SITE MANAGEMENT PLAN (SMP)

Vanchlor Landfill Site

DEC No. 9-2909-00049

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1.0 DESCRIPTION OF REMEDIAL PROGRAM

1.1 Introduction

This Site Management Plan (SMP) is required as an element of the remedial program at the Vanchlor Landfill Site (hereinafter referred to as the "Site") under the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program administered by New York State Department of Environmental Conservation (NYSDEC). The Site is listed as a Class 4 Inactive Hazardous Waste Disposal Site (Site #932039). Following the expiration of the Post-Closure RCRA Permit #9-2909-00049/0003 in September 2013, the NYSDEC requested that Vanchlor Company, Inc. (the current property holder) enter into an Order of Consent executed July 10, 2014 (Order). The purpose of the Order is to replace the permit as the legal basis for continued fulfillment of operation, maintenance and monitoring requirements previously contained in the permit and to be consistent with the provisions of the existing deed restrictions on the property recorded with the Niagara County Clerk on October 5, 1999.

1.1.1 General

Vanchlor Company, Inc. (Vanchlor) has prepared this SMP to manage soil and groundwater impacts from historical waste disposal activities that occurred at the 2.5-acre landfill portion of the 5-acre property located in the Town of Lockport, Niagara County, New York. A figure showing the site location and vicinity near the Site is provided in Figure 1. Figure 2 provides a Site Plan showing the approximate boundaries of the Site and the location of the capped landfill areas and groundwater monitoring wells. The boundaries of the site are more fully described in the metes and bounds site description included as Schedule A of the property deed included in Appendix A of this SMP.

This SMP was prepared by Golder Associates Inc. (Golder), on behalf of Vanchlor, in accordance with the requirements in NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and the guidelines provided by NYSDEC. The SMP addresses the means for implementing the Engineering and Institutional Controls (ECs and ICs) that are presented herein.

1.1.2 Background

Landfilling activities at the Site reportedly began in 1957 and continued until 1982 (from NYSDEC Module III, Part 373 Permit, July 2008). The landfilling activities reportedly consisted primarily of waste by-products from the manufacture of silicon tetrachloride. The landfilled wastes were deposited in 55-gallon drums and placed in trenches with crushed limestone (to enhance the neutralization of the acidic wastes).

In 1988, the landfill was closed in accordance with a NYSDEC approved Closure Plan that included the installation of a final cover system consisting of two feet of compacted clay overlain by a drainage layer of sand and loam soil and planted with a vegetative cover.

1.1.3 Purpose

Based on the historic use of the Site, the NYSDEC designated the Site as a Class 4 Inactive Hazardous Waste Disposal Site, which indicates that the Site was properly closed, but requires continued management. The Order supplants the Part 373 post-closure RCRA permit as the legal basis for continued operation maintenance and monitoring of the Site. The required environmental elements under the Order are the development and implementation of this SMP incorporating the required engineering and institutional controls.

Institutional Controls have been incorporated into this SMP to control potential exposure to remaining contamination during use of the site in the future and for the protection of public health and the environment. The ICs place restrictions on site use, and mandate maintenance and reporting measures for the ICs. This SMP specifies the methods necessary to ensure compliance with the ICs required by the Deed Restrictions for contamination that remains at the site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Deed Restriction and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

This SMP provides a detailed description of the procedures required to manage remaining contamination at the site including: (1) implementation/management of the Engineering and Institutional Controls; and (2) performance of periodic monitoring and inspections, certification of results, and submittal of Periodic Review Reports. This plan also includes a description of Periodic Review Reports for the periodic submittal of information, recommendations, and certifications to NYSDEC.

It is important to note that:

- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6 NYCRR Part 375 and thereby potentially subject to enforcement.

1.1.4 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. In accordance with the Deed Restriction for the site, the NYSDEC will provide to the owner of the site a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.2 Site Background

1.2.1 Site Location and Description

The site is located in the Town of Lockport, County of Niagara, New York and is identified by the SBL No. 95.17-1-56.11. The site is an approximately 5-acre area presently bounded by Mill Street to the

north, a Somerset Railroad Corp rail corridor to the south and east, and Plank Road to the west (see Figure 1).

1.2.2 Site Geology

In April 1984 a report entitled "Former Landfill Investigation & Closure Plan" was prepared by Advanced Environmental Systems and Conestoga Rovers & Associates (Appendix B). The report included information on the geology of the landfill area based on the results of the borings conducted at the Site during the installation of additional groundwater monitoring wells. The findings are summarized below.

The principal overburden material observed in the drill cuttings was a matrix of red brown clayey silt fill intermixed with red rock fragments. The fill layer ranged from 5 to 15 feet deep. The bedrock in the vicinity of the Vanchlor Landfill has been reported to include the lower three formations of the Medina Group: the Grimsby, Power Glen and Whirlpool in descending order. The primary bedrock formation encountered during the installation of the monitoring wells was the Power Glen Formation. The results of the borings for well installations during the closure investigation were consistent with previous borings in the vicinity of the landfill for geotechnical investigations associated with the adjacent railroad (Bechtel, 1982) and indicated that the Grimsby formation was removed from the footprint of the landfill area by previous rock quarry operations and replaced with a layer of fill.

The plateau upon which the landfill site is located is relatively flat and located at the very edge of the Niagara Escarpment, the southern and western boundaries of the landfill property form a steep vertical descent down to the valley formed by Eighteen Mile Creek and generally recognized as the border of the escarpment in this area. Figure 10 in the 1984 Landfill Closure Investigation Report (Appendix B) presented a north-south geologic cross section of the landfill based on the well installations performed during the investigation activities in the mid-Eighties. This cross section has been reproduced on Figure 3 and is compared on the same figure with a geologic cross section illustrating the escarpment geology where quarrying activities were not conducted and the presence of the Grimsby formation is evident. This more recent cross section was prepared as part of a remedial investigation Golder performed in 2010 at the VanDeMark Chemical site approximately 1,700 feet east of the Vanchlor Landfill.

1.2.3 Groundwater

Historical groundwater elevation data collected from the monitoring well network indicate that the general groundwater flow is in a southerly direction toward the escarpment bank leading to Eighteen Mile Creek. Due to the substantial removal of the Grimsby Formation in the area of the landfill, the overburden/bedrock interface aquifer is inferred to be connected with the Grimsby/Power Glen contact groundwater in the area to the east of the landfill over to the railroad cut and are therefore considered to be the same aquifer.

A summary of the groundwater quality associated with the Site monitoring groundwater monitoring network wells (four wells) as presented in the June 2012 Semi-Annual Post Closure Water Quality Data Evaluation. The general observations and trends were summarized as follows:

- Well VDM-9 - all parameters were either neutral or decreasing. 1,2-Dichloroethane spiked in 2006, but has been decreasing ever since. All parameters were below the New York State Groundwater Quality Standard (NYSGWQS) exceedance values;
- Well VDM-10 - all parameters were either neutral or decreasing. Most parameters have been testing at, or very near the methodology detection limit since 1991. All parameters were below the exceedance values.
- Well VDM-11 - all parameters were either neutral or decreasing. All parameters were below the NYSGWQS exceedance values.
- Well VDM-14 - historically has the highest levels of groundwater contamination of the wells monitored. This well continues to have several compounds (i.e., 5 total) in excess of the NYSGWQS exceedance level for the parameter. However, close study of the data demonstrates recent trends, (last five samplings) are generally neutral or trending downward.

Figure 4 presents a groundwater contour map of the site based on well level measurements collected during the Spring 2012 semi-annual monitoring event.

1.3 Summary of Previous Environmental Investigation Findings

As previously noted, VanDeMark Chemical Company, Inc. retained Advanced Environmental Systems Inc. and Conestoga-Rovers & Associates Limited to complete a closure investigation of the former landfill site in 1983. The results of the investigation were presented in the “Former Landfill Investigation & Closure Plan”. The results of the investigation were the basis for the selection of the closure remedy presented in the February 1987, “Closure Plan – Former Landfill Site”, Advanced Environmental Systems and Conestoga Rovers & Associates (Reference 1).

1.4 Summary of Remedial Actions

In 1988, the landfill was closed in accordance with a NYSDEC approved Closure Plan that included the installation of a final cover system consisting of two feet of compacted clay overlain by a drainage layer of sand and loam soil and planted with a vegetative cover.

The following construction activities were performed to complete the approved cover system:

- Site grading and proof rolling;
- Installation of a pan-lysimeter;
- Lime application;
- Installation of an interceptor trench in perimeter ditch;
- Construction of a two-foot clay cover including lining of ditch with clay;
- Addition of loam and sand drainage layers; and
- Addition of topsoil layer and seeding.

1.4.1 Remaining Contamination

As previously noted, the landfilled wastes were mainly deposited in 55-gallon drums and placed in trenches with crushed limestone (to enhance the neutralization of the acidic wastes). In the western fill region, landfilling practices were documented as being generally random, consisting of excavation, disposal and covering with the waste consisting mainly of drums of waste silicon tetrachloride and chlorodisiloxane, byproducts of silicon tetrachloride production. In the eastern landfill region, spent carbon and silicon carbide were also disposed of with the drummed waste. Records of the depths of waste burial were not accurately maintained but based on the investigation borings, it is estimated that the majority of waste was buried in trenches at depths ranging from two to six feet below grade prior to the construction of the final closure cover system.

The results of the initial investigation indicated elevated concentrations of metals and chlorinated volatile organic compounds (VOCs) in groundwater within the landfill footprint as a result of contact with the waste residuals that were disposed and remain buried within the landfill.

Quarterly or semi-annual groundwater monitoring has been conducted and reported to the NYSDEC for over 27 years and documents that residual contamination within the landfill groundwater remains but at significantly reduced concentrations and regular trend analysis indicates most compounds are decreasing or remaining stable in concentration where they exceed NYSGWQS.

The monitoring results of the Eighteen Mile Creek surface water (collected at each monitoring event) have consistently demonstrated that there has been no off-site impact to the creek from the landfill with no evidence of landfill contaminants of concern found in the Creek water samples.

2.0 ENGINEERING AND INSTITUTIONAL CONTROL PLAN

2.1 Introduction

2.1.1 General

Since remaining contaminated soil exists beneath the site, Engineering Controls and Institutional Controls (ECs/ICs) are required to protect human health and the environment. This Engineering and Institutional Control Plan describes the procedures for the implementation and management of the ECs/ICs at the site. The EC/IC Plan is one component of the SMP and is subject to revision by NYSDEC.

2.1.2 Purpose

This plan provides:

- A description of the ECs/ICs on the site;
- The basic implementation and intended role of each EC/IC;
- A description of the key components of the ICs set forth in the Deed Restriction (where applicable);
- A description of the features to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of EC/ICs, such as the implementation of the Excavation Work Plan for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the EC/ICs required by the site remedy, as determined by the NYSDEC.

2.2 Engineering Controls

2.2.1 Soil Cover System

Exposure to remaining contamination in soil/fill at the site is prevented by a soil cover system placed over the site. This cover system is comprised of a minimum of 24 inches of compacted clay with a permeability of 1 x 10^{-7} cm/sec overlain by a minimum of six inches of drainage layer consisting of sand and loam topped with vegetative growth. The Excavation Work Plan that is provided in Appendix C outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed and any underlying remaining contamination is disturbed. Procedures for the inspection and maintenance of this cover are provided in the Monitoring Plan included in Section 3 of this SMP.

Procedures for maintaining the soil cover system are documented in the Operation and Maintenance Plan (Section 4 of this SMP). The Monitoring Plan also addresses severe condition inspections in the event that a severe condition, which may affect the cover system at the site, occurs.

2.2.2 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when effectiveness monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.6 of NYSDEC DER-10.

2.2.2.1 Soil Cover System

The soil cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in perpetuity.

2.3 Institutional Controls

Institutional Controls are required by the NYSDEC to: (1) restrict future exposure to remaining contamination by controlling disturbances of the subsurface contamination; and, (2) limit the use and development of the site to industrial uses only (the most restrictive use as defined in DER 10. Adherence to these Institutional Controls on the Site will be implemented under this Site Management Plan. These Institutional Controls are:

- Compliance with the Deed Restrictions and this SMP by the Grantor and the Grantor's successors and assigns;
- Performance of environmental or public health monitoring as defined in this SMP, if applicable;
- Implementation and documentation of the soil/fill management procedures provided in the Excavation Work Plan (EWP), when required;
- Reporting of information pertinent to Site Management of the Controlled Property must be performed at the frequency and in a manner defined in this SMP;

Institutional Controls identified in the form of restrictions in the Deed may not be discontinued without an amendment to or extinguishment of the Deed Restriction. Please refer to Appendix A for a copy of the Deed which contains the deed restrictions filed with Niagara County, New York.

The Institutional Controls proposed for the Site are described in further detail below and are consistent the operational and management methods that the Site has been operated under since its closure in 1988 under the requirements of the former RCRA Part 373 permit. Site restrictions in the form of ICs that apply to the Controlled Property are:

- The property may only be used for restricted industrial use provided that the long-term Institutional Controls included in this SMP are employed;
- The property may not be used for a higher level of use, such as restricted commercial use without additional remediation and amendment of the Deed Restriction, as approved by the NYSDEC;

- All future activities on the property that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- The use of the groundwater underlying the property is prohibited;
- Vegetable gardens and farming on the property are prohibited;
- The site owner or remedial party will submit to NYSDEC a written statement that certifies, under penalty of perjury, that: (1) controls employed at the Controlled Property are unchanged from the previous certification or that any changes to the controls were approved by the NYSDEC; and, (2) nothing has occurred that impairs the ability of the controls to protect public health and environment or that constitute a violation or failure to comply with the SMP. NYSDEC retains the right to access such Controlled Property at any time in order to evaluate the continued maintenance of any and all controls. This certification shall be submitted annually, or an alternate period of time that NYSDEC may allow and will be made by the site owner or an expert that the NYSDEC finds acceptable.

2.3.1 Excavation Work Plan

Any future intrusive work that may potentially encounter or disturb the remaining contamination will be performed in compliance with the Excavation Work Plan (EWP) that is attached as Appendix C to this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) prepared for the site. A sample HASP is attached as Appendix D to this SMP that is in current compliance with DER-10, and 29 CFR 1910, 29 CFR 1926, and other applicable Federal, State and local regulations. This HASP is not intended to be an actual HASP for work to be conducted at the site as varying conditions and hazards may be encountered based on the nature of the work. In addition, applicable emergency contacts will change over time. Based on future changes to State and federal health and safety requirements, and specific methods employed by future contractors, the HASP and CAMP will be updated and re-submitted with the notification provided in Section C-1 of the EWP. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection and certification reports submitted under the Site Management Reporting Plan (See Section 5).

The site owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work, are completely responsible for the safe performance of all intrusive work, the structural integrity of excavations, and proper disposal of excavation de-water, if necessary, control of runoff from open excavations into remaining contamination, as may be required.

2.4 Inspections and Notification

2.4.1 Inspections

Inspections of the Site will be conducted at the frequency specified in the SMP Monitoring Plan schedule. A comprehensive site-wide inspection will be conducted annually and included with the annual Periodic Review Report submittal. The inspections will determine and document the following:

- Compliance with requirements of this SMP and the Deed Restrictions;
- Sampling and analysis of appropriate media during routine monitoring events, and if required as part of the EWP;
- If site records are complete and up to date; and
- Changes, or needed changes, to the ICs.

Inspections will be conducted in accordance with the procedures set forth in the Monitoring Plan of this SMP (Section 3). The reporting requirements are outlined in the Periodic Review Reporting section of this plan (Section 5).

2.4.2 Notifications

Notifications will be submitted by the property owner to the NYSDEC as needed for the following reasons:

- Advance notice of any proposed changes in site use that may be required under Part 375-2 and/or Environmental Conservation Law Title 27, Article 13; and
- 7-day advance notice of any proposed ground-intrusive activities pursuant to the Excavation Work Plan.

2.5 Contingency Plan

Emergencies may include injury to personnel, fire or explosion, environmental release, or serious weather conditions.

2.5.1 Emergency Telephone Numbers

In the event of any environmental or unplanned situation requiring assistance, the Owner or Owner's representative(s) should contact the appropriate party from the contact list below. For emergencies, appropriate emergency response personnel should be contacted. These emergency contact lists must be maintained in an easily accessible location at the site.

Table 1: Emergency Contact Numbers

Contact Name	Telephone Number
Medical, Fire, and Police:	911
One Call Center:	(800) 272-4480 (3 day notice required for utility markout)
Poison Control Center:	(800) 222-1222
Pollution Toxic Chemical Oil Spills:	(800) 424-8802
NYSDEC Spills Hotline	(800) 457-7362

Table 2: Site Contact Numbers

Contact Name	Telephone Number
Richard Shotell, Vanchlor	716-434-2624
Barbara Higgs, Vanchlor	716-434-2624
Chris Banach, VanDeMark Chemical	716-433-6764 x-411
Brian Law, VanDeMark Chemical	716-433-6764 x-355

Notes: Contact numbers subject to change and should be updated as necessary.

2.5.2 Directions to Nearest Health Facility

Site Location: 600 Mill Street, Lockport, NY 14094

Nearest Hospital Name: Eastern Niagara Hospital

Hospital Location: 521 East Avenue, Lockport, NY 14094

Hospital Telephone: (716) 514-5700

Directions to the Hospital (refer to Figure 5):

1. Head northwest on Mill Street toward Connecting Road
2. Continue onto Plank Road
3. Turn right onto Old Niagara Road
4. Continue onto Cold Springs Road
5. Turn right onto NY-31 West
6. Hospital on right
6. Eastern Niagara Hospital; 521 East Avenue, Lockport, NY 14094.

The total distance from the Site and estimated travel time is: 4.1 miles or about seven minutes.

2.5.3 Response Procedures

As appropriate, the fire department and other emergency response group will be notified immediately by telephone of any emergency. The emergency telephone number list is found at the beginning of this Contingency Plan (Table 2). The list will be made readily available to affected

personnel at all times. It is assumed that future activities at the Site will be consistent with current maintenance and monitoring operations at the Site. Amendments to the Contingency Plan will be made as warranted by changes to the Site or related Plans.

3.0 SITE MONITORING PLAN

3.1 Introduction

3.1.1 General

The Monitoring Plan describes the measures for evaluating the conditions at the Site and conformance with the Deed Restrictions to reduce or mitigate impacts from residual contamination at the site, and affected site media identified below. This Monitoring Plan may only be revised with the approval of NYSDEC.

3.1.2 Purpose and Schedule

This Monitoring Plan describes the methods to be used for:

- Sampling and analysis of groundwater (annual monitoring), and if required as part of the EWP implementation (e.g., groundwater or soils);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance, particularly ambient groundwater standards and Part 375 SCOs for soil;
- Evaluating site information periodically to confirm that the restrictions and institutional controls continue to be effective in protecting public health and the environment; and
- Preparing the necessary reports for the various monitoring activities.

To adequately address these issues, this Monitoring Plan provides information on:

- Annual inspection and periodic certification;
- Reporting requirements.

Annual groundwater monitoring events and inspections of the groundwater monitoring system will be conducted to assess the performance and effectiveness of the remedy and the overall reduction in contamination on-site. Inspections include evaluation of all surfaces across the entire 5-acre property, including the 2.5-acre area comprising the closed hazardous waste landfill (refer to Figure 2) within the Site as specified in Table 3 and outlined in detail in Sections 3.2 and 3.3 below.

Table 3: Monitoring/Inspection Schedule

Monitoring Item	Frequency	Monitoring Description	Analysis/Notes
Annual Groundwater & Surface Water Monitoring	Annual (during 3nd quarter)	Sample groundwater from wells D-55, VDM-9R, VDM-10, VDM-11, VDM-12, and VDM-14. Sample surface water from Eighteen Mile Creek (just downstream of Site	VOCs, Method 8240 Metals, Method 6010 Chloride, 9251 pH, Method 9040
Annual Site & Groundwater System Inspection	Annual (during 3nd quarter)	Inspect cover system integrity, vegetation condition, ditch lining, security fence and signage, monitoring well condition	Check for iron staining in drainage ditch and visible seeps in the cliff face

3.2 Annual Groundwater/Surface Water Monitoring

In September 2014 Vanchlor petitioned the Department for a reduction in the frequency of groundwater and surface water sampling from a semi-annual to an annual basis. This request was approved on October 3, 2014. Therefore under the Site Management Plan groundwater sampling will be performed annually on the following monitoring wells that comprise the landfill monitoring well network established under the former Part 373 permit: VDM-9R, VDM-10, VDM-11, VDM-12, VDM-14 and D-55. Eighteen Mile Creek shall also be sampled at a location just downstream of the Site but upstream of the City of Lockport Wastewater treatment plant SPDES discharge point (refer to Figure 1 for the approximate creek sampling location).

Table 4 summarizes the monitoring parameters and that will be analyzed in accordance with the specified analytical methods.

Table 3: Monitoring Parameters*

Constituent	Analytical Method (SW-846)	Groundwater Protection Concentration (ug/L)
Chloroform	8240	8
1,2-Dichloromethane	8240	5
Trans-1,2-Dichloroethane	8240	5
Methylene Chloride	8240	5
1,1,2,2-Tetrachloroethane	8240	5
Tetrachloroethene	8240	5
Trichloroethene	8240	5
Vinyl Chloride	8240	2
Toluene	8240	5
Chromium	6010	50
Copper	6010	200
Iron	6010	300
Zinc	6010	300
Chloride	9251	250,000
pH	9040	6-9 (standard units)

*Excerpted from Table III-1 of Module III (Post-Closure Care Conditions, Former Part 373 Permit (09/23/08)

The monitoring event will be conducted during the third quarter of each calendar year.

This SMP incorporates (refer to Appendix E) the procedures, protocols and data collection, reporting and other elements of the Groundwater Monitoring Plan (formerly Attachment II-A of the expired Part 373 permit). With the exception of the sampling frequency (i.e., annual vs. semi-annual), the former Plan has been adopted essentially unchanged from the expired permit.

3.3 Annual Site-Wide Inspection

Site-wide inspections will be performed annually in conjunction with the annual groundwater sampling events. During these inspections, an inspection form will be completed (see pages 13 and 14 of Appendix E). The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- General site conditions at the time of the inspection; and
- Confirm that site records are up to date.

3.4 Monitoring Quality Assurance/Quality Control

All sampling and analyses will be performed in accordance with the requirements of the Laboratory Quality Assurance/Quality Control (QA/QC) Plan prepared for the Site (refer to Appendix F), Main Components of the QA/QC Plan include:

- QA/QC Objectives for Data Measurement;
- Sampling Program:
  - Sample containers will be properly washed, decontaminated, and appropriate preservative will be added (if applicable) prior to their use by the analytical laboratory. Containers with preservative will be tagged as such.
  - Sample holding times will be in accordance with the NYSDEC ASP requirements.
  - Field QC samples (e.g., trip blanks, coded field duplicates, and matrix spike/matrix spike duplicates) will be collected as necessary.
- Sample Tracking and Custody;
- Calibration Procedures:
  - All field analytical equipment will be calibrated immediately prior to each day's use. Calibration procedures will conform to manufacturer's standard instructions.
- The laboratory will follow all calibration procedures and schedules as specified in USEPA SW-846 and subsequent updates that apply to the instruments used for the analytical methods.
- Analytical Procedures;
- Internal QC and Checks;
- QA Performance and System Audits; and
- Corrective Action Measures.

In addition to the Laboratory Quality Assurance/Quality Control (QA/QC) Plan, a summary of the Laboratory QA/QC Deliverables requirements is also provided on pages 15 and 16 of Appendix E.

3.5 Monitoring Reporting Requirements

Forms and any other information generated during regular monitoring events and inspections will be kept on file by Vanchlor. All forms, and other relevant reporting formats used during the monitoring/inspection events, will be (1) subject to approval by NYSDEC and (2) submitted at the time of the Periodic Review Report, as specified in the Reporting Plan of this SMP.

All monitoring results will be reported to NYSDEC on an annual basis in the Periodic Review Report.

A summary of the monitoring program deliverables are summarized in Table 5 below.

Table 5: Schedule of Monitoring/Inspection Reports

Task	Reporting Frequency*
Site Monitoring and Inspection Report	Annual

Notes: *The frequency of events will be conducted as specified until otherwise approved by NYSDEC.

4.0 OPERATION AND MAINTENANCE PLAN

4.1 Introduction

Although the site remedy does not rely on any mechanical systems to protect public health and the environment, the maintenance of the landfill's engineered soil cover system, associated drainage features and security fencing system is critical to maintaining the long term integrity of the Site.

Therefore, the following maintenance activities will be performed on an as needed basis to maintain the cover integrity:

- Repair of any erosion, settlement areas or other damage to the cover system, including reestablishment of appropriate vegetative cover using NYSDEC specified seed mixture (refer to Appendix G);
- Repair of any erosion or other damage to the clay lined drainage ditch and interceptor trench;
- Routine mowing of the vegetative cover will be performed after September 1 and removal of any vegetation, such as trees or shrubs whose root system may adversely impact the integrity of the compacted clay layer; and
- Repair or replacement of any damaged or deteriorated components of the perimeter security fencing.

The results of the annual inspections will be reviewed to determine if damage or conditions were observed that warrant repairs to the cover system. In addition, observations of the cover integrity and any damage to the cover should be reported by the individuals performing the routine mowing of the cover vegetation. Scheduling and completion of repairs shall be within 4 weeks of discovery of any issues.

5.0 INSPECTION, REPORTING, AND CERTIFICATIONS

5.1 Site Inspections

5.1.1 Inspection Frequency

All inspections will be conducted at the frequency specified in the schedules provided in the Monitoring Plan of this SMP (Section 3). At a minimum, a site-wide inspection will be conducted annually.

5.1.2 Inspection Forms, Sampling Data, and Maintenance Reports

The "Groundwater Monitoring System Inspection Plan and Form" will be completed during the annual site-wide inspection (refer to pages 13 and 14 in Appendix E). This form is subject to NYSDEC revision.

All applicable inspection forms and the results of the annual groundwater monitoring events as well as any other records (e.g., summary of cover, ditch or related Site repairs performed) generated for the site during the reporting period will be provided in electronic format in the annual Periodic Review Report.

5.1.3 Evaluation of Records and Reporting

The results of the annual groundwater sampling and inspection events will be evaluated as part of the EC/IC certification to confirm that the:

- ECs and ICs are in place, are performing properly, and remain effective; and
- The Deed Restrictions are being adhered to.

5.2 Certification of Inspection Controls

The Periodic Review Report described in Section 5.3 below will include the following certification language:

"For each institutional or engineering control identified for the site, I certify that all of the following statements are true:

- **The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;**
- **The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;**
- **Nothing has occurred that would impair the ability of the control to protect the public health and environment;**
- **Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;**

- **Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;**
- **A financial assurance mechanism is required under Item II.B of the July 10, 2014 Administrative Order which is the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;**
- **Use of the site is compliant with the NYSDEC Order on Consent and Administrative Settlement executed July 10, 2014 between the NYSDEC and the Vanchlor Company, Inc.;**
- **The engineering control systems are performing as designed and are effective;**
- **To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program [and generally accepted engineering practices]; and**
- **The information presented in this report is accurate and complete.**
- **I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, [name], of [business address], am certifying as [Owner or Owner's Designated Site Representative] (and if the site consists of multiple properties): [I have been authorized and designated by all site owners to sign this certification] for the site."**

The signed certification will be included in the Periodic Review Report described below.

5.3 Periodic Review Report

A Periodic Review Report will be submitted to the Department every year. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix A (Property Deed). The report will be prepared in accordance with NYSDEC DER-10 and submitted within 30 days of the end of each certification period. The report will include:

- Identification, assessment and certification of the ECs/ICs required for the site;
- Results of the required annual site inspections;
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends;
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted electronically in a NYSDEC-approved format;
- All applicable inspection forms and other records generated for the site during the reporting period in electronic format;
- A summary of the current financial assurance status, including financial assurance funding level, cost estimate basis and confirmation that approved financial assurance instrument is in place;
- A site evaluation, which includes the following:

- Any new conclusions or observations regarding site contamination based on inspections for the media being monitored;
- Recommendations regarding any necessary changes to the remedy and/or Monitoring Plan; and
- The overall effectiveness of the Deed Restrictions.

The Periodic Review Report will be submitted, in electronic and hard-copy format, to the NYSDEC Central Office and Regional Office in which the site is located, and in electronic format to NYSDEC Central Office, Regional Office and the NYSDOH Bureau of Environmental Exposure Investigation.

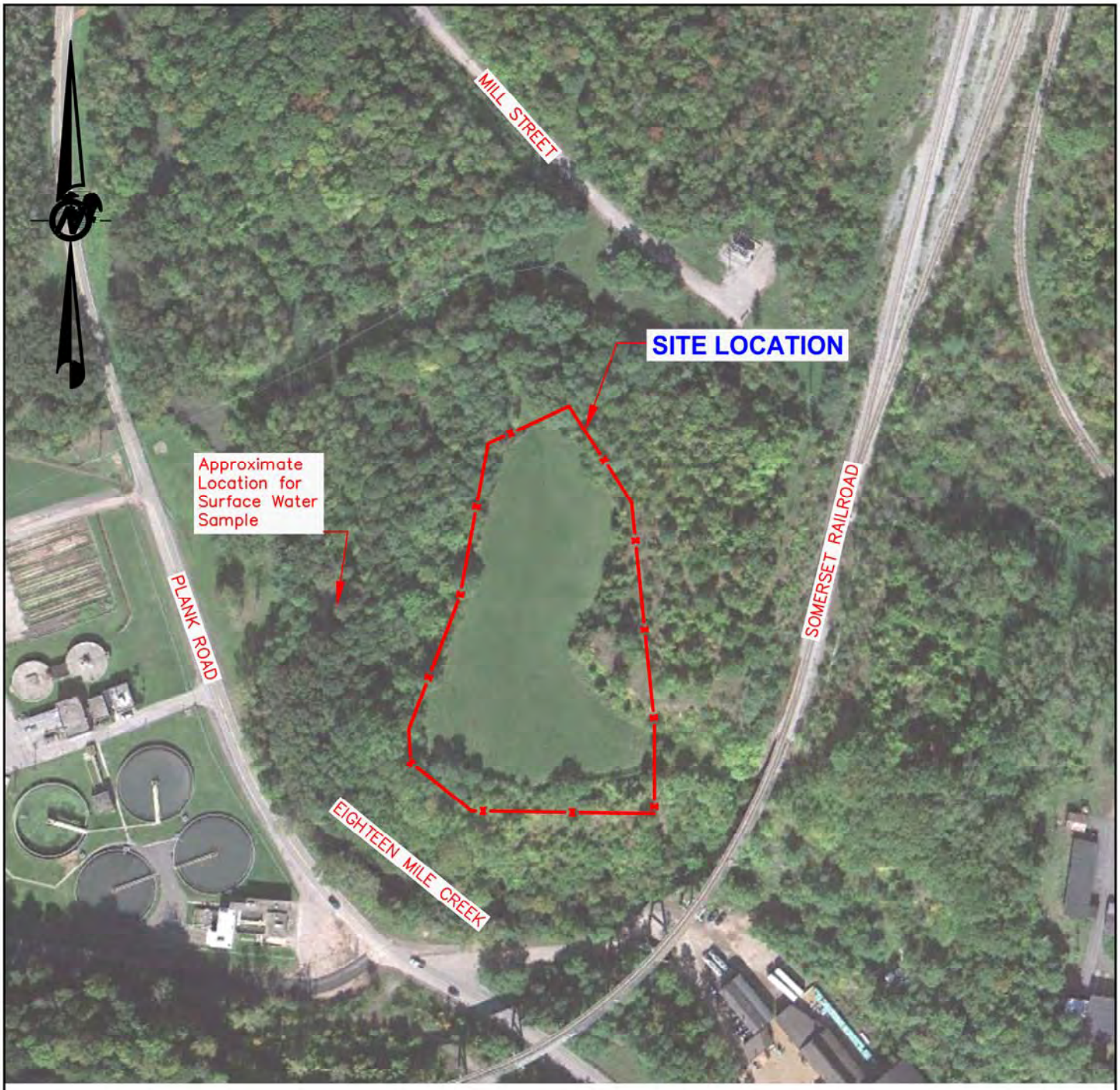
5.4 Corrective Measures Plan

If the annual site inspection identifies a significant impact(s) to the area of the Site containing residual contamination, or if the periodic certification cannot be provided due to the failure of an institutional control, a corrective measures plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the corrective measures plan until it is approved by the NYSDEC.

6.0 REFERENCES

1. "*Closure Plan – Former Landfill Site*", VanDeMark Chemical Co., Inc., February 1987, Advanced Environmental Systems and Conestoga Rovers & Associates.

FIGURES



LEGEND

FENCE / APPROXIMATE SITE PROPERTY LINE

REFERENCES

1.) BASE MAP TAKEN PER GOOGLE EARTH AERIAL IMAGE (10/5/11)

200 0 200
SCALE FEET

Golder Associates
Buffalo, New York

SCALE	AS SHOWN
DATE	9/3/14
DESIGN	JGT
CADD	JGT
CHECK	
REVIEW	

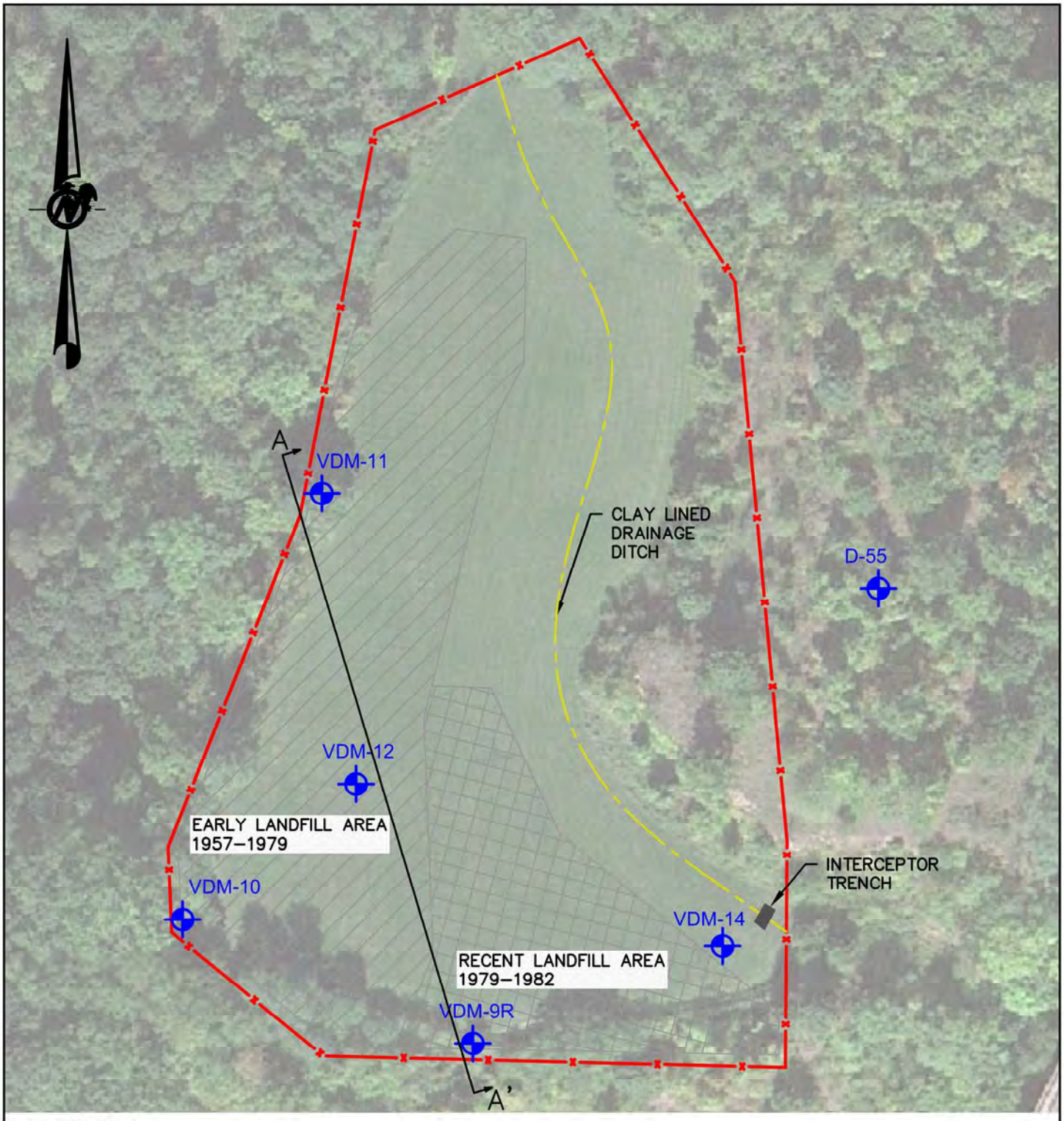
FILE No. 1403185A224
PROJECT No. 1403185 REV. 0

TITLE

SITE LOCATION AND VICINITY MAP

VANCHLOR CO. INC.

FIGURE 1



LEGEND

FENCE / APPROXIMATE SITE PROPERTY LINE

VDM-9R MONITORING WELL APPROXIMATE LOCATION

REFERENCES

1.) BASE MAP TAKEN PER GOOGLE EARTH AERIAL IMAGE (10/5/11)

75 0 75

SCALE FEET

Golder Associates
Buffalo, New York

SCALE	AS SHOWN
DATE	10/15/14
DESIGN	JGT
CADD	JGT
CHECK	
REVIEW	

FILE No. 1403800

PROJECT No. 1403800 REV. 0

TITLE

SITE PLAN
VANCHLOR LANDFILL

VANCHLOR CO. INC.

FIGURE 2

REFERENCES

1.) Section A–A' per CRA's Former Landfill Investigation and Closure Report – 1/5/1984

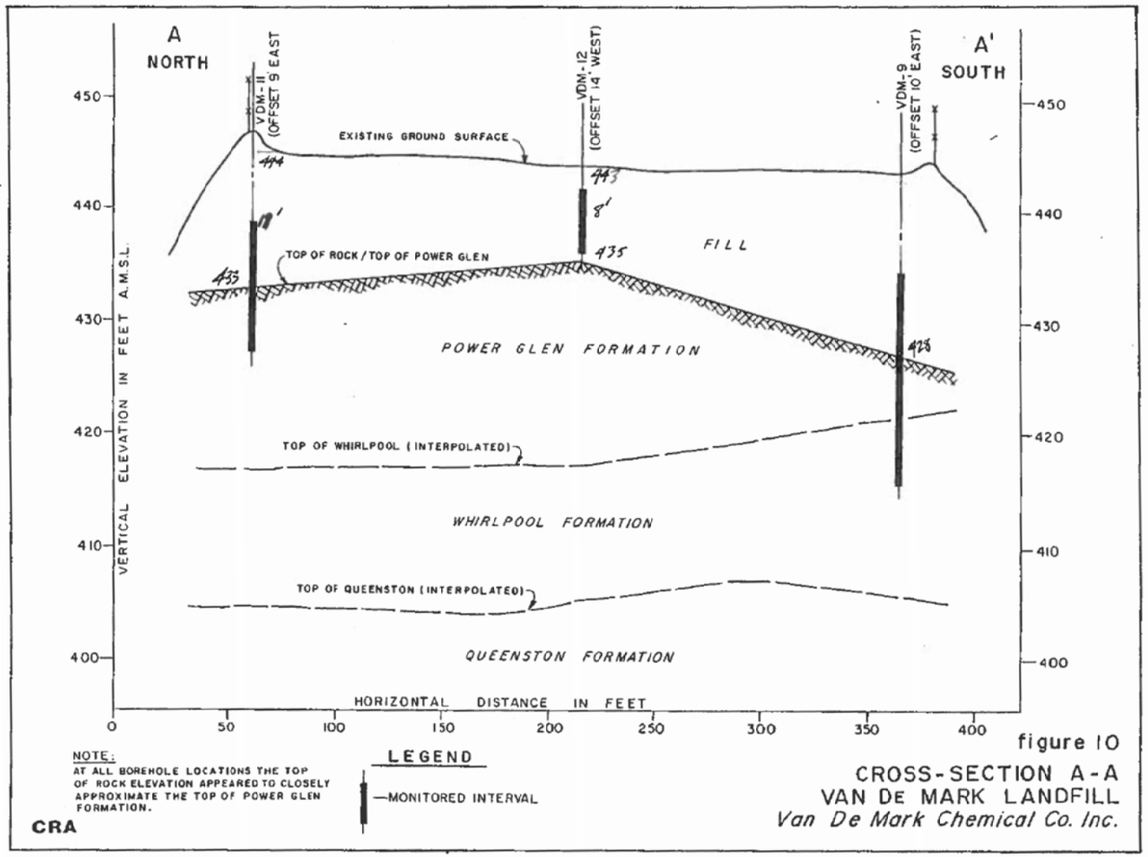
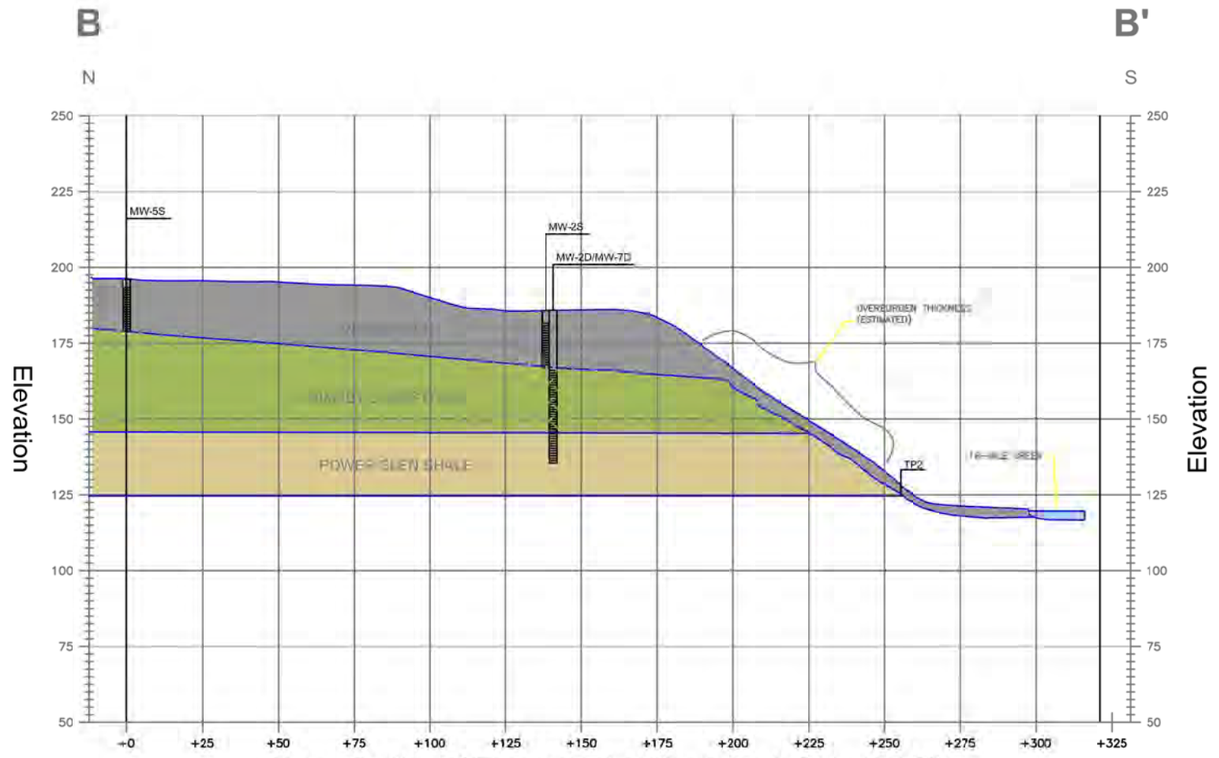


figure 10

CROSS-SECTION A-A
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.



Cross Section of Escarpment at Vandemark Chemical Site.
(Approximately 1,700 ft east of Vanchlor Landfill)

LEGEND

- OVERBURDEN
- GRIMSBY SANDSTONE
- POWER GLEN SHALE
- WATER ELEVATION IN WELL

REFERENCES

1.) URS CORP. FIGURE 3 – PHASE I/II ENVIRONMENTAL AUDIT – VANDE/MARIL INC. A VANCHEM, INC. SEPTEMBER 17, 1999.

2.) BENCHMARK BES, PLLC – SUMMARY OF SUPPLEMENTAL FIELD INVESTIGATION AND SAMPLING ACTIVITIES, ISOCHEM INC., NOVEMBER 30, 2006.

3.) U.S.G.S. LOCKPORT QUADRANGLE (FOR ELEVATION OF EIGHTEEN-MILE CREEK).

25 0 25 50
HORIZONTAL SCALE FEET

25 0 25 50
VERTICAL SCALE FEET

Golder Associates

FILE No.	1403800	SCALE	AS SHOWN
PROJECT No.	1403800 REV. 0	DATE	10/16/14
		DESIGN	JGT
		CADD	JGT
		CHECK	PTM
		REVIEW	

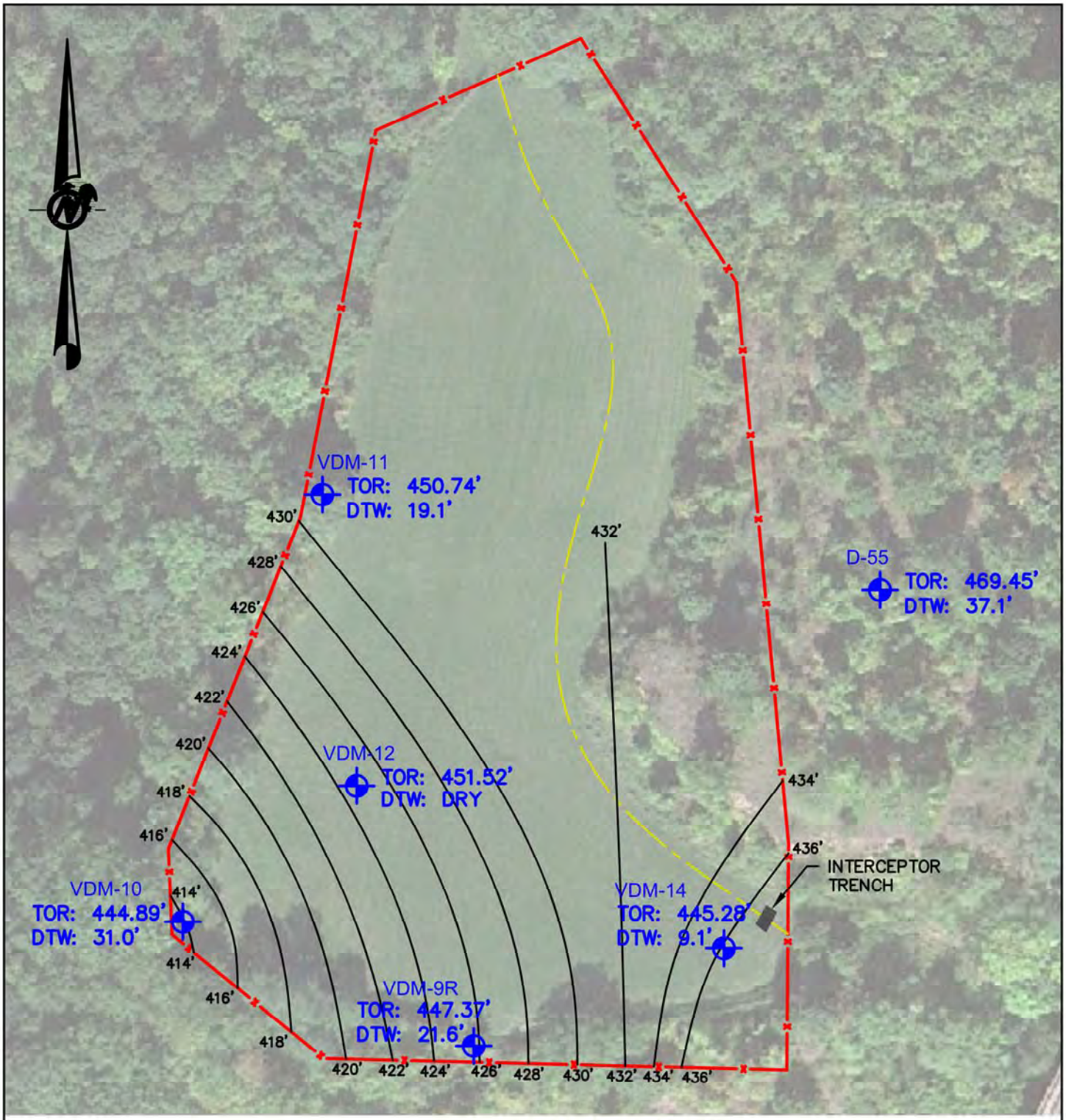
TITLE

GEOLOGIC CROSS SECTIONS
VANCHLOR LANDFILL
LOCKPORT, NEW YORK

VANCHLOR CO. INC.

FIGURE 3

Drawing file: Figure 3; Geologic Cross Sections_rev2.dwg Oct 21, 2014 – 12:31pm



LEGEND

FENCE / APPROXIMATE SITE PROPERTY LINE

VDM-9R MONITORING WELL APPROXIMATE LOCATION

REFERENCES

1.) BASE MAP TAKEN PER GOOGLE EARTH AERIAL IMAGE (10/5/11)
2.) ELEVATIONS ARE BASED ON SITE DATUM.

75 0 75
SCALE FEET

Golder Associates
Buffalo, New York

SCALE	AS SHOWN
DATE	10/15/14
DESIGN	JGT
CADD	JGT
CHECK	PTM
REVIEW	DCW

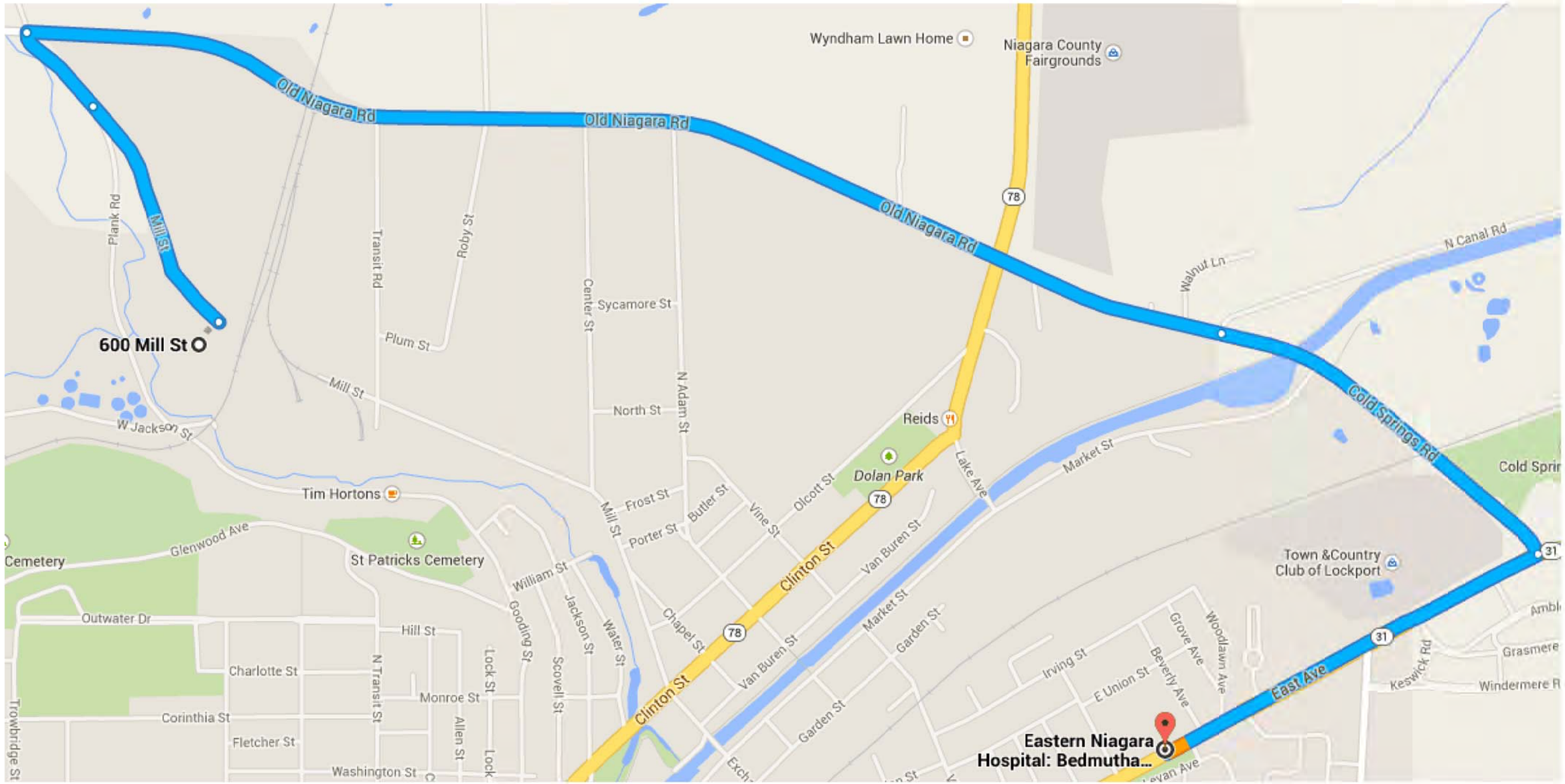
FILE No. 1403800
PROJECT No. 1403800 REV. 0

TITLE

GROUNDWATER ISOPOTENTIAL MAP
VANCHLOR LANDFILL

VANCHLOR CO. INC.

FIGURE 4



REV	DATE	DES	REVISION DESCRIPTION	CADD	CHK.	RVW

PROJECT

VANCHLOR LANDFILL
LOCKPORT, NEWYORK

TITLE

MAP OF ROUTE FROM SITE TO HOSPITAL

Golder Associates

PROJECT No.		1403185	FILE No.		1403185A224
DESIGN	JGT	9/16/14	SCALE	AS SHOWN	REV. 0
CADD	JGT	9/16/14			
CHECK					
REVIEW					

FIGURE 5

APPENDIX A

PROPERTY DEED (WITH METES AND BOUNDS)

STATE OF NEW YORK
NIAGARA COUNTY

I, Wayne F. Jagow, Clerk of said County, and also Clerk of Supreme and County Courts of said County, do hereby certify that I have compared the annexed copy with the original

DESCRIPTION: DEED
DATE: 10/05/1999
BOOK/PAGE: 2964 / 344

filed in my office and that the same is a correct transcript therefrom and of the whole of said original.

WITNESS my hand and seal of said County and Courts.

Dated MAR 06 2013

Wayne F. Jagow
Niagara County Clerk

LIBER 2964 PAGE 344

DO NOT DETACH - THIS IS PAGE 1 OF RECORDED DOCUMENT

OFFICE OF THE CLERK COUNTY OF NIAGARA

WAYNE F. JAGOW, COUNTY CLERK

INSTRUMENT # 008511

County Courthouse, 175 Hawley Street, P.O. Box 461, Lockport, NY 14095
Phone (716) 439-7027 Fax (716) 439-7086

NIAGARA COUNTY CLERK RECORDING PAGE 17778

INSTRUMENT DATE: 9/30/99 TYPE: Quit Claim Deed NUMBER OF PAGES: 6

RETURN TO: George V. C. Muscato, Esq.
Muscato, DiMilio & Vona, Attorneys
107 East Avenue
Lockport, NY 14094

Parties:

1st Part VAN DE MARK CHEMICAL CO., INC.

2nd Part VANCHLOR COMPANY, INC.

1490
REAL ESTATE TRANSFER TAX

$ 0

10,5,99

NIAGARA COUNTY

SPACE BELOW RESERVED FOR COUNTY CLERK'S USE ONLY.

RECORDED
99 OCT -5 PM 3:31
NIAGARA COUNTY CLERK'S OFFICE LOCKPORT, N.Y.

MORTGAGE AMOUNT

$

TAX DISTRICT:

[ ] Check if to be apportioned

MORTGAGE #
RECORDING TAX RECEIPT

BASIC $
ADDITIONAL $
SPECIAL $
TOTAL $

State of New York) ss
County of Niagara)
I do hereby certify that I have Received on the within Mortgage, being the amount of the Recording Tax Imposed thereon & paid at Recording

Dated this _____ of _____, 199__

Mortgage Tax Clerk of Niagara County

Recorded on the 5th day of October
1999 at 3:31 o'clock PM
in Liber 2964 of Deeds
at page 344 and examined

Niagara County Clerk

This sheet constitutes the Clerks endorsement required by Section 319 of the Real Property Law of the State of New York
DO NOT DETACH

Quit Claim Deed (from a Corporation)

LIBER 2964 PAGE 345

This Indenture

Made the 30th day of September, Nineteen Hundred and Ninety-Nine

Between VAN DE MARK CHEMICAL CO., INC., a corporation organized under the laws of the State of New York, having its office and principal place of business at One North Transit Street, Lockport, New York 14094,

party of the first part, and

008511

VANCHLOR COMPANY, INC., a corporation organized under the laws of the State of New York, having its office and principal place of business at One North Transit Street, Lockport, New York 14094,

party of the second part,

Witnesseth, that the party of the first part, in consideration of ONE AND NO MORE DOLLARS ($1.00 and No More) lawful money of the United States, paid by the party of the second part, does hereby remise and quitclaim unto the party of the second part, its successors and assigns forever,

All That Tract or Parcel of Land - per annexed Schedule "A"

TOGETHER with the appurtenances and all the estate and rights of the party of the first part in and to said premises.

TO HAVE AND TO HOLD, the above granted premises unto the party of the second part, its successors and assigns forever.

In Witness Whereof, the party of the first part has caused its corporate seal to be hereunto affixed, and these presents to be signed by its duly authorized officer this 30TH day of SEPTEMBER Nineteen Hundred and Ninety-Nine

VAN DE MARK CHEMICAL CO., INC.

By: Richard G. Shotell Pres (L.S.)
Richard G. Shotell, President

STATE OF NEW YORK)
ss:
COUNTY OF NIAGARA)

On the 30th day of September, in the year Nineteen Hundred and Ninety-Nine before me, the undersigned, a notary public in and for said state, personally appeared RICHARD G. SHOTELL the subscribing witness to the foregoing instrument, with whom I am personally acquainted, who, being by me daly sworn, did depose and say that he resides at 507 Pine Street, Lockport, New York; that said subscribing witness was present and saw said RICHARD G. SHOTELL execute the same; and that said witness at the same time personally subscribed his name as a witness thereto.

Ann Marie Werth
Notary Public
My Commission Expires: 01/22/2000

ANN MARIE WERTH
Notary Public, State of New York
Qualified in Niagara County
My Commission Expires 01/22/2000

Return to:	DEED CORPORATION QUIT CLAIM VAN DE MARK CHEMICAL CO., INC. to VANCHLOR COMPANY, INC.	Clerk's Stamp

ALL THAT TRACT OR PARCEL OF LAND, hereinafter designated as Parcel No. 10, situated in the City of Lockport, County of Niagara and State of New York, and being part of Lot 61, Township 14, Range 7 of the Holland Land Company Survey, so called, bounded and described as follows:

BEGINNING at the intersection of the north highway boundary of Stone Road, as shown on the City of Lockport Acquisition Map for Parcel No. 1, for the proposed re-alignment of Stone Road, County Road R. C. 23A-1 from Cowles Detergent Company, dated September 6, 1939 with the east line of Niagara Mohawk Power Corporation, as shown on Map No. 11832 Index 2 - T6 - M3, dated August 11, 1933, said east line also being part of Van De Mark Chemical Co., Inc. westerly line recorded by Correction Deed filed in the Niagara County Clerk's Office in Liber 2229 at Page 46; THENCE, continuing along said westerly line of Van De Mark Chemical Co., Inc., the following courses and distances N 9 29' 39" W, a distance of one hundred one and four tenths (101.40) feet, more or less, to a point; THENCE, N 7 49' 56" E, a distance of five hundred fifty-two and eleven hundredths (552.11) feet, more or less to a point; THENCE, N 34 48' 21" W a distance of four hundred ninety-five (495.0) feet, more or less to a point; THENCE, N 21 48' 21" W, a distance of one hundred thirty-two (132.0) feet, more or less to a point; THENCE, N 28 11' 39" E, a distance of three hundred thirty (330.0) feet, more or less, to a point; THENCE, N 11 48' 21" W, a distance of six hundred ninety-three (693.0) feet, more or less, to a point; THENCE, N 27 11' 39" E, a distance of forty-one and fifty-eight hundredths (41.58) feet, more or less, to a point in the middle of the Old Plank Road, which formerly led from Lower Town in the City of Lockport to Warren's Corners; THENCE, S 17 39' 10" E, along said centerline, a distance of one thousand twenty-three and ninety-eight hundredths (1023.98) feet, more or less, to a point; THENCE, continuing S 41 18' 39" E, a distance of four hundred twenty and twenty-five hundredths (420.25) feet, more or less, to a point in the centerline of existing Mill Street (so-called); THENCE, S 57 24' 30" E along said centerline of Mill Street, a distance of six hundred eighty-three and ninety-six hundredths (683.96) feet, more or less, to a point on the northeast line of Van De Mark Chemical Co., Inc. lands; THENCE, S 38 08' 26" W along said northeast line of Van De Mark Chemical Co., Inc. lands, a distance of forty-six and twenty-one hundredths (46.21) feet, more or less, to a point, said point also being fifty (50) feet south of and at right angels to the proposed centerline of improvement for reconstruction of Mill Street; THENCE, N 58 52' 25" W through the lands of Van De Mark Chemical Co., Inc., a distance of four hundred ninety-four and fifty-five hundredths (494.55) feet, more or less, to a point; said point also being fifty (50) feet south of and at right angles to the proposed centerline of improvement for the reconstruction of Mill Street; THENCE, northwesterly on a curve to the right, having a radius of nine hundred (900.0) feet, a distance of three hundred eighty-one and fifty-eight hundredths (381.58) feet to a point, said point being fifty (50) feet south of and at right angles to the proposed centerline of improvement for the reconstruction of Mill Street; THENCE, S 84 05' 56" W, a distance of one hundred twenty-two and fifty-four hundredths (122.54) feet, to a point which is further described as being at right angles to Station 42 + 50 and sixty (60) feet east of the proposed reconstruction of West Jackson Street and Stone Road as shown on the accompanying map; THENCE, S 5 54' 04" E, a distance of seven hundred ninety-nine and seventy-seven hundredths (799.77) feet, to a point, said point also being sixty (60) feet east of and at right angles to the proposed centerline of improvement for the reconstruction of West Jackson Street and Stone Road; THENCE, southerly on a curve to the left, having a radius of nine hundred forty (940.0) feet, a distance of three hundred fifty-four and sixty-nine hundredths (354.69) feet, more or less, to a point on the north highway of Stone Road; said point being also sixty (60) feet east of and at right angles to the proposed centerline of improvement for the reconstruction of West Jackson Street and Stone Road; THENCE, N 60 45' 33" W along said north highway boundary, a distance of two hundred ninety-six and six hundredths (296.06) feet, more or less, to the point of beginning, containing eight and seventy-eight hundredths (8.78) acres, more or less.

EXCEPTING and excluding any and all portions of the Mill Street Right Of Way as shown on the City of Lockport Tax Maps (94.20 & 95.17).

SCHEDULE "A"

ALSO ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Lockport, County of Niagara and State of New York, being part of Lot 61, Township 14, Range 7 of the Holland Purchase (so called), described as follows:

BEGINNING at the intersection of the center line of West Jackson Street with the center line of Lockport and Warren Corners Plank Road, being the southwest corner of land owned by the Cowles Detergent Company; and running thence north 83 degrees 30 minutes east along the center line of said West Jackson Street 117.5 feet; thence south 84 degrees east along said center line 196.7 feet; thence north 20 degrees 25 minutes west, 54 feet; thence north 54 degrees 17 minutes west, 445.8 feet to a point in the center line of Lockport and Warrens Corners Plank Road, at the point of intersection with the westerly line of land conveyed by the C. B. Whitmore Company to the Electric Smelting and Aluminum Company of Cleveland, Ohio, by deed dated January 24, 1925, and recorded in Niagara County Clerk's Office in Liber 505 of Deeds at page 36, which is 312 feet northerly of the point of beginning; thence southerly along said center line 312 feet to the point of beginning, containing 1.12 acres, more or less.

EXCEPTING THEREFROM any portion of land from the above described premises which are currently in the City of Lockport Right-of-Way as mapped on the State of New York approved City of Lockport Assessor's Tax Maps.

FURTHER EXCEPTING THEREFROM those lands previously conveyed to Somerset Railroad Corp. by Deed recorded on November 30, 1982 in Liber 1829 of Deeds at page 337, known as part of Acquisition Map 8, Parcel 8.

ALSO ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Lockport, County of Niagara and State of New York, being part of Lot Sixty-Four (64) Township Fourteen (14), Range Seven (7) of the Holland Purchase, (so called) described as follows:

BEGINNING at a point in the center line of West Jackson Street at its intersection with the east boundary line of lands owned by August Brauer and west boundary line of Niagara, Lockport & Ontario Power Company, and running thence north eighty-one (81) degrees, fifty (50) minutes west along said center line Eighty-five (85) feet to the True Point of Beginning; thence continuing along said center line, Four Hundred Fifty-One (451) feet to an angle therein; thence north Seventy-five (75) degrees, Fifty-five (55) minutes west along said center line, Two Hundred Seventy-three and One-tenth (273.1) feet; thence north Fourteen (14) degrees, Five (5) minutes east, at right angles to the last described line, Six Hundred Twenty-five (625) feet; thence south Seventy-five (75) degrees, Fifty-five (55) minutes east, at right angles to the last described line, Six Hundred Forty-three and Four-tenths (643.4) feet to the center line of the Lockport and Warrens Corners Plank Road; thence south Sixteen (16) degrees, Thirty-eight (38) minutes west along said center line, Two Hundred Sixteen and Two-tenths (216.2) feet to an angle therein; thence south Eleven (11) degrees, Forty-three (43) minutes east along the center line of said road, One Hundred Twenty-five (125) feet to its intersection with the west bounds of land owned by said Power Company; thence south Six (6) degrees, Forty (40) minutes west along the said west bounds, Two Hundred Fifty-two (252) feet to the place of beginning, containing Nine and Forty-five One-hundredths (9.45) acres of land, be the same more or less.

EXCEPTING THEREFROM that portion of land on the West side of Plank Road as currently mapped on the State of New York approved City of Lockport Assessor's Tax Maps.

ALSO ALL THAT TRACT OR PARCEL OF LAND, commonly known as PARCELS 101-L-34 as currently mapped on the State of New York approved City of Lockport Assessor's Tax Maps.

EXCEPTING THEREFROM any portion of land from the above described parcel 101-L-34 which are currently in the City of Lockport Right-of-Way as mapped on the State of New York approved City of Lockport Assessor's Tax Maps.

SUBJECT TO THE FOLLOWING:

(A) A portion of the land above described has been used to manage hazardous wastes;

(B) The use of the above described property is restricted under 6 NYCRR 373-2.7; and

(C) The survey plat and record of the type, location and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by this subdivision and subdivision (f) of this section have been filed with the local zoning authority, or the authority with jurisdiction over local land use, and with the county clerk in the county in which the facility is located, and with the commissioner.

SCHEDULE "A"

ALSO ALL THAT TRACT OR PARCEL OF LAND, situate in the City of Lockport, County of Niagara and State of New York, being parts of Lot 61, in Township 14 and Range 7 bounded and described as follows:

BEGINNING in the middle of the highway called Mill Street at a point which is 16 chains, 20 links west from the east line of said Lot 61, measured along the middle of said Mill Street, which said point is the northeasterly corner of the land conveyed by Washington Hunt and wife to William W. Whitmore and Thomas Rathbun by Deed dated October 30th, 1865, recorded in Niagara County Clerk's Office in Liber 104 of Deeds at Page 60; and running thence south, 40 degrees west, along the easterly line of said lands, 14 chains, 42 links to the southerly corner thereof, which is a stone monument in the middle of West Jackson Street; thence north 84 degrees west, along the middle of said West Jackson Street, 2 chains 98 links; thence south 83 degrees and 30 minutes west, 3 chains and 25 links; thence north 7 degrees and 30 minutes east, 13 chains, 30 links; thence north, 33 degrees west, 7 chains, 50 links; thence north 20 degrees west, 2 chains; thence north, 30 degrees east, 5 chains; thence north, 10 degrees west, 10 chains, 50 links; thence north, 29 degrees east to a point in the middle of Old Plank Road, which formerly led from Lowertown in the City of Lockport to Warren's Corners; thence southeasterly along the middle of said road lastly mentioned; thence southeast along the middle of said Mill Street, 10 chains, 35 links to the place of beginning, containing more or less.

EXCEPTING AND RESERVING from the above described premises all the lands which lie south of the northerly waters edge of 19 Mile Creek which traverses across the southerly end of the above described parcel and further excepting all of the lands east of the westerly line of lands conveyed to the Somerset Railroad Corporation by Deed dated November 9, 1982 and recorded in the Niagara County Clerk's Office in Liber 1829 of Deeds at Page 337.

ALSO EXCEPTING AND RESERVING from the above described premises all of the lands previously Deeded from Vanchlor, Inc. to the City of Lockport by Warranty Deed dated December 19, 1974, and recorded in Niagara County Clerk's Office in Liber 1565 of Deeds at Page 588 on December 20, 1974.

SUBJECT TO all easements and rights-of-way of record.

ALSO SUBJECT TO THE FOLLOWING:

(a) the land above described has been used to manage hazardous wastes;
(b) its use is restricted under 6 NYCRR 373-2.7; and
(c) the survey plat and record of the type, location, and quantity of hazardous wastes disposed of within each cell or other hazardous waste disposal unit of the facility required by this subdivision and subdivision (f) of this section have been filed with the local zoning authority, or the authority with jurisdiction over local land use, and with the county clerk in the county in which the facility is located, and with the commissioner.

APPENDIX B

FORMER LANDFILL INVESTIGATION & CLOSURE PLAN, APRIL 1984

Van De Mark Chemical Co., Inc.

FORMER LANDFILL INVESTIGATION & CLOSURE PLAN

Van De Mark Chemical Co., Inc.

FORMER LANDFILL INVESTIGATION & CLOSURE PLAN

April, 1984
Ref. No. 1277

Advanced Environmental Systems Inc.
Conestoga Rovers & Associates Limited

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1.0 INTRODUCTION

In the fall of 1983, Van De Mark Chemical Company, Inc. (VDM) authorized Advanced Environmental Systems, Inc. and Conestoga-Rovers & Associates Limited to complete a closure investigation of a former landfill site located on VDM property. The former landfill operated under Permit 2111 which was issued February 9, 1979 by the New York State Department of Environmental Conservation and which expired in February 1982. (A copy of the permit application is enclosed in Appendix A). The area had been used by VDM as a disposal area since approximately 1957.

The following report presents details on the regional and local geology including soil conditions, groundwater conditions, local topography, surface drainage and local groundwater quality. This report also addresses environmental concerns and recommends a closure plan.

Background information was provided by historic studies of the area undertaken by Woodward-Clyde Consultants and Bechtel Associates Professional Corporation for adjacent construction operations and from investigations previously undertaken by VDM.

2.0 EXISTING CONDITIONS

2.1 SITE LOCATION

The former Van De Mark Landfill is located within the Northwestern limits of the City of Lockport, New York. A site location plan is presented in Figure 1. The former landfill is located approximately 275 yards west of the Van De Mark Chemical Plant on a plateau bordered to the west and south by an embankment sloping down to Eighteen Mile Creek. The Somerset Railroad passes close by to the East. Mill Street, to the North, allows access to the 2.1 acre site.

2.2 SITE TOPOGRAPHY

The plateau upon which the former landfill site is situated, is relatively flat having an approximate elevation of 444.0 A.M.S.L. The landfill is bordered on the west and south by a steep vertical descent on the order of 85 feet; and is bordered to the north-east by a steep embankment being on the order of 24 feet high. A general site plan indicating surface contours is shown in Figure 2.

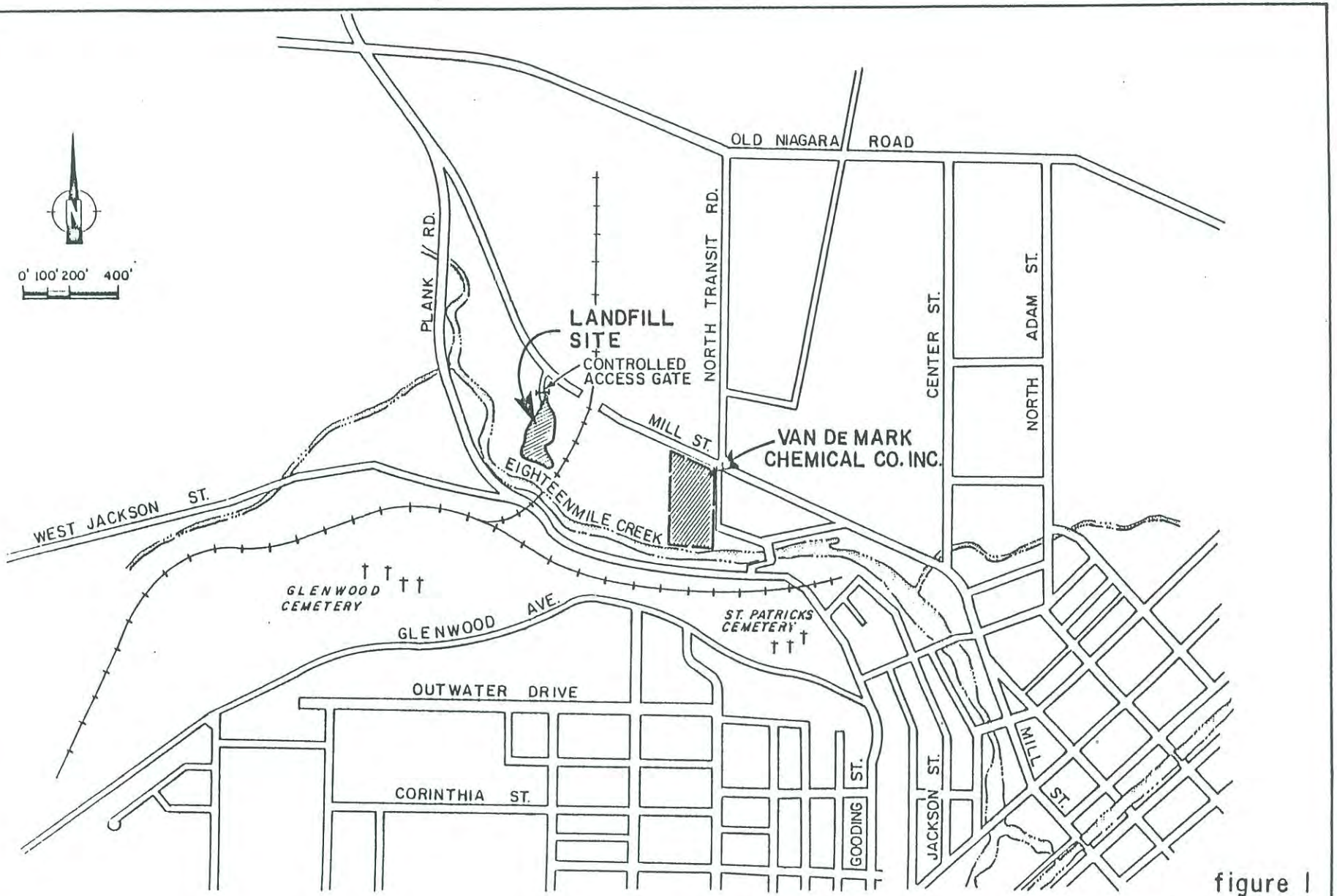

figure 1

SITE LOCATION PLAN
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

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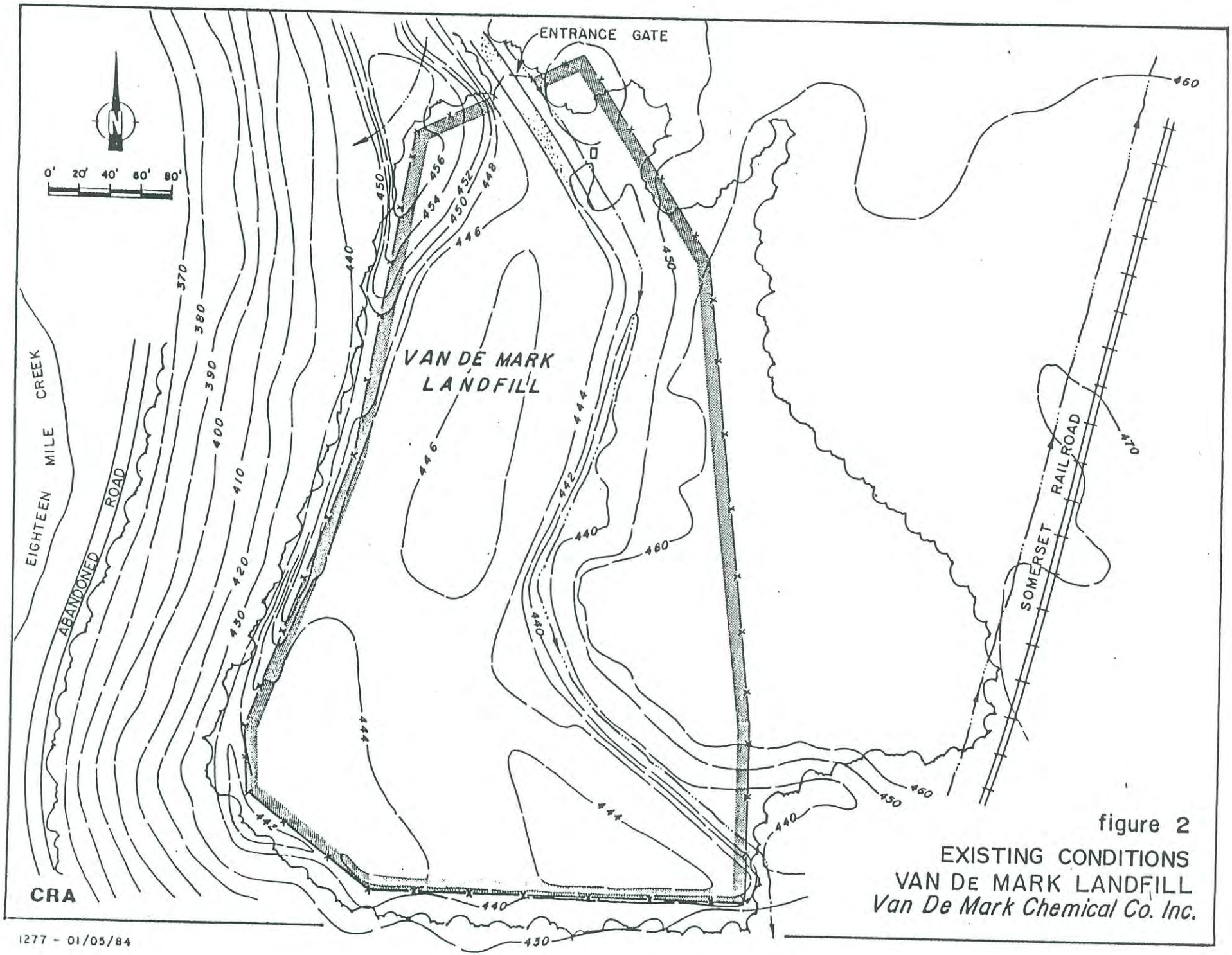

figure 2

EXISTING CONDITIONS
VAN DE MARK LANDFILL
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A small berm, one to two feet in height, extends along the edge of the western and southern disposal limits to prevent on-site surface water discharge to Eighteen Mile Creek which runs along the base of the steep slope. A drainage ditch along the base of the incline located east and northeast of the landfilled area provides the site with a surface drainage outlet.

3.0 LANDFILL PRACTICES

The Van De Mark Landfill can be subdivided into two major disposal areas as shown by Figure 3. The Western region consists of an area which was used for waste disposal between 1957 and 1979 by VDM. In this area, landfilling methods were generally random, consisting of excavation, disposal and covering. The waste consisted mainly of drums of silicon tetrachloride ($SiCl_4$) and chlorodisiloxane formed as by-products during the commercial production of phosgene.

The Eastern region of the landfill was used for the disposal of similar by-products as well as carbon and silicon carbide. Such waste was disposed of according to Permit 2111, issued February 9, 1979 and which expired in February 1982. The drummed waste was deposited in pits on a base of crushed limestone and backfilled with crushed limestone. The drums were then perforated to enhance the neutralizing of the waste. The cover consisted of bags of finish lime and agricultural lime beneath an earthen cap of red silty clayey soils. Upon expiry of Permit 2111 VDM began disposal of pretreated wastes to the Lockport Wastewater Treatment Plant.

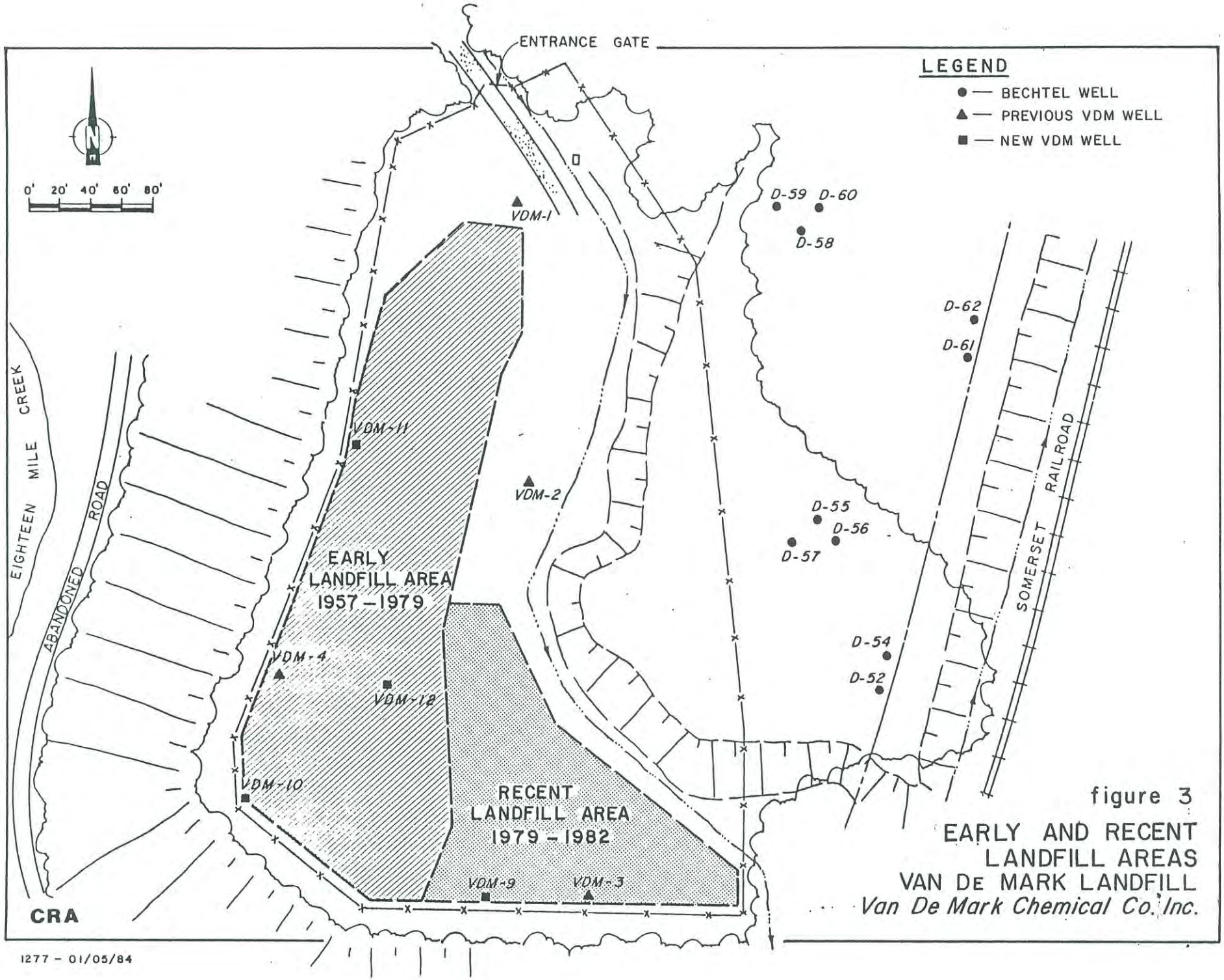

figure 3

EARLY AND RECENT LANDFILL AREAS
VAN DE MARK LANDFILL
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4.0 OBSERVATION WELL INSTALLATION

From December 1 to 9, 1983, Earth Dimensions, Inc. installed four (4) groundwater monitoring wells; three (3) monitoring wells (VDM-9, VDM-10, VDM-11) were located downgradient of the landfilled area and one (VDM-12) was installed in the central portion of the earlier landfilled area. The locations of these wells are presented in Figure 4. The direction of groundwater flow was interpreted from previous reports by Whitmore and by Bechtel. Previous wells installed by Bechtel and Whitmore as discussed in Section 4.3, are also included on Figure 4.

4.1 DOWNGRADIENT WELLS

The 1983 groundwater monitoring wells installed by CRA were placed between the landfill and top of bank as follows:

i) midway along the southern limit (VDM-9)
ii) at the southwest corner (VDM-10)
iii) midway along the west limit of the landfill (VDM-11)

The purpose of these wells was to intercept the groundwater flowing beneath the landfill and

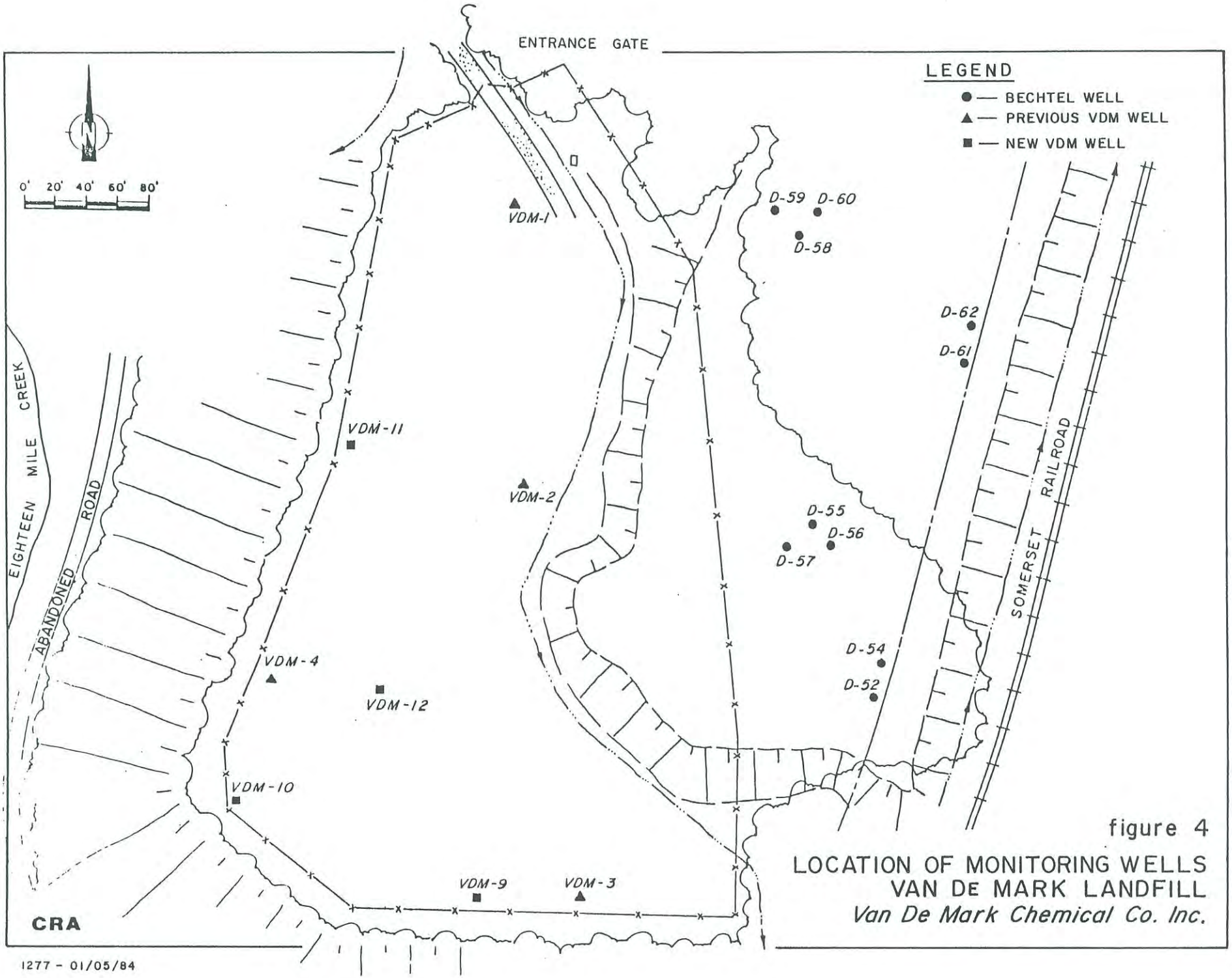

figure 4

LOCATION OF MONITORING WELLS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

discharging to the embankment along Eighteen Mile Creek.

Prior to installation it was proposed that the three downgradient monitoring wells would be installed so as to monitor a 10-foot interval of bedrock which straddled the Grimsby-Power Glen Contact. This was assumed to be the first significant water bearing interval to be encountered. Upon drilling it was found that the Grimsby Formation was not present in the area of the landfill due to former limestone-sandstone open pit quarry operations. Therefore the installations were modified such that VDM-9 and VDM-11 both monitor an interval which straddles the bedrock-overburden interface. The bedrock-overburden interface was observed to be the first encountered water bearing interval and closely approximates the expected top of the Power Glen Formation at VDM-11 and the Power Glen-Whirlpool Contact at VDM-9. Due to the weathered nature of the rock samples, the Power Glen-Whirlpool Contact at VDM-9 was not positively identified. VDM-10 monitors an interval which includes the Power Glen-Whirlpool Contact and the Whirlpool-Queenston Contact. VDM-10 was drilled down to intercept the Queenston Formation so as to provide geologic stratigraphy of the south-west area of the landfill. The monitoring

interval of VDM-10 was chosen to investigate any downward migration of contaminants.

Initially the monitoring well installations in the bedrock were not to include a screen, however, partial monitoring within the overburden required the use of a screen and sand pack. All three (3) wells were constructed of 2-inch PVC riser pipe and a 5 foot PVC well screen. The wells were installed through the augers which were progressively removed in conjunction with the backfilling operation. The annular space between the borehole wall and the well was backfilled with the following material:

1. a measured quartzite sandpack
2. a measured granular bentonite seal above the sandpack
3. a cement-bentonite grout to the surface (3% bentonite was added to prevent grout shrinkage).

Each of the three downgradient monitoring wells is protected by a 4-inch diameter steel casing with lockable cap. A typical monitoring well installation is detailed in Figure 5. Complete well logs are enclosed in Appendix 'B'.

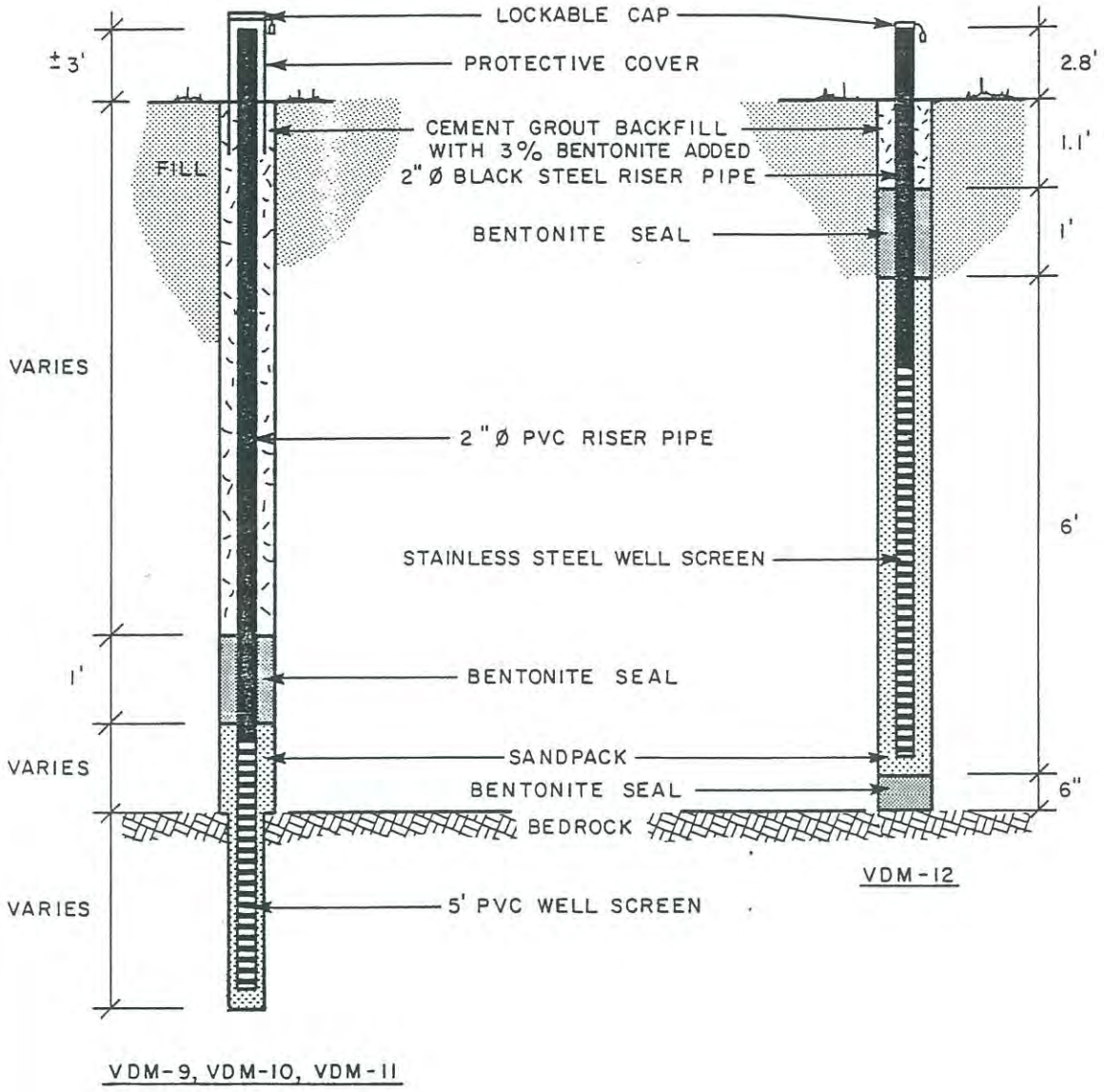

figure 5

MONITORING WELL INSTALLATION

Van De Mark Chemical Co. Inc.

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4.2 LANDFILL OBSERVATION WELL

Groundwater monitoring well VDM-12 is located approximately in the middle of the area landfilled between 1957 and 1979. Due to the random landfilling techniques used to dispose of waste in the early landfill area, leachate generation in this portion of the landfill was deemed to be a worst case condition.

VDM-12 was constructed of 2-inch diameter black steel pipe attached to a 2-inch diameter stainless steel well screen. VDM-12 was installed and backfilled (with a measured quartsite sandpack, measured bentonite plug and cement grout) and is protected by a 4-inch diameter steel casing with locking cap. VDM-12 is screened from 6 inches above bedrock to approximately 2-feet below grade.

Proper safety precautions were taken during all drilling and well installation activities. Respirators and quantities of lime to buffer any acid releases were kept close at hand. All drilling cuttings were temporarily placed in a 55-gallon drum and then disposed of in a pit on the landfill site and covered with a layer of lime and a layer of soil.

4.3 PREVIOUSLY INSTALLED WELLS

Wells previously installed include those constructed by Bechtel and by Whitmore. The Bechtel wells were completed in September and October of 1981 as part of a hydrogeologic investigation performed for the Somerset Railroad Corporation. Sample boring log and groundwater observation well report included in Appendix C pertain to Well D-55 used to gather background or upgradient data for this closure study.

Wells VDM-1 through VDM-4 were installed by Whitmore in relation to previous landfill studies. Associated well logs are also included in Appendix A.

5.0 HYDROGEOLOGIC INVESTIGATION

5.1 ON-SITE STRATIGRAPHY

The geologic stratigraphy of the landfill area was logged during the monitoring well installation program through split spoon sampling of the soil materials and NX coring of the bedrock. Complete well installation and stratigraphic logs are presented in Appendix 'B'.

The principle overburden material consisted of a matrix of red colored rock fragments and red brown clayey silt fill. This fill layer ranged in depth from 5 to 15 feet. Only trace amounts of waste materials were found at VDM-12 and the downgradient wells.

The bedrock in the area of the Van De Mark Landfill has been reported to include the lower 3 formations of the Nedina group; the Grimsby, Power Glen and Whirlpool in descending order. Below them is found the Queenston Formation (Bechtel, 1982). A general cross-section of the area is described on Table 1.

TABLE 1

GENERAL STRATIGRAPHIC COLUMN - VDM LANDFILL

System	Series	Group	Formation	Member	Thickness	Description
Silurian	Niagaran	Medina	Grimsby	Zone A	±60'	Sandstone, Siltstone with interbedded Shale: Dark red brown to light green to white sandstone and siltstone with red and green shale interbeds. Sandstone/Siltstone: Thin to medium-bedded, very fine to medium grained, medium hard to very hard, fresh, occasional green mottling, fossiliferous. Shale: Thin bedded to fissile, medium soft, moderately to severaly weathered.
			Power Glen		27.0'	Shale: With interbedded Dolomite and calcareous Sandstone: 60% shale, 40% dolomite and sandstone. Shale: dark gray to green, thin-bedded to fissile, medium soft to soft, microcrystalline, severely weathered. Dolomite and Sandstone: dark gray to green thin-bedded, medium hard, fine-grained, fresh to moderately weathered. Sandstone is cross-bedded.
			Whirlpool		12.0'	Sandstone: White with black speckling (quartz and unknown black mineral), thin-bedded in upper 2', medium-bedded to massive in remainder, fine-grained, hard to very hard, fresh. Cross-bedded, ripple marks.
Ordovician	Cincinnatian	Richmond	Queenston		1200'+	Claystone: Dark reddish-brown with pale green mottling and occasional thin pale green claystone interbeds, medium soft to very soft, clacareous, fresh to completely weathered.

Source: "Closure Plan for Solid Waste Management Facility VAN DE MARK Chemical Company Inc., Lockport, N.Y.", July 1 1982 by William W. Whitmore, Consulting Engineers.

The overlying bedrock encountered during the installation of well VDM-10 was of the Power Glen Formation. As indicated by borehole logs of VDM-1, VDM-2, VDM-3, VDM-4 and VDM-10 and supported by the Bechtel report, the Grimsby Formation has been removed in the landfill area by previous quarry operations and has been replaced with a layer of fill.

The overlying bedrock encountered during installation of wells VDM-9 and VDM-11 was soft, very weathered shale which could be augered. Due to the weathered nature of the rock a positive identification of the formation was not made. However, the top of rock at VDM-10, VDM-11 and VDM-12 was in close proximity to the Grimsby-Power Glen contact while at VDM-9, the top of rock was very close to the Power Glen-Whirlpool contact as interpolated from the Whitmore Report. Beneath the weathered rock, the Power Glen Formation was encountered at VDM-10 and VDM-11. The Power Glen Formation consists of grey shale interbedded with dolomite and sandstone and is approximately 12 feet thick in this area as indicated by local borings although the general geologic section refers to a regional average thickness of 27 feet. Top of Rock and top of Power Glen Formation contours are presented on Figures 6 and 7.

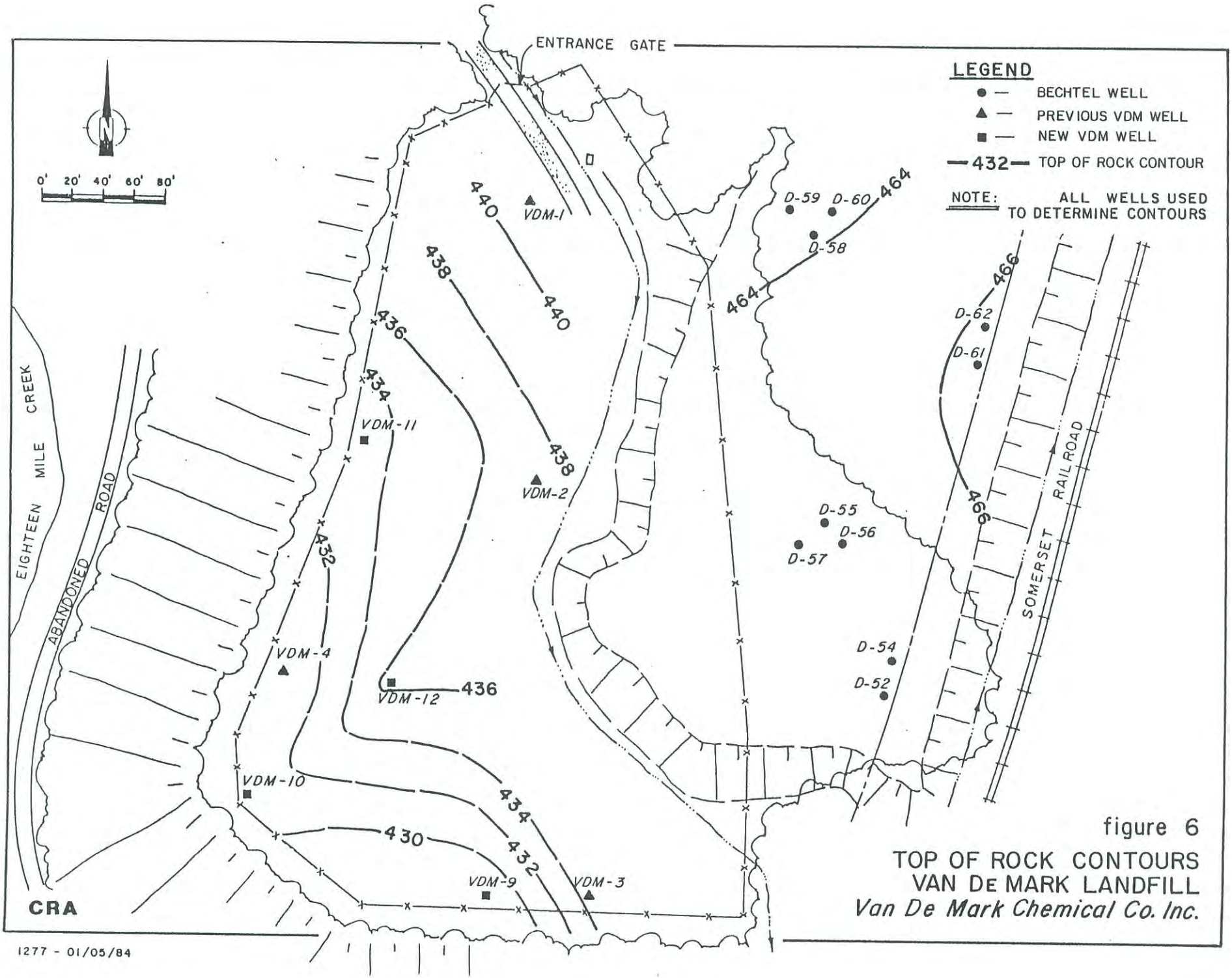


figure 6

TOP OF ROCK CONTOURS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

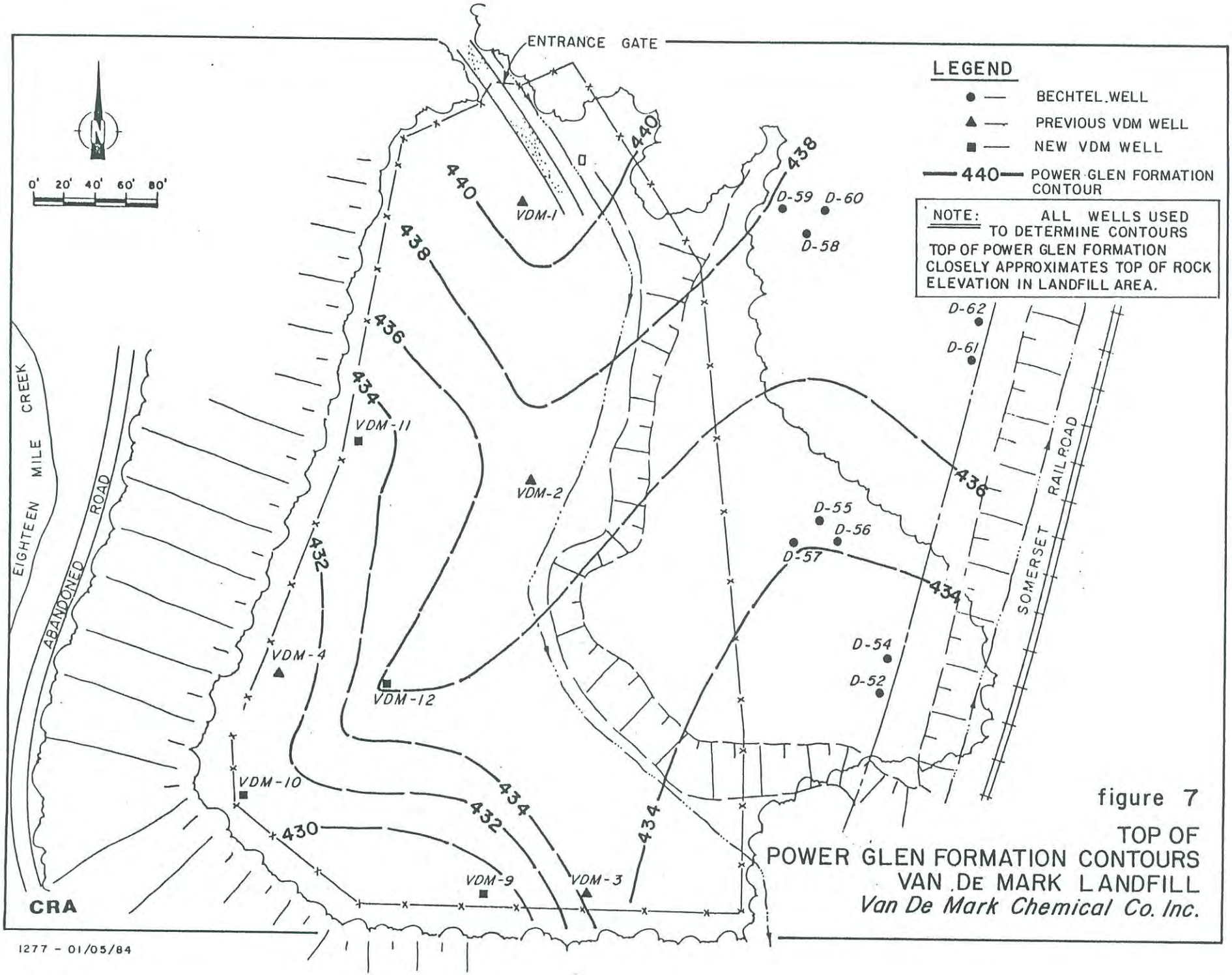


figure 7

TOP OF
POWER GLEN FORMATION CONTOURS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

At VDM-10, NX coring extended below the Power Glen Formation, through the Whirlpool Formation to intercept the Queenston Formation. In the area of the VDM Landfill, the Whirlpool Formation is approximately 15 ft. thick consisting of buff colored sandstone. The Queenston Formation is made up of dark red-brown shale (claystone) with interbedded green shale. The top of the Queenston Formation Contours are presented on Figure 8.

Two geologic cross-sections through the landfill area have been prepared. A plan view locating the cross-sections is presented in Figure 9. Figures 10 and 11 present the cross-sectional views.

5.2 GROUNDWATER

Groundwater elevations measured in the overburden/bedrock interface monitoring wells within the VDM Landfill area (VDM-1, VDM-2, VDM-9, VDM-11, and D-55 and D-61) indicate that the general groundwater flow is in a southerly direction towards the embankment leading to Eighteen Mile Creek. Due to the removal of the Grimsby Formation in the area of the landfill the overburden/bedrock interface aquifer is

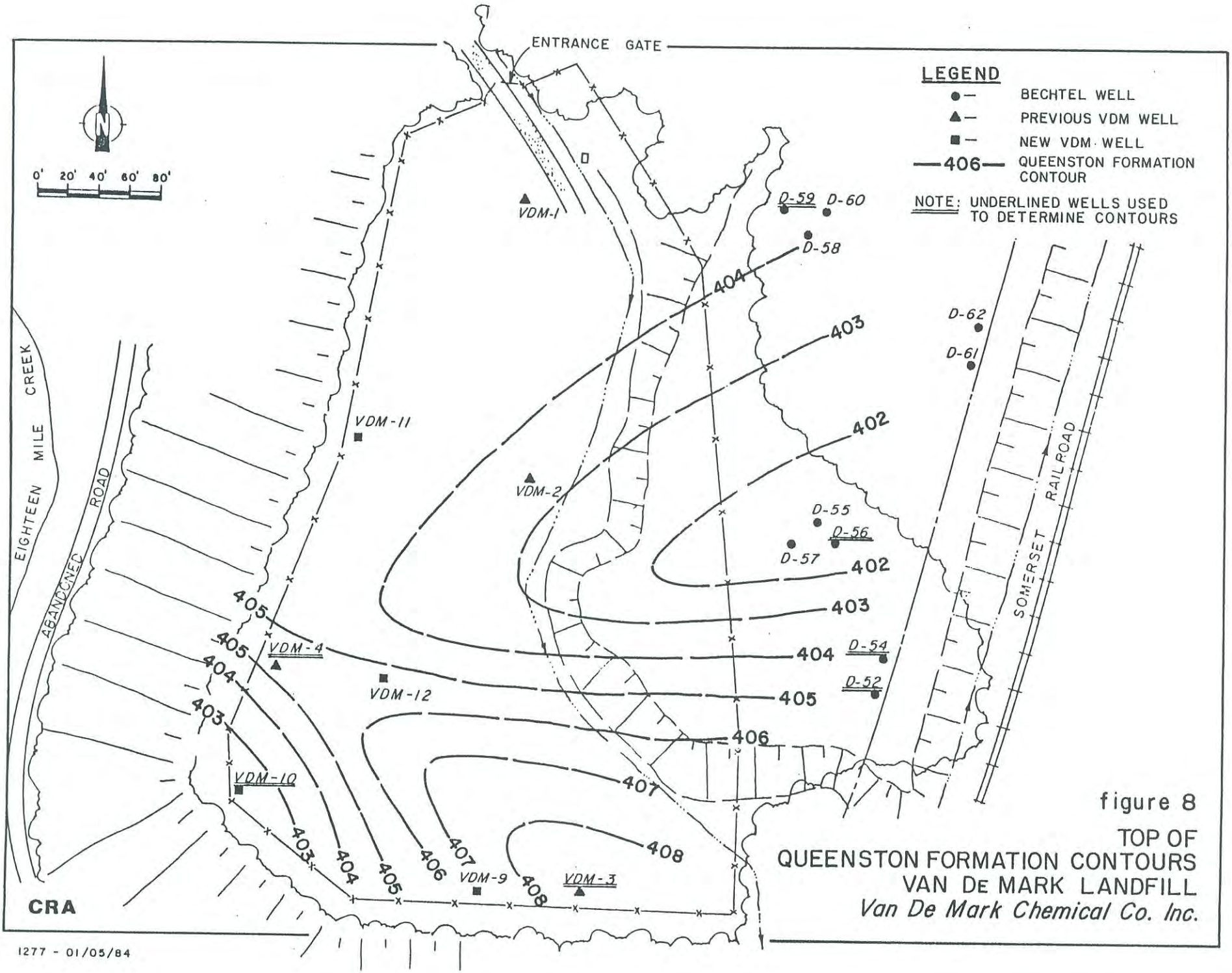


figure 8

TOP OF QUEENSTON FORMATION CONTOURS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

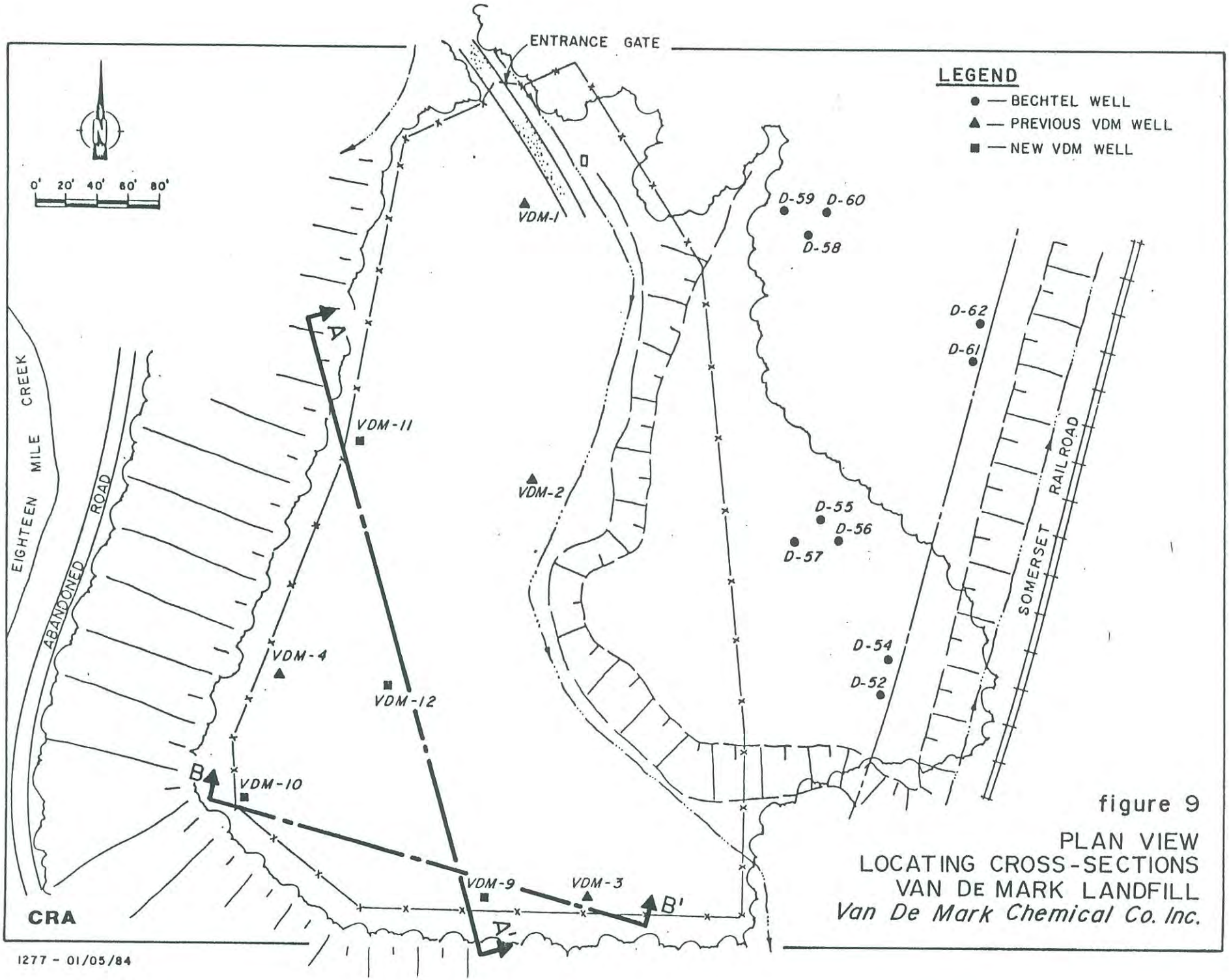
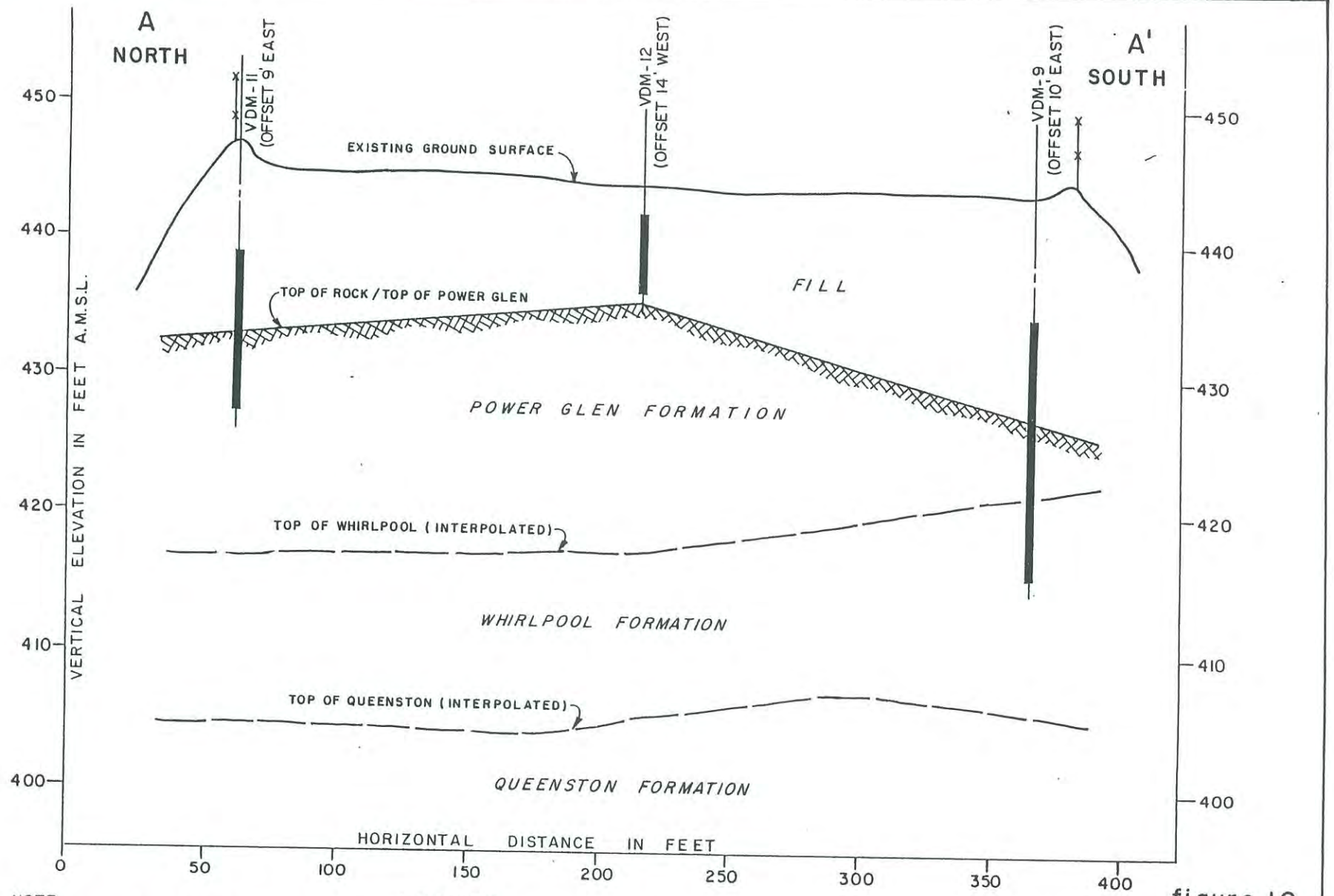


figure 9

PLAN VIEW
LOCATING CROSS-SECTIONS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.



NOTE:
AT ALL BOREHOLE LOCATIONS THE TOP OF ROCK ELEVATION APPEARED TO CLOSELY APPROXIMATE THE TOP OF POWER GLEN FORMATION.

LEGEND

—MONITORED INTERVAL

CRA

figure 10

CROSS-SECTION A-A
VAN DE MARK LANDFILL
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believed to be connected with the Grimsby/Power Glen contact groundwater in the area east of the landfill to the railroad cut and are therefore considered to be the same aquifer. Grimsby/Power Glen Aquifer water surface contours are presented by Figure 12.

A completed list of groundwater elevations measured during the investigation are presented in Table 2.

An inspection of the embankment leading down to Eighteen Mile Creek was undertaken during the spring of 1984 to identify possible seepage areas. Only one such seep was identified. It was located west of VDM-10 and was estimated to have a flow rate of less than 0.5 GPM. The seep was located at an elevation similar to the Whirlpool Formation.

Based on the facts that, i) the major water bearing intervals are postulated to be the bedding planes in the bedrock formation, ii) the major flow direction is southerly towards the embankment and iii) only one seepage point was observed along the embankment, it is assumed that the discharge of groundwater to the embankment and thus to Eighteen Mile Creek from the site is minimal. The major flowpaths through the bedrock are expected to be lateral rather

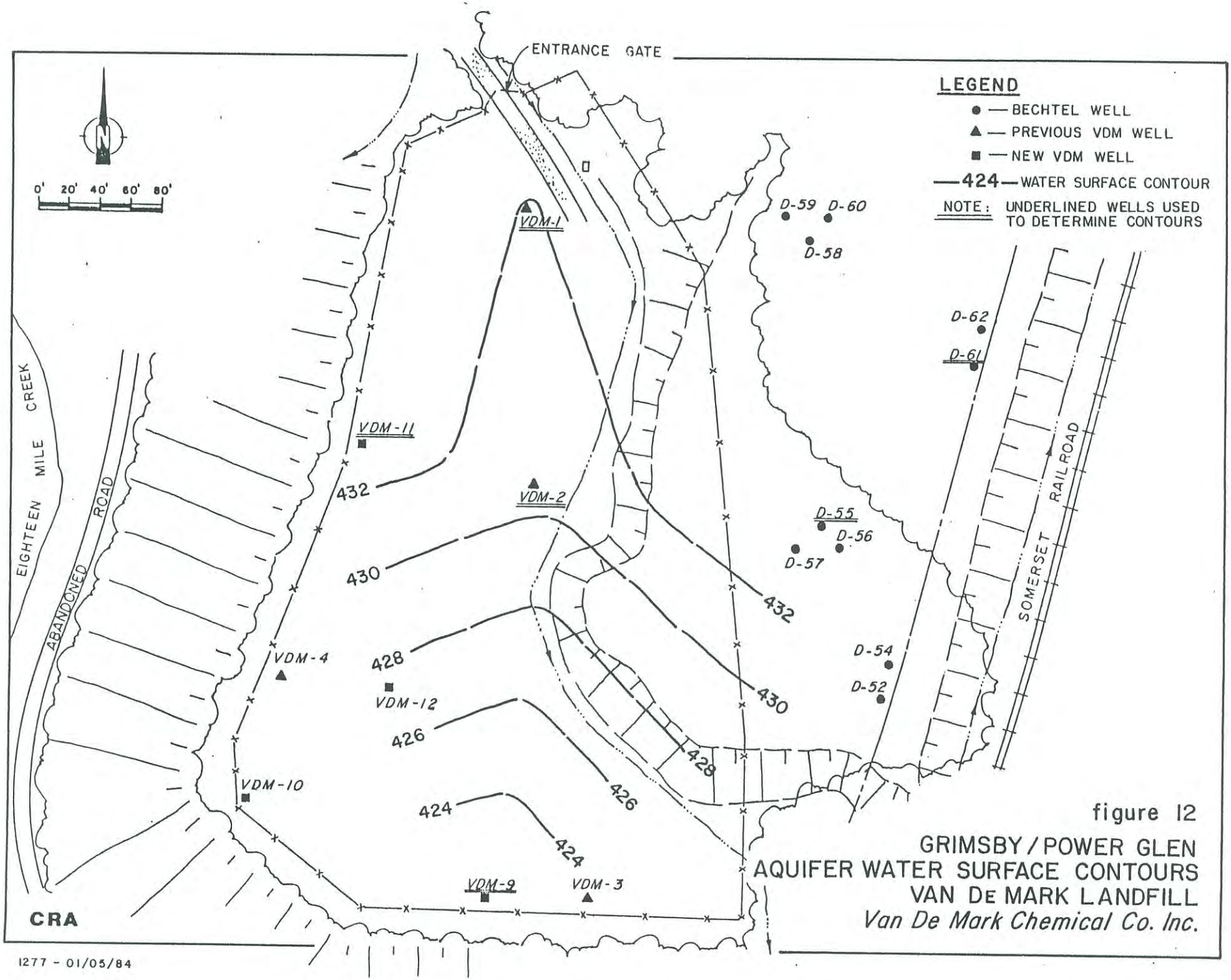


figure 12

GRIMSBY / POWER GLEN
AQUIFER WATER SURFACE CONTOURS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

TABLE 2

WATER LEVEL ELEVATIONS

	INTERVAL	12/14/83	12/16/83	01/05/84	01/24/84	01/30/84	03/15/84
VDM-1	GRIMSBY - POWER GLEN	432.16	431.96	-	-	-	-
VDM-2	GRIMSBY - POWER GLEN	430.71	430.73	-	-	-	-
VDM-3	-	414.24	414.12	-	-	-	-
VDM-4	-	395.51	396.18	-	-	-	-
VDM-9	OVERBURDEN - BEDBROCK	421.95	421.64	421.62	421.43	421.54	421.86
VDM-10	WHIRLPOOL - QUEENSTON	427.58	414.41	413.42	412.82	413.37	413.07
VDM-11	OVERBURDEN - BEDROCK	433.14	433.14	431.45	431.25	431.22	431.42
VDM-12	PERCHED	437.91	437.36	-	-	-	-
D-55	GRIMSBY - POWER GLEN	434.23	433.82	433.70	432.71	433.56	433.51
D-61	GRIMSBY - POWER GLEN	432.79	432.73	433.06	432.51	432.61	-

NOTES - GRIMSBY - POWER GLEN CONTACT AQUIFER WHICH INCLUDES THE OVERBURDEN-BEDROCK INTERFACE IN THE AREA OF THE LANDFILL

than vertical. The vertical migration of groundwater beneath the site is further restricted by the presence of the Queenston Shale which is typically considered to be an aquitard.

6.0 GROUNDWATER QUALITY MONITORING

6.1 WELL DEVELOPMENT

The sampling program was preceded by a well development program for the newly installed wells. Well development took place during December 14 to 16, 1983 and was based on the requirement that 3 well volumes be extracted per day for 3 days. Well VDM-10 provided good recovery, wells VDM-9 and VDM-11 required 2 bailings in one day to extract the necessary groundwater volume and VDM-12 had to be bailed intermittantly throughout the program as recovery was slow.

6.2 ANALYTICAL PARAMETERS

Based on the waste materials deposited in the landfill (including drummed silicon tetrachloride and chlorodisiloxane), the anticipated leachate produced would be typically acidic and high in chlorides. This would result in iron leaching both from the geologic environment and metal containers. As a result, groundwater samples were analyzed for the following parameters: chlorides, pH, iron.

To investigate if the above parameters are representative of site conditions a water sample from VDM-12 was also analyzed for the Priority Pollutants.

The protocols for analyses were as follows:

1) Chloride - Method 325.3 Titrametric - Mercuric Nitrate

2) Iron - Method 236.1 Atomic Absorption - Flame Technique

3) pH - Standard Methods, 15th Edition, Method 423

4) Priority Pollutants - U.S. EPA 600/4-79-020, March 1979.

These analytical protocols are as specified in the approved "Revised Monitoring Program Van De Mark Landfill Site", October 15, 1983 with the exception that the approved Iron Analysis method was to be by atomic absorption method 236.2, furnace technique.

6.3 INITIAL SAMPLING

The initial round of groundwater samples were collected on January 6, 1984. Each of the sampling wells had been purged on January 5, 1984 and allowed to recover. The recovery of the wells was slow, especially VDM-12, which required repeated sampling over 19 days to obtain sufficient volume of groundwater to allow for laboratory testing. Groundwater samples were obtained by bailing with a stainless steel bailer. The bailer was subject to a water wash and acetone-hexane-acetone-distilled water rinses between each sampling.

The wells sampled were VDM-9, VDM-10, VDM-11, VDM-12 and D-55. Well D-55, which provided background information is located to the east of the landfill and was installed by Bechtel. The monitoring interval of well D-55 coincides with the Grimsby-Power Glen contact.

The results of chemical analyses of the samples collected during the first round are presented in Tables 3 and 4.

First round analytical results revealed lower pH values of the downgradient and

TABLE 3

INITIAL ROUND SAMPLING RESULTS

Well No.	pH (Std. Units)	Chlorides (mg/L or ppm)	Iron (mg/L or ppm)
VDM-9	5.660	9,197	81.0
VDM-10	5.321	7,730	27.5
VDM-11	3.628	1,859	45.3
VDM-12	4.275	50,682 (51,660)[1]	9,800.0
D-55	7.545	49	<0.2

[1] - Duplicate sample

Notes:

1) Samples collected January 6, 1984
2) Analysis performed by Advanced Environmental Systems, Inc.

TABLE 4

PRIORITY POLLUTANT SURVEY - WELL VDM-12

SUMMARY[1]

(Expressed as micrograms per liter or ppb)

Parameter	Original Sample	Duplicate Sample
Volatiles (31)[2]		
Chloromethane	550	390
Methylene Chloride[3]	330	290
Chloroform	500	500
Carbon Tetrachloride	BDL[4]	28
Tetrachloroethylene	110	120
Base/Neutral Extractables (46)		
Octylphthalate	100	NR[5]
Pesticides/PCB's (25)	BDL	NR
Acid Extractables (11)	BDL	NR
Total Recoverable Phenols (mg/L or ppm)	0.08	NR
Total Cyanide	BDL	NR
Cadmium	294	
Chromium	4250	
Copper	31000	
Lead	485	
Nickel	22900	
Silver	870	
Thallium	1120	
Zinc	497000	
Beryllium	186	

1 - This table lists only those parameters identified from the total of 128; all others are below detection limits. The complete analytical report is provided in Appendix A.
2 - Number of Compounds
3 - The field blank contained 11 ug/L methylene chloride
4 - BDL - Below Detection Limits
5 - Duplicate analysis not requested

- Samples collected January 24, 1984
- Analyses performed by Advanced Environmental Systems Inc.
- Further metals analyses forthcoming

landfill wells, (especially VDM-11), than the neutral pH value of the upgradient well D-55. High chloride and iron concentrations were indicated by the landfill monitoring wells relative to the background well. As previously mentioned, low pH and elevated chlorides and soluble iron concentrations were expected based on the type of waste materials deposited in the landfill.

The priority pollutant survey completed on samples collected from VDM-12 revealed the following parameters as being above the detection limits:

1) Volatiles; Chloromethane, Methylene Chloride, Chloroform, Carbon Tetrachloride, and Tetrachloroethylene,

2) Base/Neutral extractables; Octylphthalate,

3) Total Recoverable Phenols, and

4) Metals; Cadmium, Chromium, Copper, Lead, Nickel Silver, Thallium, Zinc, Beryllium. Further metals analyses are forthcoming.

6.4 SECOND SAMPLING SURVEY

Based on the information gained through the analysis of the initial round of water samples, a set of parameters were chosen for groundwater quality confirmation. These parameters were:

1) Volatiles - Chloromethane, Methylene Chloride, Chloroform, Carbon Tetrachloride, and Tetrachloroethylene;

2) Total Recoverable Phenols;

3) Metals - Cadmium, Chromium, Copper, Lead, Nickel, Silver, Thallium, Zinc and Beryllium, and others yet to be determined.

Low levels of Octylphthalate (100 ppb) were found in the VDM-12 sample. Low level presence of octylphthalate is not considered to be of significant environmental importance and therefore was not included for in the second sampling survey.

The second round sampling survey was carried out on March 21, 1984. Sampling results are presented in Appendix D.

Second round sample analyses for pH, chlorides and iron revealed similar analytical results to the first round with the exception of the soluble iron concentrations which were typically higher for the second set of samples (See Table 5, Appendix D).

Analyses of samples from the downgradient wells indicate reduced concentrations of methylene chloride and chloroform, compared to those observed in the landfill well (VDM-12) with VDM-11 having the highest downgradient concentrations. The presence of carbon tetrachloride and tetrachloroethylene was only observed in VDM-11 and VDM-12. It is to be noted that VDM-11 is located in the older landfill area where disposal methods were not regulated. All observed volatile concentrations were less than 1 ppm in the landfill well and less than 0.35 ppm in the downgradient wells. Upgradient well (D-55) does not contain any of the parameters included in the sampling program.

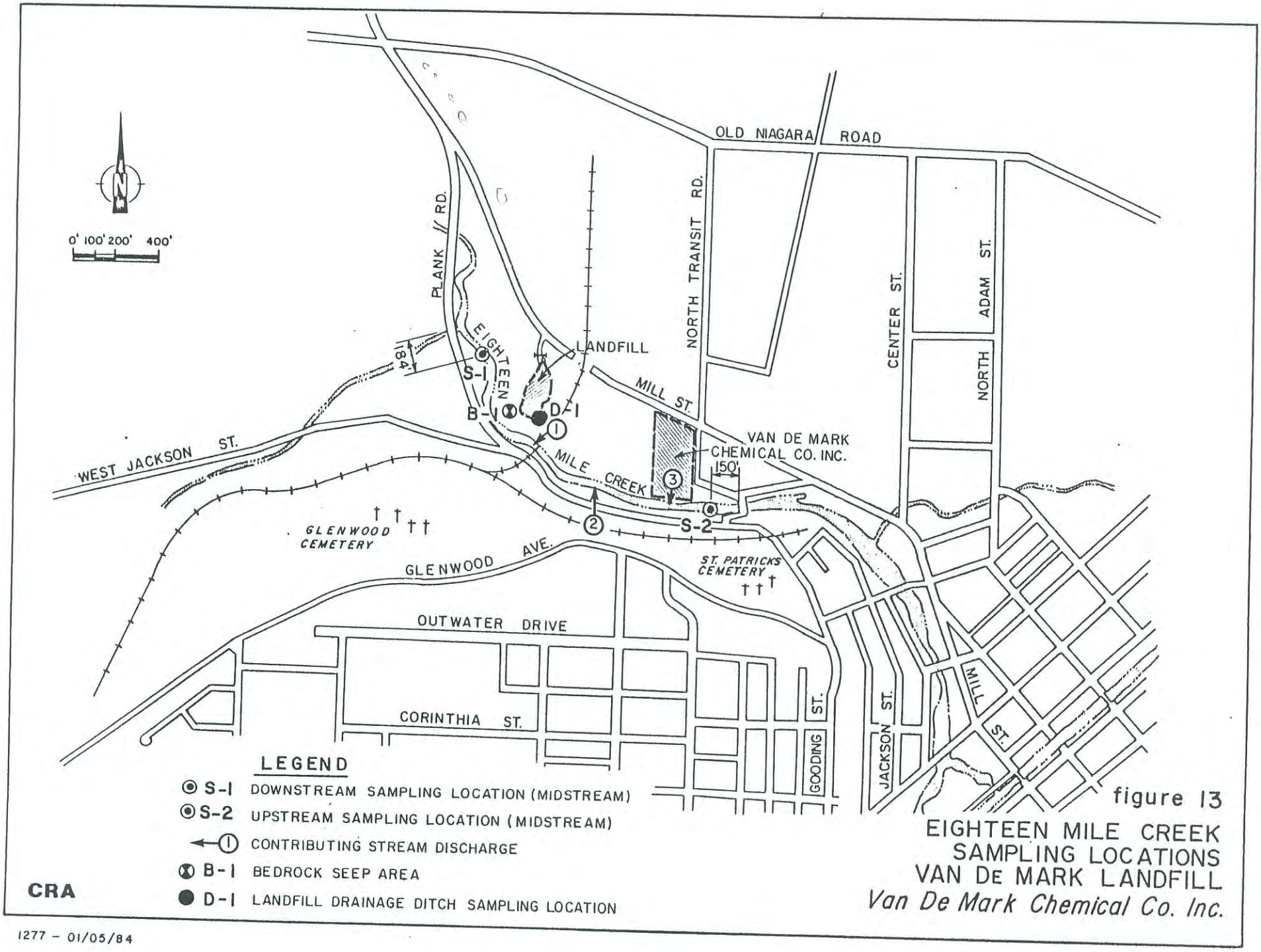
6.5 EIGHTEEN MILE CREEK SAMPLING

Since on-site monitoring indicated low level water quality impacts due to the landfill, it was deemed appropriate to undertake off-site monitoring to measure off-site impact.

On April 17, 1984, water samples were taken from Eighteen Mile Creek at locations upstream and downstream of that portion of the creek which could be impacted by runoff from beneath the Van De Mark Landfill. As shown on Figure 13, samples were taken at locations situated immediately upstream of the Waste Water Treatment Plant and downstream of the twin culverts at North Transit Road in the vicinity of the Van De Mark Plant. A sample was also taken from the seep on the embankment below the landfill in the area of VDM-10.

At each creek sampling location 3-VOA and 2-metals samples were collected. The samples were taken from approximately mid-stream at a depth of 3 to 6 inches below the surface. The samples were kept cool and transfered to the AES laboratory the same day.

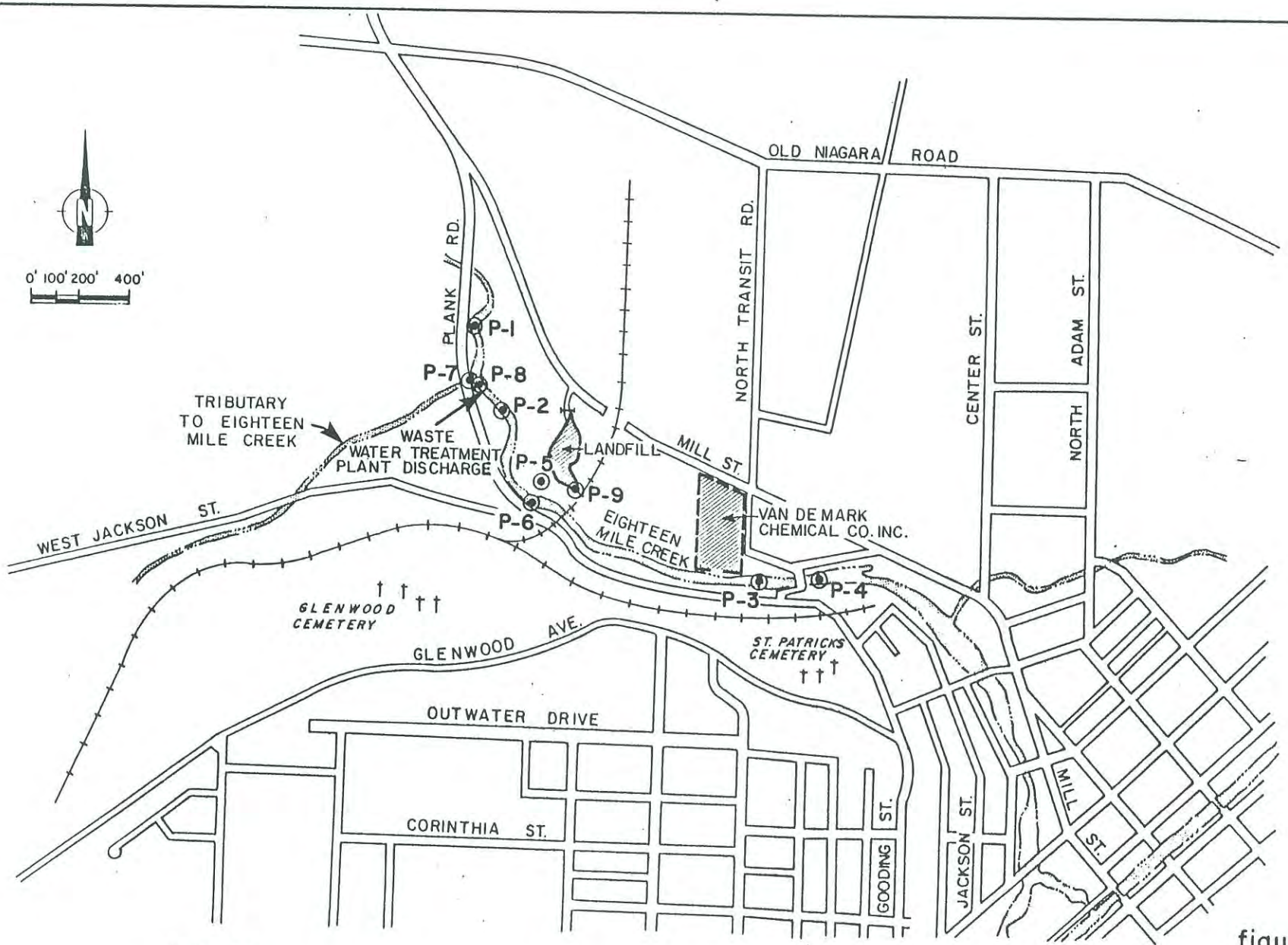
In addition, samples were collected for pH determination at several locations along Eighteen Mile Creek and in the area of the landfill on April 26, 1984 and again on May 2, 1984 as shown on Figure 14. The results indicate that the pH maintains a level of between 6.2 and 8.7 along that portion of the creek in the vicinity of the landfill. (pH sample results are presented in Table 5).



CRA

figure 13

EIGHTEEN MILE CREEK
SAMPLING LOCATIONS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.



LEGEND

⊙ P-1 APPROXIMATE PH SAMPLE LOCATION
(SAMPLES TAKEN AT MIDSTREAM WHERE APPROPRIATE)

CRA

figure 14

PH SAMPLE LOCATIONS
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

1277-01/05/84

TABLE 5

CREEK pH LEVELS

Sample No.	Location	Sampled April 26 1984	Sampled May 2 1984	Sampled May 3 1984
1	Midstream-Eighteen Mile Creek - 70 yds downstream of closest small bridge north of West Jackson Street	6.8	6.2	7.5
2	Midstream - Eighteen Mile Creek - 115 ft. upstream of most southerly Wastewater Treatment Plant discharge	7.5	--	8.4
3	Midstream - Eighteen Mile Creek - 75 ft. east of abandoned railway bridge at North Transit Road	8.0	8.4	8.5
4	Midstream - Eighteen Mile Creek - 35 ft. east of twin culverts at North Transit Road	7.8	8.4	8.5
5	Seep on embankment face in area of VDM-10 at approximate elevation of Whirlpool Formation	5.3	5.3	--
6	Midstream - Eighteen Mile Creek - opposite embankment seep area in vicinity of VDM-10	8.6	8.7	8.7
7	Midstream - tributary to Eighteen Mile Creek at entrance to Eighteen Mile Creek	--	7.1	7.6
8	Immediate vicinity of downstream discharge to Eighteen Mile Creek from Waste Water Treatment Plant	--	6.9	7.6
9	Midstream - drainage ditch to east of landfill site	--	5.3	4.8

Eighteen Mile Creek is considered to be a Class D stream. Information supplied by VDM suggests that the low flows do not fall below an average minimum of approximately 75 cfs.

Discharges to the stream between the sampling locations include the following:

1) Stormwater drainage system discharge from the Somerset Railroad cut North of Eighteen Mile Creek.

2) Stormwater drainage system discharge from West Jackson Street and from upper mountain area; Glenwood Avenue.

3) Drainage from VDM Pumping Lift Station.

4) Surface drainage from VDM Landfill Site.

The City of Lockport Wastewater Treatment Plant discharges to Eighteen Mile Creek immediately downstream of the VDM property.

Analyses of samples from Eighteen Mile Creek indicated that only tetrachloroethylene was detected in the creek and only at a concentration equal to upstream quality (1 ppb). The analyses completed to date are presented in Tables 6 and 7. The results of the metal analysis of the stream samples indicate no change in stream water quality along the site.

Analyses of the groundwater seep sample revealed the presence of chloroform at an approximate concentration of 0.2 ppm. The completed analytical results are presented in Table 6.

6.6 DRAINAGE DITCH SAMPLING

Samples of the existing surface drainage ditch have been collected and are shown on Tables 5 and 6. The results show very low concentrations of the volatile organics (Maximum 25 ppb chloroform) and an elevated chloride concentration of 3624 ppm. The analyses for iron are not yet completed. The ditch flow has a slightly reduced pH.

TABLE 6

ANALYTICAL RESULTS FROM THE EMBANKMENT SEEP, THE LANDFILLED DRAINAGE DITCH AND EIGHTEEN MILE CREEK

Sample Number Sample Source Sampling Date	F-1 Field Blank 04/17/84	S-1 Downstream 04/17/84	S-2 Upstream 04/17/84	B-1 Bedrock Seep 04/17/84	F-2 Field Blank 05/03/84	D-1 Ditch 05/03/84
Chloromethane (ppb)	<0.37	<0.37	<0.37	<0.37	<0.28	<0.28
Methylene Chloride (ppb)	5.81	1.52	<0.04	1.88	3.61	2.26
Chloroform (ppb)	<0.20	<0.20	<0.20	185.58	<0.08	24.88
Carbon Tetrachloride (ppb)	<0.21	<0.21	<0.21	<0.21	<0.17	4.98
Tetrachloroethylene (ppb)	0.71	1.09	1.08	1.18	1.47	11.81
Chlorides (ppm)	I	I	I	I	--	3624
Total Iron	I	I	I	I	--	I

I - incomplete, to be submitted upon completion.

TABLE 7

METALS ANALYSES -EIGHTEEN MILE CREEK SAMPLES

SAMPLE NUMBER SAMPLE SOURCE SAMPLING DATE	S-1 DOWNSTREAM 4/17/84	DUPLICATE DOWNSTREAM 4/17/84	S-2 UPSTREAM 4/17/84	DUPLICATE UPSTREAM 4/17/84
Atimony (ppb)	3.7	5.0	4.4	4.7
Arsenic (ppb)	I	I	I	I
Berylium (ppb)	<0.5	<0.5	<0.5	<0.5
Cadmium (ppb)	<1.0	1.2	<1.0	<1.0
Chromium (ppb)	<10.0	<10.0	<10.00	<10.0
Copper (ppb)	15.7	12.4	11.3	11.7
Lead (ppb)	<5.0	<5.0	<5.0	<5.0
Mercury (ppb)	I	I	I	I
Nickel (ppb)	<50.0	<50.0	<50.0	<50.0
Selenium (ppb)	I	I	I	I
Silver (ppb)	<1.0	1.8	1.7	1.6
Thallium (ppb)	<1.0	<1.0	<1.0	<1.0
Zinc (ppb)	34	30	34	34
Iron (ppb)	17000	17000	19000	19000

I - Incomplete, to be submitted upon completion.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 ENVIRONMENTAL IMPACT

As indicated by the results of the sample analyses, the groundwater leaching through the VDM Landfill to Eighteen Mile Creek below has no significant detrimental impact to the off-site environment. The reasons for this are:

1) On-site water quality impact is restricted to a low pH and low concentrations of volatile organics.

2) Groundwater flowing toward and discharging as seepage from the embankment, is expected to be treated by air stripping and buffering.

3) Eighteen Mile Creek intercepts any runoff from the site. The assimilative capacity of the Creek for the low discharge from the site is measured to be adequate. (see Section 6.5).

7.2 CLOSURE PLAN RECOMMENDATIONS

The recommended closure activities include site grading, injection of lime, conditioning of surface soils and seeding of the landfill area. The site grading and cleanup will be such that infiltration will be better distributed and will enhance the treatment of the low pH problem. Buffering of low pH levels in the groundwater through the addition of lime will be reduce the observed heavy metals concentration in the groundwater.

The proposed closure plan will consist of the following:

a) Backfill all minor depressions of the landfill surface with lime.

b) Add some lime to the base of the pit located at the northern limits of the recently landfilled area.

c) Since the water is reactive, it is recommended that the final grading plan minimize the area of existing cover soil disturbance. The proposed final grading plan is presented in Figure 15.

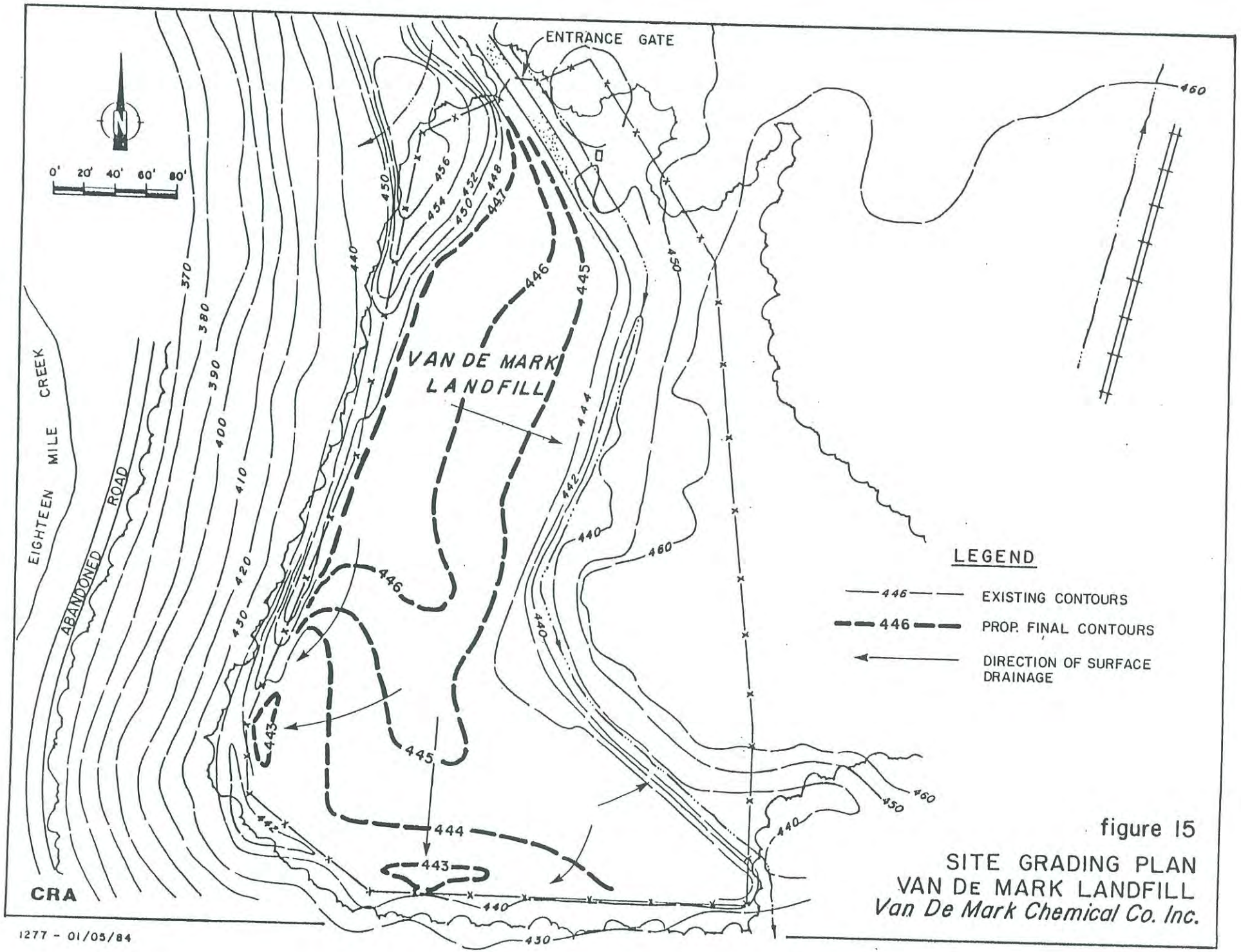


figure 15

SITE GRADING PLAN
VAN DE MARK LANDFILL
Van De Mark Chemical Co. Inc.

1277 - 01/05/84

d) Condition, fertilize and seed the site as recommended by Randall's floristic survey which forms a part of the Whitmore report. Randall suggests

i) to disk or harrow the site to assist seed germination,

ii) apply 500 lb/acre of 15-15-15 (N,P,K) fertilizer,

iii) single application of:

- Crownvetch - var. 'Penngift' - 10 lb/acre;
- Birdsfoot trefoil - var. 'Empire' - 6 lbs/acre (preferred) or var. 'Viking' - 6 lbs/acre; and
- Perennial rye grass - 10 lbs/acre (preferred) or Reed canary grass - 10 lbs/acre (post-seeding conditioning by raking, rolling or meekering is recommended)

e) Implement maintenance program.

f) Implement groundwater monitoring program.

g) The ditch is presently performing as designed. The pH is being buffered, iron is precipitated and volatiles are being air stripped from the groundwater. To

ensure that the above continues the following work is proposed:

(i) review of monitoring data with each analysis.
(ii) add lime as required
(iii) periodically remove iron staining to improve aesthetics (dispose on site under cap).

h) To enhance the buffering capacity of the groundwater, the following work will be attempted: (It is recognized that this effort may be of limited success.)

- add lime solution to upgradient wells VDM-1 and VDM-2. The amount and scheduling of injection of pH adjusting solution will be dependent upon the resultant groundwater quality observed at downgradient wells during the ongoing monitoring programs.

7.3 MAINTENANCE PLAN

The proposed maintenance plan will consist of semi-annual inspections of the site. During each inspection, the cover will be inspected for isolated depressions. Any such area will be filled with lime, recovered and reseeded.

7.4 GROUNDWATER MONITORING PLAN

The groundwater monitoring plan will consist of the collection of groundwater samples for analysis of the following identified parameters:

pH - VDM-9, VDM-10, VDM-11, VDM-12, and East Ditch

Chlorides - VDM-9, VDM-10, VDM-11, VDM-12, and East Ditch

Iron - VDM-9, VDM-10, VDM-11, VDM-12, and East Ditch

Methylene Chloride - VDM-9, VDM-10, VDM-11, VDM-12, and East Ditch

Chloroform - VDM-9, VDM-10, VDM-11, VDM-12, and East Ditch

Chloromethane - VDM-12

Carbon Tetrachloride - VDM-11 and VDM-12

Tetrachloroethylene - VDM-11, VDM-12

The sampling frequency will be as follows:

Year 1 - quarterly

Year 2 and 3 - semi-annually

Thereafter - annually

After each sampling and analysis, the data will be reviewed and submitted to the NYSDEC. The evaluation will include recommendations for site work as deemed appropriate.

All of Which is Respectfully Submitted,

CONESTOGA-ROVERS & ASSOCIATES LIMITED

Frank A. Rovers, P. Eng.

David E. Black, B.A.Sc.

REFERENCES

Advanced Environmental Systems Inc., and Conestoga-Rovers & Associates Limited, "Revised Monitoring Program, Van De Mark Landfill Site", October 15, 1983.

Bechtel Associates Professional Corporation, "Somerset Railroad Project, Hydrogeologic Study, Danielewicz Route, Station 51+810 to 52+330", February, 1982.

William W. Whitmore, Consulting Engineers, "Application for Approval to Construct a Solid Waste Management Facility", June 29, 1977.

William W. Whitmore, Consulting Engineers, "Closure Plan for Solid Waste Management Facility Van De Mark Chemical Co. Inc., Lockport, N.Y.", July 1, 1982.

APPENDIX A

APPLICATION FOR APPROVAL TO CONSTRUCT A SOLID WASTE MANAGEMENT FACILITY

APPLICATION FOR APPROVAL TO CONSTRUCT A SOLID WASTE MANAGEMENT FACILITY

PPLICATION INSTRUCTIONS ON REVERSE SIDE

PROJECT NO.	DATE REC
DEPARTMENT ACTION ☐ Approved ☐ Disapproved	DATE

R'S NAME	2. ADDRESS (Street, City, State, Zip Code)	3. Telephone No.
Mark Chemical Co., Inc.	1 N. Transit Rd., Lockport, N. Y. 14094	716-433-676
ERATOR'S NAME	5. ADDRESS (Street, City, State, Zip Code)	6. Telephone No.
SAME	SAME	SAME
NEER'S NAME	8. ADDRESS (Street, City, State, Zip Code)	9. Telephone No.
liam W. Whitmore III, P.E.P.C.	50 W. Genesee St., Lockport, New York 14094	716-434-024

NEER'S N.Y.S. LICENSE NO.	10. TYPE OF PROJECT FACILITIES:
24360 PE	☐ Composting ☐ Transfer ☐ Shredding ☐ Baling ☐ Sanitary Landfill ☐ Incineration ☐ Pyrolysis ☐ Resource Recovery-Energy ☐ Resource Recovery-Materials ☒ Other Chemical Waste La

efly describe the project including the basic process and major components:

r preparing existing site per approved plan, transport metal drums of chemical waste from pl site, excavate trenches, place drums in trench, cover, regrade & replant surface. Monitoring ports monthly

ibe location of facility. (Attach a USGS Topographic Map showing the exact location of the facility)

e attached DWG. VDM-1965 Aerial Photograph and USGS Location Map

y in which facility is located:	14. Environmental Conservation Region in which facility is located:
agara	Region 9

Municipalities Served by Facility		County	No. of Municip
None	N/A	N/a	N/A

e briefly how the proposed facility relates to the Comprehensive Solid Waste Management Plan for the Municipality. Explain any deviation from that Pl

unicipal Disposal Plan
serve Van De Mark Chemical Co., Inc. only. No other conveniently available site approved for waste.

e facility is other than a sanitary landfill, describe the residues in terms of quantities and types. Also indicate the methods and locations of residue dis if recyclable, indicate markets:

to Engineering Report attached and Topographic site location and site development drawing 1966, Sections and Details VDM-1967. Waste is dry mix containing 30-70 % Hexachlorodisiloxane 50 % Silicon Tetrachloride, and 5-30 % Carbon and Silicon Carbide package in sealed steel drums afe handling.

e facility is a sanitary landfill, provide the following information:

Total useable area – 2.1 ± Acres
istance to nearest surface water – 200± Feet
Depth to nearest ground water – 20'-24'± Feet
epth to nearest rock – 5-11'± Feet
e. Distance to nearest airport – 6± miles
f. Expected life of site – 30 -40 years
g. Is site on a flood plain? ☐ Yes ____ Year Flood ☒ No
h. Predominant type of soil on site: Red/Br. silt sand, gravel (Use Unified Soil Classification System) R/G. sandstone shale-s

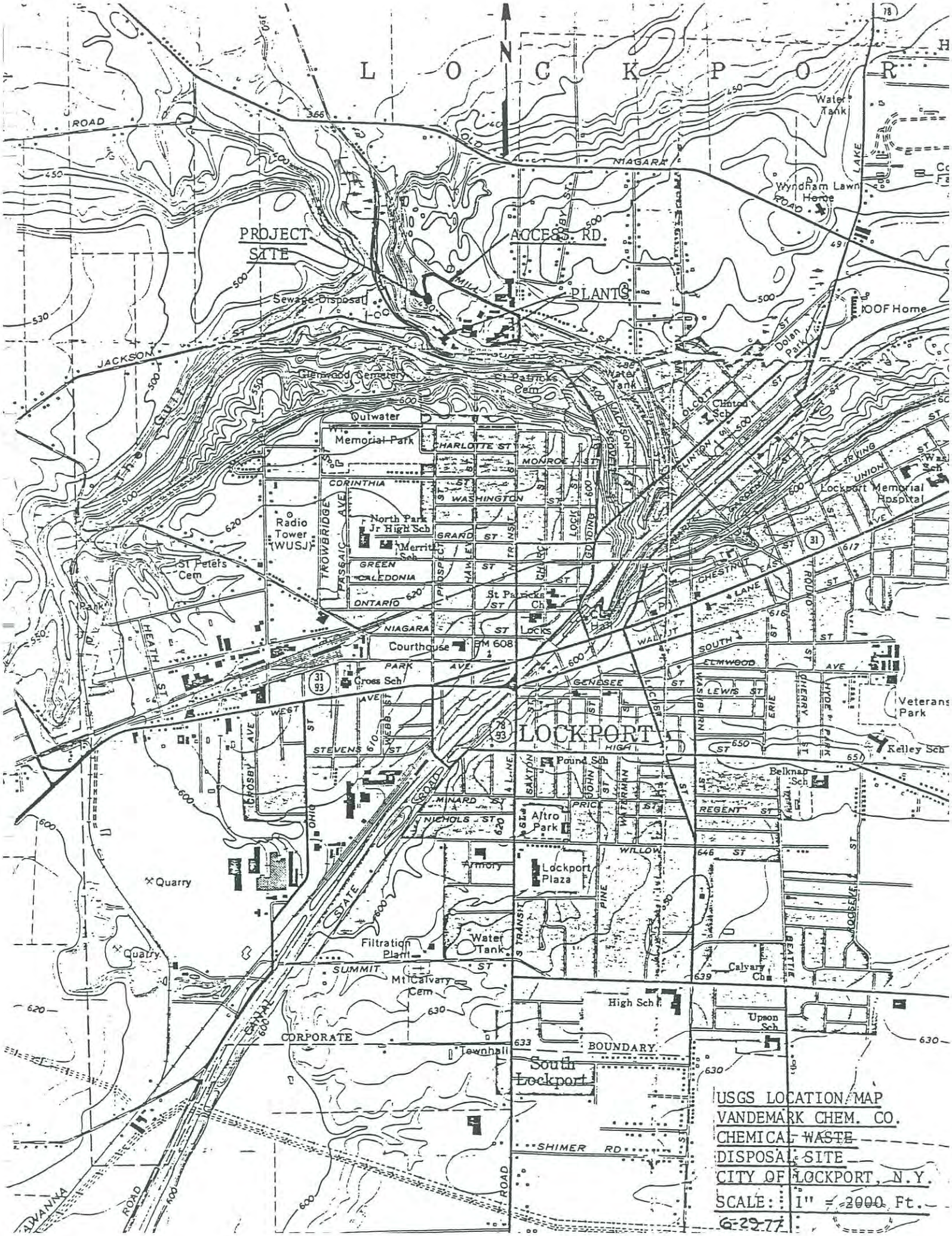
pated construction starting and completion dates		20. Estimated Population Served	
om	To	Current	Design
July, 1977	October, 1977	N/A	N/A
ted Cost		22. Estimated Daily Tonnages of Solid Waste	
tial	Annual	Current	Design
$10,000-$20,000	$5000	0.625 Tons/Day	300 Tons/Year
ling Hours per Day		24. Are attached plans and specifications in substantial conformance with "Content Guidelines for Plans and Specifications"? ☒ Yes ☐ No	
aste Deliveries on Weekly Basis			

IFICATION:

undersigned does hereby certify that the information in this application and in other attached statements and exhibits is true, correct and complete to th of his knowledge and belief.

June 29, 1977
Date

VAN DE MARK CHEMICAL CO., INC.
Allan B. Van De Mark — Signature and Title — Secretary



USGS LOCATION MAP
VANDEMARK CHEM. CO.
CHEMICAL WASTE
DISPOSAL SITE
CITY OF LOCKPORT, N.Y.
SCALE: 1" = 2000 Ft.
6-29-77

WILLIAM W. WHITMORE III, P.E. P.C.
WILLIAM W. WHITMORE III, P.E.
HAL G. ROGERS, P. E.

CONSULTING ENGINEERS

CIVIL
STRUCTURAL
MECHANICAL
ELECTRICAL

MEMBER

INDUSTRIAL . COMMERCIAL . MUNICIPAL . INSTITUTIONAL 50 WEST GENESEE STREET P.O. DRAWER J, . LOCKPORT, N. Y. 14094 . 716 . 434-0242

June 29, 1977

New York State Department of Environmental Conservation
Region 9 Environmental Quality Office
584 Delaware Avenue
Buffalo, New York 14202

ATTENTION: Mr. John McMahan P.E.
Mr. Paul Foersch P.E.

RE: Van De Mark Chemical Company, Inc., File No. 76-37

SUBJECT: Transmittal of Engineering Report for Solid Waste Disposal Site

Gentlemen:

At the request of Van De Mark Chemical Company, Inc., we have prepared the following Engineering report for application and approval for the use of an existing site on their property in Lockport for the disposal of chemical waste from the plant. This application is made on the basis of the requirements of NYCRR Part 360 of Title 6 of Official Compilation of Codes, Rules and Regula- of the State of New York, Environmental Conservation Laws Section 27-0501.

The following information is submitted on the basis of the Tentative Check List for Sanitary Landfill Design Submissions, New York State Department Environmental Conservation, Division of Solid Waste Management, dated 1973 as a guide. This report consists of the following items;

Item 1 - General description of the site and surrounding area, identification of the waste, method of handling to the site, expected life to the site, operating period, record of dumping, site access and final site use.
Item 2 - Transmittal of scale aerial photograph, VDM-1965, showing location of the site in the City of Lockport and relative to adjacent developed properties and the chemical plant.
Item 3 - Transmittal of the topographic maps of the disposal area and surrounding land areas with location of soil borings, existing elevations and proposed elevations, outline of site and surface drainage.
Item 4 - Transmittal VDM-1967, disposal site cross section showing existing ground elevations and proposed changes, details of method of filling proposed.
Item 5 - Transmittal of Empire Soils Investigations, Inc. Site Investigation report No. 77-BD-21 dated June, 1977 with subsurface logs, soils analysis-chemical tests.
Item 6 - Transmittal of reports from the consulting biologist, Dr. Robert Sweeney, Director, Great Lakes Laboratory, Buffalo, New York, as follows:

a. Chemical report describing water quality of the stream and ground water during the several test periods of the investigation.
b. Vegetative-landscaping report of the site with recommendations for site management.
c. Discussion of the adaptability of this site for the proposed solid waste disposal of the chemical waste without major impact on the aquatic or terrestrial environment of the area and/or ground water. This includes a detailed proposal for design of the disposal area, operational program and site for optimum use of the site while maintaining protection to the environment.

Based on the conclusion of the soil, chemical, biological and environmental investigations, we feel that the site is suitable for its intended use and therefore request immediate approval of application and proposed operation/management plan as presented.

Should additional investigations or data be required, including changes in the method of operation, or details of site preparation be required for final approval, we will prepare them immediately and submit for further discussion and approval. Please advise if you will require further conference on this matter.

Respectfully submitted,

William W. Whitmore III, P.E.P.C.
Consulting Engineers, for
Van De Mark Chemical Company, Inc.

Enclosures: Descriptions, reports, photographs, applications, Application Form SW-7
cc: Van De Mark Chemical Company, Inc.
Mr. Ernest Gedeon, Niagara County Health Department

June 29, 1977
PROJECT: Solid Waste Disposal Site
OWNER: Van De Mark Chemical Company, Inc.
1 North Transit Road, Lockport, New York 14094
SUBJECT: General Information and Site Details

A. GENERAL

1. Location: The existing solid waste disposal site which will be reused for this project, is west of the existing Van De Mark Chemical Company, Inc. Plant in an unpopulated area, partially wooded and formerly the sandstone, limestone open pit quarry of approximately 2.10 plus or minus acres. The site is in the northwest section of the City of Lockport in an industrial zoned area in the City Limits. Access is gained from a controlled section of Mill Street and private road to the site. The portion of Mill Street to be used for access is closed to the general public by a locked gate approximately one thousand feet west of the intersection of Mill and North Transit Road. It is located on an escarpment area bounded on the south and west sides by Eighteen Mile Creek. Elevation of the Creek of 359 is considerably lower than the bottom elevation of the proposed dump site of approximately 438 plus or minus USGS. There are no residential dwellings within approximately fifteen hundred feet of this site. The City of Lockport Waste Treatment Plant is approximately five hundred feet west of the site at elevation 362 plus or minus USGS.-- McGonigle & Hilger Roofing, Inc. warehouse and office east of the site at elevation 474 plus or minus.& Norton Laboratories Manufacturing Plant is approximately thirteen hundred feet due east of the disposal site at elevation 475 plus or minus. Van De Mark Chemical Corporation Plant on Eighteen Mile Creek is approximately five hundred feet southeast of the site and the chlorine plant is approximately fifteen hundred feet east of the site. New York State Electric and Gas Corporation Sub-station is four hundred feet north of the plant and the remaining property between Mill Street and Old Niagara Road is vacant wooded property owned by C.B. Whitmore Company, Inc. There are no water, sanitary or power facilities immediately available to the disposal site.

2. Waste materials for disposal: Van De Mark Chemical Company intends to dispose of approximately fifty to sixty steel drums of waste (375 cu.ft) plus or minus per month. The material consists of thirty to seventy per cent Hexachlorodisiloxane, ten to fifty per cent Silicon Tetrachloride, and five to thirty per cent Carbon and Silicon Carbide. The Hexachlorodisiloxane and Silicon Tetrachloride decompose into sand (Silicon Dioxide) and Hydrochloric Acid. Carbon and Silicon Carbide remain unchanged. With Limestone soil the resultant product from the interaction of the above chemicals decomposition is instant with water. If residue is buried in drums the owner reports that in four to eight months, the only visible remains are part of the drums rings used to seal the open head drum tops. Their experience indicates that eventually the entire mass will become a sand pile with some salt content. The material is to be hauled in the steel drums from the plant in the bucket of a rubber tired highlift to minimize possibility of accidental dropping of the drums or opening during handling. This method has proven to be the best and safest of several methods previously tried by the owner. No treatment before packaging in the steel drums with sealed tops is contemplated prior to burial.

3. The Plant Superintendant delegates the use of the waste disposal site, the handling of the material and delivery to the site, and the onsite excavation, burial and covering to a plant foreman who will carry out the management and submit the necessary monitoring report.

4. Expected Life of the Site: The expected volume per year of waste to be disposed of is between one hundred sixty-seven and two hundred cubic yards in volume based on a three foot depth of burial over eighty per cent of the land area of the site; it is expected that the capacity is sufficient for between thirty and forty years of burial at the average rate. This is deemed sufficient for present requirements.

5. Lands and Rights-of-way: The Van De Mark Chemical Company owns in excess of fifty acres on this site which is presently unsuitable for development due to the ground conditions of rock, the lack of public utilities and the general topography of the site. The land area adjacent to Mill Street access (the City street right-of-way) is presently unsuitable for residential development and might, in the foreseeable future, be adaptable to use for light industrial development on this fifty-eight plus or minus acres. By mutual consent of the land owners abutting Mill Street in this area, a control gate has been placed at each end of Mill Street and is controlled by those property owners to prevent access by the general public. This is monitored by Van De Mark Chemical on a regular basis.

6. Final Site Use: From the Environmental and Soils Reports, Chemical Analysis of the waste and rate of decomposition to a sandy consistency and mixed with rock cover, it can be assumed that at some future date the site could generally be used for industrial development. Since the area involved is approximately five per cent of the entire land owned by the Chemical Company, it would not create a difficult situation for further industiral development. There appears to be no reason to expect a major environmental problem from the site use in the future.

B. SITE DESCRIPTION

1. Location, size and topography is covered in the general description.

2. Topography varies from a relatively low slope of approximately .25 % to a steep slope along the south and west escarpment of 50% plus or minus slopes. Drainage generally follows existing swales and ditches running from Mill Street south and westerly to the edge of the escarpment and then into Eighteen Mile Creek in irregular pattern.

3. Cover Vegetation: The general area surrounding the site has been recently levelled by bulldozing rock and clay with removal of all vegetation, trees and shrubs. The bank of the escarpment immediately opposite the site is barren of trees but is covered with hardy shrubs and other vegetation with rock outcroppings. The area west and south and northwest of the disposal site is partially wooded area with undergrowth and vegetation, rock outcroppings.

4. Soil Profiles: Reference is made to the attached Empire Soils Investi-

tion Incorporated Site Investigation Report dated June, 1977, describing the soils profile based on four borings from cased monitoring wells and two additional borings to confirm depth to rock and overlying soil consistencies. In general, red-brown silt sand, gravel, rock fragments some vegetation and organic roots, traces of gray clay and sand make up the overburden of the rock cover varying from approximately five to seven feet in the areas not previously used for burial. Depth to ground water at time of drilling varied from five to ninety feet and has been observed to rise in the shaft to approximately the twenty-four foot level.

5. Bedrock type and depth: The top of gray sandstone and/or shale from surface varies from five to thirteen feet plus or minus and continues to the bottom of the ninety foot drill holes with five to ten per cent seams based on recoveries. Chemical tests were made as presented in the soils analysis of the Empire Soils Report for pH, nitrogen-nitrates, phosphorus, chlorides, and phenols. The pH range of 7.85 to 8.45 would indicate a generally neutral soil and rock characteristic.

6. Surface Waters: Surface water running across the easterly and northerly portions of the site from under Mill Street are spring fed and are channelled under the access road through culverts to open ditches for final disposal over the escarpment to Eighteen Mile Creek. There is an existing clay and rock lined drainage ditch around the east and north perimeter of the disposal site carrying surface water from the higher elevations east of the site to a discharge point on the escarpment to Eighteen Mile Creek. Generally the runoff and drainage conditions are excellent for surface water. Eighteen Mile Creek, at an elevation of approximately sixty to eighty feet below the top of the escarpment and site area provide the major drainage outlet for the area.

7. Availability of Cover Material: Based on the proposed trenching method of disposal in the site, there is sufficient material available for covering the waste with the excess material to be discarded in adjacent land areas for grading purposes.

8. Quality of the surface and ground water has been established in the biological chemical testing report attached to this report and is being monitored to assess any effects from surface drainage through the waste material to the ground water below the disposal area.

C. DESIGN SPECIFICATIONS

1. Site Preparation: The existing site will be graded to the contours shown in the cross section using existing , preparing the surrounding three sides of the site with the same clay material to contain surface water with general grading to allow drainage to the center of the waste site. The existing drainage ditches on the north and east side of the site will be approved adjacent to the dikes to assure that all surface water will be carried around the site and discharged to the Creek without contamination from the surface waste on the site.

2. Equipment: The owner has contracted for the use of bulldozer equipment, trench excavating equipment and transportation equipment to maintain the site in proper physical condition and to deliver, bury

and cover the waste as proposed in the Operation/Management Plan attached.

3. Landscaping: The report on vegetation- landscaping attached, describes in detail the type of vegetation and planting required to maintain the site in proper conditions and to add to the transpiration of surface water accumulating in the waste area. In addition, the root system will be developed which will be reduce erosion and which can allow for temporary removal of the hardy planning during trenching and burial operations and replanting over the backfilled areas to maintain continuous cover.

4. Roads and Fencing: The security of the site is generally assured by the control gate on Mill Street and access by responsible persons under direction of the property owner. Should a fence be required, a chain-link fence with barbed wire and padlock gates would be installed on the high escarpment areas surrounding the northwest, north and east sides of the site to over the edge of the embankment. The fence on the embankment is not deemed necessary because of the excessive slope.

D. OPERATING PROCEDURES

1. The recommendations of the biologist and the consultant for vegetation-landscaping contained in the attached report will be augmented by the owner in the operation of the waste site. Areas previously used for dumping in which complete disintegration of the chemical waste has occurred will be regraded to the inside of the site to allow maximum possible area for future use. Top elevation will be approximately equal to the top of the dike elevation. The new bottom level of the remaining portions of the waste site will be regraded to allow drainage generally toward the center of the site using existing overburden materials. It would be expected that the filling would be started in the south and southeast sections of the dike area trenching in a generally east-west direction, covering and grading approximately equal to the top of the dike, sloped toward the center of the site. Side embankments would be held to a compacted one on one excess cover material would be removed from the site. Access road would then be continuous from Mill Street into the entrance of the prepared area to the south end of the area proceeding northerly as it is filled.

2. Road Maintenance and Placement of Wastes: The roadway, presently existing on solid clay-rock formations is graded with pressed stone, crowned for drainage to the sides and is easily maintained in wet weather. Little difficulty will be experienced in maintaining machines and truck access to the site on the existing road.

3. Compaction and Cover Material Management: Compaction of the backfill will be accomplished with the backhoe-bulldozer grading equipment sufficient to allow moisture runoff as planned. The specified vegetation and planting will be placed on the entire site and dike areas immediately following completion of the grading and prior to use for burying the waste. As waste is buried this cover material will be

temporarily removed, the material placed in trenches, compacted and graded and the vegetation replanted over the newly disturbed areas.

4. Leachate Control and Rodent Control: Monitoring wells surrounding the site are properly protected and will be periodically observed, test samples taken and necessary chemical tests made and reported in accordance with the proposed Management Plan. There is no danger of infestations of rodents due to the nature of the waste and lack of organic materials.

5. Winter Operations: Winter Operations will be carried on at a normal rate during periods of access to the site with snowplowing. However, temporary storage of the waste material in drums can be accomplished at the chemical plant without hazard until access to the site is assured and ground conditions are satisfactory for excavation and backfilling.

6. Fire and Dust Control: Fire control is not a needed item on the site due to lack of burnable materials placed in the waste disposal site. Dust control is not considered to be an item after the proper establishment of the plantings and ground cover. Road dust on access roads is not to be considered a disturbing influence on the adjacent uninhabited property.

7. Monitoring Program: A monitoring program will be established in accordance with the recommendations of the biologists as contained in the attached report with necessary chemical testing being accomplished by the Van De Mark Chemical Chemist. Outside chemical tests to verify results will be made as requested.
8. Sign requirements: Required danger, warning and no admittance signs will be placed at the control gates and at the access to the site on all sides in accordance with the State requirements.

9. Emergency and Safety Equipment: Machine operators and disposal site supervisory personnel will be equiped with safety helmets, eye and nose protection and safety breathing apparatus in the event of release of toxic acid fumes during burial operations. Normal care in handling and burial of the waste in the past was found to minimize any hazard from this source.

E. CONCLUSIONS:

Based on the results of soil and subsurface investigations, chemical testing of surface, subsurface and ground-water, biological and environmental analysis of the effects of the waste disposal on the surrounding area, it is felt that the proposed method of disposal will result in a safe and a sanitary and acceptable program. Monitoring wells with the required reporting and investigation will assure continuous control of unstable factors and allow for corrective measures to be taken immediately. Cooperation of the owner and his determination to follow the guidelines, modified from time to time as necessary to maintain the proposed condition, should assure a proper acceptable management program. Any change in the characteristics, volume or method of handling would obviously require rein-

vestigations and analysis to assure continual conformance to the approved method.

LIST OF ATTACHMENTS

1. Empire Soils Investigations, Inc.
   Soils Analysis and Report No. 77-BD-21 Pages 1-3
   June 1977

   Soils Analysis
   Boring Logs B-1 - B-6

2. Site Photographs, April 1977 1-15

3. Water Quality Investigations of the
   Proposed Van De Mark Chemical Company
   Landfill Site, Lockport, New York
   June, 1977 - Great Lakes Laboratory,
   Doctor Robert Sweeney

4. Preliminary Floristic Survey of
   Lockport Stone Quarry - Van De Mark
   Chemical Company, Inc. Waste Disposal
   Site, Lockport, New York, and
   Recommendations concerning Landscaping,
   Reseeding and Maintenance - Great Lakes
   Laboratory, Doctor Eric Randall

5. Comments Regarding the Design and
   Management of the Proposed Van De Mark
   Chemical Company, Inc. Industrial Solid
   Waste Landfill Site, Lockport, New York,
   June, 1977 - Doctor Robert B. Sweeney,
   Director, Great Lakes Laboratory.

6. List of Drawings:
   USGS Location Map - Scale 1" = 2000 Ft., Lockport, N. Y.
   VDM-1965 Aerial Location Map - Aerial Photograph:
   Scale 1" = 200 Ft.
   VDM-1966 Site Location Map and Disposal Site Layout:
   Topograph Map Scale 1" = 50 Ft., 2 Ft. contours
   VDM-1967 Disposal Site Cross Sections and Details,
   Construction Notes.

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SITE INVESTIGATION REPORT
LOCKPORT STONE QUARRY
LOCKPORT, NEW YORK

FOR
W. W. WHITMORE III
LOCKPORT, NEW YORK

JOB NO.: 77-BD-21
JUNE 1977

SITE INVESTIGATION REPORT
LOCKPORT STONE QUARRY
LOCKPORT, NEW YORK

I. INTRODUCTION

This report presents the results of a subsurface investigation performed at the Van DeMark Chemical Co., Inc. Disposal Site at the Lockport Stone Quarry, authorized by Mr. William Whitmore III, who is representing Van DeMark.

The field work was performed between April 27 and May 10, 1977. A total of six (6) test borings were advanced at locations designated by Mr. Whitmore at the site.

All borings were advanced by employing two and one-half inch (2½") diameter hollow stem auger flight casing. Representative samples of the overburden were obtained by driving a two inch (2") O. D. split spoon sampler into the undisturbed soil beneath the casing with a one-hundred forty (140) pound slide weight free falling thirty inches (30") per blow.* Standard sampling techniques were employed obtaining samples at five foot intervals with random extra samples being obtained wherever necessary.

Rock was investigated at four of the six boring locations by means of a "B" size diamond bit rotary drill.

The test borings varied in depth from 6.7 feet at boring 6 to 90 feet at borings 3 and 4.

*This operation is the Standard Penetration Test and is described in greater detail in ASTM D-1586 "Standard Method for Penetration Test and Split Barrel Sampling of Soils". The sampling spoon used permitted a 24 inch long sampling run. Where 24 inch sampling run was used, the Standard Penetration Number (SPN), as defined in the Standard, was obtained by combining the blow counts for the second and third 6 inch increment of each sample run. The values are shown as the "N" value on the attached logs.

I. INTRODUCTION - Continued

The soil and rock samples retrieved were carefully transported to our laboratory where they were visually classified by an engineering geologist. Attached to this report are the subsurface logs which were prepared for each boring completed during the investigation, with reference to the drillers' logs. These logs comprise the basic records of the work performed, as well as the materials encountered.

At the request of Mr. Whitmore, soil samples retrieved from borings 5 and 6 were subjected to various chemical tests, the results of which are appended to this report.

We have also included our "GENERAL INFORMATION AND KEY TO SUBSURFACE LOGS" as a supplement to this report for an explanation of the terms, symbols and definitions which we utilized in our visual clasifications.

II. SUBSURFACE CONDITIONS

In general, the site is an abandoned stone quarry which is presently being used as a chemical waste disposal by Van DeMark Chemical Co., Inc.

The site is covered with a thin layer or crust of overburden soil consisting of reddish-brown silts and sand, with varying amounts of gravel, rock fragments and organic inclusions located within the actual detailed soil matrix. The soil existed in a dry to moist-firm to very compact condition. The depth of the overburden soils ranged from 5.0 feet at boring B-1 to 13.0 feet at boring B-3. The permeability of these materials is rather low due to the extreme compactness of the soil. In order to determine an accurate groundwater elevation on the site, close monitoring of the wellpoints should be performed. During drilling operations, freewater was encountered at only two of the borings, which does not indicate enough in-

II. SUBSURFACE CONDITIONS - Continued

formation to estimate groundwater.

Bedrock was investigated at the locations of B-1 and B-2 to a depth 23.0 feet and at B-3 and B-4 to a depth 90.0 feet. The rock retrieved varied distinctly at various depths within each boring. Weathering and seams were prominent in all of the borings, the seams occurring at greater depths at deep core locations. Based on the quality of the rock, primarily considering the extent of the seams and the amount of water loss during drilling, the rock formation could act as an aquifer for groundwater.

A very detailed description of soil and rock conditions is provided on the attached subsurface logs for your review.

If you have any further questions on subsoil conditions, or if we can help you in any way, please feel free to contact our office.

Respectfully submitted,

EMPIRE SOILS INVESTIGATIONS, INC.

Stanley J. Blas Jr.

Stanley J. Blas, Jr.
Resident Engineer

SJB/ja

Enclosure

SOILS ANALYSIS

CHEMICAL TESTS

	B-5	B-6
pH	8.45	7.85
Nitrogen - Nitrate	.4 Mil./Liter	.27 Mil./Liter
Phosphorous	.1 Mil./Liter	.08 Mil./Liter
Chloride	2.8 Mil./Liter	3.4 Mil./Liter
Phenols	1 part/Billion (Micro/Liter)	1 Part/Billion (Micro/Liter)

DATE
STARTED 5/2/77
FINISHED 5/2/77
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-1
SURF. ELEV. 437.7±
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	17	29	35	64		Red-brown SILT, SAND, GRAVEL, with ROCK fragments, trace embedded roots (Moist - Very Compact)	NOTE #1: No freewater at completion
5		2	100/.2					Top of Rock @ 5.0'	
								Grey SANDSTONE, hard, sound	"B" size core Run #1, 5'-7' 60% Recovery
								Green massive SHALE, soft, weathered with very weathered seams at 9.7', 13.0'-13.5'	Run #2, 7'-12' 90% Recovery
10									Run #3, 12'-17' 90% Recovery
15									Run #4, 17'-22' 90% Recovery
20									
								Bottom of Hole @ 22.0'	NOTE #2: Observation well installed to 22.0' @ this location
25									
30									
35									
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive ____ "casing ____ "with ____ lb. weight falling ____ "per blow.

CLASSIFICATION Visual By Soils Engineer

DATE
STARTED 5/4/77
FINISHED 5/4/77
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-2
SURF. ELEV. 441.7 ±
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0									
		1	17	25	30	55		Reddish-brown SILT, little sand and gravel (Dry - Very Compact)	NOTE #1: On completion free-water @ 2.0'
5		2	17	35	48	83		-grades SILT and SAND, some embedded Gravel, with embedded grey Rock fragments (Moist - Very Compact)	Top of Rock @ 8.0'
								Green massive SHALE, soft, slightly weathered and slightly fractured	"B" size core Run #1, 8'-13' 94% Recovery
10			-	-					
									Run #2, 13'-18' 96% Recovery
15									
									Run #3, 18'-23' 84% Recovery
20									
								Bottom of Hole @ 23.0'	NOTE #2: Wellpoint installed at this location to depth of 23.0'
25									
30									
35									
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.

CLASSIFICATION Visual By Soils Engineer

DATE
STARTED
FINISHED
SHEET 1 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-3
SURF. ELEV. 442.2±
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	7	8	9	17		Reddish-grey SILT and weathered ROCK (Dry - Firm)	NOTE: Groundwater observation well installed to bottom of hole at this location
5		2	100/.4					Reddish-brown FILL, SAND, SILT, GRAVEL, with trace gypsum, with trace cemented condition (Moist - Very Compact)	
10		3	100/.2						
		4	100/.2						Top of Rock @ 13.0'
								Grey SANDSTONE, hard, sound	"B" size core
15								Green massive SHALE, soft, weathered with some fractures	Run #1, 13'-18' 90% Recovery Seam 16.4'-16.8'
20									Run #2, 18'-23' 86% Recovery Seams 18.8'-19.1' 21.0'-21.4'
25								Extremely fractured and weathered seam 24.2'-24.7'	Run #3, 23'-28' 92% Recovery Seams 24.2'-24.4' 27.2'-27.3'
30								Grey SANDSTONE, hard, sound, slightly fractured	Run #4, 28'-33' 92% Recovery Seam 28.2'-28.4'
35									Run #5, 33'-38' 100% Recovery
40									Run #6, 38'-43'

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive ____ "casing ____ "with ____ lb. weight falling ____ "per blow.

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Soils Engineer

Cased Borings: Casing Drilled In Place

DATE
STARTED
FINISHED
SHEET 2 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-3
SURF. ELEV.
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER (C/6 / 6/12 / 12/18- / N)	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
40					Red SHALE, soft, weathered with extremely weathered seams at 41.1', 42.2', 43.6'-47', 53', 59.6'-60.4', 65.5'-66.5', 68.7', 72.7'	96% Recovery Seam 42.0'-42.2'
						Run #7, 43'-48' 76% Recovery
50						Run #8, 48'-53' 92% Recovery Seam 52.4'-52.7'
55						Run #9, 53'-58' 90% Recovery Seam 55.8'-56.1'
60						Run #10, 58'-63' 94% Recovery
65						Run #11, 63'-68' 94% Recovery
70					-becomes slightly weathered @ 72.3'	Run #12, 68'-73' 94% Recovery
75						Run #13, 73'-78' 100% Recovery
80						Run #14, 78'-83'

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow

CLASSIFICATION Visual By
Soils Enginee

DATE
STARTED
FINISHED
SHEET 3 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-3
SURF. ELEV.
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
80									90% Recovery
85									Run #15, 83'-88' 96% Recovery
90									Run #16, 88'-90' 95% Recovery
								Bottom of Hole @ 90.0'	
95									
100									
105									
110									
115									
120									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive ____ "casing ____ "with ____ lb. weight falling ____ "per blow.

CLASSIFICATION Visual By Soils Engineer

DATE
STARTED 4/27/77
FINISHED 4/27/77
SHEET 1 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO B-4
SURF. ELEV 442.20
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0									NOTE: Casing @ 9', no free-water
		1	17	18	19	37		Reddish-brown organic SILT, trace sand and embedded gravel, with embedded roots and organic material (Damp - Compact)	Boring completed, freewater @ 25'
5		2	21	44	60	104		-grades reddish-brown SILT, little sand, trace fragments, with partings of grey sand (Dry - Very Compact)	Water observation well installed to 90'
		3	100/0					Grey SANDSTONE, hard, sound	"B" size core
10								Green massive SHALE, soft, fractured and weathered	Run #1, 9'-14' 66% Recovery
15									Run #2, 14'-19' 88% Recovery
20								SANDSTONE seam at 20.8'-21.1'	Run #3, 19'-24' 98% Recovery
								Grey SANDSTONE, hard, sound, slightly fractured	
25								Green SHALE seam 24.7'-25.4'	Run #4, 24'-29' 100% Recovery
30								Weathered seam 29.8'-30.3'	Run #5, 29'-34' 92% Recovery
35								Green SHALE, massive, soft, weathered Becomes red and very weathered at 35.3'	Run #6, 34'-39' 50% Recovery Lost all drill water
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive "casing "with lb. weight falling "per blow.

CLASSIFICATION Visual By Soils Engineer

DATE
STARTED 4/27/77
FINISHED 4/27/77
SHEET 2 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO B-4
SURF. ELEV
G. W. DEPTH

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
40									Run #7, 39'-44' 68% Recovery
45								Green seam 46'-46.2'	Run #8, 44'-49' 78% Recovery
50								Green seams 51'-51.4', 52.5'-52.7', 53.1'-53.8', 60.5'-60.7', 75.1'-75.3'	Run #9, 49'-54' 100% Recovery
55									Run #10, 54'-59' 96% Recovery
60								-becomes slightly weathered @ 62' with weathered and fractured seams @ 71', 74.7', 77.7', 79', 79.5', 82', 86.6'	Run #11, 59'-64' 94% Recovery
65									Run #12, 64'-69' 100% Recovery
70									Run #13, 69'-74' 100% Recovery
75									Run #14, 74'-79' 100% Recovery
80									Run #15, 79'-84' 100% Recovery

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive ____ "casing ____ "with ____ lb. weight falling ____ "per blow.

CLASSIFICATION Visual By
Soils Engineer

DATE
STARTED 4/27/77
FINISHED 4/27/77
SHEET 3 OF 3

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-4
SURF. ELEV
G. W. DEPTH

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
80									Run #16, 84'-89' 100% Recovery
85									Run #17, 89'-90' 100% Recovery
90								Bottom of Hole @ 90.0'	
95									
100									
105									
110									
115									
120									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive ____ "casing ____ "with ____ lb. weight falling ____ "per blow

CLASSIFICATION Visual By
Soils Engineer

DATE
STARTED 5/4/77
FINISHED 5/4/77
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-5
SURF. ELEV. 443.0±
G. W. DEPTH See Note

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	17	19		54		Reddish-brown FILL, SAND, SILT, GRAVEL - large fragments blocking spoon sampler (Dry to Moist - Firm to Compact)	NOTE: No freewater encountered
			35	44					
		2	27	100/.4					
5		3	12	17		36			
			19	24					
		4	12	19		48		-grades with weathered ROCK	
			29	40					
		5	39	20					
			100/.3						
10								Bottom of Hole @ 9.3'	
15									
20									
25									
30									
35									
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.

CLASSIFICATION Visual By

DATE
STARTED 5/4/77
FINISHED 5/4/77
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

HOLE NO. B-6
SURF. ELEV. 412.0±
G. W. DEPTH See Notes

PROJECT Lockport Stone Quarry
LOCATION Lockport, New York

DEPTH-FT.	SAMPLES	SAMPLE NO.	BLOWS ON SAMPLER 0/6	6/12	12/18-	N	BLOW ON CASING C	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	15	22		57		Reddish-brown FILL, SAND, SILT, GRAVEL, with FRAGMENTS (Moist - Firm to Very Compact)	Upon completion, freewater @ 5.2'
			35	39					
		2	10	12		29			
			17	21					
5		3	12	18		39		-grades with some weathered ROCK	
			21	32					
		4	59	100/.4				Bottom of Hole @ 6.7'	
10									
15									
20									
25									
30									
35									
40									

N = No. blows to drive 2 "spoon 12 "with 140 lb. pin wt. falling 30 "per blow.
C = No. blows to drive _____ "casing _____ "with _____ lb. weight falling _____ "per blow.

CLASSIFICATION Visual By
Soils Enginee

GENERAL INFORMATION & KEY TO SUBSURFACE LOGS

The Subsurface Logs attached to this report present the observations and mechanical data collected by the driller while at the site, supplemented by classification of the materials removed from the borings as determined through visual identification by technicians in the laboratory. It is cautioned that the materials removed from the borings represent only a fraction of the total volume of the deposits at the site and may not necessarily be representative of the subsurface conditions between adjacent borings or between the sampled intervals. The data presented on the Subsurface Logs together with the recovered samples will provide a basis for evaluating the character of the subsurface conditions relative to the proposed construction. The evaluation must consider all the recorded details and their significance relative to each other. Often analyses of standard boring data indicate the need for additional testing and sampling procedures to more accurately evaluate the subsurface conditions. Any evalutions of the contents of this report and the recovered samples must be performed by Professionals having experience in Soil Mechanics and Foundation Engineering. The information presented in the following defines some of the procedures and terms used on the Subsurface Logs to describe the conditions encountered.

① The figures in the Depth column defines the scale of the Subsurface Log.

② The Sample column shows, graphically, the exact depth range from which a sample was recovered. See Table I for a description of the symbols used to signify the various types of samples

③ The Sample No. is used for identification on sample containers and/or Laboratory Test Reports.

④ Blows on Sampler – shows the results of the "Penetration Test", recording the number of blows required to drive a split spoon sampler into the soil beneath the casing. The number of blows required for each six inches penetration is recorded. The total number of blows required for the last 12 inches of penetration are summarized in the "N" column. The outside diameter of the sampler, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log.

⑤ Blows on Casing – shows the number of blows required to advance the casing a distance of 12 inches. The casing size, the hammer weight and the length of drop are noted at the bottom of the Subsurface Log. If the casing is advanced by means other than driving, the method of advancement will be indicated in the Notes column or under Method of Investigation at the bottom of the Subsurface Log.

⑥ All recovered soil samples are reviewed in the laboratory by technicians. The visual descriptions are made on basis of the sample as recovered and in accordance with the Unified Classification System. Guide Lines for the terms used in descriptions are presented in Tables II and III. The description of the relative soil compactness or consistency is based upon the penetration records as defined in Table IV. The description of the soil moisture is based upon the condition of the sample as recovered. The moisture condition is described as dry, damp, moist or wet. Water used to advance the boring may have affected the in-situ moisture content of the sample. Special terms are used as required to describe materials in greater detail; several such terms are listed in Table V. When sampling gravelly soils with a standard two-inch diameter split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter. The presence of boulders and large gravel is sometimes, but not necessarily, detected by an evaluation of the casing and sampler blows or through the "action" of the drill rig as reported by the driller.

⑦ The description of rock shown is based upon the recovered rock core. Terms frequently used in the description are included in Table VI.

⑧ Miscellaneous observation and procedures noted by the driller are shown in this column, including water level observations. It is important to realize that the reliability of the water level observations depend upon the soil type (water does not readily stabilize in a hole through fine grained soils), and that drill water used to advance the borings may have influenced the observations. The ground water level typically will fluctuate seasonally. One or more perched or trapped water levels may exist in the ground seasonally. All the available readings should be evaluated. If definite conclusions cannot be made, it is often prudent to examine the conditions more thoroughly through test pit excavations or water observation installations.

⑨ The length of core run is defined as length of penetration between retrievals of the core barrel from the bore hole, expressed in feet and tenths of feet. The core recovery expresses the length of core recovered from the core barrel per core run, in percent. The size core barrel used is also noted. The more commonly used sizes of core barrels are denoted "AX" and "NX". The "NX" core, being larger in diameter than "AX" core, often produces better recovery, and is frequently utilized where accurate information regarding the geologic conditions and engineering properties is needed. The "NX" core barrel requires the use of four inch diameter casing.

STARTED 5-1-70
FINISHED 5-1-70
SHEET 1 OF 1

EMPIRE SOILS INVESTIGATIONS, INC.

SUBSURFACE LOG

BORE NO. B-175
SURF. ELEV. 325.6
G. W. DEPTH See Note #1

PROJECT XXX LOCATION YYY

DEPTH-FT	SAMPLES	SAMPLE NO	BLOWS ON SAMPLER (6" / 6" / 12" / 12" IN. / N)	BLOW ON CASING C	CROSS SECTION	SOIL OR ROCK CLASSIFICATION	NOTES
0		1	2 2 3 5	10		TOPSOIL 3"	Note #1
				15		Brown SILT, some Sand, trace clay (Moist - Loose)	G.W. at 20' completion
				50/.5'			G.W. at 22' 24 hrs after completion
						Gray SHALE, medium hard weathered, thin bedded some fractures	Cored 2.5'-5.0', Run#1
5							95% Recovery
							AX Core

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

TABLE I

- Split Spoon Sample
- Shelby Tube Sample
- Auger or Pit Sample
- Rock Core

TABLE II

Identification of soil type is made on basis of an estimate of particle sizes, and in the case of fine grained soils also on basis of plasticity.

Soil Type	Soil Particle Size	
Boulder	> 12"	Coarse Grained (Granular)
Cobble	3" – 12"	
Gravel - Coarse	3" – 3/4"	
Gravel - Fine	3/4" – #4	
Sand - Coarse	#4 – #10	
Sand - Medium	#10 – #40	
Sand - Fine	#40 – #200	
Silt - Non Plastic (Granular)	< #200	Fine Grained
Clay - Plastic (Cohesive)	< #200	Fine Grained

TABLE III

The following terms are used in classifying soils consisting of mixtures of two or more soil types. The estimate is based on weight of total sample.

Term	Percent of Total Sample
"and"	35 – 50
"some"	20 – 35
"little"	10 – 20
"trace"	less than 10

(When sampling gravelly soils with a standard split spoon, the true percentage of gravel is often not recovered due to the relatively small sampler diameter.)

TABLE IV

The relative compactness or consistency is described in accord with the following terms.

Granular Soils		Cohesive Soils	
Term	Blows per Foot, N	Term	Blows per Foot, N
Loose	< 10	Very Soft	< 2
Firm	11 – 30	Soft	3 – 5
Compact	31 – 50	Medium	6 – 15
Very Compact	> 51	Stiff	16 – 25
		Hard	> 26

(Large particles in the soils will often significantly influence the blows per foot recorded during the Penetration Test.)

TABLE V

Varved –	Alternating layers, seams, and partings of soils.
Layer –	Soil deposit more than 6" thick.
Seam –	Soil deposit less than 6" thick.
Parting –	Soil deposit less than 1/8" thick.
Uniform –	All grains are of about the same diameter.

TABLE VI

Rock Classification Terms

Term		Meaning
Hardness	Soft	Scratched by fingernail
	Medium Hard	Scratched easily by penknife
	Hard	Scratched with difficulty by penknife
	Very Hard	Cannot be scratched by penknife
Weathering	Very Weathered	Judged from the relative amounts of disintegrating iron staining, core recovery, clay seams, etc
	Weathered	
	Sound	
Bedding	Laminated	Natural breaks in Rock Layers (< 1")
	Thin bedded	(1" – 4")
	Bedded	(4" – 12")
	Thick bedded	(12" – 36")
	Massive	(> 36")

(Fracturing refers to natural breaks in the rock oriented at some angle to the rock layers.)

APPENDIX B

BOREHOLE/WELL INSTALLATION LOGS

VDM 9, VDM 10, VDM 11, VDM 12

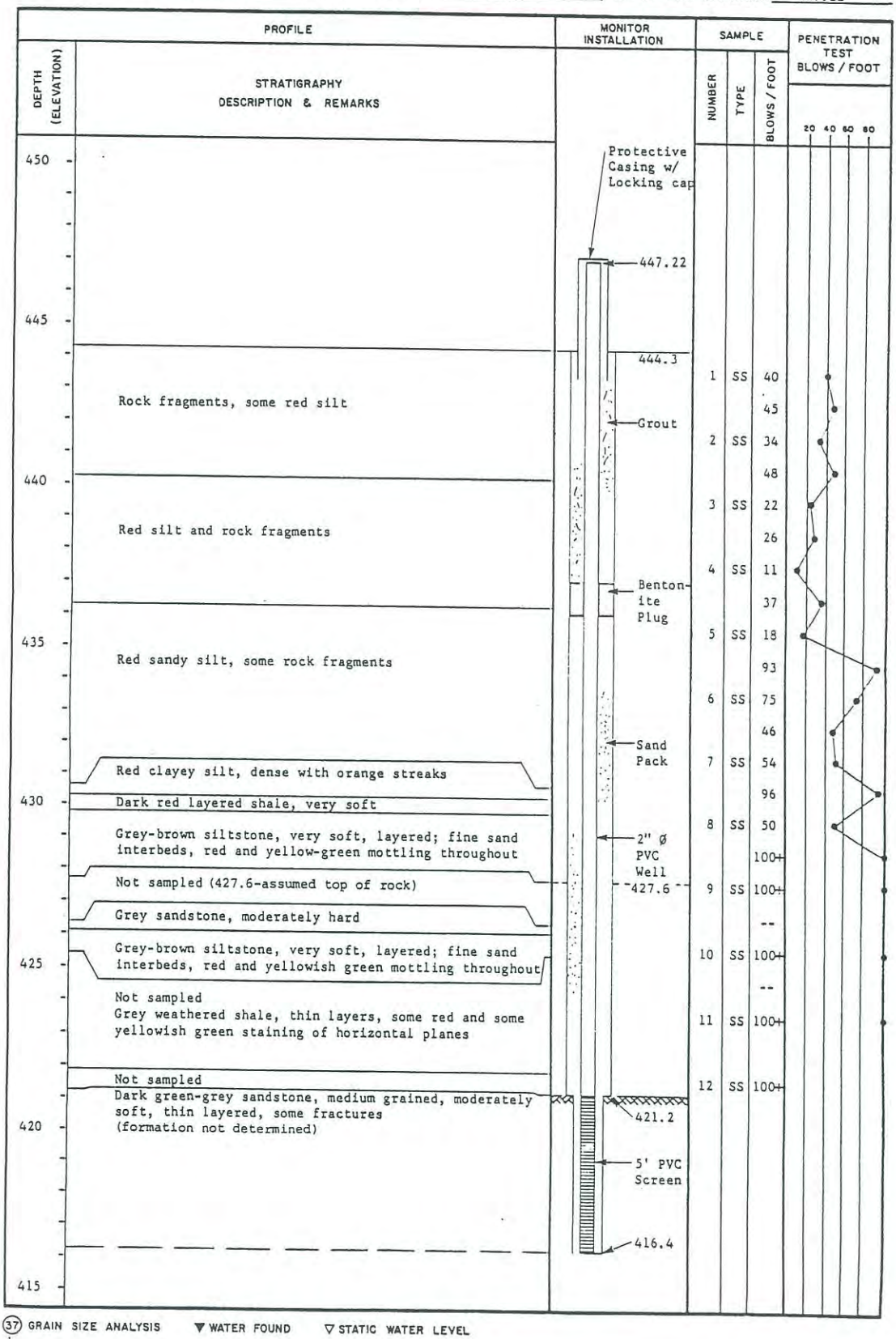
STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: VAN DE MARK LANDFILL SITE JOB NO.: 1277 HOLE NO.: VDM-9

CLIENT: VAN DE MARK CHEMICAL COMPANY DATE COMPLETED: DECEMBER 9, 1983

HOLE TYPE: 8" Ø HOLLOW STEM AUGER LOCATION: MID-SOUTHERN LIMIT OF LANDFILL

GEOLOGIST / ENGINEER: DAVE BLACK GROUND ELEVATION: 444.3 TOP OF PIPE ELEVATION: 447.22



(37) GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: VAN DE MARK LANDFILL SITE JOB NO.: 1277 HOLE NO.: VDM-10

CLIENT: VAN DE MARK CHEMICAL COMPANY DATE COMPLETED: DECEMBER 7, 1983

HOLE TYPE: 8" Ø HOLLOW STEM AUGER LOCATION: SOUTHWEST CORNER LANDFILL

GEOLOGIST / ENGINEER: DAVE BLACK GROUND ELEVATION: 442.6 TOP OF PIPE ELEVATION: 444.67

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
445		Protective Casing w/ Locking cap 444.67				
	Red clayey silt, some rock fragments, fine gravel, and root fibers	442.6	1	SS	25	
	Rock fragments				91	
440	Soft rock fragments, some red clayey silt, pebbles, trace root fibers		2	SS	100+	
					77	
			3	SS	28	
					28	
	No recovery	Grout	4	SS	36	
435					38	
	Rock fragments, some red clayey silty sand		5	SS	44	
					97	
	Dense grey siltstone, layered, greenish		6	SS	28	
	Auger refusal Light grey sandstone, medium grained	430.6			100+	
430	Grey interbedded shale and dolomite/limestone - fissile to thin bedded - highly fractured (vertical and horizontal) - hematitic staining on fractured faces					
	Increasing dolomite beds	Benton-ite Plug				
425						
	Grey dolomite/limestone, aphanitic - thin bedded, highly fractured - hematitic and MnO staining on fractures	Sand Pack				
420	Greenish grey to buff interbedded siltstone and sandstone, aphanitic to fine grained - thin to medium beds - frequent fractures along horizontal parting planes and some vertical fractures - some MnO staining - allochthonous sandstone fragments					
415	Grey shale, moderately soft interbedded with moderately hard buff sandstone	2" PVC				
	Buff sandstone moderately hard interbedded with grey moderately soft shale (thin beds)					

(37) GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: VAN DE MARK LANDFILL SITE JOB NO.: 1277 HOLE NO.: VDM-10 Pg 2 of 2

CLIENT: VAN DE MARK CHEMICAL COMPANY DATE COMPLETED: DECEMBER 7, 1983

HOLE TYPE: 8" Ø HOLLOW STEM AUGER LOCATION: SOUTHWEST CORNER OF LANDFILL

GEOLOGIST / ENGINEER: DAVE BLACK GROUND ELEVATION: 442.6 TOP OF PIPE ELEVATION: 444.67

PROFILE		MONITOR INSTALLATION	SAMPLE			PENETRATION TEST BLOWS / FOOT
DEPTH (ELEVATION)	STRATIGRAPHY DESCRIPTION & REMARKS		NUMBER	TYPE	BLOWS / FOOT	20 40 60 80
410	Buff sandstone moderately hard interbedded with grey moderately soft shale (thin beds)	2" PVC; Sand Pack				
405		5' PVC Screen				
	Buff sandstone moderately hard, massive					
	WHIRLPOOL-QUEENSTON interface (olive green) Red shale moderately soft - thin bedded - green shale interbed					
400		398.7				
		397.2				
395						

(37) GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

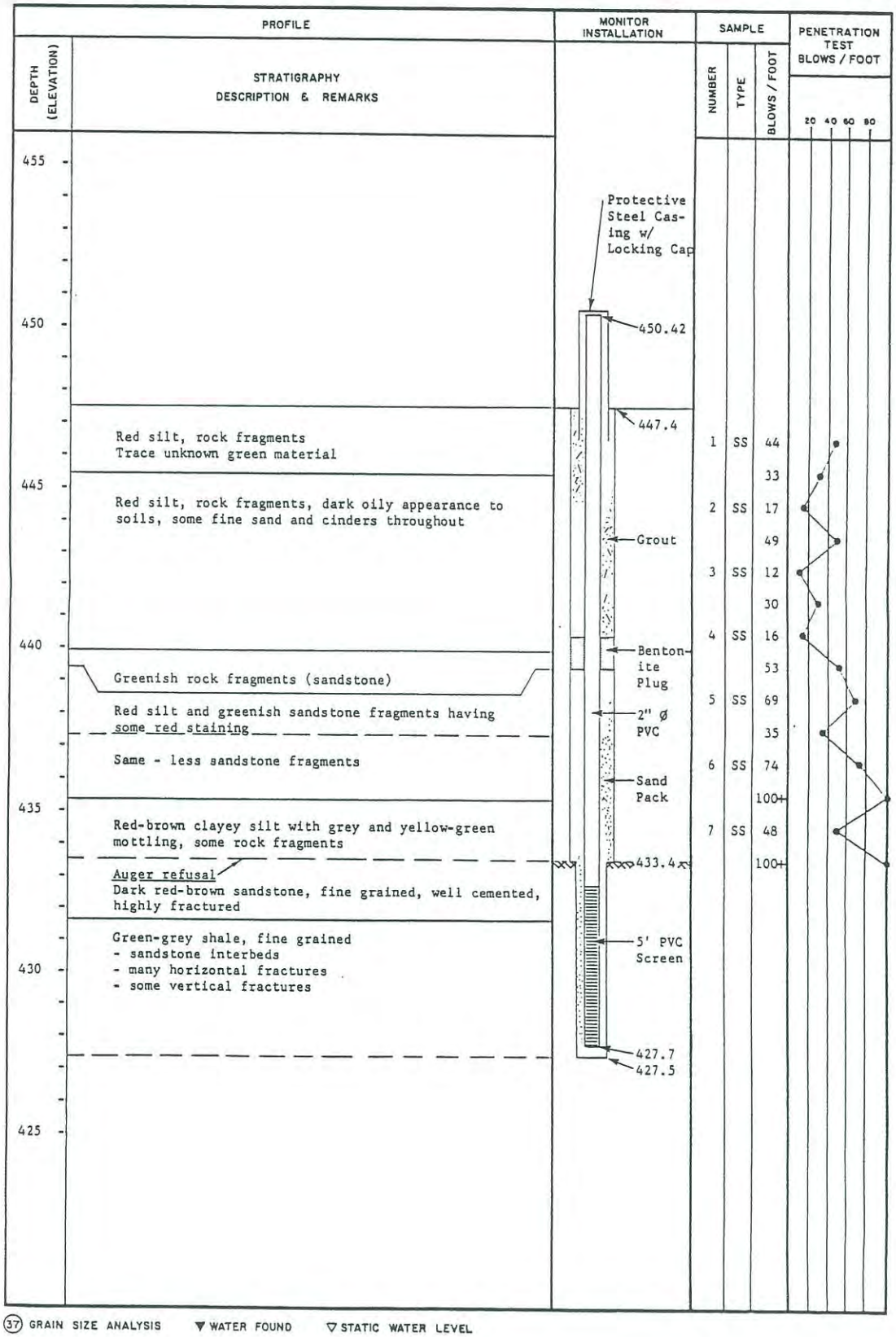
STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: VAN DE MARK LANDFILL SITE JOB NO.: 1277 HOLE NO.: VDM-11

CLIENT: VAN DE MARK CHEMICAL COMPANY DATE COMPLETED: DECEMBER 9, 1983

HOLE TYPE: 8" Ø HOLLOW STEM AUGER LOCATION: MID-WESTERN LIMIT OF LANDFILL

GEOLOGIST / ENGINEER: DAVE BLACK GROUND ELEVATION: 447.4 TOP OF PIPE ELEVATION: 450.42



(37) GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

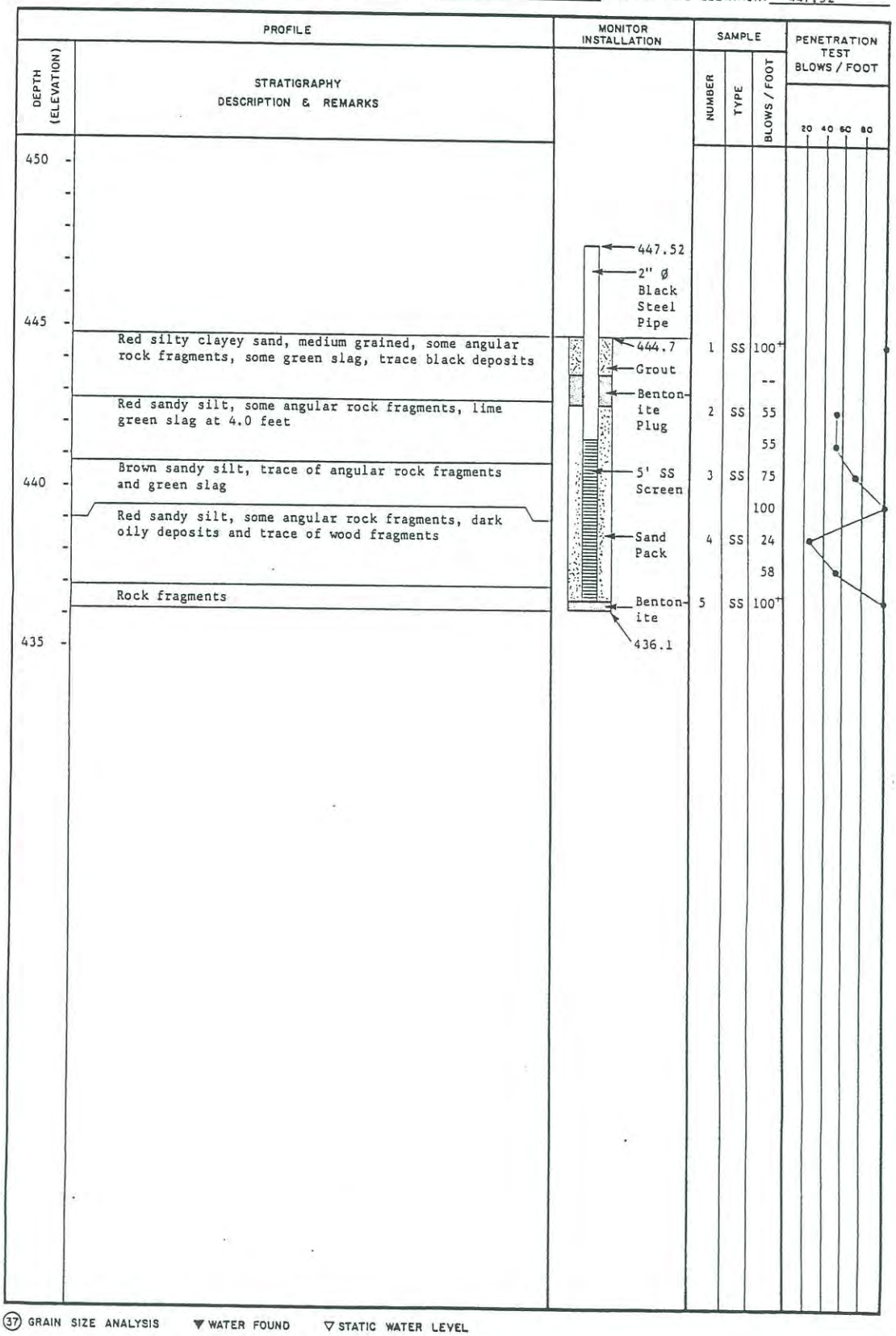
STRATIGRAPHIC AND INSTRUMENTATION LOG

PROJECT NAME: VAN DE MARK LANDFILL SITE JOB NO.: 1277 HOLE NO.: VDM-12

CLIENT: VAN DE MARK CHEMICAL COMPANY DATE COMPLETED: DECEMBER 2, 1983

HOLE TYPE: 8" Ø HOLLOW STEM AUGER LOCATION: CENTER OF EARLY LANDFILL AREA

GEOLOGIST / ENGINEER: DAVE BLACK GROUND ELEVATION: 444.7 TOP OF PIPE ELEVATION: 447.52



(37) GRAIN SIZE ANALYSIS ▼ WATER FOUND ▽ STATIC WATER LEVEL

APPENDIX C

HISTORICAL BORELOGS

Source: 'Somerset Railroad Project - Hydrogeologic Study Danielewicz Route Station 51 + 810 to 52 + 330',

February 1982, by

Bechtel Associates Professional Corporation

GROUND WATER OBSERVATION WELL REPORT

PROJECT Somerset Railroad - Van De Mark

LOCATION N1,160,756 E468,241

Date Completed 10/19/81 Original Depth 46.7 (cored)

Inspected By J. C. Isham Date 10/19/81

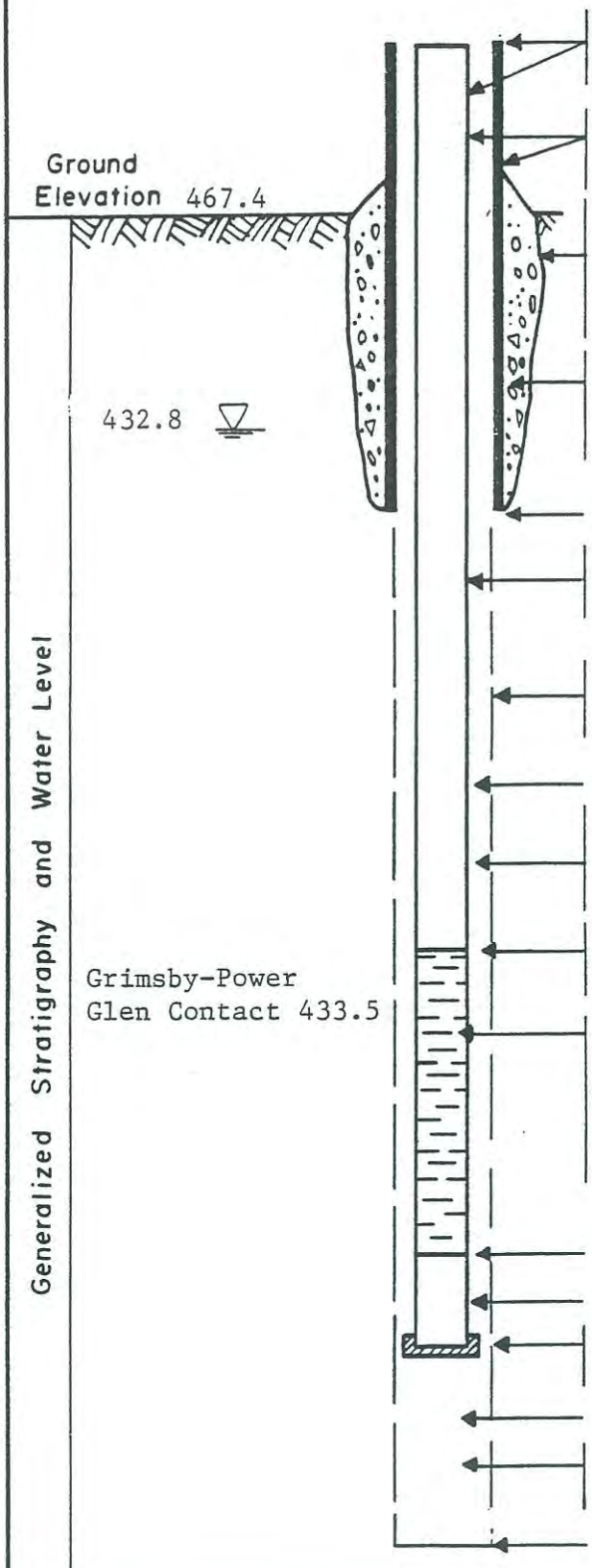
Checked By _____ Date _____

Page 7 of 23

Well No. D-55

Aquifer Grimsby-Power Glen Contact

Elev. Interval 420.7-439.4'



Elevation of top of surface casing / riser pipe.	469.36/469.36'
Heigth of top of surface casing / riser pipe above ground surface.	2.0/2.0'
Depth of surface seal below ground surface	3.0'
Type of surface seal: Cement	
I. D. of surface casing.	4"
Type of surface casing: Cast iron with lock cap	
Depth of surface casing below ground	3.0'
I. D. of riser pipe.	2"
Type of riser pipe: Sch 80 PVC	
Diameter of borehole	0.5'
Depth of borehole (reamed)	45.0'
Type of backfill: Cement	
Elev./depth top of seal.	442.3/25.1'
Type of seal: Bentonite	
Elev./depth bottom of seal.	439.4/28.0'
Type of sand pack. Q-02 (fine to med. sand)	
Depth of top of sand pack.	439.4/28.0'
Elev./depth top of screened section.	432.9/34.5'
Type of screened section: Sch 80 PVC	
Describe openings 0.010" machine slot - horizontal slot	
I.D. of screened section.	2.0"
Elev./depth bottom of screened section.	423.3/44.1'
Length of blank section.	0.9'
Elev./depth bottom of plugged blank section.	422.4/45.0'
Elev./depth bottom of sand column.	422.4/45.0'
Type of backfill below observation pipe. Cuttings	
Elev./depth of hole.	420.7/46.7'

BORING LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Somerset Railroad	14818	1 OF 2	D-55

SITE	COORDINATES	ANGLE FROM HORIZ.	BEARING
Van De Mark	N 1,160,756 E 468,241	90°	--

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	HOLE SIZE (INCHES)	OVERBURDEN (FT.)	ROCK (FT.)	TOTAL DEPTH (FT.)
10/14/81	10/16/81	J. Jensen/Empire	CME 55	NX	2.7	44	46.7

CORE RECOVERY (FT./%)	CORE BOXES	SAMPLES	EL. TOP OF CASING (FT.)	GROUND EL. (FT.)	DEPTH/EL. GROUND WATER (FT.)	DEPTH/EL. TOP OF ROCK (FT.)
42.4/96.4	3	2	469.36	467.4	34.6/432.8	2.7/464.7

SAMPLE HAMMER WEIGHT/FALL	CASING LEFT IN HOLE: DIA./LENGTH	LOGGED BY:
140#/30"	--	D. L. Middleton

SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N" / PERCENT CORE RECOVERY	PENETRATION BLOWS 1ST 6"	2ND 6"	3RD 6"	ELEVATION (FT.)	DEPTH-FT	UNIFIED SOIL CLASSIFICATION	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
							467.4					
SS	2	0.7	17	5	7	10				1	0'-2.7' Red-brown, fine to coarse, m. dense SAND, moist, trace organics, some fine gravel, some angular cobbles.	8" PVC surface casing cemented to a depth of 3 ft.
SS	0.7	0.1		100/.2	--	--	464.7			2	Red-brown to white, loose, moist, fine SAND, two angular cobbles.	
				RQD %						RUN 1	2.7'-31.9' GRIMSBY FM. Dk. red brown to pale green, med. hard to v. soft, fresh to highly weathered, fine grained to microcrystalline interbedded SANDSTONE, SILTSTONE & SHALE, shale weathered to clay, bedding thin & horizontal with few bedding plane separations. Highly jointed, horizontal to 30° in SS iron oxide stains present in some joints.	Water used as drilling fluid.
NX	5.0	5.0	100	19				5				Lost 50% of water at 11.2.
NX	2.0	2.0	100	32						2		Lost all water at 28.2. Lost water in highly fractured vuggy zone.
NX	2.0	1.6	80	0				10		RUN 3	Yellow-brown stains in horizontal joints at 13.1, 18.2, 23.1, 23.3, 25.0.	
NX	5.0	4.7	94	16				15		RUN 4		Changed core bits at end of Run 4. Metal from auger tooth at bottom hole. Lost diamond core bit at end of run 4, used old bit to TD. Fished out plenty metal shavings.
END BOX 1												
NX	5.0	4.4	88	57			447.1	20		RUN 5	20.3'-31.9' Basal GRIMSBY FM.: Mottled pale green to white, red-brown, v. hard, fresh to slightly weathered, fine grained SANDSTONE, horizontal bedding, some beds angle at 30°, horizontal & vertical joints. Horizontal joint spacing .2'-.9' yellow-brown staining on joints 27.8 vertical fracture to 28.0 yellow-brown stains.	
NX	5.0	4.9	98	88						RUN 6		
NX	5.0	4.9	98	46	Packer Test #2 2.1 x 10^{-3} cm/sec			25		RUN 7	28.15-29.0 vertical joint extends from horizontal joint at 28.15, at 29.0 vertical joint fades out. Dk. red brown to black stains present. 29.65-30.3 See page 2 for tabulation of joints.	
END BOX 2												
NX	5.0	5	100	18			435.5	30		RUN 8	31.9'-46.7' POWER GLEN FM.: Dk. reddish brown to pale green to green to white, v. soft to v. hard, slight to severely weathered, v. fine grained to microcrystalline, SHALE calcareous	
							432.4					

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: Van De Mark

HOLE NO.: D-55

BORING LOG

PROJECT	JOB NO.	SHEET NO.	HOLE NO.
Somerset Railroad	14818	2 OF 2	D-55

SAMPLER TYPE AND DIAMETER	SAMPLER ADVANCE / LENGTH CORE RUN	SAMPLE RECOVERY / CORE RECOVERY	SAMPLE BLOWS "N" / PERCENT CORE RECOVERY	PENETRATION BLOWS 1ST 6"	2ND 6"	3RD 6"	ELEVATION (FT.)	DEPTH-FT	UNIFIED SOIL CLASSIFICATION	SAMPLE	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC.
				RQD %			432.4			8	31.9'-46.7' POWER GLEN FM. (cont.): SANDSTONE, LIMESTONE, DOLOMITE, SILTSTONE, occasional slump features. Bedding is thin & horizontal. Occasional bedding joints. 31.7-31.9 vertical joints. 31.9-32.1 severely weathered zone, weathered to clay, rock fragments present.	
NX	5.0	4.9	98	78	Packer Test #1 1.7 x 10^{-4} cm/sec			40		RUN 9		
NX	5.0	5	100	16			420.7	45		RUN 10		
END BOX 3								50			Boring completed at 46.7 ft. Boring completed as observation well. See observation well completion report for construction details. Horizontal bedding joints exist throughout the rock. Vertical joints 27.8-28.0 coating 28.15-30.3 coating 38.9-39.0 coating 39.1-39.2 coating 46.7-47.2 no coating 29.65-30.3 severely weathered zone, v. vuggy, looks eaten away, no visible coatings in vugs. joint spacing 2 cm, 28.1-30.3 connected by vertical joint.	Boring reamed to 6" nom. diam. Reamed to 45'.

SS = SPLIT SPOON; ST = SHELBY TUBE; D = DENNISON; P = PITCHER; O = OTHER

SITE: Van De Mark

HOLE NO.: D-55

APPENDIX D

ANALYTICAL RESULTS

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

RESULTS OF ANALYSIS

TABLE NO. 1

TYPE OF ANALYSIS: First Round of Sampling for Three Parameters - Samples Collected January 6, 1984

UNIT OF MEASURE: See below

CLIENT: Van deMark Chemical

Analysis	Unit of Measure	SAMPLE IDENTIFICATION					
		VDM-9	VDM-10	VDM-11	VDM-12	D-55	
pH	Std.	5.660	5.321	3.628	4.275	7.545	
Chlorides	mg/l	9,197	7,730	1,859	50,682 (51,660)[1]	49	
Soluble Iron	mg/l	81.0	27.5	45.3	9,800.0	<0.2	

COMMENTS: [1]Duplicate Analysis

Table 2. Priority Pollutant Survey
Well VDM-12, Samples Collected
January 24, 1984 *

Summary[1]

(Expressed as micrograms per liter or ppb)

Parameter	Original Sample	Duplicate Sample
Volatiles (31)[2]		
Chloromethane	550	390
Methylene Chloride[3]	330	290
Chloroform	500	500
Carbon Tetrachloride	BDL[4]	28
Tetrachloroethylene	110	120
Base/Neutral Extractables(46)		
Octylphthalate	100	NR[5]
Pesticides/PCB's (25)	BDL	NR
Acid Extractables (11)	BDL	NR
Total Recoverable Phenols (mg/l or ppm)	0.08	NR
Total Cyanide	BDL	NR

[1] This table lists only those parameters identified from the total of 128; all others are below detection limits. The complete analytical report is provided in Appendix A.
[2] Number of Compounds
[3] The field blank contained 11 µg/l methylene chloride
[4] BDL - Below Detection Limits
[5] Duplicate analysis not requested.

*Well VDM-12 was purged on January 5, 1984. It took 19 days for this purged well to recharge to a sufficient volume for sampling.

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

RESULTS OF ANALYSIS

TABLE NO. 4

Second Round of Sampling of Selected Metal Compounds Found in First Round of Sampling. Samples Collected 3/21/84.

UNIT OF MEASURE: micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS		SAMPLE IDENTIFICATION					
		(VDM-9) Fld.Dup. 3/21/84	VDM-9 3/21/84	VDM-10 3/21/84	VDM-11 3/21/84	VDM-12 3/21/84	D-55 3/21/84
Cadmium		91	96	40	17	204	9
Chromium		190	190	160	190	5260	<160
Copper		7700	7800	290	510	57000	80
Lead		900	750	70	100	22200	30
Nickel		1700	1730	310	600	26600	<100
Silver		220	210	60	60	210	50
Thallium		790	850	300	200	1230	<200
Zinc		3150	3050	1140	2920	226000	0.25
Beryllium		28	28	<10	16	182	<10

COMMENTS: Due to the sample matrix interferences in the sample, the analyses of 13 Priority Pollutant metals has been difficult. Alternate methods are being

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

RESULTS OF ANALYSIS

TABLE NO. 5

Second Round of Sampling for Three Parameters

PAGE 6 OF 16

as used in the First Round of Sampling

Samples Collected March 21, 1984

UNIT OF MEASURE: milligrams/liter, or ppm

CLIENT: Van DeMark Chemical (AHG)

ANALYSIS	SAMPLE IDENTIFICATION					
	(VDM-9) Blind Fld.Dup.	VDM-9	VDM-10	VDM-11	VDM-12	D-55
pH	4.904	4.793	6.358	2.365	4.014	6.671
Chlorides	15,968	15,068	5,039	1,859	53,593	636
Soluble Iron	870	880	<.1	228	17,500	<.1

COMMENTS:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 6

TYPE OF ANALYSIS: Spiked Sample Analysis for Volatile Organics VDM-10

UNITS OF MEASURE: micrograms/liter, or ppb

CLIENT: Van DeMark Chemical (AHG)

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Chloromethane	Spike	<0.26	20.0	20.0	22.76	113.8	NA*
Chloroform	Spike	9.76	7.64	17.40	19.94	114.6	"
Carbon Tetrachloride	Spike	<0.22	7.27	7.28	8.10	111.3	"
Tetrachloroethylene	Spike	<0.14	8.36	8.36	9.36	112.0	"

Comments: *NA - not applicable

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Precision

TABLE NO. 7

TYPE OF ANALYSIS: Duplicate Analysis

PAGE 8 OF 16

for Volatile Organics Sample VDM-10

UNITS OF MEASURE: micrograms per liter, or ppb

CLIENT: Van deMark Chemical (AHG)

ANALYSIS	SAMPLE	ORIGINAL CONCEN.	DUPLICATE CONCEN.	AVERAGE CONCEN.	RANGE	REL. % DIFFER.
Chloromethane	VDM-10	<0.26	<0.26	NA	NA	NA
Methylene Chloride	VDM-10	41.37	42.03	41.70	0.66	1.6
Chloroform	VDM-10	98.73	96.46	97.60	2.27	2.3
Carbon Tetrachloride	VDM-10	<0.22	<0.22	NA	NA	NA
Tetrachloroethylene	VDM-10	<0.14	<0.14	NA	NA	NA

COMMENTS:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 8

TYPE OF ANALYSIS: EPA and Spiked Sample

Test Control

Samples Collected 3/21/84

UNITS OF MEASURE: milligrams/liter, or ppm

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Soluble Iron	EPA	.80	---	.80	.79	98.8	.70---.88
Soluble Iron (Field Dup.)*	Spike	.44	1.0	1.44	1.50	104.2	---
Soluble Iron (VDM-9)	Spike	.44	1.0	1.44	1.50	104.2	---
Soluble Iron (VDM-10)	Spike	.05	0.5	.55	.56	101.8	---
Soluble Iron (VDM-11)	Spike	1.14	1.0	2.14	2.22	103.7	---
Soluble Iron (VDM-12)	Spike	0.88	1.0	1.88	1.95	103.7	---
Soluble Iron (D-55)	Spike	.03	0.5	.53	.57	107.5	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 9

TYPE OF ANALYSIS: EPA & Spiked Sample

Test Control

PAGE 10 OF 16

UNITS OF MEASURE: Micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Copper	EPA	339	---	339	330	97.3	302---368
Copper (VDM-12, 1/6/84)	Spike	160	500	660	670	101.5	---
Copper (Fld.Dup., 3/21/84)*	Spike	390	500	890	890	100.0	---
Copper (VDM-9, 3/21/84)	Spike	390	500	890	890	100.0	---
Copper (VDM-10, 3/21/84)	Spike	150	500	650	650	100.0	---
Copper (VDM-11, 3/21/84)	Spike	260	500	760	750	98.7	---
Copper (VDM-12, 3/21/84)	Spike	290	500	790	790	100.0	---
Copper (D-55, 3/21/84)	Spike	40	500	540	570	105.6	---
Lead	EPA	43	---	43	43	100.0	3.4---5.4
Lead (VDM-12, 1/6/84)	Spike	24	25	49	48	98.0	---
Lead (Fld.Dup., 3/21/84)	Spike	45	25	70	71	101.4	---
Lead (VDM-9, 3/21/84)	Spike	4	25	29	34	117.2	---
Lead (VDM-10, 3/21/84)	Spike	33	25	58	56	96.6	---
Lead (VDM-11, 3/21/84)	Spike	50	25	75	79	105.3	---
Lead (VDM-12, 3/21/84)	Spike	11	25	36	35	97.2	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 9 Cont'd

TYPE OF ANALYSIS: EPA & Spiked Sample

Test Control

PAGE 11 OF 16

UNITS OF MEASURE: micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Lead (D-55, 3/21/84)	Spike	12	25	37	37	100.0	---
Cadmium	EPA	39	---	39	37	94.9	31---42.8
Cadmium (VDM-12, 1/6/84)	Spike	147	50	197	217	110.2	---
Cadmium (Fld.Dup. 3/21/84) *	Spike	46	50	96	102	106.3	---
Cadmium (VDM-9, 3/21/84)	Spike	48	50	98	107	109.2	---
Cadmium (VDM-10, 3/21/84)	Spike	20	50	70	73	104.3	---
Cadmium (VDM-10, 3/21/84)	Spike	9	50	59	63	106.8	---
Cadmium (VDM-11, 3/21/84)	Spike	102	50	152	161	105.9	---
Cadmium (VDM-12, 3/21/84)	Spike	5	50	55	58	105.5	---
Chromium	EPA	261	---	261	258	98.9	210---306
Chromium (VDM-12, 1/6/84)	Spike	2130	1000	3130	3100	99.0	---
Chromium (Fld.Dup. 3/21/84)	Spike	100	1000	1100	1160	105.5	---
Chromium (VDM-9, 3/21/84)	Spike	100	100	1100	1160	105.5	---
Chromium (VDM-10, 3/21/84)	Spike	80	1000	1080	1130	104.6	---
Chromium (VDM-11, 3/21/84)	Spike	100	1000	1100	1160	105.5	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 9 Cont'd

TYPE OF ANALYSIS: EPA & Spiked Sample Test Controls

UNITS OF MEASURE: micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Chromium (VDM-12, 3/21/84)	Spike	2630	1000	3630	3600	99.2	---
Chromium (D-55, 3/21/84	Spike	<100	1000	1000	990	99.0	---
Nickel	EPA	210	---	210	200	95.2	180---240
Nickel (VDM-12, 1/6/84)	Spike	1150	1000	2150	2200	102.3	---
Nickel (Fld.Dup. 3/21/84)*	Spike	850	1000	1850	1940	104.9	---
Nickel (VDM-9, 3/21/84)	Spike	850	1000	1850	1960	105.9	---
Nickel (VDM-10, 3/21/84)	Spike	150	1000	1150	1200	104.3	---
Nickel (VDM-11, 3/21/84)	Spike	300	1000	1300	1310	100.8	---
Nickel (VDM-12, 3/21/84)	Spike	1330	1000	2330	2370	101.7	---
Nickel (D-55, 3/21/84)	Spike	<100	1000	1000	1050	105.0	---
Silver	EPA	1000	---	1000	1000	100.0	---
Silver (VDM-12, 1/6/84)	Spike	440	500	940	930	98.9	---
Silver (Fld.Dup. 3/21/84)	Spike	110	500	610	630	103.3	---
Silver (VDM-9, 3/21/84)	Spike	110	500	610	620	101.6	---
Silver (VDM-10, 3/21/84)	Spike	30	500	530	480	90.6	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 9 Cont'd

TYPE OF ANALYSIS: EPA & Spiked Sample

Test Controls

PAGE 13 OF 16

UNITS OF MEASURE: micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Silver (VDM-11, 3/21/84)	Spike	30	500	530	500	94.3	---
Silver (VDM-12, 3/21/84)	Spike	110	500	610	610	100.0	---
Silver (D-55, 3/21/84)	Spike	<50	500	500	440	88.0	---
Thallium	EPA	2520	---	2520	2530	100.4	1440---3680
Thallium (VDM-12, 1/6/84)	Spike	560	2000	2560	2980	116.4	---
Thallium (Fld.Dup. 3/21/84)*	Spike	400	2000	2400	2330	97.1	---
Thallium (VDM-9, 3/21/84)	Spike	420	2000	2420	2380	98.3	---
Thallium (VDM-10, 3/21/84)	Spike	150	2000	2150	2160	100.5	---
Thallium (VDM-10, 3/21/84)	Spike	620	2000	2620	2650	101.1	---
Zinc	EPA	420	---	420	420	100.0	380---450
Zinc (VDM-12, 1/6/84)	Spike	250	500	750	750	100.0	---
Zinc (Fld.Dup., 3/21/84)	Spike	160	500	660	660	100.0	---
Zinc (VDM-9 3/21/84)	Spike	150	500	650	650	100.0	---
Zinc (VDM-10, 3/21/84)	Spike	60	500	560	560	100.0	---
Zinc (VDM-11, 3/21/84	Spike	150	500	650	640	98.5	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 9 Cont'd

PAGE 14 OF 16

TYPE OF ANALYSIS: EPA & Spiked Sample

Test Control

UNITS OF MEASURE: micrograms/liter, or ppb

CLIENT: Van deMark Chemical

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
Zinc (VDM-12, 3/21/84)	Spike	110	500	610	610	100.0	---
Zinc (D-55, 3/21/84)	Spike	120	500	620	630	101.6	---
Beryllium	EPA	235	---	235	234	99.6	207---257
Beryllium (VDM-12, 1/6/84)	Spike	93	100	193	182	94.3	---
Beryllium (Fld.Dup., 3/21/84)*	Spike	14	100	114	117	102.6	---
Beryllium (VDM-9, 3/21/84)	Spike	14	100	114	109	95.6	---
Beryllium (VDM-10, 3/21/84)	Spike	<5	100	100	101	101.0	---
Beryllium (VDM-11, 3/21/84)	Spike	8	100	108	97	89.8	---
Beryllium (VDM-11, 3/21/84)	Spike	91	100	191	182	95.3	---
Beryllium (VDM-12, 3/21/84)	Spike	<5	100	100	97	97.0	---

Comments: *Field Duplicate - VDM-9

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Accuracy

TABLE NO. 10

TYPE OF ANALYSIS: Spiked Sample, EPA and Standard Test Control Analysis

UNITS OF MEASURE: milligrams/liter, or ppm

CLIENT: Van DeMark Chemical (AHG)

ANALYSIS	TYPE	ORIGINAL CONCEN.	ADDED CONCEN.	EXPECTED CONCEN.	REPORTED CONCEN.	PERCENT RECOVERY	95% CONFID. INTERVAL
pH	Std.	7.0	--	7.0	6.978	99.7	NA
Chloride	EPA	17.8	--	17.8	16.6	93.4	NA
Phenol	EPA	.040	--	.040	.045	112.5	NA
Phenol (VDM-9) (Field Dup.)	Spike	.020	.400	.420	.375	89.3	NA
Phenol (VDM-10)	Spike	.200	.400	.600	.567	94.5	NA

Comments:

ADVANCED ENVIRONMENTAL SYSTEMS, INC.

QUALITY ASSURANCE - Precision

TABLE NO. 11

TYPE OF ANALYSIS: Duplicate Analysis for Chlorides & Phenols

UNITS OF MEASURE: milligrams/liter, or ppm

CLIENT: Van DeMark Chemical (AHG)

ANALYSIS	SAMPLE	ORIGINAL CONCEN.	DUPLICATE CONCEN.	AVERAGE CONCEN.	RANGE	REL. % DIFFER.
Chloride	VDM-11	1,859	1,859	1,859	0	0
Chloride	VDM-12	53,471	53,715	53,593	122	.23
Phenol	VDM-11	.010	.016	.013	.003	23.1

COMMENTS:

APPENDIX C

EXCAVATION WORK PLAN

SITE MANAGEMENT PLAN

APPENDIX C – EXCAVATION WORK PLAN

C-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter known or potentially contaminated material (remaining contamination) the site owner or their representative will notify the Department. Currently, this notification will be made to:

Martin L. Doster, P.E

Regional Hazardous Waste Remediation Engineer

Region 9, NYSDEC, 270 Michigan Ave., Buffalo, NY 142

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent, plans for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control,
- A summary of environmental conditions anticipated in the work areas, including the nature and concentration levels of contaminants of concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;
- A schedule for the work, detailing the start and completion of all intrusive work,
- A summary of the applicable components of this EWP,
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120,
- A copy of the contractor's health and safety plan, in electronic format, if it differs from the HASP provided in the SMP,
- Identification of disposal facilities for potential waste streams,

- Identification of sources of any anticipated backfill, along with all required chemical testing results.

C-2 SOIL SCREENING METHODS

Visual, olfactory, and instrument-based soil screening will be performed by a qualified environmental professional during all remedial and development excavations into any remaining contamination. Soil screening will be performed regardless of when the invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC. The environmental data and screening results will determine if the excavated material can be returned to the subsurface, be used as cover soil, or require off-site disposal.

Vanchlor will analyze all soil/fill excavated for metals and chlorinated volatile organic compounds (VOCs) based on historical impacts. One representative composite sample will be collected for each 250 cubic yards of soil/fill designated for excavation. In general, soil/fill that have residual concentrations of metals and chlorinated VOCs will be managed and disposed of in accordance with the applicable requirements of 6NYCRR Part 360 for the management and disposal of non-hazardous solid waste and debris.

C-3 STOCKPILE METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Straw bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC.

C-4 MATERIALS EXCAVATION AND LOAD OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and its contractors are solely responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

The qualified environmental professional will be responsible for ensuring that all outbound trucks will be free of loose soil/fill or mud prior to leaving the site until the activities performed under this section are complete. Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

C-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks will be inspected for the presence of loose soil/fill or mud prior to leaving the site. These materials will be manually removed and disposed of off-site in an appropriate manner.

It is anticipated that any soil/fill requiring off-site disposal would be taken to CWM Chemical Services' Model City Facility and the require trucks to take the following transport route:

1. Head northwest on Mill Street toward Connecting Road
2. Continue onto Plank Road
3. Turn left onto Stone Road
4. Turn right onto NY-93 W
5. Take the first left onto NY-104 West / NY-93 West
6. Take ramp onto NY-18 E/Creek Rd
7. Turn right at Model City Road and CWM Facility will be on the right.

All trucks loaded with site materials will exit the vicinity of the site using only these approved truck routes. This is the most appropriate route and takes into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport.

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

C-6 MATERIALS DISPOSAL OFF-SITE

All soil/fill/solid waste excavated and removed from the site would be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of soil/fill from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Track 1 unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

C-7 MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for re-use on-site will be placed below the demarcation layer or impervious surface (pavement, etc.), and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

C-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including excavation dewatering and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, but will be managed off-site.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

C-9 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). For this site where use as a landfill is the planned and anticipated future use, imported backfill will meet the protection of groundwater or protection of public health industrial soil cleanup objectives as set forth in Table 375-6.8(b) [6NYCRR Part 375-6.7]. Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste as defined in 6NYCRR Part 360 will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

C-10 STORMWATER POLLUTION PREVENTION

If the site redevelopment activities will disturb greater than 1 acre, a construction Stormwater Pollution Prevention Plan (SWPPP) that conforms to the requirements of

NYSDEC Division of Water guidelines and NYS regulations will be prepared in advance of intrusive Site work and a Notice of Intent or Termination (NOIT) will be filed with the Division of Water. The final SWPPP will be included as an Attachment to the Excavation Plan upon its preparation. At a minimum the SWPPP will incorporate the following provisions.

Silt fence barriers and hay bale checks will be installed around excavation areas or at the Site perimeter depending on the extent of intrusive work and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the silt fence barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

C-11 CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during subsurface excavations, site activity will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for fill, a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling

results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the periodic reports prepared pursuant to Section 5.3 of the SMP.

C-12 COMMUNITY AIR MONITORING PLAN

Prior to any excavation of contaminated materials onsite, a Community Air Monitoring Plan (CAMP) that describes required particulate and vapor monitoring to protect the neighboring community during intrusive site investigation activities will be prepared and attached to this Excavation Work Plan. The CAMP must be consistent with the requirements for community air monitoring at remediation sites as established by the New York State Department of Health (NYSDOH) and NYSDEC. Accordingly, it will follow procedures and practices outlined under NYSDOH's Generic Community Air Monitoring Plan (dated May 2010) and NYSDEC Technical Assistance and Guidance Memorandum (TAGM) 4031: Fugitive Dust Suppression and Particulate Monitoring Program at Inactive Hazardous Waste Sites.

A figure showing the location of air sampling stations based on generally prevailing wind conditions will be developed. These locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

C-13 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors offsite. If nuisance odors are identified at the site boundary, or if odor complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and

NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the property owner's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; (c) covering stockpiles with tarps or other covers; and (d) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

C-14 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved through the use of a dedicated on-Site water truck for road wetting. The truck will be equipped with equipment capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.
- Gravel will be used on roadways to provide a clean and dust-free road surface.

- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

C-15 OTHER NUISANCES

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances which includes the limitation of daily working hours if requested or required by the City's code enforcement department.

APPENDIX D

HEALTH AND SAFETY PLAN

1.0 CONTACTS LIST SUMMARY

1.1 Emergency Contacts

Contact	Number
Ambulance	911
Fire	911
Police	911
Golder National Health and Safety Leader (Jane Mills)	206-295-7002
WorkCare	888-449-7787

Additional comments

- Site is a closed hazardous waste landfill facility

Hospital name	Address	Phone	Level of Care Available
Eastern Niagara Hospital	521 East Avenue, Lockport, NY 14094	(716) 514-5700	ER

1.2 Golder contacts

Contacts	Name	Office	Cell	Home
Project Manager	Patrick Martin	(716) 204-5880	716-867-2860	716-655-5700
Project Director	Dave Wehn	(716) 204-5880	716-713-6394	716-433-0692
Client	Vanchlor Company, Inc.			

1.3 Missed Check-in Contacts

Contacts	Name	Phone	Cell
Project Manager	Patrick Martin	(716) 204-5880	716-867-2860
Project Director	Dave Wehn	(716) 204-5880	716-713-6394

It is company policy to complete a HaSEP form including a task-based Health, Safety and Environment (HSE) risk assessment for every project that includes site work, working alone or international travel.

To get an updated table of contents, please right-click the table of contents below and choose 'Update Field'

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

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You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

2.0 PROJECT PROPOSAL DETAILS

Project/Proposal Number	1403800	**Start Date**	September 17, 2014	**End Date**	September 17, 2014
Project Title	Vanchlor Company, Inc.				
Project Manager (PM)	Patrick Martin				
PM's phone - Office	(716) 204-5880	**Home**		**Cell**	716-867-2860
Project Director	Dave Wehn				
PD's phone - Office	(716) 204-5880	**Home**		**Cell**	+1 716 713-6394
Client name	Vanchlor Company, Inc.				

Brief description of project and scope of works (include any hazardous activities, if known)

Perform periodic inspection of landfill cap integrity
Groundwater sampling and analysis

3.0 GOLDER TEAM

Name	Office	Contact number (cell phone)	Role
Jonathan Taylor	Buffalo	716-316-8146	Field Inspector
Patrick Martin	Buffalo	716-867-2860	Project Manager
Russell Marchese	Buffalo	+1 585 281-9366	Field Inspector

Project Manager (PM)

- Appoint a competent site supervisor and alternate. For sites with multiple Golder projects/disciplines at work, coordinate with the overall site supervisor
- Oversee/develop hazard controls including work instructions and
- Assign only adequately trained and competent employees to the project

Site Supervisor

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

- The site supervisor is responsible for the safety of all Golder employees, subcontractors, visitors and public on the parts of the site under Golder control.
- Communicate all site hazards to affected parties, in real time, as hazards, conditions and employees change.
- Ensure that work is undertaken in accordance with the hazard controls included in this HaSEP.

Contractor

- All plant and equipment is maintained in a safe working condition
- All plant and equipment are to be registered/licensed and electrical equipment tagged and tested
- Potential hazards are to be controlled (e.g., cage over rotating parts)
- You will report any identified hazards to the Golder Associates field staff member

Field Staff

- Inspect your worksite and equipment before starting work
- Apply the controls outlined in this HaSEP
- Look out for the safety of yourself and others
- Report unsafe acts, conditions and incidents to the site supervisor

4.0 CLIENT/SITE DETAILS

4.1 Client/Site Details

Project location map (paste URL here)	https://www.google.com/maps/place/600+Mill+St,+Lockport,+NY+14094/@43.186385,-78.702734,331m/data=!3m2!1e3!4b1!4m2!3m1!1s0x89d37efd8f1bd719:0x9173a70a5597c540?hl=en

4.1.1 Site Hierarchy

Role	Name	Phone
Contact person on site	Jonathan Taylor	Office: (716) 204-5880 Cell: 716-430-2885
Client safety contact	Chris Banach	Office: 716-433-6764 Cell: 716-870-0613
Company Golder reports to	Vanchlor Company, Inc.	Office: 716-434-2624
Golder overall site supervisor and alternate:	Patrick Martin	Office: (716) 204-5880 Cell: 716-867-2860

4.1.2 Site description

If the project is near another Golder Office, has the local Office been notified of the work? ☐Yes ☒No

Site Name	Vanchlor Company, Inc.		**Address**	600 Mill Street	
Coordinates	43° 11' 08.18" N 78° 42' 11.13" W				
Description	The site is an approximately 5-acre area bounded by Mill Street to the north, a Somerset Railroad Corp rail corridor to the south and east, and Plank Road to the west				
Access info	Off of Mill Street				
Previous land uses	Landfill				
Site Receptors that maybe impacted by the proposed work	Eighteen Mile Creek				
Additional Info					
HSE Induction / orientation provider	☒Golder		☐Client	☐Contractor	
Site Contact Numbers	**Field cell phone**	716-430-2885	**Satellite phone**	**Other**	
Fax		**Email**		**Opening days and hours**	
Google Maps					

5.0 CHECK-IN SYSTEM

5.1 Check-in contacts

	Name	Phone/Email	Check-in frequency*	By	By	By	On

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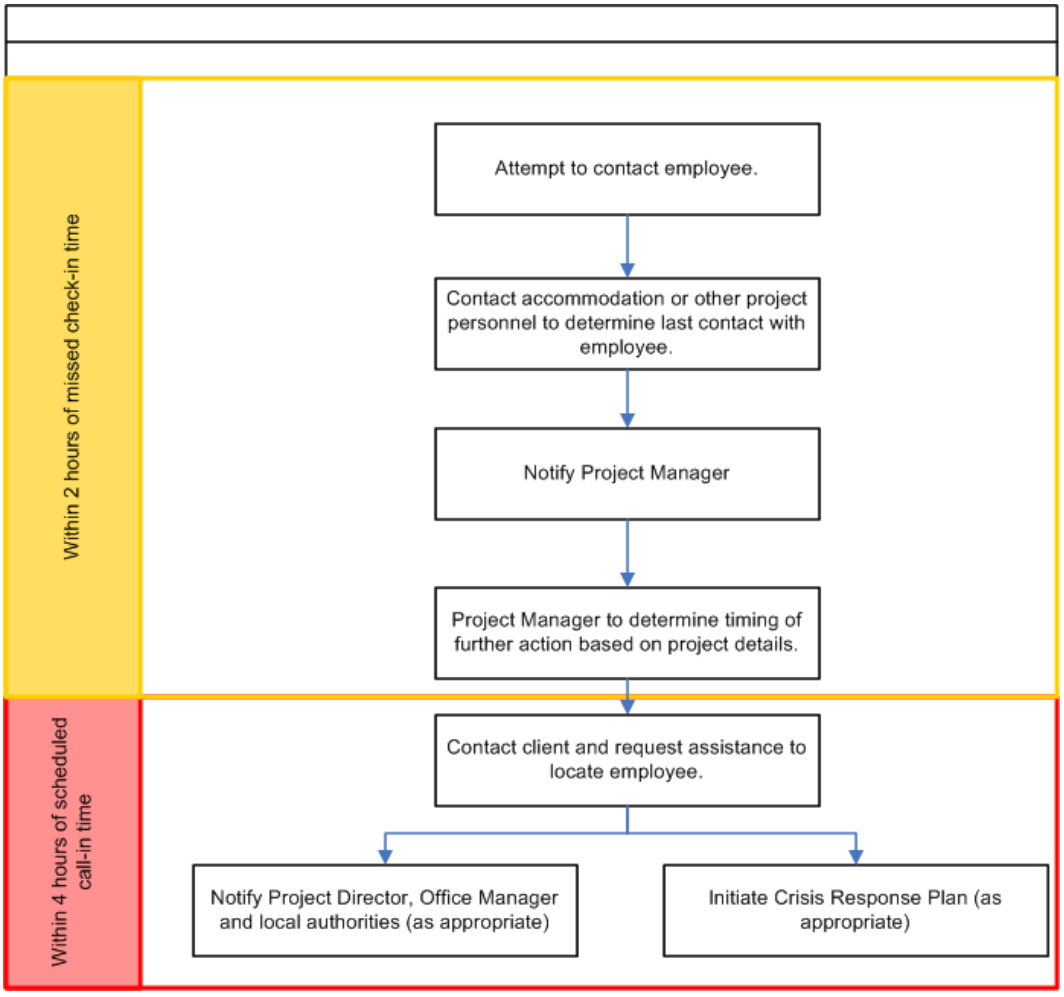
				phone	email	SMS	site
Primary	Patrick Martin	Office: (716) 204-5880 Cell: 716-867-2860	End of day	☒	☐	☐	☐
Secondary	Dave Wehn	Office: (716) 204-5880 Cell: +1 716 713-6394	End of day	☒	☐	☐	☐

5.2 Missed Check-in Procedure

Missed check-in procedure flowchart:



☐Does missed check-in procedure for this project deviate from the flowchart?

Missed check-in contact information:

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

	Name	Phone	Cell/Mobile
Project Manager	Patrick Martin	(716) 204-5880	716-867-2860
Project Director	Dave Wehn	(716) 204-5880	+1 716 713-6394
Other			
Other			
Other			

6.0 CHEMICALS AND CONTAMINANTS

6.1 Possible Contaminants or Chemical Exposures

☒Are any contaminants likely to be encountered during this project (consider previous land uses)

Contaminant Name	Heavy Metals and chlorinated organics					
Exposure routes	Dermal					
Flash point					**Odour threshold**	
Explosive limits						
☐**Monitoring of contaminant required**						
Risk controls	Nitrile gloves if handling soil or groundwater					
Additional medical surveillance (if required)						
Additional Info						

7.0 RISK REGISTER

Risk Factor	Hazard	Persons Affected	Initial Consequence	Initial Likelihood	Risk Factor	Controls	Residual Consequence	Residual Likelihood	Residual Risk	Additional controls
Contaminated soil (SWP 10)	Handling contaminants	Golder employee	3	3	9	Sampling for contaminated soils or sludges often occurs at sites that are known hazardous waste sites or adjacent to such sites. Soil sampling may present hazards such as trips, falls, and slips, and resulting injuries which are typical of undeveloped or industrial sites. Understand the hazards of the contaminants present. Consult MSDS, labels and other available information. Determine material compatibilities. Develop procedures for work around the contaminants. Minimize manual handling of the contaminant. Provide training specific to the contaminant present. Stay out of areas where contaminant is present if possible. Know where first aid and emergency response equipment is (i.e., shower/eyewash). Participate in the medical surveillance program based on	3	2	6	

						the type and extent of potential exposure. Use PPE that is appropriate for the type of chemical and task being done such as body coverings, gloves, boots, goggles, face shield, respirator.				
Fumes	Fumes	Golder employee	3	2	6	Understand the hazards of the particular chemical. Consult MSDS, labels and other available information. Minimize exposure to the fume through use of local ventilation. Use of a suitable respirator may also be required. Conduct industrial hygiene sampling to verify adequacy of the ventilation system. Provide training specific to the chemical in use. Stay out of areas where chemicals are used if possible. Know where first aid and emergency response equipment is (i.e., shower/eyewash). Recognize the signs of exposure. Participate in the medical surveillance program. Use PPE that is appropriate for the type of chemical and task being done such as body coverings, gloves, boots, goggles, face shield, respirator.	3	2	6	
Driving vehicle (Personal)	Driving vehicle (Personal)	Golder employee	4	2	8	Drivers will have a current driving license. Maintain vehicle in a roadworthy condition. The driver should be fit to drive. Adhere to highway regulations and follow speed limits. Do not drive in adverse weather or when excessively tired. Check weather and routes before departure. In poor weather delay departure. When arranging transport request suitable vehicle that is equipped with seatbelts, spare tire, winter tires & ice scraper (if needed), and bring	2	2	4	

						along a first aid kit & fire extinguisher if applicable. Conduct a pre-use inspection of the vehicle including fluid levels. Carry extra windshield washer fluid if expecting to enter a dirty road area. File a planned route if required. Drive within your abilities. If you are unsure of your ability to control the vehicle in certain terrain, slow down or do not proceed. Check personal communication devices daily. Consider alternative methods of transport or overnight and/or sharing driving.				
Traffic & road conditions(heavy equipment traffic)	Traffic and road conditions (e.g.. heavy equipment traffic)	Golder employee	5	2	10	All employees must comply with the GAI Motor Vehicle Policy. Seat belts shall be worn by all drivers and passengers in vehicles on company business. Must carry appropriate insurance if using private vehicles for work purposes. Consider the risks of driving while fatigued. Check weather conditions before travelling. Plan travel route and verify road conditions where possible. Obey all traffic signs and signals. Reduce speed in construction areas. Contact the owner if traveling on a private road. Verify the rules of the road (speed limit, type of vehicles, rules on passing, signage, method of communication with other vehicles). Adopt and enforce a structured vehicle maintenance program for Golder-owned vehicles. Maintain Vehicle Condition Check-out/Check-in list for Golder-owned vehicles. Test the brakes, wipers, tires, lights, and turn signals, and verify that the vehicle has an inflated	5	2	10	

						spare tire and jack prior to use (in company, private, or rented vehicles). Address any notes or oral warnings concerning vehicle deficiencies, which must be remedied at the earliest possible opportunity. If any safety concerns are identified, the vehicle must not be used. Report vehicle deficiencies to the Office Manager as soon as they are noticed. The Office Manager, or his/her delegate, will arrange for maintenance of the vehicle. Equip Golder-owned, rented, or private vehicles used for on-site work with fire extinguishers and first aid kits, if required. Be sure that rented or client-provided vehicles are in a roadworthy condition.				
Slips, trips and falls	Slips, trips and falls	Golder employee	4	3	12	Use care and attention when walking. Establish level pedestrian footpaths where possible. Level out work areas where possible. Wear appropriate construction safety boots that offer good support and have a good tread. Relay hazard to others, clear or mark and report any potential slip trip or fall hazard.	3	3	9	
Noise (SWP 21)	Noise	Golder employee	3	2	6	Identify potential sensitive noise receptors prior to commencement of work. If present, consult with potential receptors and modify procedures or timing to reduce impact. Comply with noise limits and hours of operation. Use well maintained equipment. Verify that insulating features are in place to minimize noise. Hearing protection required when working near operating drill rigs.	2	2	4	

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8.0 PERSONAL PROTECTIVE EQUIPMENT

Item	Required	Provided by Golder	Provided by Client	Specific Requirement
Gloves				
Disposable	☒	☒	☐	Only if handling soils or groundwater
Head Protection				
Hard Hat	☒	☒	☐	At all times on-site
Hearing Protection				
Disposable foam ear plugs	☒	☒	☐	If needed
High Visibility Clothing				
Orange	☒	☒	☐	
Safety Footwear				
Safety boots	☒	☒	☐	
Eye Protection				
Impact resistant safety goggles or glasses	☒	☒	☐	

9.0 INCIDENT AND EMERGENCY MANAGEMENT

9.1 Emergency contacts

Contact	Number
Ambulance	911
Fire	911
Police	911
Golder National Health and Safety Leader (Jane Mills)	206-295-7002
WorkCare	888-449-7787

9.2 Hospital

Hospital name	Address	Phone	Level of Care Available
Eastern Niagara Hospital	521 East Avenue, Lockport, NY 14094	(716) 514-5700	ER

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9.3 Site emergency

☒Site emergency procedures available

☒Site owner will provide emergency procedures induction/site induction

☐Medivac procedures in place (medivac arrangements must be confirmed on site)

Additional comments

- Site is a closed hazardous waste landfill facility

10.0 HSE PLAN CONTROL

It is the responsibility of the Project Manager to ensure that this HaSEP is prepared and the contents communicated at the pre-start / toolbox meeting to all project staff, Golder or subcontractor, with a copy held on site. The HaSEP has been reviewed or prepared by the Project Manager.

If the project site is remote from the home office, this HaSEP is to be reviewed and approved by the local Golder office whether in another country, province or city.

Role	Name (printed)	Date	Signature
Prepared by	Jonathan Taylor	9/17/14	
Reviewed by			
Approved by			
Other			

10.1 Golder sign-off

Signing below indicates you have read and agree to comply with the information contained in this document.

Date	Name	Company	Signature

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

11.0 ONSITE CHANGES AND REVIEW

Date	Change or modification	How was it communicated?

12.0 INSPECTIONS AND SITE VISITS

12.1 Inspections

Nature	Frequency	Person Responsible
On-site HaSEP verification with call to PM	Before work begins	Site Supervisor

13.0 REVISION HISTORY

Version	Author	Date	Amendments, hazards associated with amendments & controls	Reviewed and communicated to all parties	Approved by

ATTACHMENT 1

Standard Work Procedures (SWPs)

- GAI_HSE_200.004_SWP_Heat_Stress.pdf
- GAI_HSE_200.014_SWP_Slips_Trips_and_Falls.pdf
- GAI_HSE_200.024_SWP_Motor_Vehicles_and_Driving_on_Company_Business.pdf
- GAI_HSE_200.040_SWP_First_Aid_and_CPR.pdf

You have the right to refuse any work you feel is unsafe, or that you are not trained to do. No job is so urgent that we cannot do it without meeting our HSE obligations

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	August 2013

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) staff that work in the field in locations where there is potential for heat stress conditions to develop.

2.0 HEAT STRESS

Heat stress is a condition that can develop when the body is unable to adequately cool itself through responses such as sweating and blood circulation. Employees may experience heat stress due to a combination of environmental factors such as temperature, humidity, radiant heat (i.e. from the sun or another heat source), air velocity, and the concurrent use of personal protection equipment (PPE).

All project managers (PMs) will be trained in the elements of this SWP prior to supervising employees where heat stress conditions may be present. PMs should consider the need to monitor heat stress during the project planning stage based on the site location, type of work, and time of year. Whenever ambient temperatures are forecast to exceed 21ºC or 70ºF, the Site Safety Officer (SSO) and/or field staff will monitor conditions including temperatures and humidity levels and, if necessary, reschedule work for cool periods of the day or shorten work shifts. It usually requires 4 to 7 days of regular exposure to become acclimated to increased temperature environments.

3.0 HEAT STRESS RELATED ILLNESSES

Heat rashes, sunburns, and heat cramps can be painful and uncomfortable, but they are generally not life threatening. Field personnel should be aware that heat rashes or cramps can progress into more serious potentially life-threatening conditions such as heat exhaustion and heat stroke.

Project Managers will be trained in the signs, symptoms and response measures necessary in the event that emergency conditions develop with any employee under their supervision.

Information about these heat-related illnesses is presented below:

Heat Rash Caused by continuous exposure to heat and humid air and aggravated by chafing clothes. Symptoms: Red cluster of pimples or small blisters often occurring on the neck, upper chest, in the groin, under the breasts, and in elbow creases. First Aid: Keep affected areas dry. Apply dusting powders to increase comfort.

Sunburns Caused by too much exposure to the skin from the sun (i.e. ultraviolet (UV) radiation). Symptoms: red or painful skin that can blister or peal. Wear protective clothing such as long pants and shirts, or hats and sunglasses. First Aid: Wear water resistant sunscreen lotion of greater than SPF 30. Work in the shade or under cover.

Fainting Caused when standing in one place in heat may cause the blood to pool in the lower areas of the body (i.e., due to enlarged blood vessels), leaving the brain without adequate replenishment. Symptoms: light headedness, dizziness, weak pulse, or cool most skin. First Aid: Sit down and place your head between your legs or lie down. Once the dizziness subsides get up and walk around to prevent any further pooling of the blood. Note: fainting can indicate a serious medical condition. It may be necessary to call 911. Fainting or loss of consciousness, if work related, is an OSHA recordable injury. Contact the Golder PM as soon as time permits.

Heat Cramps Caused by profuse perspiration with inadequate fluid intake and chemical replacement. Signs: muscle spasms and pain in the extremities and abdomen. If heat cramps are suspected – stop work, move to a cool place and drink clear juice or sports drink. Seek medical attention if the worker has a history of heart problems or cramps do not subside within an hour.

Heat Exhaustion Caused by increased stress on various organs to meet increased demands to cool the body. Symptoms: heavy sweating, extreme fatigue or weakness, dizziness, confusion shallow breathing, nausea, pale, and clammy moist skin. First Aid: If symptoms occur, the employee should leave the work area and proceed to the nearest cool, shaded or air-conditioned location, drink plenty of water or other cool, non-alcoholic beverages, if possible take a cool shower or bath and rest until the symptoms pass. Contact the Golder PM immediately.

Heat Stroke The most severe type of heat-related illness. Heat stroke is a medical emergency that may rapidly result in death or permanent disability. It occurs when the body is unable to control its body temperature; the body's temperature rises rapidly, the sweating mechanism fails, and the body is unable to cool down. When this occur the body temperature can rise to 106 degrees Fahrenheit in 10-15 minutes. Symptoms: red, hot, dry skin or profuse sweating, hallucinations,

chills, throbbing headache, high body temperature, confusion/dizziness and slurred speech. First Aid: Call 911 and seek medical help immediately. If heat stroke is suspected, implement emergency response plan. Move the employee to a cool shaded area, remove excess clothing and cool the person by spraying, sponging or showering the employee with cool or lukewarm water. Fan their body. Drink water (sip do not gulp, if conscious). Do not give an unconscious person anything to eat or drink.

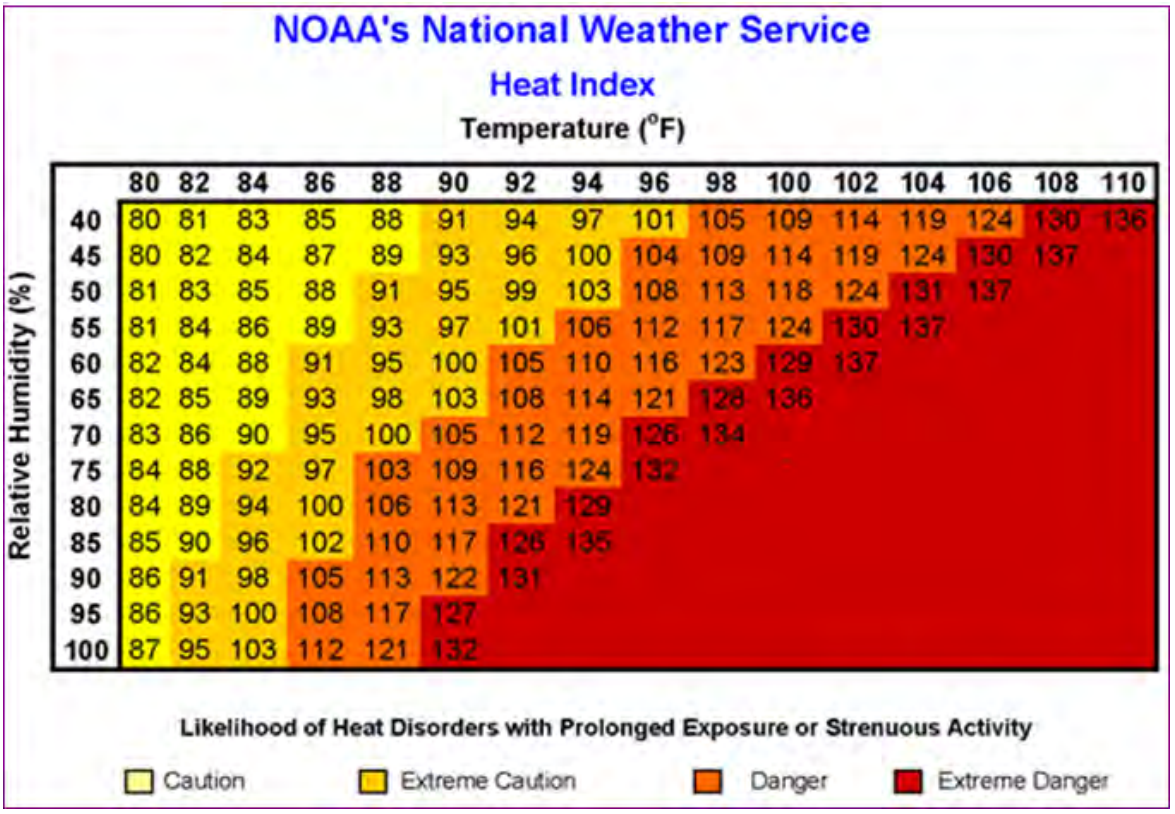
Never place ice on the person. Contact the Golder Project Manager as soon as time permits.

4.0 HEAT STRESS MANAGEMENT

4.1 Monitoring the Heat Index

Employees who are exposed to extreme heat or work in hot environments may be at risk for a heat-related illness. If hot conditions are expected, site-specific training should include heat-stress recognition and control and first-aid for heat-stress-induced illnesses.

Local weather conditions must be monitored daily and more frequent if conditions warrant. Using the Heat Index, employees can evaluate how hot it really feels when humidity if factored into the actual air temperature. The National Weather Service issues heat alerts when the heat index exceeds 105°F - 110°F for at least two consecutive days. The National Oceanic and Atmospheric Administration (NOAA) published the following heat index to evaluate the likelihood of heat-illness when temperature and humidity are factored together. Note: values were devised for shady conditions with a light wind. Exposure to full sunshine can increase the heat index by up to 15°F.



Source: National Oceanic and Atmospheric Administration

4.2 Identifying Risk Factors

Several personal factors can affect how an employee responds to high heat conditions. It is important to recognize these characteristics when scheduling work and when monitoring field staff for signs of over-exposure. Project managers must take the following fitness for duty factors into consideration prior to assigning any employee work to an area where heat related illness may be a factor. Characteristics that can adversely affect a body's reaction to temperature include:

- Fitness level
- Existing medical conditions such as heart disease, diabetes, or high blood pressure
- Pregnancy
- Age (65+)
- Medications for example antihistamines
- Previous heat-related Illnesses
- Low fluid consumption (including from the previous day)

Additional increased risk factors that must be considered when preparing to work in hot environments include:

- Exposure to direct sunlight
- Limited or no air flow
- Level of physical exertion required
- Heavy or non-breathable PPE
- Length of the shift

4.3 Heat Stress Prevention

The following steps are preventive measures that will help prevent heat-related injuries and illnesses:

- As part of project planning, this document will be made readily available to all affected Golder staff through the HASEP document required for the work. This document will be included as part of the mandatory appendices and all project staff will acknowledge their understanding of the elements contained therein by signing the HASEP.
- Project Managers, SSO, employees will be trained, to the content of this SWP, to prevent heat-related illnesses prior to managing/supervising and/or conducting work in a hot environment. Training will also include emergency response procedures to follow when an employee exhibits symptoms consistent with possible heat-related illness.
- Whenever possible, schedule work for cooler times of the day or year. Attempt to reschedule your work hours or restrict certain work activities so that you are not working in the heat of the day between 10 am and 2 pm.
- Project Managers should take steps that help employees become acclimatized (gradually build up exposure to heat, usually 4 to 7 days), especially employees who are new to working in the heat or have been away from work for a week or more. Gradually increase workloads and allow more frequent breaks during the first week of work.
- Ensure that adequate medical services are available.
- Ensure that employees have sufficient quantities of cool potable water and/or alternative fluids containing electrolytes that are designed to replace the salt and minerals lost due to sweating.
- Begin drinking extra fluids before starting any work activities. As a general rule of thumb if you are thirsty then your body is already dehydrated.
- If sweating heavily employees should drink one to two cups of water (e.g. 16 fluid ounces or 0.24 liters) every 15-20 minutes or at each rest break for a total of 17 to 34 cups (e.g. 135 to 270 ounces or 4 to 8 liters) per day.
- Employees shall have access to a cool, shaded, preferably air-conditioned area for rest breaks.
- Employees should not consume beverages that contain alcohol, caffeine, or large amounts of sugar to rehydrate. These substances do not help the body to rehydrate and alcohol can cause additional adverse effects. Employees should refrain from drinking of alcohol at night and from drinking coffee during working hours.

- Employees should be familiar with the signs of the different heat related illnesses and should monitor for signs of heat stress for themselves and for those around them (i.e. use the buddy system). Closely monitor employees who have increased risk factors for heat-related illnesses.

4.4 Sun Protection

- Employees are encouraged to maximize use of the shade provided by trees, buildings and other structures. Where there is limited access to natural shade, fixed or portable shade structures may be used and will be provided where practical.
- Rotate your work with others between indoor/shaded areas and outdoor/exposed locations to minimize time spent in the sun.
- If working in direct sunlight, take frequent breaks in shaded or cooled locations.
- Select PPE that will take into account both the need to block out UV radiation and the need to reduce the effects of heat.
- It is recommended that Golder employees wear tight-woven clothing that has a minimum ultraviolet protection factor (UPF) of at least 30 (e.g. allows 1/30th of the UV radiation falling on the surface of the clothing to pass through it). Clothing should be lightweight, light colored, loose-fitting and have a collar to assist with keeping cool.
- Hats provide shade and the bigger the brim the greater the amount of shade that is provided. Hats should be made of close-weave material and have a wide brim or be legionnaire-style. In circumstances where the wearing of a broad-brimmed hat causes difficulties due to their size sunscreen and other protective measures should be used instead.
- Sunscreen does not offer complete protection and should always be used in conjunction with other protection such as protective clothing. Broad spectrum and water-resistant sunscreen with a sun protection factor (SPF) of 30+ should be used.
- Employees using sunscreen should check the “use by dates” of the sunscreen to verify if its effectiveness has expired per the manufactures recommendations.
- Sunscreen will be placed in an easily accessible location and employees instructed in correct application and use. Sunscreen should be generously applied to all areas of exposed skin at least twenty minutes before going outside and should be reapplied at least every two hours, as directed by the manufacturer’s instructions, or as changing conditions warrant.

5.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.012 SWP Remote Work: Working Alone

6.0 REFERENCES

- Center for Disease Control (CDC) Preventing Heat-related Illness or Death of Outdoor Workers
- NIOSH: Criteria for a Recommended Standard: Occupational Exposure to Hot Environments (Revised Criteria 1986)
- OSHA: Using the Heat Index: A Guide for Employers

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	August 2013

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) staff. The majority of falls occur on slippery, uneven, defective, cluttered or obstructed walking surfaces. A significant number of debilitating falls are the result of a person falling out of his or her own chair, typically while in the process of sitting down, or leaning back. Falls from elevations while reaching for an overhead object are also common, and frequently cause severe injuries.

2.0 SLIPS, TRIPS, AND FALLS

Slips are primarily caused by a slippery surface and compounded by wearing the wrong footwear.

Providing dry walking and working surfaces and slip-resistant footwear can minimize slips and their resultant falls and injuries. Shoes with rubber-cleated, soft soles and heels are recommended for most field work.

In work areas where the walking and working surface is likely to be slippery, non-skid strips, mats, or floor coatings should be used.

As little as a 3/8" rise in a walkway can cause a “stubbed” toe resulting in a trip and fall. The same thing can happen when going up a flight of stairs: Only a slight difference in the height of subsequent steps could cause a person to trip and fall. Be aware of uneven surfaces.

3.0 TYPES OF FALLS

Falls are of two basic types: elevated falls and same-level falls. Same-level falls are most frequent, but elevated falls are more severe.

- Same-Level Falls: high frequency--low severity.
- Elevated Falls: lower frequency--high severity.

Same-level falls are generally slips or trips. Injury results when the individual hits a walking or working surface or strikes some other object during the fall. Over 60 percent of elevated falls are from less than 10 feet.

4.0 CONTRIBUTING FACTORS

Proper housekeeping in work and walking areas can contribute to safety and the prevention of falls. It is important to maintain a safe working environment and walking surface. Work areas must remain free of obstacles that might cause slips and trips. One action which promotes good housekeeping in work

environments is the painting of yellow lines to identify working and walking areas. Working and walking areas should never be obstructed by objects of any kind.

Adequate lighting can improve visibility in an area and is an important factor in the prevention of slips and falls. Moving from light to dark areas, or vice versa, can cause temporary vision problems, that might be just enough to cause a person to slip on an oil spill, or trip over a misplaced object.

Carrying an oversized object can also obstruct one's vision and result in a slip or a trip. This is a particularly serious problem on stairs.

If a material spills on the floor, promptly clean it up and post the necessary precautionary signs until it is dry and free of slip hazards.

In addition to wearing the wrong footwear, there are specific behaviors which can lead to slips, trips, and falls. Walking too fast or running can cause major problems. Rapid changes in direction or walking backwards can create a similar problem.

Other problems that can lead to slips, trips and falls are: distractions; not watching where one is going; carrying materials which obstruct view; wearing sunglasses in low-light areas; and failure to use handrails. These and other behaviors, caused by lack of knowledge, impatience, or bad habits developed from past experiences, can lead to falls, injuries, or even death.

5.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.022 SWP Housekeeping.

SWP Motor Vehicles and Driving on Company Business – GAI HSE 200.024

Approved by	Jane Mills	Issue Date	August 2012
Revision by	Brian Tuccillo	Revision Date	April 2014

1.0 SCOPE

This Standard Work Procedure (SWP) applies to all Golder Associates Inc. (Golder) company drivers who operate motor vehicles (company owned, leased, private, or hired) on company business. All employees must comply with Golder's Motor Vehicle Policy, contained within the Employee Handbook. Definitions of the terms in this SWP are the same as the terms in that Policy. In the event of conflict, Golder's Motor Vehicle Policy takes precedence over this SWP.

2.0 MOTOR VEHICLES AND DRIVING ON COMPANY-RELATED BUSINESS

Preventing work-related roadway crashes requires strategies that combine traffic safety principles and sound safety management practices. Although Golder cannot control roadway conditions, the company can provide safety information to employees and set and enforce driver safety policies to promote safe driving behavior.

3.0 GENERAL GUIDELINES

- Company drivers are authorized to operate a motor vehicle (company owned, leased, private, or hired) while on company business.
- Seat belts shall be worn by all drivers and passengers in vehicles on company business.
- Employees must carry legally required insurance if using private vehicles for work purposes.
- For restrictions relating to the use of portable electronic devices reference Golder's Motor Vehicle Policy and the HSE 200.023 SWP Cellular Telephone.
    - While operating a vehicle on company related business, employees shall not use any electronic devices, with the exception of Global Positioning System (GPS) devices. If the employee needs to operate an electronic device, they shall first park the vehicle in a designated and safe parking location.
    - Employees are strongly discouraged from performing other activities that result in taking away meaningful attention to operating a vehicle safely.
- Only operate vehicles for the designed intended purpose.
- Do not drive when fatigued, and follow the driving limitations of Golder's Fitness for Duty and Fatigue policy. Follow applicable hours-of-service regulations.
- Develop work schedules that allow employees to obey speed limits.
- Observe all the rules and regulations pertaining to the use of public land. Always ask permission before crossing pastoral land. Leave gates in the same position as they were found. Keep to constructed vehicle tracks. Avoid areas that are easily damaged, such as swamps, alpine snow plains and vegetated sand dunes. Exercise caution when operating a motor vehicle in a railroad right-of-way.

- Do not operate any vehicle while under the influence of alcohol, illegal drugs, or medications (prescription or over the counter) that might impair the ability to safely operate the vehicle.
- Consider fire safety when parking vehicles in areas with dried grasses, leaves, or other plant material. Hot engine fluids, catalytic converters or other vehicle equipment could ignite dry plant material, and cause a fire. Observe all fire restrictions.

4.0 VEHICLE MAINTENANCE AND FLEET MANAGEMENT

- To keep the vehicle in a safe working order, follow the maintenance requirements prescribed in Golder's fleet management program for company owned or leased vehicles.
- Maintain a Vehicle Condition Check-out/Check-in list for company owned or leased vehicles.
- Test the brakes, wipers, tires (including pressure, this information can be found on the inside of the driver's side door frame), lights, and turn signals, and verify that the vehicle has an inflated spare tire and jack prior to use (in company, private, or rented vehicles). Address any notes or oral warnings concerning vehicle deficiencies. If any safety concerns are identified, the vehicle must not be used.
- Report vehicle deficiencies to the Operations Manager as soon as they are noticed. The Operations Manager, or his/her delegate, will arrange for maintenance of the vehicle.
- Equip company-owned, leased, rented, or private vehicles used for on-site work with fire extinguishers and first aid kits, when appropriate for the work. For example, a journey to a client's office in a populated area would not necessitate a fire extinguisher or first aid kit in the vehicle (unless client requires this equipment).
- Make sure rented or client-provided vehicles are in a roadworthy condition.

5.0 SAFETY TRAINING PROGRAMS

- Teach employees strategies for recognizing and managing driver fatigue and in-vehicle distractions via the Learning Management System (LMS) at least annually.
- Provide appropriate training to employees operating specialized motor vehicles or equipment.
- Emphasize the need to follow safe driving practices on and off the job, through annual training programs.

6.0 DRIVER PERFORMANCE EVALUATION

- Employees must report any traffic violations and/or vehicle accidents or damage that occurred when driving on company related business to the Project Manager or the Human Resource Representative.
- Human Resources Representatives are responsible to make sure each driver of a vehicle being used on company business (company owned, leased, private, or hired) possesses a valid driver's license. The Project Manager is required to verify that the license is appropriate for the type of vehicle to be driven.
- Human Resources will check driving records of prospective employees, and perform periodic rechecks after hiring.
- Human Resources will maintain complete and accurate records of employees' driving performance.

7.0 SECURING LOADS

Unsecured and poorly secured items inside or outside of a vehicle can be extremely dangerous if they are loose or become airborne. They can harm the vehicle driver and passenger, and/or occupants in following vehicles. The following recommendations should be followed:

- Use tie-down straps that are in good condition and rated for the load that the vehicle will carry. Ratcheting tie downs are preferred over bungee cords. Bungee cords have caused numerous serious injuries and even fatalities when over-stretching has resulted in the hook opening or losing grip on the strap resulting in the strap springing back and contacting the user's face. If bungee cords must be used, seek cords with non-metal hook ends to reduce the risk of eye injuries.
- Install mounts to secure loads that are hauled frequently in the same vehicle or trailer.
- Secure tarps covering loads so they are snug and do not flap.
- Check all loads after driving for 30 minutes to make sure that they have not shifted and remain properly secured.
- Loads shall not exceed the manufactures specifications and legal limits for the vehicle.

8.0 VEHICLE SAFETY EQUIPMENT AND EMERGENCY PREPARATION

Be prepared for a driving emergency by ensuring that the vehicle is equipped with roadside emergency supplies. Consider carrying items such as the following, and know how to use them properly:

- Flashlight
- Reflective safety vest
- Light sticks
- Fire extinguisher
- Tire inflator or sealant
- Reflective triangles or flares
- Spill response kit (for company owned or leased vehicles and rentals >30 days) appropriate for the cargo carried in your vehicle.

9.0 SAFE DRIVING TECHNIQUES FOR 4-WHEEL DRIVING

9.1 Driving In Heavy Vegetation

- Check road conditions before proceeding if the ground conditions are unknown or if there is mud or water.
- Do not change transmission gears in the middle of a hazardous area. If in doubt, always choose the lower gear.
- Setting the correct tire pressure when driving off-road is important. Lowering tire pressures helps in soft ground areas. For soft tracks, 140-180 kPa or 20-26 pounds per square inch (psi) is a good tire pressure. The vehicle must be operated at a lower speed when the tires are at lower pressure. Remember to re-inflate the tires as soon as the vehicle is back on hard ground.

- Cross small ridges 'square on' and cross ditches at a slight angle.
- Turn the steering wheel from side to side to maintain traction and move forward if the vehicle begins to lose traction going uphill, along a rutted track, or in mud.

9.2 Driving On Steep Hills

- Use low second or third gear for going uphill and low first gear for going downhill.
- Use the footbrake sparingly and with caution.
- Avoid turning the vehicle sideways on a hill. If the vehicle begins to slide sideways, very slightly accelerate and steer into the slide. This will usually straighten the vehicle's descent.
- Allow sufficient stopping distance between vehicles.
- Do not touch the clutch or accelerator if the vehicle stalls going uphill.

9.3 Sand Driving

- Speed and flotation are important for successful driving on sand. High transmission gear ratio is best, if possible.
- Lower the tire pressure to 20 psi to increase the surface area of tire on the road. When a lower tire pressure is used, the vehicle must be operated at a lower speed. Remember to re-inflate the vehicle tires as soon as the vehicle is back on hard ground.
- Drive in existing wheel tracks if they are present, because the sand in those locations may be more compacted.
- Avoid sudden changes in direction or acceleration. Coast to a stop if possible.
- Approach dunes head on.
- Avoid braking when descending a dune. Point the front of the vehicle downhill. Do not go fast, but also do not go so slow that the wheels stop rolling, or the vehicle begins to slide sideways. A touch on the throttle will keep the wheels moving and the vehicle pointing in the right direction. Be aware that anti-locking braking systems (ABS) may engage which could cause the vehicle to continue to slide down a hill or slope.
- Try to rock the vehicle backwards or forwards, building up a small stretch of hardpack sand from which the vehicle can accelerate if it gets stuck. Do not spin the wheels.
- Be sure that recovery gear is always in the vehicle in these driving conditions.

9.4 Snow, Rain, and Ice Driving

- Carry chains and install them on the tires when required.
- Prepare the vehicle with appropriate safety gear (see section 8 for a preliminary list).
- Travel only on roads and tracks that are open to traffic.
- Do not travel when visibility is poor.
- Vehicles travelling uphill in snow and ice conditions have right of way.
- Park only where directed and as close to the bank as possible. When parking, leave the vehicle in gear. Do not use the handbrake - it could freeze in the "on" position.
- Lift the wiper blades off the windshield when leaving the vehicle parked.

- Watch for other travelers and animals and drive slowly in areas where they may be present. In the event that an animal is encountered on a road where driving conditions are poor due to the presence of snow, ice, or rain, do not over steer to avoid hitting the animal. The act of over steering may cause the vehicle to slide or roll. Most of the time the animal will move out of the road before the vehicle reaches it.
- Consider increasing the load or weight on the rear axle of front-wheel drive vehicles to improve traction when driving in snow, ice, or rain.

9.5 Driving in Mud

- Good tires with deep tread are helpful when driving in muddy conditions.
- Low second or third gears are the best gears for vehicle operation.
- Where appropriate, move the steering wheel rapidly from side to side to improve traction.
- Keep a steady pace.
- Stay out of ruts if possible.
- Rock the vehicle backwards or forwards by alternating between first and reverse if it becomes stuck.

9.6 Driving in Fog/Limited Visibility

- Drive with low beam lights on.
- Drive slowly and carefully.
- If visibility is poor, pull over to a safe location until weather improves if the vehicles in front or behind cannot be seen.

10.0 RELATED GOLDER DOCUMENTS

- Golder Motor Vehicle Policy
- HSE 200.023 SWP Cellular Telephone
- SWP 200.012. SWP Remote Work-Working Alone
- HSE 200.028 SWP All-Terrain Vehicles
- HSE 200.049 SWP Mine General Safety
- HSE 200.043 SWP Snowmobile Safety
- Golder Associates Inc. DOT Driver and Vehicle Program

Approved by	Jane Mills	Issue Date	August 31, 2012
Revision by	Brian Tuccillo	Revision Date	None

1.0 SCOPE

This Standard Work Practice (SWP) applies to all Golder Associates Inc. (Golder) staff working in areas where areas that could cause injury and require first-aid or where Emergency Medical Services (EMS) may be slow to respond or not available.

2.0 FIRST-AID AND CPR

First-aid, Cardiopulmonary Resuscitation (CPR) and Automated External Defibrillator (AED) training is available for Golder staff. The training must be a certified program sanctioned by the American Red Cross or equivalent. No Golder employee is responsible for providing first-aid as a routine part of their job duties, and it is hoped that no employee will ever be faced with administering first-aid, CPR or AED resuscitation in the course of their work. In the event of a life threatening emergency, Golder staff is trained to contact professionally trained Emergency Medical Technicians (EMT) through the local 911 system or other site specific emergency contact numbers listed in the site specific Health, Safety and Environment Plan (HASEP). Field personnel are, on occasion responsible for providing on-site minor (secondary) first-aid. Golder encourages all employees, field personnel in particular, to take advantage of available first-aid, CPR, and AED training. Acting in the capacity of a designated first-aid provider, however, is not mandatory and anyone who is uncomfortable with being so designated should notify the Project Manager and/or Office Health and Safety Coordinator (HSC).

At least one first-aid kit must be available on all field operations. The size and quantity of first-aid kits required to be located at any site shall be determined by the number of personnel normally dependent upon each kit. Consult the HSC for first-aid kit versus personnel requirements.

2.1 First-Aid and OSHA's Bloodborne Pathogens Requirements

The Occupational Safety and Health Administration (OSHA) has promulgated regulations (29 CFR 1910.1030) to protect employees who may be occupationally exposed to blood and other potentially infectious materials. The primary concerns include the Acquired Immune Deficiency Syndrome (AIDS) is caused by the Human Immunodeficiency Virus (HIV) and Hepatitis B (HBV) viruses which may be present in infected individuals' body fluids. Also see Golder's "Standard Work Practice – Bloodborne Pathogens" for additional information.

For the purposes of the standard, occupational exposure means "a reasonably anticipated skin, eye, mucous membrane, or potential contact with blood or other potentially infectious materials that may result from the performance of the employee's duties."

2.1.1 Exposure Control Plan

Certain portions of the bloodborne pathogen regulations apply to so-called "secondary first-aid providers who provide first-aid only infrequently in response to workplace accidents." OSHA's position is to "treat all human blood and other potentially infectious materials **as if they were infectious** for HBV and HIV." Consequently, in the event that an employee does administer CPR or render first-aid involving contact with a victim's blood or other bodily fluid, occupational exposure as defined above is presumed.

In essence, designated first-aid providers must receive specific training required by the bloodborne pathogens standard but do not otherwise fall under the bloodborne pathogen requirements unless and until they administer first-aid. Training is required for all first-aid providers upon initial assignment and annually thereafter. In addition all first-aid providers are offered HBV vaccination as required in the standard. Training records will be maintained for a minimum of three years.

While there is some risk associated with any contact with another human being's body fluids, the risk associated with providing emergency first-aid is low and the measures set out below are intended to reduce the risk even further. The prevailing opinion in the emergency medical community is that the direct life-saving benefits of immediate emergency assistance (i.e., administering CPR to a heart attack victim, or controlling severe bleeding in traumatic injury cases), far outweigh the risks associated with properly administered assistance. Nevertheless, first-aid providers shall take reasonable precautions to limit contact with the victim’s body fluids.

Nitrile, neoprene, and/or latex gloves, CPR masks, cleansing wipes and red plastic "biohazard" bags should be included in all first-aid kits. The use of “biohazard’ bags are the only labeling requirement anticipated for communication of hazards. In the event that it is necessary for you to administer first-aid to another person or CPR in the course of your job duties, use nitrile, neoprene, and/or latex gloves and/or the CPR mask, as appropriate. Place all potentially contaminated clothing and other contaminated items into the red "biohazard" bag. Either give the bag to the EMTs upon their arrival or bring it back to the office and give it to the HSC for proper disposal. Do not eat anything, smoke, or touch your eyes until you thoroughly wash your hands with at a minimum soap and water. Disposable rescue masks and nitrile, neoprene, and/or latex gloves are available through the HSC, and are standard field equipment for personnel designated as first-aid providers in the field.

Golder staff should immediately report any non-life threatening work-related injury or exposure incident to WorkSafe at 888-449-7787. WorkSafe will communicate with the appropriate office manager and Human Resources Representative (HRR) for injury or exposure reporting.

If necessary, WorkSafe will request for testing of the "source individual's" blood for HIV and HBV. The results of the source individual's blood test will be made available to Golder's occupational physician as soon as possible through the injured person's attending physician.

The post-exposure medical evaluation will include a review of the exposure incident, a review of the exposed person's medical history including HBV vaccination status, a review of the source individual's blood test results if available, a baseline sample of your blood, and possibly (if appropriate in the opinion of the attending physician) a HBV vaccination or booster.

Following the post-exposure evaluation, the attending physician will provide a written opinion to the National Leader Health, Safety, and Environment (NLHSE). This opinion shall be limited to a statement that you have been informed of the results of the evaluation and told of the need, if any, for any further evaluation or treatment. Golder is required to provide the affected staff with a copy of the physician's opinion within 15 days. The physician's written opinion shall be the only information provided to Golder's HHR regarding the exposure incident; all other medical findings and records will remain confidential. Medical records will be maintained for a period of 30 years plus employment as required under 29 CFR 1910.1020 and available to the employees on request.

2.2 First-Aid Facilities

First-aid supplies shall be readily accessible in the office and at all job sites. First-aid supplies shall meet at a minimum the American National Standards Institute (ANSI) Standard Z308.1-2003. A listing of first-aid items identified by the ANSI Standard Z308.1-2003 can be found in Appendix 1 below.

The contents of the first-aid kits shall be checked before being sent out to each job site by the HSC, Project Manager, or the Site Safety Officer (SSO). For long term projects, weekly on the job site inspections shall be conducted by the SSO to make sure the first-aid supplies are intact and/or that any expended items are replaced. First-aid kits shall consist of the appropriate items identified by Appendix 1 of this document and stored in a weather proof container with individually sealed packages of each item.

The HASEP shall identify the emergency action plan to be used in getting an injured person to a physician or hospital. In the event that the area is not served by emergency services (i.e. "911"), a list of the telephone numbers and addresses of doctors, hospitals and ambulance services shall be posted at each first-aid station or within the field vehicle(s). For field operations, the list shall also include the address location of the worksite.

In the absence of readily accessible first-aid facilities all drill rigs, trucks, field trailers and similar work areas must be equipped with not less than a 10 person first-aid kit.

All vehicles used for transporting workers must be equipped with not less than a 10 person first-aid kit. When more than five employees are being transported on any one trip, the first-aid kit shall be increased in size depending upon the number of personnel being transported.

At least one first-aid kit must be available on all field operations. The size and quantity of first-aid kits required to be located at any site shall be determined by the number of personnel normally dependent upon each kit. Consult the HSC for kit requirements.

First-aid stations are required when there are 50-200 persons working at a field worksite. They must be located as close as practicable to the highest concentration of personnel. First-aid stations must be well marked and available to personnel during all working hours. First-aid stations shall be equipped with a minimum of two first-aid kits, the size of which shall be dependent upon the number of personnel normally employed at the worksite. One first-aid kit may be a permanent wall-mounted kit, but in all cases the station shall be equipped with at least one portable first-aid kit. One person holding a valid first-aid certificate and in a position of responsibility shall be responsible for the maintenance of each office and field first-aid station.

- Maintenance of first-aid kits stationed within the office is the responsibility of the HSC
- Maintenance of first-aid kits in the laboratory is the responsibility of the lab manager
- Maintenance of first-aid kits in project related vehicles and establishment of a first-aid station where required is the responsibility of the field manager or Project Manager for the project

Where the eyes or body of any person may be exposed to injurious chemicals and/or materials, facilities for quick drenching or flushing of the eyes and body must be provided. Facilities are provided for immediate emergency use in the laboratory and must be provided near the work area or office trailer for site related activities.

3.0 JOB RELATED INJURIES AND ILLNESSES

If an employee is injured on the job or is exposed to an agent that causes immediate illness or is exposed without benefit of protective equipment to known hazardous materials, this injury or exposure must be reported immediately to the office HRR. The employee may elect to call WorkCare at 888-449-7787. WorkCare will notify the corporate HRR and within 24 hours they will notify the NLHSE. If the injury occurs in the state in which the employee resides, the physician's "first report of injury" will initiate a Worker's Compensation Claim. If an employee is injured outside of their state of residence, the Worker's Compensation Claim must be initiated from the employee's "home" office.

The HRR must make a determination if the injury or illness is OSHA recordable on the 300 Log. This determination MUST be made as soon as possible (i.e. within 24 hours). In many cases an injury or illness that requires medical attention by a physician may be considered a recordable or lost-time accident and must be entered into the office OSHA 300 Log. The OSHA 300 Log must be kept current at all times to comply with OSHA regulations. Once the incident information is recorded, an e-mail must be sent to the GAI President; HRR, and the NHSL with the following information:

- Employee name
- Office location
- Project manager
- Incident description

Records will be maintained by the HRR for all cases of occupational injury and illness, which may include the following:

- Every occupational illness
- Every occupational injury that results in one of the following:
  1. Fatality
  2. Unconsciousness
  3. Inability to perform all phases of regular job
  4. Inability to work full time on regular job
  5. Temporary assignment to another job
  6. Medical treatment beyond first-aid

All injuries or illnesses are OSHA recordable unless:

- Visits to a physician or other licensed health care professional are solely for observation or counseling
- The procedure is diagnostic in origin such as x-rays, blood tests or related administration of prescription medications
- The treatment is limited to first-aid and means the following:
  1. Using non-prescription medications at non-prescription strength
  2. Administering tetanus immunizations
  3. Cleaning, flushing or soaking wounds on the surface of the skin
  4. Using wound coverings such as bandages, gauze pads and butterfly strips
  5. Using hot or cold therapy
  6. Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc.

7. Using temporary immobilization while transporting an accident victim
8. Drilling a finger or toenail to relieve pressure or draining fluid from a blister
9. Using eye patches
10. Removing foreign bodies from the eye using only irrigation or a cotton swab
11. Removing splinters or foreign material from other than the eye by irrigation, tweezers, cotton swabs or other simple means
12. Using massages (physical therapy or chiropractic treatment are medical treatment)
13. Drinking fluids for relief of heat stress

Following incidents that are OSHA recordable, employees are to enter the recordable into Golder's Learnings Database. An incident investigation must be conducted by the HSC and the Project Manager. This incident investigation must be completed within one week of the incident. A copy of the incident investigation must be provided to the NLHSE immediately after completion. The NLHSE will follow-up on all OSHA recordable accidents to implement prevention-related activities.

State and federal law requires that within 8 hours of the occurrence of a work related accident which results in an immediate or probable fatality, or which results in the hospitalization of three or more employees, Golder must report the accident, by telephone or telegraph, to the nearest appropriate state or federal regulatory agency. The Golder reporter shall relate the circumstances of the accident, the numbers of fatalities, and the extent of any injuries. The NLHSE will follow up with a written report and shall respond to any additional requests for information from the state or federal regulatory agency.

Equipment involved in an accident resulting in an immediate or probable fatality must not be moved until a representative of the appropriate state or federal regulatory agency investigates the accident and releases such equipment, except where removal is essential to prevent further injuries or accidents. Where moving of equipment is necessary to remove the victim, such equipment may be moved only to the extent of making possible such removal.

All Golder staff shall assist the appropriate regulatory agency in every way in investigating accidents or incidents. Personnel responsible for supervision, or witnesses to the accident shall likewise provide assistance to the fullest extent required.

4.0 APPLICABLE OSHA REGULATION PARTS

- 1926.50 "Medical Services and First Aid".

5.0 RELATED GOLDER DOCUMENTS

- GAI HSE 200.036 SWP Bloodborne Pathogens.

APPENDIX 1

FIRST-AID CHECKLIST

List of Minimum Required First-Aid Kit Equipment per ANSI Z308.1-2003

Quantity	Description
1	Absorbent Compress, 32 sq. in. with no side smaller than 4 in.
16	Adhesive Bandages, 1 x 3 in.
1	Adhesive Tape, 5 yds.
10	Antiseptic, 0.5 g (0.14 fl. oz.) application
6	Burn Treatment, 0.5 g (.014 fl. oz.) application
4	Medical Exam Gloves
4	Sterile Pad, 3 x 3 in.
1	Triangular Bandage, 40 x 40 x 56 in. - 1 each
16	Analgesic/Pain Reliever (i.e. Tylenol, Aspirin)
6	Antibiotic Treatment 1/32 oz
4	Bandage Compress 2" x 36"
2	Bandage Compress 3" x 36"
1	Bandage Compress 4" x 36"
1	Breathing Barrier
1	Burn Dressing 4" x 4"
1	Cold Pack
2	Eye Covering, 2.9 sq Inches per eye
1	Eye Wash 1 oz
1	Roller Bandage 4" x 6 yd
2	Roller Bandage 2" x 6 yd
1	Bloodborne Pathogens Exposure Prevention Kit

Caution: This kit meets ANSI Z308.1–2003 only when the minimum is maintained with first-aid products marked “ANSI Z308.1–2003.”

APPENDIX E

GROUNDWATER MONITORING PLAN
(FORMERLY ATTACHMENT II-A OF PART 373 PERMIT)

APPENDIX E

GROUNDWATER MONITORING PLAN

Site Management Plan

Vanchlor Landfill Site

To assure consistency in the sampling program, Vanchlor shall follow this NYSDEC approved Groundwater Monitoring Plan. This Plan must be kept at the facility, and regularly updated with current monitoring well and groundwater quality data. Vanchlor shall ensure that all appropriate site personnel and outside contractors have been properly trained in the application of the Groundwater Monitoring Plan, and that this Plan is followed whenever samples are obtained at the site.

1.0 PRE-SAMPLING PROCEDURES

1.1 Procurement, inspection, and calibration of equipment

All field instrumentation shall be calibrated before use following manufacturer's recommended procedures for calibration.

1.2 Procurement and preparation of sample bottles

Sample bottles shall be obtained from the analytical laboratory being used for the sampling program. Bottle procurement shall follow the contract laboratory procedures. All sample bottles shall be prepared in accordance with EPA protocol.

1.3 Storage and handling of sampling equipment between uses

Each well has a dedicated stainless steel bailer. The hailers are stored in separate closed PVC casings.

1.4 Personal protective equipment

During sampling, employees shall be required to wear impervious rubber gloves and safety glasses with side shields. The rubber gloves shall be discarded between wells to prevent cross contamination.

1.5 Well purging techniques

Each monitoring well shall be purged in the morning of the sampling event to remove stagnant water contained in the well casing. Purging will be conducted with dedicated stainless steel bailers. Bailers will be rinsed with deionized water prior to purging the wen· and prior to sampling. Three well volumes shall be removed from the well or until the well is dry. All information related to the well purging shall be recorded on the well log.

1.6 Water level measuring technique

An electronic measuring device shall be used to measure water level elevations. In the case of using non-dedicated measuring devices, all components of the device that will enter the well shall be thoroughly rinsed with deionized water before and after measurement of the well. Water level elevations shall be measured prior to purging and prior to sampling. Records of the water level

elevations shall be recorded on the well logs. The depth of the well shall also be measured and recorded once a year, during the last sampling event of the calendar year, to determine if the screen is obstructed , or if there is an excessive silt buildup.

1.7 Laboratory notification/verification

The designated date of sampling is conveyed by phone to the laboratory personnel to coordinate sampling and analysis.

2.0 SAMPLING PROCEDURES

2.1 Use of sampling equipment

Collection of samples from monitoring wells will be accomplished with a new polyethylene rope attached to a dedicated stainless steel bailer for each well. This rope will be discarded after each sampling event.

Prior to sampling, the inside and outside of the bailer shall be rinsed thoroughly with deionized water (this step may be omitted if the sampling is taking place immediately following purging of the well). The bailer shall be lowered slowly into the well being careful not to hit the bottom of the well casing. The sample shall be poured directly from the bailer into the sample bottles.

After sample collection, each bailer shall be thoroughly rinsed with deionized water and returned to its dedicated case. The rope shall be discarded after each sampling event.

2.2 Field measurements and calibration

All field instrumentation shall be calibrated before use following manufacturer's recommended procedures for calibration.

2.3 Sampling, handling, and order of collection techniques

The wells shall be sampled from the least contaminated to the well with the highest contamination levels. The order of sampling shall be as follows: Eighteen Mile Creek, D-55, VDM-9, VDM-10, VDM-11, and VDM-14. VDM-12 shall be sampled if water is found to be present. VDM-12 shall be checked for the presence of water by using an electronic measuring device. The water level or well depth, if the well is dry, shall be reported for each sampling event.

VOA vials will be filled first, and will be checked to ensure that no air bubbles are present. The sample bottles that remain will be filled according to size, largest to smallest, with at least 75% capacity filled. The pH will be measured on a small separate aliquot.

2.4 Sample containers to be used

Sample containers shall be of a type as required by EPA protocol and as designated by the analytical laboratory conducting the analysis.

2.5 Sample preservation techniques

Sample preservation shall be in accordance with EPA protocol. Preservatives shall be added by the laboratory providing the sample containers and conducting the analysis.

2.6 Sample labels

The sample labels shall contain the date and. time of sampling, well location, the person taking the sample, and the preservative added. Other information on the label shall be as required by the laboratory conducting the analysis for QA/QC procedures.

2.7 Sample storage

The samples shall be placed in an insulated chest with ice (other cooling media) immediately after collection. The samples shall be transported to the laboratory conducting the analysis the same day as the collection occurs.

2.8 Field QA/QC, Cleaning, blanks, and duplicates

Cleaning of the sampling equipment is covered in sections 2.1

A trip blank form shall accompany the sample containers from the laboratory to the field and back at the laboratory. The trip blank shall be tested for VOAs.

Duplicate samples are taken from the well with the quickest recovery time (VDM-14). Duplicate samples for all parameters shall be collected in the following manner. For each parameter collected at the well, the duplicate and the initial sample from the well shall be collected from the same bailers at the same time with each sample bottle receiving approximately the same volume from each bailer. (For example – at well VDM-14 – collection of the duplicate sample. VOAs are collected first. Taking one VOA labeled for VDM-14 and one VOA labeled for the duplicate, partially fill one then partially fill the other. Then go back and finish filling the first; then finish filling the second. Each sample bottle shall receive approximately equal amounts of water from the bailer. This procedure shall be followed with each Sample bottle for each parameter until all sample bottles for the initial sample and the duplicate sample are filled.)

2.9 Sample shipping and chain of custody

Samples shall be shipped in an insulated ice chest with an adequate cooling media. Chain of custody records shall be filled out in the field. When the samples are delivered to the laboratory performing the analysis, the chain of custody shall be completed and returned with the analytical results.

3.0 LABORATORY HANDLING AND ANALYSIS

The laboratories used for the groundwater monitoring program analysis shall be limited to laboratories who are certified under the NYSDOH ELAP to conduct the analysis ·covered under the plan and can carry out the QA/QC requirements as specified in Attachment 2 of this module.

Copies of the laboratory QA/QC programs shall be provided to the Department upon request.

4.0 BACKGROUND INFORMATION AND WELL RECORD FOR EACH MONITORING WELL

Background information and well record on each monitoring well is provided in Attachment 1-A.

5.0 STATISTICAL AND OTHER EVALUATION METHODS FOR GROUNDWATER QUALITY DATA

5.1 Annual evaluation of groundwater data

Vanchlor shall prepare concentration versus time plots for each monitoring well.

5.2 Annual evaluation of groundwater data

The annual report shall address the following:

(i) Groundwater quality data will be compared on an inter-well basis to background water quality data for that parameter if the groundwater protection concentration is exceeded. Additional data analysis will be performed if the groundwater concentration for any parameter at any monitoring well exceeds the background water concentration value for that parameter by 3 standard deviations and also exceeds the groundwater protection concentration for that parameter.

(ii) For parameters that exceed the background water quality concentration by 3 standard deviations and exceed the groundwater protection concentration for that parameter, a moving average trend test will be performed. Moving average trend tests are used with time dependent groundwater data to reduce the fluctuations in analytic concentrations due to seasonal variations in the groundwater flow regimes. The use of moving average calculations with detected parameters will provide an indication of upward or downward trends over time.

The four most recent results for each parameter will be averaged and graphed with time. The use of moving average will provide information on the long term trend of constituent concentration levels while smoothing out seasonal variations which may be present. After the moving average has been plotted for several sampling events, a linear trend line will be fitted to the curve using a least squares analysis. If the trend analysis indicates an increasing concentration trend for two years, and this trend is contrary to the upgradient groundwater quality trends, then the Department will be notified and the additional evaluation below will be performed.

(iii) For parameters that show an increasing concentration trend over a two year period, the trends in Eighteen Mile Creek will be reviewed for increasing concentrations of the parameter in question. If the concentration of the parameter in question in Eighteen Mile Creek shows an increasing trend, Vanchlor shall prepare and submit a corrective measures plan to the Commissioner.

5.3 Data handling

Analytical data for all parameters will be entered into a computer spreadsheet (i.e.; Excel or Lotus). The spreadsheet will be used to generate graphs showing the changes in concentration over time for each monitoring well and to compare downgradient monitoring well concentrations. Analytical results that are reported as "not detected" will be recorded in the spreadsheet at the detection limit of the analytical method used with a notation indicating that the compound was not detected at the specified detection limit.

Concentrations of a compound detected below laboratory quantification limits will be recorded at the quantified value and footnoted as such.

The permittee shall submit an updated electronic file of the groundwater data to the Department as part of the annual report. The file shall be in spreadsheet form; such as Excel or Lotus, or some other mutually acceptable file format.

6.0 COMPONENTS REQUIRED FOR ANALYTICAL DATA

Analysis shall be performed for the parameters specified Table 3 of the Site Management Plan.

7.0 MONITORING LOCATION AND FREQUENCY

7.1 Monitoring locations

The monitoring network shall consist of the following: Wells VDM 9R, VDM-1 0, VDM-11, VDM-12, VDM-14, and D-55. Eighteen Mile Creek shall also be sampled at a location just downstream of the site but upstream of the City of Lockport Wastewater treatment plant SPDES discharge point (refer to SMP Figure 1 for surface water sampling location)

VDM-9R, 10, and 11 are groundwater monitoring wells on the down gradient outer boundaries of the landfill site. Monitoring well VDM-12 is located in the center of the landfill.

Monitoring well VDM-14 is located in the interceptor trench, a trench filled with crushed limestone, along the northern edge of the landfill.

Monitoring well D-55 is the upgradient monitoring location.

Eighteen Mile Creek will be sampled during each annual sampling event. Eighteen Mile Creek is the receptor for the groundwater leaving the site.

7.2 Monitoring frequency

Samples shall be collected on an annual basis.

7.3 Sampling Schedule

The monitoring points shall be sampled during the third quarter of each calendar year.

7.4 Inability to Obtain Representative Samples

1. If Vanchlor knows that a well may not provide a representative sample, or accurate piezometric values, may be damaged, or is inaccessible, they shall within seven (7) days of such knowledge notify the Commissioner of the problem in writing and propose a remedy. Within fourteen days (14) days of such knowledge, Vanchlor shall attempt to remedy the problem and, when appropriate, sample or resample the well. Within twenty-one (21) days of such knowledge, Vanchlor shall, through written notice to the Commissioner, provide information which describes the nature of the problem.

   In addition, the notification shall contain:

   (a) A description of how the problem with the well has been rectified; or

   (b) A schedule for the rehabilitation or replacement of the well.

If a problem with the well prevented Vanchlor from obtaining a scheduled sample, a sample shall be obtained within fourteen (14) days after rehabilitation or replacement of the well.

2. If Vanchlor knows that an error in either sampling or analytical methods has occurred, the affected samples shall be retaken within fourteen (14) days of such knowledge.

7.5 Well Maintenance

The groundwater monitoring system shall be maintained to ensure that all monitoring points yield representative samples of high integrity. During each sampling event, all wells in the monitoring network shall be inspected for integrity in accordance with the groundwater monitoring system inspection plan contained herein. Should a well be found to be damaged beyond usability, blocked, or broken, or fail to recharge properly, it shall be repaired or abandoned and replaced if necessary. Should any cracking or frost heaving of the grout be observed, repairs will be made and the top of the inner well casing resurveyed to insure accurate definition of groundwater elevations. All repairs or replacements shall be completed prior to the next scheduled sampling event.

7.6 Collection of Groundwater Samples by NYSDEC

At the request of the Department, Vanchlor shall allow the Department, or its authorized representative, to collect samples or splits of any samples collected by the permittee pursuant to the requirements of this permit. Similarly, at the request of Vanchlor, the Department will allow Vanchlor or authorized representatives to take splits or duplicates of any samples collected by the department. Vanchlor shall provide for adequate disposal of purge water whenever samples are collected by the Department. Vanchlor shall notify the Regional Office (716-851-7220) at least one week prior to conducting any field-related activities at the landfill site.

7.7 Well Construction

All groundwater monitoring wells installed after the effective date of the approved SMP, and pursuant to the requirements of the SMP, shall be constructed in accordance with the most recent RCRA requirements and guidelines. Work plans which include proposed well installations shall include a description of installation procedures, and materials to be used.

APPENDIX E

Attachment 1-A

Well Purging / Sampling Data

WELL D-55:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 469.45 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 422.40

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 469.45 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 422.40

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

Well Purging / Sampling Data

WELL VDM-9R:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 448.95 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 416.40

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 448.95 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 416.40

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

Well Purging / Sampling Data

WELL VDM-10:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 444.89 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 398.70

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 444.89 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 398.70

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

Well Purging / Sampling Data

WELL VDM-11:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 450.74 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 427.70

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 450.74 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 427.70

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

Well Purging / Sampling Data

WELL VDM-12:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 451.52 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 436.10

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 451.52 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 436.10

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

Well Purging / Sampling Data

WELL VDM-14:

WELL PURGING DATA: DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 445.28 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 434.00

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

WELL SAMPLING DATA:

DATE:_____

START TIME:_____ FINISH TIME:_____

A: MP ELEVATION: 448.28 FEET

B: DEPTH TO WATER: _____FEET

C: DEPTH OF WELL INSTALLED: 434.00

D: STATIC WATER LEVEL: C-D = _____FEET

E: WELL VOLUME: E * 0.1636 = _____GALLONS

F: DEPTH OF WELL AS MEASURED: _____FEET

G: pH OF SAMPLE: _____pH

H: pH METER CALIBRATED?: YES [ ] NO [ ]

I: SAMPLES OBTAINED:

1- TOTAL METALS, 1 TOTAL CHLORIDES, 2 VOAs

J: WEATHER CONDITIONS:_____

K: SAMPLER(S): _____

L: COMMENTS: _____

APPENDIX E

Attachment 1-B

Groundwater Monitoring System Inspection Plan and Form

A. Inspections of the groundwater monitoring system shall be performed on an annual basis to conform with the SMP monitoring schedule. Personnel trained in groundwater sampling, collection and sample preservation techniques will be used. The inspection form located below or an equivalent form shall be used. The original inspection forms shall be maintained by Vanchlor in an inspection log book or file for the full term of the Administrative Order governing the implementation of the SMP. Copies of the inspections shall be submitted with the annual monitoring reports.

B. The well inspection will include visual inspection of the security cap and lock, condition of the surface grout, and the condition of the inner casing and cap. During well purging, the relative rate of recharge should be noted for comparison with the previous data to insure that the well screen in not plugged. Also during purging and sampling, the integrity of the well shall be inspected by measuring the total well depth and noting the presence of any obstructions such as casing bends, foreign objects or siltation. The measured well depth shall be compared to the “as-built” well depth.

C. If it becomes apparent that a well is not capable of providing representative samples, Vanchlor shall notify the Department within one week of the sampling event.

Landfill/Groundwater Monitoring System Inspection Form

1.	Is the integrity of the cover and ditch lining satisfactory?		YES	NO
	1.1	Any sink holes or depressions?	YES	NO
	1.2	Significant erosion of the banks?	YES	NO
	1.3	Any visible problems?	YES	NO
2.	Is the integrity of the vegetative cover satisfactory?		YES	NO
	2.1	Is the grass healthy looking?	YES	NO
	2.2	Are there any bare spots?	YES	NO
	2.3	Is the grass less than 8” tall?	YES	NO
	2.4	Are there trees or bushes growing in the cover?	YES	NO
3.	Is drainage from the site satisfactory?		YES	NO
	3.1	Is there any ponding or puddling?	YES	NO
4.	Is the fence surrounding the site secure?		YES	NO
	4.1	Any holes or damage?	YES	NO
	4.2	Signs in place every 50 feet?	YES	NO
	4.3	Accessible entry to the site?	YES	NO
	4.4	Property “Posted Signs” visible and intact?	YES	NO

5. Are all of the covers on the monitoring wells locked? YES NO
    5.1 Caps on all of the risers? YES NO

6. Is there any iron staining in the drainage ditch? YES NO

7. Are there any visible seeps in the cliff face? YES NO

8. Are the wells in good condition? YES NO
    8.1 Any damage to the outer casing? YES NO
    8.2 Obstructions in the riser? YES NO
    8.3 Excessive sediment buildup in any wells? YES NO

Name of inspector:

Signature:_____ Date:_____

APPENDIX E

Attachment 2

Laboratory QA/QC

Deliverables

COMPONENTS REQUIRED FOR RCRA ANALYTICAL DATA SUBMITTED TO
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

A Report Narrative should accompany each submission, summarizing the contents, results and relevant circumstances of the work.

A. Parameter Requested.

B. Sample Number or Numbers, Matrix, and:

1. Date and time collected
2. Date extracted and/or digested
3. Date and time analyzed
4. Chain of custody report and/or form, including confirmation of unbroken chain of custody, intact sample packaging and container seals and adequate temperature and/or other preservation.

C. Results[b,c,f]

1. Sample results
2. Duplicate
3. Blank[a]
4. Spike; spike duplicate
5. Surrogate recoveries, if applicable

D. Supporting QA/QC[b,e]

1. Methodology
2. Method detection limits, instrument detection limits[c]
3. Linear curves
4. Percent solids
5. Calculations[d]
6. Cleanup procedures
7. Data validation procedures and completed data validation checklists
8. Documentation which illustrates how blank water is determined to be analyte-free

In addition to submitting the above, all sample data and its QA/QC data as specified in SW-846, 3rd edition, Chapter 1, must be maintained accessible to NYSDEC either in hard copy or computer data files. The data, if requested by NYSDEC should be formatted as described in SW-846, 3rd edition, Chapter 1. This requirement may be changed in the future to mandate computer data files, accessible to NYSDEC on request.

This does not obviate the requirement to do the QA/QC specified in each individual EPA-approved method.

* Components for RCRA submissions for non-contract Lab Protocols, if CLP, then CLP deliverables are required, unless otherwise stated in the approved plan.

a. The data should include all blanks (trip, equipment rinse, method and instrument blanks) as specified in the sampling and analysis plan, guidance and regulation.

b. Supporting QA/QC should be specific to the RCRA samples analyzed.

c. Every effort practicable must be made to achieve optimal detection limits below regulatory limits and comparable to the Practical Quantification Limits specified in the EPA-approved methods.

d. Alternatively, include QA/QC summaries validating the data, including calibration control charts, correlation coefficients, etc. The Report Narrative should describe the data validation and explain discrepancies. The supporting data should be provided to NYSDEC upon request.

e. Frequencies of blanks, duplicates, spikes, surrogates, calibrations, standard reference materials, etc. should be stated in the approved sampling and analysis plan, the approved analytical methods and the SW-846 3rd edition, Chapter 1, requirement. If there are any perceived conflicts, these should be resolved with NYSDEC in advance of sampling.

f. Spiking for metals, organics or other parameters must be done before sampling preparation (i.e., before digestions, extractions, etc.) unless otherwise stated in the approved plan. Furnace analysis for metals will still require post-digestion spikes on all samples analyzed by this technique.

APPENDIX F

QUALITY ASSURANCE/QUALITY CONTROL PLAN

APPENDIX F
QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PLAN

SITE MANAGEMENT PLAN

1.0 INTRODUCTION

This Quality Assurance/Quality Control Plan is designed to provide an overview of QA/QC procedures. It will give specific methods and QA/QC procedures for chemical testing of environmental samples obtained from the site. In addition, it will ensure the quality of the data produced.

The Site Management Plan (SMP) Project Manager will be responsible for verifying that QA procedures are followed in the field. This will provide for the valid collection of representative samples. The Project Manger will be in direct contact with the analytical laboratory to monitor laboratory activities to help ensure that holding times and other QA/QC requirements are met. The estimated annual number of soil/fill, stormwater and sediment samples and corresponding analytical parameters/methods are provided in Table 1. These sample quantities may vary depending on groundwater availability and adjustments to routine media monitoring requirements under the SMP monitoring program.

In addition to overall project coordination, the Project Manager will be responsible for overseeing both the analytical and field QA/QC activities. The ultimate responsibility for maintaining quality throughout the project rests with the Project Manager.

Table 1: Analytical Summary Table – Groundwater & Surface Water

Parameter	EPA Method	Groundwater/Surface Water Samples [1]
VOC	8240	11
Metals	6010	10
Chloride	9251	10
pH	9040	10

Notes: 1. Includes 1 MS/MSD and 1 duplicate sample

The analytical laboratory proposed for use for the analysis of samples will be a certified NYSDOH ELAP laboratory for the appropriate categories. The QA Manager of the laboratory will be responsible for performing project-specific audits and for overseeing the quality control data generated.

2.0 DATA QUALITY OBJECTIVES

2.1 Background

Data Quality Objectives (DQOs) are qualitative and quantitative statements, which specify the quality of data required to support the investigation of the Site. DQOs focus on the identification of the end use of the data to be collected. The project DQOs will be achieved utilizing the definitive data category, as outlined in *Guidance for the Data Quality Objectives Process*, EPA QA/G-4 (September 1994). All sample analyses will provide definitive data, which are generated using rigorous analytical methods, such as the reference methods approved by the United States Environmental Protection Agency (USEPA). The purpose of this investigation is to assess the performance and effectiveness of the remedy and the overall reduction in contamination at the site.

Within the context of the purpose stated above, the project DQOs for data collected during this investigation are:

- To assess the nature/extent of contamination in groundwater.
- To maintain the highest possible scientific/professional standards for each procedure.
- To develop enough information to assess if the levels of contaminates identified in the media sampled are increasing or decreasing.

2.2 QA Objectives for Chemical Data Measurement

Sample analytical methodology for the media sampled and data deliverables will meet the requirements in the most recent NYSDEC Analytical Services Protocol (ASP). Laboratories will be instructed that completed **Sample Preparation and Analysis Summary forms** are to be submitted with the analytical data packages. The laboratory also will be instructed that matrix interferences must be cleaned up, to the extent practicable. Data usability summary reports (DUSRs) will be generated. In order to achieve the definitive data category described above, the data quality indicators of precision, accuracy, representativeness, comparability, and completeness will be measured during offsite chemical analysis.

2.2.1 Precision

Precision examines the distribution of the reported values about their mean. The distribution of reported values refers to how different the individual reported values are from the average reported value. Precision may be affected by the natural variation of the matrix or contamination within that matrix, as well as by errors made in field and/or laboratory handling procedures. Precision is evaluated using analyses of a laboratory matrix spike/matrix spike duplicate (for organics) and matrix duplicates (for inorganics), which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. Relative Percent Difference (RPD) is used to evaluate precision. RPD criteria must meet the method requirements identified in Table B-1.

2.2.2 Accuracy

Accuracy measures the analytical bias in a measurement system. Sources of error are the sampling process, field contamination, preservation, handling, sample matrix, sample preparation, and analysis techniques. These data help to assess the potential concentration contribution from various outside sources. The laboratory objective for accuracy is to equal or exceeds the accuracy demonstrated for the applied analytical methods on samples of the same matrix. The percent recovery criterion is used to estimate accuracy based on recovery in the matrix spike/matrix spike duplicate and matrix spike blank samples. The spike and spike duplicate, which will give an indication of matrix effects that may be affecting target compounds is also a good gauge of method efficiency.

2.2.3 Representativeness

Representativeness expresses the degree to which the sample data accurately and precisely represent the characteristics of a population of samples, parameter variations at a sampling point, or environmental conditions. Representativeness is a qualitative parameter, which is most concerned with the proper design of the sampling program or sub-sampling of a given sample. Objectives for representativeness are defined for sampling and analysis tasks and are a function of the investigative objectives. The sampling procedures have been selected with the goal of obtaining representative samples for the media of concern.

2.2.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. A DQO for this program is to produce data with the greatest possible degree of comparability. This goal is achieved through using standard techniques to collect and analyze representative samples and reporting analytical results in appropriate units. Complete field documentation will support the assessment of comparability. Comparability is limited by the other parameters (e.g., precision, accuracy, representative-ness, completeness, comparability), because only when precision and accuracy are known can data sets be compared with confidence. In order for data sets may be comparable, it is imperative that contract-required methods and procedures be explicitly followed.

2.2.5 Completeness

Completeness is defined as a measure of the amount of valid data obtainable from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is important that appropriate QA procedures be maintained to verify that valid data are obtained in order to meet project needs. For the data generated, a goal of 90% is required for completeness (or usability) of the analytical data. If this goal is not met, then NYSDEC and GOLDER project personnel will determine whether the deviations might cause the data to be rejected.

3.0 SAMPLING LOCATIONS, CUSTODY, HOLDING TIMES, & ANALYSIS

Sampling locations and procedures are discussed in Section 3.2.1 and Appendix D of the SMP. Procedures for chain of custody, holding times, and laboratory analyses shall be followed as per SW-846 and as per the laboratory's Quality Assurance Plan. All holding times begin with validated time of sample receipt (VTSR) at the laboratory. The laboratory must meet the method required detection limits which are referenced within the methods.

4.0 CALIBRATION PROCEDURES AND FREQUENCY

In order to obtain a high level of precision and accuracy during sample processing procedures, laboratory instruments must be calibrated properly. Several analytical support areas must be considered so the integrity of standards and reagents is upheld prior to instrument calibration. The following sections describe the analytical support areas and laboratory instrument calibration procedures.

4.1 Analytical Support Areas

Prior to generating quality data, several analytical support areas must be considered; these are detailed in the following paragraphs.

Standard/Reagent Preparation - Primary reference standards and secondary standard solutions shall be obtained from National Institute of Standards and Technology (NIST), or other reliable commercial sources to verify the highest purity possible. The preparation and maintenance of standards and reagents will be accomplished according to the methods referenced. All standards and standard solutions are to be formally documented (i.e., in a logbook) and should identify the supplier, lot number, purity/concentration, receipt/preparation date, preparers name, method of preparation, expiration date, and any other pertinent information. All standard solutions shall be validated prior to use. Care shall be exercised in the proper storage and handling of standard solutions (e.g., separating volatile standards from nonvolatile standards). The laboratory shall continually monitor the quality of the standards and reagents through well documented procedures.

Balances - The analytical balances shall be calibrated and maintained in accordance with manufacturer specifications. Calibration is conducted with two Class AS" weights that bracket the expected balance use range. The laboratory shall check the accuracy of the balances daily and they must be properly documented in permanently bound logbooks.

Refrigerators/Freezers - The temperature of the refrigerators and freezers within the laboratory shall be monitored and recorded daily. This will verify that the quality of the standards and reagents is not compromised and the integrity of the analytical samples is upheld. Appropriate acceptance ranges (2 to 6°C for refrigerators) shall be clearly posted on each unit in service.

Water Supply System - The laboratory must maintain a sufficient water supply for all project needs. The grade of the water must be of the highest quality (analyte-free) in order to eliminate false-positives from the analytical results. Ultraviolet cartridges or carbon absorption treatments are recommended for organic analyses and ion-exchange treatment is recommended for inorganic tests. Appropriate documentation of the quality of the water supply system(s) will be performed on a regular basis.

4.2 Laboratory Instruments

Calibration of instruments is required to verify that the analytical system is operating properly and at the sensitivity necessary to meet established quantitation limits. Each instrument for organic and inorganic analyses shall be calibrated with standards appropriate to the type of instrument and linear range established within the analytical method(s). Calibration of laboratory instruments will be performed according to specified methods.

In addition to the requirements stated within the analytical methods, the contract laboratory will be required to analyze an additional low level standard at or near the detection limits. In general, standards will be used that bracket the expected concentration of the samples. This will require the use of different concentration levels, which are used to demonstrate the instrument's linear range of calibration.

Calibration of an instrument must be performed prior to the analysis of any samples and then at periodic intervals (continuing calibration) during the sample analysis to verify that the instrument is still calibrated. If the contract laboratory cannot meet the method required calibration requirements, corrective action shall be taken as discussed in Section 7.0. All corrective action procedures taken by the contract laboratory are to be documented, summarized within the case narrative, and submitted with the analytical results.

5.0 INTERNAL QUALITY CONTROL CHECKS

Internal QC checks are used to determine if analytical operations at the laboratory are in control, as well as determining the effect sample matrix may have on data being generated. Two types of internal checks are performed and are described as batch QC and matrix-specific QC procedures. The type and frequency of specific QC samples performed by the contract laboratory will be according to the specified analytical method and project specific requirements. Acceptable criteria and/or target ranges for these QC samples are presented within the referenced analytical methods.

QC results which vary from acceptable ranges shall result in the implementation of appropriate corrective measures, potential application of qualifiers, and/or an assessment of the impact these corrective measures have on the established data quality objectives. Quality control samples including any project-specific QC will be analyzed are discussed below.

5.1 Batch QC

Method Blanks - A method blank is defined as laboratory-distilled or deionized water that is carried through the entire analytical procedure. The method blank is used to determine the level of laboratory background contamination. Method blanks are analyzed at a frequency of one per analytical batch.

Matrix Spike Blank Samples - A matrix spike blank (MSB) sample is an aliquot of water spiked (fortified) with all the elements being analyzed for calculation of precision and accuracy to verify that the analysis that is being performed is in control. A MSB will be performed for each matrix and organic parameter only.

5.2 Matrix-Specific QC

Matrix Spike Samples - An aliquot of a matrix is spiked with known concentrations of specific compounds as stipulated by the methodology. The matrix spike (MS) and matrix spike duplicate (MSD) are subjected to the entire analytical procedure in order to assess both accuracy and precision of the method for the matrix by measuring the percent recovery and relative percent difference of the two spiked samples. The samples are used to assess matrix interference effects on the method, as well as to evaluate instrument performance. MS/MSDs are analyzed at a frequency of one each per 20 samples per matrix.

Matrix Duplicates - The matrix duplicate (MD) is two representative aliquots of the same sample which are prepared and analyzed identically. Collection of duplicate samples provides for the evaluation of precision both in the field and at the laboratory by comparing the analytical results of two samples taken from the same location. Obtaining duplicate samples from a soil matrix requires homogenization (except for volatile organic compounds) of the sample aliquot prior to filling sample containers, in order to best achieve representative samples. Every effort will be made to obtain replicate samples; however, due to interferences, lack of homogeneity, and the nature of the soil samples, the analytical results are not always reproducible.

Rinsate (Equipment) Blanks - A rinsate blank is a sample of laboratory demonstrated analyte free water passed through and over the cleaned sampling equipment. A rinsate blank is used to indicate potential contamination from ambient air and from sample instruments used to collect and transfer samples. This water must originate from one common source within the laboratory and must be the same water used by the laboratory performing the analysis. The rinsate blank should be collected, transported, and analyzed in the same manner as the samples acquired that day. Rinsate blanks for nonaqueous matrices should be performed at a rate of 10 percent of the total number of samples collected throughout the sampling event. Rinse blanks will not be performed on samples (i.e., groundwater) where dedicated disposable equipment is used.

Trip Blanks - Trip blanks are not required for nonaqueous matrices. Trip blanks are required for aqueous sampling events. They consist of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte free water. These samples then accompany the bottles that are prepared at the lab into the field and back to the laboratory, along with the collected samples for analysis. These bottles are never opened in the field. Trip blanks must return to the lab with the same set of bottles they accompanied to the field. Trip blanks will be analyzed for volatile organic parameters. Trip blanks must be included at a rate of one per volatile sample shipment.

6.0 CALCULATION OF DATA QUALITY INDICATORS

6.1 Precision

Precision is evaluated using analyses of a field duplicate and/or a laboratory MS/MSD which not only exhibit sampling and analytical precision, but indicate analytical precision through the reproducibility of the analytical results. RPD is used to evaluate precision by the following formula:

$$RPD = \frac{(X_1 - X_2)}{[(X_1 + X_2)/2]} \times 100\%$$

Where:

X_1 = Measured value of sample or matrix spike
X_2 = Measured value of duplicate or matrix spike duplicate

Precision will be determined through the use of MS/MSD (for organics) and matrix duplicates (for inorganics) analyses.

6.2 Accuracy

Accuracy is defined as the degree of difference between the measured or calculated value and the true value. The closer the numerical value of the measurement comes to the true value or actual concentration, the more accurate the measurement is. Analytical accuracy is expressed as the percent recovery of a compound or element that has been added to the environmental sample at known concentrations before analysis. Analytical accuracy may be assessed through the use of known and unknown QC samples and spiked samples. It is presented as percent recovery. Accuracy will be determined from matrix spike, matrix spike duplicate, and matrix spike blank samples, as well as from surrogate compounds added to organic fractions (i.e., volatiles, semivolatiles, PCB), and is calculated as follows:

$$Accuracy\ (\%R) = \frac{(X_s - X_u)}{K} \times 100\%$$

Where:

X_s - Measured value of the spike sample
X_u - Measured value of the unspiked sample
K - Known amount of spike in the sample

6.3 Completeness

Completeness is calculated on a per matrix basis for the project and is calculated as follows:

$$Completeness\ (\%C) = \frac{(X_v - X_n)}{N} \times 100\%$$

Where:

X_v - Number of valid measurements
X_n - Number of invalid measurements
N - Number of valid measurements expected to be obtained

7.0 CORRECTIVE ACTIONS

Laboratory corrective actions shall be implemented to resolve problems and restore proper functioning to the analytical system when errors, deficiencies, or out-of-control situations exist at the laboratory. Full documentation of the corrective action procedure needed to resolve the problem shall be filed in the project records, and the information summarized in the case narrative. A discussion of the corrective actions to be taken is presented in the following sections.

7.1 Incoming Samples

Problems noted during sample receipt shall be documented by the laboratory. The Golder Associates (Golder) Project Manager shall be contacted immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.2 Sample Holding Times

If any sample extraction and/or analyses exceed method holding time requirements, the Golder Project Manager shall be notified immediately for problem resolution. All corrective actions shall be documented thoroughly.

7.3 Instrument Calibration

Sample analysis shall not be allowed until all initial calibrations meet the appropriate requirements. All laboratory instrumentation must be calibrated in accordance with method requirements. If any initial/continuing calibration standards exceed method QC limits, recalibration must be performed and, if necessary, reanalysis of all samples affected back to the previous acceptable calibration check.

7.4 Reporting Limits

The laboratory must meet the method required detection limits listed in NYSDEC ASP, 10/95 criteria. If difficulties arise in achieving these limits due to a particular sample matrix, the laboratory must notify Golder project personnel for problem resolution. In order to achieve those detection limits, the laboratory must utilize all appropriate cleanup procedures in an attempt to retain the project required detection limits. When any sample requires a secondary dilution due to high levels of target analytes, the laboratory must document all initial analyses and secondary dilution results. Secondary dilution will be

permitted only to bring target analytes within the linear range of calibration. If samples are analyzed at a secondary dilution with no target analytes detected, the Golder Project Manager will be immediately notified so that appropriate corrective actions can be initiated.

7.5 Method QC

All QC method-specified QC samples, shall meet the method requirements referenced in the analytical methods. Failure of method-required QC will result in the review and possible qualification of all affected data. If the laboratory cannot find any errors, the affected sample(s) shall be reanalyzed and/or re-extracted/redigested, then reanalyzed within method-required holding times to verify the presence or absence of matrix effects. If matrix effect is confirmed, the corresponding data shall be flagged accordingly using the flagging symbols and criteria. If matrix effect is not confirmed, then the entire batch of samples may have to be reanalyzed and/or re-extracted/redigested, then reanalyzed at no cost. Golder shall be notified as soon as possible to discuss possible corrective actions should unusually difficult sample matrices be encountered.

7.6 Calculation Errors

All analytical results must be reviewed systematically for accuracy prior to submittal. If upon data review calculation and/or reporting errors exist, the laboratory will be required to reissue the analytical data report with the corrective actions appropriately documented in the case narrative.

8.0 DATA REDUCTION, VALIDATION, AND USABILITY

8.1 Data Reduction

Laboratory analytical data are first generated in raw form at the instrument. These data may be either in a graphic or printed tabular format. Specific data generation procedures and calculations are found in each of the referenced methods. Analytical results must be reported consistently. Identification of all analytes must be accomplished with an authentic standard of the analyte traceable to NIST or USEPA sources. Individuals experienced with a particular analysis and knowledgeable of requirements will perform data reduction.

8.2 Data Validation

Data validation is a systematic procedure of reviewing a body of data against a set of established criteria to provide a specified level of assurance of validity prior to its intended use. All analytical samples collected will receive a limited data review. The data validation will be limited to a review of holding times, completeness of all required deliverables, review of QC results (surrogates, spikes, duplicates) and a 10% check of all samples analyzed to ensure they were analyzed properly. The methods as well as the general guidelines presented in the following documents will be used during the data review USEPA *Contract Laboratory Program (CLP) Organic Data Review, SOP Nos. HW-6, Revision #11 and USEPA*

Evaluation of Metals Data for the Contract Laboratory Program based on 3/90, SOW, Revision XI. These documents will be used with the following exceptions:

- Technical holding times will be in accordance with NYSDEC ASP, 10/95 edition.
- Organic calibration and QC criteria will be in accordance with NYSDEC ASP, 10/95 edition. Data will be qualified if it does not meet NYSDEC ASP, 10/95 criteria.

Where possible, discrepancies will be resolved by the project manager (i.e., no letters will be written to laboratories). A complete analytical data validation is not anticipated. However, if the initial limited data audit reveals significant deviations and problems with the analytical data, project personnel may recommend a complete variation of the data.

9.0 REFERENCES

Comprehensive Environmental Response Compensation and Liability Act (CERCLA) Quality Assurance Manual, Final Copy , Revision I, October 1989.

National Enforcement Investigations Center of USEPA Office of Enforcement. *NEIC Policies and Procedures*. Washington: USEPA.

New York State Department of Environmental Conservation (NYSDEC). 1995. *Analytical Services Protocol*, (ASP) 10/95 Edition. Albany: NYSDEC.

APPENDIX G

NYSDEC SPECIFIED SEED MIXTURE

APPENDIX G – NYSDEC SPECIFIED SEED MIXTURE

DESCRIPTION OF TYPE A SEED MIXTURE

1. The Type "A" seed mixture is identified below.

Common Name	Variety	% of Mix	App. rate /acre
Tall Fescue	KY-31	36	70.6 lb.
Orchard Grass	Pennlate	15	29.4 lb.
Creeping red fescue	Ensylva	20	39.2 lb.
Perrenial ryegrass	Polly	25	49 lb.
Birds-foot trefoil*	Viking	4	7.8 lb

*All leguminous seeds requiring inoculation will be previously inoculated before sowing. Inoculant will accompany the seed or certificate of inoculation will accompany the seed mixture.

2. All seeding repair areas will include application of a turf starter fertilizer to the entire seeded area.

4. Fertilizer will conform to NYSDOT (1990) specification 713-03, Type 3 Fertilizer. Fertilizer may be either fluid or dry formation consisting of 10-6-4 NPK.

5. Fertilizer is applied to conform with NYSDOT (1990) specification 610-3.01 and 610-3.02. Application rate will be 800 pounds per acre.

6. Submittals are required for seed, fertilizer and mulch for Department review and approvals before purchase.

7. Seed, Fertilizer and Mulch may be applied by hydraulic application methods in conformance with NYSDOT (1990) specification 610-3.01.

At Golder Associates we strive to be the most respected global group of companies specializing in ground engineering and environmental services. Employee owned since our formation in 1960, we have created a unique culture with pride in ownership, resulting in long-term organizational stability. Golder professionals take the time to build an understanding of client needs and of the specific environments in which they operate. We continue to expand our technical capabilities and have experienced steady growth with employees now operating from offices located throughout Africa, Asia, Australasia, Europe, North America and South America.

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