OPERATION AND MAINTENANCE WORK PLAN

Prepared for

3M FACILITY
Tonawanda, New York

March 2000

Prepared by

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1. INTRODUCTION

In March 1999, the New York State Department of Environmental Conservation (NYSDEC) issued a Record of Decision (ROD) (Registry No. 915148) for the Minnesota Mining and Manufacturing Company (3M) facility in the Town of Tonawanda, New York. The ROD presents the selected remedial action for the 3M Tonawanda site that was chosen by NYSDEC in consultation with the New York State Department of Health (NYSDOH). The selected remedy, No Further Action with Monitoring, includes: Interim Remedial Measures (IRMs) that had already been implemented to address carbon disulfide (CS_2) in soils and replacement of the CS_2 storage tank; long-term groundwater monitoring for CS_2; maintenance of the completed IRMs; and filing a deed restriction with the Erie County Clerk's Office prohibiting the use of the site for residential purposes. 3M is implementing the selected remedy under an Order on Consent (Order).

In compliance with the Order, this Operation and Maintenance (O&M) Work Plan presents the activities that will be conducted by 3M to maintain the IRMs and monitor groundwater at the facility as prescribed in the ROD. 3M is preparing a Declaration of Covenants and Restrictions to be filed with the Erie County Clerk shortly after approval of this O&M Work Plan by NYSDEC and full execution of the Order. A copy of the deed restriction will be provided to the NYSDEC when it is filed.

The purpose of the O&M Plan activities is to ensure that human health and the environment remain adequately protected. As such, maintenance of the IRMs is required to ensure their continued integrity. Groundwater monitoring, conducted under the supervision of the NYSDEC, will be effective in confirming that site conditions remain unchanged or in detecting any future migration of CS_2, should it occur. This O&M Plan contains the procedures that will be followed to maintain the IRMs and conduct groundwater monitoring. Only minor modifications of the procedures may occur as necessary to adjust to field conditions.

2. BACKGROUND

2.1 SITE LOCATION AND DESCRIPTION

The 3M Tonawanda facility (Facility) is located at 305 Sawyer Avenue in a heavily developed industrial area of the Town of Tonawanda, Erie County, New York. The approximately 19-acre Facility is bounded by Sawyer Avenue and a mix of industrial and residential properties to the north, the Dunlop Tire Corporation to the south, an industrial property to the east, and an industrial facility to the west (Figure 2-1). The portion of the Facility listed in the New York State Registry of Inactive Hazardous Waste Disposal Sites (Registry), consisting of less than 1 acre, includes the former CS_2 storage tank and the former drainage swale on the southern portion of the Facility (Figure 2-2). The topography of the site is relatively flat, with most surface water runoff toward an on-site storm sewer system. Historically, surface water collected in former drainage swales and was conveyed through piping underneath the facility to a drainage ditch along Sawyer Avenue. The Niagara River is located approximately 1 mile west of the Facility.

2.2 SITE OPERATIONS AND HISTORY

The Facility uses CS_2 in the manufacture of cellulose sponges. From the early 1960s through late 1995, CS_2 was stored in a 19, 000-gallon steel tank located on the southeastern portion of the Facility (Figure 2-2). An earthen berm surrounded the tank prior to the installation of a five-foot high concrete containment structure in the early 1970s. Historically, the CS_2 storage tank was loaded directly from railroad tank cars by displacing the CS_2 in the tank car with water. Upon completion of the transfer, water within the tank car was discharged to the diked containment area. Similarly, water that was displaced from the storage tank as it filled was also discharged to the containment area. In the past, a control structure (weir) in the containment area allowed any overflow to discharge into an adjacent drainage swale. Operational modifications were subsequently implemented by the Facility to prevent discharges of water containing CS_2 to the swale. A permitted aeration process was also constructed within the containment dike to reduce the concentration of CS_2 in the water within the diked area. This water was then discharged directly to the Tonawanda Publicly Owned Treatment Works (POTW) in accordance with

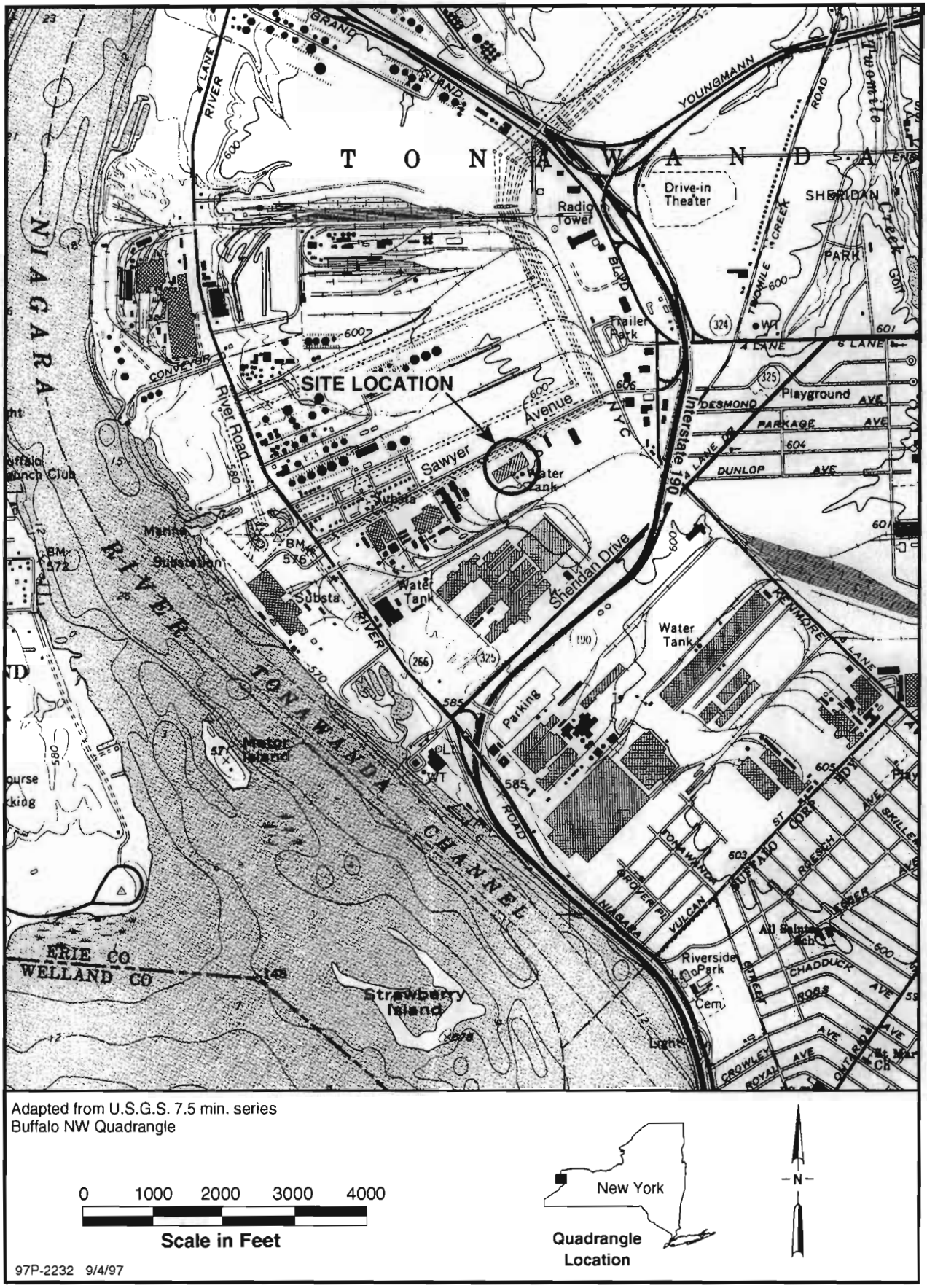

FIGURE 2-1 SITE LOCATION MAP
3M TONAWANDA FACILITY

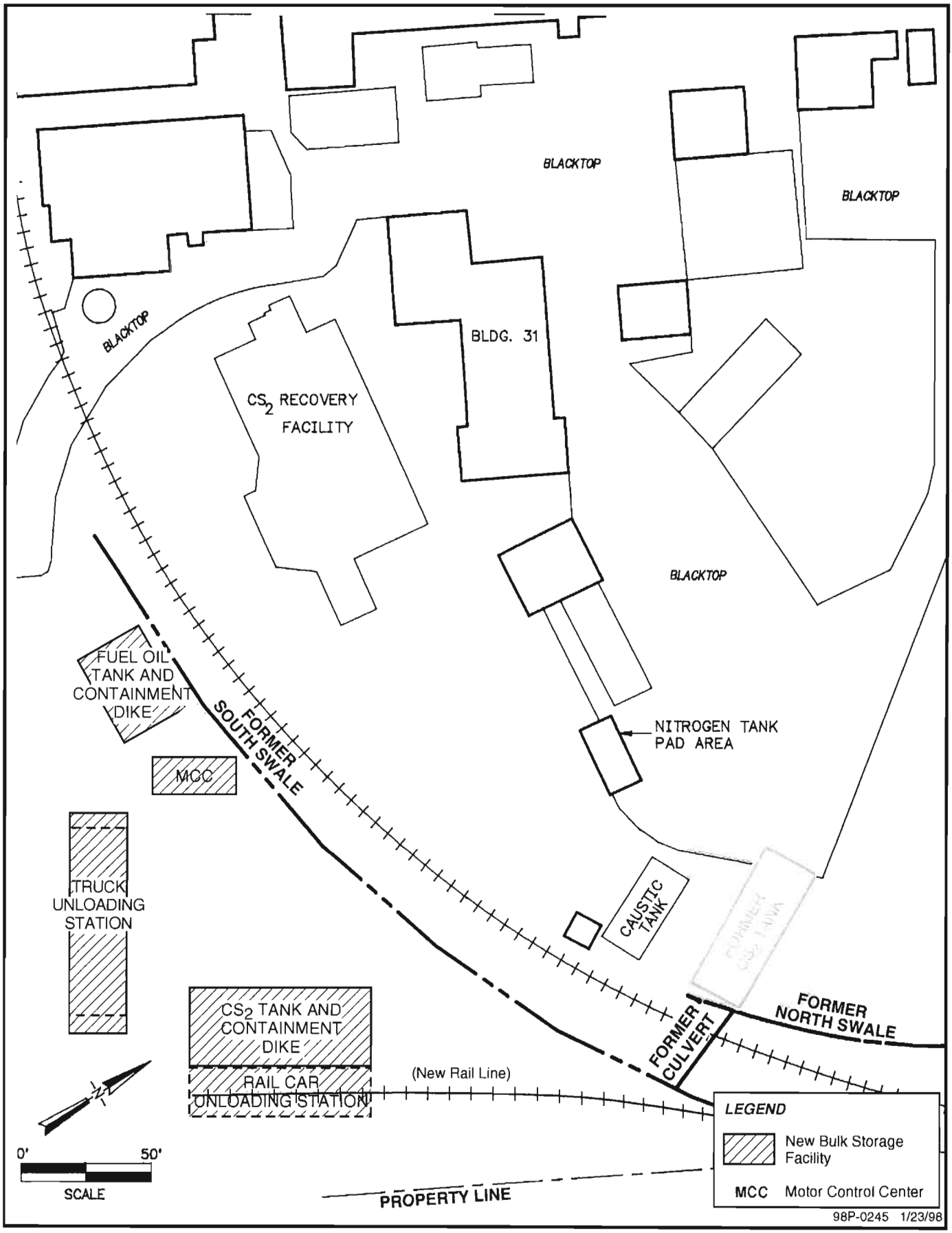

FIGURE 2-2 SOUTHERN PORTION OF THE 3M TONAWANDA FACILITY

applicable limits in the Facility's permit. In 1995, the storage tank was decommissioned and the drainage swale was upgraded. This is discussed in detail in Section 2.3.

Several investigations have been conducted by 3M to characterize the extent of CS_2 in soils and groundwater at the facility that resulted from previous site activities. A report entitled "Report on the Site Assessment and Risk Characterization Study, March 1998" (RI Report) summarizes the results of the investigations and has been approved by the NYSDEC.

2.3 INTERIM REMEDIAL MEASURES

Prior to the completion of the remedial investigation/feasibility study (RI/FS) process, 3M implemented various interim remedial measures (IRMs) to mitigate potential adverse impacts to the environment and public health by addressing the CS_2 detected in drainage swale soils and improving the management of CS_2 during loading/unloading operations. IRMs are conducted at sites when a source of contamination or exposure pathway can be effectively addressed before completion of a RI/FS. A detailed description of the implemented IRMs can be found in the document entitled "Closure Report for Interim Remedial Measures, March 1998". The IRMs include the following:

- In 1991, approximately 300 cubic yards of soil containing higher concentrations of CS_2 were excavated from the former drainage swale adjacent to the former CS_2 tank. The excavated soils were disposed off-site. Excavation in some areas extended to a depth of approximately eight feet.

- 3M constructed a new state-of-the-art CS_2 storage facility designed to prevent future releases of CS_2 to the environment. The location of this new storage facility is approximately 150 feet southwest of the former CS_2 storage tank as shown in Figure 2-3. The system became operational in late winter 1995 and is registered with the NYSDEC through the Chemical Bulk Storage Program.

  The former CS_2 storage tank was systematically closed-out once the new storage tank was on-line and fully operational. The tank was dismantled and disposed off-site. The concrete containment dike was backfilled with clean on-site soils and graded to promote run-off.

- The former drainage swale was upgraded to promote more effective stormwater management by minimizing infiltration into subsurface soils. This reduction in infiltration reduces the potential impact on groundwater by subsurface soils containing CS_2. The upgrades were completed in the spring of 1995 and included the

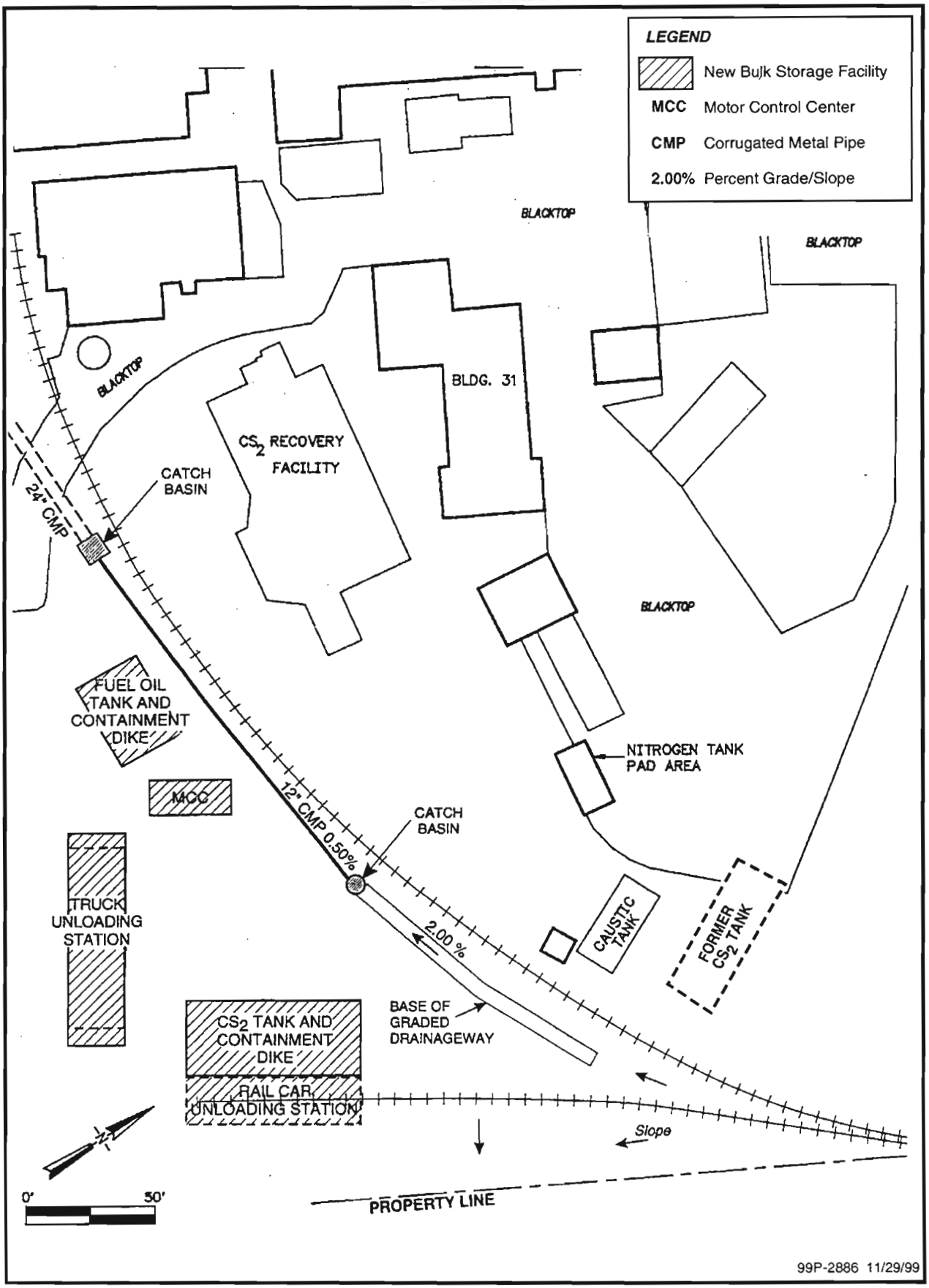

FIGURE 2-3 INTERIM REMEDIAL MEASURES
3M TONAWANDA FACILITY

installation of catch basins and connecting underground stormwater conveyance piping (corrugated metal pipe) in the former swale area as shown in Figure 2-3. The swale was backfilled with clean soils excavated during the construction of the new CS_2 storage tank system, graded to direct stormwater off-site or to the catch basins, and revegetated, where necessary.

2.4 CURRENT PROPERTY ENVIRONMENTAL CONDITIONS

As described in the RI Report, 39 water and approximately 800 soil samples were collected at the Facility to characterize the nature and extent of CS_2 remaining on-site following the completion of soil removal activities in 1991. The analytical data were compared to environmental Standards, Criteria, and Guidance values (SCGs). These data and SCGs are discussed in the following sections along with the site geology and hydrology to provide a description of current conditions at the Facility.

It is also important to note that a risk assessment (RA) was performed for the CS_2 remaining in site soils and indicated that current site conditions pose no significant risk to human health or the environment.

2.4.1 Soil

Geology – Four distinct stratigraphic units exist at the facility as shown in Figure 2-4. These units, in order of increasing depth below ground surface, include:

- Fill consisting primarily of gravel and disturbed silty clay. The approximate thickness of this unit ranges from 0 to 5 feet;
- Glaciolacustrine silty clay. This deposit has a very low permeability (meaning the groundwater cannot easily move through it). The approximate thickness of this unit is 62 feet;
- A dense glacial till approximately 6 feet thick that is composed of poorly sorted gravelly sand and clay. The permeability of this unit is also very low; and
- Shale bedrock of the Camillus Shale Formation. This formation was encountered at depths ranging from 69 to 71 feet.

In addition, the glaciolacustrine silty clay consists of two subunits. The upper silty clay unit, which is approximately 30 feet thick, is unsaturated and contains fine vertical desiccation cracks.

The lower silty clay is saturated, highly plastic, does not contain vertical cracks, and exhibits a very low permeability.

Summary of RI Results – CS_2 was not detected in soils from 0 to 2 feet below ground surface (bgs), satisfying the goal of the NYSDOH to reduce potential exposures at the ground surface. Soils 2 to 4 feet bgs did not contain CS_2 at concentrations above the NYSDEC cleanup goal for CS_2 of 2.7 ppm. Only one sample in soils 4 to 6 feet bgs contained a CS_2 concentration greater than 2.7 ppm (at 6.3 ppm).

As shown in Figures 2-4 and 2-5, the highest concentrations of CS_2 (100 to 1400 ppm) generally were detected in unsaturated soils at depths ranging from 6 to 16 feet bgs near the former CS_2 tank and drainage swale. While soils containing CS_2 at concentrations of 10 ppm or more have been found to depths of approximately 35 feet bgs, they generally decrease with increasing depth below 16 feet bgs. Laterally, CS_2 concentrations decrease rapidly with increasing distance from the former CS_2 tank and former south (eastern portion) swale area.

The soil analytical data show that over a period of about 30 years, CS_2 has not migrated very far laterally. In addition, the lower silty clay unit has prevented the further downward migration of CS_2 and kept upper bedrock groundwater from being impacted. Consequently, soils with residual CS_2 concentrations are mainly found at depths less than 40 feet bgs.

2.4.2 Groundwater

Hydrology – The unconsolidated geologic deposits at the Faclity are underlain by the Camillus Shale Formation, which is part of a regional aquifer in the Erie-Niagara Basin. Groundwater from this bedrock aquifer, however, is not utilized as a source of drinking water in the Tonawanda area because of naturally occurring high mineral content and the close proximity to the Niagara River, an important source of municipal drinking water throughout the western New York area. Groundwater flow in the upper bedrock unit at the 3M Tonawanda site is to the west toward the Niagara River.

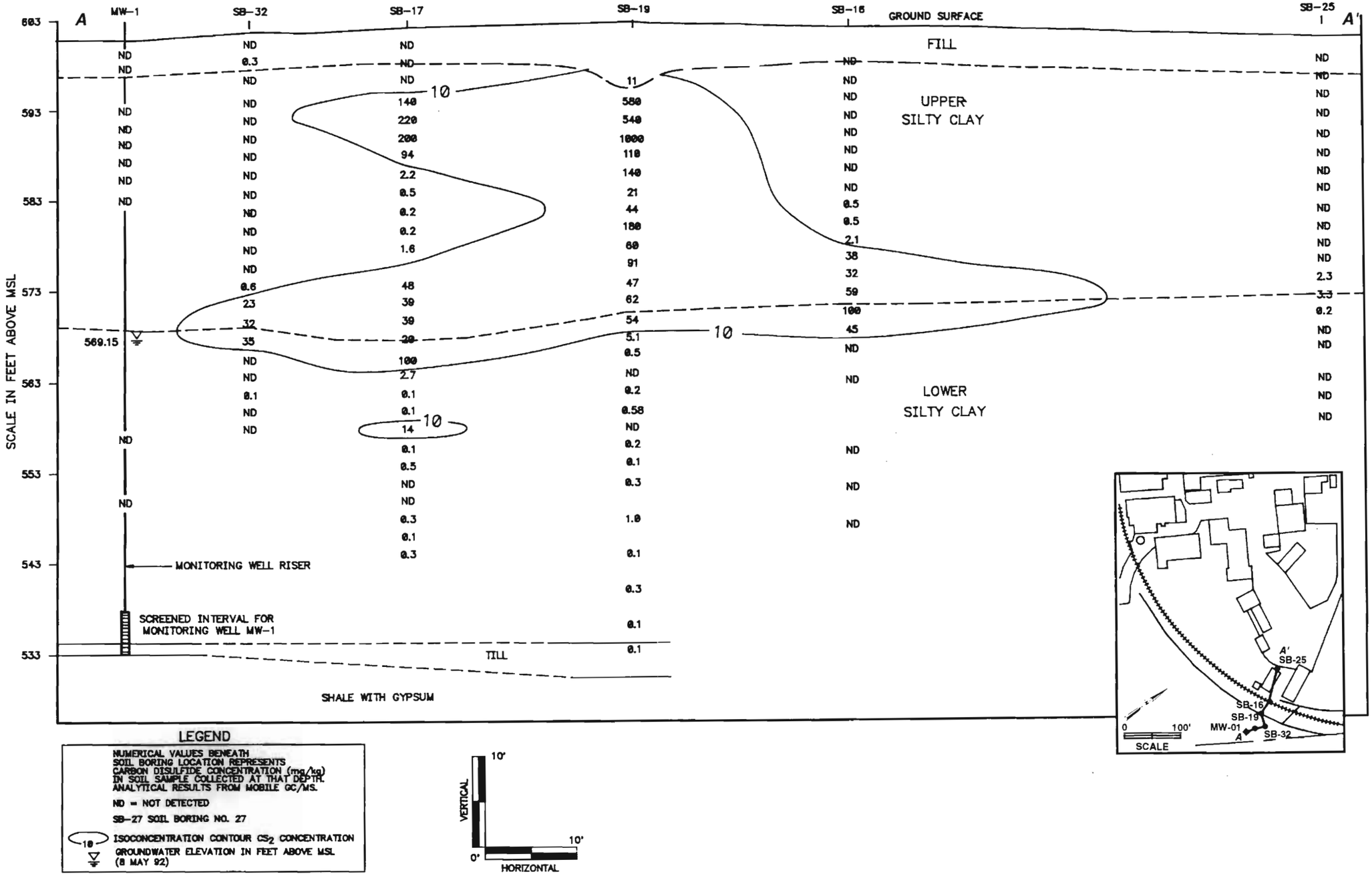

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FIGURE 2-4 GEOLOGIC CROSS-SECTION A-A' DEPICTING CS_2 CONCENTRATIONS WITH DEPTH 3M TONAWANDA FACILITY

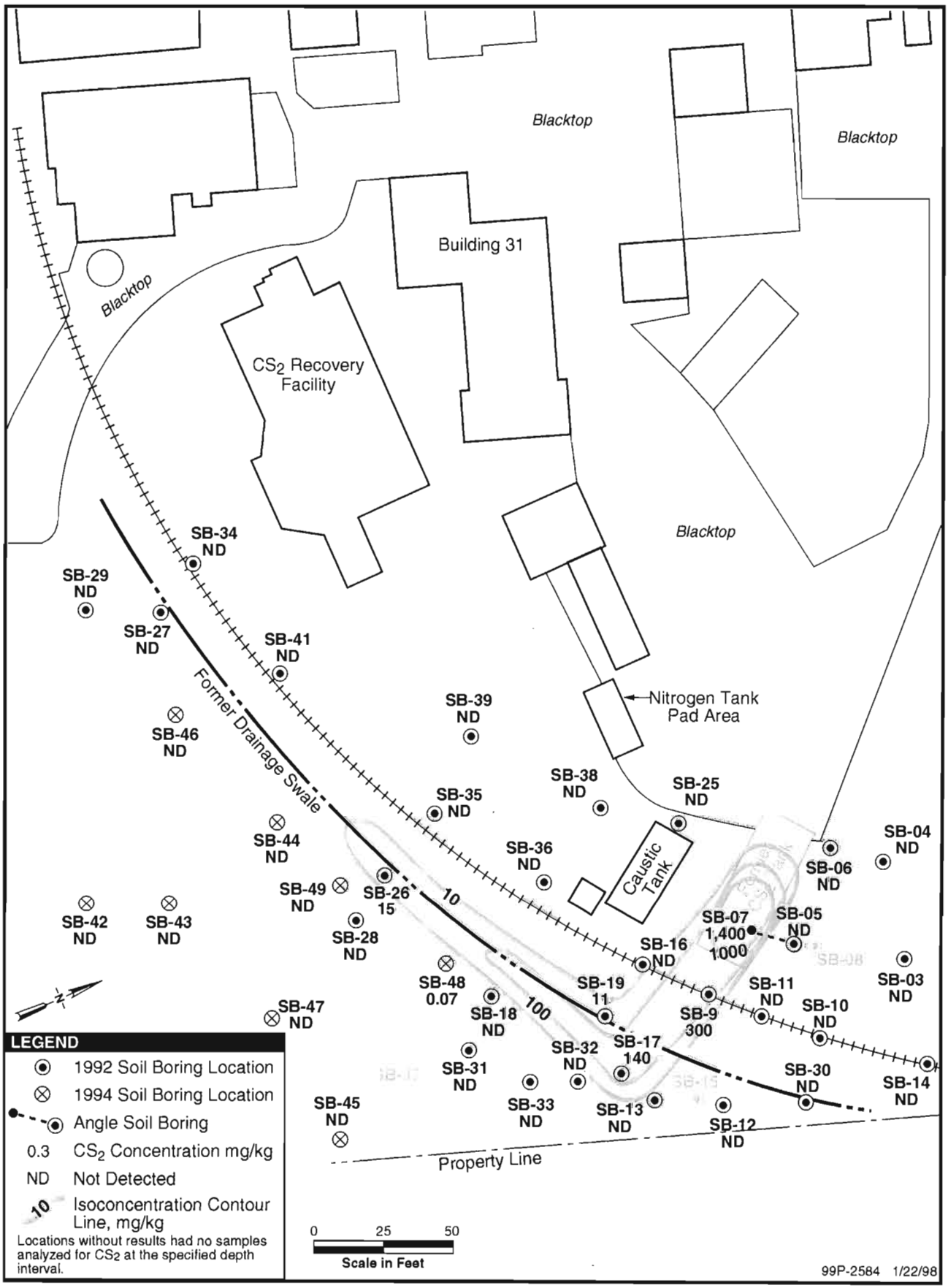

FIGURE 2-5 CONCENTRATION OF CS_2 IN SOILS AT 6 TO 8 FEET BGS 3M TONAWANDA FACILITY

Perched groundwater is sporadically encountered within the fill material at the Facility and is limited in lateral extent. It is separated from bedrock groundwater by the glaciolacustrine clay. This shallow groundwater is perched on top of the clay unit because of its low permeability. Soil pore water, found in very small quantities, is bound to soil particles of the upper (unsaturated) silty clay unit. As a result, this water has a very low mobility.

Summary of RI Results – In the 1995/1996 quarterly sampling of the four site monitor wells, CS_2 was not detected in the bedrock groundwater, which underlies the highly plastic, low permeability glaciolacustrine clay unit. This indicated that there is no impact on saturated zone groundwater quality from the presence of CS_2 in site soils. The absence of CS_2 in the bedrock groundwater indicates that the highly plastic, low permeability clay layer restricts the vertical migration and mobility of CS_2 in the subsurface.

CS_2 was detected in site perched water and soil pore water (i.e., water within the shallow unsaturated zone). The analytical data indicates that perched groundwater containing CS_2 is highly localized, limited in lateral extent primarily beneath and to the south of the former containment structure of the former CS_2 tank, and is largely immobile. The soil pore water is bound to soil particles of the unsaturated upper silty clay unit, making it nearly immobile.

2.5 ROD GOALS

It is stated in the site ROD that "The selected remedy for any site should, at a minimum, eliminate or mitigate all significant threats to public health or the environment presented by the hazardous waste at the site. The State [NYSDEC] believes that the Interim Remedial Measures now in place ... have accomplished this objective provided that they continue to be operated and maintained in a manner consistent with their design."

The ROD requires performance of the following actions to ensure that human health and the environment remain adequately protected:

1. Maintain the integrity of the IRMs.
2. Conduct groundwater monitoring to confirm that conditions remain unchanged or to detect future migration of CS_2 should it occur.

3. Ensure compliance with the restriction on the use of the property for only commercial/industrial purposes and prohibition on the use for residential purposes.

3. MAINTENANCE OF IRMS

The maintenance of IRMs at the 3M Tonawanda facility will include the following tasks:

- **Tank system inspections** – Inspections of the new CS_2 tank/secondary containment system, and the associated truck and rail unloading stations, will be conducted as follows:

  Daily Inspections – Daily inspections will consist of visually inspecting the tank system for spills and leaks or unpermitted discharges of water containing CS_2. Any spill, leak, or unpermitted discharge of contaminated water that is observed will be immediately reported to the 3M Site Environmental Engineer and the NYSDEC.

  The aboveground storage tank system will be visually inspected for cracks, areas of wear, corrosion, poor maintenance and operating practices, excessive settlement of structures, and separation or swelling of tank insulation.

  The secondary containment system will be visually inspected for erosion, cracks, evidence of releases, excessive settlement and structural weaknesses.

  Exterior coatings, exterior welds and/or rivets, and foundations will be visually checked for adequacy. The results of the inspections will be recorded in the daily inspection log.

  Periodic Inspections - Visual inspections will be conducted prior to and during the transfer of material into the storage tank, for malfunctioning equipment, safety interlocks, safety trips, automatic shutoffs, leak detection and monitoring, warning or gauging equipment which may not be working properly. Any deficiencies will be reported to the Shipping and Receiving Supervisor and the Environmental Engineer.

  Annual Inspections - The annual inspection will include all of the inspection elements included in the daily and periodic inspections. NYSDEC will be notified at least 10 days prior to conducting the annual inspection.

  The emergency response equipment and fire deluge system will also be inspected, and tested at least annually, and will ensure any deficiencies identified are corrected.

  At least annually, a review of compliance with 6NYCRR Part 598 and Part 599 will be conducted.

  Five Year Inspection – The new CS_2 storage tank system is registered with the NYSDEC under the Chemical Bulk Storage Tank Program. Under this program, inspection of all aboveground piping systems and aboveground tank systems will

be conducted in accordance with 6NYCRR Part 598.7(d) consistent with a consensus code, standard or practice developed by a recognized association or independent testing laboratory such as API 653.

Based on the five-year inspection, an assessment and evaluation will be made of system tightness, structural soundness, corrosion, wear, foundation weakness and operability. Re-inspection will be performed no later than five years from the initial inspection or regulatory deadline, whichever comes first. If thinning of one millimeter per year or greater occurs on the pipe or tank walls, or if the useful life is determined to be less than 10 years, re-inspection will be performed at one half of the remaining useful life.

The five-year inspection will consist of examination of exposed and insulated piping for misalignment, tightness and structural inspection of representative sections for thinning and corrosion.

An inspection will be made of the tank and piping, utilizing non-destructive testing (NDT) methods such as ultrasonic, radiographic, magnetic particle, dye penetrant, hydrostatic, vacuum or other equivalent test method to determine structural soundness including measurement of erosion and corrosion wear, galvanic corrosion, intergranular and stress corrosion cracking, device corrosion, pitting, cellular corrosion and material incompatibility.

For the CS_2 tank, the five-year inspection will be conducted under the direction of a New York State licensed Professional Engineer (PE). The PE will certify that the tank is structurally sound and not subject to internal or external corrosion that may result in a release prior to the next inspection and re-certification.

- **Recordkeeping** - Reports for annual and five-year inspections will be maintained and made part of the Spill Prevention Report (REF 4281-1650) and made available to the NYSDEC upon request. Records of annual inspections will be kept for five years. Reports of five-year inspections will be kept for 10 years.

- **Catch Basin Inspections and Maintenance Activities** – The graded area surrounding the catch basins will be maintained such that the grass is mowed periodically throughout the growing season. Annual inspections of the catch basins and surrounding area will be conducted to identify other maintenance requirements. Based on the findings of the annual inspection, maintenance activities will be performed as needed and may include making repairs to correct the effects of erosion, reseeding of repaired and sparsely vegetated areas, or cleaning the catch basins. The site fencing will be maintained to keep out trespassers.

4. GROUNDWATER MONITORING

4.1 INTRODUCTION

The groundwater monitoring planned for the 3M Tonawanda facility will involve the monitoring of saturated zone bedrock groundwater and unsaturated zone soil pore water to ensure that site conditions remain the same or to detect any migration of CS_2, should it occur. The components of the monitoring program are described in the following sections.

4.2 MONITORING NETWORK

The groundwater monitor well network at the Facility consists of existing wells screened at or just above the shale bedrock unit in the saturated zone. This includes monitor wells MW-01, MW-02, MW-03, and MW-04. Monitor well locations are shown in Figure 4-1 and construction details are provided in Table 4-1. The monitor well construction diagrams and lithologic logs are provided in Appendix A.

Soil pore water from the unsaturated zone will also be monitored at lysimeters LY-1 and LY-2. The lysimeter locations are shown on Figure 4-1. Each lysimeter extends to a depth of approximately 23 feet bgs. The lysimeter construction diagram is provided in Appendix A.

4.3 SAMPLING AND ANALYSIS

The groundwater and soil pore water sampling/analysis program for the Facility will include the following elements:

- The semiannual groundwater sampling at monitor wells MW-1, MW-2, MW-3, and MW-4.
- Annual soil pore water sampling at lysimeters LY-1 and LY-2.
- The groundwater and soil pore water sampling will be conducted in accordance with Section 4.4 procedures.
- The groundwater and soil pore water samples will be analyzed at an NYSDEC-certified laboratory for CS_2. Measurements of pH, temperature, turbidity, and specific conductance will be recorded in the field at the time of sample collection.

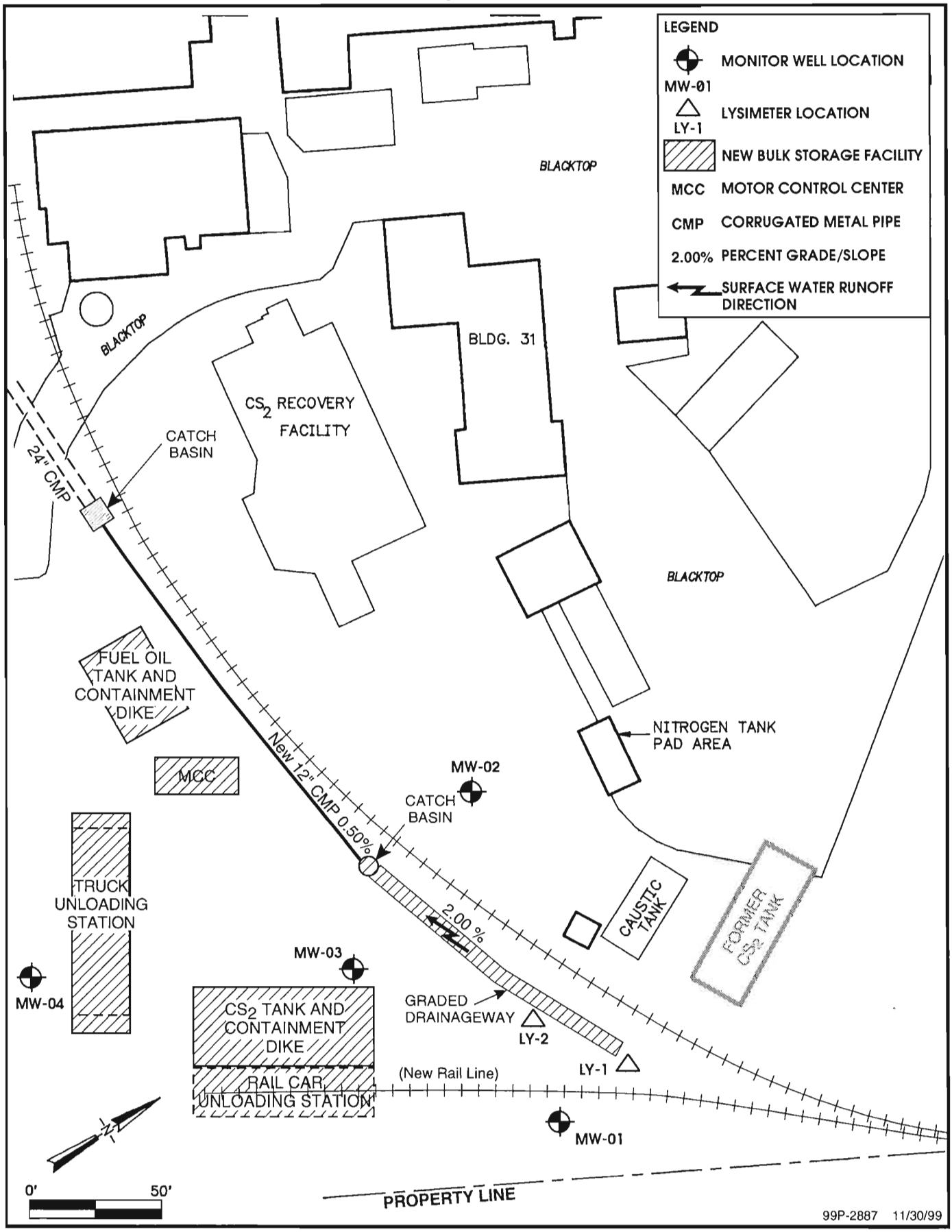

FIGURE 4-1 NO FURTHER ACTION WITH MONITORING 3M TONAWANDA FACILITY

Table 4-1

Monitor Well Construction Specifications
3M Tonawanda Facility

	MW-1	MW-2	MW-3	MW-4
Total Depth of Borehole (feet bgs)	69	71.4	72.5	77
Depth of Screened Interval (feet bgs)	63-68	65.4-70.4	67.5-72.5	69-74
Top of Sand Pack (feet bgs)	62	64.4	65.2	67
Top of Bentonite Seal (feet bgs)	60	59.4	63.2	65
Top of Casing Elevation (feet above MSL)	604.03	605.56	604.09	601.84

bgs – Below ground surface
MSL – Mean sea level

- Water level measurements will be recorded at monitor wells MW-1, MW-2, MW-3, and MW-4 prior to each sampling event to identify groundwater flow directions at the time of the sampling event.

As required by the Order, 3M will notify the NYSDEC 10 days in advance of sampling commencement.

4.4 SAMPLING METHODOLOGY

The groundwater-monitoring program will involve semiannual sampling of monitor wells MW-1, MW-2, MW-3, and MW-4. The procedures to be used for groundwater sampling are as follows:

- Prior to collecting groundwater samples from the wells, a complete round of water level measurements (accurate to ± 0.01 ft) will be recorded.

- Upon arrival at the well to be sampled, a thorough inspection will be conducted and observations will be recorded. For the monitor wells to be sampled, the depth-to-water, total well depth, and well diameter will be used to calculate the volume of standing water in each well. The calculations will be recorded on the appropriate well sampling form (shown in Figure 4-2). All measuring devices will be cleaned prior to use and between wells using a laboratory-grade detergent/potable water solution, followed by a potable water rinse.

- Evacuate a minimum of three well casing volumes of water using a clean stainless steel submersible pump, or clean Teflon© bailer. The purge rate should be adjusted to avoid excessive drawdown of the water level in the well. At the initiation of purging and after three well casing volumes have been removed, collect purge water samples and analyze for general water quality parameters (temperature, pH, specific conductance, and turbidity). Continue to collect and field analyze purge water until water quality parameters stabilize. Following stabilization of the water quality parameters, cease purging and record the volume of water removed and the elapsed time of purging. The field instrument (YSI 6820, or equivalent for temperature, pH, conductivity, and turbidity) will be calibrated at least once a day prior to purging.

- Cleaning of any pump/attached electrical cord and bailer used during sampling will involve a laboratory-grade detergent/potable water scrub and purge, followed by a potable water rinse and purge. Cleaning will be conducted prior to use and between wells.

- Because CS_2 is not expected to be detected in groundwater at monitor wells MW-1, MW-2, MW-3 and MW-4, the purge water from these wells will be discharged to the ground surface.

GEOLIS® Well Purging Form

COMPANY: _____ SAMPLE NO.: _____

CLIENT: _____ DATE: _____

PROJECT: _____ SAMPLER: _____

SITE: _____ SIGNATURE: _____

WELL OBSERVATIONS

WELL CASING AND LID: INTACT - DAMAGED - HEAVED - NONE LOCKED: YES - NO KEY NO: _____

WELL DIAMETER: 2" - 4" - 6" - 8" - OTHER: _____ STICKUP HEIGHT: _____ FT-M MEASURING POINT: TIC - TOC - GRS

VAPOR READINGS: PID - FID - OTHER: _____ BACKGROUND: _____ INSIDE WELL: _____

CHECKED FOR NAPL LAYER: YES - NO OBSERVED: NON - FLT - SNK THICKNESS: _____ IN-CM SHEEN: YES - NO

PURGING CALCULATIONS

(A) DEPTH TO WELL BOTTOM: _____ FT-M BMP

(B) DEPTH TO WATER: _____ FT-M BMP

(C) WATER COLUMN HEIGHT (A - B): _____ FT-M

(D) WELL DIAMETER FACTOR: _____ GPF-LPM

(E) ONE WELL VOLUME (C x D): _____ GAL-L

(F) VOLUMES TO BE PURGED: _____

(G) TOTAL PURGE VOLUME (E x F): _____ GAL-L

Well Factor = 0.041 (Well Diameter in Inches)²

(2" = 0.16; 4" = 0.65; 6" = 1.47; 8" = 2.61 GPF)

(2" = 2.0; 4" = 8.1; 6" = 18.2; 8" = 32.4 LPM)

Example Purge Endpoint Criteria

Volume:	3 to 5 well/sand pack volumes
Time:	4 hours maximum
Parameters:	MTP - ± 1°C. MPH - ± 0.2 Units
	MSC - ± 5% (0.01 TO 0.03 mS/cm)
Turbidity	5 NTU or less

PURGING INFORMATION

PURGE ENDPOINT: VOLUME - TIME - PARAMETER STABILIZATION - TURBIDITY CRITERIA: _____

PURGING METHOD: BAILER - SUB. PUMP - CENT. PUMP - OTHER: _____

DEVICE DESCRIPTION: _____ DEVICE No.: _____

PUMP/BAILER INTAKE: SCREEN TOP - SCREEN/WELL BOTTOM - MID SCREEN/WELL - WATER LEVEL - MOVED UP/DOWN

PURGE WATER: DISCHARGED - TREATED - STORED ONSITE STORED IN: TANKS - DRUMS NO.: _____

FIELD MEASURMENTS FROM: FLOW THRU CHAMBER - OPEN CONTAINER CASCADING WATER NOTED: YES - NO

SCREEN/OPEN HOLE INTERVAL: _____ TO _____ FT-M BMP PURGE DEPTH TO WATER (MAX): _____ FT-M BMP

TIME	DEPTH TO WATER (FT-M BMP)	PURGE RATE or VOLUME (GPM-GAL)	TURBID -ITY (NTU)	FIELD MEASUREMENTS AND UNITS						COMMENTS
				MTP °C.						
										Pre Purge Readings
										Post Purge Readings

TOTAL PURGE TIME: _____ HRS TOTAL PURGE VOLUME: _____ GAL - L RECOVERY: FAST - SLOW - V.SLOW

FIELD MEASUREMENT CODES

MTP - Temperature (°C.)	MCL - Color	MDO - Dissolved Oxygen (mg/L)	MD1 - DTW in Well _____
MSC - Specific Conductance (mS/cm)	MPH - pH	MO1 - Other: _____	MD2 - DTW in Well _____
MPD - Photolonizer (e.g., HNu)	MEH - Eh	MO2 - Other: _____	MD3 - DTW in Well _____
MFD - Flame Ionizer (e.g., OVA)	MAL - Alkalinity	MO3 - Other: _____	MD4 - DTW in Well _____

FIGURE 4-2 WELL PURGING FORM

99P-2592

- Use a clean Teflon© bottom-filling bailer with a dedicated polyethylene cord to obtain the groundwater sample from each monitor well. Attach a braided polyethylene cord to the bailer and slowly lower the bailer into the well. After the bailer has filled, slowly raise the bailer from the well. Do not allow the bailer to touch the ground. Fill the 40-ml glass bottles, checking to confirm that the vials are free from all air bubbles. Appropriately discard the cord after each use.

- Seal the bottle with a Teflon©-lined cap and label sample bottle. Record all pertinent information on each sample (color, odor, sheen, etc.) on the sampling forms.

- Each sample bottle will be sealed individually into resealable plastic bags and will be placed into ice-packed coolers for shipment to the laboratory. Each cooler will be sealed with chain-of-custody seals for shipment. All samples will be shipped according to International Air Transport Association (IATA) regulations. Chain-of-custody documentation will be maintained during sampling and will accompany sample shipments to the laboratory.

- The groundwater samples will be shipped to the off-site NYSDEC-certified laboratory and analyzed for CS_2. The analytical method and reporting limit for this analyte is provided in Table 4-2.

- Quality control samples will be collected during each sampling event. These quality control samples will consist of a duplicate sample, a rinse blank sample and a trip blank. One duplicate sample will be collected from a specific sampling location by filling three sample containers. One rinse blank will be collected per sampling event. The rinse blank will be collected by pouring high pressure liquid chromatography (HPLC) water in the cleaned bailer. The HPLC water will then be poured into the appropriate sample container. One trip blank per sampling event will be prepared at the laboratory and will remain in the sample cooler until it is returned to the laboratory with the groundwater samples.

- Laboratory data reports will include sample analytical results, reportable field and laboratory QA/QC sample analytical results, any analytical problems, and parameter reporting limits.

The soil pore water monitoring program will involve annual sampling of lysimeters LY-1 and LY-2. For a minimum of three times prior to sample collection, the lysimeters will be subjected to a vacuum and then pressurized to remove water from the lysimeters. Following this purging process, a sample will be obtained from the discharge access tubing on each lysimeter. Soil pore water sample handling, shipping, and analysis will be performed in the same manner as the groundwater samples from the monitor wells.

Table 4-2

Holding Time, Container, Preservative, and Analytical Method
Groundwater and Soil Pore Water Monitoring Program
3M Tonawanda Facility

Analyte	Holding Time from Collection	Container	Preservative	Method of Preparation/ Analysis	Method Reporting Limit
Carbon Disulfide (CS_2) in Water	14 days	(3) 40-ml glass vials with Teflon-lined caps	Cool, 4°C	EPA Method 5030B/8260B	5µg/L

5. REPORTING AND SCHEDULE

3M will submit semiannual progress reports to the NYSDEC. As required by the Order, an electronic copy of each report will also be submitted to NYSDEC within 30 days of report approval. Pursuant to the Order, the progress reports will be submitted to the NYSDEC commencing the tenth day of the sixth month following the effective date of the Order. The semiannual progress reports will contain the following information:

- A description of O&M activities undertaken during the six month cycle to achieve compliance with the Order.
- A description of any deficiency observed during the inspections of the CS_2 tank system, the date the deficiency was observed and a description of corrective action(s) taken to address the identified deficiency.
- A summary of any leaks, spills, or unpermitted discharges of contaminated water from the CS_2 tank system that occurred during the reporting period and a description of corrective action(s) taken.
- The catch basin inspection date and a discussion of observations made during the annual inspection. A description of any maintenance activity performed on the catch basins and the surrounding graded area during the reporting period.
- A summary of groundwater quality results with tabulation for the reporting period and previous reporting periods. Also included, will be any other data generated during the reporting period as well as a copy of the analytical data packages.
- Identification of any deliverables required by the Order that were completed and submitted during the reporting period.
- A description of O&M activities planned for the next six month cycle. If necessary, a discussion of items that may affect the future schedule and efforts made to mitigate potential delays.
- Any proposed or approved modifications to the O&M work plan.

Groundwater monitoring results from each semiannual sampling round will be evaluated to identify changes in groundwater quality. If CS_2 is detected in any of the deep monitor wells, verification sampling of the select well(s) will be performed within 30 days of 3M receiving the laboratory results documenting such detection. Based on the review of the verification sampling results, the following actions will be taken:

- Continuation of the semiannual sampling if the initial sample results are not confirmed through verification sampling.

- If the presence of CS_2 in any deep well is confirmed by the verification sampling, an additional sample will be collected from the select well(s) three months after the verification sampling event. Regular sampling of the site monitor wells will then continue. The additional groundwater quality data will be evaluated to determine whether a detection was an anomaly or the situation is continuing and requires further evaluation of the selected remedial action. 3M will work with the NYSDEC to develop an action plan if continued detections are documented.

Every five years, 3M will conduct a reevaluation of remedial alternative performance. 3M will meet with NYSDEC to discuss results and determine the frequency, future course, and duration of monitoring activities.

APPENDIX A

MONITOR WELL AND LYSIMETER CONSTRUCTION DIAGRAMS AND MONITOR WELL LITHOLOGIC LOGS

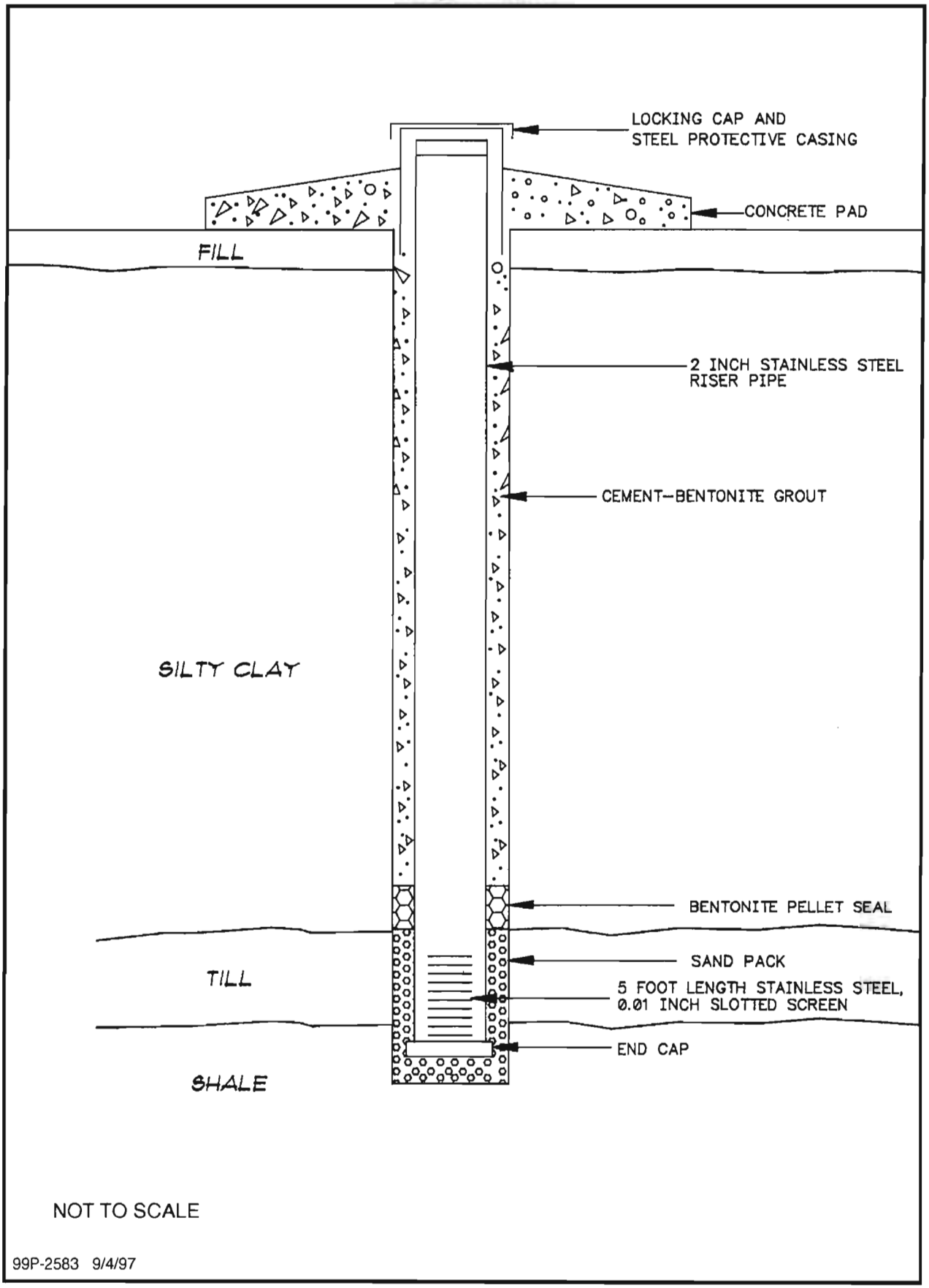

FIGURE A-1 SCHEMATIC DIAGRAM OF MONITOR WELLS MW-1, MW-2, AND MW-3 CONSTRUCTION 3M TONAWANDA FACILITY

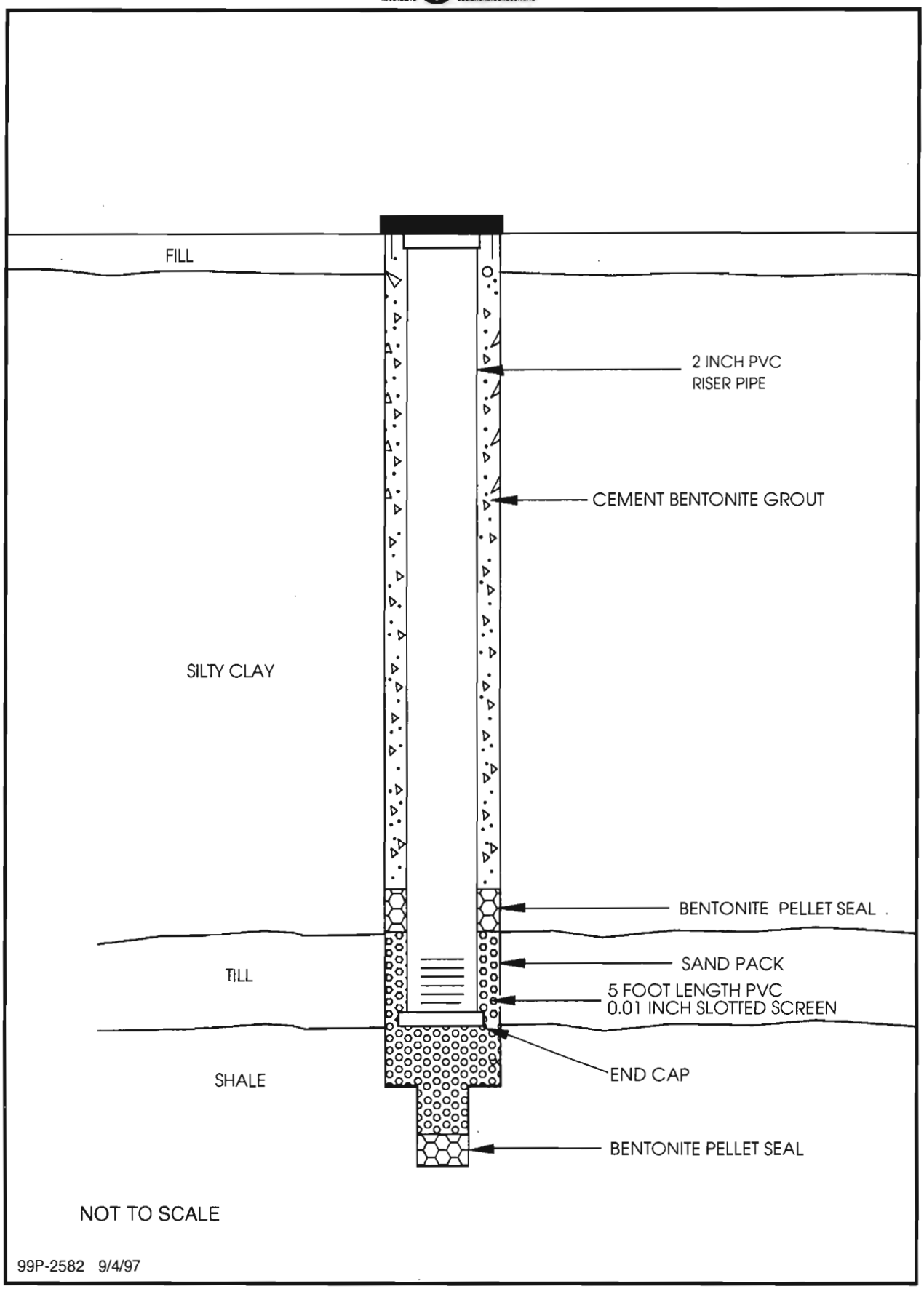

FIGURE A-2 SCHEMATIC DIAGRAM OF MONITOR WELL MW-4 CONSTRUCTION 3M TONAWANDA FACILITY

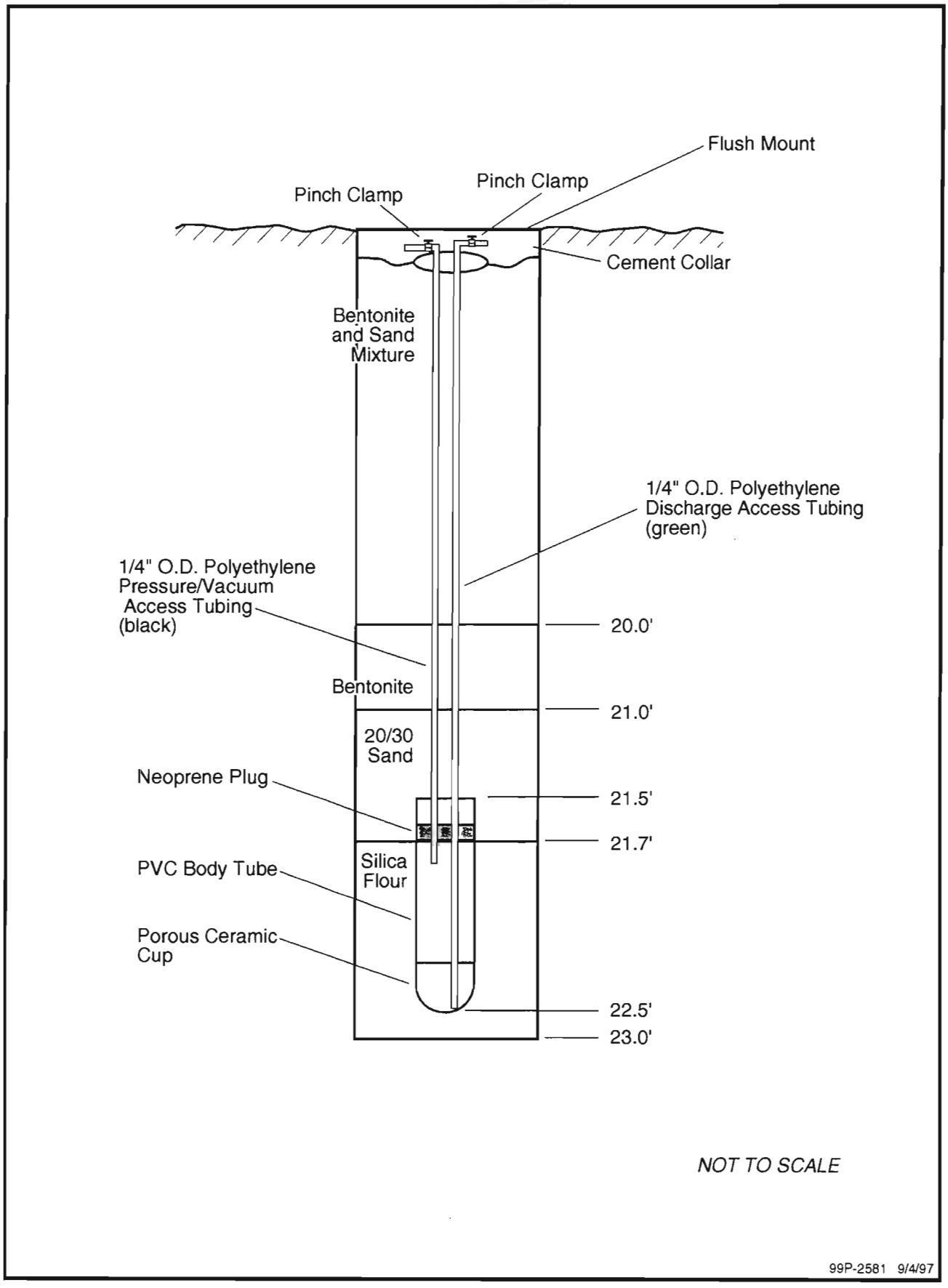

FIGURE A-3 LYSIMETER CONSTRUCTION DIAGRAM
3M TONAWANDA FACILITY

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonawanda, NY.

PAGE NO.: 1 of 3 | HOLE NO.: MW-1

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
4/7/92	4/7/92	Empire	4.25' ID HSA	8.00"	4.00"	69.00'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
R. Bennett			/'

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	6	1 1 2 2		1			GP		Brown CLAY and GRAVEL (FILL); organic debris; saturated.	
2	SS	7	2 3 4 5		2 3 4			GP			
3	SS	14	3 4 7 9		5 6			CL		Reddish brown SILTY CLAY; trace medium sand to medium gravel; firm; moist.	
4	SS	16	13 15 18 22		7 8			CL		As above; very stiff.	
5	ST	18	6 7 12 13		9 10			CL			
6	SS	20	4 6 8 12		11 12			CL			
7	SS	18	13 15 19 23		13 14			CL		As above; fine vertical fractures.	
8	SS	0	7 9 12 12		15 16			CL			
9	SS	24	7 7 10 12		17 18			CL			
10	SS	24	2 4 4 4		19 20			CL		As above; firm.	
11	SS	18	1 2 2 4		21 22			CL			
12	ST	24	3 4 5 6		23 24			CL			
13	SS	18	1 2 2 4		25 26			CL			
14	SS	22	4 6 6 5		27 28			CL			
15	SS	24	1 2 3 4		29			CL			

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonawanda, NY.

PAGE NO. 2 of 3 | HOLE NO. MW-1

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
16	SS	18	1/1.5 3		31			CL		As above; soft.	
17	SS	20	1 1 2 2		32 33			CL		As above; very plastic; soft; sticky; wet to moist.	
18	SS	24	1/1.5 2		34 35			CL		As above; wet to saturated.	
19	ST	22	1 1 2 2		36 37			CL			
20	SS	24	1 2 3 4		38 39 40 41 42 43			CL			
21	SS	24	1 1 2 3		44 45 46 47 48			CL			
22	SS	24	1 1 1 3		49 50 51 52 53			CL		Reddish brown <u>SILTY CLAY</u>; trace gravel; very soft; saturated.	
23	SS	24	1 1 1 1		54 55 56 57 58			CL			
24	SS	24	1/1.5 3		59 60			CL			
25	SS	24	1 1 2 1		61 62			CL			

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SS = SPLIT SPOON ST = SHELBY TUBE
D = DENNISON C = CORE CS = CONTINUOUS SAMPLER
CT = CUTTINGS BA =BUCKET AUG.

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonawanda, NY.

PAGE NO.: 3 of 3

HOLE NO.: MW-1

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					64 65 66 67 68 69					**CLAY and GRAVEL** Weathered **SHALE** End of boring at 69 feet.	

*ASTM D1586 ST = SHELBY TUBE
SS = SPLIT SPOON C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA =BUCKET AUG

Confidential Client
Tonawanda, NY.

PAGE NO.: 3 of 3

HOLE NO.: MW-1

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION	PAGE NO.	HOLE NO.
Confidential Client, Tonowanda, NY	1 of 3	MW-2

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
4/17/92	4/17/92	Empire	4.25" ID HSA	8.00"	4.00"	71.40'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
R. Shultz			38.00'/' 04/08/92

Note: Stainless steel casing, wire wrap, 10 slot, Mory Sand No.0.

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	3	4 3 5 8		1			CL		Reddish brown to dark brown GRAVELLY CLAY (FILL); moist.	
2	SS	3	7 6 6 5		2 3 4			CL		As above; black layer at bottom 2".	
3	SS	14	4 3 6 9		5			CL		Reddish brown SILTY CLAY: little angular, black gravel; firm; dry to slightly moist.	
4	SS	12	15 39 41 59		6 7			CL		As above; very stiff; fractures at 7'.	
5	SS	22	7 14 22 32		8 9			CL		As above; fractures at 8.5' and 9.2'; dry to slightly moist.	
6	SS	24	12 19 30 38		10 11			CL		As above; fractures at 11' and 11.5'; very stiff.	
7	SS	3	50/5"		12 13			CL			
8	SS	22	4 12 14 21		14 15			CL		As above; fractures throughout.	
9	SS	24	26 30 29 34		16 17 18			CL		As above; moisture content increasing; more plastic.	
10	SS	14	10 15 14 16		19 20			CL		As above; gravelly zone at 18.8'.	
11	SS	24	3 7 12 13		21 22			CL		Reddish brown SILTY CLAY; very plastic; very stiff, moist.	
12	SS	24	14 17 17 21		23 24			CL		As above; firm.	
13	SS	24	2 5 5 7		25 26			CL			
14	SS	24	9 12 11 13		27 28			CL			
15	SS	24	4 4 2 6		29			CL			

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER

Confidential Client
Tonowanda, NY

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonowanda, NY

PAGE NO. 2 of 3 | HOLE NO. MW-2

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
16	SS	24	0 4 4 7		31			CL			
17	SS	24	5 6 6 6		32 33			CL			
18	SS	24	1 2 2 4		34 35			CL		As above; soft; wet.	
19	SS	24	4 5 5 7		36 37			CL			
20	SS	24	0 1 2 4		38 39		▽	CL			
21	SS	24	4 1 3 2		40 41 42 43 44			CL		Reddish brown SILTY CLAY: sticky; no coarse fraction; soft; wet.	
22	SS	24	1 1 3 5		45 46 47 48 49			CL			
23	SS	24	WH 1 2 2		50 51 52 53 54			CL			
24	SS	24	WH 6		55 56 57 58 59			CL		As above; extremely sticky; wet to saturated.	
25	SS	24	WH 2 4 42		60 61 62			CL			

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
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Confidential Client
Tonowanda, NY

PAGE NO. 2 of 3 | HOLE NO. MW-2

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonowanda, NY

PAGE NO.: 3 of 3

HOLE NO.: MW-2

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					64						
26	SS	0	100/2		65			CL			
					66						
27	SS	12	45 26 23 48		67			GP		Gray SANDY GRAVELLY and CLAY	
					68						
					69						
28	SS	22	19 12 27 100/4		70			SP		Gray to tan SAND; fine grained; well sorted; angular; gypsum lense in bedrock; with platy shale fragments; wet.	
					71					End of boring at 71.4 feet.	

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SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

Confidential Client
Tonowanda, NY

PAGE NO. 3 of 3

HOLE NO. MW-2

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonowanda, NY

PAGE NO.: 1 of 3 | HOLE NO.: MW-3

START	FINISH	DRILLER	DRILL METHOD	BOREHOLE DIAMETER	WELL DIAMETER	TOTAL DEPTH
4/10/92	4/10/92	Empire	4.25" ID HSA	8.00"	4.00"	72.50'

LOGGER	TOP of CASING ELEV.	GROUND ELEVATION	DEPTH/ELEVATION GROUNDWATER - DATE MEASURED
R. Shultz			71.20'/' 04/10/92

Note: Stainless steel casing, wire wrap, 10 slot, Mory Sand No.0. CS2 refers to Carbon Disulfide Concentration (PPM).

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
1	SS	18	12 11 9 8		20			CL		Reddish brown SILTY CLAY: trace fine, angular, black gravel; stiff; moist.	
2	SS	14	14 16 18 18		22			CL			
3	SS	24	2 3 5 7		24			CL		As above; firm; moist.	
4	SS	24	6 7 7 9		26			CL			
5	SS	24	0 3 3 3		28			CL			

*ASTM D1586
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D = DENNISON CT = CUTTINGS BA = BUCKET AUG

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonowanda, NY

PAGE NO. 2 of 3 | HOLE NO. MW-3

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
6	SS	24	1 2 3 3 2		31			CL			
7	SS	24	2 4 4 5 7		32			CL			
8	SS	24	7 0 0 1 2		33			CL		As above; very sticky; soft; wet.	
9	SS	24	1 3 3 5 0		34			CL			
10	SS	24	0 0 2 2 2		35			CL		As above; gray top 8 inches; then grades to brown-red; very sticky.	
11	SS	24	0 1 2 3		36			CL			
12	SS	24	0 1 2 3		37			CL			
13	SS	16	0 2 3 3		38			CL			
14	SS	24	WH 1 2		39			CL		As above; very soft; wet.	
					40						
					41						
					42						
					43						
					44						
					45						
					46						
					47						
					48						
					49						
					50						
					51						
					52						
					53						
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					56						
					57						
					58						
					59						
					60						
					61						
					62						

*ASTM D1586
SS = SPLIT SPOON ST = SHELBY TUBE C = CORE CS = CONTINUOUS SAMPLER
D = DENNISON CT = CUTTINGS BA = BUCKET AUG.

Confidential Client
Tonowanda, NY

PAGE NO. 2 of 3 | HOLE NO. MW-3

GEOLOGIC DRILL LOG

PROJECT NAME AND LOCATION: Confidential Client, Tonowanda, NY

PAGE NO.: 3 of 3

HOLE NO.: MW-3

SAMPLE NO.	SAMPLE TYPE	RECOVERY "	SAMPLE BLOWS*	ELEV	DEPTH	GRAPHIC LOG	WELL CONSTRUCTION	CLASS-IFICATION	SAMPLE INTERVAL	DESCRIPTION	NOTES
					64						
					65						
					66						
					67						
15	SS	18	3 26 25 63		68			GC		Light green to gray GRAVELLY SAND AND CLAY; sand/gravel subangular to subrounded; medium to fine grained; gypsum lenses at 68 feet.	
					69						
16	SS	4	30 100/2		70			GC		As above, diesel fuel odor in water.	
					71						
17	SS	6	45 100/2		72			HALE		Gray SILTY TO SANDY SHALE; fine to medium grained; medium to coarse grained below 71.2 feet; white fine grained gypsum lenses; disiel fuel odor; fine upward sequence.	
										End of boring at 72.50 feet.	

*ASTM D1586
SS = SPLIT SPOON
D = DENNISON
ST = SHELBY TUBE
C = CORE
CT = CUTTINGS
CS = CONTINUOUS SAMPLER
BA = BUCKET AUG.

ROY F. WESTON, INC.
WESTON
MANAGERS DESIGNERS/CONSULTANTS

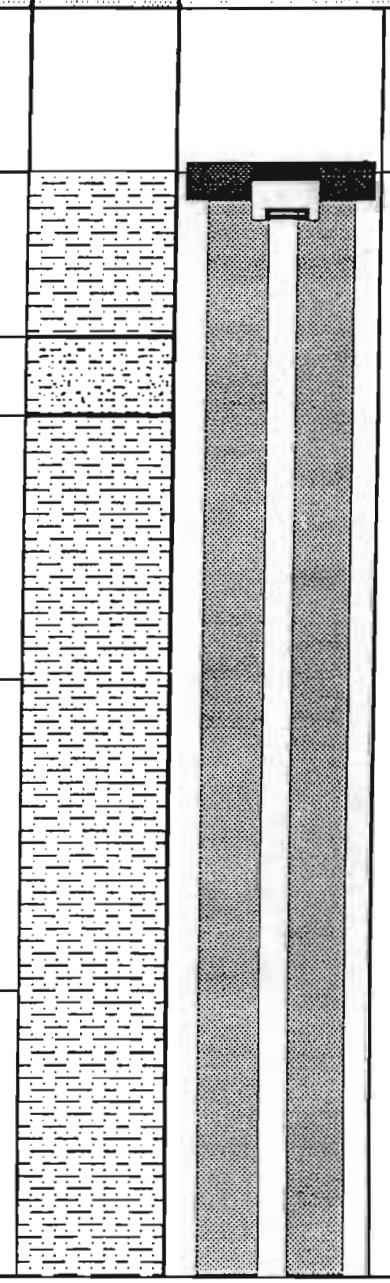
MONITOR WELL/BOREHOLE LOG

BOREHOLE NUMBER: MW-4

PROJECT NAME: O-CEL-O, TONAWANDA, NY
W.O.#: 02181-086-005-0001
LOCATION: TONAWANDA, NEW YORK
DRILLING COMPANY: NOTHNAGLE
RIG TYPE: CME 75
DRILLING METHOD: HOLLOW STEM AUGERS, TO 74.2 '; HQ CORE TO 84.2'
WEATHER: SUNNY, WARM
LOGGED BY: BRAD STONE
DATE BEGUN: 7-17-95 DATE COMPLETED: 7-18-95

TOTAL DEPTH: 84.2 FEET BLS
NORTHING: 3936.70
EASTING: 10318.26
SURFACE ELEV.: 602.04 FEET AMSL
INITIAL WATER LEVEL:
DATE/TIME/DATUM: AUGUST 18, 1995
AIR MONITORING INSTRUMENT: OVM
BOREHOLE/WELL CASING DIAMETER: 10" / 2"
COMMENTS: TOC ELEVATION IS 601.84 FEET AMSL

DEPTH BLS	SPT BLOWS PER 0.5 FT.	VOLATILE ORGANIC VAPORS (UNITS)	% RECOVERY	LITHOLOGIC DESCRIPTION
0	2-3-7-9	background	100	Fill: Brown, Silty Clay, moist (CL/CH)
	5-7-2-2	background	80	
5	1-2-1-2	background	80	
	2-2-4-5	background	100	Fill: Brown, Clayey Silty Fine Sand, moist (SC)
	5-7-8-10	background	90	Reddish brown, Silty Clay, dry, with fine gray filled dessication cracks, trace angular black fine gravel (CH)
10	6-8-13-18	background	80	
	5-7-9-18	background	50	
15	15-25-29-29	background	50	
	2-4-6-7	background	50	Brown, Silty Clay, moist, trace fine angular black gravel (CH)
	1-1-2-3	background	50	
20	9-9-9-9	background	60	
	1-2-3-6	background	50	
25	5-7-9-13	background	90	
	1-1-1-1	background	60	Brown, Silty Clay, very moist (CH)
	5-7-6-5	background	50	
30	1-1-1-1	background	50	
	1-2-2-4	background	50	
35				



ROY F. WESTON, INC.
WESTON
MANAGERS DESIGNERS/CONSULTANTS

MONITOR WELL/BOREHOLE LOG

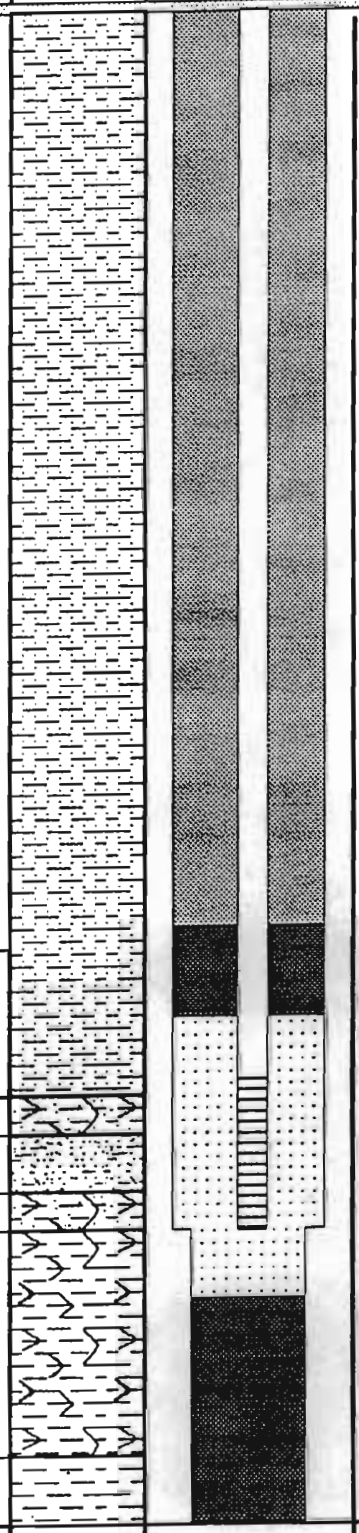
BOREHOLE NUMBER: MW-4

PAGE NO. 2 OF 2

DEPTH BLS	SPT BLOWS PER 0.5 FT.	VOLATILE ORGANIC VAPORS (UNITS)	% RECOVERY	LITHOLOGIC DESCRIPTION
	WOR	background	50	Brown, Silty Clay, very moist (CH)
	1-1-1-2	background	60	
	WOR	background	50	
40	WOH-4	background	75	
	WOH	background	15	
45	WOR-1-WOR-1	background	15	
	WOH	background	20	
	WOH	background	80	
50	1-1-1-1	background	100	
	WOH-1	background	80	
55	WOH	background	80	
	WOH	background	60	
	WOR	background	50	
60	1-2-2-2	background	100	
	WOR	background	100	
65	WOR-12-29	background	100	
	16-17-23-37	background	100	Brown-gray, grading to gray, Silty Clay, moist, trace angular to subangular black fine gravel, percentage gravel increases with depth
	25-100/6"	background	70	
70	100/6"	background	100	Gray Silty to Sandy Shale with white fine grained gypsum lenses
				Gray Silty, Clayey Sand, saturated, with fine subrounded black gravel
	4-10-100/2"	background	100	Gray Silty to Sandy Shale with fine grained gypsum lenses, soft
75	HQ core 74.2'-79.2' RQD = 100%	NA	98	Shale containing layers of fine grained gypsum. Gypsum content decreases with depth
80	HQ core 74.2'-79.2' RQD =100%	NA	98	
				Gray thinly bedded shale
85				Coring terminated at 84.2'

WOR = Weight of Rod
WOH = Weight of Hammer

90



GRAPHIC LOG

WELL CONSTRUCTION (GRAPHIC)

COMMENT

2.5 feet bentonite seal set @ 64.7 to 67.2 feet bgs

filter pack @ 67.2 to 77.2 feet bgs, 20/30 clean sand

2" PVC slotted screen (0.010") set @69.2 to 74.2 feet bgs, w/ end cap

HQ core hole (4" dia.) @74.2 to 84.2 feet bgs

bentonite set from @77.2 feet to bottom of core hole (84.2 feet bgs)

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MW-4
CORE DESCRIPTION DATA SHEET
3M FACILITY
TONAWANDA, NEW YORK

Core Run	Depth (ft bgs)	Fracture Type	Dip Angle (Degrees)	Number of Fractures	Lithology	Comments
C1	74.6	5	40	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C1	74.8	5	15	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C1	75.2	4	5	1	Camillus Shale	Fracture occurs along lines of gypsum mineralization
C1	75.6 - 78.8	4	0	6	Camillus Shale	Fracture occurs along lines of gypsum mineralization
C2	79.2	5	10	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C2	79.6	2	30	1	Camillus Shale	Fracture filled with gypsum
C2	79.8	5	15	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C2	80.5	4	0	1	Camillus Shale	Fracture occurs along lines of gypsum mineralization
C2	81.5	5	10	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C2	82.3	5	10	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C2	82.6	5	5	1	Camillus Shale	Fracture occurs across lines of gypsum mineralization
C2	82.7	4	0	8	Camillus Shale	
C2	83.0	5	10	1	Camillus Shale	
C2	83.3	5	15	1	Camillus Shale	
C2	83.5	4	0	1	Camillus Shale	

BGS: Below ground surface.

Fracture Type:
1-Penetrative, natural
2-Non-penetrative, natural
3-Filled
4-Induced, parallel to foliation
5-Induced, not parallel to foliation