 1908 | 12.97 | 102 | 5.80 | -0.3 | 0.54 | 14.6 | |
| 1620 | 3,39 | 43.0 | 450 | | 13.53 | 103 | 5.91 | -5.6 | 0.40 | 10.57 | |
| 1025 | 3,39 | 43.0 | 450 | 25al | 13.69 | 103 | 5.93 | -8.2 | 0.32 | 8,54 | |
| 1029 | 3.40 | 43.0 | 450 | | 13.75 | i03 | 5,93 | -10.2 | 0.28 | 5,09 | |
| 1034 | 3,41 | 42?43.Z | 350 | | 13-79 | 103 | 5.90 | -12.2 | 0.24 | 4.05 | |
| 1049 | 3,37 | 42,2 | 350 | 3901 | 14.14 | 103 | 5.89 | -12.1 | 0.24 | 4.08 | |
| 1043 | 3,35 | 42.2 | 350 | / | 14.23 | 103 | 5.93 | ~12.6 | 0.27 | 5.72 | |
| 1046 | 3,36 | 42.7 | 750 | | 14.31 | (04 | 5.91 | -13.9 | 0.22 | 3.96 | |
| 1049 | 3.36 | 42.2 | 350 | 4 gal | 14.27 | 104 | 5.50 | -17.8 | 021 | 2.85 | |
| 1052 | 3,36 | 42.2 | 35Û | , | 14.30 | 104 | 5.94 | -15.2 | C.22 | 2.98 | |
| 1055 | 3,36 | 42.2 | | | 14.32 | (04 | 5.72 | -15.2 | 0.21 | 3,08 | |
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| NOTES: | | | | · | 3% | | +0.1 unit | | 10% | | |
| SAMPLE | TAKEN AT: / C | 57 | wetted | Screen volume | = TT/- | /2 (15.7 | -5.7 | ()(7.4) | 8/99/ | $\mathcal{A}^3) = 1$ | 10 gal |
| | | | | | | | | , | J / | • | - J |
| | | | | | | | | | | | |

YSI# 00 D 0698 AF TURBIDITY# 39576

| GWM | WELL# | <hm-< th=""><th>·99-31B</th><th></th><th></th><th>U</th><th>I.S. A</th><th>rmy C</th><th>orps</th><th>of Engi</th><th>neers</th></hm-<> | ·99-31B | | | U | I.S. A | rmy C | orps | of Engi | neers |
|---------|---------------------------------------|---|------------|---------------------------------------|---------------|-------------------|-----------|------------|-----------|---------------------------------------|------------------------|
| li | INTERVAL DEPTH | | -102.3 ft | WELL DIAMETER: | 2" | | | | | ing Log S | |
| u | EL: DEPTH, PRE P | | | • | | Proje | ect Nam | e: Shepl | ey's Hill | Landfill, D | evens, MA |
| | DEPTH, POST P | | | | • | | SAMPLE | METHOD: | EPA LOW | STRESS ME | THOD |
| DEPTH S | | | Ft | REFERENCE POINT: | PVC DR CASING | Metals/Hardness | 1 x 1L H | DPE (ph<2) | | VOC'S 3 x 4 | 0ml glass vials (ph<2) |
| II. | 310CT 02 | TIME: | 1045 | (DEPTHS RECORDED BENEATH) | | | | | | BOD 1 x 1L I | HDPE |
| SAMPLE | | L PY MK WM | SIGNATURE: | Tacha P | | Anions,Alkalinity | TDS 1x | 500ml HDPE | • | COD 1 x 250 | mL HDPE (ph<2) |
| III . | ED BY: JBKM D | | SIGNATURE: | TackAL | | TSS 1 x 1L HDF | Έ | | | TOC 3 x 40m | nl glass vials |
| TIME | WATER DPTH | РИМР | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D.O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/min) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1127 | 3.97 | 46.0 | 600 | 1,0 | 10.78 | 336 | 5.93 | 1.4 | 0.48 | 0.54 | |
| 1144 | 3.97 | 45.2 | 580 | 1.6 | 10.98 | 349 | 10.07 | -2.6 | 0.49 | 0.48 | |
| 1148 | 3.98 | 44,5 | 400 | 3,3 | 11,06 | 354 | 6.13 | -3,8 | 0.45 | 0,44 | |
| 1152 | 3,98 | 44,4 | 400 | 26 | 11.08 | 356 | 6.1.3 | -4,2 | 0.55 | 0,46 | |
| 1156 | 3.98 | 44,4 | 400 | 3,2 | 1/./3 | 358 | 6,12 | -4,4 | 0.53 | 0.35 | |
| 1159 | 3,98 | 44,5 | 400 | 3,6 | 11.16 | 360 | 6.13 | -4.6 | 0.50 | 0.32 | |
| 1203 | 3,98 | 44.5 | 400 | 4,2 | 11.16 | 362 | 6.14 | -4.8 | 0.54 | 0.26 | |
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| NOTES: | - | 10 00 | | | 3% | 3% | +0.1 unit | +10 mv | 10% | 10% | |
| SAMPLE | TAKEN AT: | 1205 | <u> </u> | vetted screen | sline = | TP (121)2(| 623/-s | 72.37)(1 | .481991 | 1/f43) = 1 | .6 94/ |
| | | - | | | | | | | ~ | | <i>U</i> |
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YSI# 39576 TURBIDITY# 39576 S/n=001 '98 AF

| GWM | 1 WELL# | <4M- < | 99-31C. | | | l U | .S. A | rmy C | orps | of Engi | neers |
|----------|-------------------|---------------|------------|------------------|--------------|-------------------|-----------|------------|---------|-------------|---------------------------------------|
| 11 | INTERVAL DEPTH | | | WELL DIAMETER | : 2" | | Groun | dwater | Sampl | ing Log S | heet |
| | EL: DEPTH, PRE PL | | | - | | Proje | | | | | evens, MA |
| | DEPTH, POST PL | JMP INSERTION | 4.25 ++ | | _ | | SAMPLE | METHOD: | EPA LOV | STRESS ME | |
| DEPTH S | AMPLED: | 75 ft | | | PVOOR CASING | Metals/Hardness | 1 x 1L H | OPE (ph<2) | | | 0ml glass vials (ph<2) |
| DATE: | 310CT02 | TIME: | 1010 | REFERENCE POINT: | 315.52 GVD | Cyanide 1 x 250 | ml HDPE (| ph>12 + As | cAc) | BOD 1 x 1L | |
| SAMPLE | | L PY MKWM | SIGNATURE: | m/ 4-1 | hell | Anions,Alkalinity | TDS 1 x 5 | 600ml HDPE | • | | mL HDPE (ph<2) |
| RECORD | ED BY: JK KM DI | PY MK WMD | SIGNATURE: | mll IT | helle | TSS 1 x 1L HDF | Έ | | | TOC 3 x 40n | nl glass vials |
| TIME | WATER DPTH | PUMP | PURGE RATE | CUM. VOLUME | WATER | SPECIFIC | рН | ORP/Eh | D. O. | TURBIDITY | COMMENTS |
| (24hr) | BELOW MP (feet) | SETTING | (ml/mln) | PURGED (gal) | TEMP (°C) | COND. (µS/cm) | | (mv) | (mg/L) | (NTU's) | |
| 1051 | 4.43 | 46.3 | 480 | | 10.71 | 426 | 6.68 | -367 | 3,32 | 10.60 | |
| 1056 | 4.43 | 4.6.3 | 500 | | 10.50 | 10.58 | 6,67 | -83,4 | 0.55 | 5,57 | |
| 1059 | r 4.43 | 46.3 | 500 | 1.898 | 10.67 | 1062 | 6.69 | -88.2 | 0.44 | 4,15 | |
| 1103 | 4,43 | 4613 | T00 | | 10,79 | 1054 | C.LR | -90.5 | 0.39 | 2.03 | |
| 1107 | 4,43 | 4613 | 480 | 3.090 | 10.79 | 1048 | 6.68 | -92.3 | 0.35 | 0.89 | |
| 1/11 | 4,43 | 46.3 | 500 | | 10.82 | 1051 | 6.62 | -92.9 | 0.33 | 0:71 | |
| 1114 | 4,43 | 463 | 500 | ļ | 10.87 | 1055 | 6.67 | -93,8 | 0.31 | 0.73 | |
| 1117 | 4,43 | 96,3 | 500 | 4.2.991 | 10.93 | 10.59 | 6.67 | -948 | 0.30 | 0.65 | |
| | | | | | | | | | | | |
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| NOTES: | | | <u> </u> | | L | <u> </u> | | -40 | 100/ | 100 | |
| | TAKEN AT: | 121 | 11 / | sven who | 3% | ·/ L /2/- | +0.1 unit | +10 mv | 10% | 10% | 17 - 1 |
| SAIVIPLE | TAKEN AT: | 161 | wetted | screen wilms | <u>= 71</u> | (12)(80. | 1-70-1 |)(7.48 | 51 gal, | 1463)= | 1.6 gal |
| | | | | | <u></u> | | | | - · | | |
| | | | | | | | | | | | |

APPENDIX C CHAIN OF CUSTODY FORMS



Severn Trent Laboratories, Inc.

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

| Report to: | | Invoice to | | | | | | NALY | | 7 | 7 | 7 | \int | | | | | | Lab Us Due Da | se Only ate: | 4 | 9.1 |
|--|---|---|-----------------|--------------|---|------------------|----|--------------|---------------------|---------------|--|--|------------|----------|---------|----------|----------------------|--------------------------|------------------|-----------------|-----------|-----------|
| Company: U.S. ARMY CURPS OF ENG. | | any: | | | | - | ΠŁ | QUES | אונט | I | $\int_{-\infty}^{\infty}$ | | 1. | -/- | | | | 11 | Temp. | of coolers | | \dashv |
| Address: 696 VIRGINIA Road | Addr | ess: | | | | | | | | / | | | /- | / | | | | 1 / | 1 | received (C | | 1 |
| Cenearl, my 01742 | - | | | | | | | | 1 | | | / - | | / | / | / | | | 1 2 | 2 3 | 4 5 | |
| Contact: MARIE LUOJTAS | Conf | act: | | | | | | | / | -/ | 3346 | '- <i> </i> | 160 | | I - J | ' 1 | / / | - - | Custoc | ty Seal | N/Y | 7 |
| Phone: 978/2/8 - 8/75 | — Ph | one: | | | | | | | -/ | | 37 | . J. | W | /- | - / | | | | Intact | | N/Y | - [|
| Fax: | - | Fax: | | | | | | • | | | . الأيا | . /~ | F)- | | | • [| | . | Screer | ied | | \exists |
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| Sampler's Name Pavid Lubianez | Sampler | 's Signature Law | 7 | 1 | 14 | = | | . / | / , | 3 | 1 0 | 7 3 | 7 | / | / | / | | / | L | | Τ. | - |
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| Proj. No. Project Name CO776 Shepleys Hill | / / Tn | 1 | No/1) | pe of C | ontair | ners* | | 1: | | | છું | Ŋ | Res 140.1 | 7 | y | 63 | | | € | | 1 | |
| CG | , | <u>/</u> | | XG C | 050 | T | | ن / | $\sqrt{\epsilon}$ | \mathcal{J} | <u>}</u> |) | 4 | | | ર/ ∖ | $\int_{\mathcal{F}}$ | | | | | |
| Matrix Date Time o r Identifying Marks of | Sample(s) | | VOA | alass | 250 ml | P/Q | | 13 | METAL BROK | 15000 - SIM | A41. | Co. 300 / 1/2/ | | # F | 7 6 | j j | | La | ıb/Sample | ID (Lab U | Jse Only) | |
| W \$12/02 1007 X SHL-10 | | | 3 | 3 | 1 | 5 | | 3 | 1 | 1 | 1 | t | 1 | 1 | 3 | | | | | | , | |
| w shop 1008 X SHM- 93- | 10C | | 3 | 3 | 1 | 5 | | 3 | 1 | ١ | 1 | 1 | 1 | ١ | 3 | | | | | | | |
| W \$2/02 1310 X SHL-19 | | | 3 | 3 | ١ | 5 | | 3 | 1 | 1 | 1 | 1 | 1 | 1 | 3 | | | | | | | |
| W 92/02 1310 X SHL- 19n | 15 | | 3 | 3 | 1 | 2 | | 3 | - | 1 | l | - | 1 | _ | 3 | | | | | | , | |
| W 9462 1310 X SHL- 191 | | | 3 | 3 | ī | 1 | | 3 | 1 | 1 | - | _ | 1 | _ | 3 | | | | | , | Ź | |
| w 5/2% 1157 X SHL-3 | | · · · · · · · · · · · · · · · · · · · | 3 | 3 | 1 | 5 | | 3 | 1 | 1 | 1 | 1 | - | 1 | 3 | Г | | | | | | |
| W 6/2/03/35/ X SHL-4 | | • | 3 | 3 | 17 | 5 | | 3 | 1 | 1 | | 1 | 1 | 1 | 3 | T | | 1 | | - | | |
| ł 15/./1 ! ! ! | | | 3 | 3 | 1 | 5 | | 3 | $\overrightarrow{}$ | <u> </u> | | <u> </u> | <u>`</u> | 1 | 3 | \vdash | \vdash | | | | | |
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| W 5/26/1600 X SHL-20 W 5/26/2 X TRIPBLANK | · | | + | - | <u> </u> | + | - | , | | | | _ | - | Ė | 1 | \vdash | + | | | | | _ |
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| Relinquished/by: (Signature) Date 514 02 | Time 1830 | Received by: (Signature ain bill # 827 4 | Feb. 6 11009 | 5xpre 516 | 4 | Date | | Time | | Re | emark | 3 | ر د | | <u></u> | / | | -/ • | | | | |
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| Relinquished by: (Signature) Date | Time | Received by: (Signature | | - | | Date | | Time | | | | | | | | | | ptance of S Schedule. | levern Trer | nt Laborate | ories | |
| 'Matrix WW - Wastewater W - Water ² Container VOA - 40 ml vial A/G - Amber | S - Soil / Or Glass 1 Lite | L - Liquid A - / er - 250 ml - Glass wid | | | | narcoal - Pla | | | SL - | | ze | . (|) • (| Oil | | | | cannot a lease Fax | | changes | • | |

| Report to: Company: U.S. ARMY Corps OF ENG. Address: G96 VIRCINIA Road Concord, MA 01742 Contact: MARIE WOJTHS Phone: 978/315 - 8175 Fax: Contract/ Ouote: | Invoice to Company: Address: Contact: Phone: Fax: | | | | | • | NALY: QUES | | | 3 23 100 | 12 | Jan. 1705-160 | | | | | | | Lab Use (Due Date: Temp. of when reco 1 2 Custody S Intact Screened For Radio | coolers eived (C° | | 5 |
|---|--|--------------------|----------|-----------|----------------|------------------|---------------|--------------|-----|-----------|--------------|---------------|-------|-----------|---------|-------|-------------------|----------|---|----------------------|----------|---|
| Sampler's Name A. Keenan Mark R. Keenig Proj. No. Project Name Shepley's Hill Matrix! Date Time of a Identifying Marks of Sam | | No/J | Age of C | 250 | ers² | 1 | Mac | MeTal Solole | B | 4. 2010 A | Ŋ | 1015-112 | 1507 | The 160.2 | 300 | | | Lab/S | Sample ID | (Lab Us | se Only) | |
| W 5/21/02 1035 X SHL-9 | | 3 | 3 | 1 | 5 | | 3 | T | ī | 7 | i | 1 | 1 | 3 | | | | | | | | |
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| W \$/2/21250 X SHM-93-3 | L2C | 3 | 3 | , | 5 | | 3 | 1 | 1 | ı | 1 | 1 | 1 | 3 | | | | ~. | | | | |
| W 5/0/01/254 X SHM-96- | - - | 3 | 3 | 1 | 5 | | 3 | ī | 1 | 1 | 1 | 1 | l | 3 | | | | | | | <u> </u> | |
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| 'Matrix WW - Wastewater W - Water S 2Container 40 ml vial A/G - Amber / Or | | Air bag de mout | | - Ch P | arcoal T | Tube astic or | | SL - | | | |) - | | amed I | n une 1 | STL | cannot lease F | t acce | ept verba ritten cha | anş | /es. | |



Severn Trent Laboratories, Inc.

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

| Report to: | Invoice | | Ť. | | | Analy | | 7 | \int | \mathcal{T} | \int . | \int | 1 | 1 | 7 | | Lab Use Only Due Date: | /• |
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| Company: U.S. ARMY CORPS OF ENG. | 1 | • | | · | - | NEQUE | ,, ,, | | 1 | | 18 | } / " | | / | | 1.1 | Temp. of cools | ers |
| Address: 696 VIRBINIA ROAD CONCORD, MA 01747 | Address: | | • | | - | | | / ⁱⁱ | / Ø | / | / · • | | / | / | <u> </u> | 1 | when received | |
| Contact: marie wolths | Contact: | | | | - | | 1 | | 3408 | ' / | ZZ/ | 1 | 1 | / / | Γ, | $ \setminus $ | 1 2 3 | 4 5 |
| Phone: 978/3/8-8/75 | Phone: | | | | - | | | | 3 | | 1005 | | | | - / | | Custody Seal | N/Y |
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| Sampler's Name David Lugiane Z | Sampler's Signature Cause | il X | Zel | 1/2 | | / | 82608 | 80108 | Solas | * | | | Ä | 6 | / | <i>[</i> | | |
| Trak Keenan Mark R. Koenig | May | LAR | Ka | ons | | . / | 3 | Ž | ا د | 1/2 | 10. | 705, | 160. | 8 | البر | and the same | and the second of the second o | |
| Proj. No. Project Name SHEPTEY'S HILL | | No/Ty | pe of Co | ontaire | Zs² | 1 | | | /لا | 710 | (- | <u>.</u> | 4 | ar. | | | 2- | The same of the sa |
| Matrix Date Time O r Identifying Marks of Sa | | VOA | NG AG | 250 ml | P/O | 780 | 5 | C Y 2011 | Anna | 3 | 108 | 1 2 | | | | ે. વ્યા | ab/Sample ID (Lai | Use Only) |
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| ¹ Matrix WW - Wastewater W - Water ² Container VOA - 40 ml vial A/G - Amber / | • | Air bag wide mouth | С | - Char P/O | rcoal To - Plas | ube stic or other | SL - | Sludge | • | 0 | - 0 | il — | | | | iease Fa | accept verbal ch x written change (2) 655-1248 | |

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| Relinquished by: | ,, | re) | + | Date / Time | Received by | | re) 🖁 | Rei | inquis | hed b | y: (S | ignatu | ire) | \dashv | Da | te / Time | Received by: | Signature) |
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| Relinquished by: | | | | Date / Time | Received for (Signature) | | | £ ¹ . | | e / Ti | | F | Remai | rks | <i>i</i> : | cooler | Shippel | , |



| Report to: Company: U.S. Army Cope of En Address: Legle Virginia Road Concord MA 01747 Contact: Mark Koenig Phone: 978 318-8312 Fax: Contract/ Quote: Sampler's Name Mack Koenig Lusiane 2 | | R. K. | oeni Tull | W. | 1 | Analys | STED | 9060 | als 60100 /. | 9010 Hardress | All Lair | 90. | 405-1 | 160.2 | | | Temp. when 1 Custo Intact Scree | of cooler received (2 3— dy Seal | C°): 4 N/Y N/Y | |
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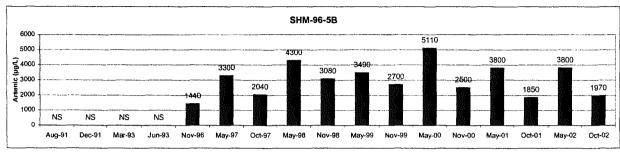
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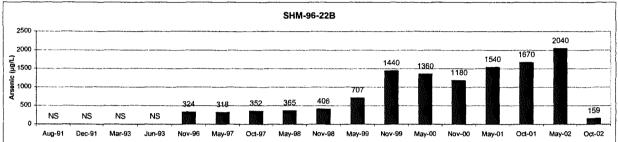
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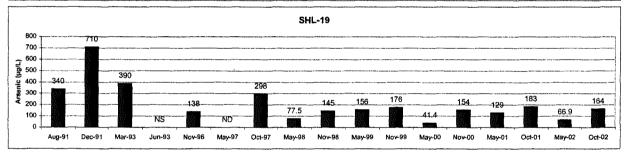
APPENDIX D COMPARISON OF ARSENIC RESULTS

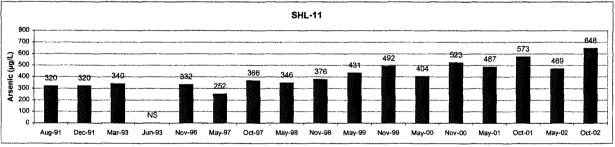
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING HISTORIC ARSENIC CONCENTRATION CHARTS CLEANUP LEVEL = $50 \mu g/L$

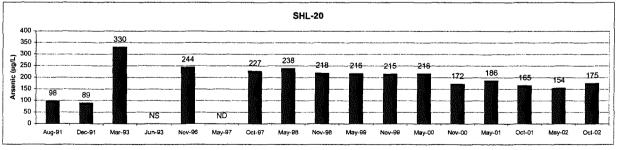
(Sheet 1 of 3)











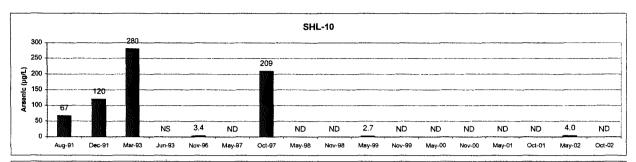
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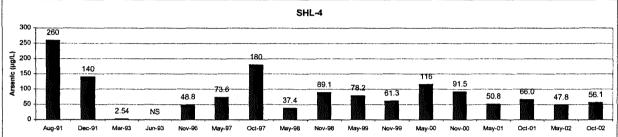
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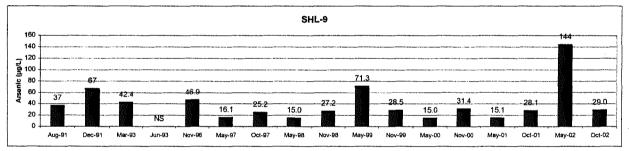
Charts are displayed in order of decreasing historical maximum arsenic concentrations

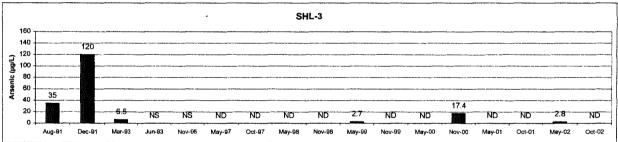
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING HISTORIC ARSENIC CONCENTRATION CHARTS CLEANUP LEVEL = $50 \mu g/L$

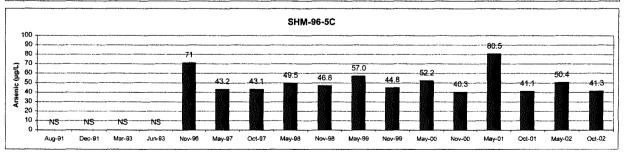
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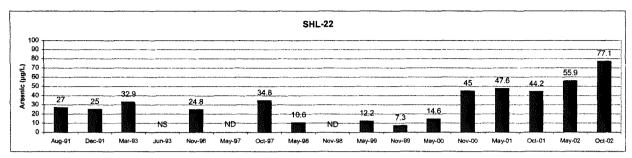
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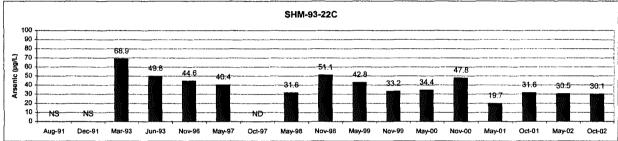
NS: Not Sampled ND: Not Detected

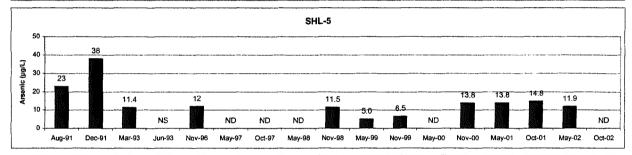
Charts are displayed in order of decreasing historical maximum arsenic concentrations

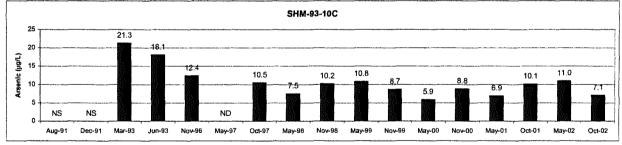
SHEPLEY'S HILL LANDFILL GROUNDWATER MONITORING HISTORIC ARSENIC CONCENTRATION CHARTS CLEANUP LEVEL = 50 µg/L

(Sheet 3 of 3)









NOTES:

NS: Not Sampled ND: Not Detected

Charts are displayed in order of decreasing historical maximum arsenic concentrations

APPENDIX E CHEMICAL QUALITY ASSURANCE REPORTS

Chemical Quality Assurance Report Spring 2002

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-092702

MAY 21, 2002 SAMPLING EVENT

PREPARED BY
THE
GEOLOGY
AND
CHEMISTRY SECTION
ENGINEERING/PLANNING DIVISION

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

SEPTEMBER 27, 2002

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS MAY 21, 2002 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-092702

TABLE OF CONTENTS

| <u>Paragraph</u> | <u>Title</u> | Page |
|------------------|---|-------|
| | Executive Summary | 1-2 |
| | Table 1- Data Comparison Summary | 3 |
| | Table 2 - Analyses Performed by QA Laboratory | 4 |
| 1. | QA sample shipping and chain-of-custody deficiencies | 5 |
| 2. | Data comparison for volatiles by Method 8260B | 5-7 |
| 3. | Data comparison for metals by Method 6010B and 7470 | 7-8 |
| 4. | Data comparison for cyanide by Method 9010B | 8-9 |
| 5. | Data comparison for anions by Method 300.0 | 9-10 |
| 6. | Data comparison for COD by Method 410.4 | 10-11 |
| 7. | Data comparison for BOD by Method 405.1 | 11-12 |
| 8. | Data comparison for alkalinity by Method 310.1 | 12-13 |
| 9. | Data comparison for hardness by Method 2340B | 13-15 |
| 10. | Data comparison for TDS and TSS by Methods 160.1 and 160.2 | 15-17 |
| 11. | Data comparison for total organic carbon (TOC) by Method 9060 | 17-18 |

TABLE OF CONTENTS (continued)

12. References 18

Appendix A - Key to Comments on Data Comparison Code

Appendix B - Data Comparison Tables

Appendix C - Custody Documentation

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS May 21, 2002 - QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-092702

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 98 out of 101 (97.0%) of the comparisons. Primary and QA samples agreed quantitatively in 32 out of 35 (91.4%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. Two major and one minor discrepancy 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 were two major data discrepancies noted in the metals comparisons which occurred in sample SHM-96-5B in which the QA laboratory reported aluminum at 310 ug/L and the primary laboratory reported a non-detect at 19.8 U ug/L. The second major data discrepancy was noted in sample SHM-96-5B-QA in which the QA laboratory reported copper at 12 J ug/L and the primary laboratory reported 2.9 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, May 21, 2002 Sampling Event

Overall Agreement (1) Quantitative Agreement (2)

| Method | Parameter | Number | Percent | Number | Percent |
|-----------|----------------|--------|---------|--------|---------|
| 8260B | Volatiles | 66/66 | 100 | 7/7 | 100 |
| 6020/7471 | Metals/Mercury | 20/23 | 87.0 | 17/20 | 85.0 |
| 9010B | Cyanide | 1/1 | 100 | NA | NA |
| 300.0 | Anions | 4/4 | 100 | 3/3 | 100 |
| 410.1 | COD | 1/1 | 100 | 1/1 | 100 |
| 405.1 | BOD | 1/1 | 100 | NA | NA |
| 310.1 | Alkalinity | 1/1 | 100 | 1/1 | 100 |
| 130.2 | Hardness | 1/1 | 100 | 1/1 | 100 |
| 160.1 | TDS | 1/1 | 100 | 1/1 | 100 |
| 160.2 | TSS | 1/1 | 100 | 1/1 | 100 |
| 9060 | TOC | 1/1 | 100 | 1/1 | 100 |
| Total | | 98/101 | 97.0 | 32/35 | 91.4 |

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 | 5-21-02 | 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 |
| | | Ì | 160.1-Total Dissolved Solids (TDS) |
| | | | 160.2-Total Suspended Solids (TSS) |
| | | | 9060-Total Organic Carbon (TOC) |
| Trip Blank | Water | 5-21-02 | 5030B/8260B-Volatiles |

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS MAY 21, 2002 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-090402

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 22 May 2002. Proper sample handling protocols were followed for this shipment, except the cyanide sample container needed to be adjusted for pH at the lab to greater than 12 pH units.

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 seven out of seven (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 exhibit the presence of TIC's.

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

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

<u>Method Blanks</u>: 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.

<u>Trip Blanks</u>: 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 020531A, was within the acceptance limits for all of the target analytes except for five compounds. The target analyte 1,1-dichloropropene was marginally above the acceptance limits and isopropylbenzene, n-propylbenzene, sec-butylbenzene and n-butylbenzene were all marginally below the acceptance limits. 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 and none of these target analytes were detected in the sample.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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.

<u>Surrogates</u>: 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.

<u>Method Blanks</u>: The method blank results associated with the QA sample showed contamination below the laboratory's reporting limits for the following target analytes; isobutyl alcohol at 53 J ug/L, 1,4-dioane at 210 J ug/L, 1,2,4-trichlorobenzene at 1.5 J ug/L, hexachlorobutadiene at 2.5 J ug/L, naphthalene at 3.2 J ug/L, and 1,2,3-trichlorobenzene at 1.7 J ug/L which were detected in the method blank samples VBLKR1. These target analytes were not detected in the QA sample SHM-96-5B-QA and were below the reporting limits for these target analytes. The sample results for SHM-96-5B-QA would not be affected.

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

<u>Laboratory Control Sample (LCSs)</u>: The primary laboratory reported that all of the target analytes in the three LCS samples, were within the acceptance limits for accuracy and precision, except for the following:

| MWZI-LCS (water) 5-21-02 | RDP= 0 out of 84 outside QC limits |
|--------------------------|---|
| , , , | % Recoveries= 1 out of 84 outside QC limits, |
| NTLC-LCS (water) 5-21-02 | RDP= 0 out of 84 outside QC limits |
| , , | % Recoveries= 4 out of 84 outside QC limits, |
| NTLD-LCS (water) 5-21-02 | RDP= 0 out of 84 outside QC limits |
| , | % Recoveries= 7 out of 168 outside QC limits, |

All 84 of the target analytes were spiked into the LCS samples. The amount spiked, percent recoveries and control limits were provided in the report. None of the target analytes that were marginally above or below the acceptable limits were detected in any of the associated samples. Target analytes that were reported below the acceptable QC limits may indicate a slight low bias 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 only exceeded by the NTLD-LCS and would not affect the sample results.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD)</u>: 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) 5-21-02 | RDP= 0 out of 84 outside QC limits |
|-------------------------------|--|
| | % Recoveries= 7 out of 168 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 above or below the acceptable limits were detected in any of the associated samples and the outages may be attributed to matrix effects. The sample results would not be affected.

<u>Surrogates</u>: 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 20 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 20 (87.0%) of the cases and quantitative agreement in 17 out of 20 (85.0%) of the cases. Two major data discrepancies and one minor data discrepancy was noted.

The first major data discrepancy occurred in sample SHM-96-5B-QA in which the QA laboratory reported aluminum at 310 ug/L and the primary laboratory reported 19.8 U ug/L. The second major data discrepancy occurred in sample SHM-96-5B-QA in which the QA laboratory reported copper at 12 ug/L and the primary laboratory reported 2.9 B 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.

<u>Method Blanks</u>: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limits, except for iron which was reported below the at 58.84 J ug/L.

<u>Laboratory Control Sample (LCS)</u>: 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 arsenic, lead and selenium. The high MS/MSD recoveries for arsenic were due to the high sample concentration relative to the spike concentration. The lead (63.4% and 63.0%) and selenium (48.5% and 42.7%) outages were possibly due to a matrix interference. All of the spike levels, percent recoveries and QC limits were provided in the reports.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Samples (LCS/LCSDs):</u> 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.

<u>Matrix Spike (MS)</u>: 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 assumed acceptance limits (75-125%) for accuracy, except for iron which was recovered at 66.0%. The primary laboratory did not provide acceptance limits for the MS sample results. The post digestion spike recovery for iron was within the assumed acceptance limits at 97.0%.

<u>Laboratory Duplicate</u>: The primary laboratory reported the laboratory duplicate SHL-19D was within the assumed acceptance limits of 20% RPD for precision for all of the target analytes that were above the CRDL. The primary laboratory did not provide the acceptance limits for laboratory duplicates. The blind duplicate sample SHM-DUP-02A was in close agreement with the original sample SHM-DUP-02A. Refer to the data comparison table for the RPD's.

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.

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

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

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

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

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS)</u>: The primary laboratory reported the LCS for cyanide was within the assumed acceptance limits of 90-110% at 103.0%. The spike amount added and the percent recoveries were all provided in the report, but no QC limits were provided.

<u>Matrix Spike (MS)</u>: The primary laboratory reported that the MS sample SHL-19MS was recovered within the acceptance limits of 75-125% for cyanide at 102.4%.

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

5. Data comparison for anions by Method 300.0.

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

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

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

<u>Method Blanks</u>: The method blank results for anions showed no contamination above the laboratory's reporting limit. Ortho-phosphate was analyzed by Method 365.2.

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

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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 (except for ortho-phosphate at 3.17% RPD) and precision could not be determined for chloride, nitrate and sulfate. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Samples (LCSs)</u>: 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. The QA laboratory provides multiple sample analysis dates for their method blanks and LCS's and it is not possible to associate the supporting batch QC to any particular sample or analytical batch of samples.

<u>Matrix Spike (MS)</u>: 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.

<u>Laboratory Duplicate</u>: 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. The primary laboratory reported COD at 43.5 mg/L which was below the QA laboratory's reporting limit of 50 ug/L. There was 100% overall agreement for this determination, however the primary laboratory's reporting limit was ten times lower at 5.0 ug/L. No data discrepancy was noted based on the higher reporting limit.

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

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

<u>Laboratory Control Samples (LCS)</u>: The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 98.6%. 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 90.4% and 91.9% with a RPD of 1.27%. 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.

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

<u>Laboratory Control Sample (LCS)</u>: 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.

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

<u>Laboratory Duplicate</u>: 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.

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

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

<u>Laboratory Control Samples (LCS/LCSDs)</u>: The QA laboratory reported that the LCS/LCSD recoveries for BOD were within the laboratory's acceptance limits for accuracy and precision at 108% and 97.4% recoveries, with a RPD of 10.3%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

<u>Laboratory Duplicate</u>: 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.

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

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

<u>Laboratory Control Sample (LCS)</u>: 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.

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

<u>Laboratory Duplicate</u>: 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.

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

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recovery for alkalinity 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 alkalinity were within the laboratory's acceptance limits for accuracy (80-120%) and precision (20%RPD), at 98% and 100% recoveries with an RPD of 0.382%.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS)</u>: The primary laboratory reported that the LCS for alkalinity was within the assumed acceptance limits of 90-110% at 103.4%. 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 92.0%. 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.

<u>Laboratory Duplicate</u>: The primary laboratory reported the laboratory duplicate results for sample SHL-19 were within reasonable acceptance limits at 2.7% 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 OA laboratory reported hardness by Standard 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 May 2002 sampling event results:

| , | Calculated Hardness | Hardness by 130.2 | Calculated Hardness |
|------------------|---------------------|-------------------|---------------------|
| Sample ID | 5-15-01 (mg/L) | 5-15-01 (mg/L) | 5-21-02 (mg/L) |
| SHL-10 | 17.6 | 20.0 | 18.4 |
| SHM-93-10C | 240 | 232 | 237 |
| SHL-3 | 13.3 | 18.0 | 9.5 |
| SHL-19 | 23.0 | 28.0 | 37.4 |
| SHL-4 | 80.8 | 82.0 | 31.0 |
| SHL-11 | 193 | 184 | 162 |
| SHL-20 | 341 | 20.0 | 250 (As=154) |
| SHL-9 | 68.2 | 76.0 | 68.4 |
| SHM-93-22C | 201 | 196 | 238 |
| SHL-22 | 450 | 472 | 433 |
| SHM-96-22B-91.7' | 289 | 150 | 249 (As=2040) |
| SHM-96-5B | 313 | 90.0 | 304 (As=3800) |
| SHM-DUP-02A | 316 | 144 | 301 (As=3830) |
| SHM-96-5C | 288 | 300 | 258 |
| SHL-5 | 30.3 | 34.0 | 28.2 |
| EB-5B | 0 | < 2.0 | < 1.0 |
| SHM-99-32X | 349 | 356 | 334 |
| SHM-99-31C | 392 | 400 | 391 |
| SHM-99-31A | 27.6 | 28.0 | 26.1 |
| SHM-99-31B | 128 | 124 | 145 |

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 21 May 2002.

9a. Batch QC Evaluation for the QA laboratory-AMRO.

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

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

<u>Laboratory Control Sample (LCS)</u>: 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), 105% and 103% recoveries with an RPD of 0.678%.

<u>Laboratory Duplicate</u>: The QA laboratory did not report any laboratory duplicate results for hardness.

9b. Batch QC Evaluation for the Primary Laboratory-STL-VT.

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

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

<u>Laboratory Control Samples (LCS/LCSD's)</u>: 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.

<u>Laboratory Duplicate</u>: 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.

<u>Holding Times</u>: The QA sample was analyzed within the method prescribed holding times.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 102% and 96%, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

<u>Laboratory Duplicate</u>: The QA laboratory reported that the TDS and TSS laboratory duplicates were within the laboratory's acceptance limits of 20% RPD at 2.26% and 2.94%, 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.

<u>Method Blanks</u>: All of the method blank results showed no contamination above the laboratory's reporting limit for TDS and TSS.

<u>Laboratory Control Sample (LCS)</u>: 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.

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

<u>Laboratory Duplicate</u>: The primary laboratory reported the duplicate sample results for SHL-19 were within reasonable acceptance limits for TDS at 0.0% 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 subcontracted 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.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits at 106%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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 91% and 89% recoveries with an RPD of 1.8%.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Samples (LCS's)</u>: 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.

<u>Matrix Spike/Matrix Sipke Duplicate(MS/MSDs)</u>: The primary laboratory reported the MS recovery at 113.3%. No matrix spike QC limits were provided. The primary laboratory did not provide any MSD results for TOC and no evaluation of precision could be made.

<u>Laboratory Duplicate</u>: The primary laboratory reported the duplicate sample results for SHL-19 were above the acceptance limits at 200% 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 18 June 2002. The QA laboratory's data report, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 2 July 2002.
- 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)
 - N₁<MDL₁ and N₂>MDL₂ but <MDL₁*
- both values are above respective detection limit (N>MDL) and difference between two values satisfies conditions below

For all analyses in a water matrix and for metals analysis in soil:

<2X difference

For all other analyses:

<4X difference

- 1 Minor contamination by laboratory contaminant
- 2 Not tested by both laboratories
- 3 Minor data discrepancy, disagreement not serious, if any one of the following apply:
- N₁<MDL₁ and N₂>MDL₂ and the difference between values N₂ * does not exceed the upper limit (described below) defining a minor data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:

2X<difference <3X

For all other analyses:

4X<difference <5X

- 4 Major data discrepancy, disagreement serious, if any one of the following apply:
- N₁<MDL₁ and N₂>MDL₂ and the difference between values N₂ and MDL₁* exceeds the limit (described below) defining a major data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:

>3X difference

For all other analyses:

>5X difference

MDL = Method Detection Limit

N = Analytical result

* - not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank

DO - Diluted out

J - estimated value, above MDL but below practical quantitation limit

NA - Not analyzed

ND - Not detected

NR - Not reported

APPENDIX B DATA COMPARISON TABLES

| 1 | | 1 1 | | | |
|----------------------------|--------------|---|-----------------------|--|---------------|
| | COM | PARISON OF O | A & CONTRACT | OR RESULTS | Page 1 of 2 |
| | PROJE | CT: SHEPLEY'S | S HILL LANDFIL | L, SPRING 2002 | |
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| | | | | | |
| QA SAMPLE No.: | 0205216-01A | | CONTRACT | ORS SAMPLE No.: | 488701 |
| QA FIELD ID: | SHM-96-5B-QA | | CONTRA | CTORS FIELD ID: | SHM-96-5B |
| A ANALYSIS DATE: | 6/1/02 | | CONTRACTOR'S | ANALYSIS DATE: | 5/28/02 |
| QA LABORATORY: | AMRO | | | 'S LABORATORY: | STL, VT |
| RACTION METHOD: | 5030B | | | CTION METHOD: | 5030B |
| ANALYSIS METHOD: | 8260B | | AN. | ALYSIS METHOD: | 8260B |
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| | MATERIAL D | ESCRIPTION: V | VATER | | |
| | | | 5/21/02 | | |
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| Target Analyte | AMRO | AMRO | STL-VT | STL-VT | |
| | QA LAB | RESULTS | CONTRACT | | COMPARISO |
| | LRL | QA LAB | LRL | CONTRACTOR | CODE |
| | | | | | |
| | | | | | |
| Dichlorodifluoromethane | | | < 5.0 | | 0 |
| Chloromethane | < 5.0 | | < 5.0 | | 0 |
| Vinyl Chloride | < 2.0 | | < 5.0 | | 0 |
| Bromomethane | < 2.0 | | < 5.0 | | 0 |
| Chloroethane | | 3.156 | | - 14 4 th s | 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 | | | : 4 | 2 |
| Methyl-t-Butyl Ether | < 2.0 | | | | 0 |
| 1,1-Dichloroethane | | Tues 1 | | la de la companya de la companya de la companya de la companya de la companya de la companya de la companya de | 0 |
| Vinyl Acetate | NR | | < 5.0 | | 2 |
| Chloroprene | NR | | < 5.0 | | 2 |
| cis-1,2-Dichloroethene | | | | 1,31,1 | 0 |
| 2-Butanone | < 10 | | < 5.0 | | 0 |
| Proionitrile | NR | | < 20 | | 2 |
| Methacrylonitrile | NR NR | | < 5.0 | | 2 |
| Bromochloromethane | < 2.0 | | < 5.0 | | 0 |
| Tetrahydrofuran | NR 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 NR | | < 250 | | 2 |
| Benzene | | 8, 55, 1 | | i Aga Ba | |
| 1,2-Dichloroethane | < 2.0 | | < 5.0 | | 0 |
| Trichloroethene | < 2.0 | | < 5.0 | | |
| 1,2-Dichloropropane | < 2.0 | | < 5.0 | | |
| Methyl Methacrylate | NR NR | | < 5.0 | | 2 |
| Dibromomethane | < 2.0 | | < 5.0 | | $\frac{2}{0}$ |
| 1,4-Dioxane | NR NR | | < 250 | | 2 |
| Bromodichloromethane | < 2.0 | | < 5.0 | | |
| | NR NR | | < 5.0 | | |
| 2-Chloroethyl Vinyl Ether | ··· | 100000000000000000000000000000000000000 | < 5.0 | | |
| cis-1,3-Dichloropropene | < 1.0 | | < 5.0 | | 0 |
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| | | | | TO COMMENTS | |
| | | | REPORTED | | |
| | | J=Estimate | ed value greater than | one half the reporting limit. | 1 1 |

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| | | COMPARI | ISON OF | QA & CO | ONTRACT | OR RES | ULTS | | Page 2 of | 2 | | | |
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| QA SAMPLE No.: | 0205216-0 | | | CO | NTRACTO | | | | 488701 | | | | |
| QA FIELD ID: | SHM-96- | 5B-QA | | | CONTRAC | | | | SHM-96- | 5B | | | |
| A ANALYSIS DATE: | 6/1/02 | | | | ACTOR'S A | | | | 5/28/02 | | | | |
| QA LABORATORY: | AMRO | | | CONT | ractor's | | | | STL, VT | | | | |
| RACTION METHOD: | 5030B | | | | | CTION M | | | 5030B | | | | |
| NALYSIS METHOD: | 8260B | | | | ANA | LYSIS M | ETHOD: | | 8260B | | | | |
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| Target Analyte | AMRO | | AMRO | ļ | STL-VT | | STL-VT | | | - | | | |
| Target Allaryte | QA LAB | | RESULTS | | ONTRACTO | | RESULTS | | | OMPARISO | | | |
| | LRL | | QA LAB | | LRL | | NTRACT | | | CODE | JIN | | |
| | 1 11(1) | - | QA DAD | | LICE | | TIME | | | CODE | | | |
| | | | | | | | | | | | | | |
| 4-Methyl-2-pentanone | < 10 | | | | < 5.0 | | | · · · · · · · · · · · · · · · · · · · | - | 0 | | | |
| Toluene Toluene | < 2.0 | | | | < 5.0 | | | | | 0 | | | |
| trans-1,3-Dichloropropene | < 1.0 | † | | | < 5.0 | | | | | 0 | | | |
| Ethyl Methacrylate | NR | 1 | | | < 5.0 | | | | | 2 | | | - |
| 1,1,2-Trichloroethane | < 2.0 | † | | | < 5.0 | | | | <u> </u> | 0 | | | |
| Tetrachloroethene | < 2.0 | | | | < 5.0 | | | | | 0 | | | |
| 2-Hexanone | < 10 | | | | < 5.0 | | | | <u> </u> | 0 | | | |
| Dibromochloromethane | < 2.0 | | | *************************************** | < 5.0 | | | *************************************** | | 0 | 1 | | |
| 1,2-Dibromoethane | < 2.0 | | | *************************************** | < 5.0 | | | | † | 0 | 1 | | † |
| 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 | | . 1 | | | 0 | | | |
| Xylene (total) | < 2.0 | | | | < 5.0 | | | | | 0 | | | |
| Xylene (o) | < 2.0 | | | | < 5.0 | | | | | 0 | | | |
| Styrene | < 2.0 | | | | < 5.0 | | | | | 0 | | | T |
| Bromoform | < 2.0 | | | | < 5.0 | | | | 1 | 0 | | | |
| Isopropylbenzene | < 2.0 | | | | < 5.0 | | | | | 0 | | | |
| cis-1,4-Dichloro-2-butene | NR | | | | < 5.0 | | | | | 2 | | | <u></u> |
| 1,1,2,2-Tetrachloroethane | < 2.0 | | | | < 5.0 | | | | | 0 | | | <u>L</u> . |
| 1,2,3-Trichloropropane | < 2.0 | | | | < 5.0 | | | | ļ | 0 | <u> </u> | | <u> </u> |
| trans-1,4-Dichloro-2-buten | | | | | < 5.0 | | | | | 2 | ļ | <u> </u> | ↓ |
| 1,3-Dichlorobenzene | < 2.0 | | | | < 5.0 | | | | ļ | 0 | | | <u> </u> |
| 1,4-Dichlorobenzene | | | 1 1/4 | | < 5.0 | | | | | 0 | - | | ↓ |
| 1,2-Dichlorobenzene | < 2.0 | | - | | < 5.0 | | | | | 0 | | | |
| 1,2-Dibromo-3-Chloroprop | | | | ********* | < 5.0 | | | | | 0 | | | ┼ |
| 1,2,4-Trichlorobenzene | < 2.0 | | - | | < 5.0 | | | | | 0 | | | |
| Hexachlorobutadiene | < 2.0 | | | | < 5.0 | | | <u> </u> | | 0 | | | |
| Naphthalene | < 5.0 | | | I | < 5.0 | | | | + | 0 | | | + |
| 2,2-Dichloropropane | < 2.0 | | | | < 5.0 | | | <u> </u> | 1 | 0 | 1 | | +- |
| 1,1-Dichloropropene 1,3-Dichloropropane | < 2.0 | | | | < 5.0 | | | | | 0 | | | + |
| | < 2.0 < 2.0 | | | | < 5.0 < 5.0 | | | l | | 0 | | + | +- |
| Bromobenzene | | | | | < 5.0 | | | | | | + | + | + |
| n-Propylbenzene | < 2.0 < 2.0 | | | | < 5.0 | | | | + | 0 | | + | + |
| 2-Chlorotoluene | | | | | < 5.0 | | | | + | 0 | | + | + |
| 4-Chlorotoluene 1,3,5-Trimethylbenzene | < 2.0 | | | | < 5.0 | | | I | + | 0 | + | + | + |
| | < 2.0 | | | I | < 5.0 | | | | + | 0 | | + | + |
| 1,2,4-Trimethylbenzene | < 2.0 | | | | < 5.0 | | | | + | 1 0 | | + | + |
| sec-Butylbenzene | < 2.0 | | - 600 | | < 5.0 | | | | + | + 0 | + | + | +- |
| 4-Isopropyltoluene | < 2.0 | | | | < 5.0 | | | l | | 0 | + | + | + |
| n-Butyibenzene | < 2.0 | | | | < 5.0 | | | I | | 0 | + | | + |
| 1,2,3-Trichlorobenzene | < 2.0 | | | | < 5.0 | | - , , , , , , , | | | 1 0 | + | + | + |
| 1,4,5-11 POLICE OFFICE | | | The state of the s | | - 3.0 | | A PROPERTY. | - | + | | | | + |
| SURROGATE RECOV | PIEC (0/) | QA | + | | - | | + | | PRIMA | RV | + | + | +- |
| SURROGATE RECUY | ALES (70) | - VA | | | - | | + | + | 1 7711/17 | `` | | | +- |
| Dibromofloromethane (85 | 120) | 94.8 | + | + | Toluena | d8 (88-11 | <u></u> | | 101 | | + | + | + |
| 1,2-Dichloroethane-d4 (8) | | 94.8 | +- | | | | <u>∪)</u> -d4 (72-14 | 1) | 101 | + | | + | + |
| Toulene-d8 (88-109) | -123) | 92.5 | | | | | ne (72-142) | | 103 | + | | | + |
| | 7 117\ | 98.8 | | - | | | ne (72-122 ne-d4 (69-1 | | 96 | | + | + | + |
| 4-Bromofluorobenzene (7 | 1~11/) | 98.8 | + | | 1,2-1/1Ch | JUDENZE | 10-44 (09-) | 127) | 1 90 | | + | | + |
| | | | CEP A | DDDAIDIV | A FOR KEY | TO CO | AN ADVITE | | + | | + | + | + |
| | | | | OT REPOR | | TOCON | TIME IN TO | | | | | + | +- |
| | | | | | greater than | Long bale | the | na limit | + | | | | +- |
| | | | | | e greater than | | | ng mmit. | + | | + | + | + |
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| | | PROJECT: | SHEPLE | Y'S HILL | LANDFI | LL, SPRINC | G 2002 | | | | |
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| | | | | | | | | | | | |
| QA SAMPLE No.: | 0205216-01F | 3 | | (| CONTRAC | CTORS SAM | PLE No.: | | 488701 | | |
| QA FIELD ID: | SHM-96-5B | -QA | | | CONT | RACTORS F | TELD ID: | | SHM-96- | 5B | |
| QA ANALYSIS DATE: | 5/28/02 | | | CONT | RACTOR | 'S ANALYS | IS DATE: | | 5/30/02 | | |
| QA LABORATORY: | AMRO | | | CO | | DR'S LABOR | | | STL, VT | | |
| EXTRACTION METHOD: | 3010A | | | | | RACTION M | | | 3010A | | |
| ANALYSIS METHOD: | 6010B,Hg-74 | 470A | | | A | NALYSIS M | ETHOD: | | 6010, Hg- | -7470 | |
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| | MATE | RIAL DESC | | | | | | | - | | |
| | | DATE SA | | 5/21/02 | ļ | | | | | | - |
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| Target Analyte | AMRO | | AMRO | | STL-VT | | STL-VT | | - | CODE | |
| | QA LAB | | QA LAB | | NTRACT | | NTRACT | | Dup- | ļ | ļ |
| | LRL | <u> </u> | RESULTS | <u> </u> | LRL | K | ESULTS | Dup | RPD's | | |
| | | - | | } | 10077 | | | 10.077 | | | |
| Aluminum | < 200 | | 341 | | 19.8 U | - | | 19.8 U | NC NC | 4 | |
| Antimony | < 20 | | AV2 (| | 2.5 U | | Na. | 2.1 B | NC | 3 | |
| Arsenic | < 5.0 | (SW7060A) | | | 2.2 U | ļ | 3,7515 | 3830 | 0.79 | 0 | |
| Barium | < 200 | | 35.4 | | 6.3 U | | | 60.9 B | 1.32 | 0 | ļ |
| Beryllium | < 5.0 | ļ | W | | 0.11 U | | dQF h | 0.24 B | 4.08 | 0 | - |
| Cadmium | < 5.0 | | Wite- | L | 0.50 U | | 1687111 | 0.94 B | 6.86 | 0 | |
| Calciuum | < 2500 | | Annui: | | 128 U | | | 95200 2.7 B | | 0 | |
| Chromium Colbolt | < 10 < 50 | | Mh 3 | | 2.9 U | | os t Mark | 19.2 B | 16.9 2.11 | 0 | |
| Copper | < 25 | | 14. 4 | | 1.4 U | | 1 Table | 4.2 B | 36.6 | 4 | |
| Iron | < 100 | + | arintin | <u> </u> | 61.4 U | | dinin. | 39800 | 0.75 | 0 | |
| Lead | < 5.0 | (SW7421) | Star | | 1.0 U | | . At | 1.8 B | 53.1 | 0 | |
| Magnesium | <2500 | (511/741) | (6)DF | | 132 U | | 1.4.000 | 15300 | 0.65 | 0 | |
| Manganese | < 15 | | 19890 | | 0.50 U | | or High | 10900 | 0.03 | 0 | |
| Mercury | < 0.20 | (SW7470A) | | | | (11-13-01) | 65 | 0.10 U | NC | 0 | 1 |
| Nickel | < 40 | 1 | 137 | | 2.8 U | 1 | 14 | 14.9 B | 1.99 | 0 | |
| Potassium | <2500 | | oithit. | | 273 U | <u> </u> | (J. 11) | 11700 | 0 | 0 | |
| Selenium | < 5.0 | (SW7740) | | | 2.7 U | | 0.006 | 2.4 B | 58.8 | 0 | 1 |
| Silver | < 7.0 | 1 | 411 | | 1.3 U | | 4.3 1. | 3.1 B | 38.5 | ō | 1 |
| Sodium | <2500 | 1 | 1311111 | | 350 U | | them | 37000 | 1.09 | 0 | |
| Thallium | < 5.0 | (SW7841) | | | 3.3 U | | 84 | 3.3 U | NC | 0 | |
| Vanadium | < 50 | | A17.00 | | 2.0 U | | | 2.0 U | NC | 0 | |
| Zinc | < 20 | | Nys | | 1.1 U | | 1891 | 8.8 B | 1.13 | 0 | |
| | | 1 | | | | | | | | | |
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| | | T | SEE APP | ENDIX A | FOR KEY | TO COMM | ENTS | | | | |
| | | | | REPORT | | T | · | | T | | |
| | | | ND= Not | Detected a | at the Repo | rting Limit | | <u> </u> | 1 | | |
| | | 1 | | Detected at | | | | | | | |
| | | 1 | | | | uired Detecti | on Limit (| CRDL), | | | |
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| | | : SHEPLE | | | | | | | | - |
| | PROJECT | SHEFFE | SILLE | LANDEI | il, 31 Ki | 10 2002 | | | | |
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| QA SAMPLE No.: | 0205216-01 | | CC | NTRACT | ORSSAN | API E No : | 488701 | | | ļ · |
| QA FIELD ID: | SHM-96-5B-QA | | | | | FIELD ID: | SHM-9 | | | |
| QA ANALYSIS DATE: | See Below | | CONTR | | | IS DATE: | NR | T | | |
| QA LABORATORY: | AMRO | | | | | RATORY: | STL, V | T | | |
| TRACTION METHOD: | NA NA | + | | | | METHOD: | NA | | | |
| ANALYSIS METHOD: | 9010B | 1 | | | | METHOD: | 335.4 | | | - |
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| | MATERIAL DES | CRIPTION: | WATER | | | | | 1 | | 1 |
| | | SAMPLED: | | | | | | | | 1 |
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| Target Analyte | AMRO | AMRO | | STL-VT | | STL-VT | | | | |
| | QA LAB | RESULT | | ONTRACT | | RESULTS | | COMPARIS | NC | <u> </u> |
| | LRL | QA LAB | | LRL | C | ONTRACTO | R | CODE | | |
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| Cyanide (CN) | < 0.020 | | | < 0.010 | | _ | | 0 | | <u> </u> |
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| | | T REPORTE | | | 14. > 12 | | | | | |
| | *Note: C | yanide samp | ie was acju | isted for pr | 1 to >12 u | ntii it was rece | eived at the lab. | | | |
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| | | | | PR | OJECT: | SHEPLEY | 'S HILL I | ANDFILI | , SPRIN | G 2002 | | | |
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| | QA SAM | PLE No.: | | 0205216-0 | l | | C | ONTRACT | TORS SAI | MPLE No.: | 488701 | | |
| | QA F | IELD ID: | | SHM-96-5 | B-QA | | | CONTR | ACTORS | FIELD ID: | SHM-96- | 5B | |
| QA | ANALYS | IS DATE: | | See Below | | | CONT | RACTOR'S | ANALY | SIS DATE: | NR | | |
| | QA LABOR | | | AMRO | | | CON | ITRACTO | R'S LABO | RATORY: | STL, VT | | |
| XTR | ACTION M | IETHOD: | | NA | | | | EXTR | ACTION | METHOD: | NA | | |
| Aì | IALYSIS N | IETHOD: | | 300.0 | | | | AN | IALYSIS | METHOD: | 300.0 | | |
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| | | | | MATERI | AL DES | CRIPTION: | WATER | | | | | | |
| | | | *************************************** | | DATE | SAMPLED: | 5/21/02 | | | | | | |
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| | Target Ar | nalyte | | AMRO | | AMRO | | STL-VT | | STL-VT | | | T |
| | 1 | 1 | · | QA LAB | | RESULTS | C | ONTRACT | OR | RESULTS | CC | MPARISO | NC |
| | 1 | | | LRL | | QA LAB | <u> </u> | LRL | C | ONTRACTOR | | CODE | T |
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| | Chloride | | (5-29-02) | < 5.0 | | : | | < 0.20 | <u> </u> | 5.10 | | 0 | |
| | Nitrate, | | (5-23-02) | < 0.20 | | 2 Table 19 | | < 0.20 | ļ | 7 | | 0 | <u> </u> |
| Ot | nophosphat | | (5-23-02) | | <u> </u> | | | < 0.20 | <u> </u> | | | 0 | |
| | Sulfate, | SO4 | (5-28-02) | < 1.0 | | | | < 0.20 | | | | 0 | |
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| | | <u> </u> | | | | Manufacture and the | | | | Waadda. | | | |
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| | | - | COMPA | RISON OF | QA & CO | NTRACT | OR RESU | LTS | | | | |
| | | | PROJECT: | SHEPLEY | 'S HILL I | ANDFILI | L, SPRIN | G 2002 | | | | ļ |
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| + | QA SAMPLE No.: | 02052 | 16-01 | + | | ONTRACT | ORSSAN | (PLE No · | | 488701 | | |
| | QA FIELD ID: | | 96-5B-QA | + | ĭ | | ACTORS I | | | SHM-96- | 5B | - |
| QA | ANALYSIS DATE: | 6/4/20 | | | CONTR | ACTOR'S | | | | NR | <u> </u> | † |
| Q | A LABORATORY: | AMRO | | | CON | TRACTOR | | | | STL, VT | | Ī |
| | CTION METHOD: | NA | | | | | ACTION N | | | NA | | |
| AN | ALYSIS METHOD: | 410.4 | | | | AN | ALYSIS N | METHOD: | | 410.1 | | |
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| | Target Analyte | AMI | | AMRO | 1 | STL-VT | | STL-VT | <u> </u> | | | |
| | | QA I | | RESULTS | | NTRACT | | RESULTS | | C | OMPARIS | <u>ON</u> |
| | | LR | L | QA LAB | | LRL | CC | NTRACT | <u>UK</u> | | CODE | |
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| hemica | l Oxygen Demand (| COD) < 5 | | | ! | < 5.0 | | | - | | 0 | |
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| | | PRO | JECT: SHEPLE | Y'S HILL | LANDFILL | , SPRING 2002 | | |
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| | QA SAMPLE No.: | 0205216-01 | | CC | | RS SAMPLE No.: | 488701 | |
| | QA FIELD ID: | SHM-96-5B | -QA | | | TORS FIELD ID: | SHM-96- | 5B |
| | ANALYSIS DATE: | 5/23/02 | | | | NALYSIS DATE: | NR NR | |
| | A LABORATORY: | AMRO | | CON | | LABORATORY: | STL, VT | |
| | CTION METHOD: | NA 105 1 | | | | TION METHOD: | NA NA | |
| ANA | ALYSIS METHOD: | 405.1 | | | ANAI | LYSIS METHOD: | 405.1 | ļ |
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| | | | DESCRIPTION: | | | | | |
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| | Target Analyte | AMRO | AMRO | <u> </u> | STL-VT | STL-VT | | |
| | | QA LAB | RESULT | | NTRACTO | | | OMPARISON |
| | | LRL | QA LAB | | LRL | CONTRACTO | R | CODE |
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| siologica | Oxygen Demand (5 Day) | < 2.0 | | | < 0.20 | | | 0 |
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| | COMP | ARISON OF | QA & CON | TRACTO | R RESU | LTS | | | |
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| | PROJE | CT: SHEPLE | Y'S HILL | LANDFIL | L, SPRIN | NG 2002 | | | |
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| QA SAMPLE No.: | 0205216-01 | | CC | ONTRACT | | | 488701 | <u> </u> | |
| QA FIELD ID: | SHM-96-5B-QA | | | · | CTORS F | | SHM-96- | 5B | |
| QA ANALYSIS DATE: | 5/31/02 | | | ACTOR'S | | | NR | | |
| QA LABORATORY: | AMRO | | CONT | RACTOR | | | STL, VT | ļ | |
| EXTRACTION METHOD: | NA NA | | | | CTION N | | NA NA | | |
| ANALYSIS METHOD: | 310.1 | | | AN | ALYSIS N | AETHOD: | 310.1 | <u> </u> | |
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| | MATERIAL D | ECCLIPTION | WATED | | | | | | |
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| Target Analyte | AMRO | AMRO | | STL-VT | | STL-VT | | | |
| | QA LAB | RESULT | | NTRACT | OR | RESULTS | C | OMPARISO | N |
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| Total Alkalinity as Ca | CO3 < 5.0 | 3 B | | < 1.0 | | FEN | | 0 | |
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| | PR | OJECT: SHEFLE | SHILL | LANDFIL | | | | | | | |
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| QA SAMPLE No.: | 0205216-01 | | CC | NTRACTO | ORC SAN | MPI F No | 488701 | | | | |
| QA FIELD ID: | SHM-96-5B | LOA | | CONTRA | | | SHM-96- | 5R | | | |
| QA ANALYSIS DATE: | 5/28/02 | - VA | CONTR | ACTOR'S | | | NR | 36 | | | |
| QA LABORATORY: | AMRO | | | | | | STL, VT | | | | |
| EXTRACTION METHOD: | NA | | CONTRACTOR'S LABORATORY: EXTRACTION METHOD: | | | | | | | NA | |
| ANALYSIS METHOD: | 6010B (234 | 0B) | | | | METHOD: | 6010B (2: | 340B) | | | |
| | 100102 (25) | <u> </u> | | | | | 00.02 | 102/ | | | |
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| | MATERI. | AL DESCRIPTION: | WATER | | | | | | | | |
| | | DATE SAMPLED: | 5/21/02 | | | | | | | | |
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| Target Analyte | AMRO' | AMRO | | STL-VT | | STL-VT | | <u> </u> | | | |
| | QA LAB | RESULT | | NTRACT | | RESULTS | CC | MPARISON_ | | | |
| | LRL | QA LAB | | LRL | C | ONTRACTOR | | CODE | | | |
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| Total Hardness as CaCO3* | < 33 | 4,41 | | NR | | | | 0 | | | |
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| | | | T REPORT | | 10 001 | ATATEM 19 | | | | | |
| | | | | | ny the se | parate determinatio | ns of calcium | and magnesium | | | |
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| QA SAMPLE No.: | 0205216-01 | | | CC | NTRACT | ORS SA | MPLE No.: | 488701 | 488701 | | | | |
| QA FIELD ID: | SHM-96-5 | B-QA | | | | | FIELD ID: | SHM-96-5B | | | | | |
| QA ANALYSIS DATE: | 5/24/02 | | | CONTR | | | SIS DATE: | NR | T | | | | |
| QA LABORATORY: | AMRO | | | CON | TRACTOR | 'S LABO | RATORY: | STL, VT | | | | | |
| EXTRACTION METHOD: | NA | | | | EXTR. | CTION | METHOD: | NA | | | | | |
| ANALYSIS METHOD: | 160.1 and 1 | 60.2 | | | AN. | ALYSIS | METHOD: | 160.1 and | 160.2 | | | | |
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| | MATER | UAL DES | CRIPTION: | WATER | | | | | | | | | |
| | | DATE | SAMPLED: | 5/21/02 | | | | | | | | | |
| | | | UNITS: | mg/L | | | | | | | | | |
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| Target Analyte | AMRO | | AMRO | | STL-VT | | STL-VT | | | | | | |
| | QA LAB | | RESULTS | S CO | ONTRACT | | RESULTS | | OMPARIS | ON | | | |
| | LRL | | QA LAB | | LRL | C | ONTRACTOR | | CODE | | | | |
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| | | | | | | | | | | | | | |
| Total Dissolved Solids (TDS by 160.1) | < 10 | <u> </u> | | | < 5.0 | | , | | 0 | | | | |
| Total Suspended Solids (TSS by 160.2) | < 4.0 | | | | < 0.50 | | | | 0 | <u> </u> | | | |
| | | <u> </u> | | | <u> </u> | | | | | <u> </u> | | | |
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| | QA FIELD ID: | SHM-96-5B-QA | | | | CTORS FIELD ID: | SHM-96- | 5B |
| OA | ANALYSIS DATE: | 5/24/02 | | CONTR | | ANALYSIS DATE: | NR | |
| | QA LABORATORY: | STL-Pittsgurgh (| subcontracted) | | | S LABORATORY: | STL, VT | |
| | ACTION METHOD: | NA NA | | | | CTION METHOD: | NA NA | |
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APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

CHAIN OF CUSTODY RECORD

| PROJ. NO. PROJECT NAME | | | | | | | | | , | 7 | 7 | 7 | \. | ./ | _/ | 7// | • | | |
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Chemical Quality Assurance Report Fall 2002

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-011703

OCTOBER 30, 2002 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 3, 2003

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS OCTOBER 30, 2002 SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-011703

TABLE OF CONTENTS

| <u>Paragraph</u> | <u>Title</u> | <u>Page</u> |
|------------------|---|-------------|
| | Executive Summary | 1-2 |
| | Table 1- Data Comparison Summary | 3 |
| | Table 2 - Analyses Performed by QA Laboratory | 4 |
| 1. | QA sample shipping and chain-of-custody deficiencies | 5 |
| 2. | Data comparison for volatiles by Method 8260B | 5-6 |
| 3. | Data comparison for metals by Method 6010B and 7470 | 7-8 |
| 4. | Data comparison for cyanide by Method 9010B | 8-9 |
| 5. | Data comparison for anions by Method 300.0 | 9-10 |
| 6. | Data comparison for COD by Method 410.4 | 10-11 |
| 7. | Data comparison for BOD by Method 405.1 | 11-12 |
| 8. | Data comparison for alkalinity by Method 310.1 | 12-13 |
| 9. | Data comparison for hardness by Method 2340B | 13-14 |
| 10. | Data comparison for TDS and TSS by Methods 160.1 and 160.2 | 14-15 |
| 11. | Data comparison for total organic carbon (TOC) by Method 9060 | 15-16 |

TABLE OF CONTENTS (continued)

| 12. References | | 16 |
|----------------|--|----|
|----------------|--|----|

Appendix A - Key to Comments on Data Comparison Code

Appendix B - Data Comparison Tables

Appendix C - Custody Documentation

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS OCTOBER 30, 2002 - QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-011703

Executive Summary

QA samples from one shipment for Shepley's Hill Landfill Long Term Monitoring, Devens, Massachusetts were analyzed by the QA laboratory, resulting in a total of 101 target analyte determinations. The shipment contained one QA water sample and one trip blank sample and was received in good condition. The data report from the QA laboratory, AMRO, Merrimack, NH, dated 1 January 2003, was used in the comparison. In 31 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 101 out of 101 (100%) of the comparisons. Primary and QA samples agreed quantitatively in 31 out of 31 (100%) of the comparisons. Quantitative agreement represents only those determinations where an analyte was detected by at least one laboratory. No major or 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-8260B, TAL Metals-6010B, CN, Anions, COD, BOD, Alkalinity, TDS, TSS, hardness and TOC were in complete overall and quantitative agreement. There was very little bias to any of the QA laboratory's sample results and only a few minor QC deviations were noted in their case narrative. The data is complete, usable and satisfies the DQO's of the project.

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

The QA and primary laboratory's reporting limits were comparable, except for 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, 2002 Sampling Event

Overall Agreement (1) Quantitative Agreement (2)

| | | Overall Agr | cement (1) | Quantitative | 181 coment (2) |
|-----------|----------------|-------------|------------|--------------|----------------|
| Method | Parameter | Number | Percent | Number | Percent |
| 8260B | Volatiles | 66/66 | 100 | 8/8 | 100 |
| 6020/7471 | Metals/Mercury | 23/23 | 100 | 15/15 | 100 |
| 9010B | Cyanide | 1/1 | 100 | NA | NA |
| 300.0 | Anions | 4/4 | 100 | 2/2 | 100 |
| 410.1 | COD | 1/1 | 100 | 1/1 | 100 |
| 405.1 | BOD | 1/1 | 100 | NA | NA |
| 310.1 | Alkalinity | 1/1 | 100 | 1/1 | 100 |
| 130.2 | Hardness | 1/1 | 100 | 1/1 | 100 |
| 160.1 | TDS | 1/1 | 100 | 1/1 | 100 |
| 160.2 | TSS | 1/1 | 100 | 1/1 | 100 |
| 9060 | TOC | 1/1 | 100 | 1/1 | 100 |
| Total | | 101/101 | 100 | 31/31 | 100 |
| | | | | | |

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 | 10-30-02 | 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 | 10-30-02 | 5030B/8260B-Volatiles |

SHEPLEY'S HILL LANDFILL LONG TERM MONITORING DEVENS, MASSACHUSETTS OCTOBER 30, 2002 QA SAMPLING EVENT

CHEMICAL QUALITY ASSURANCE REPORT No. E0776-011703

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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 2002. Proper sample handling protocols were followed for this shipment, except the cyanide sample container needed to be adjusted for pH at the lab to greater than 12 pH units. The sample SHM-96-5B-QA has historically required additional NaOH to be added by the QA laboratory in order to adjust the pH to greater than 12 pH units.

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

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

There were 66 volatile determinations. In 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 eight out of eight (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 exhibit the presence of TIC's. The pH of sample SHM-96-5B-QA was above the method recommended pH of < 2, at 5 pH units.

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

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

<u>Method Blanks</u>: Results of all the method blanks that were associated with the QA split sample showed no contamination above the laboratory's reporting limit for any of the target analytes, except for methylene chloride which was reported at 0.89 J ug/l.

<u>Trip Blanks</u>: 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.

<u>Laboratory Control Samples</u>: 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 021105A, was within the acceptance limits for all of the target analytes.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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, except for the recovery of trichloroethene (83-118%) in the MSD at 79.6%. Trichloroethene was not detected in the sample SHM-96-5B-QA. The MS/MSD's samples reported were from another client's project.

<u>Surrogates</u>: 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.

<u>Method Blanks</u>: The method blank results associated with the QA sample showed contamination below the laboratory's reporting limits for the following target analytes; isobutyl alcohol at 100 J ug/L, 1,4-dioxane at 520 ug/L, 1,2,4-trichlorobenzene at 1.1 J ug/L, hexachlorobutadiene at 2.8 J ug/L, naphthalene at 1.3 J ug/L, and 1,2,3-trichlorobenzene at 1.2 J ug/L which were detected in the method blank sample VBLKY9. These target analytes were not detected in the QA sample SHM-96-5B-QA and were below the reporting limits for these target analytes. The sample results for SHM-96-5B-QA would not be affected.

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

<u>Laboratory Control Sample (LCS/LCSDs)</u>: The primary laboratory reported that all of the target analytes in the LCS/LCSD were within the acceptance limits for accuracy and precision. All 84 of the target analytes were spiked into the LCS samples. The amount spiked, percent recoveries and control limits were provided in the report.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSD)</u>: The primary laboratory did not report the results of the MS/MSD for sample SHL-19 which was requested on the chain-of-custody. Refer to the LCS/LCSD for accuracy and precision.

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

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

There were 22 ICP-metals determinations and one mercury determination. In 15 of these determinations, target analytes were detected by one or both laboratories. There was overall agreement in 23 (100%) of the cases and quantitative agreement in 15 out of 15 (100%) of the cases. No data discrepancies were noted.

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

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

<u>Method Blanks</u>: All of the method blank sample results for all of the target analytes showed no contamination above the laboratory's reporting limits, except for calcium, iron, magnesium, potassium, sodium and zinc which were all reported below the reporting limits.

<u>Laboratory Control Sample (LCS)</u>: 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.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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. All of the spike levels, percent recoveries and QC limits were provided in the reports.

<u>Laboratory Duplicate</u>: The QA laboratory did not report any laboratory duplicate results.

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

<u>Holding times</u>: All the samples were analyzed within the method prescribed holding times.

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

<u>Laboratory Control Samples (LCS/LCSDs)</u>: 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.

<u>Matrix Spike (MS):</u> 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 assumed acceptance limits (75-125%) for accuracy, except for thallium which was recovered at 69.6%. The primary laboratory did not provide acceptance limits for the MS sample results. The post digestion spike recovery for thallium was within the assumed acceptance limits at 88.6%.

<u>Laboratory Duplicate</u>: The primary laboratory reported the laboratory duplicate SHL-19D was within the assumed acceptance limits of 20% RPD for precision for all of the target analytes that were above the CRDL. The primary laboratory did not provide the acceptance limits for laboratory duplicates. The blind field duplicate sample SHM-DUP-02A was in close agreement with the original sample SHM-DUP-02A. Refer to the data comparison table for the RPD's.

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.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS result for cyanide was within the laboratory's acceptance limits of 90-110%, at 108%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS)</u>: The primary laboratory reported the LCS for cyanide was within the assumed acceptance limits of 90-110% at 100.9%. The spike amount added and the percent recoveries were all provided in the report, but no QC limits were provided.

<u>Matrix Spike (MS)</u>: The primary laboratory reported that the MS sample SHL-19MS was recovered below the acceptance limits of 75-125% for cyanide at 57.5%. The primary lab suspects the low cyanide recovery was due to a matrix effect.

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

5. Data comparison for anions by Method 300.0.

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

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

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

<u>Method Blanks</u>: The method blank results for anions showed no contamination above the laboratory's reporting limit. Ortho-phosphate was analyzed by Method 365.2. Chloride was detected below the reporting limit of 0.50 mg/l at 0.05 mg/l.

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

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS for anions were within the laboratory's acceptance limits for accuracy, except for ortho-phosphate at 0% recovery. The QA laboratory suspects a specific matrix interference. The sample was reanalyzed at a dilution with the same results and was qualified appropriately. The non-detect sample result should be considered biased low due to the poor recovery in the MS. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Samples (LCSs)</u>: The primary laboratory reported that all the LCS/LCSD's for anions were within the laboratory acceptance limits for accuracy and precision. The spike amount added and percent recoveries were all provided in the report.

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

<u>Laboratory Duplicate</u>: 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. The primary laboratory reported COD at 87.9 mg/L which was above the QA laboratory's reporting limit of 50 ug/L. There was 100% overall agreement for this determination, however the primary laboratory's reporting limit was ten times lower at 5.0 ug/L. No data discrepancy was noted based on the higher reporting limit.

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

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

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

<u>Laboratory Control Samples (LCS)</u>: The QA laboratory reported that the LCS result for COD was within the laboratory's acceptance limits of 80-120%, at 100%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for COD were within the laboratory's acceptance limits of 80-120% for accuracy and precision, at 99.9% and 101% with a RPD of 1.35%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS/LCSD)</u>: The primary laboratory reported that the LCS/LCSD for COD were within the acceptance limits for accuracy and precision. The spike amount added and percent recoveries were all provided in the report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The primary laboratory was not requested to

perform MS/MSD's on any of the samples for COD and no evaluation of accuracy and precision based on matrix effects could be made.

<u>Laboratory Duplicate</u>: The primary laboratory did not report any laboratory duplicate results for COD.

7. Data comparison for BOD by Method 405.1.

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

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

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

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

<u>Laboratory Control Samples (LCS/LCSDs)</u>: The QA laboratory reported that the LCS/LCSD recoveries for BOD were within the laboratory's acceptance limits for accuracy and precision at 95.9% and 94.2% recoveries, with a RPD of 1.78%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

<u>Laboratory Duplicate</u>: The QA laboratory did not report any laboratory duplicate results for BOD.

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

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

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

<u>Laboratory Control Sample (LCS/LCSD's)</u>: The primary laboratory reported that all the LCS's for BOD were within the acceptance limits for accuracy and precision. The spike amount added and percent recoveries were all provided in the report.

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

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recovery for alkalinity was within the laboratory's acceptance limits of 80-120% at 98.9%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: 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 97% and 95.7% recoveries with an RPD of 1.08%.

<u>Laboratory Duplicate</u>: The QA laboratory reported that the sample duplicate result for alkalinity was within the 20% RPD acceptance limit at 8.65%.

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.

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

<u>Laboratory Control Sample (LCS)</u>: The primary laboratory reported that the LCS for alkalinity was within the acceptance limits of 80-120%. The spike amount added, percent recoveries and QC limits were all provided in the report.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: The primary laboratory reported that the MS for alkalinity was recovered within the acceptance limits of 75-125% at 98.8%.

<u>Laboratory Duplicate</u>: The primary laboratory reported the laboratory duplicate results for sample SHL-19 were within the acceptance limits of 80-120% at 2.0% RPD.

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

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

9a. Batch QC Evaluation for the QA laboratory-AMRO.

<u>Holding Times</u>: The QA sample was analyzed within the method prescribed holding time.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recovery for hardness was within the laboratory's acceptance limits of (80-120%) at 99.4%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

<u>Matrix Spike/Matrix Spike Duplicate (MS/MSDs)</u>: The QA laboratory did not report any MS/MSD results for hardness and accuracy and precision based on matrix effects could not be determined.

<u>Laboratory Duplicate</u>: The QA laboratory did not report any laboratory duplicate results for hardness.

9b. Batch OC Evaluation for the Primary Laboratory-STL-VT.

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

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

<u>Laboratory Control Samples (LCS/LCSD's)</u>: 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.

<u>Matrix Spike/Matrix Sipke Duplicate(MS/MSDs)</u>: 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.

<u>Laboratory Duplicate</u>: 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.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recoveries for TDS and TSS were within the laboratory's acceptance limits at 91.4% and 92%, respectively. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

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

<u>Laboratory Duplicate</u>: The QA laboratory reported that the TDS and TSS laboratory duplicates were within the laboratory's acceptance limits of 20% RPD at 10.4% and 13.3%, 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.

<u>Method Blanks</u>: All of the method blank results showed no contamination above the laboratory's reporting limit for TDS and TSS.

<u>Laboratory Control Sample (LCS/LCSD)</u>: The primary laboratory reported that all the LCS/LCSD's for TDS and TSS were within the acceptance limits of 80-120% for accuracy and precision. The spike amount added and percent recoveries were all provided in the report.

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

<u>Laboratory Duplicate</u>: The primary laboratory reported the duplicate sample results for SHL-19 were within the acceptance limits of 20% RPD for TDS at 2.0% RPD. No duplicate sample result for TSS was 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 subcontracted 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.

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

<u>Laboratory Control Sample (LCS)</u>: The QA laboratory reported that the LCS recovery for TOC was within the laboratory's acceptance limits at 100%. All of the spike levels, percent recoveries and QC limits were appropriately indicated in the QA laboratory's report.

Matrix Spike/Matrix Spike Duplicate (MS/MSDs): The QA laboratory reported that the MS/MSD's for TOC were within the laboratory's acceptance limits for accuracy (75-125%) and precision (25%RPD), at 96% and 104% recoveries with an RPD of 1.9%.

<u>Laboratory Duplicate</u>: The QA laboratory did not report any laboratory duplicate results for TOC.

11b. Batch QC Evaluation for the Primary-Sub Laboratory-STL-Pittsburgh.

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

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

<u>Laboratory Control Samples (LCSLCSD's)</u>: The primary laboratory reported that the LCS/LCSD's for TOC were within the acceptance limits for accuracy and precision. The spike amount added, percent recoveries and the QC limits were all provided in the report.

<u>Matrix Spike/Matrix Sipke Duplicate(MS/MSDs)</u>: The primary laboratory did not report any MS/MSD results for TOC and no evaluation of accuracy or precision based on matrix effects could be made. Refer to the LCS/LCSD for accuracy and precision verification.

<u>Laboratory Duplicate</u>: The primary laboratory reported the duplicate sample results for SHL-19 were above the acceptance limits at 200% 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 20 December 2002. The QA laboratory's data report, prepared by AMRO Environmental Laboratories Corporation, 111 Herrick Street, Merrimack, NH. 03054, were received 3 January 2003.
- b. EM 200-1-6, Chemical Quality Assurance for Hazardous, Toxic and Radioactive Waste (HTRW) Projects, dated 10 October 1997.
 - c. Shell for Analytical Chemistry Requirements, 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)
 - N₁<MDL₁ and N₂>MDL₂ but <MDL₁*
- both values are above respective detection limit (N>MDL) and difference between two values satisfies conditions below

For all analyses in a water matrix and for metals analysis in soil:

<2X difference

For all other analyses:

≤4X difference

- 1 Minor contamination by laboratory contaminant
- 2 Not tested by both laboratories
- 3 Minor data discrepancy, disagreement not serious, if any one of the following apply:
- N₁<MDL₁ and N₂>MDL₂ and the difference between values N₂* does not exceed the upper limit (described below) defining a minor data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:

2X<difference<3X

For all other analyses:

4X<difference<5X

- 4 Major data discrepancy, disagreement serious, if any one of the following apply:
- N₁<MDL₁ and N₂>MDL₂ and the difference between values N₂ and MDL₁* exceeds the limit (described below) defining a major data discrepancy
- both values are above respective detection limit (N>MDL*) and conditions described below apply to the difference between the two values

For all analyses in a water matrix and for metals analysis in soil:

>3X difference

For all other analyses:

>5X difference

MDL = Method Detection Limit

N = Analytical result

* - not all < values are MDLs. Values which are not MDLs will be noted.

Key to data qualifiers:

B - detected in method blank

DO - Diluted out

J - estimated value, above MDL but below practical quantitation limit

NA - Not analyzed

ND - Not detected

NR - Not reported

APPENDIX B DATA COMPARISON TABLES

| P | | | | | | |
|---------------------------------------|----------------------|------------------|-----------------------|-------------------------------------|--------------|---------------|
| | 4 | | | | | |
| | | COMPARISON OF | OA & CONTRAC | TOR RESULTS | Page 1 o | f 2 |
| | P | ROJECT: SHEPLE | | | Tage 10 | |
| | | | | T | | |
| | <u> </u> | | | | | |
| | 10010000 | | | | | |
| QA SAMPLE No.: QA FIELD ID: | 0210278-0 SHM-96- | | | ORS SAMPLE No.: ACTORS FIELD ID: | | 5D |
| QA ANALYSIS DATE: | 11/5/02 | SB-QA | | ANALYSIS DATE | | -36 |
| QA LABORATORY: | AMRO | | | 'S LABORATORY | | |
| EXTRACTION METHOD: | 5030B | | EXTRA | CTION METHOD: | 5030B | · |
| ANALYSIS METHOD: | 8260B | | AN | ALYSIS METHOD: | 8260B | |
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| | MATER | IAL DESCRIPTION: | WATED | | , | |
| | WATER | DATE SAMPLED: | | | <u> </u> | + |
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| Target Analyte | AMRO | AMRO | STL-VT | STL-VT | | |
| raiget Analyte | QA LAB | | | | | OMPARISON |
| | LRL | QA LAB | | CONTRACT | | CODE |
| | | | | | | |
| District 100 | | | | | | |
| Dichlorodifluoromethane Chloromethane | < 5.0 | (58) | < 5.0 < 5.0 | | | 0 |
| Vinyl Chloride | < 2.0 | silvii.is | < 5.0 | | | 0 |
| Bromomethane | < 2.0 | | < 5.0 | | <u> </u> | 0 |
| Chloroethane | < 5.0 | | < 5.0 | | | 0 |
| Trichlorofluoromethane | < 2.0 | | < 5.0 | | | 0 |
| Acrolein Freon TF | NR NR | | < 5.0 < 5.0 | | | 2 2 |
| 1,1-Dichloroethene | $\frac{NR}{< 1.0}$ | | < 5.0 | | | $\frac{2}{0}$ |
| Acetone | < 10 | | < 5.0 | | | 0 |
| Methyl Iodide | NR | | < 5.0 | | | 2 |
| Carbon Disulfide | < 2.0 | | < 5.0 | | | 0 |
| Allyl Chloride Methylene Chloride | NR (50 | | < 5.0 | | | 2 |
| Acrylonitrile | < 5.0 NR | | < 5.0 < 5.0 | | | 2 |
| trans-1,2-Dichloroethene | < 2.0 | | < 5.0 | | | 0 |
| 1,2-Dichloroethene (total) | NR | | < 5.0 | | | 2 |
| Methyl-t-Butyl Ether | < 2.0 | 10000 | < 5.0 | | | 0 |
| 1,1-Dichloroethane | < 2.0 | | < 5.0 | | 1 | 0 |
| Vinyl Acetate Chloroprene | NR NR | | < 5.0 < 5.0 | | | 2 2 |
| cis-1,2-Dichloroethene | < 2.0 | | < 5.0 | | | 0 |
| 2-Butanone | < 10 | | < 5.0 | | | 0 |
| Proionitrile | NR | | < 20 | | | 2 |
| Methacrylonitrile | NR | | < 5.0 | | | 2 |
| Bromochloromethane Tetrahydrofuran | < 2.0 NR | | < 5.0 < 50 | | | 2 |
| Chloroform | < 2.0 | | < 5.0 | | | 0 |
| 1,1,1-Trichloroethane | < 2.0 | | < 5.0 | | | 0 |
| Carbon Tetrachloride | < 2.0 | | < 5.0 | | | 0 |
| Isobutyl Alcohol | NR | | < 250 | | | 2 |
| Benzene | < 1.0 | | < 5.0 | | | 0 |
| 1,2-Dichloroethane Trichloroethene | < 2.0 | | < 5.0 < 5.0 | | | 0 . |
| 1,2-Dichloropropane | < 2.0 < 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 |
| | | (| | | 1 | |
| | | SEE APP | ENDIX A FOR KEY | TO COMMENTS | | |
| | | NR=NOT | REPORTED | | | |
| | | | ed value greater than | | ng limit. | |
| | | B=Analyt | e was detected in met | hod blank. | <u> </u> | |

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| | COMPA | RISON OF QA & | CONTRACTO | PESITE | Page 2 of 2 | | |
| | PROJECT: | SHEPLEY'S HIL | L LANDFILL. | FALL 2002 | 1 age 2 01 2 | | |
| | 1777 | | T===1=1 | T | | · · · · † · | |
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| | 0210278-01A | C | ONTRACTORS | SAMPLE No.: | 508311 | | |
| | SHM-96-5B-QA | | CONTRACTO | RS FIELD ID: | SHM-96-5B | | |
| | 11/5/02 | CONTR | RACTOR'S ANA | LYSIS DATE: | 11/5/02 | | |
| QA LABORATORY: | AMRO | CON | TRACTOR'S LA | BORATORY: | STL, VT | | |
| | 5030B | | EXTRACTIO | ON METHOD: | 5030B | | |
| ANALYSIS METHOD: | 8260B | | ANALYS | SIS METHOD: | 8260B | | |
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| | | | | | | | |
| Target Analyte | AMRO | AMRO | STL-VT | STL-VT | | | |
| | QA LAB | | ONTRACTOR | RESULTS CONTRACTOR | | PARISON | |
| | LRL | QA LAB | LRL | CUNTRACTOR | | CODE | |
| | · · - · · · | -00000 | | | | | <u> </u> |
| 4-Methyl-2-pentanone | < 10 | -7/4/4/4 | < 5.0 | | | | |
| Toluene Toluene | < 2.0 | | < 5.0 | | | 0 | |
| trans-1,3-Dichloropropene | < 1.0 | | < 5.0 | | | | |
| Ethyl Methacrylate | NR NR | | < 5.0 | | | 2 | |
| 1,1,2-Trichloroethane | < 2.0 | | < 5.0 | | | 0 | 1 |
| Tetrachloroethene | < 2.0 | Light Control | < 5.0 | Washing the | 1 ! | 0 + | ! |
| 2-Hexanone | < 10 | | < 5.0 | | | | |
| Dibromochloromethane | < 2.0 | | < 5.0 | | | 0 | |
| 1,2-Dibromoethane | < 2.0 | 640.00 | < 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 | li de la companie de la companie de la companie de la companie de la companie de la companie de la companie de | | 0 | |
| Xylene (total) | < 2.0 | | < 5.0 | | | 0 | |
| Xylene (o) | < 2.0 | | < 5.0 | | | 0 | |
| Styrene | < 2.0 | | < 5.0 | | | 0 | |
| Bromoform | < 2.0 | _14 (24.3) | < 5.0 | | | 0 | <u> </u> |
| Isopropylbenzene | < 2.0 | | < 5.0 | | | 0 | |
| cis-1,4-Dichloro-2-butene | NR | -1000001 | < 5.0 | | | 2 | |
| 1,1,2,2-Tetrachloroethane 1,2,3-Trichloropropane | < 2.0 < 2.0 | | < 5.0 | /**** | | 0 | |
| trans-1,4-Dichloro-2-butene | NR NR | -MARKA | < 5.0 < 5.0 | | | | |
| 1,3-Dichlorobenzene | < 2.0 | | < 5.0 | | i | 2 0 | |
| 1,4-Dichlorobenzene | < 2.0 | 1.00 | < 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 | ļ |
| 4-Isopropyltoluene | < 2.0 | | < 5.0 | | | 0 | |
| n-Butylbenzene | < 2.0 | | < 5.0 | | | 0 - ; | |
| 1,2,3-Trichlorobenzene | < 2.0 | | < 5.0 | | | 0 | |
| CUPPOCATE PECCUES. | FG (9() | + | | | DDING | i <u> </u> | |
| SURROGATE RECOVERIE | ES (%) QA | | | | PRIMARY | | |
| Dibromoficament (05 120 | , | - | Tol 10 (2) | 2 110) | 100 | | |
| Dibromofloromethane (85-120 | | | Toluene-d8 (88 | | 108 | | |
| 1,2-Dichloroethane-d4 (80-124 | | | | hane-d4 (72-141) | | | |
| Toulene-d8 (88-109) | 90.8 | | | enzene (72-122) | 105 | | |
| 4-Bromofluorobenzene (77-11 | 7) 85.8 | - | 1,2-Dichiorobe | enzene-d4 (69-124) | 106 | | |
| | | CEE ADDENDES | A FOR VEV TO | COMMENTE | | | |
| | | SEE APPENDIX | | COMMEN 18 | | | |
| | | NR=NOT REPOR | | half the range in a li- | ie : | | |
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| | APLE No.: | | | L., | | | | CTORS SAI | | | | 6 D | |
| | FIELD ID: | | HM-96-5B | -QA | | | | RACTORS | | ļ | SHM-96- | -2R | |
| QA ANALYS | | | 1/5/02 | <u> </u> | | | | 'S ANALY | | ļ | 11/1/02 | | |
| QA LABO | | | MRO | | | CON | | OR'S LABO | | | STL, VT | | |
| XTRACTION N | | | 010A | <u></u> | | | | RACTION | | | 3010A | <u></u> | ; |
| ANALYSIS N | METHOD: |)60 | 010B,Hg-74 | 170A | | | A | NALYSIS | METHOD: | | 6010, Hg | -7470 | |
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| Target A | nalyte | | AMRO | | AMRO | | STL-VT | | STL-VT | | † <u>-</u> | CODE | 1 |
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| | y | | | (011/70(0.4) | PERSONAL PROPERTY OF CO | | | | | 1960 | 0.51 | | -i |
| Arsenic | + | +- | < 5.0 | (SW7060A) | Control of the San Property | | 3.2 U | | | | 0.31 | 0 | |
| Barium | | | < 200 | | (3.0) | | 9.2 U | ļ | de ou | 45.6 B | | 0 | 1 |
| Berylliur | | | < 5.0 | | | | 0.20 U | ļ | 0,200 | 0.20 U | NC | $\frac{1}{1}$ | |
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| Calciuu | | | < 2500 | | 93000 | | 155 U | | 24.020.00 | 102000 | 0 | 0 | 4 |
| Chromiu | ım | | < 10 | | iű | | 4.6 U | | 746 U. | 4.6 U | NC | 0 | ļ |
| Colbolt | | | < 50 | | 100 | | 2.2 U | | 11/42/11 | 12.4 B | 0.81 | 0 | |
| Copper | | | < 25 | | 1.5 | | 1.8 U | | 45 S.B. | 1.8 U | NC | 0 | <u> </u> |
| Iron | | | < 100 | | Same, | | 22.6 U | | (1870) | 18700 | 0 | 0 | |
| Lead | | | < 5.0 | (SW7421) | g, spinitte | | 1.2 U | | 3811111 | 1.1 U | NC | 0 | <u> </u> |
| Magnes | ium | | < 2500 | | (3000) | | 218 U | | i etalju s | 14500 | 0.69 | 0 | |
| Mangan | ese | | < 15 | T | \$20000° | | 2.5 U | | e ismil) | 12800 | 1.55 | 0 | |
| Mercury | | | < 0.20 | (SW7470A) | | | 0.10 U | (11-6-02) | (0.10.16) | 0.10 U | NC | 0 | 1 |
| Nickel | | | < 40 | T` | | | 13.5 U | <u> </u> | | 13.5 U | NC | 0 | ! |
| Potassiu | m | | < 2500 | | (8000) | | 275 U | | | 8760 | 0 | 0 | :: |
| Seleniun | | | < 5.0 | (SW7740) | | | 3.9 U | | 958114 27 | 6.0 | 2.47 | 0 | |
| Silver | - | | < 7.0 | 1 (2 , , , , 3) | 377 | | 1.4 U | | | 1.4 U | NC | 0 | - |
| Sodium | 1 | | < 2500 | | 35000 | | 539 U | | - 36200 | 35800 | 1.11 | 0 | |
| Thallium | | | < 5.0 | (SW7841) | | <u> </u> | 3.0 U | | | 3.0 U | NC | 0 | ÷ |
| Vanadiu | | | < 50 | (317/641) | 50.0 | | 2.8 U | | | 2.8 U | NC | 0 | ! |
| Zinc | '' | | < 20 | + | | | 6.9 U | | 8.84 | 7.3 B | NC | 0 | · · · · · · |
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| QA SAMPLE No.: | 0210278- | -01 | | CC | NTRACT | ORS SAN | MPLE No.: | | 508311 | | | T |
| QA FIELD ID: | SHM-96- | | | | | | FIELD ID: | | SHM-96- | 5B | | |
| QA ANALYSIS DATE: | 11/6/02 | 1 | | | | | SIS DATE: | | NR | Ī - | | |
| QA LABORATORY: | AMRO | | | | | | RATORY: | | STL, VT | | | |
| TRACTION METHOD: | NA | - | | CON | | | METHOD: | | NA | | | |
| ANALYSIS METHOD: | 9010B | | | | | | METHOD: | | 335.4 | | | |
| ANALTSIS METHOD: | 90108 | _ | | | AIN | ALYSIS P | METHOD: | | 333.4 | | ļ | ļ |
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| Target Analyte | AMRO | , | AMRO | | STL-VT | † | STL-VT | | | | ļ | 1 |
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| QA SAMPLE No.: | | 0210278-0 | 01 | | C | ONTRACT | ORS SAI | MPLE No.: | 508311 | | |
| QA FIELD ID: | | SHM-96- | 5B-QA | | | CONTR | ACTORS | FIELD ID: | SHM-96-5B | | |
| QA ANALYSIS DATE: | | See Below | V | | | RACTOR'S | | | 10/31/02 | | |
| QA LABORATORY: | | AMRO | | | CON | TRACTOR | R'S LABO | RATORY: | STL, VT | | |
| XTRACTION METHOD: | | NA | | | | EXTR | ACTION | METHOD: | NA | | |
| ANALYSIS METHOD: | | 300.0 | | | | AN | ALYSIS | METHOD: | 300.0 | | |
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| Target Analyte | | AMRO | | AMRO | | STL-VT | | STL-VT | | | |
| | | QA LAB | | RESULTS | CC | ONTRACTO | OR | RESULTS | CO | MPARISO | ON |
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| Chloride, CL | (11-1-02) | | | | | < 0.20 | | | | 0 | |
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| Nitrate, as N Othophosphate, as P | (10-31-02) (11-1-02) | < 0.20 < 0.10 | | 100 | | < 0.20 < 0.20 | | 102000 | | 0 | |
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| | | P. | ROJECT: SHEPI | LEY'S HILL | LANDFIL | L, FALL | 2002 | · | | | |
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| | QA SAMPLE No.: | 0210278-01 | | | ONITOACT | TODECAL | MPLE No.: | 1 | 508311 | ļ | |
| | QA FIELD ID: | SHM-96-5E | | | | | FIELD ID: | | SHM-96-5 | | |
| OA / | ANALYSIS DATE: | 11/13/02 | S-QA | CONTE | | | SIS DATE: | | 11/4/02 | D | |
| | A LABORATORY: | AMRO | | | | | RATORY: | } | STL, VT | <u> </u> | |
| | CTION METHOD: | NA | | | | | METHOD: | | NA | · | |
| | ALYSIS METHOD: | 410.4 | | | | | METHOD: | | 410.1 | | ···· |
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| | Target Analyte | AMRO | AMR | | STL-VT | | STL-VT | | | | |
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| QA SAMPLE No.: | 0210278-01 | r | CO | NTRACTO | RS SAMPLE No.: | 508311 | 1 | |
| QA FIELD ID: | SHM-96-5B-QA | \ | | | CTORS FIELD ID: | SHM-96-5 | В | |
| QA ANALYSIS DATE: | 11/1/02 | | | | NALYSIS DATE: | 11/1/02 | T | |
| QA LABORATORY: | AMRO | | | | LABORATORY: | STL, VT | | |
| EXTRACTION METHOD: | NA | 1 | | EXTRAC | CTION METHOD: | NA | | |
| ANALYSIS METHOD: | 405.1 | 1 | | ANA | LYSIS METHOD: | 405.1 | 1 | |
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| | MATERIAL DE | SCRIPTION: | WATER | | | | | |
| | | SAMPLED: | | | | | | |
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| Target Analyte | AMRO | AMRO | | STL-VT | STL-VT | | | |
| | QA LAB | RESULTS | S CO | NTRACTO | OR RESULTS | CC | OMPARISON | |
| | LRL | QA LAB | | LRL | CONTRACTO | R | CODE | |
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| | | SEE APP | ENDIX A | FOR KEY | TO COMMENTS | | | |
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| QA SAMPLE No.: | 0210278-01 | | CONTRACTORS | CAMPLENG | 508311 | |
| QA FIELD ID: | SHM-96-5B-QA | | | ORS FIELD ID: | SHM-96-5B | |
| QA FIELD ID. | 11/5/02 | CO | NTRACTOR'S ANA | | 11/11/02 | |
| QA LABORATORY: | AMRO | | CONTRACTOR'S L | | STL, VT | |
| XTRACTION METHOD: | NA | | | ON METHOD: | NA | |
| ANALYSIS METHOD: | 310.2 | | | SIS METHOD: | 310.1 | |
| THAILISIS METHOD. | 310.2 | | AITALI | OIG METHOD. | 710.1 | |
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| Target Analyte | AMRO | AMRO | STL-VT | STL-VT | | |
| | QA LAB | RESULTS | CONTRACTOR | | | ARISON |
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| Total Alkalinity as CaCO3 | < 10 | | < 1.0 | | | 0 |
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| | | DJECT: SHEPLE | | | | | |
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| QA SAMPLE No.: | 0210278-01 | *** | CONT | TRACTORS S | SAMPLE No | 508311 | |
| QA FIELD ID: | SHM-96-5B- | -OA | | ONTRACTOR | | SHM-96- | 5B |
| QA ANALYSIS DATE: | 11/5/02 | - · · | · | TOR'S ANAI | | 11/21/02 | |
| QA LABORATORY: | AMRO | | | CTOR'S LA | | STL, VT | |
| XTRACTION METHOD: | NA | T 1 | · | EXTRACTIO | | NA | |
| ANALYSIS METHOD: | 2340B | | | | IS METHOD: | 2340B | |
| | 25.02 | | | | | | |
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| | MATERIA | L DESCRIPTION: | WATER | | | | |
| | | DATE SAMPLED: | | | | | |
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| Target Analyte | AMRO | AMRO | S | TL-VT | STL-VT | | |
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| | LRL | QA LAB | | | CONTRACTOR | | CODE |
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| Total Hardness as CaCO3* | < 33 | | | < 1.3 | 3165 | | 0 |
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| | | SEE APP | ENDIX A FO | R KEY TO C | COMMENTS | | |
| | | | REPORTED | | | | <u>-</u> |
| | | *Note: Ha | rdness as cale | culated by the | separate determinati | ions of calcium | and magnesi |
| | | | | | CaCO3/L by Method | | |

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| QA SAMPLE No.: | 0210278-01 | | | | S SAMPLE No.: | 508311 | 1 |
| QA FIELD ID: | SHM-96-5B-QA | <u> </u> | | | ORS FIELD ID: | SHM-96-5B | .l |
| QA ANALYSIS DATE: | 11/1/02 | | | | ALYSIS DATE: | 11-5+4-02 | 1 |
| QA LABORATORY: | AMRO | | CONTI | | ABORATORY: | STL, VT | 1 |
| EXTRACTION METHOD: | NA | | | | ION METHOD: | NA | 1 |
| ANALYSIS METHOD: | 160.1 and 160.2 | | | ANAL | YSIS METHOD: | 160.1 and 160.2 | 1 |
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| | MATERIAL | DESCRIPTION: | WATER | i | | | |
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| Target Analyte | AMRO | AMRO | L | STL-VT | STL-VT | | |
| | QA LAB | RESULTS | CO CO | NTRACTOR | | COMPARIS | |
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| otal Dissolved Solids (TDS by 160.1) | < 10 | · · · · · · · · · · · · · · · · · · · | | < 5.0 | 167 | 8.80% 0 | |
| otal Suspended Solids (TSS by 160.2) | < 4.0 | i i i | | < 0.50 | 200 | 50.80% 0 | 1 |
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| | LRL | Laboratory Rep | orting Limi | t | | | |

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| QA SAMPLE No.: | C2K010332-001 | | | CTORS SAMPLE No.: | 508311 | |
| QA FIELD ID: | SHM-96-5B-QA | <u>\</u> | | RACTORS FIELD ID: | SHM-96-5I | 3 |
| QA ANALYSIS DATE: | 11/7/02 | | | 'S ANALYSIS DATE: | 11/21/02 | ļ |
| QA LABORATORY: | STL-Pittsgurgh | (subcontracted) | | OR'S LABORATORY: | STL, VT | L |
| EXTRACTION METHOD: | NA NA | | | RACTION METHOD: | NA . | ļ |
| ANALYSIS METHOD: | 9060.0 | | A | NALYSIS METHOD: | 9060.0 | |
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| | MATERIALI | DESCRIPTION: | WATER | | | ļ |
| | | TE SAMPLED: | 10/30/02 | | | |
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| Target Analyte | AMRO | AMRO | STL-V | | | |
| | QA LAB | RESULTS | | | | OMPARISON |
| | LRL | QA LAB | LRL | CONTRACTOR | RPD | CODE |
| | | | | | | |
| | | | | | 5.100 | |
| Total Organic Carbon (TOC) | < 1.0 | | < 1.0 | | 7.14% | 0 |
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| | SEE A | APPENDIX A F | OR KEY TO COMN | ÆNTS | | |
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APPENDIX C

SAMPLE RECEIPT & CUSTODY DOCUMENTATION

SAMPLE RECEIPT CHECKLIST

111 Herrick Street Merrimack, NH 03054

| Client: ARMY CORP Project Name: SHEPLEX'S HILL LAND FILL | AMRO I | | (603) 424-20; 0 2 10278 10-31-02 11-12-02 | | | | |
|--|--|----------|--|-----------------|--|--|--|
| | Date Re | | | | | | |
| Ship via: (circle one) Fed Ex), UPS, AMRO Courier, Hand Del., Other Courier, Other: | Date Du | ie: | | | | | |
| nand Del., Other Couner, Other: | | | | | | | |
| Items to be Checked Upon Receipt | Yes | No | NA. | Commonto | | | |
| Army Samples received in individual plastic bags? | | 140 | - NA | Comments | | | |
| Custody Seals present? | \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ | | | | | | |
| | I V | } | | | | | |
| 3. Custody Seals Intact? | 1 | | <u> </u> | | | | |
| 4. Air Bill included in folder if received? | 1 | | - | | | | |
| 5. Is COC included with samples? | | <u> </u> | | | | | |
| 6. Is COC signed and dated by client? 7. Laboratory receipt temperature. / TEMP = 4 | - | ļ | ļ | | | | |
| | <u> </u> | ļ | | | | | |
| Samples rec. with ice ice packs neither | | | | | | | |
| 8. Were samples received the same day they were sampled? | L | | <u> </u> | | | | |
| Is client temperature 4°C ± 2°C? | V | <u> </u> | <u> </u> | | | | |
| If no obtain authorization from the client for the analyses. | <u> </u> | | <u> </u> | | | | |
| Client authorization from: Date: Obtained by: | | ļ | | | | | |
| Is the COC filled out correctly and completely? | 1 | | | | | | |
| 10. Does the info on the COC match the samples? | V | | | | | | |
| 11. Were samples rec. within holding time? | V | | <u> </u> | | | | |
| 12. Were all samples properly labeled? | ~ | | | | | | |
| 13. Were all samples properly preserved? | | V | <u> </u> | CN sought pH=10 | | | |
| 14. Were proper sample containers used? | | | | , , | | | |
| 15. Were all samples received intact? (none broken or leaking) | ·V | | | | | | |
| 16. Were VOA vials rec. with no air bubbles? | | | | | | | |
| 17. Were the sample volumes sufficient for requested analysis? | 1 | | <u> </u> | | | | |
| 18. Were all samples received? | V | | <u> </u> | | | | |
| 19. VPH and VOA Soils only: | | | V | | | | |
| Sampling Method VPH (circle one): M=Methanol, E=EnCore (air-tight | | - | | • | | | |
| Sampling Method VOA (circle one): M=Methanol, SB=Sodium Bisulfat | e, E=EnC | ore, B=B | ulk | | | | |
| 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 obtain | ned from | client | | | | | |
| Was dry weight aliquot provided? | <u></u> | | | | | | |
| If NO then fax client and inform the | VOA lat | ASAP. | | | | | |
| 20. Subcontracted Samples: | <u></u> | | | | | | |
| What samples sent: $O(\frac{\lambda}{2})$ Where sent: $STL - PITTSBURG$ | | | | | | | |
| | | | | | | | |
| Date: 10-31-02 | | | | | | | |
| | | | | | | | |
| Analysis: TOC | | | | | | | |
| TAT: STL, | | | | | | | |
| | | | | | | | |
| TAT: STL, | | | | | | | |
| TAT: 574, 21. Information entered into: | ~ | | / | | | | |
| TAT: 57d, 21. Information entered into: Internal Tracking Log? | \(\tau_{\text{\texit}\\ \text{\text{\text{\text{\text{\text{\text{\text{\text{\texit{\text{\tinit}\\ \text{\tin}\}\\ \text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\text{\texi}\text{\text{\texi}\tint{\text{\text{\texi}\text{\text{\texi}\text{\text{\texi}\text{\text{\texi}\text{\texit{\texit{\texi}\tint{\tiint{\texit{\texi}\titt{\texitit}}\\text{\texit{\texi{\texi{\texi{\texi{\tet | | / | | | | |
| TAT: 57d, 21. Information entered into: Internal Tracking Log? Dry Weight Log? Client Log? | | | 1 1 1 | | | | |
| TAT: 57d, 21. Information entered into: Internal Tracking Log? Dry Weight Log? | 7 | | | | | | |

U.S. ARMY CORPS OF ENGINEERS Amro # 02 10278 Concord MA 01742 Mark Foeig 918 318 8312 CHAIN OF CUSTODY RECORD
PROJ. NO. PROJECT NAME SAMPLERS: (Signature)
William Mullen July July NO. OF REMARKS CON-**TAINERS** COMP. STATION LOCATION STA. NO. DATE TIME 30 007 5HM-96-5B-QA 12 1141 2002 Trip Blank Relinquished by: (Signature) Received by: (Signature)
Fed Ex Airbill Date / Time Relinquished by: (Signature) Date / Time Received by: (Signature) " neil 30 OCT 1530 835310231158 Received by: (Signature)
0900 10/31/02 Relinquished by: (Signature) Date / Time Relinquished by: (Signature) Date / Time. Received by: (Signature)

Date / Time

Remarks

Relinquished by: (Signature)

Date / Time

Received for Laboratory by:

(Signature)

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

CASE NARRATIVE

Amro Environmental Laboratories Shepley's Hill

STL Lot #: C2K010332

Sample Receiving:

STL Pittsburgh received one sample on November 1, 2002. The cooler temperature was within the proper temperature range.

General Chemistry:

There were no problems associated with the analysis.

CHAIN-OF-CUSTODY RECORD

43699

Office: (603) 424-2022 Fax: (603) 429-8496

| Project No.: | Project Name: | ect Name: SHEPCEY'S WILL LTM | | | | | Project Manager: Sa | | | | | | Samplers (Signature): | | | | | AMRO Project No.: 0210278 |
|---|----------------|-------------------------------|--|-------------------------|---------|--|---------------------|--------------------------|----------|--|--|----------|--|--|--------------|--|---------------------------|--------------------------------------|
| | Project State: | MA | | | | | | | | | | | | | | | | |
| Sample ID | Date/Time | Matrix | Total # | Comp | mp Grab | | | | | Analysis Re | | | ed . | | | | | Remarks |
| | Sampled | A= Air | of Cont. | | | 0 | | | | 1 | | | | | | | | |
| | | S= Soil | & Size | | | 9060 | | | | | 1. | |] | · | | , | | |
| | | GW= Ground W. WW= Waste W. | | | | 8 | - 1 | 1 | | | | | | | | | | |
| | | DW= Drinking W. | , | | | الإرا | |] | | | | | | | | | | |
| | | O= Oil | | | . | 15 | | | | | | | | | | | | |
| | | Other= Specify | | | | <u> </u> | | _ | _ - | | - | <u> </u> | | | | | - | |
| 01D SHM-96- 5B-QA | 10/30/02 | AQ. | 3-40M/ | L | | 1 | | - | | | <u> </u> | | | | | | | |
| 5B-QA | @ 1141 | | | | | <u> </u> | | _ | | | | | | | | | | |
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| | | | | | | | \dashv | + | _ | 1- | + | 1 | | | | | | |
| | | | | | | | | - | | | + | 1 | - | | | | | |
| Preservative: Cl-HCl, MeOH, N-H | N03, S-H2SO4 | Na-NaOH, O- Orl | ner | | | 3 | + | + | + | +- | + | + | +- | - | | - | - | |
| Container Type: P- Plastic, G-Gla | | | | | İ. | V | 二十 | | | | Ĭ | Ī | | Ĺ | | | | |
| Send Results To: | | FAX No.: | - A.1-1 | Seal Intact? P.O. No: | | | | | | GW-1* GW-2 GW-3 | | | | | | | | |
| AMRO ENVIRONMI | ENTAL | 603 42 | | | | | | | | | | | | | | | | |
| 111 Herrick St. | | | | Yes | No | N/A | | | | CP Leve | | | | | | | | , |
| Merrimack, NH 03054 | | | | Results Needed By: S77) | | | | | | | *= May require additional cost | | | | | | | |
| Relinquished By Date/ Time | | | Received By | | | | | | | PRIORITY TURNAROUND TIME AUTHORIZATION | | | | | | | | |
| Graco Shwaldi 10/3/02 | | | 1 1 | F- | f f | | 4-1 | 2 | | | | | | | | | | you must have requested TION NUMBER. |
| process of the same | 10/31/02 | 1-6-6 | | TX/ | | ب در | <u>y</u> | | | | | | | | | | | |
| | | | 1 | , | | | | | - 41 | Samples arriving after 12:00 noon will be tracked and billed as received on the following day. | | | | | | | | |
| | | | | | | | | | | AUTHORIZATION No. | | | | | | | BY: | |
| | | | | مراضع والمستحدد | | | | , | I_ | · | | | | | ·. | | | |
| Please print clearly, legibly and completely. Samples can not be logged in and the turnaround time clock will not start until any ambiguities are resolved. | | | NOTES: Preservatives, Special reporting limits, Know | | | | | nown Contamination, etc; | | | | | | | | | otification in writing to | |
| | | | H250 4 | | | | | | | · | | | | 4 | | | | where the samples were |
| | | | | | | | | | | | | | | collected from highly contaminated sites. | | | | |
| White: Lab Copy Yellow: Accompanies Report | | | Pink: Client Copy SHEET | | | | | | | | | or / | | | | | | |

APPENDIX F

GROUNDWATER ANALYTICAL DATA

3.5 inch diskette (not included in all reports)

APPENDIX G REFERENCES

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- 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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