VL-4

REMEDIAL DESIGN WORK PLAN

VOLNEY LANDFILL
SILK ROAD
VOLNEY, NEW YORK

NOVEMBER, 1998

PREPARED FOR:

COUNTY OF OSWEGO,
ALCAN ALUMINUM CORPORATION,
ARMSTRONG WORLD INDUSTRIES, INC.,
MILLER BREWING COMPANY AND THE PAS PRPs.

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1.0 INTRODUCTION

Barton & Loguidice, P.C. (Barton & Loguidice) was retained by Oswego County, Alcan Aluminum Corporation, Armstrong World Industries, Inc., Miller Brewing Company, and the Pollution Abatement Services (PAS) PRPs to prepare this Remedial Design Work Plan (RD Work Plan) for conducting remedial action activities at the Volney Landfill located on Silk Road in the Town of Volney, New York. The rationale behind the remedial action being undertaken at the landfill is outlined in the following sections; also are included are the methodologies and procedures to be used during the field activities associated with the implementation of the approved RD Work Plan.

The Sampling, Analysis and Monitoring Plan (Appendix A), contains plans for the following activities related to cap design/construction: an explosive gas investigation, proposed air monitoring procedures, the monitoring of cap performance and gas control, leachate and runoff control, and a wetlands and flood plains impact evaluation. Also included in this plan are the following activities related to groundwater remediation: long-term groundwater monitoring procedures, and a contingency plan for hydraulic control of groundwater and leachate.

The following are included as appendices: Appendix A, the Sampling, Analysis and Monitoring Plan (SAMP) describes sampling and monitoring procedures. Appendix B, the Quality Assurance Project Plan (QAPP), outlines Quality Assurance/Quality Control (QA/QC) procedures that will be implemented to ensure the quality of the data generated from the RD. Appendix C, The Health and Safety Contingency Plan (HASCP), which details health and safety measures to be implemented in order to ensure worker health and safety while on the site during RD activities. Appendix D, contains information on access and other approvals, and Appendix E contains schedules for the remedial design, and for the construction/operation, maintenance and monitoring (OM&M). Appendix F provides examples of the statistical testing procedure for the trigger mechanism in the Hydraulic Control Contingency Plan (described later).

2.0 BACKGROUND

2.1 Selection of Remedy

The remedial alternative selected in the source control Record of Decision (ROD) (USEPA 1987) for the Volney Landfill, and confirmed in the Post Decision Document (PDD) (USEPA 1989), included the following components:

- Installation of a supplemental cap over the side slopes of the landfill.
- Installation of a leachate collection system and soil-bentonite slurry walls (the latter pending cost-effectiveness studies) in the northern and southwestern perimeters of the landfill.
- Treatment of the collected leachate either in an on-site treatment plant or off-site treatment facility (to be determined based upon treatability studies).

The 1987 ROD specified that studies be performed during the RD phase to determine if the leachate generated from the landfill should be treated on-site or off-site. The PDD that followed in 1989 called for pre-RD studies to re-evaluate the cost-effectiveness of the proposed slurry walls and included the on-site versus off-site treatment comparison in the pre-RD studies, instead of later during the RD phase. Camp Dresser and McKee (CDM) conducted these studies (Leachate Generation and Treatability Studies) and summarized their findings in two draft reports submitted to the USEPA in May 1991 (CDM 1991a and 1991b). Although the studies provided information about potential leachate disposal at publicly owned treatment works (POTWs) and updated construction costs for the site remedy, they also concluded that additional site work was necessary to resolve some critical questions about the "complex hydrology" at the site, before the final assessment of the cost-effectiveness of the slurry wall installation and the decisions regarding off-site versus on-site treatment could be made.

In review of this matter, the USEPA concluded that additional work was required and should be performed in a supplemental pre-RD study, incorporated within the framework of an RD work plan.

The purpose of the Supplemental Pre-Remedial Design Study (SPRDS) was to resolve several major hydrogeological and leachate generation/collection issues needed to facilitate the United States Environmental Protection Agency's (USEPA's) selection of the final remedial components for the site remedy. The studies also included gathering data to support the resolution of the Resources Conservation and Recovery Act (RCRA) "F019 issue" concerning leachate disposal, and the further development of a database for the performance of the remedial design (RD) and remedial action (RA) at the site. The SPRDS concluded the following in the Design Data Evaluation Report (DDER):

- Utilizing intermittent groundwater extraction and treatment, on an as-needed basis, 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 would not be cost-effective in combination with intermittent groundwater extraction.
- The collected leachate should be treated off-site.
- The RCRA regulations related to hazardous waste sludge which was disposed of at the landfill should be waived.

In August 1997, USEPA issued an Explanation of Significant Differences (ESD) for the Volney Landfill site to implement these changes in the original ROD.

2.2 Groundwater Contamination

The evaluation of groundwater quality in the overburden unit at the perimeter of the landfill indicates that the main impacts are from leachate indicator compounds (conventional water parameters, *e.g.*, alkalinity, ammonia, hardness, iron, etc.), to a lesser extent from organic compounds, *i.e.*, mostly volatile organic compounds (VOCs), and from various metals. The most impacts and highest concentrations of contaminants generally occurred in the northeast and southern perimeter of the landfill, and followed the configuration of the water table. With respect to the organic contaminants, most occurred at a relatively low frequency and most of the exceedences of groundwater standards occurred in the northeast; however, there was no consistent pattern between the occurrence or concentration of contaminants between adjacent wells, or more upgradient wells, in any area. Based upon this information, it was concluded that there is no indication of a continuous or definable organic contaminant plume leaving the site.

Groundwater quality in the lodgement till unit, which separates the overburden and bedrock units, did not appear to be impacted (except for a few miscellaneous organics and some metals elevations); however, some migration of contaminants from the overburden through the lodgement till in limited locations is the likely source of similar contamination found in the bedrock aquifer. The overall rate of contaminant migration through the lodgement till unit appears to be quite low.

Although the 1987 ROD called for evaluating the potential for bedrock contamination in a future Contamination Pathways Remedial Investigation/Feasibility Study (CP RI/FS), it was more expedient to perform the investigation during the SPRDS. Results of the bedrock groundwater analysis show similar but less leachate indicator impacts compared to the overburden aquifer, with the highest leachate indicators occurring in upgradient bedrock wells in the southwest. This higher concentration appears to be the result of the permeability of the bedrock and the density and slope of the lodgement till drumlin underlying the southern part of the site, directing the flow of overburden groundwater toward the southwest. While some low-level organic contaminants (VOCs and SVOCs) were also detected in the bedrock, these were mostly limited to the south/southeast perimeter of the landfill (again upgradient) and were far fewer than in the overburden aquifer. Some metals elevations were also found in the bedrock aquifer, but these were also fewer and generally lower in concentration than in the overburden aquifer.

The 1994 SPRDS analytical data characterizing the overburden aquifer provided a valuable third data set to add to the historical quality-assured data from 1988 and 1990. A review of these data, spanning six years, shows intermittent or sporadic organic contaminant elevations (sometimes exceeding groundwater standards) over time and generally no consistency in contaminant distribution or concentration between adjacent wells. This further confirms the absence of any continuous or definable organic contaminant plume leaving the site.

Oswego County has been gathering groundwater data since 1984 from monitoring wells at the perimeter of the landfill. Although it is USEPA policy that analytical data that has not been properly quality-assured by USEPA methods, such as the County data, cannot be used in determining the nature and extent of contamination at and emanating from a Superfund site, such data can be utilized for qualitative purposes to confirm data, trends, etc. In reviewing the County data since 1984, it was found that the general characteristics of the County data (*i.e.*, showing intermittent contaminant elevations and lack of any contamination pattern in perimeter wells), generally confirmed the same characteristics in the quality-assured data from 1988, 1990 and 1994.

2.3 Description of Selected 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, off-site treatment of leachate and contaminated ground water, and long-term monitoring. The supplemental capping of the landfill side slopes is anticipated to reduce the infiltration of surface water into the landfill by over 99%. Thus new leachate generation will be effectively eliminated following installation of the supplemental side slope cap. The continued use of the existing leachate collection system and the collection of contaminated groundwater on an as-needed basis will reduce existing groundwater contamination. A trigger mechanism is provided in this plan for the implementation of groundwater collection.

The proposed remedy will effectively preclude new leachate generation and reduce existing impacts to groundwater, however the difficulty in achieving full restoration of groundwater quality through technology applications is well documented in the scientific, engineering, and regulatory literature. Therefore, an important element of the overall remedy will be evaluating the role of natural attenuation in restoring groundwater quality. The DDER indicated that natural attenuation is occurring, and appears to have developed a buffer zone around the site. The CP RI/FS, which will be performed concurrently with the RD, will further characterize the natural attenuation processes which are occurring in the environs of the landfill.

3.0 REMEDIAL DESIGN ACTIVITIES

3.1 Design of Remedial Components

Capping and closure activities will be performed in accordance with applicable sections of 40 CFR Part 264 Subpart G and 6 NYCRR Part 360. The remedial design will be performed in accordance with the Statement of Work (SOW) which is appended to the RD/RA Consent Decree. Submittals will include a Preliminary RD Report at the 35% design completion stage and a Final RD Report at the 100% completion stage.

The major technical issues for the design are as follows:

- Achievement of 6NYCRR Part 360 (and applicable sections of 40 CFR 264 subpart G) design criteria and capping requirements
- Stability analyses of the capping system, waste mass and Silk Road both during and after construction of the supplemental side slope capping system
- Analysis of the need to relocate Niagara Mohawk overhead power lines along both Silk and Howard Roads to accommodate the supplemental side slope capping system
- Quantitative analysis of site surface water control requirements and design of control systems
- Quantitative analysis of site landfill gas control requirements and design of control systems

The Preliminary RD Report (35% completion) will contain, at a minimum, the following elements:

1. Design criteria

2. Results of remedial design studies, including wetlands delineation and groundwater monitoring
3. A discussion of the how the design will achieve the Performance Standards
4. Preliminary engineering drawings and plans, including plan and cross-sectional views of the capping system (including vegetative cover alternatives capable of supporting wildlife habitat), landfill gas control system and surface water control system
5. Preliminary landfill access roadway layout
6. Preliminary results of engineering evaluations and calculations
7. Table of contents/outline for the construction specifications in Construction Specification Institute (CSI) format
8. A technical specification for photographic documentation of the remedial construction work
9. A draft groundwater extraction contingency plan
10. A technical specification for signage per the SOW
11. Site security plan
12. A draft construction schedule

The Final RD Report (100% completion) will contain the following elements:

1. Final engineering plans and drawings
2. Final engineering specifications
3. An Operation, Maintenance and Monitoring (OM&M) Plan per SOW requirements
4. A Construction Quality Assurance Plan (CQAP) per SOW requirements
5. A Health and Safety Contingency Plan (HSCP) for remedial construction
6. A final construction cost estimate
7. A plan for construction oversight and certification
8. A description of the method for selection of construction contractors

9. A final groundwater extraction contingency plan
10. A final construction schedule

3.2 Explosive Gas Investigation

An explosive gas investigation will be conducted to determine the amount of gas presently being produced by the landfill, as well as the extent of possible subsurface gas migration. Gas measurements will be collected from the top of the landfill (existing plastic cap), the sideslopes (existing soil cap) and perimeter areas (uncapped). The gas investigation will be conducted similarly to the 1993 field work performed as part of the Supplemental Pre-Remedial Design Study (SPRDS). In addition, five samples well be collected for VOC analysis from the vents exhibiting the highest methane concentration. These samples will be analyzed by USEPA Method TO-14, but the collection method described in Method TO-14 will not be used (see the SAMP for sample collection protocol). More detail on the explosive gas investigation is provided in the SAMP which is provided in Appendix A. Data gathered will be used to design the gas collection system for the supplemental side slope capping system, as well as, to evaluate how to best control gases using the existing top slope gas collection system. The landfill gas collection/control system portion of the Remedial Design (RD) may consist of passive gas vents allowing the gases to vent directly to the atmosphere, passive gas collection manifolded to a few locations with candlestick flares, or an active system where the gas is extracted and flared or possibly used to generate power. The design and implementation of gas venting will be in accordance with 6 NYCRR Parts 200 and 360, as well as 40 CFR Part 264 Subparts AA, BB and CC.

3.3 Monitoring of Closure System Components

Following construction of the RD, routine inspections of the entire closure system will occur quarterly in conjunction with the Environmental Monitoring Plan presently being developed for the site. The closure system components to be monitored include both the existing top and supplemental side slope caps, the surface water control system, the gas venting system and the leachate collection system.

The existing top and supplemental side slope caps will be visually inspected to ensure that they are functioning as designed. The barrier protection soil above the PVC geomembranes will be inspected to ensure that adequate thickness still exists to protect the PVC from environmental factors including weather and burrowing animals. Additionally, cover vegetation will be inspected to prevent root damage to the geomembranes. Any erosion of the cover soil will be noted and corrected. PVC coupons will be extracted from both the existing and supplemental caps every five years and will be sent to a testing laboratory to verify the continued long-term integrity of the PVC. Any problems noted with the capping systems which prevent them from functioning as designed will be corrected.

Similarly, the surface water control, gas venting and leachate collection systems will be visually inspected on a quarterly basis. These systems shall be maintained such that they continue to provide for the efficient collection and removal of surface water, gas and leachate, respectively, as designed. Deficiencies in these systems discovered during routine monitoring will be corrected.

3.4 Groundwater Monitoring Program

The Groundwater Monitoring Program will be consistent with the applicable sections of 40 CFR Part 264 Subpart F and 6 NYCRR Part 360.

Historically, there have been two distinct types of groundwater sampling and analysis which have occurred at the Volney Landfill: periodic sampling for specific programs (*e.g.*, – PDD, SPRDS) which incorporated data validation and regular (quarterly and semi-annually) monitoring by the Oswego County Department of Health which employed non-validated data. While decisions regarding selection of remedy have been based only on validated results, the SPRDS helped establish the value of the Oswego County data.

The Oswego County program will be continuing through 1998 and in 1999 will become the long-term monitoring program, with some modifications. Also in 1998, one of the County sampling rounds will be replaced by one of the sampling rounds for the Contamination Pathways Remedial Investigation (CPRI). The schedule of sampling activities is shown on Table 1 (reduction in sampling frequency will be based on analytical results and subject to USEPA approval); an inventory of wells and analytical parameters for the different sampling programs is provided on Table 2, and the sampling points for the long-term sampling program are shown on Figure 1. Sampling procedures are provided in the SAMP. Data from the monitoring program will be validated.

The analytical parameter list (Table 2) includes a list of metals, encompassing those which have been detected in excess of state/federal standards for drinking water. The monitoring program (Table 1) also includes periodic monitoring for semi-volatile organic compounds (SVOCs). In 1999, one monitoring round will include sampling and analysis for SVOCs for leachate and landfill monitoring wells. In 2000 and subsequent years, SVOCs will be monitored annually in leachate samples. SVOC samples may be collected from selected monitoring wells based on the results of leachate samples.

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.

3.7 Wetlands, Floodplains Impact Evaluation

As part of the RD, a delineation of state and federally regulated wetlands within the vicinity of the site will be conducted. Site maps will then be updated to depict the identified wetland areas, as well as mapped floodplain areas (100-year and 500-year). The wetlands delineation will be conducted in accordance with the Army Corps of Engineers Wetlands Delineation Manual (January 1987).

During the RD, an evaluation will be performed to determine if the increased surface water runoff (due to the reduction in infiltration) caused by the construction of the supplemental side slope capping system will have an adverse impact on the wetlands and/or flood plains in the vicinity of the site. This evaluation will be qualitative, and will assess whether incremental increases in flow will adversely impact the existing wetlands species. The surface water control system will be designed to minimize effects on the local wetlands and/or flood plains both during and after construction of the closure system. An evaluation will also be conducted to determine whether the reduction in infiltration to the groundwater system (as a result of capping and possible groundwater pumpage) will have an adverse impact on the wetlands and/or flood plains in the vicinity of the site. An ecological site description (Step I of the NYSDEC Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites) will be prepared as part of this task. Finally, an evaluation will be performed to determine if the one-hundred (100) foot buffer around the NYSDEC regulated wetland to the north of the site will be encroached upon during the construction of the capping system.

In the event that potential adverse impacts to wetland areas from the implementation of the RA are identified, a wetlands mitigation plan and post-mitigation monitoring plan will be prepared consistent with current NYSDEC and Army Corps of Engineers wetlands mitigation guidance.

3.8 Silk Road Stability Evaluation

As a result of the close proximity of Silk Road (and the steep bank to the east of the road) to the landfill footprint, an evaluation of the stability of the road will be performed as part of the RD. The stability of the road both during, as well as, after construction of the supplemental side slope capping system will be examined using PCSTABL5, a two-dimensional slope stability computer program. The effects of surface water runoff from the capping system will be accounted for in the evaluation. Any provisions required to ensure the stability of the road and the bank, either during or after construction, will be incorporated into the RD.

3.9 Overhead Power Line Relocation Evaluation

The landfill limits of waste extend very close to the Niagara Mohawk overhead power lines along both Silk and Howard Roads. In order to properly construct the capping system, and to ensure safe working conditions during construction, it appears that either the power lines or some waste will have to be relocated. Engineering, cost and implementability analyses will be performed during the RD to determine which alternative is more environmentally sound and cost effective.

3.10 <u>Photogrammetric Survey of the Site</u>

An updated survey of the site and surrounding areas will be obtained to ensure that all components of the RD are properly analyzed. Any settlement of the landfill from the last survey will be measured and this data will be incorporated into the design of the capping, surface water control and gas venting systems.

APPENDIX A

SAMPLING, ANALYSIS AND MONITORING PLAN

SAMPLING, ANALYSIS AND MONITORING PLAN

1.0 INTRODUCTION

This Sampling, Analysis and Monitoring Plan (SAMP) is part of the Remedial Design Work Plan and has been prepared in accordance with the Statement of Work which is appended to the Consent Decree for the Remedial Design/Remedial Action at the Volney Landfill, as well as applicable USEPA guidance.

2.0 EXPLOSION GAS INVESTIGATION

An explosive gas investigation will be conducted to determine the amount of gas in percent of the Lower Explosive Limit (% LEL) and, if needed, percent gas (%Gas) presently being produced by the landfill, as well as, the extent of possible subsurface gas migration. The gas investigation will be conducted similarly to the 1993 field work performed as part of the Supplemental Pre-Remedial Design Study (SPRDS). The proposed investigation will include the monitoring of the 13 side slope gas vents, the 19 top slope gas vents and the 15 top slope monitoring probes. In addition, shallow, subsurface points will be measured at 200 foot intervals around the perimeter of the site corresponding to the approximate locations tested during the SPRDS. Two rounds of gas measurements will be collected, several weeks apart depending upon weather conditions. Measurement rounds will be scheduled for days when low or falling atmospheric pressure conditions are predicted.

A combustible gas indicator (CGI) will be used to measure gas concentrations. The CGI will be field checked/calibrated against a calibration gas on a daily basis. The calibration gas will be methane in air. The results of field checks/calibrations will be recorded in the field log.

Daily temperature, weather and barometric conditions will also be recorded in the field log. The gas concentration of each gas vent and monitoring probe will be measured by inserting the probe of the CGI several inches into the opening of the vent or monitoring probe. The general condition of each vent or probe will be noted on the field log.

Samples to be collected for laboratory analysis for VOC's will be collected using a battery-powered air sampling pump. Tubing connected to the pump intake will be lowered 1-2 feet into the gas vent. After 3 minutes of purging a 1-liter Tedlar bar will be attached to the pump outlet. The bag will be filled and the valve closed. The bag will then be placed in a cooler for transport to the laboratory.

The gas concentrations at the landfill perimeter locations will be measured by first advancing a 4-6 inch diameter borehole with a hand or power auger. The borings will be advanced to a depth of approximately 3 feet below grade. A 1-1/4 inch diameter section of rigid PVC pipe will be inserted into each borehole, and the borehole will be backfilled with drilling cuttings and sealed at the surface with a bentonite grout. The top of the PVC pipe will then be covered with parafilm wrap and left to equilibrate for a minimum of 1-2 hours (these probes will be left in the ground for the second round of measurements). After equilibration, the CGI probe will be inserted through the parafilm and the measurement recorded after purging the wall.

3.0 AIR MONITORING

This plan describes the procedures which will be employed to ensure that air emissions, meet applicable or relevant and appropriate requirements (ARARs) for air emissions. These air emissions may result from capping activities

The primary air monitoring will occur as part of health and safety activities. The Health and Safety Contingency Plan (HSCP) provides a discussion of the air monitoring program. Real-time instrumentation (photoionization detector (PID), flame ionization detector (FID) and/or combustible gas indicator (CGI) and a hydrogen sulfide (H_2S) detector will be used to measure airborne concentrations of contaminants which might result during landfill capping activities. Monitoring will also be conducted for particulates. The exhumation of landfilled waste would likely be the only circumstance under which air emissions would be expected. The need for the exhumation of landfilled waste to achieve proper grades for cap installation will be determined during the design phase. If exhumation is determined to be necessary, venting of gasses and/or emissions will be controlled in conformance with 40 CFR Part 264 Subparts AA, BB and CC.

If for airborne contaminants are approached, perimeter air monitoring will. Capping operations will be suspended as quickly as feasible if health and safety action levels are reached in the interior of the site, and appropriate mitigation measures such as vapor/dust suppression using water or foam will be implemented. Perimeter (fence line) air monitoring will be conducted with appropriate real-time instrumentation to determine whether airborne contaminants from the capping operation are being transported off-site.

4.0 GROUNDWATER MONITORING PROGRAM

There have been two distinct types of groundwater sampling and analysis which have occurred at the Volney Landfill. Periodic sampling has been performed for specific programs (*e.g.*, – PDD, SPRDS) which incorporated data validation. Regular (quarterly and semi-annually) monitoring has been performed by the Oswego County Department of Health which employed non-validated data.

The Oswego County program will be continuing through 1998 and in 1999 will become the long-term monitoring program, with some modifications. Also in 1998, one of the County sampling rounds will be replaced by one of the sampling rounds for the Contamination Pathways

Remedial Investigation (CPRI). The schedule of sampling activities is shown on Table 1 of the RD work plan; an inventory of wells and analytical parameters for the different sampling programs is provided on Table 2 of the RD work plan, and the sampling points for the long-term sampling program are shown on Figure 1 of the RD work plan.

The analytical parameter list in the RD work plan (Table 2) includes a list of metals, encompassing those which have been detected in excess of state/federal standards for drinking water. The monitoring program (Table 1 of the RD work plan) also includes periodic monitoring for semi-volatile organic compounds (SVOCs). In 1999, one monitoring round will include sampling and analysis for SVOCs for leachate and landfill monitoring wells. In 2000 and subsequent years, SVOCs will be monitored annually in leachate samples. SVOC samples may be collected from selected monitoring wells based on the results of leachate samples.

Protocols for the collection of groundwater samples are attached to this document.

4.1 <u>Effectiveness Monitoring</u>

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 and sample collection procedures 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 following the implementation of pumpage. Water levels in monitoring wells proximate to the impacted area will be measured before and after pumping 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.

GROUNDWATER

SAMPLING PROTOCOL

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

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	Turbidity meter
Plastic sheeting	Bladder sampling pump (PVC or equivalent)
Polypropylene rope	Compressor and power source
Micro laboratory detergent (or equivalent)	Thermometers
Sample bottles*	Indelible marking pens
Buckets (graduated)	Brushes
Gloves (Latex, Nitrile, or equivalent)	Measuring tape
	Polyethylene tubing
pH meter and buffers (with millivolt scale)	Beakers
Redox probe and standards	Flow-thru cell

Dissolved oxygen meter	Clear tape
Specific conductance meter and standard	

* 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.

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.

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. Judgement 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 III).

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 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.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPP)

QUALITY ASSURANCE PROJECT PLAN
REMEDIAL DESIGN
WORK PLAN, VOLNEY LANDFILL
VOLNEY, NEW YORK

VOLNEY LANDFILL
SILK ROAD
VOLNEY, NEW YORK

AUGUST, 1998

PREPARED FOR:

COUNTY OF OSWEGO,
ALCAN ALUMINUM CORPORATION, ARMSTRONG WORLD INDUSTRIES,
MILLER BREWING COMPANY, AND THE PAS PRPs

PREPARED BY:

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QUALITY ASSURANCE PROJECT PLAN
REMEDIAL DESIGN
WORK 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 conducting the Remedial Design (RD) field program 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-005/80.

- USEPA. October 1988. Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. Interim Final. EPA/540/G-89/004.

- USEPA. March 1987. Data Quality Objectives for Remedial Response Activities: Development Process. EPA/540/G-87/003.

- USEPA. May 1978, Revised May 1986. NEIC Policies and Procedures. EPA-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. Some parts of the structure are described in this document (*e.g.*, data management); and other parts are described in the Work Plan and are incorporated into the QAPP by reference. This applies particularly to the Standard Operating Protocols and Procedures (SOPs), which have been developed for the various RD field tasks. Site background information and RD data collection activities are described in detail in the RD work plan.

The internal laboratory SOPs and QA/QC procedures will be described in the laboratory QAPP, an independent plan to be provided by the analytical laboratory. This plan will be appended to this document (Appendix A) when the laboratory has been selected. The SOPs provided by the subcontracted laboratory will be consistent with the USEPA Contract Laboratory Program (CLP) Statements of Work (SOWs) planned for this project.

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

The project organizational structure is discussed in the draft Consent Decree and draft Statement of Work. The project team organization is shown on Figure 5 of the CPRI WP. 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 Project Coordinator.

- *The Project Engineer* is responsible for engineering activities to be undertaken under the Consent Decree, including preliminary and final designs of side slope cap, and conveyance systems for pumped groundwater. 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 RD Project Support Team* member include the sampling team, 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 will be described in the laboratory QAPP (under separate cover following laboratory selection).

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 field measurements and laboratory analyses will be used to support one or more steps in the RD process. These field steps include side capping of the landfill and long term sampling. The data to be collected range from qualitative information (based on field observations) to quantitative laboratory analyses. An important factor in the use of the data will be the ability to evaluate site conditions with respect to the applicable or relevant and appropriate requirements (ARARs).

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" (USEPA 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 RD. 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 will be described in the laboratory QAPP (under separate cover following laboratory selection) will be 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 will be provided in the laboratory QAPP (Appendix A).

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 SOPs described in the Work Plan. Laboratory representativeness requirements will be provided in the laboratory QAPP (under separate cover following laboratory selection).

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 will be provided in the laboratory QAPP (under separate cover following laboratory selection).

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. Protocols for the collection of field blanks are provided in the SAP. Field blanks will be analyzed for the same analyte list as environmental samples using the CLP and/or USEPA 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 USEPA 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. USEPA CLP non-standard services laboratory methods.

The analytical support levels which will be used to generate the project data are summarized in Table 1. As shown in this table, the analyses that will be performed during the RD will fall within Levels 1, 2, 3 and 4.

3.3 QUALITY CONTROL OBJECTIVE

The QC objective for the RD 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 will also be 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 (under separate cover following laboratory selection).

4.0 SAMPLING PROCEDURES

Samples will be collected in accordance with the approved project SOPs to the Work Plan. The SOPs specify detailed step-by-step protocols for sample collection and address the following as appropriate:

- 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.

All samples will be delivered to the laboratory within 24 hours from day of collection. Preservation, container, and holding time requirements for the parameters to be analyzed are provided in the Sampling and Analysis Plan.

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 followed to provide the chain-of-custody in the field from sample collection through shipment to the laboratory (including sample preservation) are specified in the Sampling and Analysis Plan. 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 (under separate cover following laboratory selection). 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 discussed in the Work Plan. These procedures are described for the following instruments:

- 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 will be discussed in the laboratory QAPP (under separate cover following laboratory selection).

7.0 ANALYTICAL PROCEDURES

The analytical methods for testing for the volatile, semi-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, semi-volatile, and inorganic 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 the analytical data will be described in the laboratory QAPP (Appendix A). 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). 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 judgements 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 USEPA 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 tabulated format will be suitable for inclusion in the RD report and will be designed to facilitate comparison and evaluation of the data. The data tabulations will be sorted by classes of constituents (*e.g.*, VOCs, semi-volatile organic compounds, 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 transferred into typed formats or organized in their original form for inclusion as report appendices. The following log forms will be used:

- Sample/Core Logs
- Water-Level/Aquifer Test Logs
- Water Sampling Logs

The tables and logs will be compiled whenever feasible by the field geologist, 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 geologist 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. The frequencies for collecting the QA/QC samples are specified in the Work Plan.

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 will be specified in the laboratory QAPP (under separate cover following laboratory selection). 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.

10.0 PERFORMANCE AND SYSTEM AUDITS

System audits will 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 geologist 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 all field work is accurately and neatly documented. QA checklists will be filled out daily during the sampling programs.

- 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 manager will oversee the field geologist, field engineer, and data validator, and 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 will be discussed in the laboratory QAPP (under separate cover following laboratory selection).

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 will be discussed in the laboratory QAPP (under separate cover following laboratory selection).

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 geologist 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 will be 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 manager 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 SAP 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 SOPs and/or analytical procedures established for the project, or other unforseen difficulties. Persons identifying an unacceptable condition will notify the field geologist, where applicable, and/or the project manager. The project manager, 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 USEPA 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 will be described in the laboratory QAPP (under separate cover following laboratory selection).

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:

- Quarterly progress reports will be 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 RD field program that might require significant corrective actions, changes in the scope of work, or departures from the approved project SOPs.

- 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 will be described in the laboratory QAPP (under separate cover following laboratory selection).

APPENDIX C

HEALTH AND SAFETY CONTINGENCY PLAN (HASCP)

HEALTH AND SAFETY PLAN

CLIENT: **Oswego County; Alcan Aluminum Corp.; Armstrong World Industries, Inc.; Miller Brewing Company; and The PAS PRPs**

SITE NAME: **Volney Landfill**

SITE ADDRESS: **Silk Road**
Volney, N.Y.

PROJECT NUMBER:

DATE PREPARED:

DATE(S) REVISED:

DATE EXPIRES:

HEALTH AND SAFETY PLAN APPROVALS

	Name	Signature	Date
PROJECT MANAGER:	Andrew Barber		
FIELD SUPERVISOR/ SITE SAFETY OFFICER:			
HEALTH & SAFETY MANAGER:			

Acknowledgments:

Subcontractor	Name	Date

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1.0 GENERAL INFORMATION1.0 GENERAL INFORMATION

1.1 Introduction

This Health & Safety Plan (HASP) addresses those activities associated with the scope of work stated in the HASP and will be implemented by the Site Safety Officer (SSO) during site work. Compliance with this HASP 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, and/or the Health and Safety Manager (HSM). The content of this HASP 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 are subject to approval by the HSM and Project Manager.

This site specific Health & Safety Plan 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 any other contractor or personnel of any such contractor. This Plan may not address the specific health and safety needs or requirements of any other such contractor 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 any 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 Summary1.2Executive 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 Remedial Design Work 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 *(by task in order of execution)*

1. Construction of a supplemental cap on the landfill slopes;
2. A long-term monitoring program (groundwater sampling); and
3. Implementation of an intermittent groundwater extraction plan, to be utilized on an as-needed-basis.

2.5 Utility Clearance

1. To be performed by: UFPO -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 Hazards3.1Chemical Hazards

TABLE 3-1

KNOWN AND/OR PROBABLE CONTAMINANTS*

CONTAMINANT	SOURCE OF CONTAMINATION	SOURCE OF SAMPLE DATA (soil/water/air)	RANGE OF CONCENTRATION
See Table 3-2	Landfill leachate	Leachate	See source below

- Source of data: Geraghty & Miller, Inc., Project Operations Plan, Supplemental Pre-Remedial Design Studies/Remedial Design Work Plan, Table 2, Volney Landfill, Volney, New York

TABLE 3-2

ASSESSMENT OF CHEMICALS OF CONCERN

Task No.	Chemical Name[a] (or class)	PEL/TLV[a]	Other Pertinent Limits[a] (Specify)	Warning Properties - Odor Threshold[a]	Potential Exposure Pathways	Acute Health Effects	Chronic Health Effects
1	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
1	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
1	Ethylbenzene	100/100 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
1	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
1	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

Task No.	Chemical Name[a] (or class)	PEL/TLV[a]	Other Pertinent Limits[a] (Specify)	Warning Properties - Odor Threshold[a]	Potential Exposure Pathways	Acute Health Effects	Chronic Health Effects
1	1,2-Dichloroethene	200 ppm	IDLH = 1,000 ppm	Colorless liquid with a slightly acrid chloroform-like odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; Depression; CNS effects	Eyes; respiratory system; CNS
1	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
1	Methyl ethyl ketone (MEK)/2-butanone	200/200 ppm	IDLH = 3,000 ppm	Colorless liquid with a Moderately sharp, fragrant, mint-or acetone-like odor	Inhalation, Absorption, Ingestion, Contact	Eye, skin & respiratory irritation; depression; CNS effects	Eyes; respiratory system; CNS
1	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

- PEL = OSHA Permissible Exposure Limit; represents the maximum allowable 8-hr. time weighted average (TWA) exposure concentration.
- TLV = ACGIH Threshold Limit Value; represents 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 the maximum exposure concentration above which an employee shall not be exposed during any period without respiratory protection.
- IDLH = Immediately Dangerous to Life and Health; represents the 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 Intended 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; and
5. Heat or cold stress depending on the season of work activity.

4.0 HEALTH AND SAFETY FIELD IMPLEMENTATION4.0 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 percent 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 (H2S)	Portable H2S 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 breathing 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 TASKS[a]	PPE[b]							LEVEL OF PROTECTION[c]	LEVEL IF UPGRADE[c]	ADDITIONAL PPE FOR UPGRADE[c]	MONITORING EQUIPMENT[d]
	SUIT	GLOVES	FEET	HEAD	EYE	EAR	RESPIRATOR				
1. 1 & 3	Std.	Work	Steel	HH	Glass /Goggles	Plugs	N/A	D	C	Full APR	PID/FID and Draeger tube
2. 2	Std.	V/N	Steel	N/A	N/A	N/A	N/A	D	C	Full APR	PID/FID and Draeger tube

a Personal Protective Equipment (PPE):

SUIT:

Std	=	Standard work clothes
Tyvek	=	Uncoated Tyvek disposable coverall
PE Tyvek	=	Polyethylene-coated Tyvek
Chemrel	=	Chemrel coverall with hood
Saranex	=	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

a 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

a 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

* Return all completed health and safety plan forms to the Project Manager for review and signature and then to the Health and Safety Manager.

4.3 Decontamination Procedures *(Modify as appropriate)*

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 is performed:

- Hand augers and buckets will be washed in TSP solution or equivalent 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 and Safety

The monitoring program described in Section 4.2 incorporates the monitoring elements of NYSDEC TAGM 4031 (Fugitive Dust supression 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 even 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 contaminated 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/Health and Safety 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 Procedure6.1.3Site-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 *(Name, Title, Phone)*

Environmental Evan Walsh of the Oswego County Health Department

Safety HSM and SSO

Security

Facilities

6.3.2 Locate Shut-Offs6.3.2Locate Shut-Offs

Gas

Power

Fuel

6.3.3 Evacuation Route

Identify Evacuation Route

Identify Meeting Area (Perform Head Count)

6.3.4 Spill Containment Plan *(Specify)*

1. Not Applicable

2.

3.

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		
Haz. Waste Natl. Response Center	HAZMAT	(800) 424-8802
PROJECT/BUSINESS		
Project Coordinator	Andrew Barber	(518) 355-4599
Health & Safety Manager	Mark Chauvin	(315) 457-5200
Field Supervisor		(315) 457-5200
Client Contact	Bruce Clark, Esq.	(315) 349-8296
Site Contact	Evan Walsh	
Subcontractor		
Subcontractor		
Human Resources Manager		

ATTACHMENT 1

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 4^{th} Street), four blocks, Hospital on right hand side.

APPENDIX D

ACCESS AND OTHER APPROVALS

Because of County ownership of properties surrounding the Landfill, access/approval issues are not anticipated. In the event that such issues arise, the Oswego County Department of Health will be requested to coordinate activities as they have done in the past.

APPENDIX E

TABLES AND SCHEDULE

Table 1: Monitoring Program for Groundwater, Surface Water and Leachate Volney Landfill				
	1998	1999	2000	2001
Quarterly Leachate Samples	O O O C+	x x+	x x+	x+
Quarterly Surface Water	O O O C	x x	x x	x
Quarterly Res. Wells	O O O C	x x x x	x x x x	x x x x
Semi-Annual Wells	O C+	x x+	x x	x
New Program Wells	O C+	x x+	x x	x

o = Existing Oswego County Analytical Parameters
C = CPRI Analytical Parameters
C+ = CPRI Analytical Parameters plus SVOCs
x = New Parameter List
x+ = New Parameter List plus SVOCs

(Reductions in monitoring frequency will be based on the analytical results and subject to USEPA approval)

Quarterly Leachate Samples = OVL-1, OVL-2, OVL-3

Quarterly Surface Water = SW-1, SW-2, SW-3, SW-5

Quarterly Residential Wells = RW-1A, RW-1B, RW-2, RW-4, RW-5, RW-7, RW-10, RW-11

Semi-Annual Wells = GW-3C, GW-3D, GW-5, GW-6R, GW-7R, GW-8R, GW-9, GW-10, GW-11A, GW-12A, GW-14A, GW-15, GW-16, GW-17, GW-18R, SGW- 26, SGW- 27A, SGW- 27B, SGW- 28, SGW- 29, SGW- 30A, SGW- 30B, SGW- 33, SGW- 34

New Program Wells = MW-1S, MW-2S, MW-2I, MW-3S, MW-4S, MW-4I, MW-5S, MW-5I, WP-1, MW-7BR, MW-8BR, MW-9S, MW-9BR, VBW-8S, VBW-8D, VBW-8BR, SP-13

Table 2: Summary of Analytical Parameter Lists Volney Landfill			
	County Parameters	CPRI Parameters	New Parameter List
Volatile Organic Compounds (VOCs)	y	y	y
Semi-Volatile Organic Compounds (SVOCs)	n	y/n	y/n
Metals			
Aluminum	n	y	n
Antimony	y	n	y
Arsenic	y	y	y
Barium	y	y	y
Berylium	y	n	y
Cadmium	y	y	y
Chromium	y	y	y
Chromium (Hexavalent)	y	n	n
Copper	n	y	y
Iron	y	y	y
Lead	n	y	y
Manganese	y	y	y
Mercury	y	y	n
Nickel	y	y	y
Thallium	y	n	n
Zinc	y	y	y
Inorganics			
Alkalinity	y	y	y
Ammonia	y	y	y
Calcium	n	y	y
Chemical Oxygen Demand (COD)	y	n	n
Chloride	y	y	y
Cyanide	y	y	y
Flouride	y	n	n
Hardness	y	y	y
Magnesium	n	y	y
Nitrate	y	y	y
Potassium	n	y	y
Sodium	y	y	y
Sulfate	y	y	y
Sulfide	n	y	y
Total Dissolved Solids (TDS)	y	y	y
Total Organic Carbon (TOC)	y	y	y
pH	y	y	y
Redox Potential	y	y	y
Specific Conductance	y	y	y
Dissolved Oxygen	n	y	y

VOLNEY LANDFILL CLOSURE

Remedial Design Work Plan (RDWP) - Timeframe for Submission of Various Reports and Plans

PROJECT SCHEDULE

1/23/98, Revised 8/24/98

PROJECT TASK — YEAR:	1998												1999												2000					
MONTH:	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J
1. Lodging of Consent Decree						■																								
2. Submission of proposed engineers to EPA & DEC by Settling Defendants (w/in 10 days after 1.)							■																							
A. EPA review							■	■																						
B. EPA approval								■																						
3. Submission of the Remedial Design Work Plan (RDWP) to EPA (w/in 90 days after 2B.)		■																												
A. EPA review		■	■	■	■	■																								
B. RDWP modifications, if required						■	■	■																						
C. EPA approval									■																					
4. Design of the Modified Remedy and submission of the Remedial Design (RD) to EPA										■	■																			
A. RD Investigation/Preliminary RD Report (35% completion)											■																			
B. Final RD Report (100% completion)												■																		
a. EPA review												■	■																	
b. Final RD Report modifications, if required																														
C. EPA approval: Final RD Report becomes Final Design Report													■																	
5. Settling Defendants award Remedial Action (RA) contract (w/in 120 days after 4C.)														■	■	■	■													
6. Submission of the Remedial Action Work Plan (RAWP) to EPA (w/in 60 days after 5.)															■	■														
A. EPA review																	■													
B. RAWP modifications, if required																														
C. EPA approval																	■													
7. Construction of the Remedial Action (RA)																		■	■	■	■	■	■							
8. Submission of Operation, Maintenance&Monitoring(OM&M) Manual (90 days before 7. is completed)																				■										
A. EPA review																					■									
B. OM&M Manual modifications, if required																														
C. EPA approval																					■									
9. Final Site Inspection (w/in 90 days after 7.)																								■						
A. EPA specified corrective measures, if required																														
a. Submission of a corrective measures schedule to EPA (w/in 5 days after 9A.)																														
b. Final corrective measures site inspection																														
B. Final EPA approval of the Remedial Action Construction (RAC)																								■						
10. Submission of a Draft RAC Report to EPA (w/in 30 days after 9B.)																									■					
A. EPA review																										■				
B. Draft RAC Report modifications, if required																														
C. Additional EPA specified corrective measures, if required																														
a. Submission of a corrective measures schedule to EPA																														
b. Submission of a Revised Draft RAC Report																														
c. Final corrective measures site inspection																										■				
D. EPA approval: Draft (or Revised Draft) RAC Report becomes Final RAC Report																										■				
11. Settling Defendants perform OM&M activities																										■	■	■	■	■
12. Hydraulic containment by pumping																														

Note: This timeline represents an absolute best case scenario with 30 day EPA review and approval period for all reports, no major modifications to reports and no additional corrective measures.

APPENDIX F

STATISTICAL TEST EXAMPLES

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

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

Then compute the Mann-Kendall statistic

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

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

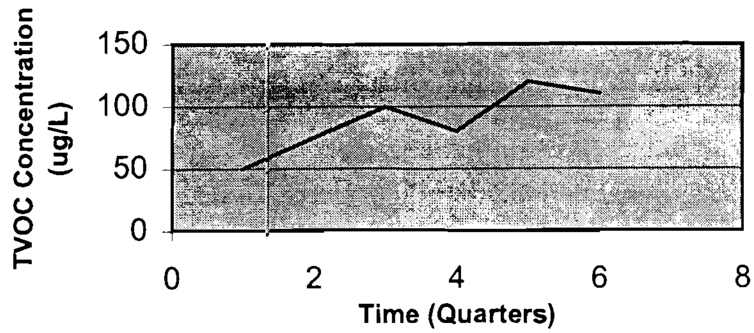
For trend analysis, the typical application is to test a null hypothesis, H_0, of no trend against the alternative hypothesis, H_A, of an upward trend. In the examples provided on the following page, S is first calculated, and then a probability value (from Table A18 of Gilbert, 1987) for the computed S is compared to the specified significance level (α). For this application α = 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

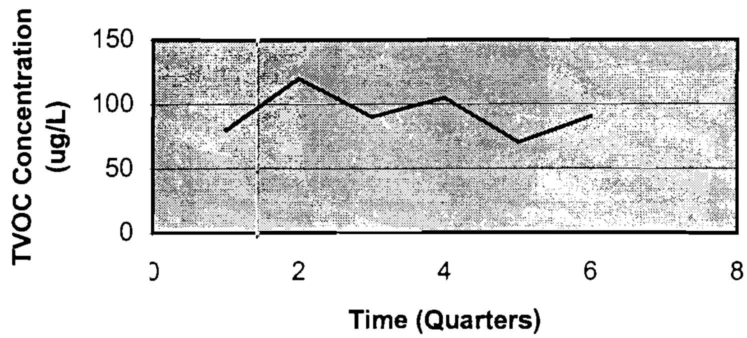
Time (Qtrs)	Case 1 TVOC	Case 2 TVOC	Case 3 TVOC	Case 4 TVOC
1	50	80	70	70
2	75	120	80	85
3	100	90	90	100
4	80	105	105	85
5	120	70	80	110
6	110	90	85	95
Results of Statistical Test				
No. of Increases	13	8	10	11
No. of Decreases	2	6	4	3
S	11	2	6	8
Probability	0.028	0.43	0.19	0.1
Specified Significance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

Examples of Application of Mann-Kendall Statistical Test

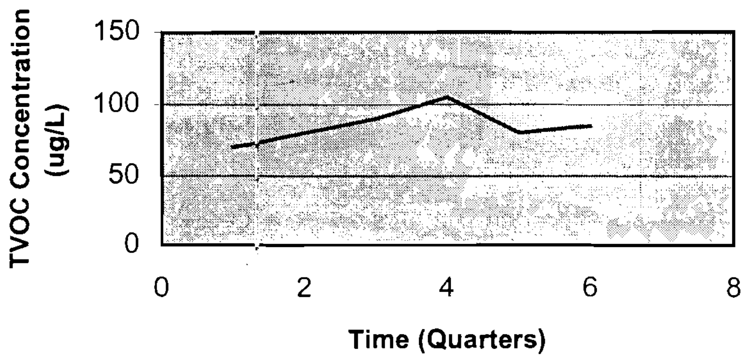
Case 1



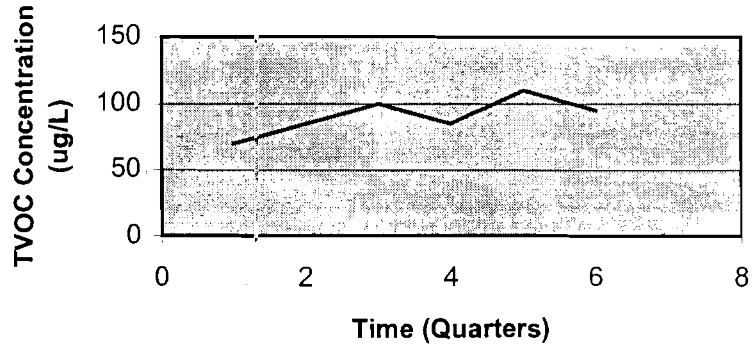
Case 2



Case 3



Case 4



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

	Values of n				S	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)

FIGURES

LEGEND

VBW-1, VBW-3S, SHW-2, SGW-30A, GMPW-1, PZ-1, GW-2, SP-8	MONITORING WELL LOCATION INSTALLED IN SAND AND GRAVEL, LACUSTRINE SAND, AND SAND/SILT DEPOSITS OR FILL
VBW-3D LTW-1, DTP-1	MONITORING WELL LOCATION INSTALLED IN LODGEMENT TILL
VBW-3BR, BRW-1	MONITORING WELL LOCATION INSTALLED IN BEDROCK
RW-11	RESIDENTIAL WELL LOCATION
SW-5	SURFACE WATER SAMPLING LOCATION
WP-4	PROPOSED WELLPOINT AND STAFF GUAGE
	PROPOSED SHALLOW WELL
	PROPOSED INTERMEDIATE WELL
	PROPOSED BEDROCK WELL
GW-18R	EXISTING WELL TO BE SAMPLED DURING LONG-TERM MONITORING PROGRAM

In charge of ______
Designed by ______
Drawn by ______
Checked by ______

Date
Scale 0 150' 300' 600'

NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

REVISIONS

COMPLETED CONSTRUCTION
Significant Construction Changes Are Shown
By ______ Date ______
Ck'd ______ Date ______

Barton & Loguidice, P.C.
Consulting Engineers
290 Elwood Davis Road / Box 3107, Syracuse, New York 13220

LOCATION OF SAMPLING POINTS FOR LONG-TERM MONITORING PROGRAM

OSWEGO COUNTY
VOLNEY LANDFILL
TOWN OF VOLNEY OSWEGO COUNTY, NY

Sheet Number 1
File Number BL1-VOL