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BUREAU OF
CONSTRUCTION SERVICES

OPERATION, MAINTENANCE AND MONITORING MANUAL

VOLNEY LANDFILL
VOLNEY, NEW YORK

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1.0 INTRODUCTION

Barton & Loguidice, P.C. has prepared this Operation, Maintenance and Monitoring (OM&M) Manual in accordance with the Statement of Work (SOW) for the Consent Decree (CD) for the Source Control Operable Unit (OU-1) at the Volney Landfill, as well as applicable sections of 6 NYCRR Part 360. This OM&M Manual has been prepared on behalf of the County of Oswego, who is the Supervising Contractor pursuant to the terms of the CD. The preparation of this manual is part of the completion of the Remedial Action (RA) for the site. The selected remedy for the site, presented in the 1987 Record of Decision (ROD) and modified by the 1997 Explanation of Significant Differences (ESD), included the supplemental capping of the landfill side slopes, continued leachate collection from the existing leachate collection system, intermittent groundwater collection on an as-needed basis, off-site treatment of leachate and contaminated groundwater, and long-term monitoring.

This plan contains the procedures for inspecting and maintaining the supplemental cap, off-site disposal of collected leachate, provision and certification of institutional controls, decommissioning of monitoring wells, as well as monitoring of groundwater and air quality in the immediate perimeter of the landfill. This plan also incorporates monitoring of downgradient groundwater wells based upon information from the Contamination Pathways Investigation and as required by the 2001 ESD issued by the U.S. Environmental Protection Agency (USEPA).

2.0 BACKGROUND AND SITE DESCRIPTION

The 85-acre Volney Landfill is located in a rural area of the Town of Volney, New York. Bell Creek, which flows north to south, is located to the east of the landfill and wetlands are located to the north, east, southeast, and southwest of the landfill.

Landfilling operations were conducted in a 55-acre unlined disposal area from 1969 to 1983. Most of the waste materials disposed of at the landfill consisted of residential, commercial, institutional, and light industrial wastes; however, approximately 8,000 drums from Pollution Abatement Services, a hazardous waste incineration facility located in Oswego, New York, were approved for disposal at the landfill by the New York State Department of Environmental Conservation (NYSDEC). While the approval applied only to discarded drums containing known and limited chemical residues, it was later reported that approximately 50 to 200 of these drums contained liquid waste of unknown volume and composition. The physical condition and locations of these drums in the landfill are unknown.

After ground water quality standards were contravened in monitoring wells located near the site, in 1979, NYSDEC entered into a consent order with the current owner of the landfill, Oswego County. The consent order required the capping the landfill top with a liner and soil, capping the side slopes with compacted soil, installing a gas collection system, and installing a leachate collection system. This work was performed between 1979 and 1985. Off-site leachate disposal and ground water monitoring have been performed since the completion of the closure activities.

In October 1984, the Volney Landfill site was included on the Superfund National Priorities List.

An RI/FS was conducted from 1985 to 1987 by NYSDEC, and a ROD was signed by EPA on July 31, 1987. The selected remedy included capping of the landfill side slopes with an impermeable membrane, installation of a more extensive leachate collection drain system and a subsurface ground water containment barrier (slurry wall), treatment of the collected leachate either on- or off-site, and long-term monitoring.

After the signing of the ROD, it was learned that a quality assurance/quality control review of the analytical data associated with the RI had not been performed. EPA re-sampled the site in 1988 and, based upon the sampling results, concluded that hazardous substances were present at the site at levels that posed a risk to public health and the environment. On September 29, 1989, EPA issued a PDD, which reaffirmed the remedy selected in the ROD. In response to comments received during the public comment period, the PDD also called for a re-evaluation of the cost-effectiveness of the slurry wall called for in the ROD and a determination as to whether to provide for on- or off-site leachate treatment.

Studies conducted from 1989 to 1990 provided information about off-site leachate treatment and updated the construction costs for the site remedy. The studies concluded, however, that before any final decisions related to the slurry wall or leachate treatment could be made, additional testing was needed to resolve several critical issues concerning the site hydrogeology (i.e., possible artesian conditions, ground water flow issues, and no reduction in contaminated leachate collection volume since the 1985 capping of the landfill).

An Administrative Order on Consent was signed in 1993 for the performance of a pre-design study by a group of Potentially Responsible Parties (PRPs). Based upon the results of the pre-design study, which was completed in 1997, EPA determined that while there is no definable contaminant ground water plume, only intermittent increases in contaminant concentrations.

In addition, it was determined that natural attenuation is occurring in a sizable buffer zone between the landfill and eight downgradient residential wells. This conclusion was based upon the fact that contamination has not been found in the downgradient private wells, the closest well being located approximately 450 feet from the landfill. It was also determined that the installation of a slurry wall and a more extensive leachate collection drain system would not offer a significant protective benefit when considering its relatively high cost and the relatively low volume of leachate that is generated. Also, off-site treatment and disposal of the leachate would be more cost-effective than on-site treatment and disposal (due to the low volume of leachate that is generated and the significant cost to construct and operate an on-site treatment facility). Based upon these findings, an ESD was issued by EPA in 1997, which concluded that a slurry wall should not be installed, the intermittent ground water contamination should be extracted on an as-needed-basis, and the collected contaminated ground water should be treated off-site.

Negotiations with 40 PRPs for the performance of the design and construction of the remedy resulted in the PRPs signing a CD in May 1998. The design began shortly thereafter, and was completed in September 1999. The construction commenced in the Summer of 2000, and was completed in mid-September 2001.

The ROD called for an investigation to evaluate the potential for the migration of contaminants in the ground water and to the surface water and sediments of the adjacent Bell Creek and wetlands surrounding the site. This investigation was initiated in 1990 under an Administrative Order on Consent with the PRPs, but was delayed while the pre-design study noted above was completed. The investigation was reactivated in 1998 (at the same time as the initiation of the design). The resulting Contamination Pathways Investigation Report and Contamination Pathways Human Health and Ecological Risk Assessments were completed in September 2001.

A groundwater extraction contingency plan was developed to determine when groundwater concentrations warranted implementation of groundwater collection.

USEPA indicated that the initial pumping requirement of the ROD and the need to demonstrate the functionality of the groundwater extraction system would be met by a groundwater pumping program involving well VBW-8D.

2.1 HISTORY OF REGULATORY AND RESPONSE ACTIONS

The 1987 Record of Decision (ROD) for the Volney Landfill site called for, among other things, supplemental capping of the landfill side slopes, installation of a more extensive leachate collection system, installation of a slurry wall, performance of treatability studies to determine if leachate treatment/disposal should be on- or off-site, implementation of the on- or off-site treatment/disposal alternative, and long-term monitoring.

Following a re-sampling of the site in 1988, USEPA issued a Post-Decision Document (PDD) in 1989. This document called for a re-evaluation of the slurry wall and a determination as to whether the leachate should be treated/disposed of on- or off-site. Pre-remedial design (pre-RD) studies were conducted to address these issues, as well as questions that arose concerning the hydrology at the site and the finding that a Resource Conservation and Recovery Act (RCRA)-listed hazardous waste sludge had been disposed of at the landfill.

In August of 1997, the USEPA issued an Explanation of Significant Differences for the site. In an attempt to address the outstanding issues so as to appropriately refine the remedy selected in the ROD, the DDER, developed and evaluated seventeen remedial alternatives. The alternatives evaluation included comparisons of different combinations of remedial components (*i.e.*, leachate drains versus extraction wells, slurry wall versus no slurry wall, on- versus off-site leachate treatment/disposal, and hazardous versus non-hazardous leachate treatment/disposal). All of the alternatives that were evaluated utilized the same supplemental side slope cap. Based upon this evaluation, it was concluded that:

- utilizing intermittent groundwater extraction and treatment, on an as-needed basis (after initial pumping, subject to the trigger mechanism in the RD Work Plan), in combination with the existing leachate collection system, would be more appropriate than expanding the existing leachate collection system and continuously collecting large volumes of relatively dilute leachate;

- a slurry wall is not cost-effective in combination with intermittent groundwater extraction; and

- the collected leachate should be treated off-site.

Further, it was concluded that the RCRA regulations related to the hazardous waste sludge, which was disposed of at the landfill should be waived. Summarized below is the basis for these conclusions.

Since selecting an appropriate method of leachate treatment/disposal would be significantly influenced by whether or not the leachate would have to be handled as a RCRA-listed hazardous waste, the F019 issue is addressed first.

2.1.1 F019 Issue – RCRA Regulations Waiver

As noted above, EPA determined that the Miller Brewing Co. had disposed of RCRA-listed F019 waste sludges in the landfill. A review of analytical data related to five different batches of leachate collected from the landfill from 1992 to 1996 (approximately 150,000 gallons/batch) did not, however, show either F019 constituent (hexavalent chromium or cyanide). In addition, based upon information provided to EPA by Miller in 1996, EPA has determined that one of the two hazardous waste constituents, cyanide, was probably never used in the Miller plant process. EPA has also concluded that the other constituent, hexavalent chromium, would likely have been converted to trivalent chromium by Miller's wastewater treatment process. Therefore, trivalent chromium, not the more toxic hexavalent chromium, would have been the primary chromium component in the sludge delivered to the landfill from 1976 to 1978.

Based on these considerations, USEPA determined that the RCRA regulations applying to this matter should be "waived" on the basis of "equivalent standard of performance" pursuant to Section 121(d)(4)(D) of CERCLA, and Section 300.430(f)(1)(ii)(C)(4) of the National Oil and Hazardous Substances Pollution Contingency Plan. Use of this waiver is intended where the standard of performance can be equaled or exceeded through the use of another standard. Invoking this waiver will also result in a more cost-effective remedy. This waiver will not, however, relieve Oswego County from continued responsibility for testing to determine if the leachate should be managed as a characteristic hazardous waste.

2.1.2 Description of the Significant Differences

A review of groundwater data collected from monitoring wells located at the perimeter of the landfill shows a relatively low frequency range of organic contamination, characterized by intermittent increases in contaminant concentrations. In addition, there is no definable contaminant plume at the perimeter of the landfill. Further, pre-RD study data suggest that natural attenuation is occurring in a sizeable buffer zone between the landfill perimeter and the downgradient residential wells. In addition, natural attenuation appears to have been protecting the residential wells for a significant period of time. Based upon these findings, USEPA concluded that it would be more appropriate to collect the contaminated groundwater (in combination with the existing leachate collection system), on an as-needed basis (based upon criteria established during the design phase), rather than expanding the existing leachate collection system and continuously collecting large volumes of relatively dilute volumes of relatively dilute leachate.

USEPA also determined that the installation of a slurry wall and leachate collection drain system to isolate and collect leachate will not offer a significant protective benefit in comparison to its cost, because once the landfill's side slopes are capped, it is estimated that over 99% of the surface water infiltration will be eliminated. For the same reason, leachate collection by extraction wells that are pumped intermittently would be more cost-effective than a leachate collection drain system.

With respect to leachate treatment and disposal, USEPA concluded that off-site treatment and disposal of non-hazardous leachate is more cost-effective than on-site treatment and disposal.

2.1.3 Description of the Modified Remedy

The selected remedy, as modified by the ESD, includes supplemental capping of the landfill side slopes, continued leachate collection from the existing leachate collection system, intermittent groundwater extraction on an as-needed basis (after initial pumping, subject to the trigger mechanism in the RD Work Plan), off-site leachate and groundwater treatment, and long-term monitoring.

2.1.4 Remedial Activities

The sideslope capping was completed in 2001,and the construction activities are described in the remedial Action Report (RAR) for Remedial Work Element I (RWEI) (original dated September 2001). The implementation of remedial pumping of groundwater was commenced in 2001,and the activities are described in the RAR for RWE II (dated September 2001).

2.2 CHRONOLOGY

Date:	**Event:**
July 31, 1987	Record of Decision issued by EPA
September 29, 1989	Post-Decision Document issued by EPA
September 28, 1990	Administrative Order on Consent for Contamination Pathways investigation executed.
June 28, 1993	Administrative Order on Consent for Supplemental Pre-Remedial Design Investigation executed.
August 7, 1997	Supplemental Pre-Remedial Design Investigation completed.
August 7, 1997	Explanation of Significant Differences issued by EPA
October 9, 1998	Design/Construction Consent Decree entered by Court
September 30, 1999	Design completed.
August 9, 2000	Construction starts on-site.
September 12, 2001	Construction completed; pre-final inspection.

2.3 PERFORMANCE STANDARDS AND CONSTRUCTION QUALITY CONTROL

Remedial action activities at the site were undertaken in a manner consistent with the 1987 ROD, as modified by the 1989 PDD, and 1997 ESD and with the RD plans and specifications, as modified by the as-built documentation. All applicable EPA and State QA/QC procedures and protocols were incorporated into the RD. EPA analytical methods were used for all validation and monitoring samples during all RA activities. All procedures and protocols followed for ground water, soil, and air sample collection and analyses during the RA are documented in the RD reports, and the sample analyses were conducted through Contract Laboratory Program laboratories.

The QA/QC program used throughout the soil and ground water RAs was rigorous and in conformance with EPA and State standards; therefore, EPA and the State determined that all analytical results are accurate to the degree needed to assure satisfactory execution of the RAs, consistent with the 1987 ROD, as modified by the 1989 PDD, and 1997 ESD, and the RD plans and specifications, as modified by the as-built documentation.

2.4 FINAL INSPECTIONS AND CERTIFICATIONS

The final inspection of the constructed remedy and the remedial pumping demonstration took place on September 12, 2001. Present at the inspection were representatives of the following:

U.S. Environmental Protection Agency
New York State Department of Environmental Conservation
U.S. Army Corps of Engineers
Oswego County
Barton & Loguidice, P. C.

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3.0 SITE OPERATION

3.1 Leachate Collection

The existing leachate collection system was evaluated in the Design Data Evaluation Report (DDER), and the collection tank is shown on Figure 1. The tank is inspected on a regular basis by the Oswego County Department of Health. The tank is emptied on an as-needed basis by the Oswego County Department of Solid Waste, under the supervision of the Health Department. The sampling and disposal of collected leachate is managed by the Health Department. Leachate is disposed at a municipal sewage treatment plant (usually the City of Fulton or the City of Watertown), depending upon the available capacity. On occasion, small amounts of collected groundwater may be added to the leachate tank and mixed with the collected leachate for later disposal. The management of leachate/groundwater by the process just described will be continued through the foreseeable future .

4.0 SITE MAINTENANCE

The landfill cap and gas system on the top of the landfill are roughly 15 years older than the respective components on the side slopes, and the inspections discussed in this section • acknowledge this fact. The landfill will be inspected on a quarterly basis, as described below. The inspection form is provided as Figure 2.

Maintenance of the site will be performed by three departments of Oswego County. The three departments are: The Department of Health (DOH), the Department of Public Works (DPW), and the Department of Solid Waste (DSW). Each department will perform specific tasks associated with post-closure operation, monitoring and maintenance. Some tasks overlap and more than one department may be responsible for performing the task. In order for the program to be successful it is imperative that each department notify the other department of upcoming events. A list of the proposed tasks along with a description and frequency has been prepared for each department. The proposed task delegation list is included as Figure 3.

4.1 Landfill Cap

The landfill cap consists of two different yet integrated systems. On the top slopes of the landfill, the cap consists of a PVC geomembrane barrier layer overlain with a minimum of 1.5 feet of cover soil. This capping system was constructed approximately 15 years ago. On the side slopes of the landfill, the cap consists of a textured LLDPE geomembrane barrier layer overlain with a minimum of 2.5 feet of cover soil. Construction of this capping system was completed in 2001. Due to the top capping system being older that the side slope capping system, the top slope cap should be inspected more carefully as the individual components of the system may be more likely to require maintenance.

The landfill cap will be inspected on a quarterly basis by a Barton & Loguidice engineer to identify whether problems that might have developed, such as cracking, settlement, erosion or loss of vegetation from cover soils. Inspection of the geomembrane (PVC on top of the landfill, textured LLDPE on the side slopes of the landfill) should occur if exposed to ensure that geomembrane has not been damaged. If geomembrane has been damaged, it will be repaired by a geomembrane installer. If erosion to the cover soils are noted, they will be repaired by replacement of the soils and re-seeding (note that reseeding will not be performed during the winter, but in the next growing season). If loss of vegetation is noted, seeding, fertilizing and mulching will repair the unprotected area. To prevent excessive vegetative growth, the vegetative cover will be mowed on an annual basis by Oswego County.

If excessive settlement of the cap is observed such that a major ponding of water occurs, it may be necessary to repair the landfill cap. The repair will require the removal of the landfill cover soil and, if applicable, geomembrane liner over the entire settlement area. Upon removal, the settlement area must be brought back to pre-settlement drainage grades. The geomembrane will be patched by a geomembrane installer, the soil replaced and reseeded. USEPA and NYSDEC will be notified prior to major cap settlement remediation.

4.2 Drainage System

The drainage system will also be inspected on a quarterly basis. The toe of slope, where water discharges from the soil drainage layer, will be inspected to identify areas of possible erosion or siltation, which may restrict the flow of surface water within the system. Siltation or other flow restrictions shall be removed; additional stone or soil added; reseeding of the area if necessary; and silt fencing or bales shall be reestablished. Perimeter swales, downchutes and culverts will be inspected for proper performance. Eroded areas will be repaired and reseeded as needed.

4.3 Landfill Gas System

The landfill gas collection and venting system will also be inspected on a quarterly basis. Each vent shall be inspected for physical damage and the surrounding cover soil should be checked for settlement. Damaged pipe should be replaced with similar pipe. It excessive settlement is observed, the geomembrane (PVC or LLDPE) should be exposed and inspected to determine if it has been breached. If the geomembrane has been breached, it will be repaired, the soils shall then be replaced and additional soils will be installed to bring the cover soil back to the elevation surrounding the vent.

Pumping of vents will be performed using non-submersible pumps, with the suction line being long enough to pump each well dry. The actual well pump should only be operated in well ventilated areas. The area where the pump will be operated should be checked for explosive gases prior to pump operation. Gas concentrations must be below lower explosive limit before operating the pump. Maintenance and inspection procedures for the gas flares will be performed in accordance with manufacturers recommendations which are included in Appendix D, "Cut Sheets".

During the completion of the landfill cap construction, a buildup of water was noted in landfill gas vent 15A, which is located on the northwest slope of the landfill. The water was pumped from this vent and two adjacent "B" vents on several occasions. During the final site inspection, it was agreed that continued pumping of this vent on an as-needed basis would be a long-term maintenance issue. This vent will be inspected and pumped on a minimum of a quarterly basis. It is anticipated that initially this vent will be pumped out more frequently than quarterly. The frequency of pumping will be adjusted based on regular inspection and measurement. If water buildup is noted in other vents, they will be similarly pumped. The water collected from the vent is pumped into a portable plastic tank and is transported to the east side of the landfill and discharged into the leachate collection tank.

4.4 Gas Monitoring

On a quarterly basis a combustible gas indicator (CGI) will be used to measure landfill gas emissions at the ten (10) explosive gas monitoring locations (EGM-1 through EGM-10) located along the property boundary and at all on-site structures. See Figure 1 for monitoring locations.

At each monitoring location, a 1.5-inch diameter auger will be advanced to a depth of approximately eighteen to twenty inches below ground surface. A 1.5-inch diameter by 36-inch long PVC pipe will then be placed in the auger hole to a depth of approximately 12-inches. The outside of the PVC pipe will then be backfilled with soil. The top end of the pipe is then sealed with parafilm. A period of approximately one hour will be allowed for soil gas within the sealed pipe to equilibrate to natural concentrations. The tip of the combustible gas monitor will then be inserted through the parafilm seal to obtain a headspace reading of gas emissions concentration.

The concentration of methane and other explosive gases must not exceed:

- 25% of the lower explosive limit (LEL) for gases in structures on or off-site (excluding the gas control system components); and
- the lower explosive limit for gases at or beyond the property boundary.

If these concentrations are exceeded, the following tasks must be performed within the specified time frames:

- Within seven (7) days of detection, the methane gas levels detected shall be submitted to USEPA and NYSDEC along with a description of the steps taken to protect human health. Corrective actions taken must initially ensure the safety and protection of all operating personnel.
- Within forty five (45) days of detection, a remediation plan must be submitted to USEPA and NYSDEC which describes the nature and extent of the problem, the proposed remedy, and a schedule for implementation of the plan. Possible remedies include installing a passive or active gas venting system between the landfill and nearby structures and the property limits. The system implemented must effectively reduce the explosive gas concentrations to levels in compliance with the criterion given above.
- Within sixty (60) days of detection, the remediation plan must be fully implemented.

4.5 Vectors

During the quarterly inspections, the presence of vectors on the site will be identified. Vectors include but are not limited to rodents, insects, and birds. Should vectors be identified at the site, treatment should be made to remove them from the site.

4.6 Structures

On a quarterly basis, on-site structures shall be inspected. On-site structures include monitoring well covers, fences, gates, manholes, buildings, and access roads. These structures should all be inspected to ensure that each is undamaged and secure. Damaged structure should be repaired using suitable methods based on the nature of the damage. Any failed structure affiliated with the security of the site such as fences and gates should be re-secured immediately. Severe damage should be repaired by a fencing contractor. Minor damage can be repaired with the installation of new chain link sections installed with the proper tensioning tools and fasteners. Damage to access road shall be repaired by grading the roads and importing additional gravel backfill as required. In severe soft spots the installation of geotextile may be necessary.

5.0 SITE MONITORING

This section constitutes the Sampling Analysis and Monitoring Plan (SAMP), providing the procedures for monitoring environmental media around the landfill following installation of the remedy. The Quality Assurance Project Plan and the Health and Safety Contingency Plan are provided in Appendices A and B, respectively. Site monitoring protocols/procedures are provided in Appendix C.

5.1 Ambient Air Monitoring

The SOW calls for the implementation of long-term air quality monitoring to evaluate the effectiveness of the capping component of the site remedy. Extensive investigation of subsurface landfill gas was conducted during the Supplemental Pre-Remedial Design Study (SPRDS) and during the Remedial Design phase. As part of the Remedial Design phase, extensive testing of the landfill gas vents was conducted, and an evaluation of potential air emissions was conducted. The results of the testing and evaluation are contained in the report titled *Supplemental Ambient Air Quality Analysis Report – Landfill Gas Emissions*, dated April 2001. The conclusion of that report was that even under worst-case concentrations, ambient air quality standards or guidelines would not be exceeded at the landfill boundary. Additionally, flares have been installed on landfill gas vents to control nuisance odors.

Given that potential emissions are anticipated to be very low in comparison to ambient air quality standards or guidelines, a limited ambient air monitoring program is being proposed. Ambient air sampling will be conducted once during each of the first two years following completion of the cap installation, i.e. – 2002 and 2003. Ambient air samples will be collected during the summer of each of these years; if feasible, collection of air samples will be coordinated with events that use surrounding properties (e.g., the race track.) During each sampling event, one sample will be collected along each of the east, west, north and south fence lines (i.e. – for a total of four samples). Samples will be collected with a sampling pump into an evacuated tedlar bag. Samples will be analyzed for volatile organic compounds (VOCs) by method TO-14. Depending upon the results of the two rounds of ambient air sampling and the landfill gas monitoring, future ambient air sampling may be continued, modified or eliminated; USEPA and NYSDEC will be consulted in this decision.

5.2 Long-Term Leachate and Groundwater Quality Monitoring

Sampling and analysis of leachate and groundwater has taken place numerous times at the Volney Landfill site. The Oswego County Department of Health (OCDH) has conducted a groundwater monitoring program on a quarterly/semi-annual basis since the mid-1980's; this program has included groundwater monitoring wells, residential wells, surface water and leachate. Sampling and analysis has also been conducted as part of specific programs, with the largest sampling and analysis events being conducted during the SPRDS and the Contamination Pathways (CP) Investigation.

The OCDH program included sampling of surface water at points along Bell Creek, and the CP Investigation included sampling of surface water and sediment in Bell Creek as well as in the unnamed tributary west of the landfill. Contamination attributable to the landfill was not detected during the 15+ years of monitoring by OCDH or in the sediment and surface water sampling conducted during the CP Investigation. The conclusions of the CP Investigation indicate that monitoring of surface water and sediment around the landfill is not warranted.

Previous investigations have included semivolatile organic compounds (SVOCs) in the analytical suite of parameters. Only a very few SVOCs have been detected at this site, and at very low concentrations. SVOCs have not been detected in the absence of leachate indicator parameters, i.e., the limited detection of SVOCs has been within the area of defined leachate impacts. The SVOCs did not meaningfully contribute to possible risk posed by the site, as discussed in the CP Investigation report. Consequently, the data needs of the ongoing groundwater monitoring program do not justify the expense of analyzing collected samples for SVOCs.

The leachate and groundwater monitoring program has been developed to incorporate the benefits of each of these data collection efforts. The groundwater monitoring program proposed in this manual is a modification of the program first proposed in the August 1999 RD Report. The modifications largely reflect the findings of the CP Investigation, which was completed after the issuance of the RD Report. The long-term monitoring points for leachate and groundwater are identified in Table 1 and shown on Figure 1; the analytical parameters are provided in Table 2 (with the exception of the new monitoring well at the Race Track and VBW-8D Pumping Well.) The two wells just cited will be sampled quarterly for one year; samples will be analyzed for full Target Compound List (TCL), Target Analyst List (TAL) and conventional water quality parameters. The results of the testing will be reviewed with USEPH after one year, and a reduced sampling and analysis regimen may be implemented. Sampling of the wells identified in Table 1 will be conducted semi-annually.

The residential wells will be sampled on a quarterly basis, for an indefinite time period into the future. The monitoring wells and leachate manholes will be sampled on a semi-annual basis up to the first 5-year review for the site, at which time the adequacy of the monitoring program will be reviewed with NYSDEC and USEPA. In the event that monitoring data indicates that modifications to the monitoring program are warranted prior to the 5-year review, the proposed modifications will be provided to NYSDEC and USEPA in writing for review and approval prior to implementation.

The results from the monitoring wells will be addressed by the Groundwater Extraction Contingency Plan appearing in the September 1999 Remedial Design Report (also provided in Appendix E of this plan) and as modified below:

Also provided in Table 1 is a notation as to whether the results from the identified well will be compared to the "trigger levels" appearing in the Groundwater Extraction Contingency Plan or to drinking water standards to evaluate remedial progress. The trigger levels were derived for addressing groundwater in the immediate perimeter (or source control area) of the landfill, to identify wells where sufficient contamination was present to warrant remedial pumping. The trigger levels were not developed as cleanup criteria, but as a means to determine when pumping should be implemented as an additional, temporary remedial measure. As can be seen from Table 1, the trigger levels are only applicable to wells that are proximate to the landfill; to date only well VBW-8D has exceeded the trigger level and a pumping program was implemented. Water quality in wells that are located at distance from the landfill are protected by natural attenuation of contaminants, as discussed in the Contamination Pathways Investigation Report. Consequently, water quality data will be compared to drinking water standards (Federal MCLs and/or 6NYCRR Part 705 standards, which are the cleanup goals) to evaluate the effectiveness of the remedy, the need for modification of the monitoring program (e.g., expansion or reduction), and to evaluate whether the trigger levels are applicable.

5.3 Decommissioning of Monitoring Wells

Table 1 identifies the monitoring wells that will be used for the long-term monitoring of groundwater conditions around the landfill. There are numerous other wells located around the landfill that were installed during the different subsurface investigations (see Figure 1), So that damaged or unused monitoring wells will not serve as conduits for surface runoff, a program of decommissioning (abandonment) of monitoring wells will be undertaken. The first group of wells to be decommissioned are identified on Table 3. The protocol for decommissioning of monitoring wells is provided in Appendix F. In the future, groups of wells will be proposed for decommissioning to USEPA if they are damaged or become unnecessary for the groundwater monitoring program.

5.4 Institutional Controls

The landfill property and adjoining properties owned by Oswego County will be subject to some restrictions regarding their future use. These restrictions have not been finalized at this time, but will likely prohibit certain activities (e.g. - installation of potable water wells) on the properties; these restrictions will be attached or added to the deeds for these properties. Oswego

County will perform an annual certification of these restrictions, as will be described in the forthcoming agreement between USEPA and the County.

5.5 Public Notification

The work at the site is governed by a consent decree with USEPA, which derives its authority from the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the National Contingency Plan (NCP). USEPA has provided ample opportunity for public notification input to the remedial process at the Volney Landfill Site, consistent with CERCLA and NCP requirements including: public meetings, establishment of a local document repository, mailings to residents living near the site, placing notices in local papers, provisions of site signage with agency contacts, and provision of public phone contact with the USEPA Remedial Project Manager. Oswego County and Barton & Loguidice have provided support to USEPA's efforts as needed. In the event that public notification activities are deemed necessary by the USEPA RPM, the same mechanisms will be employed as previously done.

TABLE 1
Monitoring Points for Long-Term Monitoring

Well No.	Rationale	Comparison Criteria
Overburden Wells		
VBW-8S	VOCs detected during CPRI	TL
VBW-8D	VOCs detected during CPRI	TL
SHW-1	VOCs detected during CPRI	TL
SHW-3	VOCs detected during CPRI	TL
SHW-4	VOCs detected during CPRI	TL
SHW-8	VOCs detected during CPRI	TL
GW-3C	VOCs detected during CPRI; monitor extent of leachate impacts	TL
GW-9R	Replacement for SHW-2 - VOCs detected during CPRI	TL
SGW-27A	Replacement for VBW-4S - VOCs detected during CPRI	TL
SGW-30B	Monitor extent of leachate impacts	DW
MW-3S	Monitor extent of leachate impacts	DW
MW-10S	Monitor extent of leachate impacts	DW
MW-11S	Monitor extent of leachate impacts	DW
Bedrock Wells		
BRW-6	VOCs detected during CPRI	DW
BRW-7	VOCs detected during CPRI	DW
MW-6BR	Monitor extent of leachate impacts	DW
MW-7BR	VOCs detected during CPRI; monitor extent of leachate impacts	DW
MW-8BR	VOCs detected during CPRI; monitor extent of leachate impacts	DW
VBW-8D	Pumping Well	
Leachate		
OVL-1	Monitor leachate quality	NA
OVL-2	Monitor leachate quality	NA
OVL-3	Monitor leachate quality	NA
Residential Wells		
RW-1A	Ongoing residential well monitoring	DW
RW-1B	Ongoing residential well monitoring	DW
RW-2	Ongoing residential well monitoring	DW
RW-5	Ongoing residential well monitoring	DW
RW-6	Ongoing residential well monitoring	DW
RW-7	Ongoing residential well monitoring	DW
RW-10	Ongoing residential well monitoring	DW
RW-11	Ongoing residential well monitoring	DW
-	New Monitoring Well at Race Track (Proposed)	DW

TL – Trigger Level DW-Drinking Water Standards NA-Not Applicable

TABLE 2

MONITORING PARAMETERS

VOCs
Arsenic
Barium
Chromium
Ammonia
Nitrate
Iron
Manganese
Sodium
Chloride
Calcium
Magnesium
Alkalinity
Field Parameters – pH, Conductivity, DO, Redox, Temp

Table 3 Monitoring Wells Proposed for Abandonment - Volney Landfill

	SP-1	VBW-3S	MW-1S
BRW-1	SP-2	VBW-3BR	MW-2S
BRW-2	SP-5	VBW-5	MW-2I
BRW-3	SP-6	VBW-13	MW-4S
BRW-4	SP-7	VBW-31	MW-5S
BRW-5	SP-8	VBW-12	MW-9S
BRW-9	SP-9	VBW-15	MW-9BR
	SP-10	VBW-17A	
PZ-1	SP-12	VBW-17	DTP-1
PZ-2	SP-13	VBW-11	
PZ-3	SP-14	VBW-14	
PZ-4			
	SGW-28	LTW-10	WP-1
GW-3D	SGW-27B	LTW-9	WP-2
GW-6R	SGW-30A	LTW-6	WP-3
GW-7R	SGW-33	LTW-5	WP-4
GW-8R	SGW-34	LTW-5	WP-5
GW-18	SGW-29	LTW-11	
GW-10		LTW-13	
GW-16	SHW-2	LTW-12	
GW-12A	SHW-5	LTW-8	
GW-14A	SHW-7		
GW-11A	SHW-9	LTW-3	
GW-17		VBW-7S	
GW-11AR		VBW-7B	
GW-5R		VBW-8BR	
GW-10R		LTW-4	
GW-15R		LTW-2	
		VBW-6	
		LTW-6	
		LTW-1	

6.0 CONTINGENCIES

6.1 Explosive Landfill Gases Detected On-Site

If gas is detected in the monitoring wells located at or outside the perimeter of the landfill at concentrations which exceed the criterion given in Section 4.4, Oswego County will immediately notify the NYSDEC Division of Environmental Remediation and will initiate corrective actions to ensure safety and protection of human health. Additionally, the following steps shall be taken with in the specified time frames:

- Within seven (7) days of detection, the methane gas levels detected will be submitted to USEPA and NYSDEC along with a description of the steps taken to protect human health. Corrective actions taken must initially ensure the safety and protection of all operating personnel.

- Within forty five (45) days of detection, a remediation plan will be submitted to USEPA and NYSDEC which describes the nature and extent of the problem, the proposed remedy, and a schedule for implementation of the plan. Possible remedies include installing a passive or active gas venting system between the landfill and nearby structures and the property limits. The system implemented must effectively reduce the explosive gas concentrations to levels in compliance with the criterion given in Section 4.3.

- Within sixty (60) days of detection, the remediation plan must be fully implemented.

6.2 Dust Control

Dust control on access and haul roads will be accomplished by means of a water truck, and by limiting the size of unvegetated areas (such as borrow areas) to the minimum practicable operational size. Vegetation will also be reestablished as quickly as possible on areas which will not be used for a significant period of time. No chemical means of dust control is allowed.

6.3 Odor Control

The landfill gas collection and control system will help to reduce odors by burning off gases which contribute to landfill odors. Should odors become a problem, vent flares shall be checked to verify that they are operational. Also, the vents will be checked to verify that they are not plugged by elevated leachate levels. If leachate is found to be present within the vent, the leachate should be pumped out as described in Section 4.3.

6.4 Unusual Traffic Conditions

Unusual traffic conditions will generally consist of either mud or snow problems. Extended periods of wet weather may make traction difficult to and from the leachate storage tank and in general on the perimeter access roads. Landfill equipment will be equipped with tow chains and will be prepared to tow vehicles in and out as necessary. Snow removal on-site will be provided by a snowplow or front end loader on the access roads. During winter months, landfill personnel will contact the appropriate authorities that monitor local road conditions to ascertain the driving conditions. If conditions are hazardous, leachate will not be hauled out of the landfill on such days.

6.5 Vector Control

With the landfill closed, the presence of vectors is not anticipated to be a problem. However, should vectors be encountered at the site, they should be removed from the site via pest control. If periodic inspections identify rodent activity, a trapping program will be implemented to reduce the rodent population. No chemical means of rodent or bird control will be used at the site. Bird control techniques such as recordings, scarecrows, or balloons may be used on an as-needed basis, during the daytime. Also, whistlers or shotcrackers which are non-lethal noise producing projectiles may be fired from a gun if necessary.

6.6 Releases of Hazardous or Toxic Materials

Should a release of Hazardous or Toxic Materials occur, the NYSDEC Division of Environmental Remediation (518) 402 - 9812, and the NYSDEC Spill Hot Line (1-800-457-7632) will be notified immediately, and if necessary, a cleanup contractor will be called to the site. A listing of cleanup contractors and their telephone numbers will be maintained by Oswego County at the landfill site.

Similar procedures will be followed in the event of a spill of fuel oil or hydraulic oil outside of the lined portion of the landfill from operations at the site. A supply of absorbent and spill containment materials will be maintained at the landfill to contain any fuel oil or hydraulic oil spill until it is cleaned up.

6.7 Leachate Storage Facility at or Above Capacity

The leachate tank level shall be monitored on at least a quarterly basis and more frequently during operation of the groundwater extraction system. Also, the level in the tank should be monitored after periods of wet weather and after large storm events. Increased hauling frequencies for leachate will be instituted when a leachate tank reaches 3/4 full capacity. This will continue until the tank can be maintained at 3/4 full capacity. If necessary, the leachate tanker can haul for extended hours to increase the daily capacity for transferring leachate to ensure that the storage capacity is not exceeded.

The proposed operation of the tank will include a yearly lowering to minimum levels prior to the winter months. This will facilitate the reduction or elimination of leachate disposal trips during winter months when travel and loading conditions are less favorable.

6.8 Leachate Tank Spills or Leakage

The concrete tank is designed to be leak-proof. No secondary containment structure exists, therefore any leachate that has overflowed or leaked out should be recovered as quickly as possible using a pump and tanker truck. If tank leakage is suspected, the tank should be emptied to the degree possible and inspected. Any cracks or holes that are observed should be repaired as appropriate.

6.9 Leachate Truck Spill or Accident

Oswego County will train its personnel in the procedures to be followed if a spill occurs during the hauling of leachate from the landfill to the wastewater treatment facility. After emergency services are called to deal with any injuries, Oswego County will immediately contact the New York State Department of Environmental Conservation Spill Hot Line (800-457-7362) to report the spill.

Cleanup activities will be undertaken by Oswego County personnel or contractors in coordination with any NYSDEC staff assigned to monitor the cleanup. Any leachate that is present as standing water will be pumped by Oswego County personnel, using a portable pump, into a tanker truck. Other remedial measures, appropriate to the amount and nature of the spill, will be implemented.

In addition, Oswego County will notify the New York State Department of Health to evaluate potential health impacts and determine what, if any, water quality testing should be performed on nearby water bodies. In the event leachate is released into waters that are used for water supplies, the appropriate municipal officials (as well as USEPA and NYSDEC and the New York State Department of Health) will be promptly notified. A listing of all such water sources along the designated hauling routes, and the relevant municipal officials, will be maintained by Oswego County.

6.10 Interruption of Service by Leachate Treatment Facility

Oswego County will maintain contracts with multiple treatment facilities. If one becomes unavailable, the other(s) will serve as backup(s). Each plant will have adequate capacity to handle leachate generated by the landfill.

6.11 Leachate Wet Well/Pump Station Damage or Vandalism

In the event that the wet well piping or pumps are damaged or inoperable, the leachate inflow from the conveyance system will be shut off to the pump station to allow for the repair of the damaged equipment. Upon ceasing the flow from the landfill, the piping or pumps will be repaired by evacuating the wet well into portable tankers, then replacing the damaged equipment. Spare pumps and appurtenances will be kept in the event of equipment breakdowns. In the event that a prolonged delay in operation of the pump station is encountered, temporary piping from the landfill leachate transfer manholes and portable pumps will be used to maintain leachate collection and storage until the necessary repairs have been completed.

6.12 High Liquid Level Alarms

A high liquid level alarm is located at the leachate pump station. This alarm typically will activate due to pumps becoming inoperable. Therefore a high liquid level alarm in the leachate pump station would be responded to as described in Section 5.12 Leachate Wet Well/Pump Station Damage or Vandalism of this Report.

6.13 Monitoring Well Damage or Vandalism

If a monitoring well is damaged or vandalized, it will first be checked to see if it has been destroyed beyond repair or plugged. If it has been damaged beyond repair, a replacement well will be installed If the well is not destroyed or plugged, it will be redeveloped.

6.14 Emergency Services

Refer to the enclosed section 6.0 "EMERGENCY RESPONSE PROCEDURES" of the Health and Safety Plan (Appendix B) for emergency procedures.

6.15 Power Outage

In the event of a loss of power, the local power company will be contacted to determine the anticipated length of the power outage. Without power, leachate pumping operations at the leachate pump station will cease. For extended power outages (more than 24 hours), a backup portable generator will be used to provide power to operate the leachate handling equipment.

6.16 Cap System Settlement and Erosion

If the cap has settled such that a major ponding of water occurs, it may be necessary to repair the landfill cap. The repair will require the removal of the landfill cover soil and, if applicable, geomembrane liner over the entire settlement area. Upon removal, the settlement area must be brought back to presettlement drainage grades. The geomembrane should be patched by a geomembrane installer, the soil replaced and reseeded. USEPA and NYSDEC will be notified prior to major cap settlement remediation.

Erosion in the cover soil should be repaired by replacing the eroded soil and compacting it prior to reestablishing the vegetative cover. Loss in vegetative cover should be repaired by seeding, fertilizing and mulching the unprotected area.

6.17 Storm Water Control System

An inspection of the storm water control system should identify any erosion, siltation and restriction to the flow of water in the storm water detention basins, ditches, swales, culverts, down chutes, outlet structures, etc. Eroded areas should be repaired and additional stone added or reseeded to prevent further erosion. Siltation or other restriction to the flow of water in the ditches should be removed and silt fencing or hay bales reestablished and/or additional erosion control devices constructed.

6.18 Leachate Outbreaks

Leachate outbreaks should not develop. If a leachate seep does develop, the area of the seep will be excavated and a means of positive hydraulic conveyance will be installed to ensure that the leachate enters the leachate collection system. The repaired seep area will be routinely inspected to ensure that future seepage does not develop. USEPA and NYSDEC will be notified when a leachate outbreak is discovered during the post-closure inspections, and the remediation procedures will be implemented with prior USEPA and NYSDEC approval.

6.19 Gas Management System

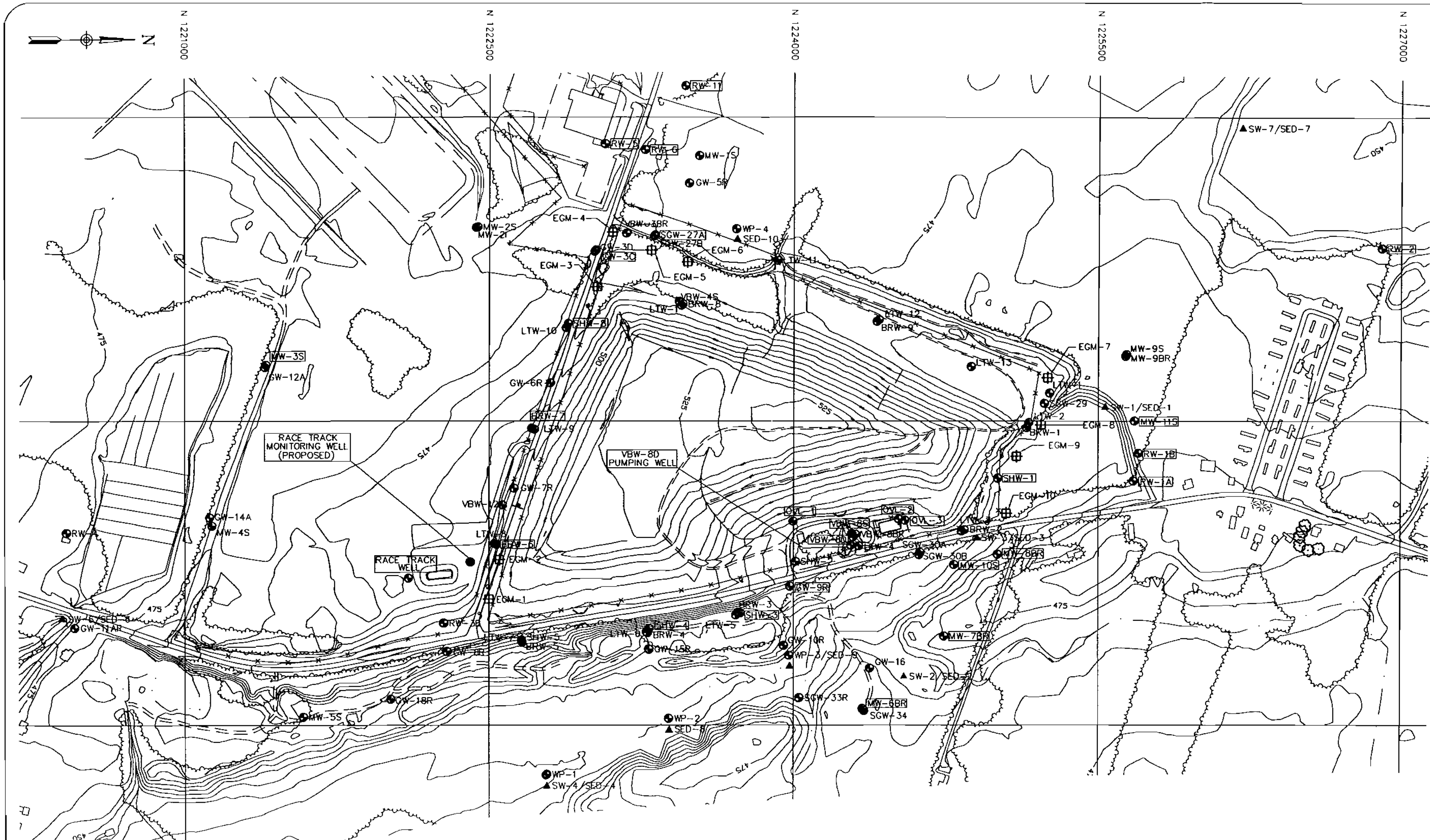
Inspection of the gas collection system should include checking the risers for any physical damage or plugging and checking the cap system adjacent to the risers for any settlement. All plugs, clogs, or waterlogging in the risers should be cleared, any damaged risers should be repaired, if necessary, replaced. If there are any settlements, these will be repaired as previously discussed (Section 4.1).

6.20 Structures

All monitoring wells, site access structures and any other on-site structures should be checked to insure that they are undamaged and have been secured. Any damaged structures should be repaired using suitable methods based on the nature of the damage. All structures should be resecured immediately.

6.21 Fires

Fires in any of the structures, gas management system or other fires requiring assistance will be immediately called in to 911.



LEGEND

- MONITORING WELLS USED AS REMEDIAL INVESTIGATION WATER QUALITY DATA POINTS
- ▲ SURFACE WATER / SEDIMENT SAMPLING LOCATION
- MONITORING POINTS THAT WILL BE SAMPLED AS PART OF ONGOING OM & M PROGRAM (SEE TABLE 1)
- EXPLOSIVE GAS MONITORING POINTS

SCALE: 1" = 500'

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VOLNEY LANDFILL
OM & M PLAN

LEACHATE AND GROUNDWATER MONITORING LOCATION

TOWN OF VOLNEY — OSWEGO COUNTY, NEW YORK

Figure 1

Project No. 132.165

QUARTERLY LANDFILL
INSPECTION LOG

Site:Volney Landfill	Date:
Client:	Inspector:
Project #	Weather:

Landfill Cap: Walk over cap, look for signs of erosion, excessive settlement, surface water ponding, and stressed vegetation. Note observations below:

Surface Water Drainage System: Check all swales, ditches, and downchutes on the top and sides of the landfill and the stone toe drain around the perimeter of the landfill for signs of erosion and siltation. Any erosion or siltation blocking flow should be noted below:

Landfill Gas Venting System: Check all vents for physical damage and extreme settlement around each vent. Check gas vent flares to ensure proper operation (follow inspection procedures included in cut sheet section of OM&M plan). Are vents functioning (i.e. are there odors coming from each vent?) If no odors are noted, the gooseneck should be removed and the vent checked for blockage. If water is observed within the vent, it should be pumped out. Take explosive gas readings from the locations described in the attached table. Note observations below:

Vectors: Check the site for evidence of vectors (rodents, insects, birds, or other animals). Evidence of excessive amounts of vectors should be recorded below:

Structures: Check all structures listed below to ensure that they are undamaged and secure. Note observations by each item.

1 Monitoring Wells
- Does well have I.D.?
- Is location flagged/painted in hard to find areas?
- Is well locked?
- Condition of surface seal:

2 Fences
- Is fence in tact?
- Is access secure? Were gates locked?

3 Manholes/tanks
- Are manholes in tact?
- Any signs of erosion around manhole?
- Is pump station operational?
- Any signs of leachate tank leakage or overflow?
- How full is leachate tank? (if more than 3/4 full report to DPW)
- Any cracking in tank walls?

4 Buildings
- Any evidence of vandalism?
- Were buildings locked?

5 Access Roads
- Are roads rutted?
- Do roads have large puddles?
- Were roads driveable?

Additional Notes, Observations:

VOLNEY LANDFILL
EXPLOSIVE GAS MONITORING

Site: Volney Landfill

Date:
Inspector:
Barometric Pressure:

Using combustible gas indicator (CGI) measure the % of the lower explosive limit (LEL) at each vent/well/structure location. If %LEL is greater than 100% (meter pegs), then switch CGI to %gas mode and note reading in % gas column.

PERIMETER FENCE MONITORING	%LEL	%GAS
Along south side (Howard Road) across from Race Track Well		
EGM-1		
EGM-2		
Along south and west sides		
EGM-3		
EGM-4		
EGM-5		
EGM-6		
Along north side		
EGM-7		
EGM-8		
EGM-9		
EGM-10		
Maintenance Building		
along floor		
near electrical conduits		

VOLNEY LANDFILL
OPERATIONS, MAINTENANCE & MONITORING PROGRAM
PROPOSED TASK DELEGATIONS

TASK	TASK DESCRIPTION	FREQUENCY
DEPARTMENT OF HEALTH (DOH)		
Water Quality Monitoring	Collect groundwater and leachate samples from on-site monitoring locations.	semi-annually for 2 yrs, then annually for 3 years
	Collect groundwater samples from residential wells.	quarterly
Groundwater Extraction	Operate groundwater pumping from designated wells as determined by results of groundwater quality monitoring.	as needed
Leachate Tank Inspection	Inspect level of leachate in tank and notify DSW if tank needs to be pumped. Especially important if groundwater extraction is operational.	quarterly and during groundwater extraction
DEPARTMENT OF PUBLIC WORKS (DPW)		
Cap Mowing/Maintenance	Mow landfill cap.	annually
Erosion repairs	Repair any erosion gullies which may occur in ditches, swales, on the cap. Repairs will include backfilling any gullies with appropriate soils, placing topsoil, and seeding the affected area.	as needed
General Repairs	Fencing, Paving, etc.	as needed
DEPARTMENT OF SOLID WASTE (DSW)		
Landfill Cap Inspection	Inspect landfill cap for signs of erosion. If erosion is present, notify DPW that cap is in need of repairs.	quarterly
Gas Vent Inspection/Monitoring	Using combustible gas indicator, measure and record emissions from each vent. Where vents appear to not be venting check for leachate within well.	quarterly
Gas Flare Inspection/Maintenance	Inspect each flare to ensure it is operating correctly. Maintain as necessary.	quarterly
Gas Vent Pumping	If leachate is found within gas vent, initiate pumping. Pumped leachate is to be collected in a tanker trailer and emptied into leachate tank. Gas Vent 15A and other nearby vents have a history of leachate build up and must be pumped as needed.	quarterly or as needed for vent 15A.
Leachate Tank Inspection	Inspect level of leachate in tank. Leachate should be hauled away if level is high. DOH should be informed so that they can coordinate and schedule leachate sampling events.	quarterly and more frequently during groundwater extraction
Leachate Hauling	Haul leachate from the tank to water treatment plant.	as needed
BARTON & LOGUIDICE, P.C.		
Water Quality Monitoring	Assist DOH with coordination of sampling. Prepare reports and submit to DEC & EPA.	quarterly
Ambient Air Quality Monitoring	Measure ambient air quality at perimeter of landfill by collecting air sample from all four boundaries of the landfill.	annually for 2 years

FIGURE 3

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN

QUALITY ASSURANCE PROJECT PLAN
VOLNEY LANDFILL
VOLNEY, NEW YORK

TABLE OF CONTENTS

QUALITY ASSURANCE PROJECT PLAN
VOLNEY LANDFILL
VOLNEY, NEW YORK

1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) presents the organizational structure, data quality objectives (DQOs) and data management scheme for the Operation, Maintenance and Monitoring (OM&M) phase and defines the specific quality control (QC) checks and quality assurance (QA) auditing processes. The QAPP is designed to assure that the precision, accuracy, representativeness, comparability, and completeness (the "PARCC" parameters) of the collected data are known and documented and adequate to satisfy the DQOs of the study. The format and contents of the QAPP have been prepared in accordance with the following United States Environmental Protection Agency (USEPA) guidance documents:

- USEPA. February 1983. Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans. QAMS-OO5/80.
- USEPA. October 1988. Guidance for Conducting Remedial Investigal ions and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004.
- USEPA. March 1987. Data Quality Objectives for Remedial Response Activities: Development Process. EP *N5401G-87 1003.*
- USEPA. May 1978, Revised May 1986. NEIC Policies and Procedures EP A-330/9- 78-001-R.
- USEPA. 1989. Region II CERCLA Quality Assurance Manual. Revision I

The QAPP serves as an overall summary of the QA structure of the project. The internal laboratory SOPs and QA/QC procedures are described in the laboratory QAPP, which has been previously provided. (Upstate Laboratories, Inc. - Laboratory Quality Assurance Project Plan, submitted to USEPA April 1999, revised version approved by USEPA July 1999.) The SOPs provided by the subcontracted laboratory will be consistent with the USEPA Contract Laboratory Program (CLP) Statements of Work (SOWs).

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The responsibilities of the key personnel are detailed below.

- *The Project Coordinator* is responsible for overseeing the implementation of the Consent Decree. To the maximum extent possible, all documents, including reports, approvals and other correspondence concerning the activities performed pursuant to the terms and conditions of the Consent Decree will be directed through the Projected Coordinator.

- *Project Engineer* is responsible for engineering activities to be undertaken under the Consent Decree, including cap inspection. The Project Engineer is a registered Professional Engineer in the State of New York.

- *The Project QA/QC Manager* is responsible for performing systems auditing, and for providing independent data quality review of project documents and reports, and validation of laboratory data.

- *The Project Health and Safety Coordinator* is responsible for implementing the site-specific health and safety directives in the Health and Safety Plan (HASP) and for contingency response.

- *The Field and Support Team* member include the sampling team (Oswego County Department of Health), support staff *(e.g.,* data processors, secretaries, and in-house experts in hydrogeology and chemistry, etc.) who are responsible for the technical direction and adequacy of the work in their respective areas of specialty which are or may be required to meet the project objectives.

Tasks which will be performed by subcontractors include construction/operation and analytical (laboratory) testing. The internal project organizational structure within the laboratory is described in the laboratory QAPP.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

The overall QA objective is to develop and implement procedures for field measurements, sampling, and analytical testing that will provide data of known quality that is consistent with the intended use of the information. This section defines the objectives by (1) describing the use of the data; (2) specifying the applicable QC effort (field checks and analytical support levels), and (3) defining the QC objectives (data quality acceptance criteria).

3.1 DATA USAGE AND REQUIREMENTS

The documents, "Contract Laboratory Program Statement of Work for Inorganic Analysis" (USEPA most recent edition), the "Contract Laboratory Program Statement of Work for Organics Analysis" (USEP A most recent edition), and Methods for Chemical Analysis of water and waste (EPA-600/4-79-020) will be followed by the laboratory for the analyses of groundwater samples collected during the OM&M phase. SOPs for sample control, calibration, analysis of samples, data analysis, data validation, data reporting, internal QC checks, system performance audits, preventive maintenance, and data assessment will be prepared in accordance with the Statements of Work (SOWs) for USEPA CLP analysis. Analytical procedures will be described in more detail in Sub-Section 7.0 of this QAPP. The sample handling procedures are described in the laboratory QAPP and are consistent with the SOWs mentioned above.

Quantitation limits for the organic and inorganic parameter analyses are provided in the Organic and Inorganic CLP SOWs and Methods for Chemical Analysis of Water and Waste; however, dilution or interference effects may make it necessary to raise these limits. The laboratory will make every effort to achieve detection and quantitation limits as low as practicable and will report estimated concentration values at less than the contract required quantitation limit by flagging the value with a J .

3.2 LEVEL OF QUALITY CONTROL EFFORT

The laboratory will follow standard QC measures to provide data of known and defensible quality. The data quality elements that will be checked and documented include the PARCC parameters which are discussed separately below.

3.2.1 Precision

Measurements of data precision are necessary to demonstrate the reproducibility of the analytical data. Precision of the groundwater sample data will be determined from the analyses of matrix spike and matrix spike duplicates (MS/MSDs) and field replicate samples. Field replicates will be collected and analyzed at a frequency of 10 percent (one per 10 samples) or at least one per sample matrix if less than 10 samples are to be collected. MS/MSD samples will be collected at a frequency of 5 percent (one MS/MSD pair per 20 samples), or one per two-week sampling period. An extra sample volume will be collected for each replicate and MS/MSD sample taken. QA/QC samples will be labeled on the sample container and appropriate sample log and chain-of-custody forms as replicate, or MS and MSD analyses. Laboratory precision requirements are provided in the laboratory QAPP.

3.2.2 Accuracy

Accuracy is the relationship of the reported data to the "true" value. The accuracy of the methods use for the analyses of groundwater samples will be evaluated through the use of calibration standards, MS/MSD analyses, and surrogate spikes. MS/MSD samples will be collected and analyzed at a frequency of 5 percent (one MS and one MSD per 20 samples per matrix), or one MS/MSD pair per two-week period. An extra sample volume will be collected for each MS/MSD sample taken. Laboratory accuracy requirements will be provided in the laboratory QAPP (under separate cover following laboratory selection).

3.2.3 Representativeness

Data obtained should be representative of actual conditions at the sampling location. Considerations for evaluating the representativeness of the data include, but are not limited to the following: the sampling location; the methods used to obtain samples at the site; and the appropriateness of the analytical method to the type of sample obtained. Field sampling activities will be performed according to the protocols and procedures provided in Appendix C of the OM&M plan. Laboratory representativeness requirements are provided in the laboratory QAPP (previously provided under separate cover).

3.2.4 Comparability

Comparability will be achieved by utilizing standardized sampling and analysis methods and data reporting format. The data will be generated such that it is comparable to the existing database.

3.2.5 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement program compared to the total amount collected. The validity of the collected data will be evaluated utilizing the appropriate QA/QC guidelines. Laboratory completeness requirements are provided in the laboratory QAPP (previously provided under separate cover).

The sampling team will use many different types of QA/QC samples to ensure and document the integrity of the sampling procedures, laboratory handling procedures, and the validity of the measurement data.

Field replicate samples will be collected to also demonstrate the reproducibility of the sampling technique. These analyses will be in addition to the replicates that the laboratory must run and will not be replaced by a laboratory-generated replicate. The replicate sampling locations will be selected for each sampling event. Since the replicate will be "blind" to the laboratory, it will have a coded identity on its label and on the chain-of-custody record form. The actual sampling location will be recorded on a daily log form and on the water sampling log form.

To determine if cross-contamination has occurred during groundwater sampling, one field blank per day of sampling will be prepared using analyte-free water provided by the laboratory. Field blanks will be analyzed for the same analyte list as environmental samples using the CLP and/or USEA methods, as appropriate.

One trip blank, consisting of two 40-ml vials filled by the laboratory with analyte-free water, will be provided by the laboratory for each container used to ship and store volatile organic samples during each sampling event. Trip blanks will be analyzed for VOCs only.

The USEP A has developed a standard series of analytical support levels to denote types of analysis and the associated level of QC efforts as follows:

Level 1.	Field screening or analysis using portable instruments
Level 2.	Field analyses using more sophisticated instruments.
Level 3.	Standard USEPA approved laboratory methods.
Level 4.	USEPA CLP routine analytical services laboratory methods
Level 5.	USEPPA CLP non-standard services laboratory methods.

The analyses that will be performed during the OM&M phase will fall within Levels 1, 2, 3 & 4.

3.3 QUALITY CONTROL OBJECTIVE

The QC objective is to provide data of known and defensible quality. Several different types of QC check samples will be analyzed and the results will be compared to data quality acceptance criteria and/or QC control limits that are specified for each method. The laboratory will routinely run these QC samples in accordance with the protocols and frequencies specified in the CLP SOWs for Organics and Inorganics Analyses and will provide a comparable level of QC effort for the non-CLP analytical parameters. The QC check samples include the following:

- Blank samples
  - Preparation
  - Method
  - Holding
  - Calibration
  - Instrument
- Tunings
- Initial and Continuing Calibrations
- Surrogate spikes
- Matrix spikes/analytical spikes
- Duplicate samples
- Control Samples
- Reagent check samples

The QC control limits, or data quality acceptance criteria, for each of the types of QC check samples are specified in the laboratory QAPP (under separate cover following laboratory selection). The specific types and frequencies of QC checks which will be performed in support of each test method, the calibration procedures for each instrument, and the QC control limits and/or data quality acceptance criteria for each of the types of QC check samples, will also be specified, in detail in the laboratory QAPP.

4.0 SAMPLING PROCEDURES

Samples will be collected in accordance with the previously approved sampling procedures that have been used for sample collection. These procedures are provided in Appendix C of the OM&M plan and address the following:

- Use of sampling equipment.
- Decontamination of sampling equipment.
- Pre-sampling requirements (well evacuation volumes).
- Field screening procedures.
- Field QC check sample collection procedures (blanks, rinseates, replicates)
- Sample packaging and shipment.
- Sampling documentation and chain-of-custody.
- Performance of field analyses.

Samples will be delivered to the laboratory within 24 hours from time of collection.

5.0 SAMPLE CUSTODY

A chain-of-custody record will be maintained for each sample collected and will provide an accurate written record that can be used to trace the possession and holding of samples from collection through analysis and reporting. The procedures that will be used to continue the chain-of-custody for each sample from its arrival in the laboratory through analysis and reporting will be specified in the laboratory QAPP (previously provided under separate cover). The laboratory sample custody procedures conform to the guidelines in the USEPA CLP. The project samples will be retained by the laboratory until the holding times are exceeded, or until permission to discard is received.

6.0 CALIBRATION PROCEDURES

The calibration procedures for field instrumentation are provided in Appendix C of the OM&M Plan.

- Water-Level recorder (m-scope).
- OVA flame ionization detector .
- OVM photo ionization detector.
- pH/ORP meter.
- DO meter.
- Specific conductance/temperature meter
- Combustible gas indicator .

The calibration procedures for laboratory instrumentation are discussed in the laboratory QAPP (which has been provided under separate cover).

7.0 ANALYTICAL PROCEDURES

The analytical methods for testing for the volatile and inorganic parameters are those specified in the USEPA CLP; other parameters will utilize Methods for Chemical Analysis of Water and Waste. The types and frequencies of QC checks will be those specified in the analytical methods and are discussed in Sub-Section 3.3 of this QAPP. Full CLP data packages will be requested for the volatile parameters and comparable data packages for the non-CLP analytical parameters.

8.0 DATA REDUCTION, VALIDATION, AND REPORTING

The laboratory procedures for reducing, validating, and reporting of the analytical data are described in the laboratory QAPP. The laboratory data will also be validated consisting of a systematic review of the analytical results and QC documentation, and will be performed in accordance with the guidelines in "CLP Organics Data Review and Preliminary Review" (USEPA most recent edition) and "Evaluation of Metals Data for the Contract Laboratory Program (CLP)" (USEPA most recent edition). Data validation will be performed on data resulting from each monitoring event. It is anticipated that at some point in the future, data validation may not be required for every sampling event.

On the basis of this review, the data validator will make judgments and comments on the quality and limitations of specific data, as well as on the validity of the overall data package. The data validator will prepare documentation of his or her review and conclusions using the standard USEP A Inorganics Regional Data Assessment and Organics Regional Data Assessment forms to summarize overall deficiencies that require attention. General laboratory performance will also be assessed by the data validator. These forms will be accompanied by appropriate supplementary documentation, clearly identifying specific problems.

The data validator will inform the project manager of data quality and limitations, and assist the project manager in interacting with the laboratory to correct any data omissions and/or deficiencies. The laboratory may be required to rerun or resubmit data depending on the extent of the deficiencies, and their importance in meeting the data quality objectives within the overall context of the project.

The validated laboratory data will be reduced into a computerized tabulation. The data tabulations will be sorted by classes of constituents *(e.g.,* VOCs, inorganics). Each individual table will contain the following information: sample number; analytical parameters; detection limits; concentrations detected; and qualifiers, as appropriate.

The field measurement data will be similarly reduced into a tabulated format suitable for inclusion in the RD report and will be designed to facilitate comparison and evaluation for the data. These tabulations will include but not be limited to the following information:

- Field screen (OVA) results.
- Field analyses (pH, temperature, and specific conductance).
- Water-level measurements and surveyed measuring point elevations

Field logs will be completed for groundwater samples.

The sample logs will be compiled by the field sampling team, who will inform the project manager of problems encountered during data collection, identify apparent inconsistencies, and provide opinions on the data quality and limitations. The tables and logs will be used as the basis for data interpretation and will be checked against the original field documentation by an independent reviewer prior to use.

9.0 INTERNAL QUALITY CONTROL

The field sampling team will make use of the following types of QA/QC samples to ensure and document the integrity of the sampling and sample handling procedures and the validity of the measurement data: field replicates, field blanks, and laboratory-prepared trip blanks.

Two types of quality assurance mechanisms are used to ensure the production of analytical data of known and documented quality: analytical method QC, and program QA. The internal quality control procedures for the analytical services on samples to be provided are specified in the laboratory QAPP (submitted under separate cover). These specifications include the types of control samples required (sample spikes, surrogate spikes, reference samples, controls, blanks), the frequency of each control; the compounds to be used for sample spikes and surrogate spikes, and the quality control acceptance criteria. The laboratory will be responsible for documenting that both initial and ongoing instrument and analytical QC criteria are met in each package. This information will be included in the packages generated by the laboratory and will be evaluated during the validation performed by Barton & Loguidice.

The field QA/QC analytical results will also be compared to acceptance criteria, and documentation will be performed showing that those criteria have been met. Samples in nonconformance with the QC criteria will be identified and reanalyzed by the laboratory, if possible. The following QC procedures will be employed by the laboratory for analyses of groundwater samples:

- Proper storage of samples.
- Use of qualified and/or certified technicians.
- Use of calibrated equipment traceable to National Bureau of Standards or USEPA standards.
- Formal independent confirmation of computations and reduction of laboratory data and results.
- Use of standardized test procedures.
- Inclusion of replicate samples at a frequency of one replicate per 20 samples.

10. PERFORMANCE AND SYSTEM AUDITS

System audits may be performed on a periodic basis, as appropriate, to assure that the RD field program is implemented in accordance with the approved project SOPs and in an overall satisfactory manner. Examples of systems audits that will be performed by Barton & Loguidice project personnel during the RD are as follows:

- The field sampling team will supervise and check on a daily basis the following tasks: that the groundwater program and other field programs are conducted correctly; that field measurements are made accurately; that equipment is thoroughly decontaminated; that samples are collected and handled properly; and that field work is accurately and neatly documented.

- On a timely basis, the data validator will review the data package submitted by the laboratory to check the following information: that all requested analyses were performed; that sample holding times were met; that the data were generated through the approved methodology with the appropriate level of QC effort and reporting; and that the analytical results are in conformance with the prescribed acceptance criteria. The data quality and limitations will be evaluated on the basis of these factors.

- The project coordinator will check that the management of the acquired data proceeds in an organized and expeditious manner.

- Systems audits of the laboratory are performed on a regular basis by the USEPA, as well as by the NYSDEC. These audits are discussed in the laboratory QAPP (previously provided under separate cover).

Performance audits of laboratories participating in the CLP are performed quarterly in accordance with the procedures and frequencies established by USEPA for the CLP. The laboratory performance evaluation audits are discussed in the laboratory QAPP (previously submitted under separate cover).

11.0 PREVENTIVE MAINTENANCE

Barton & Loguidice has established a program for the maintenance of field equipment to ensure the availability of equipment in good working order when and where it is needed, as indicated in the following examples:

- An inventory of equipment, including model and serial number, quantity, and condition will be maintained. Each item will be tagged and signed out when in use, and its operating condition and cleanliness will be checked upon return. Routine checks will be made on the status of the equipment, and spare parts will be stocked. An equipment manual library will also be maintained.

- The field sampling team is responsible for making sure that the equipment is tested, cleaned, charged, and calibrated in accordance with the manufacturer's instructions before being taken into the field.

The laboratory also follows a well-defined program to prevent the failure of laboratory equipment and instrumentation. This preventive maintenance program is described in the laboratory QAPP (under separate cover following laboratory selection).

12.0 DATA ASSESSMENT PROCEDURES

The field- and laboratory-generated data will be assessed for the PARCC parameters. Both quantitative and qualitative procedures will be used for these assessments. The criterion for assessment of field measurements will be that the measurements were taken properly using calibrated instruments. Assessment of the sampling data with respect to field performance will be based on the criteria that the samples were properly collected and handled. Field QC check sample results will also be considered in assessing the representativeness and comparability of the samples collected. The project coordinator will have overall responsibility for data assessment and integration of that assessment into data use and interpretation.

The laboratory will calculate and report the precision, accuracy, and completeness of the analytical data. Precision will be expressed as the relative percent difference (RPD) between values for duplicate samples. Accuracy will be expressed as percent recoveries (%R) for surrogate standards and matrix spike compounds. The precision and accuracy results will be compared to the prescribed QC acceptance criteria. The QC acceptance criteria prescribed for each test method will be presented in the laboratory QAPP (under separate cover following laboratory selection). For the organic and inorganic parameters, the QC acceptance criteria conform to control limits established in the CLP SOWs. Completeness is expressed as the percentage of valid data, based on the total amount of data intended to be collected.

Rigorous QA/QC procedures will be followed for the collection of samples. The sampling protocols will be strictly adhered to in order to maintain consistency in sampling and representativeness and comparability of the samples.

The assessment of data representativeness with respect to laboratory performance will be based on sample handling and analyses with respect to holding times and also on the method blank results. Data comparability will be assessed based on laboratory performance with respect to USEPA analytical protocols.

13.0 CORRECTIVE ACTION

The QA/QC program contained in this QAPP will enable problems to be identified, controlled, and corrected. Potential problems may involve non-conformance with the established procedures and/or analytical procedures established for the project, or other unforeseen difficulties. Persons identifying an unacceptable condition will notify the project coordinator. The project coordinator, with assistance from the project QA/QC manager, will be responsible for developing and initiating appropriate corrective action and verifying that the corrective actions will be documented for a Corrective Action report.

Corrective actions may include repeating measurements, resampling and/or reanalysis of samples, and amending or adjusting project procedures. If warranted by the severity of the problem *(e.g.,* if monitoring wells require resampling or if the project schedule may be affected), the project coordinator and USEP A remedial project manager will be notified. Additional work, which is dependent upon an unacceptable activity, will not be performed until the problem has been eliminated.

The laboratory maintains an internal closed-loop corrective action system and this is described in the laboratory QAPP (previously provided under separate cover).

14.0 QUALITY ASSURANCE REPORTS

Regular QA reporting throughout the duration of the project, as well as reporting on an as-needed basis will include the following:

- Monthly progress reports are submitted to the USEPA remedial project manager. At a minimum these reports will include the following: a description of the activities that have taken place during the month; validated results of sampling, tests, analytical data, and interpretations received; a description of data anticipated and activities scheduled for the next month; and a description of problems encountered or anticipated.

- Conference calls and/or meetings to be scheduled if requested by the project coordinator or by the USEPA remedial project manager to discuss concerns that may arise during the course of the OM&M program that might require significant corrective actions, changes in the scope of work, or departures from the approved project procedures.

- Serious deficiencies in sampling and/or monitoring data will be reported to the USEPA as soon as practicable after such deficiencies have been noted.

The laboratory's internal QA reporting is described in the laboratory QAPP.

APPENDIX B

HEALTH & SAFETY CONTINGENCY PLAN

HEALTH & SAFETY PLAN

VOLNEY LANDFILL

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TABLE OF CONTENTS (Cont.)

1.0 GENERAL INFORMATION

1.1 Introduction

This Health & Safety Contingency Plan (HSCP) addresses those activities associated with the scope of work stated in the Operation Maintenance & Monitoring (OM&M) Plan for the Volney Landfill, and will be implemented by the Site Safety Officer (SSO) during site work. Compliance with this HSCP is required of all persons and third parties who enter this site. Assistance in implementing this plan can be obtained from the Site Safety Officer and Project Manager. The content of the HSCP may change or undergo revision based upon additional information made available to health and safety (H&S) personnel, monitoring results or changes in the scope of work. Any changes proposed must be reviewed by H&S Staff and Project Manager.

This site specific HSCP has been prepared for the use of Barton & Loguidice and its employees and supplements the Health and Safety training that each Barton & Loguidice employee receives. The health and safety guidelines in this Plan were prepared specifically for this site. Due to the potentially hazardous nature of the site covered by this Plan and the activity occurring on the site, it is not possible to discover, evaluate, and provide protection for all possible hazards which may be encountered. This plan is written for the specific site conditions, purposes, dates, and personnel specified and must be amended if these conditions change.

This Plan is not intended to be used by site contractor or subcontractors, but it may be used as a basis for contractors to prepare their own plans. This Plan may not address the specific health and safety needs or requirements of any other such contractors and its employees. Neither this plan nor any part of it should be used on any other site.

Barton & Loguidice expressly disclaims any and all guarantees or warranties, express or implied, that the Plan will meet the needs or requirements of any such contractor or its employees. Barton & Loguidice, therefore, cannot and does not assume any liability by the use or reuse of the Plan by client, contractor or their employees or agents. Any reliance on the Plan will be at the sole risk and liability of such party.

1.2 Executive Summary

See McLaren/Hart, Inc. and Barton & Loguidice, P.C. Preliminary Design Data Evaluation Report, Volney Landfill Site, Town of Volney, Oswego County, New York, Volume I, dated June 1996.

1.3 Acknowledgment

I acknowledge having reviewed this Health & Safety Plan, understand its contents and agree to abide by it. Additionally, I am current in the training and medical surveillance requirements specified in 29 CFR 1910.120, Hazardous Waste Operations and Emergency Response.

(Please Print Clearly)

NAME	DATE	COMPANY AFFILIATION
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2.0 PROJECT INFORMATION

2.1 Site Description

The 85-acre Volney Landfill, presently owned by Oswego County, is located in a rural area of the Town of Volney, Oswego County, New York. Landfill operations were conducted in a 55-acre unlined disposal area from 1969 to 1983. The landfill has been inactive since 1983.

See the OM&M Plan for further detail and Site Map.

2.2 Background Information

. See McLaren/Hart, Inc. and Barton & Loguidice, P.C. Preliminary Design Data Evaluation Report, Volney Landfill Site, Town of Volney, Oswego County, New York, Volume I, dated June 1996

2.3 Purpose of Site Work

The objectives of the work to be conducted for the Volney Landfill Superfund Site are to control the source of contamination at the Site, to reduce and minimize the downgradient migration of contaminants in the groundwater, and to minimize any potential future health and environmental impacts.

2.4 Scope of Work

The basic scope of the OM&M Plan for the Volney Landfill site consists of the following elements:

1. Inspect the landfill cap, surface water control system, leachate collection system and landfill gas venting system;
2. Conduct a long-term monitoring program (groundwater sampling);

3. Implementation of an intermittent groundwater extraction plan, to be utilized on an as-needed-basis;
4. Perform the necessary repairs to the various septems as required.

2.5 Utility Clearance

In the event that drilling of monitoring wells is required in the future at locations off the landfill property, utility clearance must be obtained prior to drilling.

1. To be performed by: UFPO 1-800-962-7962
2. Date to be performed: 72-hours prior to excavating and/or subsurface drilling
3. Methods Utilized: UFPO contacts local utilities

3.0 HEALTH AND SAFETY RISK ANALYSIS

3.1 Chemical Hazards

The following table presents a summary of the volatile organic compounds (VOCs) that have been detected most frequently in leachate and groundwater at the site. While semi-VOCs and some metals have also been detected in leachate and groundwater, they are not considered to pose meaningful hazards during OM&M activities as ingestion of contaminated water would be the main exposure route. The VOCs that have been detected are anticipated to pose relatively low hazard, as they have been detected only sporadically, and at generally low concentrations (generally less than 20 ug/l).

TABLE 3-1

ASSESSMENT OF CHEMICALS OF CONCERN

Chemical Name[a] (or class)	PEL/TLV[a]	Other Pertinent Limits (Specify)	Warning Properties - Odor Threshold[a]	Potential Exposure Pathways	Acute Health Effects	Chronic Health Effects
Toluene	200 ppm (OSHA) / 100 ppm (NIOSH)	STEL = 150 ppm C = 300 ppm IDLH = 500 ppm	Colorless liquid with a sweet, pungent, benzene-like odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; confusion dizziness, headache	CNS effects; liver, kidney damage; dermatitis
Total xylenes	100/100 ppm	STEL = 150 ppm IDLH = 900 ppm	Colorless liquid with an aromatic odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; dizziness, drowsiness, nausea, vomit, headache, abdominal pain	Dermatitis; CNS effects; liver/kidney damage; blood
Ethylbenzene	00/100 ppm	STEL = 125 ppm IDLH = 800 ppm	Colorless liquid with an aromatic odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; CNS effects; headache	Dermatitis; CNS effects
Acetone	250 (NIOSH)/1,000 ppm (OSHA)	IDLH = 2,500	Colorless liquid with a fragrant, mint-like odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; CNS effects; headache, dizziness	Dermatitis; CNS effects
Chlorobenzene	75 ppm (OSHA)	IDLH = 1,000 ppm	Colorless liquid with an almond-like odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; drowsiness; Depression; CNS effects	Respiratory; CNS; liver
Chloromethane (methyl chloride)	100 ppm (OSHA)	C = 200 ppm IDLH = 2,000 ppm	Colorless gas with a faint, sweet odor which is not noticeable at dangerous concentrations	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; dizziness, nausea, vomit, slurred speech	CNS; liver; kidneys; Reproductive system

Chemical Name[a] (or class)	PEL/TLV[a]	Other Pertinent Limits (Specify)	Warning Properties - Odor Threshold[a]	Potential Exposure Pathways	Acute Health Effects	Chronic Health Effects
1,2-Dichloropropane (Propylene dichloride)	75 ppm (NIOSH)	IDLH = 400 ppm	Colorless liquid with a chloroform-like odor.	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; drowsiness; light-headed	Eyes; respiratory system; dermatitis; CNS; liver and kidneys
Methyl ethyl ketone (MEK)/2-butanone	200/200 ppm	IDLH = 3,000 ppm	Colorless liquid with a Moderately sharp, fragrant, mint-or acetone-likc odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; depression; CNS effects	Eyes; respiratory system; CNS
Isopropyl Alcohol (decontamination, if necessary)	400/400 ppm	STEL = 500 ppm IDLH = 2,000 ppm	Colorless liquid with the odor of rubbing alcohol	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; headache, drowsiness, dizziness, dry cracking skin	Dermatitis
Benzene	0.1 ppm	IDLH = 500 ppm STEL = 1 ppm	Colorless liquid with distinct pungent odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; hcadache, drowsiness, dizziness, headache.	CNS effects; liver and kidney damage; dermatitis, blood.

a

PEL	=	OSHA Permissible Exposure Limit; represents the maximum allowable 8-hr. time weighted average (TWA) exposure concentration.
TLV	=	ACGIH Threshold Limit Value; reprcsents the maximum recommended 8-hr. TWA exposure concentration.
STEL	=	OSHA Short-term Exposure Limit; represents the maximum allowable 15 minute TWA exposure concentration.
TLV-STEL	=	ACGIH Short-term Exposure Limit; represents the maximum recommended 15 minute TWA exposure concentration.
C	=	OSHA Ceiling Limit; represents thc maximum exposurc concentration above which an employee shall not be exposed during any period without respiratory protection.
IDLH	=	Immediately Dangerous to Life and Health; represents thc concentration at which one could be exposed for 30 minutes without experiencing escape-impairing or irreversible health effects.
TPH	=	Total Petroleum Hydrocarbons
VOC	=	Volatile Organic Compounds
( )	=	ACGIH TLV Intendcd Change

3.2 Non-chemical Hazards and Mitigation

Non-chemical hazards are associated with:

1. Slip, trip, and fall during all activities (uneven terrain);
2. Moving parts of heavy equipment;
3. Noise from heavy equipment;
4. Utility hazards;
5. Natural hazards (insects, poison ivy, etc.); and
6. Heat or cold stress depending on the season of work activity.

4.0 HEALTH AND SAFETY FIELD IMPLEMENTATION

4.1 Personal Protective Equipment (PPE) Requirements

PPE may be upgraded or downgraded by the Site Safety Officer based upon site conditions and air monitoring results.

See Table 4-1 for PPE requirements.

4.2 Monitoring Equipment Requirements

Monitoring is conducted by the Site Safety Officer or designee. Conduct contaminant source monitoring initially. Complete breathing zone monitoring if source concentrations are near or above contaminant action level concentrations. Log direct reading monitoring as specified in the Table 4-1 (Monitoring Protocol) and record results on Direct Reading Report form. Direct reading instrumentation shall be calibrated in accordance with manufacturing requirements, *e.g.*, at least daily, and results of the calibration shall be documented on Field Log.

TABLE 4-1 MONITORING PROTOCOLS AND CONTAMINANT ACTION LEVELS

CONTAMINANT / ATMOSPHERIC CONDITION	MONITORING EQUIPMENT	MONITORING PROTOCOL	BREATHING ZONE* ACTION LEVEL CONCENTRATIONS	
			MONITORED LEVEL** FOR MANDATORY RESPIRATOR USE	MONITORED LEVEL*** FOR MANDATORY WORK STOPPAGES
VOCs	Photoionization detector (PID) such as an Organic Vapor Monitor (OVM)	Continuous monitoring. Initially, readings will be recorded every 15 minutes at beginning of task. If no sustained readings are obtained in the breathing zone, readings will be recorded every 30 minutes.	10 ppm	50 ppm
VOCs	Flame ionization detector (FID) such as an Organic Vapor Analyzer (OVA)	Continuous monitoring initially during subsurface disturbance, and recorded every 15 minutes at beginning of task. If no readings are obtained, readings will be recorded every 30 minutes.	10 ppm	50 ppm
Flammable Organics	Combustible Gas Indicator (CGI)	Prior and during initial soil disturbance. Periodically to check monitoring wells and gas vents.		Work will be discontinued if the CGI readings are 10 pereent of the LEL. Work will not resume until the readings drop below 10 percent of the LEL.
Particulates	MiniRam or equivalent	Three times daily when work is being conducted which can generate dust, e.g. – waste exhumation, movement and placement of cap construction materials (sand, soil, etc.).	150 ug/m3 per NYSDEC TAGM 4031	150 ug/m3 at fenceline per NYSDEC TAGM 4031
Hydrogen Sulfide (H_2S)	Portable H_2S Meter	Prior and during initial soil disturbance. Periodically to check monitoring wells and gas vents.	1 ppm	1 ppm at fenceline

* Monitoring performed at operator's breathing zone. Monitor at the source first; if the source concentration is near or above the action level concentration, monitor in the brcathing zone.

** Monitored levels will require the use of an approved respiratory protection system specified in Table 4-1.

*** Call the Project Manager and Health and Safety Manager for consultation.

TABLE 4-2

PERSONAL PROTECTIVE EQUIPMENT (PPE) REQUIREMENTS

JOB TASK	PPE							LEVEL OF PROTECTION	LEVEL IF UPGRADE^c	ADDITIONAL PPE FOR UPGRADE	MONITORING EQUIPMENT
	SUIT	GLOVES	FEET	HEAD	EYE	EAR	RESPIRATOR				
1. All on-site	Std.	Work	Steel	HH	Glass /Goggles	Plugs	N/A	D	C	Full APR	PID/FID

Personal Protective Equipment (PPE):

SUIT:

Std	=	Standard work clothes
Tyvek	=	Uncoated Tyvek disposable coverall
PE Tyvek	=	Polyethylene-coated Tyvek
Chemrel	=	Chemrel coverall with hood
Sarauex	=	Saranex-laminated Tyvek
Lt PVC	=	Light wt. PVC rain gear
Med PVC	=	Medium wt. PVC suit
Hvy PVC	=	Heavy wt. PVC coverall with hood
Road	=	Roadwork vest
Nomex	=	Nomex coveralls

GLOVES:

Work	=	Work gloves (canvas, leather)
Neo	=	Neoprene gloves
PVC	=	PVC gloves
N	=	Nitrile gloves
V	=	Vinyl gloves
L	=	Latex gloves

Personal Protective Equipment (PPE):

FEET:

Steel	=	Steel-toe boots
Steel+	=	Steel-toe Neoprene or PVC boots
Booties	=	PVC or Latex booties

HEAD:

HH	=	Hard hat

EYE:

Glass	=	Safety glasses
Goggle	=	Goggles
Shield	=	Face shield

EAR:

Plugs	=	Earplugs
Muff	=	Ear muffs

Personal Protective Equipment (PPE):

RESPIRATOR:

APR	=	Air-purifying respirator
Full APR	=	Full face APR
Half APR	=	Half face APR
PAPR	=	Powered Air-purifying Respirator
SAR	=	Airline supplied air respirator
SCBA	=	Self contained breathing apparatus
Escape	=	Escape SCBA
OV	=	Organic Vapor cartridge
AG	=	Acid gas cartridge
OV/AG	=	Organic vapor/Acid gas cartridge
AM	=	Ammonia cartridge
D/M	=	Dust/mist pre-filter and cover for cartridge
HEPA	=	High efficiency particulate air filter cartridge

OTHER:

*	=	Use if contact with wet soil or water
**	=	Optional use except if specific hazard present

4.3 Decontamination Procedures

Depending on the specific job task, decontamination may include personnel themselves, sampling equipment, and/or heavy equipment. The specified level of protection for a task (A, B, C, or D) does not in itself define the extent of personal protection or equipment decontamination. For instance, Level C without dermal hazards will require less decontamination than Level C with dermal hazards. Heavy equipment will always require decontamination to prevent cross-contamination of samples and/or facilities. The following sections summarize general decontamination protocols.

4.3.1 Heavy Equipment

Heavy equipment will be decontaminated prior to personnel decontamination. Drillers and/or excavation equipment will steam clean their augers/buckets after use preferably at locations near the individual drilling/excavation operations. Contaminant systems will be set-up for collection of decon fluids and materials. Berms and wind barriers will be set up, if appropriate.

Vehicles that become contaminated with suspect soil will be cleaned prior to leaving the site. The wheel wells, tires, sides of vehicles, etc. will be high-pressure washed at a location to be determined by the SSO.

4.3.2 Personnel

Use steps and procedures outlined below as guidelines for personnel decontamination:

- Brush loose soil from body;
- Boot removal (where appropriate);
- Suit removal (where appropriate);
- Respirator/hard hat removal (where appropriate);
- Respirator wash (where appropriate);
- Glove removal;
- Field wash hands

4.3.3 Samples and Sampling Equipment

The same decontamination line will be used for sampling equipment decon as is used for personnel decon. At a minimum the following will be performed:

- Hand augers and buckets will be washed in soap solution and rinsed in distilled water;
- Sampling equipment will be brushed clean and rinsed with distilled water or other appropriate cleaning material;
- Samples will be dry-wiped prior to packaging.

4.3.4 Decon Wastes

- Spent decon solutions may be required to be drummed and disposed of as hazardous waste and/or solvent solutions may be required to be segregated from water rinses.

- Decontamination shall be performed in a manner that minimizes the amount of waste generated.

4.4 Community Health & Safety

The monitoring program described in Section 4.2 incorporates the monitoring elements of NYSDEC TAGM 4031 (Fugitive Dust suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites) as well as requiring monitoring for a wide range of possible gases and vapors. In the event that particulates associated with site activities exceed the TAGM 4031 criteria, dust suppression will be implemented, likely consisting of regular wetting of the work area and equipment.

5.0 SITE OPERATING PROCEDURES

5.1 Initial Site Entry Procedures

- Locate nearest available telephone.
- Prior to working on-site, conduct an inspection for physical and chemical hazards.
- Conduct or review utility clearance prior to start of work, if appropriate.
- Note any specialized protocols particular to work tasks associated with the project.

5.2 Daily Operating Procedures

- Hold Tailgate Safety Meetings prior to work start and as needed there after (suggest daily, however minimum of weekly).
- Use monitoring instruments and follow designated protocol and contaminant action levels.
- Use personal protective equipment (PPE) as specified.
- Use hearing protection if noise levels exceed 85 dbA.
- Remain upwind of operations and airborne contaminants, if possible.
- Establish a work/rest regime when ambient temperatures and protective clothing create a potential heat stress hazard.
- Do not carry cigarettes, gum, etc. into work areas.
- Refer to Site Safety Officer (SSO) for specific safety concerns for each individual site task.
- Be alert to your own physical condition.
- All accidents, no matter how minor, must be reported immediately to the SSO.

6.0 EMERGENCY RESPONSE PROCEDURES

6.1 Emergency Incident Procedures

The nature of work at contaminated or potentially contaminated work sites makes emergencies a continual possibility. Although emergencies are unlikely and occur infrequently, a contingency plan is required to assure timely and appropriate response actions. The contingency plan is reviewed at tailgate safety meetings.

Report all incidents to the Site Safety Officer (SSO) immediately. The SSO will then instruct you of the proper procedure.

6.1.1 Emergency Incident Procedures

If an emergency incident occurs, take the following action:

Step 1: Size-up the situation based on the available information.

Step 2: Notify the Site Safety Officer and/or Field Supervisor.

Step 3: Only respond to an emergency if personnel are sufficiently trained and properly equipped.

Step 4: As appropriate, evacuate site personnel and notify emergency response agencies, e.g., police, fire, etc.

Step 5: As necessary, request assistance from outside sources and/or allocate personnel and equipment resources for response.

Step 6: Consult the posted emergency phone list and contact key project personnel.

Step 7: Prepare an incident report. Forward incident report to Project Manager within 24 hours.

6.1.2 Medical Emergencies

If a medical emergency occurs, take the following action:

Step 1: Assess the severity of the injury and perform life-saving first aid/CPR as necessary to stabilize the injured person. Follow universal precautions to protect against exposure to blood borne pathogens.

Step 2: Get medical attention for the injured person immediately. (Call 911 or consult the Emergency Contacts list which must be posted at the site).

Step 3: Notify the Site Safety Officer and Field Supervisor immediately. The Site Safety Officer will assume charge during a medical emergency.

Step 4: Depending on the type and severity of the injury, transport the injured employee to the nearest hospital emergency room. If the injury is not serious, then transport the injured employee to a nearby medical clinic.

Step 5: Prepare an accident report.

6.1.3 Site-Specific Procedure

Refer to Site Safety Officer for specific procedures.

6.2 Emergency Routes

See Hospital Route - Attachment 1 – Verify Route *(TO BE POSTED)*

6.3 Site Specific Requirements in Event of an Emergency:

6.3.1 Facility Notifications

Environmental	Evan Walsh of the Oswego County Health Department
Safety	HSM and SSO
Security	
Facilities	

6.3.2 Locate Shut –Offs

Gas	
Power	Groundwater Extraction Well: The air compressor which operates the pumping system is located in the maintenance building. Power can be shut off by unplugging the air compressor. Leachate Pump Station: Power to the pump station can be shut off at the power panel located at the pump station.
Fuel	

6.3.3 Spill Containment Plan

In the event that contaminated groundwater from the remedial pumping operation is released, the following steps will be taken:

1. shut off pumping system
2. notify safety officer (Evan Walsh).
3. notify project coordinator (Andy Barber)
4. contain water on-site if possible with berms.

EMERGENCY CONTACTS

(To be Posted)

TITLE	NAME	PHONE NUMBER
EMERGENCY		
Police	Emergency Service	**911** (315)598-2111
Fire	Emergency Service	**911** (315)695-2085
Local Hospital	A.L. Lee Memorial Hospital South 4 th Street Fulton, New York	(315) 592-2224
Local Ambulance/Rescue		**911** (315) 343-1313
Poison Control Center		(800) 336-6997
Haz. Waste Natl. Response Center	HAZMAT	(800) 424-8802
PROJECT/BUSINESS		
Project Coordinator	Andrew Barber	(518) 218-1801
Site Safety Officer/ Health & Safety Manager	Evan Walsh	(315) 349-8526
Field Supervisor	Evan Walsh	(315) 349-8526
Client Contact	Bruce Clark, Esq.	(315) 349-8296
Site Contact	Evan Walsh	(315) 349-8526

HOSPITAL ROUTE

South on Silk Road to Rt. 3 (right) to city limits of Fulton, bear left (Broadway - Rt. 3), take second light, turn left (South 4th Street), four blocks, Hospital on right hand side.

APPENDIX C

PROTOCOLS

PROTCOLS

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GROUNDWATER LEVEL MEASUREMENT PROTOCOLS

Depth to groundwater in the monitoring wells will be measured as part of the field program. These data will be converted to water-level elevations using surveyed vertical measuring points on individual well casings.

An electronic measuring tape (m-scope) graduated in tenths of a foot will be the primary instrument of measuring the depth to groundwater. Prior to insertion, the measuring tape will be rinsed with a laboratory-grade detergent solution (Micro or equivalent), rinsed with distilled water and dried with a clean cloth. The tape will be lowered slowly down the center of the casing. After the electronic buzzer sounds and the light illuminates, signifying that water has been encountered in the well, the tape will be held at the pre-marked surveyed point at the top of the well. The measurement (depth to water) will be recorded on a B&L Water-Level/Pumping Record form or water sampling log. The tape will then be removed from the well and cleaned in the same manner as before insertion into the well.

GROUNDWATER AND FORMATION SAMPLING PROTOCOLS

INTRODUCTION

The collection, handling, and analysis of groundwater samples will be performed according to the protocols set forth in this appendix to ensure quality assurance/quality control (QA/QC). Quality control includes proper sampling procedures for well purging prior to sampling, sample-removal methods that utilize acceptable materials for all equipment and supplies, sample processing (including filtration, preservation, labeling, and bottle filling), and sample shipment. Sample collection will be performed by staff from the Oswego County Department of Health with field support by B&L. The B&L project manager will work in conjunction with the Oswego County Department of Health and with the analytical laboratory to assure that samples reach the laboratory in proper condition. Water-quality data will be scrutinized according to B&L's QA/QC protocols for data validation as discussed in the Quality Assurance Project Plan (QAPP).

Groundwater sampling will be conducted using a "low flow" (or low stress) technique. This method will be consistent with USEPA Region II procedures.

Pertinent information regarding groundwater sampling procedures will be recorded in the B&L daily log book and/or water sampling log forms.

PREPARATION OF SAMPLING EQUIPMENT

The sampling equipment (e.g., submersible pumps, M-scopes, buckets, filtration equipment for metals) will be thoroughly cleaned before each use. Any supplies, such as tubing, that cannot be properly cleaned after each use will be discarded in an appropriate manner. Specific conductance and pH meters will be calibrated according to manufacturer's instructions.

SAMPLING EQUIPMENT

The equipment and materials that will be needed for the collection of ground-water samples are listed below:

- Electric water-level probe (M-Scope)
- Clean rags
- Distilled or deionized water
- Plastic sheeting
- Bladder sampling pump (PVC or equivalent)
- Polypropylene rope
- Micro laboratory detergent (or equivalent)
- Sample bottles*
- Buckets (graduated)
- Gloves (Latex, Nitrile, or equivalent)
- pH meter and buffers (with millivolt scale)
- Redox probe and standards
- Dissolved oxygen meter
- Specific conductance meter and standard
- Turbidity meter
- Compressor and power source
- Thermometers
- Indelible marking pens
- Brushes
- Measuring tape
- Polyethylene tubing
- Beakers
- Flow-thru cell
- Clear tape

* Sample bottles will be obtained from the laboratory; they will be cleaned and quality controlled according to OSWER Directive #9240.0-5 titled "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers."

PREPARATION OF WELL FOR SAMPLING

Opening the Well

Upon arrival at the well site, sampling personnel will record the well designations, inspect the well head for damage, wipe the top of the well clean, and then remove the cap and wipe the top of the well casing with clean paper towels. This information will be recorded on the daily log. Plastic sheeting will be placed around the well so sampling equipment will be protected from potential contamination on the ground surface. In the event that a buildup of volatile organic compounds (VOCs) is anticipated based on historic data, a photoionization detector (PID) should be employed to screen for VOCs around the well per the Health and Safety Plan.

Sounding the Well

The total depth of each well will be measured (sounded) to an accuracy of 0.1 feet using a weighted steel or plastic tape prior to sampling. This information together with the depth to water allows the sampling team to calculate the volume of water in the well and to determine if formation material has accumulated at the bottom of the well.

Measuring the Height of the Measuring Point

The height of the measuring point above or below ground surface will be measured to an accuracy of 0.01 feet as an indication of whether the well may have been disturbed since installation.

Measuring The Water Level

A full round of water levels will be collected prior to sampling the first well. The date and time of each measurement will be recorded. Each measurement will be made to an accuracy of 0.01 feet. Care will be taken to avoid cross contamination of wells by thoroughly cleaning the measuring instrument (M-scope or measuring tape) between wells.

Purging the Well

Assemble the pump and power source, attaching fresh discharge tubing to the pump. Slowly lower the pump, supply/discharge tubing and support rope into the well. The pump should be set near the midpoint of the well screen (at least 2 feet off the bottom of the well).

Calibrate field instruments according to manufacturer's instructions and insert probes into the flow-thru cell. Cut tubing to length and connect to the flow-thru cell. Begin pumping at a rate of 200-500 ml/min, measuring the water level in the well about every 5 minutes. Adjust pumping rate if necessary to try to achieve a relatively static water level with minimal drawdown (preferably 0.3 feet or less); pumping rates can be adjusted to the minimum capabilities of the pump.

Collect measurements from the field instruments on about 5 minute intervals. Ideally, three consecutive stabilized field parameter readings will be the basis for sample collection, with stabilization being defined as follows:

- +/- 0.1 for pH
- +/- 3% for specific conductance
- +/- 10 mV for redox potential
- +/- 10% for turbidity and dissolved oxygen

Field parameters may not completely stabilize, and it may also not be possible to achieve a relatively static water level in the well during pumping. Judgment may have to be used in the field to determine when to collect samples. Options would include 1) stopping pumpage and allowing the well to recover prior to sampling and 2) collecting samples despite readings which have not fully stabilized. Probably the most important parameter in making this decision is turbidity, as it has a significant effect on metals analysis. If turbidity has remained under 100 NTU (and preferably under 50 NTU), sampling can proceed. If turbidity has been consistently elevated over 100 NTU, the well should be allowed to recover (possibly overnight) before sample collection.

Collection of Ground-water Samples

After the well has been purged, disconnect the flow-thru cell and adjust the flow rate to 100-200 ml/min. Ground-water samples will be collected by directly filling each sample container from the pump discharge. The VOC vials should be filled first, and care taken not to rinse preservatives out of the sample containers. New disposable gloves will be worn by sampling personnel for each well sampled. The sample containers will be inspected to ensure that they are the correct type and number for the respective analytical parameters and have the correct preservative, if required. The labels will then be properly filled out and affixed to the containers and protected by clear tape affixed to the containers. Care will also be exercised to avoid breakage and to eliminate the entry or contact of, any substance with the interior surface of the bottles, vials, or caps, other than the water sample being collected. Caps will not be removed until sampling begins and then they will be replaced as soon as the container has been filled. The sample containers will be kept cool, dust-free, and out of the sun. The procedures that the sampling team will follow to collect water samples are described below in the order in which they will be performed:

1. Complete labels on all containers and protect labels by wrapping them to each container with clear tape. Information that will be provided on labels include the following: project name, well numbers, sampling date, etc.

2. Fill the 40 milliliter (ml) vials for volatile organic analysis first in such a manner as to ensure that there are no air bubbles. Prior to VOC sample collection, acidification of the VOC samples will be performed according to the following procedure:

   The pH of the sample will be adjusted to less than 2 by carefully adding 1:1 HCl drop by drop to the two 40 ml vials. The number of drops of 1:1 HCl required should be determined on a third portion of water sample of equal volume. If acidification causes effervescence, the sample will be submitted without preservation, except for cooling to 4°C, but the holding time will be reduced to 7 days.

3. Fill the remaining sample containers in the order of the parameter's volatilization sensitivity. The preferred order of sample collection is as follows: volatile organics, extractable organics, total metals, dissolved metals, TOC, phenols, cyanide, nitrate, ammonia, and the remaining fractions.

4. Replace the well cap and lock the well.

5. Pack the samples on ice in a cooler with the completed chain-of-custody record form. Samples will be delivered or shipped to the laboratory within 24 hours after sample collection and the receiver's signature will be obtained on the chain-of-custody record form.

6. Discard the disposable sampling equipment such as used cord, gloves, and plastic sheeting.

QUALITY CONTROL

Quality-control (QC) samples will be used to monitor sampling and laboratory performance. The types of QC samples that will be included in this investigation are replicates and blanks. To ensure unbiased handling and analysis by the laboratory, the identity of replicates will be disguised by means of coding so that the laboratory does not know which samples are used for this purpose. Detailed QC procedures are outlined in the QAPP (Section II).

Replicate Analyses

Replicate samples are samples collected from the same well and are identical within the limits of normal concentration fluctuations. Collection and analysis of such samples allow a check to be made on sampling precision. Five percent of all ground-water samples collected at this site will be replicated.

When collecting replicate samples for VOC analysis, each of the two sample vials for the sample and replicate will alternately be filled. For other analytes, the collected water will be distributed to fill portions of each sample container until the containers are filled. Sampling for replicates is discussed in more detail in the QAPP.

Blanks

The analysis of trip blanks will be incorporated into this field investigation. Trip blanks will be prepared fresh daily and will be composed of demonstrated analyte-free deionized water acidified to a pH of less than 2 with 1:1 HCl. It is analyzed to determine whether samples may have been contaminated by VOCs as a result of handling in the field, during shipment, or in the laboratory. One trip blank will accompany each day's shipment of water samples to the laboratory for VOC analysis. A field blank for all analytes will also be prepared using demonstrated analyte-free water to determine if the decontamination procedure was adequately performed and that cross contamination of samples is not occurring. Field blanks will be collected at the rate of one per equipment type per decontamination event, not to exceed one per day. Blank analyses are discussed in more detail in the QAPP.

Demonstrated analyte-free water is defined as water of a known quality meeting the following criteria: the assigned values for the Contract Required Detection Limits (CRDLs) and Contract Required Quantitation Limits (CRQLs) can be found in the most recent CLP SOWs. These criteria apply to all blank water, whether or not EPA CLP analytical methods are employed (volatile organics - less than 10 ug/L, semivolatile organics - less than CRQL, pesticides - less than CRQL, PCBs - less than CRQL, inorganics - less than CRQL). However, specifically for the common laboratory contaminants (methylene chloride, acetone, toluene, 2-butanone, and phthalates) the allowable limits are three times the respective CRQLs. The analytical testing required for the water to be demonstrated as analyte-free will be performed prior to the start of sample collection, and the results will be kept on file at the site for EPA auditing purposes.

RECORD KEEPING

Personnel involved in sample collection will carefully document the handling history of ground-water samples and blanks collected.

Daily Log

Daily logs will be used by the field team for QA/QC purposes to record all sampling events and field observations. Entries in the daily log forms will be dated by the person making the entry, and the logs will be kept in a secure, dry place. The following information will be included on each daily log form:

1. Project name.
2. Date and time of arrival at site.
3. Client.
4. Location.
5. Weather.
6. Sampling team members.
7. Work progress.
8. QC samples.
9. Departure time.
10. Delays.
11. Unusual situations.
12. Well damage.
13. Departure from established QA/QC field procedures.
14. Instrument problems.
15. Accidents.

Water Sampling Log

The sampling team will complete a water sampling log form for QA/QC purposes at the time of sampling to record information about each sample collected. The following information will be included on each Water Sampling Log form:

1. Date and time of sampling.
2. Well evacuation data.
3. Physical appearance of samples (e.g., color and turbidity).
4. Field observations.
5. Results of field analyses.
6. Sampling method and material.
7. Constituents sampled for.
8. Sample container size, composition, and color.
9. Preservative.
10. Sampling personnel.
11. Weather conditions.

Sample Labels and Chain-of-custody Record Form

Sample labels are necessary for proper sample identification. The labels will be affixed to the sample containers prior to the time of sampling: Labels will not be affixed to container lids or caps. To track QA/QC handling protocols the labels will be filled out by sampling personnel, and the chain-of-custody record form will be completed in the field before the sampling team leaves the site. Labels will include sample identification, project number, date and time collected, analyses to be performed, and pH adjustment information as required.

The sampling team will be responsible for maintaining custody of the samples until they are delivered to the carrier or the laboratory. The chain-of-custody record form will then be signed and custody formally relinquished. The containers (bearing custody seals) will be in view at all times or will be stored in a secure place restricted to authorized personnel.

EQUIPMENT DECONTAMINATION

Before sampling begins, between each well sampled, and prior to leaving the site, equipment such as submersible pumps, bailers, filtration apparatus (flasks, funnels, and beakers) and buckets will be decontaminated. Disposable equipment will be discarded in an appropriate manner. Submersible pumps will first be disassembled and rinsed/scrubbed. The pump will then be re-assembled and submersed in several gallons of a non-phosphate detergent solution and then operated for several minutes. The pump will then be submersed in several gallons of de-ionized/distilled water and then operated for several minutes. The pump will then be wrapped in clean plastic sheeting for transport.

FORMATION SAMPLING PROTOCOLS *(If Necessary)*

Formation samples will be collected from the borings at each of the drilling sites. Samples will be obtained in intervals of five feet to the completion depth in accordance with the Standard Penetration Test (ASTM-D1586). Samples are collected by advancing the split-spoon ahead of the drill bit into the undisturbed formation at the desired depth. Before and after each use, the split-spoons will be decontaminated by scrubbing with Micro solution and rinsing with distilled water. Split-spoon samples and soil cuttings of the well will be monitored with a photo ionization detector/flame ionization detector.

Auger cutting descriptions, water-level readings, air monitoring readings, and other pertinent observations will be logged by the field geologist. Split-spoon samples of unconsolidated sediment will be collected and visually identified by the field geologist using the Unified Soil Classification System. Standard identification practices detailed in ASTM D-2488 will be followed. The following information will be recorded by the field geologist, at a minimum:

- Sediment sample interval
- Sampling hammer weight and distance of fall

- Blow count (per 6-inch interval)
- Amount of sample recovered
- Sample color
- Sample texture
- Sample moisture content (dry, moist, wet)
- Organic vapor readings
- Any unusual characteristics
- Depth to water
- Drill rig behavior and penetration rate

Pertinent information regarding formation samples will be recorded on the B&L Sample/Core Log and transferred into the Daily Log Book.

Representative sediment samples from each sampled interval will be placed in glass jars with screw-type lids for future reference. Each sample container will be labeled with the site name and the boring and sample number. No geotechnical data will be written on the container that is not specified in the boring log. Jars will be stored in cardboard boxes for future reference.

In addition, samples will be collected for laboratory geotechnical analysis from the soil borings and from the unconsolidated monitoring well boreholes. At locations where monitoring wells will be installed, one sample from the midpoint of the screened interval will be collected and analyzed for grain size distribution, permeability, and Atterberg limits.

Rock coring will be performed at bedrock monitoring well locations. Rock coring will be performed in accordance with ASTM D-2113 (Standard Practice for Diamond Core Drilling for Site Investigations).

Core drilling will be performed in 5-foot intervals utilizing diamond core drill bits. Potable water will be used as the drilling fluid for all coring. Water is necessary to remove cuttings and acts as a lubricant for the drill bit. Immediately after the barrel is retrieved and while the core is still intact inside the barrel, percent recovery will be recorded.

The core will be removed from the barrel and placed in wooden storage boxes that are specifically designed to contain rock cores. At a minimum, the following information will be recorded by the field geologist:

- Boring or well number
- Core interval
- Percent recovery
- Rock color (utilizing Munsell System)
- Sample texture
- Organic vapor readings
- Any unusual characteristics
- RQD (Rock Quality Design Index)
- Fracture occurrence and angles
- Penetration rate during drilling
- Fluid lost during drilling

SURFACE WATER AND SEDIMENT SAMPLING PROTOCOLS (if necessary)

Surface water and sediment samples will be collected at several locations. Where samples are to be collected from the same flow system, sampling will be conducted moving from the most downstream location moving to successively upstream locations. Surface water samples will be collected first by partially immersing the sample container in the water and gently tipping the container to allow water to flow in to the container. Care will be taken not to allow pre-added preservatives to be rinsed from the container during filling. Surface water samples will be collected from the rough mid-point of the stream. If it is necessary to wade in to the stream to collect the sample, personnel will stand downstream and reach upstream to collect the sample.

Sediment samples will then be collected using a pre-cleaned trowel or core-type sampler, depending upon field conditions (sediment texture, water column depth, etc.). Samples will be collected from the top six inches of the sediment column. Sediment will be transferred to the sample containers, starting with the VOC containers.

Procedures for decontamination of sampling equipment, sample custody, quality control and record keeping will be the same as those previously discussed for groundwater sampling.

CHAIN-OF-CUSTODY PROCEDURES

The chain-of-custody procedure for the collection of samples that will be sent to the laboratory for analysis is given below:

1. The field geologist or sampling team will maintain custody of any samples that are collected until they are delivered to the overnight common carrier or courier for shipment to the laboratory. Samples shipped to a laboratory will be accompanied by the chain-of-custody record form (duplicate) will be completed in the field; the original form will accompany the shipment, and the other copy will be retained by the field geologist for the project file. The chain-of-custody record form will list each of the individual sample containers from each well sampled and will be signed by each of the sampling team members who participated in the sampling program.

2. A separate chain-of-custody record form will be filled out for the contents of each shipment container (cooler). The form will be placed in a plastic bag and taped to the underside of the lid of the cooler.

3. To provide a means of detecting any potential tampering during shipment, all shipment containers (coolers) will have a signed B&L or laboratory-supplied seal placed across the outside of the cooler where the lid and cooler join. In addition, a 2-inch wide transparent tape will be wrapped entirely around the cooler securing the lid firmly to the cooler.

4. Receipts from couriers, air bills, and bills of lading will be retained in the field project file.

FIELD INSTRUMENTATION OPERATING PROCEDURES

Field instruments used during the investigation will be calibrated and operated in accordance with the following standard operating procedures and with the manufacturers' instructions.

AIR MONITORING EQUIPMENT

Photoionization Detector - A photo ionization detector (PID) may be used for monitoring VOCs in the breathing zone during the OM&M field work (see HSCP). The PID will be calibrated prior to use on a daily basis. First the PID will be zeroed using background ambient air followed by a mixture of 100 parts per million (ppm) isobutylene and air. The calibration will be checked using a 50 ppb isobutylene in air.

Combustible Gas Indicator - A ***Gastec Model 4320*** meter (or equivalent) will be used to measure the Lower Explosive Limit (LEL) of explosive gases during OM&M. This instrument is calibrated by the manufacturers, and therefore, requires no field calibration.

Flame Ionization Detector - A ***Century Systems Model 88*** organic vapor analyzer (OVA) (or equivalent) flame-ionization detector (FID) may also be used during the OM&M phase, if necessary, to monitor for methane and total volatile organic compounds (VOCs). The OVA will be calibrated prior to use on a daily basis using zero air and a mixture of 100 parts per million (ppm) methane and air. The calibration procedure is detailed in the manufacturers' instructions.

FIELD ANALYSIS INSTRUMENTS

Field analysis of water samples will consist of measurements of pH, temperature, specific conductance and oxidation - reduction potential. A description of the equipment that will be used and the calibration procedure for each is provided below:

Temperature: This field parameter will be measured using a multi-parameter water-quality meter with a temperature measuring range of -15°C to 105°C. The probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading.

pH: This field parameter will be measured using a multi-parameter water-quality meter, or equivalent. Two buffer standards that bracket the anticipated pH of samples (nominal pH values of 4 and 7 or 7 and 11) will be used to calibrate the instrument, prior to analysis of each sample. The probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading. Calibration data will be recorded.

Specific conductance: This field parameter will be measured using a multi-parameter water-quality meter, or equivalent. Calibration will be made using a 2000 umhos standard solution. Calibration of the meter will be adjusted to temperature. The meter will be calibrated daily when in use. To measure this parameter, the probe will be placed into a flow-through cell, allowing the formation water to flow freely over the probe for the most accurate reading. All calibration data will be recorded.

Oxidation-Reduction Potential (Eh): The Eh is determined with a glass ORP electrode compared against a reference electrode by means of a pH/ORP meter set to read in millivolts (mV). Because Eh can change rapidly upon exposure to the atmosphere, measurements must be made quickly but carefully. At the beginning of the day the pH/ORP meter will be checked against a solution of known Eh and the necessary adjustments made.

Before any measurement is made, the probe will be completely rinsed with deionized or distilled water. Then the probe will be placed into a flow-through cell allowing the formation water to flow freely over the probe. An Eh reading will be taken after stabilization. Between measurements, the probe will be immersed in deionized water. The pH/ORP meter will be checked against a reference frequently during the sampling round to ensure accurate and precise measurements.

Dissolved Oxygen (DO): The DO is determined with a membrane electrode by means of an oxygen meter. At the beginning of the day, the DO meter will be calibrated as per the manufacturer's instructions.

Before any measurement is made, the probe will be completely rinsed with deionized or distilled water. Then the probe will be placed into a flow-through cell allowing the formation water to flow freely over the probe. A DO reading will be taken as soon as the reading on the meter equilibrates. Between measurements, the probe will be immersed in deionized water. The DO meter will be recalibrated frequently during the sampling round to ensure accurate and precise measurements.

APPENDIX D

CUT SHEETS

LTI LANDFILL TECHNOLOGIES, INCORPORATED

P.O. Box 519 West Sand Lake, New York 12196 (518) 674-8694

FAX (518) 674-8695

CF-5 LANDFILL GAS VENT FLARE

Installation Instructions

Revised: 28 APR 00

IMPORTANT! READ ALL INSTRUCTIONS AND REVIEW ASSEMBLY PICTURES BEFORE STARTING INSTALLATION.

Check gas flow and quality to assure satisfactory flare performance. Gas quality should be between approximately 30% and 80% methane and flow at a rate of 2 to 60 CFM at an inlet pressure between approximately 0.5 to 5 inches water column. Clearly visible waves of exiting gas usually indicate sufficient flow and pressure.

CAUTION! ALWAYS CARRY A METHANE-IN-AIR SAFETY ALARM METER while working near landfill gas. Explosive and flammable conditions may cause injury or death. Do not cause a spark or flame in the presence of ambient flammable gas concentrations.

CAUTION! This appliance weighs approximately 95 lbs. Vent riser must be sturdy enough to support flare during windy conditions. Guy wires may be required.

CAUTION! The solar igniter produces a high-voltage sparking current. Do not touch metal spark strap or SparkPilot® while unit is operating; an electrical shock could result.

CAUTION! This work must be performed only by skilled technicians in accordance with OSHA regulations and standard industry safety practices.

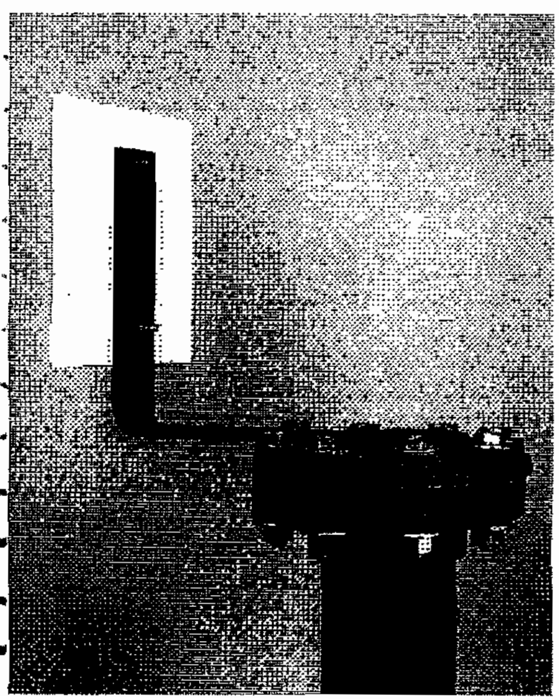
Installation Instructions

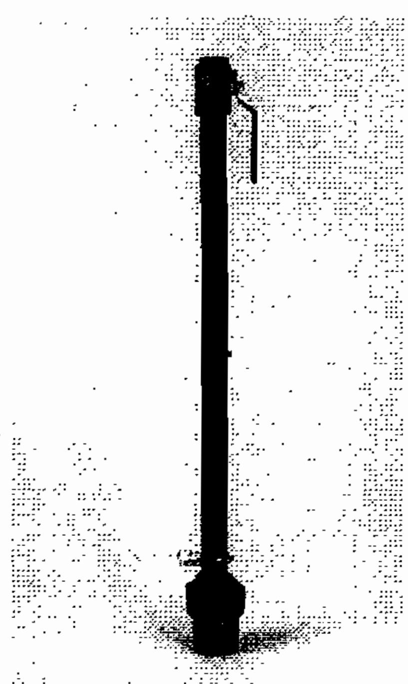
GENERAL NOTE: Pipe thread sealant (pipe dope) is provided and should be used at all threaded joints.

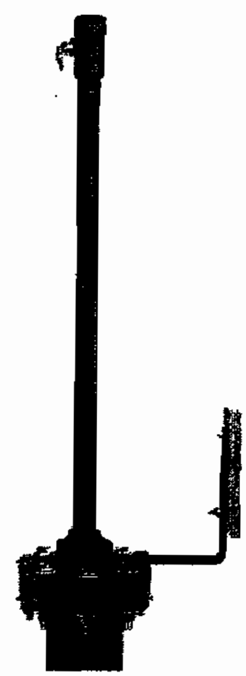
1) Well or vent riser should be cut approximately 24" above ground level. Install flange adapters as necessary to mate with 4" inlet bushing at flare base. All connections must be gas-tight and leakproof.

2) Bolt the igniter mounting bracket and mounting plate onto the companion flange facing in a southerly direction.

3) Mount stainless steel valve on top of 1½" dia. pipe section with four-inch bushings at base. Four-inch inlet bushing threads into companion flange. Close valve after pipe assembly is mounted into flange bushing.



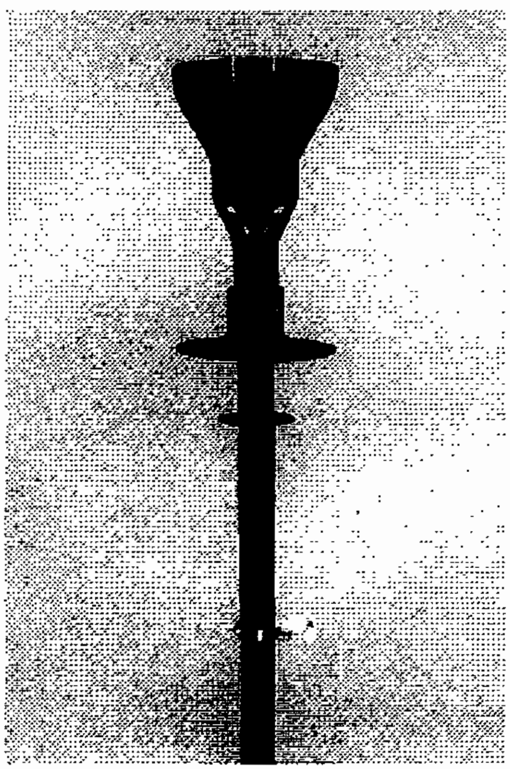


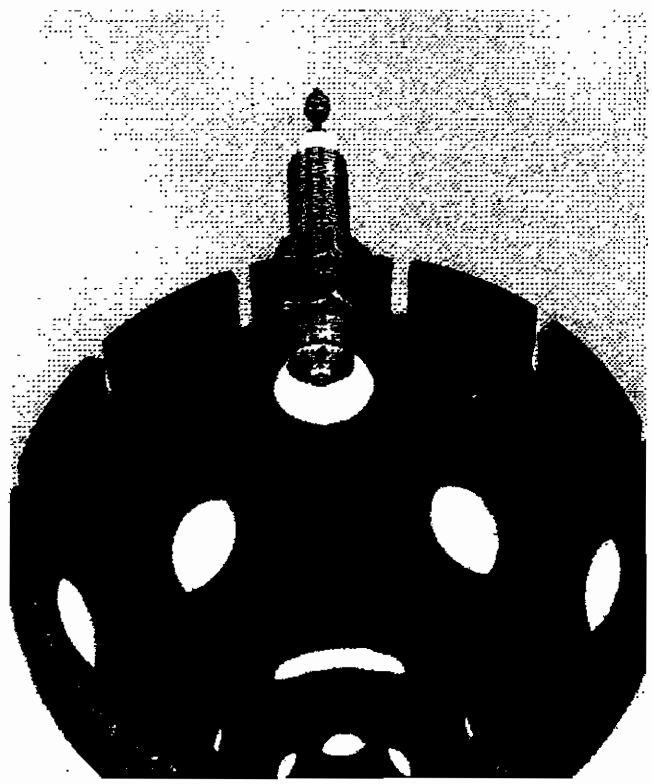


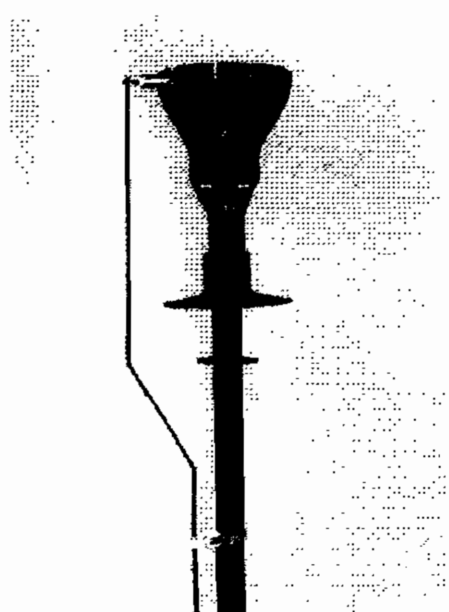
4) Connect the other 1½" dia. pipe section (with the welded guy wire bracket) to the heat shield coupling which connects to the flarehead.

5) Install the SparkPilot® into the 7/8" slot at the upper rim of the flarehead; make sure drainage slots in SparkPilot® body are facing downward. The black arrow on the SparkPilot® face electrode points in the upward direction. Install spark strap (bend as shown) from SparkPilot® to insulated pipe clamp. Then install this entire assembly (flarehead, heat shield, pipe) into the valve.

6) Tighten all pipe connections and position the SparkPilot® 90° (crosswise) to the prevailing wind direction.





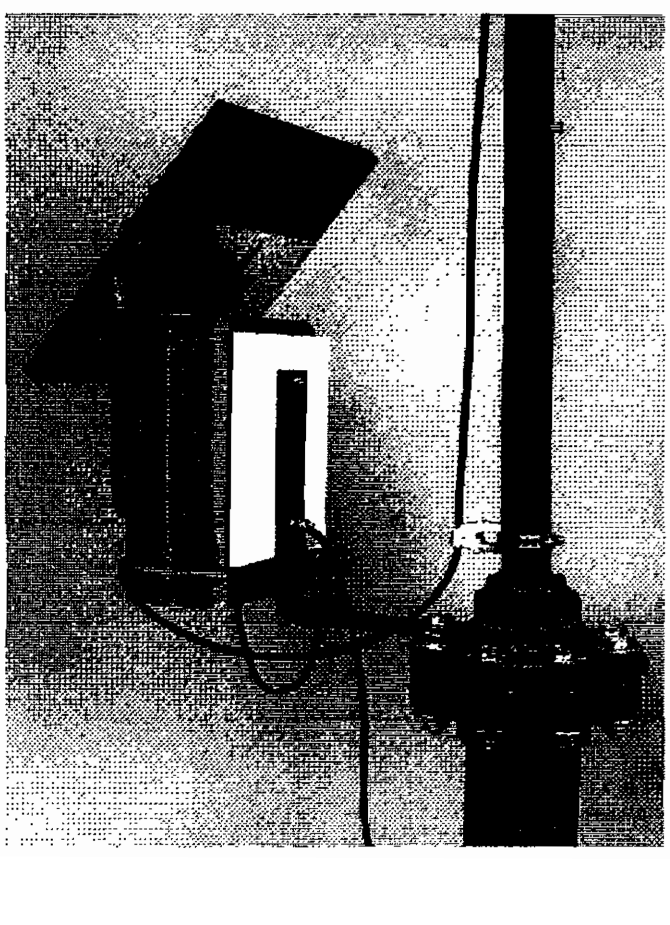


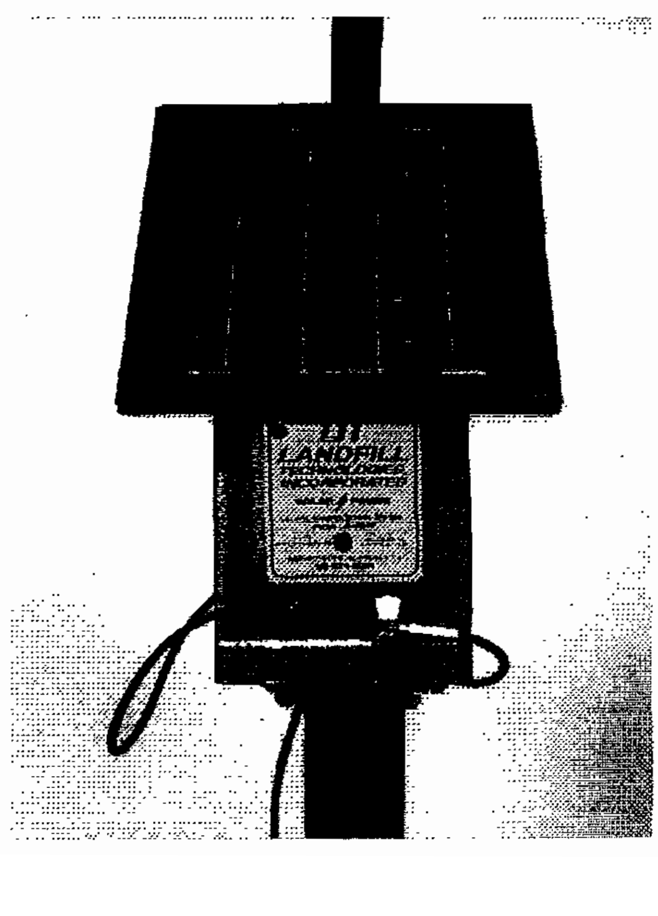
7) Mount the fully charged solar flare igniter on the two projecting mounting screws. These screw heads fit into the holes in the back of the igniter case, and the unit slips slightly downward into the mounting slots. Do not attempt to tighten mounting screws or disassemble igniter unit.

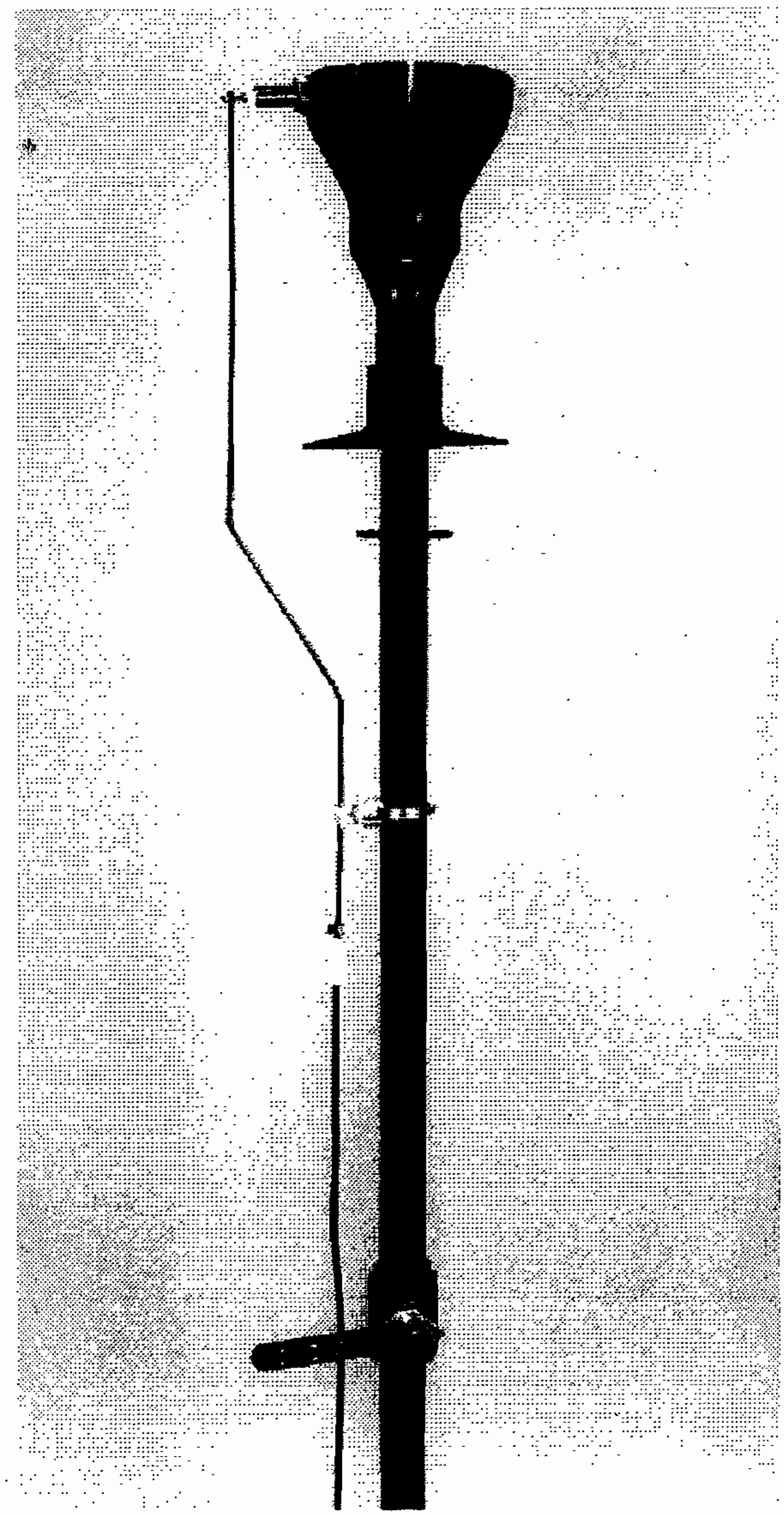
8) Attach the eyelet end of the 6' ignition cable (yellow end) to the bottom of the spark strap. Connect the other snap-on end of the ignition cable to the hot line terminal (beneath white ceramic insulator). The rubber boot will cover the bottom of the white ceramic insulator. Coil and secure any excess cable.

9) Connect one eyelet of the 2' ground cable to the nearest fastening bolt at rear of mounting plate. An extra nut and washers are placed on this bolt for connecting the eyelets. Also connect an eyelet of the 5' ground cable to the same bolt. Both eyelets should be fastened beneath the double washers and then tighten the terminal nut.

10) Push the grounding stake into the soil near the riser pipe, within reach of the 5' grounding cable. Connect the other eyelet of the 5' grounding cable to the bolt at the top of the grounding stake. Coil and secure any excess cable.







11) After checking completion and security of all above steps, open gas valve and let the gas purge the system for a few minutes.

12) Push "ON" button of solar igniter and listen for "snapping" sound of a spark plug. Verify that red spark indicator light is flashing. Flare should ignite within 60 seconds.

IF FLARE DOES NOT IGNITE, <u>first, close gas valve</u>; then:

A. Verify spark is occurring. Check SparkPilot® gap (0.045" to 0.050") and visually inspect spark. You will see a flash across the gap and hear a snapping sound. DO NOT TOUCH SPARKPILOT® OR SPARK STRAP TO AVOID ELECTRICAL SHOCK.

B. Open valve <u>very slowly</u> to check for "rich" condition. Flare may ignite at partial open setting. Experiment with a few trial settings.

IF FLARE STILL WON'T IGNITE, <u>turn off spark igniter</u>; then:

C. Verify gas quality with meter. If gas quality is between 30% and 80% methane, then:

D. Close gas valve; make sure spark igniter is "OFF"; then: Readjust SparkPilot® vertical location or radial position to optimize ignition with flow rate and prevailing wind. Return to Step 12.

If problems persist, contact LTI technicians AT (518) 674-8694 for help with unresolved questions or problems.

CF-5 LFG VENT FLARE
TYPICAL INSTALLATION - (PATENT PENDING)

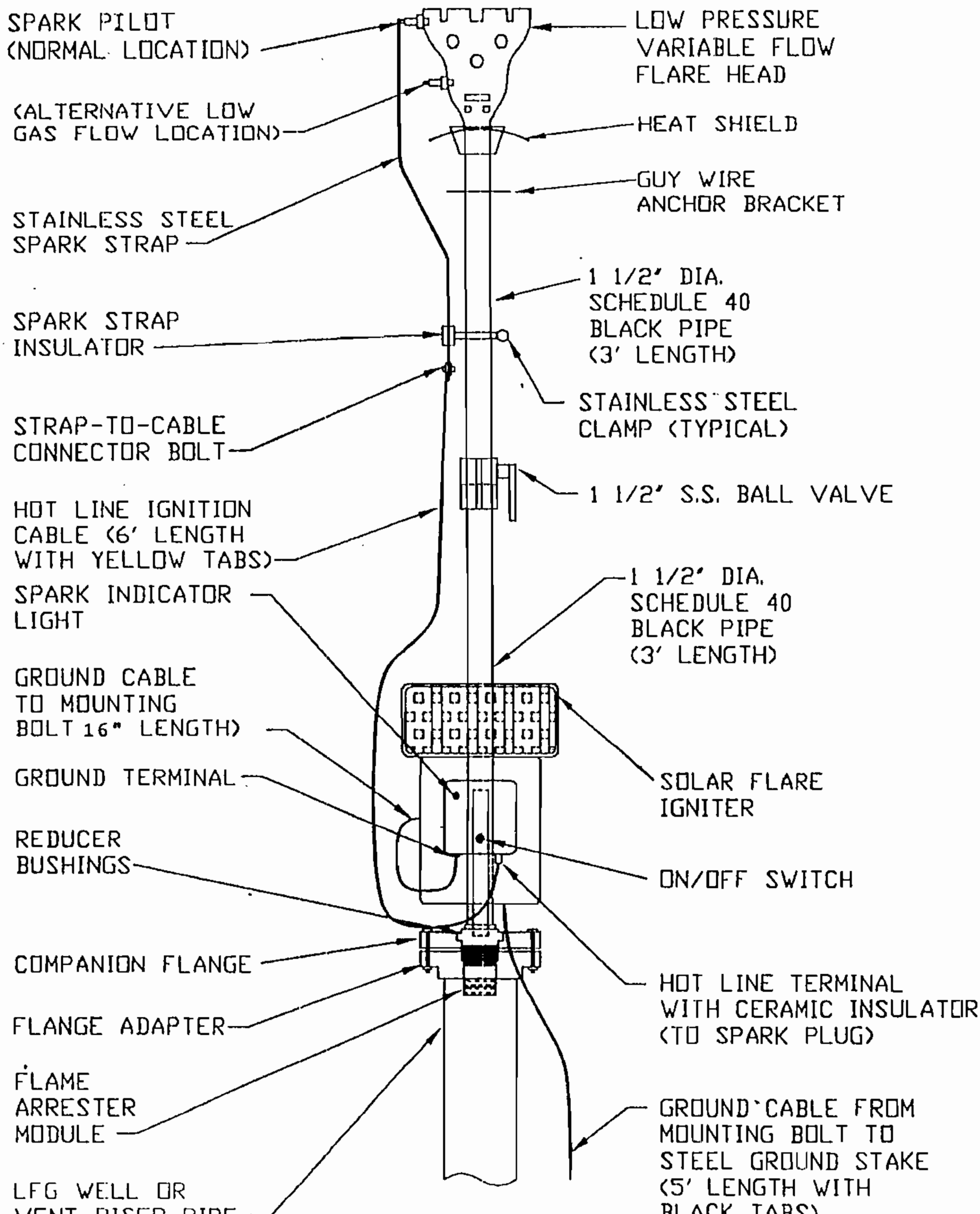


FIGURE 1

SFI-100 SOLAR IGNITER
TYPICAL MOUNTING DETAIL

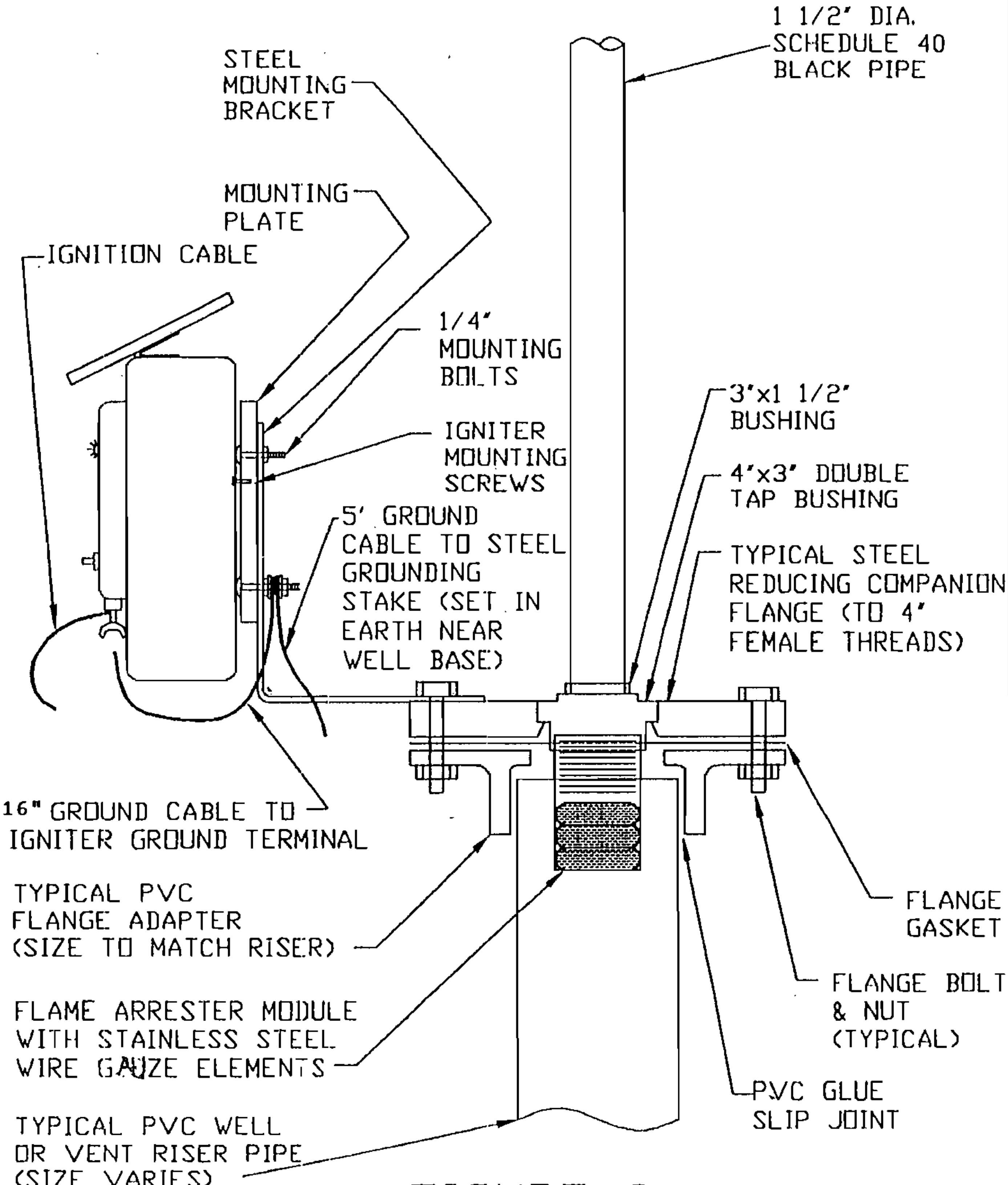


FIGURE 2

LTI LANDFILL TECHNOLOGIES, INCORPORATED

P.O. Box 519 West Sand Lake, New York 12196 (518) 674-8694
FAX: (518) 674-8695

CF-5 LANDFILL GAS VENT FLARE

ROUTINE INSPECTION AND MAINTENANCE PROCEDURES

Revised: 10 APR 98

DAILY INSPECTION:

- ➢ Verify combustion OK at flarehead.
- ➢ Verify spark indicator light is flashing.
- ➢ Verify ignition wires OK.

MONTHLY INSPECTION:

- ➢ Visually inspect ignition spark; verify OK.
- ➢ Check all ignition and ground wire terminals and connections for security.
- ➢ Exercise valve by opening and closing; verify proper re-ignition of flare.
- ➢ Clean surface of solar panel if necessary.

SEMIANNUAL INSPECTION:

- ➢ Check SparkPilot® for any carbon buildup, proper gap and proper sparking action. Clean electrodes if necessary.

ANNUAL MAINTENANCE:

- ➢ Perform annual maintenance procedure in accordance with attached sheet.

CF-5 LANDFILL GAS VENT FLARE

ANNUAL MAINTENANCE PROCEDURE

Revised: 10 APR 98

➢ Check integrity of solar panel, electrical connections and ignition wires. Replace any defective parts. Clean solar panel and assure it is facing generally south.

➢ Check the battery voltage; if 6-volt battery is less than 6V (or if 12-volt battery is less than 12V), recharge it using appropriate trickle charger. If the battery will not recharge, or won't hold a charge, replace with a new battery. The battery is checked by removing the solar igniter top cover and testing with a multimeter at positive and negative terminals.

➢ Remove the CF-5 flare by unbolting the companion flange. Lay the flare down. Remove the stainless steel screws in the flame arrester module and take out the stainless steel wire gauze insert with needle-nose pliers or a screwdriver. Clean the insert in solvent, or obtain replacement insert.

➢ Look through the flare from bottom to top to assure that it is free of obstruction. A buildup of dead insects in the pipe can cause an obstruction; this buildup should be removed by running a broom handle or pipe through the flare. Then install cleaned or new flame arrester wire gauze insert.

➢ Observe the SparkPilot® for build-up of carbon on electrode surfaces. Run a fine emery cloth across the gap to remove any buildup from the surface of the stainless steel body and spark ring. Assure gap is 0.045" to 0.050". Replace defective or inoperative SparkPilot®.

➢ Visually inspect all flare elements for corrosion or other damage. Clean or replace as required.

➢ Reinstall the flare. Assure that spark is performing reliably and valve operates freely. Check that re-ignition of gas occurs within approximately 60 seconds after opening valve.

APPENDIX E

GROUNDWATER EXTRACTION CONTINGENCY PLAN

APPENDIX E

3.5 Implementation of Hydraulic Control

In August 1997, USEPA issued the ESD for the Volney Landfill, which concluded "... that it would be more appropriate to collect the contaminated groundwater (in combination with the existing leachate collection system), on an as-needed-basis...to match the intermittent elevated contaminant concentrations...". The goal of hydraulic control, if implemented, is to provide contaminant mass removal by conducting focused pumpage in response to intermittent groundwater contamination exceeding the trigger values. Hydraulic control is expected to be a relatively short-term measure, and is not intended to be a stand-alone measure to achieve state/federal drinking water standards and/or to provide aquifer restoration. The difficulty in achieving groundwater restoration by pumpage only is discussed in the 1993 USEPA memo entitled *Guidance for Evaluating the Technical Impracticability of Ground-Water Restoration.* Restoration of groundwater quality at the Volney Landfill will be the result of: 1) the design and installation of the landfill cap (which effectively eliminates future leachate production); 2) the demonstration of the capacity for natural attenuation to reduce existing groundwater impacts (CPRI task); and 3) contaminant mass removal from groundwater by pumpage on an as-needed basis. The long-term groundwater monitoring plan has been developed to provide a means for effectively monitoring groundwater quality around the site, and to provide a mechanism which would trigger implementation of hydraulic containment in a timely manner, if warranted by groundwater quality data.

3.5.1 Summary Of Leachate Generation Analyses

Leachate generation forecasts were provided in Table 5-15 of the DDER, which indicated that ten years after placement of the proposed PVC cap on the side slopes, the amount of annual percolation from the waste (leachate) will have dropped from an initial 6.77 million gallons to roughly 880,000 gallons. In reviewing these forecasts, it is important to note that less than 1% of incident water infiltrates into the waste, once the supplemental capping system is in place. Once the site is fully capped, leachate generation is largely the result of water in the waste and soil layers prior to capping. The majority of this water entered the waste when the site was operating. In summary, the initial moisture content of the waste dominates the leachate generation estimates.

Because of the difficulties in obtaining actual waste moisture content values, a default value was used in the forecasts, and as discussed above, the likelihood is that actual leachate generation will be less than that predicted by the HELP Model. While the predicted annual leachate volumes are important results to evaluate, it is also important to evaluate the rate of reduction of leachate. Carrying the leachate generation forecasts out an additional 10 years (20 years after capping), annual leachate generation is 430,000 gallons; carrying out the forecast another 10 years (30 years after capping), leachate generation is 280,000 gallons. These forecasts demonstrate a gradual unloading of water stored in the waste (drying out of the waste mass) over time.

3.5.2 Groundwater Monitoring/Trigger Concentrations

The groundwater monitoring program is described in a previous section. The initiation of hydraulic containment pumping will be based on groundwater quality data which indicates that groundwater exhibits the "...intermittent elevated contaminant concentrations ..." referred to in the ROD. A trigger mechanism has been developed (described in the next section) to help distinguish between routine variations in groundwater quality and elevated contaminant concentrations which are precursors to groundwater contaminant plume formation. The trigger mechanism is meant to apply to the marginal cases (where contaminant concentrations vary in the same range as their respective drinking water standard), and the trigger mechanism can be circumvented when groundwater quality data clearly indicates elevated concentrations in one or more wells.

Initially, TVOC will be used as the trigger parameter; other parameters (such as individual SVOCs or heavy metals) may be added to the trigger list based on future groundwater monitoring. The TVOC parameter will be used because a unique VOC has not been consistently identified in groundwater around the Volney Landfill, *i.e.* - different VOCs have been detected in groundwater at the site, but not in a consistent pattern or distribution. Data will be subject to QA/QC review prior to calculation of TVOC for each sampling event. The QA/QC review may result in the exclusion of persistent laboratory artifact compounds such as methylene chloride and acetone for a specific TVOC calculation.

3.5.3 Trigger Mechanism

As discussed above, the purpose of the trigger mechanism is to help distinguish between routine variations in groundwater quality and elevated contaminant concentrations which are precursors to groundwater contaminant plume formation. To allow for timely implementation of hydraulic control, the trigger mechanism will be bypassed in the event that groundwater quality data clearly indicate that formation of a groundwater plume is occurring. Examples of such a situation are provided below:

- Contaminant concentrations are detected at two or more times their respective drinking water standard (if such a detection takes place, the well(s) will be re-sampled as soon as possible, with sample analysis on a quick turnaround basis).

- A distinct contaminant concentration gradient becomes evident between adjacent monitoring wells.

By its nature, the trigger mechanism has a temporal component, which is the rationale for bypassing the trigger mechanism in non-marginal cases just described. Initiation of hydraulic containment pumping via the trigger mechanism at a particular monitoring well will require that two criteria be met, as follows:

- Trigger concentrations are exceeded on a sustained basis in the monitoring well
- Monitoring data demonstrates an upward trend in trigger constituent concentration in the well

These criteria are described in more detail below.

The trigger concentration(s) represent concentrations in groundwater samples which, if exceeded, initiate a series of activities possibly leading to the commencement of hydraulic containment pumping. If a trigger concentration is exceeded for two consecutive monitoring periods in a monitoring well, trend analysis (described later) will be conducted to determine whether the exceedences are indicative of an overall upward trend of the trigger constituent concentration in that well. If an upward trend is not evident, no further action will be taken unless subsequent data indicates that such a trend is evident. If an upward trend is evident, the monitoring well will be re-sampled as soon as feasible following data reporting, and the sample will be analyzed for the exceeded parameter, with sample analysis on a quick turnaround basis. If the re-analyzed concentration is below the trigger concentration, monitoring will resume according to the previous schedule. If the re-analyzed concentration still exceeds the trigger concentration, the monitoring well will be sampled on at least a monthly basis. Trend analysis will be conducted on the groundwater quality data from the monitoring well. This monitoring process will continue until trend analysis indicates that a statistically upward trend is evident. At the time when the trend is evident and concentrations continue to exceed the primary trigger concentration, hydraulic containment pumping will be initiated.

3.5.4 Trend Analysis

Trend analysis will be conducted on data sets sorted by well and parameter. The Mann-Kendall test will be used for the trend analysis. The Mann-Kendall test is a non-parametric statistical test and is thus not dependant upon the data set following a normal distribution, nor is the Mann-Kendall test affected by missing values. Several examples of the use of the Mann-Kendall test are provided in Appendix F. These examples demonstrate the outcome of the test (initiate hydraulic control or continue to monitor water quality) as applied to hypothetical sets of quarterly data with TVOC concentrations in the range of 100 ug/L. Different statistical tests may be proposed in the future, based on a review of the monitoring results.

3.5.5 Trigger Concentrations

The TVOC trigger concentration will be set at 100 ug/L. This value is New York State Drinking Water Guidance Valve (6NYCRR Part 702.16) for TVOC in groundwater effluent. The trigger concentration was in part developed based on an analysis of existing groundwater, surface water and leachate data from the landfill, which includes data generated by Oswego County, USEPA/NYSDEC contractors, and from the DDER. This pooled data provides a reliable range of concentrations of TVOC detected at and around the landfill. The frequency of detection of TVOC in different concentration ranges is provided below:

TVOC Concentration (ug/L)	NUMBER OF DETECTIONS
Not Detected	1337
50	157
50-100	29
100-200	26
200	42

3.5.6 Initial Pumping

The ESD refers to "... ground-water extraction and treatment, on an as-needed basis (after initial pumping)...". The initial pumping phase was included in the ESD based on the fact that two wells have contained TVOC concentrations in excess of the trigger concentration (VBW-8S and SP-13), and the presumption that one or more of these wells would contain TVOC in excess of the TVOC trigger concentration. Following the first round of groundwater monitoring, exceedences of the TVOC trigger concentration will be compared to historic data for the individual well. If appropriate, trend analysis will be conducted to determine whether initial pumping needs to be undertaken.

3.6 Implementation, Operation, Monitoring and Maintenance of Hydraulic Containment System

This section describes the procedures which will be used to implement, operate, monitor and maintain the hydraulic containment system, should the need be triggered.

3.6.1 Description of Hydraulic Containment System

The DDER provided an evaluation of alternatives for capping and for complete hydraulic containment of leachate and groundwater at the landfill, including the use of groundwater extraction wells. The results of the evaluation of extraction wells to provide full hydraulic containment are summarized below:

Perimeter Area	Number of Extraction Wells	Pumping Rate Per Well (gallons per minute)
Southwest	2	5
North/Northeast	8	0.5
South/Southeast	14	2

If pumpage becomes necessary by the mechanisms described in this plan, a somewhat different approach would be taken than proposed in the DDER, as the intent would be to provide focused, and likely temporary, means of controlling leachate and impacted groundwater. On the northern half of the landfill, additional containment may not be necessary due to the presence of the northern leachate collection system; the DDER indicated appreciable bypass of this system such that upgrading the system may be necessary. In the event that hydraulic containment is necessary prior to the installation of the cap and leachate bypass cannot be controlled by ugrading the leachate collection system, extraction wells would be employed. For the southern portion of the landfill, extraction well placement will be in the areas of greatest saturated thickness (southeast and southwest of the landfill) rather than trying to encapsulate or surround the site with extraction wells. Pumpage, at a rate greater than proposed in the DDER (owing to greater saturated thickness), would be focused in these areas to provide the broadest hydraulic influence. This approach is already developed for the southwest area, as shown in the table above. For the southeast area, it may be possible to install two to three extraction wells at the base of the gravel pit, east of Silk Road; utilizing high pumpage rates to achieve the desired hydraulic control. The DDER evaluation (summarized above) assumed an average saturated thickness of the upper overburden unit of 20 feet along the south/southeast side; however, at the proposed location, the saturated thickness is 30-40 feet, and consequently, higher pumpage rates may be achieved.

If possible, existing 4-inch diameter monitoring wells will be used as extraction wells. If new extraction wells are necessary, they will be constructed in a manner similar to the well installed for the SPRDS pumping test (GMPW): 6-inch diameter PVC screen and casing. Boreholes will be advanced through the upper overburden unit to the top of the lodgment till, and the extraction wells will be installed with 20 to 30 feet of screen, depending upon field conditions.

3.6.2 Containment Options for Pumped Water

Depending on the pumping rates and locations which are ultimately selected, there are two basic options for containing the pumped water: direct tanker loading or the use of new storage construction. The volume of storage required will be dependent on the magnitude of the impacted area, as well as the rate of groundwater extraction.

If direct tanker loading is employed, water will be pumped directly from the extraction wells into tankers, then directly transported for disposal. As described earlier, there will be a prepared staging area for tankers while they are being filled; this area will be capable of containing accidental releases. A spill prevention plan will be developed to minimize the possibility of overfills. The design for the tanker staging area will be prepared during the RD.

The existing leachate tank will continue to store leachate which is conveyed through the in-place collection system and from groundwater pumpage. If new storage tanks are constructed, pumped water will be conveyed to the tank(s) from the extraction wells by double-walled piping installed on top of the existing cap.

3.6.3 Pumping and Conveyance System for Pumped Water

The pumping system will consist of permanent submersible pumps, either electrically or pneumatically powered. Depending on whether the pumped water is directly loaded into tankers or transferred to new storage tanks, the leachate conveyance system will differ. A discussion of the alternatives for managing pumped water is provided in a following section. For direct tanker loading, there will be a prepared area near the extraction wells for staging the tanker. The tanker will be connected to the wellhead by flexible hose equipped with quick disconnect fittings. Once connections are made, the pump(s) will be activated; pumping will continue under the supervision of an operator until the tanker is full. At that point, an isolation valve will be activated, and the pump will be deactivated. Water remaining in the hose will be drained back into the well. The staging area will be lined with geomembrane with an overlying protective fabric, and topped with rounded gravel. Accidental releases will be contained within the staging area and pumped into the tanker.

If a system of transfer to new storage tanks is implemented, the pumping systems will be connected to double-walled piping installed on top of the existing cap, leading to the new storage tank. The pipelines will be insulated for winter operation. Pumps will likely be manually controlled, unless operating conditions dictate that automatic controls are appropriate.

3.6.4 Flow Control

Each extraction well will be fitted with a rotary type flow meter to record and control pumpage. Pumpage will be controlled through the use of an overflow system to avoid filling the new storage tanks within one foot of the top.

3.6.5 Disposal Options for Pumped Water

Removal and disposal of leachate/groundwater will be performed in accordance with the applicable sections of 40 CFR Parts 262, 263 and 268, as well as 6 NYCRR Parts 360, and 370-373.

Oswego County has been disposing of leachate collected from the northern portion of the site as non-hazardous waste at in-state municipal sewage treatment facilities on a batch basis, with USEPA approval. It is anticipated that this practice will continue, regardless of which containment option is employed. If the direct tanker loading method is employed, loads will be sampled and analyzed (with an expedited laboratory turnaround) prior to shipment.

In the event that leachate quality changes in the future such that non-hazardous disposal is not allowed, the pumped water will be shipped to a permitted treatment facility; facilities in western New York and New Jersey have previously been used for this purpose. Another option is to pre-treat the pumped water on-site and then ship the treated water off-site for disposal as a non-hazardous waste. Pre-treatment would likely be by precipitation.

3.6.6 Operation and Maintenance

To ensure that the system is operated and maintained properly, an operation and maintenance (O&M) manual will be developed. The manual will describe the O&M procedures and provide for an operator training program. Operators will receive an initial briefing on system operation and then have periodic refresher training. Additionally, spill prevention and contingency plans will be prepared, and operators will be thoroughly familiar with emergency response procedures.

If system operation is triggered, a trained operator will be on-site daily to operate, maintain and monitor the system. In the event that long-term operation of the system becomes necessary, automatic controls will be designed and installed.

The decision to use pneumatic or electrical pumps will be dictated by how many wells would need to be pumped and at which locations, and possibly due to landfill gas considerations (whether explosion-proof equipment is necessary). At least one spare pump will be kept on-site. Pumps, when not in use as part of the Hydraulic Control Contingency Plan, will be utilized quarterly as part of the groundwater monitoring program; at this time valves will also be operated to verify functionality.

3.6.7 Effectiveness Monitoring

An effectiveness monitoring program will be employed to determine the efficiency of the pumpage in mitigating the observed impact to groundwater quality and to provide a basis for termination of pumpage based on improvements in groundwater quality. The effectiveness monitoring program will initially employ the same analytical parameters as the groundwater monitoring program; the analytical parameters may be modified depending upon the project needs at that time, with USEPA concurrence.

It is anticipated that pumped groundwater will be sampled and analyzed on roughly a weekly basis right after the implementation of pumpage. Water levels in monitoring wells proximate to the impacted area will be measured to demonstrate hydraulic control in the area. Groundwater samples will be collected from selected wells in the impacted area and analyzed on a monthly basis for the first three months; thereafter, the selected wells will be included in the quarterly monitoring program.

3.6.8 Pumpage Termination

Pumpage will be terminated when it can be demonstrated that contaminant concentrations are below their primary respective trigger levels or that contaminant concentrations have declined but reached an asymptotic relationship with time. The achievement of an asymptotic condition indicates that the pumpage has been successful in providing contaminant mass removal, but further contaminant removal is limited by hydrogeologic/ geochemical factors such as sorption/desorption and diffusion. In this general type of case, the achievement of groundwater standards is likely infeasible (USEPA, 1993). Modifications to the pumpage program will be evaluated prior to discontinuing pumpage if standards are not achieved.

If an asymptotic demonstration becomes necessary, an appropriate statistical method will be proposed and mutually agreed upon at that time. Depending upon the trends in groundwater quality data, monitoring frequency may be increased from quarterly to monthly for the purpose of facilitating the termination of pumpage.

MANN-KENDALL TEST
(Gilbert 1987)

"The first step is to list the data in the order in which they were collected over time: x_1, $x_2,\ldots,x_n$, where x_i is the datum at time i. Then determine the sign of all n(n-1)/2 possible differences $x_j - x_k$, where j>k. These differences are x_2-x_1, $x_3-x_1,\ldots,x_n-x_1$, x_3-x_2, $x_4-x_2,\ldots$, x_n-x_{n-2}, x_n-x_{n-1}.

Let $\text{sgn}(x_j-x_k)$ be an indicator function that takes on the values 1, 0, or –1 according to the sign of x_j-x_k:

$$\begin{aligned} \text{sgn}(x_j-x_k) &= 1 \quad \text{if} \quad x_j-x_k>0 \\ &= 0 \quad \text{if} \quad x_j-x_k=0 \\ &= -1 \quad \text{if} \quad x_j-x_k<0 \end{aligned}$$

Then compute the Mann-Kendall statistic

$$S = \sum_{k=1}^{n-1} \sum_{j=k+1}^{n} \text{sgn}(x_j-x_k)$$

which is the number of positive differences minus the number of negative differences."

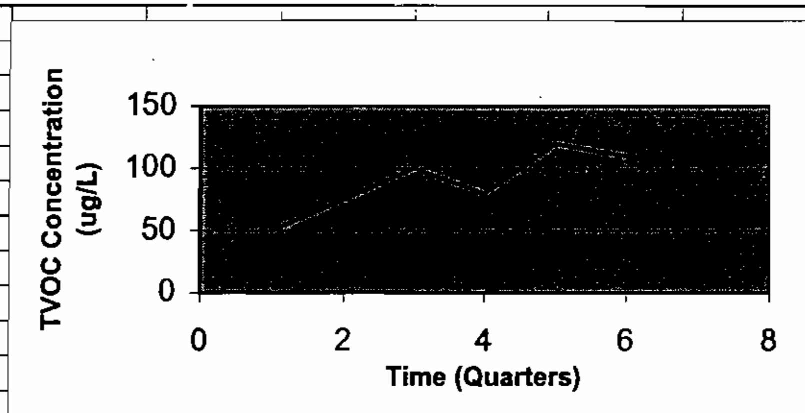
For trend analysis, the typical application is to test a null hypothesis, H_0, of no trend against the alternative hypothesis, H_A, of an upward trend. In the examples provided on the following page, S is first calculated, and then a probability value (from Table A18 of Gilbert, 1987) for the computed S is compared to the specified significance level (α). For this application $\alpha = 0.10$ or 10%. If the probability value is greater than 0.10, then H_0 cannot be rejected and no trend exists. If the probability value is less than 0.10, then H_0 is rejected and H_A is accepted (an upward trend exists).

Examples of Application of Mann-Kendall Statistical Test

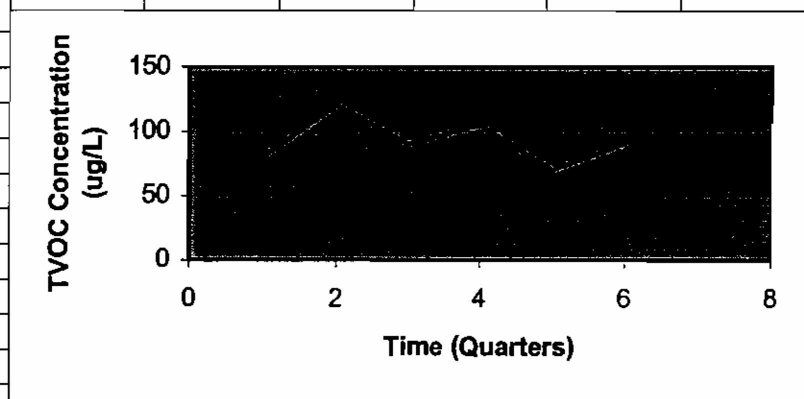
	Case 1	Case 2	Case 3	Case 4
Time (Qtrs)	TVOC	TVOC	TVOC	TVOC
1	50	80	70	70
2	75	120	80	85
3	100	90	90	100
4	80	105	105	85
5	120	70	80	110
6	110	90	85	95
Results of Statistical Test				
No. of Increases	13	8	10	11
No. of Decreases	2	6	4	3
S	11	2	6	8
Probability	0.028	0.43	0.19	0.1
Specified Significance Level	0.10	0.10	0.10	0.10
Increasing Trend?	Yes	No	No	Yes

Examples of Application of Mann-Kendall Statistical Test

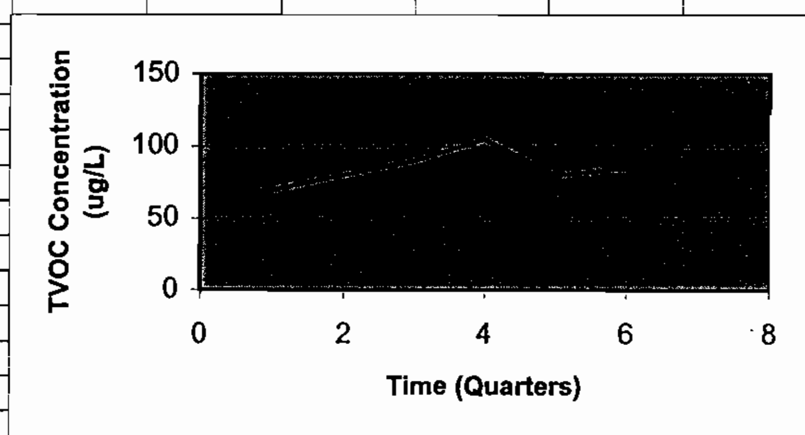
Case 1



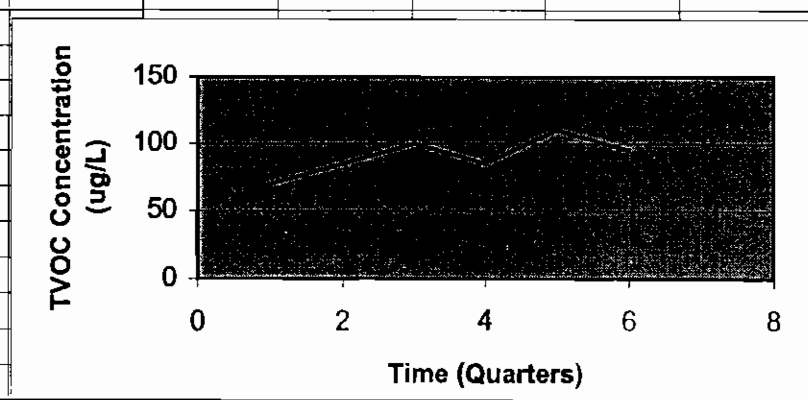
Case 2



Case 3



Case 4



Probabilities for the Mann-Kendall Non-Parametric Test for Trend

	Values of n					Values of n		
S	4	5	8	9	S	6	7	10
0	0.625	0.592	0.548	0.540	1	0.500	0.500	0.500
2	0.375	0.408	0.452	0.460	3	0.360	0.386	0.431
4	0.167	0.242	0.360	0.381	5	0.235	0.281	0.364
6	0.042	0.117	0.274	0.306	7	0.136	0.191	0.300
8		0.042	0.199	0.238	9	0.068	0.119	0.242
10		0.0083	0.138	0.179	11	0.028	0.068	0.190
12			0.089	0.130	13	0.0083	0.035	0.146
14			0.054	0.090	15	0.0014	0.015	0.108
16			0.031	0.060	17		0.0054	0.078
18			0.016	0.038	19		0.0014	0.054
20			0.0071	0.022	21		0.00020	0.036
22			0.0028	0.012	23			0.023
24			0.00087	0.0063	25			0.014
26			0.00019	0.0029	27			0.0083
28			0.000025	0.0012	29			0.0046
30				0.00043	31			0.0023
32				0.00012	33			0.0011
34				0.000025	35			0.00047
36				0.0000028	37			0.00018
					39			0.000058
					41			0.000015
					43			0.0000028
					45			0.00000028

Taken from Gilbert, 1987 (originally from Kendall, 1975)

APPENDIX F

MONITORING WELL DECOMMISSIONING PROCEDURE

APPENDIX F

SPECIFICATIONS

SECTION 02523

ABANDONMENT OF ENVIRONMENTAL MONITORING LOCATIONS BY PRESSURE GROUTING IN-PLACE

PART 1 - GENERAL

1.1 DESCRIPTION:

1.1.1 Under this Section, the Contractor shall furnish all labor, materials and equipment for the Abandonment of Environmental Monitoring Locations by Pressure Grouting In-Place, including, but not limited to, gas monitoring wells, groundwater monitoring wells, groundwater piezometers, and injection wells, as specified, and/or directed. The abandonment of environmental monitoring locations by pressure grouting in-place will be approved in the field by the Engineer.

1.2 REFERENCES: The Abandonment of Environmental Monitoring Locations by Pressure Grouting In-Place will be performed in accordance with the following references:

ASTM D5299	Decommission of Groundwater Wells, Vadose Zone Monitoring Devices, Boreholes, and Other Devices for Environmental Activities
Part 360-2.11 (a)(8)(vi)(b)	6 NYCRR Part 360 Solid Waste Management Facilities, NYSDEC

1.3 DELIVERY, STORAGE AND PROTECTION: Deliver materials in an undamaged condition. Store materials off the ground to protect against weathering. Replace defective or damaged materials with new materials.

1.4 GENERAL REQUIREMENTS: Perform abandonment of environmental monitoring locations in accordance with the references cited herein, and to the satisfaction of the Engineer.

PART 2 - PRODUCTS

2.1 MATERIALS: Shall conform to the respective procedures as referenced herein and as shown on the Plans.

SECTION 02523

ABANDONMENT OF ENVIRONMENTAL MONITORING LOCATIONS BY PRESSURE GROUTING IN-PLACE

PART 3 - EXECUTION

3.1 ABANDONMENT PROCEDURES: Remove protective casings and/or well riser stickups level to ground surface. Inject cement bentonite grout, prepared in accordance with ASTM D5299-92, to a height above the top of the well screen interval using the tremie method. Once it has been determined that the height of the grout column within the well is above the screen, the adequacy of the grout seal within the well screen interval will be tested by filling the remaining length of the well with water and applying a pressure of 10 psi to the system. The system must be able to maintain 10 psi for a period of one hour. The remaining well riser section is to be grouted to the surface to complete abandonment. In the event that the number of units abandoned exceeds the estimated quantity presented in Section 00100, "Information For Bidders", the Contract price and time for completion will be adjusted in accordance with the Contract.

PART 4 - MEASUREMENT & PAYMENT

4.1 MEASUREMENT - ABANDONMENT OF ENVIRONMENTAL MONITORING LOCATIONS BY PRESSURE GROUTING IN-PLACE:

4.1.1 Measurement for the Abandonment of Environmental Monitoring Locations by Pressure Grouting In-Place shall include the cost of all materials, equipment and labor for the complete decommission of wells to include, but not limited to, mobilization, demobilization, site restoration, removal of waste materials, standby time and any other costs associated with the work.

4.2 PAYMENT - ABANDONMENT OF ENVIRONMENTAL MONITORING LOCATIONS BY PRESSURE GROUTING IN-PLACE:

4.2.1 For Abandonment of Environmental Monitoring Locations by Pressure Grouting In-Place, not included in other unit or lump sum price items, payment for Abandonment of Environmental Monitoring Locations by Pressure Grouting In-Place will be made at the applicable price stated in the Bid.

END OF SECTION