CHARLES GIBSON SITE

NIAGARA COUNTY

NIAGARA FALLS, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: 932063

Prepared for:

Olin Corporation

3855 North Ocoee St., Suite 200

Cleveland, TN 37312

Prepared by:

Wood Environment and Infrastructure Solutions

511 Congress Street, Suite 200, Portland, ME 04101

207-775-5401

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date
0	6/22/2020	Original	

JUNE 2020

CERTIFICATION STATEMENT

I REBECCA BROSNAN certify that I am currently a Qualified Environmental Professional as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Rebecca M. Brosnan QEP

06/22/2020 DATE

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LIST OF ACRONYMS

bgs	below ground surface
BHC	Hexachlorocyclohexane
CP	Commissioner Policy
CPVC	chlorinated polyvinyl chloride
DER	Division of Environmental Remediation
EC	Engineering Control
EWP	Excavation Work Plan
FML	Flexible Membrane Layer
FS	Feasibility Study
HCB	Hexachlorobenzene
HDPE	High Density Polyethylene
IC	Institutional Control
LTMP	long term monitoring program
msl	mean sea level
MW	monitoring well
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
O&MM	Operation and Maintenance Monitoring
Olin	Olin Corporation
OSHA	Occupational Safety and Health Administration
PRR	Periodic Review Report
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RI	Remedial Investigation
RSO	Remedial System Optimization
SCG	Standards, Criteria and Guidelines

SCO	Soil Cleanup Objective
Site	Charles Gibson Site located in Niagara Falls, New York
SMP	Site Management Plan
Wood	Wood Environment and Infrastructure Solutions
WWTF	Waste Water Treatment Facility

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification: Site No. 932063

Charles Gibson
Corner of Pine Avenue and Tuscorora Blvd
Niagara Falls, NY 14304

Institutional Controls:	1. The property may be used for its existing use. 2. Institutional Controls for the Site are: • The property may be used for its existing use. • All ECs must be operated and maintained as specified in this SMP. • All ECs must be inspected at a frequency and in a manner defined in the SMP. • The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the Niagara County Department of Health or the NYSDOH to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.

Site Identification: Site No. 932063

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	• Groundwater and other environmental or public health monitoring, leachate, and creek sediment monitoring must be performed as defined in this SMP. • Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP. • All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP. • Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP. • Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP. • Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this SMP; and • Vegetable gardens and farming on the site are prohibited.
Engineering Controls:	1. Landfill Cover System 2. Groundwater Containment and Leachate Collection System 3. Site Access Controls

Site Identification: Site No. 932063

Charles Gibson
Corner of Pine Avenue and Tuscorora Blvd
Niagara Falls, NY 14304

Inspections:	Frequency
1. Fencing, gates, and Site access 2. Monitoring well integrity 3. Landfill Cover System	Quarterly
Monitoring:	
1. Hydraulic Monitoring for Groundwater Containment	Quarterly
2. Manhole B water samples	Annually (BHC Isomers) Every 5 Years (HBC)
3. Groundwater Monitoring Wells MW-A3, MW-4, MW-5	Annually (BHC Isomers) Biennially (HBC)
Maintenance:	
1. Pump maintenance	As needed
2. Landfill cover mowing	Annually
Reporting:	
1. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Charles Gibson Site located in Niagara Falls, New York (hereinafter referred to as the "Site") (**Figure 1.1**). The Site is currently in the New York State (NYS) Inactive Hazardous Waste Disposal Site Remedial Program Site No. 932063, which is administered by New York State Department of Environmental Conservation (NYSDEC).

The Olin Corporation (Olin) entered into a Stipulation and Consent Judgment (Civil Action No. 83-1400c) dated March 20, 1985 with the United States District Court for the Western District of New York to remediate the site. The site location and boundaries are shown on **Figures 1.1 and 1.2**. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Stipulation and Consent Judgment provided in **Appendix A**.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. The Stipulation and Consent Judgment and subsequent Release of Liability requires compliance with the NYSDEC, and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the Site. This plan has been approved by the NYSDEC, and compliance with this plan is required by the Site owner their successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the NYSDEC. Failure to properly implement the SMP is a violation of the SMP.
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the Stipulation and Consent Judgment (Civil Action No. 83-1400C; Site #932063) for the Site, and thereby subject to applicable penalties.

Reports associated with the Site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the Site is provided in **Appendix B** of this SMP.

This SMP was prepared by Wood Environment and Infrastructure Solutions (Wood), on behalf of Olin, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the NYSDEC for the Site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shutdown of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the site conditions. In accordance with this SMP for the Site, the NYSDEC will provide a notice of any approved changes to the SMP and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required, by 6NYCRR Part 375 and/or Environmental Conservation Law.

- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.

- Notice within 48-hours of identification of damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.

- Verbal notice by noon of the following day of identification of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the Site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

Table 1.1 on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B**.

Table 1.1: Notifications*

Name	Contact Information
Brian Sadowski, NYSDEC Project Manager	716-851-7220; bpsadows@gw.dec.state.ny.us
Glenn May, NYSDEC Regional Manager	716-851-7220: glenn.may@dec.ny.gov
Olin Emergency Hotline	1-800-295-6141
Michael Walker, Sevenson Environmental Services	716-583-4460

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The Site is located in Niagara Falls, Niagara County, New York and is identified as Section 159.11 Block 1 and Lot 16 and Section 161.05 Block 3 Lot 7 on the City of Niagara Falls Tax Map (**Figure 1.1**, **Appendix C**). The Site is an approximately 2-acre area and is bounded by Cayuga Creek to the north and east, private property to the south, and Tuscarora Road to the west (**Figure 1.2**). The property to the south with frontage on Pine Avenue was previously part of the Site. The Site was also historically referred to as the Pine and Tuscarora Site. The boundaries of the site are more fully described in the Stipulation and Consent Judgment included in **Appendix A**. The owner of the site parcel(s) at the time of issuance of this SMP is:

Olin Corporation
190 Carondelet Plz.
Ste 1530
Clayton, MO 63105

2.2 Physical Setting

2.2.1 Land Use

The Site consists of a capped landfill. The Site is zoned as Commercial type C-3 (City of Niagara Falls, 2013) and is currently vacant (City of Niagara Falls, 2020).

The properties adjoining the Site and, in the neighborhood, surrounding the Site primarily include commercial and residential properties. The property immediately south of the Site is a commercial auto parts store and parking lot; the property immediately north of the Site is a wooded residential property; the property immediately east of the Site is a partially developed commercial property; and the properties to the west of the Site include residential properties. The Niagara Mohawk Power Corporation maintains an 80-

foot-wide right-of-way running east to west along the southern Site boundary, between the Site and the auto parts store.

2.2.2 Geology

Overburden lithology on the capped area of the Site consists of 6 to 9 feet (ft) of fill containing industrial wastes including hexachlorobenzene (HCB) and hexachlorocyclohexane (BHC), demolition materials, and miscellaneous debris underlain by up to 2-ft pockets of poorly-sorted natural sediments, consisting of clays, sands, and silts, followed by 10 to 14 ft of stiff clay, believed to be the varved glaciolacustrine clay layer common in the Niagara Falls area (WCC, 1987). Beneath this glaciolacustrine clay are varied lenses of silty, gravelly sand, and/or clayey sand and silt ranging in thickness from 3 to 7 ft (WCC, 1987). Bedrock at the Site is comprised of approximately 150 ft of fractured dolomite of the Lockport formation, underlain by interbedded siltstone, limestone, and shale. Geologic cross sections and site-specific boring logs are provided in **Appendix D**.

2.2.3 Hydrogeology

Regionally, groundwater is in two primary zones: the surficial glacial deposits and the fractured dolomite bedrock. Generally, where glacial deposits directly overlie dolomite in the vicinity of the Site, the rate of groundwater recharge to the dolomite is enhanced. At the Site, the glaciolacustrine clay has been demonstrated to act as an aquitard, preventing groundwater from permeating below the surficial glacial layer (WCC, 1987). Regionally, groundwater and surface water discharges to the Niagara Falls Basin to the south and west.

Prior to remedial measures, groundwater at the Site flowed to the east and northeast toward the Cayuga Creek. Remedial measures create an inward hydraulic gradient within the capped area of the Site preventing discharge of groundwater to the Cayuga Creek. Groundwater at the Site is located approximately 3 ft below ground surface (bgs) adjacent to Cayuga Creek and 13 ft bgs on the southern end of the capped area (Olin 2019). South of the capped area, depth to groundwater is generally less than 5 ft bgs,

consistent with groundwater levels prior to remedial action (HLA 1986). All wells are screened in the overburden in a stiff clay layer that acts as an aquitard. There are not private or public wells on the Site. The Site vicinity is serviced by public water sourced from the Niagara River; therefore, it is unlikely that there are nearby private wells.

A groundwater contour map is shown in **Figure 2.1**. Groundwater elevation data is provided in **Table 2.1**. Groundwater monitoring well construction logs are provided in **Appendix D.**

2.3 Investigation and Remedial History

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the Site. Full titles for each of the reports referenced below are provided in **Section 8.0** - References.

2.3.1 Site History

The eastern portion of the Site was originally low-lying marsh land; the western portion contained a residence that is no longer present. In 1957, the Site was filled with chemical wastes from manufacturing, soil, and building debris. The chemical wastes consisted of two main sources: approximately 400 metal drums containing HBC, used as a fungicidal by-product from related chemical syntheses, and approximately 100 tons of BHC residue in the form of alpha-beta cake. A 1981 test indicated levels of contamination up to 7.7% in soil samples from the Site; analyses of surface water and sediment from the on-site portion of the Cayuga Creek did not reveal contamination at that time (HLA, 1986).

2.3.2 Investigations

The initial site investigation occurred following a December 1983 lawsuit brought against Olin and the Site property owners, (New York vs. Olin, et al. CIV 83-1400) and subsequent agreement in March 1985, hereinafter referred to as the State/Olin Agreement. Olin was obligated under this Stipulation and Consent Judgment to protect public health and the environment by assessing the extent of the contamination at the site

via field investigations and the design and implementation of remedial plans. Olin contracted Harding Lawson and Associates (HLA) to conduct a Site Remedial Investigation (RI), which was performed in July 1986 (HLA 1986). The RI included characterization of the Site lithology and evaluation of Site soils, groundwater, and ambient air. Results from the RI indicated presence of Site contaminants in soil and groundwater.

The State/Olin agreement was modified on April 13, 1987 following State concerns that the full extent of contamination was not captured in the original RI (NYS 1987). This agreement designated the northern and southern parts of the Site as distinct areas for further investigation to inform potential remedial measures. This investigation was completed in 1989 and consisted of a drum sampling program to characterize the HBC on site, and further evaluate groundwater (HLA 1989). Concentrations of Site contaminants were detected in groundwater and presence of HCB in the drums was confirmed.

A feasibility study (FS) for the northern portion of the Site was submitted to the State in 1987 and approved in 1988 (WCC, 1987). The FS identified the most significant risk of exposure to Site contaminants was via shallow groundwater discharge to the Cayuga Creek. RI geotechnical testing deemed migration to deeper groundwater zones unlikely due to the aquitard at approximately 6 to 9 ft bgs.

Remedial Action History

Remedial measures implemented at the Site in 1989 and 1990 included:

- Excavating a new creek channel on the eastern portion of the Site, stabilization of the new channel using geotextile, and construction of new stream banks with riprap.
- Stabilization of the former creek bed with shot rock, pieces of concrete, excavated soil from on-site trenching, and structural fill.
- Installation of a leachate collection system consisting of: 6-inch chlorinated polyvinyl chloride (CPVC) drain pipe in a 4-foot trench along the southern through western banks of the creek and lined with stabilizing geotextile, and

coarse drainage aggregate stone, two manholes on the northeastern and southeastern corners of the Site with related pipe connections.

- Installation of a fully circumscribing soil-bentonite slurry wall barrier from the original site grade into the underlying red-brown clay layer (**Appendix E** – As Built) to serve as a physical deterrent to infiltration of Site groundwater into the Cayuga Creek.
- Capping of the landfill with compacted clay, two 40-millimeter layers of flexible membrane lining (FML) with welded seams, 110-millimeter geotextile, 40-millimeter geotextile to prevent infiltration of precipitation through the waste.
- Placing topsoil and seeding the capped area.
- Installing a perimeter chain-link fence and wood privacy fence along portions of the Site readily visible to the public.
- Implementation of a long-term monitoring program (LTMP).

A Closure Certification Report (Olin 1990) further detailed the remedies listed above. NYSDEC approved an O&M Manual for the Site and attached Addendum 1 on October 30, 1992. On November 6, 1992, a Release of Liability was issued by Judge John T. Curtin stating that the field investigation and remediation implementation were complete, and that Olin must continue to monitor the effectiveness of the remedy into the future.

In March 1997, a direct discharge line was installed connecting the leachate collection system with sanitary sewer. Leachate is now routed to the Niagara Falls Wastewater Treatment Facility (WWTF). Although Olin originally held a permit for wastewater, based on the low flow and low pollutant loadings, the Site was reclassified as a Commercial/Small Industrial/Residential User on September 14,1999 and the Significant Industrial User Permit was no longer required. Documentation regarding this reclassification is included in **Appendix F**.

Long-Term Monitoring Program

NYSDEC reduced the status in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites in 1993 from 2 (poses significant threat to the public health- action

required) to 4 (Site property closed- requires continued management) due to the successful lining and capping of the Site and the beginning of the LTMP. The implementation of the LTMP is required under this site designation.

The first year of post-remedial monitoring began in 1992 consisting of quarterly groundwater sampling and semi-annual Cayuga Creek sediment sampling; however, the first Annual Report for the LTMP was submitted by Olin for the 1993 monitoring year in March 1994 (Olin 2000). Monitoring at the Site has been reduced iteratively throughout the LTM and now includes:

- Quarterly groundwater level monitoring at three piezometer pairs (inside and outside of the slurry wall barrier).
- Annual sampling of Manhole B, MW-A3, MW-4, and MW-5 for BHC isomers.
- Periodic sampling of Manhole B, MW-A3, MW-4, and MW-5 for HCB (Manhole B every 5 years, MWs biennially).
- Annual sampling of sediment and upstream and downstream sediment traps for BHC in the fall.

Results from 2000 to 2018 showed a stable and consistent management of contaminant levels under the current O&M program (Olin 2019). Sample results from 2019 were higher than historical values; results are discussed in the 2019 Periodic Review Report (PRR) (Olin, 2020). Results from the 2019 annual sampling event for groundwater, leachate, and sediment are depicted on **Figure 2.2** and historical results are listed in **Table 2.2** and **Table 2.3**.

An April 27, 2018 letter from NYSDEC requested that remediation sites statewide test for 1,4-dioxane and per- and polyfluoroalkyl substances. Three wells were sampled for the requested contaminants during the September 2019 event; results will be reported under separate cover.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the Site are broadly outlined in the Stipulation and Consent New York vs. Olin, et. al CIV 83-1400 dated April 29, 1985 (State/Olin Agreement) as follows:

The design and implementation of remedial plans resulted in the removal from the Site and its environs or the isolation from people and the environment of contaminants deposited or caused to be deposited on-Site by Olin or of such contaminants that have migrated from the Site to effectively protect the public health and environment. Interpreted application to specific media are outlined below.

2.4.1 Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent migration of contaminants that would result in groundwater or surface water contamination through isolation.

2.4.2 Sediment

RAOs for Environmental Protection

- Prevent releases of contaminants from sediments that would result in surface water levels in excess of ambient water quality criteria.

2.4.3 Groundwater

RAOs for Public Health and Environment Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Isolate on-Site contaminants to prevent the discharge of contaminants to surface water.

2.5 Remaining Contamination

2.5.1 Soil

Remaining soil contamination discussed in this section is based on results from the 1986 RI. The clean-up criteria defined in the State/Olin Agreement was the presence of the target analytes. Soil contamination detected during the RI is included in **Table 2.2**.

The majority of contaminated soil on-Site consists of the alpha-beta cake or soil contaminated with the BHC used as part of the wetland fill material. The cake, or soils contaminated with the cake, are estimated to have a volume of roughly 8,500 ft^3 over an area of approximately 27,400 ft^2 (HLA, 1986). Depth of soil contamination ranged from 0 to 6 ft bgs during the RI and is underlain by a clay aquiclude. The remaining contamination is located on-site under an engineered cap. Remedial measures included a landfill cap, covering contaminated soil with approximately 3 ft of material (construction of the cap is discussed in **Section 3.3.1**.) The top of the contamination (deposited waste) is demarcated by the FML. No soil contamination was observed outside of the areas where the alpha-beta cake was encountered during the RI, with the exception of a detection of alpha-BHC at MW-4, which exceeds the Unrestricted SCO. MW-4 is south of the capped area and west of Cayuga Creek. **Table 2.2** and **Figure 2.2** summarize the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Industrial Use SCOs at the site after completion of remedial action. The cross sections in **Appendix D** show the vertical and horizontal extent of BHC contamination.

Currently, there are no existing structures on the Site, however Niagara Mohawk Power Corporation installed a pipeline in their ROW in the late 1980s.

2.5.2 Sediment

Sediment sampling for BHC and HBC was conducted during the RI in 1986 from the top 3 inches of the streambed; sediment sampling for BHC is currently a component of the LTM. During the rerouting of the stream in 1989, sediment was excavated to the clay aquitard, which was left as the top of the streambed and functions as a demarcation layer.

In 2000, HCB sediment sampling was discontinued after 7 years of consistent results showed the contaminant was not present in upstream or downstream sediments, which lie north and east of the Site, respectively. Sediment samples are now collected on an annual basis for BHC using sediment traps, which were installed in 2001. Concentrations of alpha-BHC and beta-BHC remain at the upstream sampling location and beta-BHC at the downstream sampling location. Generally, the upstream location contains higher concentrations than the downstream location.

Table 2.3 and **Figure 2.2** summarize the results of sediment samples collected that exceed the SCGs after completion of the remedial action.

2.5.3 Groundwater

Remaining groundwater contamination is present at three groundwater monitoring wells: two downgradient of the Site (MW-4 and MW-5) and one across Cayuga Creek to the east (MW-A3).

Concentrations of BHC and HBC were not detected in groundwater samples collected between 2012 and 2018. Laboratory reporting limits are higher than the respective guidance values (GVs); however, because detection limits are below GVs, concentrations above GVs would be evident as qualified detections. In 2019, concentrations of alpha, gamma, and delta BHC isomers in the on-site wells exceeded the respective GVs. These exceedances indicate that contaminated groundwater is present south of the Site, adjacent to the Cayuga Creek. Groundwater contamination is contained to the shallow overburden above the clay aquitard, which is present at approximately 11 ft bgs. **Table 2.4** and **Figure 2.2** present the remaining exceedances of SCGs

.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

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

This plan provides:

- A description of all IC/ECs on the Site.
- The basic implementation and intended role of each IC/EC.
- A description of the key components of the ICs set forth in the this SMP.
- A description of the controls to be evaluated during each required inspection and periodic review.
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in **Appendix G**) 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 IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by this SMP to: (1) maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and (3) limit the use and development of the Site to existing uses only. Adherence to these ICs on the site is required by the this SMP. ICs identified in the in this SMP may not be discontinued without approval of the NYSDEC. The IC boundaries are shown on **Figure 3.1**. ICs include the following:

- The property may be used for its existing use.
- All ECs must be operated and maintained as specified in this SMP.
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the Niagara County Department of Health (NYSDOH) to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring, leachate, and creek sediment monitoring must be performed as defined in this SMP.
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP.
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP.
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP.
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP.
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by this SMP; and
- Vegetable gardens and farming on the site are prohibited.

3.3 Engineering Controls

The subsections below discuss the ECs currently being implemented at the Site. Additional details on the operation and maintenance of the ECs are provided in the Operation and Maintenance (O&M) Plan provided in **Appendix H**. As-built drawings, sealed and signed by a professional engineer, are provided in **Appendix E**. The ECs are depicted on **Figure 3.1**.

3.3.1 Landfill Cover System

Exposure to remaining contamination at the Site is prevented by a cover system placed over the Site. This cover system is comprised of a landfill cap, slurry wall barrier, and leachate collection system.

The landfill cap consists of 2 ft of compacted clay, a double high-density polyethylene (HDPE) flexible membrane layer (FML), two layers of geotextile filter fabric, 18 inches of clean structural fill, and 6 inches of seeded topsoil.

The slurry wall barrier surrounds the landfill is integrated into the cover system under the landfill cap. The slurry wall is an approximately three-foot wide soil-bentonite mixture that serves as a physical barrier to groundwater infiltration into the Cayuga Creek. The slurry wall extends 2 feet into the aquitard identified as the red-brown clay layer (5-10 feet bgs) up to 6 inches below the original grade (the grade prior to cap installation).

The collection system includes a leachate collection drain line which runs along the inside perimeter of the slurry wall along the bank of the Cayuga Creek to intercept leachate beneath the FML. The collection system is tied into the public sewer lines and is directly discharged from the Site to the City of Niagara Falls WWTF. The system collects leachate via gravitational flow into a 6-inch perforated chlorinated polyvinyl chloride pipe which is located approximately 15 ft inside the perimeter of the slurry wall. The drain line is overlain with stone to allow infiltration. This leachate is routed to Manhole A then Manhole B via a HDPE dual containment pipe (2-inch pipe inside of a 4-inch pipe). A ½ horse-power submersible sump pump, installed at the bottom on Manhole B, is set to turn on when groundwater reaches 563.34 feet above mean sea level (msl). This maintains a groundwater level to provide an inward gradient in the cover system, preventing discharge to the Cayuga Creek. The pump turns off when groundwater falls to 560.34 feet above msl.

Procedures for operating and maintaining the groundwater containment and leachate collection system are documented in the O&M Plan (**Section 5.0** of this SMP).

Figure 3.1 presents the location of the cover system and **Appendix E** contains as-built drawings that depict applicable demarcation layers. The Excavation Work Plan (EWP) provided in **Appendix G** 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 of this cover are provided in the Monitoring and Sampling Plan included in **Section 4.0** of this SMP. Work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (included as part of the O&M Plan in **Appendix H**) and associated Community Air Monitoring Plan prepared for the Site.

3.3.2 Other ECs

Site Access Controls

Unauthorized access to the Site is restricted by a chain link fence around the perimeter of the capped area of the Site with wooden privacy fence outside portions of the chain link fence. The fenced area is shown on **Figure 3.1**. Procedures for operating and maintaining the fencing is documented in the O&M Plan (**Section 5.0** of this SMP).

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when 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 6.4 of NYSDEC DER-10.

3.3.3.1 Landfill Cover System

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

3.3.3.2 Groundwater Monitoring

Groundwater sampling activities and groundwater elevation monitoring will continue until, as determined by the NYSDEC with consultation with NYSDOH, residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period.

In the event that monitoring data indicates that monitoring may no longer be required, a proposal to discontinue the system will be submitted by the remedial party. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan (QAPP) provided as part of the O&M Manual in **Appendix H**.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor, soils).
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards; and
- Evaluating Site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment.

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

- Sampling locations, protocol and frequency.
- Information on all designed monitoring systems.
- Analytical sampling program requirements.
- Inspection and maintenance requirements for monitoring wells.
- Monitoring well decommissioning procedures; and
- Quarterly inspection and periodic certification.

Reporting requirements are provided in **Section 7.0** of this SMP.

4.2 Site – Wide Inspection

Site-wide inspections will be performed quarterly. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in **Appendix I**. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage.
- An evaluation of the condition and continued effectiveness of ECs.
- General site conditions at the time of the inspection.
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of remedial components installed at the Site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed.
- If these controls continue to be protective of human health and the environment.
- Compliance with requirements of this SMP.
- Achievement of remedial performance criteria; and
- If site records are complete and up to date.

Reporting requirements are outlined in **Section 7.0** of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day after identification of the issue. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Remedial System Monitoring and Sampling

4.3.1 Remedial System Monitoring

Monitoring of the Landfill Cover System including the slurry wall barrier and leachate collection system will be performed on a routine basis, as identified in **Table 4.1** to verify that the system is functioning properly. Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the remedial system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Landfill Cover System components to be monitored include, but are not limited to, the components included in **Table 4.1**.

A complete list of components to be inspected is provided in the Inspection Checklist, provided in **Appendix I**. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the O&M Plan, is required immediately.

4.3.2 Remedial System Sampling

Samples will be collected from Manhole B on a routine basis for hexachlorocyclohexane (BHC) isomers and (hexachlorobenzene) HCB. The sample location required analytical parameters and schedule are provided in **Table 4.2**. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

Manhole B is sampled according to the procedure in **Appendix J**. Detailed sample collection and analytical procedures and protocols are provided in **Appendix H** – Operations and Maintenance Manual, which includes the QAPP.

4.4 Post-Remediation Media Monitoring and Sampling

Samples will be collected from on and off-Site locations on a routine basis. Sampling locations, required analytical parameters, and schedule are provided in **Table 4.2** and in **Table 4.3**. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

4.4.1 Soil Sampling

Soil sampling is not currently conducted at the Site.

4.4.2 Sediment Sampling

Sediment sampling will be performed annually for BHC-isomers only to assess the quality of the sediment following completion of the remedial actions. Locations are depicted on **Figure 2.2**. Sediment samples will be collected during "low water" periods from the sediment traps installed at the upstream and downstream sampling locations. Detailed sample collection and analytical procedures and protocols are provided in **Appendix H**.

Sediment sample locations in Cayuga Creek have been selected to assess site contaminants that may be from sources upstream from the Site or from potential backwash effects from changes in the water level of the Niagara River, and to assess site contaminant levels in the creek sediment. A list of analytical parameters with their associated detection limits and

reporting limits provided by the laboratory and applicable regulatory criteria are included in **Table 4.3**.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the sediment sampling program are specified in **Section 7.0** – Reporting Requirements.

4.4.3 Groundwater Sampling

Groundwater monitoring will be performed annually to assess the performance of the remedy. The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The monitoring wells are shown on **Figure 1.2** and are listed on **Table 4.4**. The network of on-site and off-site wells has been designed based on the following criteria:

- To monitor Site contaminant concentrations downgradient from the capped area (MW-4 and MW-5); and
- To monitor off-Site groundwater quality (MW-A3).

Table 4.4 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, one on-site manhole (Manhole B), two on-site wells (MW-4 and MW-5) and one off-site well (MW-A3) are sampled to evaluate the effectiveness of the remedial system. The wells and Manhole-B are sampled annually for BHC isomers on rotating seasons (i.e. Spring and Fall) to assess seasonal variability. Sampling for HCB occurs every 5 years, beginning in 2000. A summary of the sampling schedule is included in **Table 4.2**. A list of analytical parameters, the laboratory analytical limits, and applicable regulatory criteria are provided in **Table 4.3**.

Available monitoring well construction logs are included in **Appendix D** of this document. The remedial measure establishes a hydraulic gradient such that groundwater flows inward on the capped portion of the Site; however, groundwater in that area would naturally flow to the north-northeast. South of the capped area of the Site, groundwater flows east-southeast toward Cayuga Creek.

Groundwater samples are collected from monitoring wells south of the capped area of the Site using a peristaltic pump and dedicated Teflon tubing and HDPE drive tubing or a disposable Teflon bailer. Sample collection occurs after purging a minimum of three well casing volumes. If a well is purged dry, the sample will be collected after the water level has recovered to at least 80 percent of the static (pre-purged) water level, or after 24 hours. Physical parameters (pH, specific conductivity, and temperature) will be collected from purge water until the stabilization occurs (10% change with a parameter), or until the well is dry. All purge water is disposed to Manhole B. Sediment samples are collected from sediment traps installed at the upstream and downstream sampling locations depicted on **Figure 2.2.** Detailed sample collection and analytical procedures and protocols are provided in **Appendix H**.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable. Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures."

Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in **Section 7.0** – Reporting Requirements.

4.4.4 Surface Water Sampling

Surface water sampling is not currently conducted at the Site.

4.4.5 Soil Vapor Sampling

Soil vapor sampling is not currently conducted at the Site.

4.4.6 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling is not currently conducted at the Site.

4.4.7 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling logs as provided in **Appendix I**. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the O&M Manual provided as **Appendix H** of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This O&M Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the direct discharge system.
- Will be updated periodically to reflect changes in site conditions or the manner in which the direct discharge system is operated and maintained.

Further detail regarding the O&M of the direct discharge system is provided in **Appendix K**. A copy of the O&M Plan, along with the complete SMP, is to be maintained by Olin. This Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System Performance Criteria

The groundwater containment and leachate collection and discharge are highly variable due to seasonality and slow groundwater flow at the Site. The sump pump in Manhole B is set to turn on with groundwater at 563.34 feet above msl (approximately 8 ft from the bottom of the manhole pit), discharging to the Niagara Falls WWTP in order to maintain a groundwater level to provide an inward gradient within the capped portion of the Site. The pump turns off when groundwater falls to 560.34 feet above msl. The water level in Manhole B is monitored quarterly to ensure pump operation. The depth to water to top of the manhole rim should not be less than 14.07 ft as this would exceed the pump operation threshold of 563.34 ft above msl.

5.3 Operation and Maintenance of the Direct Discharge System

The following section provides a description of the operations and maintenance of the direct discharge system. Cut-sheets and as-built drawings for the system are provided in **Appendix E**.

The direct discharge system consists of a ½ horsepower sump pump, float switch (Rotofloat SST), magnetic flow meter (Sparling Tiger Mag), and telemetry system (Microtel/Tano Series 1000 dialer). The system components are powered from the electrical panel on the western portion of the Site; the electrical lines run through an underground CPVC pipe along the southern end of the landfill cap. System components have integral battery back-up in case of power outages, and are set to restart automatically when power is returned after an outage. The system operates automatically, turning on when it reaches its horizontal axis and turning off when it is 1 inch below its horizontal axis. Daily flow rates and volumes discharged from Manhole B are measured with the flow meter and transmitted with the telemetry system. Discharged leachate is pumped through a dual containment line (2-inch HDPE pipe contained in a 4-inch HDPE pipe) to the sanitary sewer main along Tuscorora Road.

5.3.1 System Start-Up and Testing

The start-up procedure for the Microtel/Tano Series 1000 dialer telemetry system is included in **Appendix K.** The Rotofloat is set at approximately 8 ft from the bottom of the pit, which can be measured using the 1-inch mount pipe. The telemetry system consists of:

- Set up dialer
- Set pump and float switch
- Flow meter communication

Because of the system's integral battery back-up power and automatic restart, the telemetry system is not expected to require start-up procedures after initiation. In the event of a backup failure, the components of the system may be restarted manually as described in **Appendix K**.

5.3.2 Routine System Operation and Maintenance

If necessary, maintenance on the discharge line may be performed via the cleanout installed downstream of the Manhole B connection. The pump may be removed and cleaned as needed. Removal of the pump from Manhole B will be conducted under and confined space entry plan. **Table 4.1** provides a summary and schedule of routine maintenance.

5.3.3 Non-Routine Operation and Maintenance

Required maintenance not listed in **Section 5.3.2** will be addressed as needed.

5.3.4 System Monitoring Devices and Alarms

The direct discharge system has a warning device to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in this SMP, and the direct discharge system will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENT/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

A climate change vulnerability assessment has not been conducted at the Site. Based on a review of Federal Emergency Management Administration flood insurance maps of the area, the Site is not located in a flood zone (**Appendix L**). However, the Site is directly adjacent to and bordered on two sides (north and east) by a Zone AE Special Flood Hazard Area and a Regulatory Floodway, Cayuga Creek. To the south, a Zone X area of flood hazard is present, which corresponds to a 0.2% annual chance of flood hazard, area of 1% annual chance of flood with average depth less than one foot or with drainage areas of less than one square mile. It is worth noting that the FEMA flood maps were developed based on historical data and may underestimate the potential for future flooding in light of climate change.

If deemed necessary, a vulnerability assessment will be performed during the periodic review and include, but not be limited to, a discussion of potential vulnerabilities to be assessed such as the following:

- Flood Plain: Identify whether the Site is located in a flood plain, low-lying or low-groundwater recharge area.
- Site Drainage and Storm Water Management: Identify areas of the Site which may flood during severe rain events due to insufficient groundwater recharge capabilities or inadequate storm water management systems.

- Erosion: Identify evidence of erosion at the Site or areas of the Site which may be susceptible to erosion during periods of severe rain events.
- High Wind: Identify areas of the Site and/or remedial system which may be susceptible to damage from the wind itself or falling objects, such as trees or utility structures during periods of high wind.
- Spill/Contaminant Release: Identify areas of the Site and/or remedial system which may be susceptible to a spill or other contaminant release due to storm-related damage caused by flooding, erosion, high winds, loss of power etc.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the Site and/or engineering controls to severe storms/weather events and associated flooding.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

The remedy in place at the Site involves gravity-fed leachate collection. Operation of the submersible pump in Manhole B is inherently efficient, operating automatically on an as-needed basis when water reaches approximately 8 ft above the bottom of the manhole pit. Leachate is disposed of by pumping from the manholes to the sanitary sewer only as needed to maintain the inward hydraulic gradient. Maintenance activities are limited to annual mowing and repairs as necessary.

The LTMP generates minimal waste by reusing materials such as dedicated tubing.

Methods utilized to reduce energy consumption, resource usage, waste generation, water usage, etc. will be included in the PRR.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2. Remedial Systems

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate.

The leachate collected system is gravity fed and the sump pump in Manhole B operates only when water reaches the float switch. Maintenance activities are limited to annual mowing and repairs as necessary.

6.2.3 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the Site and use of consumables in relation to visiting the Site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources.

The annual sampling is combined with quarterly monitoring events to reduce the number of visits to the Site. The telemetry system for the discharge pump also reduces necessity for frequent Site visits.

6.2.4 Metrics and Reporting

Green remediation efforts will be reported in the PRR. A template for documentation of green remediation metrics is provided in **Appendix M.**

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the remedial party requests in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document.
- The management and operation of the remedial system is exceeding the estimated costs.
- The remedial system is not performing as expected or as designed.
- Previously unidentified source material may be suspected.
- Plume shift has potentially occurred.
- Site conditions change due to development, change of use, change in groundwater use, etc.
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the Site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in **Appendix I**. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of **Table 7.1** and summarized in the Periodic Review Report.

Table 7.1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
Site Inspection Report	Quarterly
Periodic Review Report	Annually, or as otherwise determined by the Department

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

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period.
- Name, company, and position of person(s) conducting monitoring/inspection activities.
- Description of the activities performed.
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet).
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc.).
- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.).

- Sampling results in comparison to appropriate standards/criteria.
- A figure illustrating sample type and sampling locations.
- Copies of all laboratory data sheets, and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format).
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event.
- Name, company, and position of person(s) conducting maintenance activities.
- Description of maintenance activities performed.
- Any modifications to the system.
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event.
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities.
- Description of non-routine activities performed.
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at the following link: http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

Prior to submittal of a Periodic Review Report (PRR), Annual Reports were submitted to the Department beginning in 1993, after the Closure approval was issued in 1991. The first PRR was issued in 2008. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event 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**. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
- Results of the required annual site inspections and severe condition inspections, if applicable.
- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), 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 sheet, and the required laboratory data deliverables for all samples collected during the reporting

period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS™ database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:
  - The compliance of the remedy with the requirements of the site-specific RAWP, Record of Decision or Decision Document.
  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications.
  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored.
  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and
  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.
  - The overall performance and effectiveness of the remedy.
  - The number of days the system operated for the reporting period.
  - The average, high, and low flows per day.
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime.
  - A description of the resolution of performance problems.
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"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.*
- *If a financial assurance mechanism is required under 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.*
- *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 qualified environmental professional, of 3855 North Ocoee Street, Cleveland, TN, am certifying as Olin Corporation for the Site."

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work 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 Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

There is no RSO for the Site at this time.

8.0 REFERENCES

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FIGURES

Image Source: Copyright:© 2013 National Geographic Society, i-cubed

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Prepared/Date: BRP 02/27/20 | Checked/Date: HP 02/27/20

Figure 1.1
Site Location

Site Management Plan
Olin Charles Gibson
Niagara Falls, New York

Document: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\SMP\SMP_8.5x11P.mxd PDF: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.2_Work_Plans\Site Management Plan\Figures\Figure 1.1 - Site Location.pdf 02/27/2020 2:37 PM brian.peters

Niagara County color digital orthoimagery
(2017) obtained from New York State
GIS Clearinghouse at: https://gis.ny.gov

N

0 35 70
Feet

Legend

- Monitoring Well
- Piezometer
- Manhole
- Sediment Trap
- Site Boundary
- Current Property Boundary
- Former Property Boundary

Prepared/Date: BRP 03/12/20 | Checked/Date: HP 03/12/20

Figure 1.2
Site Layout

Site Management Plan
Olin Charles Gibson
Niagara Falls, New York

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Niagara County color digital orthoimagery (2017) obtained from New York State GIS Clearinghouse at: https://gis.ny.gov

N

0 20 40 Feet

Prepared/Date: BRP 03/12/20 | Checked/Date: HP 03/12/20

Legend

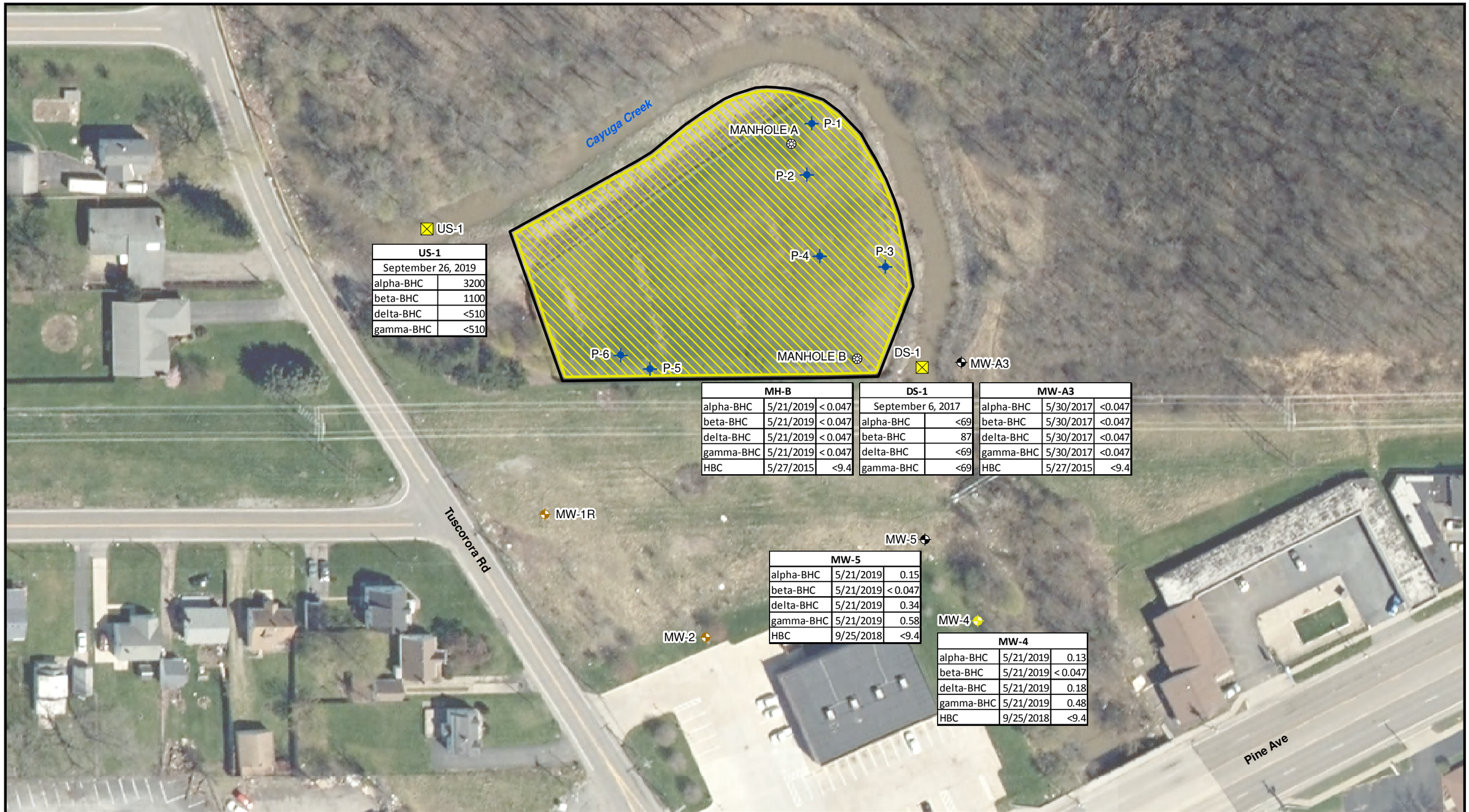
- Piezometer
- Manhole
- Groundwater Contour (feet above mean sea level)

Note: Groundwater level measurements were taken November 6, 2019.

Figure 2.1
Groundwater Contours

Site Management Plan
Olin Charles Gibson
Niagara Falls, New York

Document: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\SMP\SMP_11x17LS.mxd PDF: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.2_Work_Plans\Site Management Plan\Figures\Figure 2.1 - GW Contours.pdf 03/12/2020 1:21 PM brian.peters



US-1	
September 26, 2019	
alpha-BHC	3200
beta-BHC	1100
delta-BHC	<510
gamma-BHC	<510

MH-B		
alpha-BHC	5/21/2019	< 0.047
beta-BHC	5/21/2019	< 0.047
delta-BHC	5/21/2019	< 0.047
gamma-BHC	5/21/2019	< 0.047
HBC	5/27/2015	<9.4

DS-1	
September 6, 2017	
alpha-BHC	<69
beta-BHC	87
delta-BHC	<69
gamma-BHC	<69

MW-A3		
alpha-BHC	5/30/2017	<0.047
beta-BHC	5/30/2017	<0.047
delta-BHC	5/30/2017	<0.047
gamma-BHC	5/30/2017	<0.047
HBC	5/27/2015	<9.4

MW-5		
alpha-BHC	5/21/2019	0.15
beta-BHC	5/21/2019	< 0.047
delta-BHC	5/21/2019	0.34
gamma-BHC	5/21/2019	0.58
HBC	9/25/2018	<9.4

MW-4		
alpha-BHC	5/21/2019	0.13
beta-BHC	5/21/2019	< 0.047
delta-BHC	5/21/2019	0.18
gamma-BHC	5/21/2019	0.48
HBC	9/25/2018	<9.4

Niagara County color digital orthoimagery (2017) obtained from New York State GIS Clearinghouse at: https://gis.ny.gov

N

0 35 70 Feet

Prepared/Date: BRP 03/12/20 | Checked/Date: HP 03/12/20

BHC = Hexachlorocyclohexane
HBC = Hexachlorobenzene

Groundwater results reported in micrograms/liter (ug/L)

Sediment is only sampled for BHC-isomers.

Most recent result is shown for all parameters.

Legend

- Monitoring Well
- Piezometer
- Manhole
- Sediment Trap
- Monitoring Well - Not Sampled
- Remaining Soil Contamination
- Site Boundary
- Remaining Soil Contamination (Capped Area)

Note: Remaining extent of soil contamination based on remedial investigation results.

Figure 2.2
Remaining Contamination in Groundwater, Soil, and Sediment
Site Management Plan
Olin Charles Gibson
Niagara Falls, New York

Document: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\SMP\SMP_ChemBoxes_11x17LS.mxd PDF: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.2_Work_Plans\Site Management Plan\Figures\Figure 2.2 - Remaining Contamination.pdf 03/12/2020 1:17 PM brian.peters

Niagara County color digital orthoimagery
(2017) obtained from New York State
GIS Clearinghouse at: https://gis.ny.gov

N

0 25 50 Feet

Prepared/Date: BRP 03/11/20 | Checked/Date: HP 03/11/20

Legend

- Monitoring Well
- Piezometer
- Manhole
- Sediment Trap
- Direct Discharge Line to Niagara Falls Waste Water Treatment Facility
- Wooden Picket Fence
- Chain Link Fence
- Slurry Wall
- Landfill Cap

Figure 3.1
Engineering and Institutional Control Boundaries

Site Management Plan
Olin Charles Gibson
Niagara Falls, New York

Document: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.5_Databases\GIS\MapDocuments\SMP\SMP_11x17LS.mxd PDF: P:\Projects\Olin Charles Gibson\4.0_Deliverables\4.2_Work_Plans\Site Management Plan\Figures - update numbers\Figure 3.1 - Eng and Inst Ctrl Boundaries.pdf 03/11/2020 8:57 AM brian.peters

TABLES

Table 2.1. Summary of Groundwater Elevation Measurements

Charles Gibson Site

Niagara Falls, New York

Piezometer/Manhole	GW Elevation 3/18/2014	GW Elevation 5/9/2014	GW Elevation 9/18/2014	GW Elevation 12/8/2014	GW Elevation 11/10/2015	GW Elevation 9/1/2015	GW Elevation 5/27/2015	GW Elevation 3/11/2015
P1 (outside)	565.34	565.50	565.54	566.65	564.97	565.16	565.84	565.15
P2 (inside)	565.49	565.50	566.88	565.08	565.40	565.41	565.53	564.68
P3 (outside)	569.24	568.44	565.37	568.15	566.11	565.17	566.71	567.45
P4 (inside)	565.19	565.35	568.55	565.15	565.34	565.49	565.44	565.15
P5 (outside)	569.35	569.36	567.76	568.14	568.92	567.46	568.46	568.39
P6 (inside)	567.76	567.82	567.17	566.86	567.07	577.07	567.49	567.07
Manhole A	563.86	563.83	563.27	563.5	563.67	563.51	563.84	568.80
Manhole B	563.89	563.91	563.32	563.56	563.76	563.54	563.83	563.89

Notes:

GW = Groundwater

Elevations presented in feet above mean sea level.

Manhole monitoring:

- Maintain water level below 565 feet to prevent hydrostatic pressure buildup under concrete slab.
- Pump Manhole B as required to maintain an inward gradient.

Outside and inside refer to relative position to the slurry wall barrier. Piezometers are paired consecutively (i.e. P1 is paired with P2).

Created by: HEP 2/24/2020

Checked by: MSB 2/25/2020

Table 2.1. Summary of Groundwater Elevation Measurements

Charles Gibson Site

Niagara Falls, New York

Piezometer/Manhole	GW Elevation 11/11/2016	GW Elevation 9/8/2016	GW Elevation 5/27/2016	GW Elevation 3/8/2016	GW Elevation 3/7/2017	GW Elevation 5/30/2017	GW Elevation 9/6/2017	GW Elevation 11/21/2017
P1 (outside)	563.28	564.27	565.87	565.08	565.22	566.00	566.12	565.01
P2 (inside)	565.11	565.37	565.56	565.67	565.58	566.31	565.48	565.51
P3 (outside)	565.17	563.95	567.24	570.39	570.75	568.71	565.88	569.92
P4 (inside)	565.17	565.33	565.60	565.46	565.37	565.43	565.49	565.43
P5 (outside)	565.44	566.18	568.60	569.34	568.68	569.03	566.60	569.24
P6 (inside)	566.13	566.53	567.88	567.67	567.07	567.63	567.33	567.60
Manhole A	563.36	563.32	563.94	563.51	563.64	563.57	563.40	563.52
Manhole B	563.39	563.49	563.48	563.59	563.74	563.63	563.49	563.60

Notes:

GW = Groundwater

Manhole monitoring:

- Maintain water level below 565 feet to prevent hydrostatic pressure buildup under concrete slab.
- Pump Manhole B as required to maintain an inward gradient.

Outside and inside refer to relative position to the slurry wall barrier. Piezometers are paired consecutively (i.e. P1 is paired with P2).

Created by: HEP 2/24/2020

Checked by: MSB 2/25/2020

Table 2.1. Summary of Groundwater Elevation Measurements
Charles Gibson Site
Niagara Falls, New York

Piezometer/Manhole	GW Elevation 3/13/2018	GW Elevation 5/24/2018	GW Elevation 9/25/2018	GW Elevation 11/8/2018	GW Elevation 3/7/2019	GW Elevation 5/21/2019	GW Elevation 9/24/2019	GW Elevation 11/6/2019
P1 (outside)	565.64	565.90	564.33	563.33	565.52	566.11	564.91	564.74
P2 (inside)	565.54	565.53	565.34	565.19	565.58	565.58	565.35	565.4
P3 (outside)	568.64	567.21	563.86	568.91	567.96	568.87	564.71	567.51
P4 (inside)	565.49	565.35	569.13	568.16	567.75	565.46	565.22	565.19
P5 (outside)	568.26	568.70	566.20	568.85	569.08	569.43	567.9	568.85
P6 (inside)	567.77	567.57	567.12	566.57	567.67	567.88	567.17	567.36
Manhole A	563.77	563.24	563.10	563.21	563.9	563.63	562.94	563.08
Manhole B	563.79	563.31	563.14	563.25	563.99	563.69	563.03	563.14

Notes:
GW = Groundwater

Manhole monitoring:

- Maintain water level below 565 feet to prevent hydrostatic pressure buildup under concrete slab.
- Pump Manhole B as required to maintain an inward gradient.

Outside and inside refer to relative position to the slurry wall barrier. Piezometers are paired consecutively (i.e. P1 is paired with P2).

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Table 2.2 Remaining Soil Contamination
Charles Gibson Site
Niagara Falls, New York

				Location	North						
				Boring ID	A4	C3			X1	Y1	
				Sample Depth	2-4	2-4	2-4B	4-6	2-4	2-4	
	Parameter	**Unrestricted SCO**	**Industrial SCO**	**Units**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	
Semivolatiles											
	alpha-BHC	0.02	6.8	mg/kg	**200,000**	<0.78	<0.85	**6.275**	**263.5**	<0.81	
	beta-BHC	0.036	14	mg/kg	**44,000**	**15.55**	**0.945**	**9.665**	**92.2**	<0.81	
	gamma-BHC	0.1	23	mg/kg	**23,000**	<0.78	<0.85	<0.85	**8.8**	<0.81	
	delta-BHC	0.04	1000	mg/kg	**14,000**	<0.78	<0.85	<0.85	<5.5	<0.81	
	Formaldehyde	--		mg/kg	NS	<1.55	**2.48**	<1.5	<1.21	<1.58	
Metals											
	Mercury	0.18	5.7	mg/kg	NS	**0.42**	**0.496**	**0.339**	**0.97**	**0.316**	

Notes:
Analytical results presented were the extent reported in the 1986 RI Report.
Reported depths reflect depth prior to installation of the landfill cover.
Bolded values are detections
< = analyte was not detected above the laboratory reporting limit
Gray shaded values exceed the Unrestricted SCO
Yellow shaded values exceed the Industrial SCO
-- No Standard
NS = No Sample
SCO = Soil Cleanup Objective (6 NYCRR Part 375, subpart 375-6), December 2006.
mg/kg = milligrams per kilogram
BHC = hexachlorocyclohexane

Created by: HEP 2/24/2020
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Table 2.2 Remaining Soil Contamination
Charles Gibson Site
Niagara Falls, New York

		South						
Y3		MW-4	E4		E5	E6	F7	H7
0-2	2-4	8-10	0-2	6-7	6-8	2-4	6-8A	10-12
Result	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**	**Result**
<0.02	<0.875	**0.841**	<0.565	<0.60	<0.67	<0.63	<0.875	<0.61
40	<0.875	<0.75	<0.565	<0.60	<0.67	<0.63	<0.875	<0.61
<0.02	<0.875	<0.75	<0.565	<0.60	<0.67	<0.63	<0.875	<0.61
<0.02	<0.875	<0.75	<0.565	<0.60	<0.67	<0.63	<0.875	<0.61
NS	**5.6**	<1.1	**6.0**	<1.5	<1.3	<1.57	**1.7**	<1.25
NS	**0.175**	**0.39**	**2.25**	**1.23**	**1.11**	**1.23**	**0.698**	**0.44**

Created by: HEP 2/24/2020
Checked by: MSB 2/27/2020

Table 4.1 Remedial System Monitoring and Schedule
Olin Charles Gibson Site
Niagara Falls, New York

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
Manhole B Discharge Pump	Flow Rate/Flow Volume	See Note 1	Daily via Facsimile
Piezometers	Water Level/ Hydraulic Gradient	NA	Quarterly
Manholes A and B	Water Level	<10.27 feet bgs (Manhole A) and <14.07 feet bgs (Manhole B)	Quarterly
Landfill and Slurry Wall Cap	Erosion	NA	Quarterly
CPVC Drain/Sump System	Structure, physical damage, obstructions	NA	Quarterly
Electrical Panel	Exterior damage	NA	Quarterly

Notes:

1 -Highest flow rate calculated from April 2017 (14,231 gal/30 days), most days have no discharge

2 -bgs = below ground surface

Created by: HEP 2/25/2020
Checked by: MSB 2/27/2020

Table 4.2. Inspection, Maintenance, and Sampling Schedule
Olin Charles Gibson Site
Niagara Falls, New York

Event	Frequency	Tasks Included
Site Inspection	Quarterly	Remedial System Monitoring[a]: Visual inspection of Site cover, fencing, riprap, Site structures, CPVC drain pipe/sump system Piezometer and manhole groundwater level measurements
Groundwater and Leachate Sampling (BHC isomers)	Annually - Rotating Quarters	Post-Remediation Monitoring: Sampling of MW-A3, MW-4, and MW-5 for BHC isomer analysis Remedial System Monitoring[a]: Sampling of Manhole-B for BHC isomer analysis
Sediment Sampling (BHC isomers)	Annually - October	Post-Remediation Monitoring: Sampling from the Cayuga Creek upstream and downstream sediment traps for BHC isomer analysis
Groundwater Sampling (HCB isomers)	Biennially	Post-Remediation Monitoring: Sampling of MW-A3, MW-4, and MW-5 for HCB analysis
Leachate Sampling (HCB isomers)	Every 5 Years	Remedial System Monitoring[a]: Sampling of Manhole-B for HBC analysis

Notes:

[a]Monitoring criteria and parameters for the remedial system are included on Table 4.1 Remedial System Monitoring Requirements and Schedule.

BHC = hexachlorocyclohexane

HCB = hexachlorobenzene

BHC isomers include: alpha, beta, gamma, and delta

CPVC= Chlorinated Polyvinyl Chloride

HCB and BHC in sediment and groundwater via EPA Method 8081B.

Created by: HEP 2/25/2020
Checked by: MSB 2/27/2020

Table 4.3 Analytical Limits and Regulatory Criteria

Olin Charles Gibson Site

Niagara Falls, New York

Analyte	Matrix	Units	MDL	MRL	GA	GV
ALPHA-BHC	Water	ug/L	0.02	0.05	0.02	--
BETA-BHC	Water	ug/L	0.022	0.05	0.04	--
DELTA-BHC	Water	ug/L	0.02	0.05	0.04	--
GAMMA-BHC (LINDANE)	Water	ug/L	0.02	0.05	0.05	--
HEXACHLOROBENZENE	Water	ug/L	0.02	0.05	0.04	--
ALPHA-BHC	Solid	ug/kg	0.84	1.7	--	NS
BETA-BHC	Solid	ug/kg	0.84	1.7	--	NS
DELTA-BHC	Solid	ug/kg	0.84	1.7	--	NS
GAMMA-BHC (LINDANE)	Solid	ug/kg	0.84	1.7	--	47
HEXACHLOROBENZENE	Solid	ug/kg	0.84	1.7	--	NS

Notes:

BHC = Hexachlorocyclohexane

GA = Groundwater Criteria - NYS Part 703 Groundwater Quality Standards

GV = Groundwater Criteria - NYS Part 703 Guidance Values

MDL = Method Detection Limit

MRL = Method Reporting Limit

NS = No Standard

-- = Not Applicable

ug/L = microgram/ Liter

ug/kg = microgram/ kilogram

MDL and MRL provided by ALS Laboratory of Rochester, NY

Created by: HEP 2/25/2020

Checked by: MSB 2/27/2020

Table 4.4 Monitoring Well Construction Details
Olin Charles Gibson Site
Niagara Falls, New York

Well ID	Well Location	Latitude	Longitude	Total Depth (ft bTOR)	Well Diameter (inches)	Measuring Point Elevation NAVD88 (ft amsl)	Screened Interval (feet bgs)
MW-A3	Downgradient	-78°57.780'	43°05.572'	11.95	2	547.7	5 - 10
MW-4	Downgradient	-78°57.777'	43°05.540'	13.75	2	UNK	7 - 12
MW-5	Downgradient	-78°57.786'	43°05.550'	15.28	2	UNK	6.5 - 11.5

Notes:
ft bTOR = feet below top of riser
amsl = above mean sea level
bgs = below ground surface

Created by: HEP 2/25/2020
Checked by: MSB 2/27/2020

APPENDIX A STATE OLIN AGREEMENT AND RELEASE OF LIABILITY

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

THE STATE OF NEW YORK, Plaintiff, v. OLIN CORPORATION, ARTHUR BATROUNY, BEVERLY JANE BATROUNY, JOHN ZITO, and ELIZABETH ZITO, Defendants.	Civil Action No. 83-1400C

STIPULATION AND CONSENT JUDGMENT
APPROVING SETTLEMENT AGREEMENT

IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF NEW YORK

THE STATE OF NEW YORK, Plaintiff, v. OLIN CORPORATION, ARTHUR BATROUNY, BEVERLY JANE BATROUNY, JOHN ZITO, and ELIZABETH ZITO, Defendants.	Civil Action No. 83-1400C

STIPULATION AND CONSENT JUDGMENT
APPROVING SETTLEMENT AGREEMENT

The undersigned, having agreed and stipulated that a consent judgment can be entered in this action incorporating a settlement agreement containing the following terms and conditions, and the Court having reviewed such terms and conditions, and having determined that they are reasonable and adequate to resolve the issues raised in this action, and constitute appropriate programs, using requisite remedial technology, to effectively protect the public health and environment consistent with the goals of the field investigations and remedial programs, and the Court being fully advised in the premises and having subject matter jurisdiction herein pursuant to 28 U.S.C.§1331,

NOW, THEREFORE, IT IS ORDERED AND ADJUDGED AS FOLLOWS:

INTRODUCTION

1. (a) The parties to this Agreement are:

(i) THE STATE OF NEW YORK, on behalf of the People of New York (hereinafter the "State");

(ii) OLIN CORPORATION, a corporation organized and existing under the laws of the State of Virginia (hereinafter "Olin");

(iii) JOHN and ELIZABETH ZITO, both residents of Niagara County, New York (hereinafter "Zito"); and

(iv) ARTHUR and BEVERLY JANE BATROUNY, both residents of Niagara County, New York (hereinafter "Batrouny").

(b) This Agreement pertains to the matter entitled The State of New York v. Olin Corp., Arthur Batrouny, et al., Civil Action No. CIV 83-1400 (hereinafter the "Action") filed in the United States District Court, Western District of New York (hereinafter the "Court").

2. The Gibson site (hereinafter the "Site"), described in Attachment 1, consists of three contiguous parcels of land owned respectively by Zito, the Niagara Mohawk Power Corporation and Batrouny, including all rights of way and easements within the boundaries of said three parcels. The parcels consist of approximately 4 acres of land in Niagara County, bordered on the south by Pine Avenue, on the west by Tuscarora Road and on the north and east by Cayuga Creek.

3. (a) In order to fulfill the purposes of this Agreement, Zito

and Batrouny shall cooperate fully with the State and Olin in allowing access to the Site and all structures and facilities erected thereon, as necessary, and in allowing and permitting the use and/or installation of appropriate sampling and testing devices, and excavations and borings on the Site, and in allowing necessary remedial actions, appropriate and necessary to fulfill the field investigations and remedial programs hereinafter described. Zito and Batrouny each shall execute and deliver to Olin, on a timely basis, such easements, rights of way, rights of entry, or other authorizations and approvals necessary to carry out any of Olin's obligations pursuant to this Agreement.

(b) Olin and the State will give Zito and Batrouny reasonable notice of all significant investigation and remedial activities to be conducted on the Site.

(c) Olin and the State will, to the maximum extent practicable, minimize interference with Zito's and Batrouny's use and enjoyment of the Site caused by actions called for by this Agreement and associated plans.

4. (a) The field investigations and remedial programs described in this Agreement have been or shall be designed to provide for, and shall have as goals, (i) the generation and analysis of data necessary to determine adequately the extent of chemical contamination of the Site and its environs which may have resulted from materials deposited or caused to be deposited on-Site by Olin or which may have migrated from the Site

following their deposit by Olin; and (ii) the design and implementation, in accordance with the schedule set forth herein, of remedial plans, based on the information generated through the field investigations, which to the extent achievable through the use of "requisite remedial technology" (as that phrase is defined below) will result in the removal from the Site and its environs or the isolation from people and the environment of contaminants which were deposited or caused to be deposited on-Site by Olin or of such contaminants which have migrated from the Site so as effectively protect the public health and environment.

(b) Olin shall utilize requisite remedial technology to achieve the purposes set forth in this Agreement. As used in this Agreement, "requisite remedial technology" refers to known engineering and construction practices, used or acceptable for use in the cleanup or containment of chemical contamination applicable to materials and hydrogeological conditions found at the Site, which will effectively protect the public health and environment.

(c) Olin shall be required to apply the requisite remedial technology approved by the State in accordance with the terms and conditions of this Agreement, unless, upon evidence, the Court determines that application of such technology is unnecessary to satisfy the goals described in subparagraph (a).

(d) Any judicial review concerning the application of requisite remedial technology pursuant to this Agreement shall be based on the standards and considerations described in this paragraph.

(e) For purposes of this Agreement, "chemical contamination" or "contaminants" means the presence of any of the following "listed chemicals" at or near the Site: benzene, mono-through hexachlorobenzene, pentachloronitrobenzene, tetrachloroethylene, all isomers of hexachlorocyclohexane, heptachlorocyclohexane, trichloroanisole, phenylmethyl ether (anisole), formaldehyde, mercury, chlorinated biphenyls, phenol, and di- and trichlorophenols.

(f) The State, solely at its own option but without prejudice to a claim that costs incurred in the testing may be reimbursable pursuant to paragraph 12 below, may test for additional chemicals at the Site. If the State's analysis demonstrates that chemicals other than "listed chemicals" are present at the Site and such chemicals either (i) resulted from manufacturing operations at Olin's Niagara Falls plant, or (ii) are intermixed with contaminants deposited or caused to be deposited on the Site by Olin, such chemicals shall be deemed "listed chemicals" for the purpose of subparagraph 4(e) and Appendix 6 of Plan A, which plan is described in paragraph 5, below. The State shall notify Olin of (i) the chemical(s) for which it intends to conduct additional tests, and (ii) the samples, as provided pursuant to Paragraph 7(d) of this Agreement, which it intends to so analyze, within thirty (30) days after receipt of the results of Olin's analysis of soil samples collected and analyzed pursuant to Plan A hereto, as provided for by Paragraph 5(c) of this Agreement and paragraphs I.C.4(d) and III.A. of Plan A hereto. Upon such notification, the State shall retain a qualified laboratory to perform such analyses, which laboratory shall perform such analyses

without unnecessary delay. The State shall promptly report the results of said analyses to Olin, and shall, within 30 days of receipt of its laboratory analyses, designate those chemicals which its analyses demonstrate are present at the Site and either (i) resulted from manufacturing operations at Olin's Niagara Falls plant, or (ii) are intermixed with contaminants deposited or caused to be deposited on the Site by Olin. Upon the State's designation of such chemical(s), Olin shall amend Plan A (and, as appropriate, Plans B-F, which plans are described in paragraph 5, below) to determine the areal and vertical extent of such chemical contamination and the appropriate remedial measures consistent with the goals set forth at paragraph 4(a) above. The State and Olin shall then agree upon new reasonable dates for the completion of the activities described in Paragraph 5, below. Olin shall not be required to begin any remedial work before the State completes its designation of other "listed chemicals" under this provision or notifies Olin that it will not designate any other chemical as "listed chemicals" under this provision.

(g) For purposes of this Agreement, the following chemicals shall be deemed to have been deposited or caused to be deposited on-site by Olin if such chemicals are found to be present at the site: hexachlorobenzene and all isomers of hexachlorocyclohexane.

(h) The presence of any or all of the listed chemicals at the Site does not constitute an admission or evidence that Olin generated or disposed of such chemicals. The State is not precluded from claiming that chemicals other than those specifically named in paragraph (e) were

deposited at the Site by Olin or were reaction products of deposited chemicals.

FIELD INVESTIGATION AND REMEDIAL PROGRAM

5. Olin shall conduct a field investigation and undertake remedial work in accordance with the following provisions:

(a) Olin shall commence an initial field investigation, in accordance with "Plan A" attached hereto, according to the Schedule set out below. Implementation of Plan A shall be accomplished by appropriate personnel, approved by the State, with expertise in hydrogeology and environmental engineering. Disapproval of personnel selected by Olin shall be upon a showing of good cause by the State within 15 days after the State is given written notice by Olin of the personnel selected.

(b) Olin shall select a consultant, and the consultant shall submit to the State for approval a health and safety plan for the implementation of Plan A by May 1, 1985. The State will respond to the health and safety plan as provided in paragraph 8. The field investigation program shall commence by May 15, 1985, weather permitting, but in no event later than June 15, 1985. The field investigation program, including the metal detection program, soil boring program, well installation, collection of groundwater samples, determination of groundwater levels, creek levels, etc., shall be conducted in accordance with the provisions of Plan A. The metal detection program, soil boring program, and well installation shall be concluded by September 1, 1985.

The field investigation program shall be concluded as soon as practicable, but in no event later than June 1, 1986.

(c) Preliminary data from the field investigation and sampling program described in the foregoing paragraph shall be submitted to the State as they are obtained by Olin, its contractors, or consultants in accordance with a schedule to be developed by the parties. A preliminary feasibility study of remedial options ("preliminary study") shall be submitted to the State as soon as practicable, but in no event later than December 1, 1985, unless said date is changed pursuant to paragraph 4(f) above.

(d) Olin shall submit a final report and feasibility study of remedial options ("final report") to the State as soon as practicable after data are collected which are sufficient to comprehensively evaluate the possible remedial alternatives and recommend a remediation plan alternative adequate to isolate or remove the on-site chemical contamination as provided by the goals set forth at paragraph 4(a) above, but in no event later than August 1, 1986, unless that date is changed pursuant to paragraph 4(f). Unless the final study is submitted by March 1, 1986, Olin shall submit, by March 1, 1986, an interim report identifying the additional data necessary to prepare the final report and stating the reasons the additional data are needed. The interim report shall update the evaluation of remedial options identified in the preliminary study if additional data collected since December 1, 1985, so warrant. The final report shall include all available data and results obtained during the field investigation and, except as provided by

subparagraph (e), below, shall describe possible remedial alternatives and shall recommend a remediation plan alternative adequate to isolate or remove the on site chemical contamination as provided by the goals as set forth at paragraph 4(a) above. The final report shall specify the reasons for which the alternative methods of remediation identified in the final study have been rejected. Such final report or any subsequent versions of it, shall be modified if data collected after its preparation so warrant.

(e) If the final report proposes containment of some or all of the contaminants on the Site as the recommended remedial plan, then the requirements of subparagraph 5(f) do not apply and Olin shall design and submit to the State a field investigation ("Plan B"), consistent with the findings of Plan A, designed to determine the extent of and potential for off-Site migration of contaminants which were deposited or caused to be deposited on-Site by Olin, unless Olin can demonstrate by clear and convincing evidence that such off-Site investigation is unnecessary to the design of a remedial plan consistent with the goals set forth at paragraph 4(a). The information gathered in the course of implementation of Plan A and Plan B shall then be used to design and submit to the State the required remediation plan for the Site ("Plan C"). Plan C shall include, at a minimum, the following elements:

(i) quarterly groundwater monitoring for 30 years;

(ii) sample collection and analysis of creek water during high and low water periods annually, and of creek sediments annually for 30 years;

(iii) establishment of an upward hydraulic gradient within the containment area, unless Olin demonstrates by clear and convincing evidence that the establishment of the same is unnecessary or inappropriate to the accomplishment of the goals set forth at paragraph 4(a) herein;

(iv) acquisition by Olin of easements which would permit the required monitoring;

(v) provisions for protection of the site from disturbance which might increase the threat of contamination migration, including regular inspection of the site;

(vi) provisions for the design and implementation of a contingency plan in the event that migration of contaminants occurs despite the implementation of the containment remediation plan; such contingency plan shall be consistent with the goals set forth at paragraph 4(a);

(vii) containment or removal of contaminants deposited or caused to be deposited by Olin which have migrated off-site consistent with the goals of paragraph 4(a) above;

(viii) fiscal arrangements, guarantees, or the provision of financial assurances sufficient to ensure that Olin possesses the financial ability to perform the containment remedial plan and monitoring.

In the event that after seven years following the delivery of a Release (as described in paragraph 14(a) below) Olin demonstrates by clear and convincing evidence that conditions at the Site are such that the stated frequency or duration of the requirements set forth in the above provisions (i), (ii), or (v) are no longer necessary to a determination of whether the remediation is effective, Olin may reduce the frequency and/or duration of such monitoring or inspections. In addition, in the event that after seven years following delivery of a Release (as described in Paragraph 14(a) below), Olin is able to demonstrate that the above provision (viii) is no longer necessary to ensure performance, Olin may alter the fiscal arrangements appropriately.

(f) If the final report recommends removal of contaminants from the Site, then the requirements of Paragraph 5(e) do not apply and Olin shall design and submit to the State a remedial plan consistent with that recommendation ("Plan D"). Following completion of the remedial work called for by Plan D, Olin shall design and submit to the State a plan for additional field investigations ("Plan E"), consistent with the findings of Plan A, in order to determine the extent of off-Site migration, if any, of contaminants deposited or caused to be deposited by Olin and the effectiveness of the remedial work performed. Plan E may be limited to a determination of the effectiveness of the remedial work performed if Olin can demonstrate by clear and convincing evidence that off-Site investigation is unnecessary to remediation consistent with the goals set forth at paragraph 4(a).

(g) If the information gathered as a result of Plan E reveals off-Site migration of contaminants which were deposited or caused to be deposited on-Site by Olin, Olin shall design and submit to the State a plan ("Plan F"), which is consistent with the goals of Paragraph 4 (a) above.

(h) The Attorney General, on behalf of the State of New York, shall approve or disapprove Plans B, C, D, E, and/or F pursuant to the approval mechanism set forth in Paragraph 8, and Olin shall implement the approved Plans B, C, D, E, and/or F within 60 days after approval, weather permitting.

(i) During the field investigations and remedial programs, Olin shall also implement environmental health and safety plans which shall contain, inter alia, procedures to prevent unauthorized access to the Site and to ensure the safety of persons on and/or in the vicinity of the Site during the field investigations and remedial work.

6. All proposed plans submitted by Olin shall include specific procedures for the cleansing of equipment and the disposal of contaminated materials. Said procedures shall comply with all applicable federal and state laws.

ENTRY AND INSPECTION

7. (a) During the implementation of the field investigations and remedial programs, the State shall have authority to enter the Site or

its vicinity controlled (by easement or otherwise) by Olin during regular business hours for the purposes of inspecting and copying records, operating logs, contracts, or other documents or property required to assess Olin's compliance with this Agreement. Olin shall also allow the State to inspect all other property related to the implementation of this Agreement and to inspect and copy all records, operating logs, contracts, or other documents (so long as such property and documents would be subject to inspection and discovery pursuant to Rule 34 of the Federal Rules of Civil Procedure; provided, however, no party shall have been deemed to waive any privilege available under New York State and federal law) which the State requires to assess Olin's compliance with this Agreement. Olin shall honor all reasonable and timely requests for such entry or inspection by the State conditioned only upon presentation of proper credentials and prior written notification to Olin or its agent (as designated pursuant to Paragraph 9) of the purpose of said request.

(b) Olin shall identify to the state all laboratories, whether or not owned by Olin, participating in the performance of the requirements of this Agreement. To the extent provided in and in accordance with Paragraph 7(a), the State may enter and inspect any such laboratory owned or operated by Olin or any subsidiary of Olin and inspect and copy all records located therein required to assess Olin's compliance with this Agreement; in addition, Olin shall consent to the State obtaining such access to laboratories owned by third parties.

(c) The State shall have the right to designate an agent or agents having appropriate qualifications and education in environmental

engineering, chemistry, or hydrogeology to participate in and assist, on and off the Site, in the field investigations and remedial programs. These agents and Olin or its agents or consultants shall confer on a timely basis and cooperate in the accomplishment of the programs' goals and purposes. The State's agents shall be permitted access to the Site and its vicinity controlled by Olin whenever any aspect of a program is being performed or studied.

(d) Where possible, any samples collected by Olin shall be sufficiently large in quantity to allow for the provision of split samples to the State. Olin shall advise the State of any sample collection at least 48 hours before samples are collected except when such notice is not possible; if such notice cannot be given, notice of sample collection shall be given as soon as possible. Soil borings shall be archived as provided in Plan A and will be split with the State as soon as is practicable after Olin selects samples for analysis as provided in Plan A.

SUBMISSION OF PLANS

8. The parties shall proceed as follows whenever this Agreement requires Olin to submit a proposed plan for the State's approval:

(a) The State, through the Attorney General, shall determine whether each proposed plan is in accordance with the applicable purposes and goals of this Agreement.

(b) Throughout the review process, the parties shall attempt in

good faith to resolve any differences regarding an appropriate and acceptable plan.

(c) After receiving a proposed plan, the State shall promptly respond to said proposal. If the proposal is complete and acceptable, the State shall serve written notice of approval to Olin within 30 days after receipt of the proposal. The plan shall become effective on the date the acceptance is served upon Olin.

(d) If the proposal is not complete or acceptable, the State shall serve a written notification of disapproval within 30 days after receipt of the proposal which shall include its particular objections and may include suggested modifications. If the parties cannot agree upon a proposed plan within 30 days of the notice of disapproval of a proposed plan, the State, through the Attorney General, shall present Olin with a plan which shall be implemented by Olin unless Olin moves the court within 15 days after receipt of the State's plan for a determination that the implementation of the State's plan is unreasonable in light of the goals and purposes of the Agreement. On the basis of the Court's determination, the Court may issue any order appropriate to effectuate the purposes and goals of this Agreement.

(e) In each instance in which a plan as proposed or modified becomes effective, the State shall attach it to this Agreement as an appendix, serve copies of the appended document on Olin and file it with the Court in accordance with all other filing requirements set forth herein.

(f) Whenever Olin is required to make significant submissions

to the State, Olin shall make a simultaneous and identical submission to Zito and Batrouny or their legal representatives. Zito and Batrouny shall promptly inform the State of their comments, concerns or objections concerning the proposed plan. The State shall take Zito's and Batrouny's comments, concerns and objections into account in determining whether the proposal is complete and acceptable.

NOTIFICATION

9. Any documents which Olin, Zito, or Batrouny are required to send to the State, pursuant to this Agreement, shall be sent to:

(a) GLEN BAILEY
New York State Department of Environmental Conservation
600 Delaware Avenue
Buffalo, New York 14202

(b) GORDON J. JOHNSON
Assistant Attorney General
Environmental Protection Bureau
New York State Department of Law
Two World Trade Center
New York, New York 10047

(c) GREGORY SHKUDA
Environmental Protection Bureau
Department of Law
Two World Trade Center
New York, New York 10047

Any documents which the State, Zito, or Batrouny are required to send to Olin pursuant to this Agreement shall be sent to:

(d) GEORGE H. PAIN
Counsel
Olin Corporation (J-J)
120 Long Ridge Road
Stamford, CT 06904

(e) VERRILL M. NORWOOD
Vice President, Environmental Affairs
Olin Corporation
P.O. Box 248
Lower River Road
Charleston, TN 37310

(f) DANIEL M. DARRAGH
RICK W. KENNEDY
Hodgson, Russ, Andrews, Woods & Goodyear
1800 One M&T Plaza
Buffalo, NY 14203

Any documents which Olin or the State are required to send to Batrouny and Zito, pursuant to this Agreement, shall be sent to:

(g) JOEL E. SCHWEITZER
(for Batrouny)
Gellman, Brydges, Schroff & Schweitzer
M.P.O. Box 279
Niagara Falls, NY 14302

(h) STANLEY GROSSMAN
(for Zito)
Grossman, Levine & Civiletto
331 Buffalo Avenue
Niagara Falls, NY 14302

Any of the persons receiving documents may designate in writing a substitute to whom documents will be sent instead.

DELAY OR PREVENTION OF PERFORMANCE

10. (a) Olin and the State shall use their best efforts to minimize or avoid any delay or prevention of the performance of their obligations pursuant to this Agreement. If any event occurs which delays or prevents, or leads Olin to anticipate delays or prevention of, Olin's compliance with any appropriate term or condition of this Agreement,

shall promptly so notify the State. As soon thereafter as possible, but in no event later than 20 days after learning of such delay or prevention, Olin shall submit a written statement to the State which shall fully describe the anticipated cause of such delay or prevention, the anticipated length of the delay, the actions Olin has taken, and proposes to take, if any, to minimize the delay and to mitigate the impact of such event, and the schedules of such actions.

(b) To the extent that events which delay or prevent Olin's compliance with any appropriate term or condition of this Agreement have been caused by "force majeure," e.g., an act of God which makes it impossible to perform, and Olin has complied with the notification provision provided in subparagraph (a), the time for such performance hereunder shall be extended for the time period of such delay and if such circumstances prevent such performance, such performance shall be excused unless and until circumstances so change that the performance is no longer prevented; provided, however, that any excused delay or prevention of any intermediate requirement shall not result in the excused delay or prevention of any subsequent requirement if the subsequent step can reasonably be implemented without completion of the prior step.

(c) Reasonably foreseeable increases in costs or expenses associated with the implementation of actions required by this Agreement shall not, in any event, be a basis for extensions of time, excuses of performance, or defenses to a petition for sanctions. Any excused delay or prevention of performance predicated upon unforeseeable increases in costs or expenses shall not result in the excused delay or prevention of

performance of any other requirement which reasonably can be implemented notwithstanding such unforeseeable increases or which reasonably can be modified to take into account such unforeseeable increases, consistent with the goals of Paragraph 4(a). If the performance of an action required by this Agreement is excused on the basis of unforeseeable increases in costs or expenses, such excusal shall not constitute a defense to any claim made or action brought by the State for injunctive relief or for reimbursement of costs it may have incurred performing any such excused action. Increases in costs or expenses resulting from (a) the designation of chemicals, other than those named at paragraph 4(e) of this Agreement, as "listed chemicals" pursuant to paragraph 4(f) of this Agreement, or (b) implementation and performance of a health and safety plan, in connection with each field investigation and remediation plan required pursuant to paragraph 5 of this Agreement, which health and safety plan is necessary to protect the public and the environment from chemical contamination that may otherwise occur in the course of performing any field investigation or remediation, are reasonably foreseeable.

(d) If the State and Olin agree that the delay or prevention is excusable under the criteria set forth in subparagraph (b) and agree concerning the length of such delay or prevention, Olin and the State shall file with the Court a stipulation and proposed order to such effect. If, however, within 10 days after Olin's written statement to the State, the State and Olin do not so stipulate or the State advises Olin in writing that it does not consider the aforementioned

circumstances to have been satisfied or does not agree with the length of the delay, the State may immediately advise the Court of any delay or prevention, or anticipated delay or prevention, of Olin's performance of its obligations pursuant to this Agreement. Thereafter, either the State or Olin may submit the matter to the Court for resolution.

PERMITS AND EASEMENTS

11. (a) Olin shall use its best efforts, and the State shall cooperate consistent with its legal authority, to obtain on a timely basis such permits, easements, rights of way, rights of entry, approvals, or other authorizations from any federal, State, or local government entity, or any corporation, partnership, association, or private person which are necessary to carry out any of Olin's obligations pursuant to this Agreement. Olin shall promptly notify the State in the event of Olin's inability to obtain such authorizations on a timely basis or its inability to obtain authorizations which do not contain use restrictions which prohibit or interfere with activities required pursuant to this Agreement, or of Olin's receipt of governmental authorizations containing terms or conditions not specifically required by federal or state statutes or regulations.

(b) In the event Olin is unable to obtain the authorizations required by the preceding paragraph, the State shall, consistent with its legal authority, assist in obtaining, as appropriate, all such authorizations which Olin was unable to obtain or which it could not

obtain without terms and conditions which effectively prevent implementation of this Agreement. If, despite Olin's best efforts, Olin does not obtain the aforementioned authorizations on a timely basis or if Olin obtains authorizations containing terms and conditions which effectively prevent timely compliance with the terms and conditions of this Agreement, the time for performance of any obligations pursuant to this Agreement which are necessarily dependent upon such authorizations shall be extended as appropriate. If, despite Olin's best efforts, such authorizations or access cannot be obtained despite an enlargement of time, this Agreement may be modified by excusing performance of any obligations pursuant to this Agreement which are necessarily dependent upon such authorizations.

(c) In no event shall the State be required to exercise its powers in order to obtain the easements described by paragraph 5(e)(iv), and Olin's failure to obtain such easements shall not constitute a basis for excusing performance.

REIMBURSEMENT

12. The term "reimbursable costs" as used in this Agreement, shall mean those costs incurred by the State which the State is legally entitled to recover under the Comprehensive Environmental Response, Compensation and Liability Act, the New York State Environmental Conservation Law and the common law of New York and which are (i) reasonable and (ii) not duplicative of costs previously incurred by the State and reimbursed by Olin.

(a) Payment of past costs.

In order to expedite the execution of this Agreement, and without admitting that any of the costs incurred by the State before the date of execution of this Agreement are reimbursable costs, Olin shall pay to the Hazardous Waste Remedial Fund (established by the New York State Finance Law section 97-b) the sum of $26,371.31 within sixty days of the effective date of this Agreement. Upon receipt of said sum, the State shall execute and deliver a release of liability to Olin for all claims resulting from or relating to all costs related to the Site incurred by the State or its agent(s) prior to the date of execution of this Agreement.

(b) Periodic payment of reimbursable costs.

Commencing six (6) months from the date this Agreement is executed and every six (6) months thereafter, the State shall submit to Olin a detailed statement of the reimbursable costs incurred during the preceding six months. The Statement shall be sufficiently detailed and documented to allow Olin to assess whether the costs claimed by the State to be reimbursable costs satisfy the criteria set forth in paragraph 12. The statement shall be submitted to Olin as soon as is practicable after the end of the six month period to which it applies. Within sixty (60) days of receipt of the statement, Olin will either pay the sum set forth in the statement or notify the State in writing of its objection(s) to it. If the objection(s) cannot be resolved by the parties within thirty (30) days, the State may move the Court for a determination of the amount of reimbursable costs owed for the six month period in dispute.

FINANCIAL SECURITY

13. (a) If at any time prior to the completion of Plans A through F (i) the consolidated net worth of Olin declines by twenty-five percent (25%) or more in any one fiscal quarter, or (ii) over a period of three consecutive fiscal quarters the consolidated net worth of Olin declines by a total of twenty-five percent (25%) or more as compared with the consolidated net worth of Olin as of the beginning of the first of such quarters, or (iii) if the consolidated net worth of Olin declines by twenty-five percent (25%) or more in any one fiscal year, or (iv) if the consolidated net worth of Olin declines at any time to one hundred million dollars ($100,000,000) or below, Olin shall immediately notify the State and shall promptly provide security in an amount equal to one hundred and twenty-five percent (125%) of the estimated cost to complete the implementation of the field investigation and remedial plans.

(b) Notwithstanding the foregoing, if because of other circumstances affecting the financial conditions of Olin, the State determines that other or additional financial security is necessary, the State may seek such relief from the Court which shall grant such relief if necessary to insure the availability of funds to complete the implementation of field investigations and remedial plans described in paragraph 5, above.

MISCELLANEOUS PROVISIONS

14. (a) Upon either (i) certification by the State that Olin has completed satisfactorily, in accordance with the goals of the Agreement stated in Paragraph 4(a), the remedial plans required by Paragraphs 5(f) and (g), or (ii) certification by the State that Olin has implemented satisfactorily, in accordance with the goals of Paragraph 4(a) herein, the remedial plans required by Paragraph 5(e) and is performing the monitoring required thereby, the State will execute and deliver a Release of Liability ("Release") to Olin, Sito and Matrouny for the following claims:

(i) All claims for civil penalties which were raised or could have been raised in this Action;

(ii) All other claims resulting from or relating to any migration, discharge or release of chemicals or other substances from the Site and all other claims which were raised in this Action, except claims resulting from, or relating to, any migration, discharge or release from the Site of chemicals or other substances occurring after the date of the Release.

Certification of remediation, or the reasons for denial of such certification, shall be delivered in writing by the State to Olin within thirty (30) days after Olin's written request for such certification. If the State denies certification and the parties cannot in good faith resolve the disagreement within thirty (30) days from date of denial, Olin may move the court for an Order directing that the State provide

such certification. Olin shall be entitled to said Order if Olin demonstrates that it has either: (i) completed satisfactorily, in accordance with the goals of the Agreement stated in Paragraph 4(a), the remedial plans required by Paragraphs 5(f) and (g); or (ii) implemented satisfactorily, in accordance with the goals of Paragraph 4(a), the remedial plans required by Paragraph 5(e) and is performing the monitoring required thereby.

(b) This Agreement does not affect any other claims or actions the State may have now or in the future against Olin, Zito and Batrouny or any other person.

(c) Nothing herein precludes the State from enforcing any legal or equitable rights or claims whatsoever which it may have now or in the future against anyone other than Olin, Zito and Batrouny.

(d) Nothing herein precludes the State from enforcing any legal or equitable rights or claims whatsoever which arise from activities of Olin, Zito and Batrouny after the date of the Release.

(e) Nothing herein discharges or releases Olin, Zito and Batrouny from any obligations at law or in equity which arise from pollution of soil, groundwater and drinking water which is unrelated to the chemical contamination which is the subject of this Agreement, unless said pollution is identified by Olin in its field investigation conducted pursuant to Paragraph 5 herein and addressed in Olin's remedial plan pursuant to said Paragraph.

(f) Until the Release is given, compliance with the provisions of this Agreement shall be considered a complete defense to the Action or

any other action the State may hereinafter bring against Olin, Zito and Batrouny which arises out of or relates to the migration, discharge, or release of contaminants from the Site which migration, discharge, or release is or reasonably should have been known by the State to be occurring or existing as of the date of the Agreement. Nothing herein shall limit the authority of the State or its agencies to order and require Olin, Zito and Batrouny to respond to emergencies which constitute an immediate and substantial endangerment to the health and safety of people or to the environment arising from the migration, discharge, or release from the Site of contaminants deposited or caused to be deposited by Olin on the Site.

(g) Nothing herein shall be deemed to waive or release any claims on behalf of Zito or Batrouny against Olin for damages to persons and property which may have resulted from contaminants deposited or caused to be deposited at the Site by Olin.

15. There shall be the following filing requirements:

(a) Within fifteen days after the effective date of this Agreement, the State may file a copy of this Agreement with the Niagara County Clerk to be recorded against the parcels of land which include some or all of the Site;

(b) Within fifteen days after the effective date of any plan approved pursuant to this Agreement, the State may similarly file a copy of the resulting appended version of this Agreement;

(c) Within fifteen days after obtaining an easement pursuant to paragraph 11 of this Agreement, Olin or the State shall file a copy of such easement for recording; and

(d) Within fifteen days of the certification by the State that Olin's remedial program has been successfully completed and that the goals of this Agreement have been met, the State and Olin shall, if notices have been filed pursuant to subparagraphs (a), (b), and (c), also file a notice with the Niagara County Clerk that this Agreement has been fully implemented, to be recorded against all parcels against which a notice has been recorded before.

(e) All property, including real property structures, constructions, and fixtures, owned by Site owner or owners ("Owners") at the site may be freely alienated; provided that forty-five (45) days prior to the date of such alienation the Owners give the State written notice of such alienation and a description of which of the Owners' obligations, if any, pursuant to the Agreement shall be performed by the person or entity to whom the property is alienated. The Owners may proceed with such alienation unless, within 30 days following such notification (i) the State or Olin file a petition with the Court objecting to such alienation on grounds that it would interfere with the performance or any party's obligations pursuant to this Agreement and (ii) in response to such petition, the Court orders such alienation not to proceed pending final determination of the issues raised by such petition or the Court determines that such alienation would interfere with a party's obligations pursuant to this Agreement. In the event of such alienation, all of the Owners' obligations pursuant to this Agreement shall continue to be met either by, at the Owners' option, the owners or the person or entity to whom the property is alienated. Any

deed, title or other instrument of conveyance of property at the Site shall contain notice of such provisions for continuing performance as herein above described and, additionally, shall clearly describe the use for which the property has been subjected.

(f) Owners and any subsequent owners shall comply with the provisions of §27-1317 of the New York State Environmental Conservation Law and nothing herein constitutes a waiver of the provision of said law.

16. The effective date of this Agreement shall be the date on which it is approved by the Court.

17. The provisions, terms and conditions herein shall bind Olin, its successors and assigns.

18. The terms and conditions of this Agreement shall include the terms and conditions of any plan appended to this Agreement pursuant to the provisions herein.

19. The Court shall retain jurisdiction to modify and enforce the terms and conditions of this Agreement and to resolve all disputes arising hereunder as may be necessary or appropriate for the construction or execution of this Agreement. In order to assist the Court in resolving technically complicated and complex issues which may hereinafter be presented to it in this Action, any party hereto may petition the Court, pursuant to Rule 53 of the Federal Rules of Civil

Procedure, to refer such issues, as appropriate, to a master.

20. All information and documents submitted by Olin to the State pursuant to this Agreement shall be subject to public inspection except such information which the Court, upon application and demonstration by Olin, finds is a trade secret disclosure of which would cause substantial injury to the competitive position of Olin.

21. Neither this Agreement nor any part hereof shall constitute an admission of law or fact or evidence of same, nor of any violation of any law or regulation. The parties hereto may not rely on this Agreement in any other action or proceeding. It is intended that this Agreement shall neither create nor affect the rights of persons or entities who are not parties to this Action.

22. This Agreement shall bind and inure to the benefit of all the parties hereto and their respective successors and assigns.

23. This Agreement may be executed in counterpart. Each counterpart may serve as a duplicate original.

24. The persons signing this agreement represent that they have full authority to bind the respective parties which they represent.

The State and Olin, by their duly authorized representatives,

and Zito and Batrouny consent to this judgment on 20th day of March, 1985.

THE STATE OF NEW YORK

By: _____
Albert M. Bronson

Title: Assistant Attorney General

By: _____
Gordon J. Johnson

Title: Assistant Attorney General

OLIN CORPORATION

By: _____
E. McIntosh Cover

Title: Vice President and General Counsel

JOHN ZITO

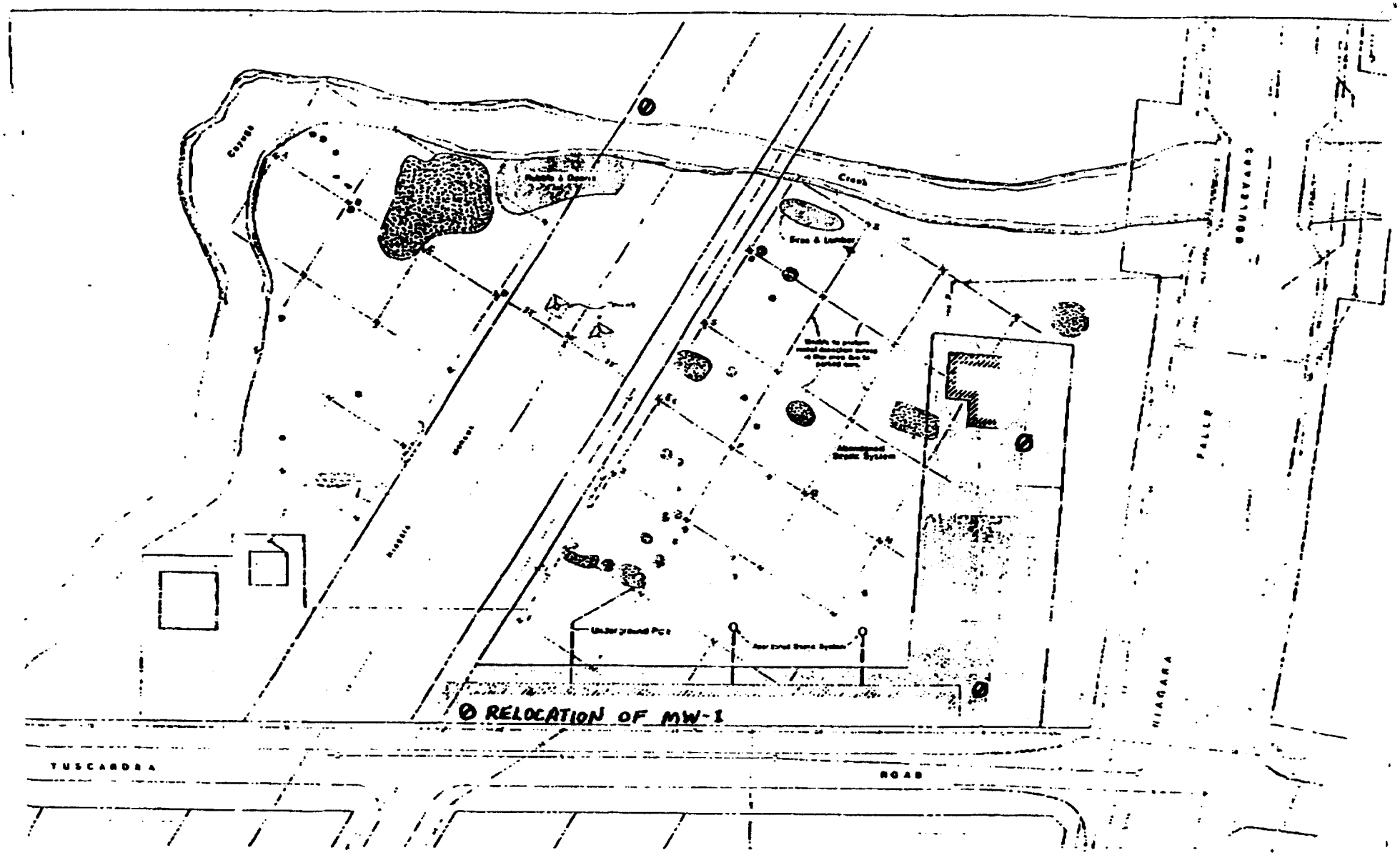
ELIZABETH ZITO

ARTHUR BATROUNY

BEVERLY JANE BATROUNY

The foregoing Consent Judgment, with Plan A incorporated therein and attached hereto, is hereby adopted and enforced in this cause, The State of New York v. Olin Corporation, et al., Civil Action No. CIV 83-1400, this 29 day of April, 1985.

United States District Judge



SITE PLAN

- ADDITIONAL WELLS TO BE INSTALLED (PROPOSED)

9-24-86

WENDEL

Olin

ATTACHMENT 1

The Site consists of three contiguous parcels of land owned respectively by Zito, Batrouny and the Niagara Mohawk Power Corporation, including all rights of way and easements within the boundaries of the three parcels, which are described, respectively, as follows:

Zito property

ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Niagara, County of Niagara and State of New York, being the south part of Lot No. 5, Township 13, Range 9, and more particularly bounded and described as follows:

BEGINNING at the intersection of the northeasterly line of Tuscarora Road and the northwesterly line of the new Buffalo-Niagara Falls Boulevard; running thence northwesterly along the northeasterly line of Tuscarora Road 392.68 feet to the southerly line of the 80 foot transmission line right of way of the Niagara Falls Power Company; running thence easterly along the southerly line of the 80 foot transmission line right of way of the Niagara Falls Power Company 358 feet more or less to the westerly bank of Cayuga Creek; running thence southerly along the westerly side of Cayuga Creek to the northwesterly line of the new Buffalo-Niagara Falls Boulevard; running thence southwesterly along the northwesterly line of the new Buffalo-Niagara Falls Boulevard 272 feet more or less to the point or place of beginning.

Batrouny property

ALL THAT TRACT OR PARCEL OF LAND, situate in the Town of Niagara, County of Niagara and State of New York, being part of Lot 5, Township 13, Range 9, and more particularly bounded and described as follows:

BEGINNING at a point in the northeasterly line of Tuscarora Road which is distant six hundred seventeen and one-tenth (617.10) feet northwesterly from the intersection of the northeasterly line of Tuscarora Road and the northwesterly line of the new Buffalo-Niagara Falls Boulevard and which point is also distant one hundred thirty (130) feet northwesterly from the intersection of the northeasterly line of Tuscarora Road and the northerly line of the eighty (80) foot transmission line right of way of the Niagara Falls Power Company; running thence easterly and parallel to the northerly line of the eighty (80) foot transmission line right of way of the Niagara Falls Power Company twenty-five (25) feet more or less to the westerly bank of Cayuga Creek; thence running southerly

and easterly along the westerly bank of Cayuga Creek to the intersection of the said westerly bank of Cayuga Creek with the northerly line of the eighty (80) foot transmission line right of way of the Niagara Falls Power Company; running thence westerly and along the northerly line of the eighty (80) foot transmission line right of way to the Niagara Falls Power Company three hundred seventy-five and three-tenths (375.3) feet more or less to the northeasterly line of Tuscarora Road; running thence northwesterly along the northeasterly line of Tuscarora Road one hundred thirty (130) feet to the point or place of beginning.

Niagara Mohawk Power Corporation
Transmission Line Right of Way

THOSE PORTIONS OF THE TRACTS OR PARCELS OF LAND, situate in the Town of Niagara, County of Niagara and State of New York, being part of Lot 5, Township 13, Range 9, and more particularly described below, which lie between the northeasterly line of Tuscarora Road and the westerly bank of Cayuga Creek:

1. BEGINNING in the centerline of Tuscarora Road at a point distant four hundred ninety one and thirteen one-hundredths (498.13) feet north of the mile line measured along the centerline of said road; thence north twenty-eight (28) degrees thirty-seven (37) minutes thirty (30) seconds west along the centerline of said road ninety-four and forty-two one hundredths (94.42) feet; thence south eighty-six (86) degrees thirty-two (32) minutes thirty (30) seconds east, twenty four hundred thirty-eight and ninety-six one hundredths (2438.96) feet on a line parallel to and forty-three (43) feet north at right angles from the northerly boundary of lands hereto-fore conveyed to Cataract Construction Company by George Dick by deed dated June 6, 1895 and recorded in said clerk's office in Liber 237 of Deeds at page 282; thence south sixty-one (61) degrees forty-three (43) minutes east six hundred seventy-eight and seventy-two one hundredths (678.72) feet, on a line parallel to and forty-three (43) feet northerly at right angles from the northerly boundary of lands conveyed by George Dick to the Niagara Falls Power Company by deed dated July 2, 1901 and recorded in said clerk's office in Liber 278 of Deeds at page 11; thence along the easterly boundary of said grantor's premises, being the westerly boundary of lands now or formerly owned by Omer O. Roszel or said line produced northerly,

south two (2) degrees forty-five (45) minutes thirty (30) seconds west along said boundary and the same produced, eighty-eight and sixty-five one hundredths (88.65) feet; thence north sixty-one (61) degrees forty-three (43) minutes west on a line parallel to the southerly boundary of said lands heretofore deeded to the Niagara Falls Power Company and seven (7) feet southerly therefrom measured at right angles thereto, six hundred ninety-nine and thirty-two one hundredths (699.32) feet; thence still parallel to and distance seven (7) feet southerly at right angles from the southerly boundary of lands conveyed as aforesaid to Cataract Construction Company north eighty-six (86) degrees thirty-two (32) minutes thirty (30) seconds west, twenty-three hundred and seventy-one and twenty one hundredths (2371.21) feet to the centerline of Tuscarora Road at point of beginning, excepting therefrom lands now owned by the Niagara Falls Power Company included in its present right-of-way, being a strip thirty (30) feet wide parallel to and included within the premises above described and extending entirely through said premises between the easterly and westerly bounds thereof, said premises hereby conveyed containing three and five hundred seventeen one thousandths (3.517) acres of land exclusive of such exception.

2. BEGINNING at a point in the centerline of Tuscarora Road, which point is distant five hundred seventeen and one tenth (517.1) feet from the intersection of the mile line as established by C.F. Whitmer, Surveyor, in 1894 and shown upon a map now on file in the Niagara County Clerk's Office, with the centerline of said Tuscarora Road, measured along said centerline, north twenty-eight (28) degrees, thirty seven and one-half (37 1/2) minutes west from the said point of intersection: thence, from said point of beginning, south eighty-six (86) degrees, thirty-two and one-half (32 1/2) minutes east, parallel to the northerly line of said premises and three hundred forty-one and eight tenths (341.8) feet distant southerly measured at right angles therefrom, two thousand three hundred eighty-nine and eighty-three one hundredths (2389.83) feet: thence, south three (3) degrees, forty-four (44) minutes west, parallel to the westerly line of lot number fifty-nine (59) of the mile reserve, (said westerly line being produced northerly) and fifteen (15) feet distant easterly measured at right angles from said produced westerly line of lot number fifty-nine (59) two hundred fifteen and twenty-six one hundredths (215.26) feet: thence, south seventy-one (71) degrees,

forty-six (46) minutes east, parallel to the mile line as established by C.F. Whitmer, Surveyor, and fifteen (15) feet distant northerly, measured at right angles therefrom, eleven hundred twenty-eight and eight one hundredths (1128.08) feet to a point in the easterly line of said premises, which line is also the easterly line of lot number five (5) aforesaid; said point of ending being distant fifteen and fifty-four one hudnredths (15.54) feet from the intersection of the east line of said lot number five (5) with the mile line as above described, measured along the said east line north three (3) degrees and nine (9) minutes east from the said point of intersection; the said strip of thirty (30) feet in width containing two and five hundred seventy-one one thousandths (2.571) acres of land, more or less; and being subject to the rights of the public in and to the said Tuscarora Road.

FILE COPY

RECEIVED
MAY 3 1993
D. L. CUMMINGS

HODGSON, RUSS, ANDREWS, WOODS & GOODYEAR
(A PARTNERSHIP INCLUDING PROFESSIONAL ASSOCIATIONS)
ATTORNEYS AT LAW
1800 ONE M & T PLAZA
BUFFALO, NY 14203-2391
716-856-4000
FAX: ONE M & T PLAZA 716-849-0349
FAX: GUARANTY BLDG. 716-852-5185
TELEX 386623 BUFPAT

THREE CITY SQUARE
ALBANY, NY 12207-2884
518-465-2333
FAX: 518-465-1567

2000 GLADES ROAD
SUITE 400
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RICK W. KENNEDY
PARTNER

3 ROBERT SPECK PARKWAY
SUITE 880
MISSISSAUGA, ONTARIO
CANADA L4Z 2G5
416-566-5061
FAX: 416-566-2049

1401 NEW YORK AVENUE, N.W.
SUITE 1201
WASHINGTON, DC 20005-2102
202-347-9898
FAX: 202-737-1529

April 27, 1993

Hon. John T. Curtin
United States District Court
Western District of New York
68 Court Street
Buffalo, NY 14202

Dear Judge Curtin:

Re: **The State of New York v. Olin Corporation, et al.**
Civil Action No. 83-1400C

This is a status report.

The State of New York brought a civil action against Olin Corporation ("Olin") and others in this Court in 1983 to compel the remediation of a hazardous waste site in Niagara Falls, commonly referred to as the "Gibson Site". Olin and the State entered into a Stipulation and Consent Judgment Approving Settlement Agreement (the "Settlement Agreement") on March 20, 1985; the Court approved the Settlement Agreement on May 2, 1985. Under the terms of the Settlement Agreement, Olin was required to perform a field investigation and design and implement a remedial program.

The State certified on November 16, 1992 that Olin had performed the work required by the Settlement Agreement in a satisfactory manner. A copy of that certification letter is attached to this letter as Attachment 1. In accordance with Paragraph 14 of the Settlement Agreement, the State, on December 15, 1992, issued a Release of Liability to Olin. A copy of that Release is attached to this letter as Attachment 2.

Although the remedy has been certified as complete and a Release of Liability issued, Olin must continue to maintain and monitor the effectiveness of the remedy in the future. Those obligations would appear to be the only reason for continuing Court supervision of this case.

If you have any questions concerning the status of this case, we would be happy to appear at your direction or to participate in a telephone conference call.

Very truly yours,

Rick W. Kennedy

RWK/rad
Attachments

Copies to: Albert M. Bronson, Esq.
Assistant Attorney General

bccs: Charles T. Steffens, P.E.
David Cummings
John Stockli, Esq.

UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF NEW YORK

The State of New York,

Plaintiff,

v.

Olin Corporation, et al.,

Defendants.

Civil Action No. 83-1400C

RELEASE OF LIABILITY

WHEREAS, the State of New York, by and through the Attorney General of the State of New York (collectively the "State") brought a civil action against Olin Corporation and others in the United States District Court for the Western District of New York, entitled The State of New York v. Olin Corporation, Arthur Batrouny, et al., Civil Action No. CIV 83-1400C (the "Action"), to compel the remediation of certain real property located in the County of Niagara, and bordered on the south by Pine Avenue, on the west by Tuscarora Road and on the north and east by Cayuga Creek and commonly referred to as 8700 Pine Avenue, Niagara Falls, New York and 1505 Tuscarora Road, Niagara Falls, New York (the owners of such property being John and Elizabeth Zito and Olin Corporation, respectively) (the "Site"); and

WHEREAS, Olin Corporation entered into a Stipulation and Consent Judgment Approving Settlement Agreement (the "Settlement Agreement") with the State on or about March 20, 1985 in settlement of the Action, which Settlement Agreement was approved

by the Hon. John T. Curtin and filed in the United States District Court for the Western District of New York on May 2, 1985 (the "Order"); the Settlement Agreement and Order being subsequently filed in the Office of the Clerk of Niagara County on November 27, 1989 in Liber 2230 of Deeds at Page 245; and

WHEREAS, pursuant to the Settlement Agreement, Olin Corporation was required to undertake a field investigation of the Site and design alternate remedial programs involving either removal and off-site disposal of contaminated material or on-site containment of such materials; and

WHEREAS, Olin Corporation has completed the field investigation and the remedial program chosen for the Site; and

WHEREAS, pursuant to Paragraph 14 of the Settlement Agreement, upon certification by the State that such work has been satisfactorily implemented in accordance with the terms of the Settlement Agreement, Olin Corporation is entitled to a Release of Liability; and

WHEREAS, the State certified on November 16, 1992 that Olin Corporation had implemented the work required by the Settlement Agreement in a satisfactory manner.

NOW, THEREFORE, the State hereby releases Olin Corporation from the following claims:

1. Olin Corporation is released from all claims for civil penalties which were raised or could have been raised in the civil action State of New York v. Olin Corporation, Arthur Batrouny, et al., Civil Action No. CIV 83-1400C.

2. Olin Corporation is released from all other claims resulting from or relating to any migration, discharge or release of chemicals or other substances from the Site and all other claims which were raised in the Action, except claims resulting from or relating to, any migration, discharge or release from the Site of chemicals or other substances occurring after the date of this Release.

3. This is a total and complete release from any and all claims, debts, demands and obligations of any kind, nature or description, respecting claims specifically described in Paragraphs 1 and 2.

4. This Release does not affect any other claims or actions the State may have now or in the future against Olin Corporation.

5. This Release does not preclude the State from enforcing any legal or equitable rights or claims it may have now or in the future against anyone other than Olin Corporation.

6. This Release does not preclude the State from enforcing any legal or equitable rights or claims which may arise from activities of Olin Corporation after the date of this Release.

7. This Release does not discharge or release Olin Corporation from any obligation at law or in equity which arises from pollution of soil, groundwater and drinking water which is unrelated to the chemical contamination which is the subject of the Settlement Agreement to the extent that such contamination was not identified by Olin Corporation in its field

investigations conducted pursuant to the Paragraph 5 of the Settlement Agreement and was not addressed in Olin Corporation's remedial plan for the Site.

8. This Release does not discharge or release Olin Corporation from payment of unbilled and/or unpaid reimbursable costs as provided in Paragraph 12 of the Settlement Agreement.

9. This Release shall be binding on the parties hereto and shall not be deemed to waive or release any claims on behalf of any third party not a party to this Release.

IN WITNESS WHEREOF, the State of New York, by its duly authorized representative, has executed this Release on the 15th day of December, 1992.

THE STATE OF NEW YORK

By: Albert M. Bronson
Albert M. Bronson
Assistant Attorney General

STATE OF NEW YORK)
) ss.:
COUNTY OF ALBANY)

On this 15th day of December, 1992, before me personally came Albert M. Bronson, to be personally known, who, being by me duly sworn, did depose and say that deponent is the Assistant Attorney General of the State of New York, the municipality described in and which executed the foregoing instrument.

Albert M. Bronson

Sworn to before me this
15th day of December, 1992.

Lawrence A. Rappoport

LAWRENCE A. RAPPOPORT
Notary Public, State of New York
Qualified in Albany County
No. 4513713
My Commission Expires [redacted]
DECEMBER 31, 1993

New York State Department of Environmental Conservation
50 Wolf Road, Albany, New York 12233

Thomas C. Jorling
Commissioner

NOV 16 1992

E. McIntosh Lover
Executive Vice President
Olin Chemicals
Lower River Road
P.O. Box 248
Charleston, Tennessee 37310

Dear Mr. Lover:

Re: Site #9-32-063
Charles Gibson Site
Niagara County

The Department contracted with Rizzo Associates to provide observation for the Charles Gibson encapsulation. The enclosed certification stated that Rizzo "did not observe any deviation from the original or modified plans and specifications during the completion of the closure and capping process". Therefore, the Department has determined that Olin Chemical Co. has satisfactorily completed the remedial plans and has submitted an approved monitoring and maintenance plan for the encapsulation and the associated monitoring wells.

If you have any questions, call Jim Drumm at (518) 457-9285.

Sincerely,

Michael J. O'Toole, Jr.
Director
Div. of Hazardous Waste Remediation

Enclosure

cc: A. Bronson - NYSDOL
C. Steffan - Olin Chemicals
R. Hughto - Rizzo Assoc.
[redacted]

4.0 SUMMARY

Rizzo Associates Engineering, P.C.'s role in providing oversight of the remediation of the Pine and Tuscarora Site in Niagara Falls by Olin Chemical, the PRP, is complete. We did not observe any deviation from the original or modified plans and specifications during completion of the closure and capping process.

Problems relating to ambitious schedules and adverse weather conditions delayed the construction activities during 1989. Unexpected subsurface conditions accelerated the difficulties.

Early 1990 activities proceeded smoothly as a result of lessons learned from the previous year. In the middle of June 1990, slope stability problems relating to the support of the slurry wall on the northwestern border of the Site delayed the Project over eight weeks. The final reconstruction procedures to resolve the problem were a result of extensive geotechnical analysis.

HRA/134801L1JJD.(MGM)

RIZZO ASSOCIATES ENGINEERING, PC

ENGINEERS AND ENVIRONMENTAL SCIENTISTS

235 West Central Street Natick, MA 01760 (508) 651-3401 FAX (508) 651-1189

March 25, 1991

Mr. James Drumm, Project Manager
New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233-7010

RE: PRP Oversight Contract
Charles Gibson Site
W.A No. D002237-2
Final Remediation Summary Report

Dear Mr. Drumm:

Rizzo Associates Engineering, P.C. is pleased to submit this revised Final Remediation Summary Report for the Charles Gibson Site (also referred to as the Pine and Tuscarora Site) in Niagara Falls, New York. The report summarizes the remediation controls implemented at the Site by the PRP (Olin Chemicals), their engineer (Woodward-Clyde), and their contractors (IT Corporation and Sevenson), during the period that oversight was provided by Rizzo Associates and our subcontractor, Larsen Engineers. Also, this report incorporates comments from your office outlined in letters to Rizzo Associates, dated December 17, 1990 and January 9, 1991.

Please contact us should you have any questions after reviewing the report. It has been a pleasure providing these services to you.

Very truly yours,

Michael J. Hudson
Senior Project Geologist

Richard J. Hughto, Ph.D., P.E.
Project Manager

HRA\134801L1.JJD

APPENDIX B SITE CONTACTS

APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Site Owner – Olin Corporation	423-336-4057; ABCarringer@olin.com
Olin Emergency Hotline	[phone]
NYSDEC DER Project Manager – Brian Sadowski	716-851-7220; bpsadows@gw.dec.state.ny.us
NYSDEC Regional Manager – Glenn May	716-851-7220; glenn.may@dec.ny.gov
Sevenson – Olin Site Consultant	[phone] [email address]

APPENDIX C SITE TAX MAP

ArcGIS Web Map

3/11/2020, 8:42:01 AM

Bridges (NYS DOT 2017)

- Non-County Bridge

Municipal Boundary (NYS IT, 2017)

Parcels (Niagara County, 2019)

World Transportation

1:2,257

0 0.0275 0.055 0.11 mi

0 0.0425 0.085 0.17 km

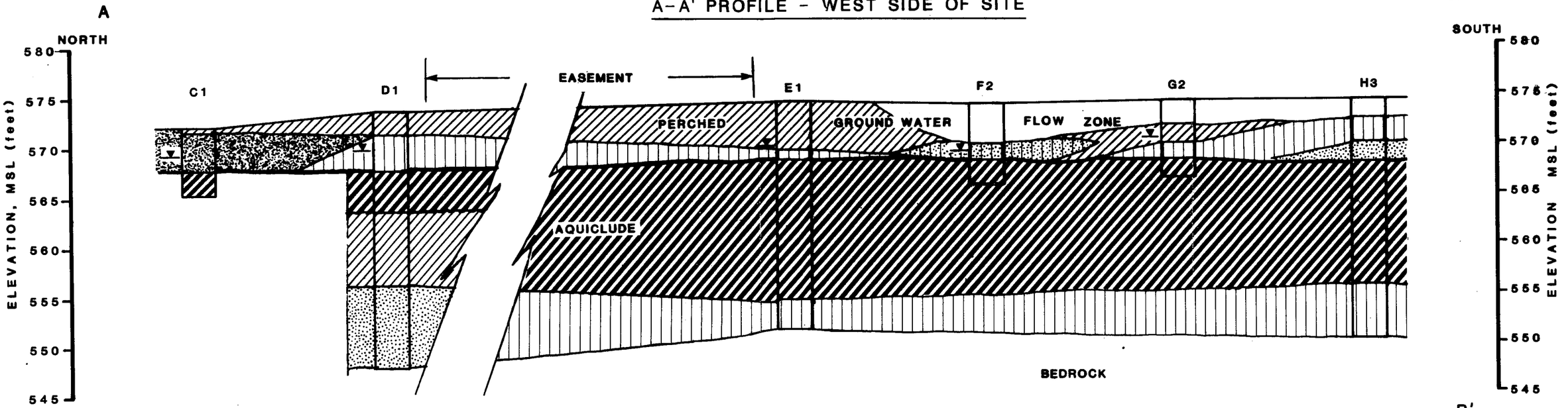
Esri, HERE, Garmin, (c) OpenStreetMap contributors
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Web AppBuilder for ArcGIS

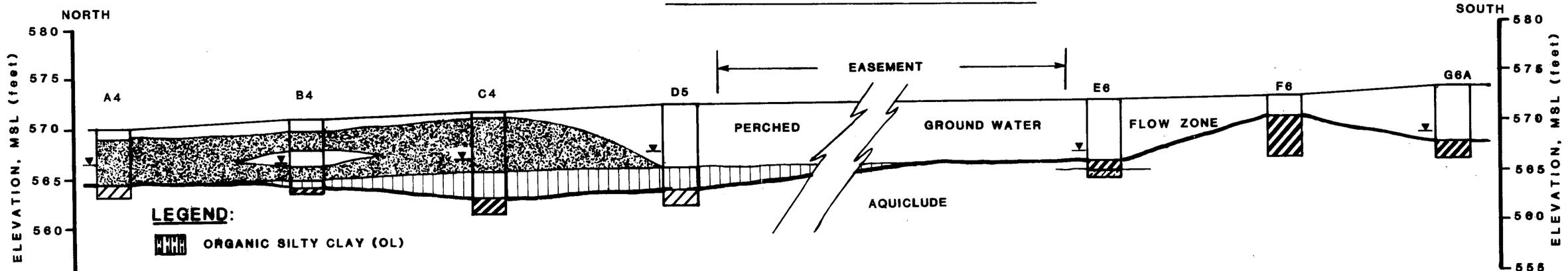
City of Welland, Niagara Region, Regional Municipality of Niagara, Province of Ontario, Ontario MNR, Esri Canada, Esri, HERE, Garmin, INCREMENT P, USGS, EPA, USDA, AAFC, NRCan | NYS ITS GIS Program Office | NYS GIS Program Office | Telephone: (518) 242-5029 | Email: its.sm.SAM.Maintenance@its.ny.gov | NYS GIS Program Office | County of Niagara Real Property Services, Tax Mapping Division: prepared for Tax purposes only and is NOT to be reproduced for surveying or conveyancing. See also the ESRI License Agreement for Disclaimer of Warranties and Liabilities. | Esri, HERE, iPC, NRCan |

APPENDIX D GEOLOGIC CROSS SECTIONS, MONITORING WELL BORING AND CONSTRUCTION

A–A' PROFILE – WEST SIDE OF SITE



B–B' PROFILE – EAST SIDE OF SITE



LEGEND:

- ORGANIC SILTY CLAY (OL)
- CAKE (suspected BHC–HCB)
- SILT (ML)
- CLAY (CL)
- CLAY (CH)
- SAND (SW)
- SILTY SAND (SM)
- NON-CAKE FILL MATERIAL (soil, const. debris)
- ORGANIC CLAY (OH)
- WATER LEVEL

0 25 50

SCALE HORIZONTAL FEET

NOTE:
Refer to Plate 2 for Boring Location

Harding Lawson Associates
Engineers, Geologists & Geophysicists

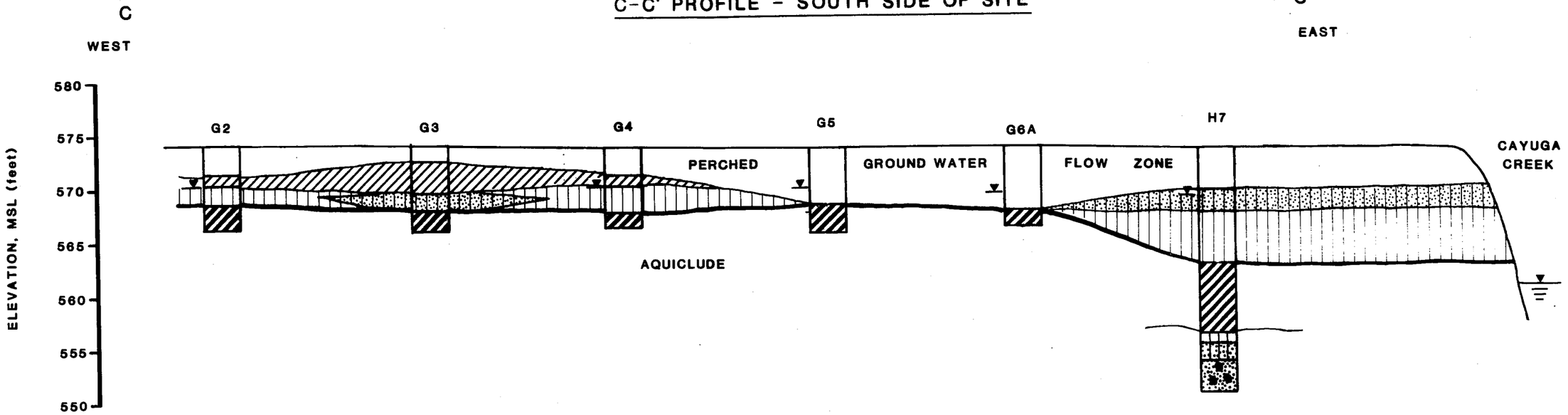
SUBSURFACE PROFILES A–A' & B–B'

Pine and Tuscarora Site
Niagara Falls, New York

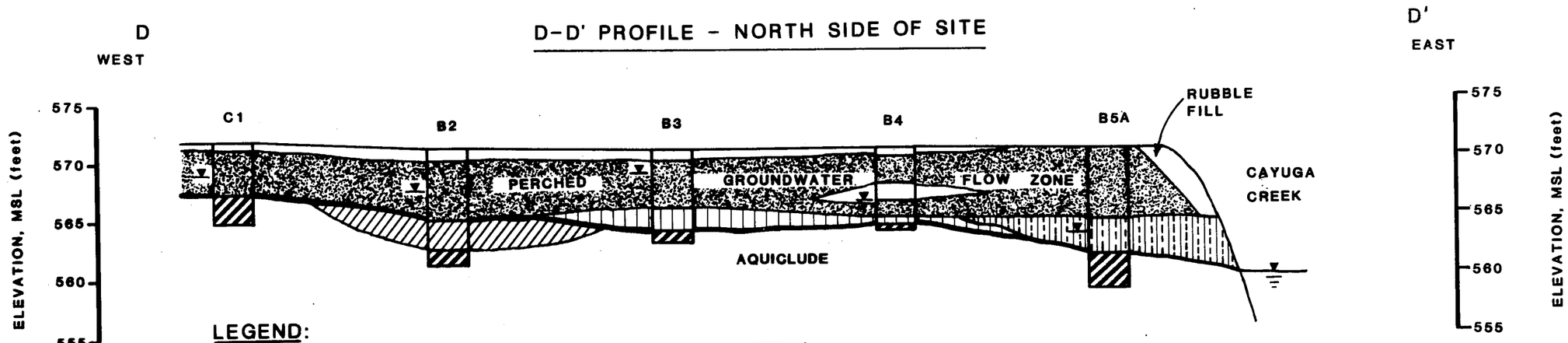
PLATE 6

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
EB	17497,001.12	RC	3/20/86	BH	7/23/86

C-C' PROFILE - SOUTH SIDE OF SITE



D-D' PROFILE - NORTH SIDE OF SITE



LEGEND:

- ORGANIC SILTY CLAY (OL)
- CAKE (suspected BHC-HCB)
- SILT (ML)
- CLAY (CL)
- CLAY (CH)
- SAND (SW)
- SILTY SAND (SM)
- NON-CAKE FILL MATERIAL (soil, const. debris)
- WATER LEVEL
- GRAVEL (GW)

SCALE HORIZONTAL: 0 25 50 FEET

NOTE: Refer to Plate 2 for Boring Location

Harding Lawson Associates
Engineers, Geologists & Geophysicists

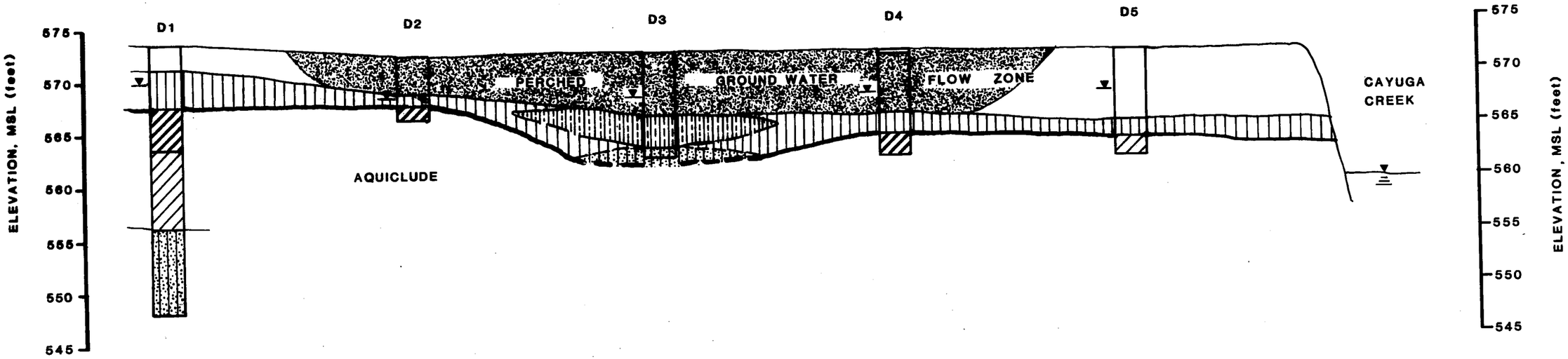
SUBSURFACE PROFILES C-C' & D-D'

Pine and Tuscarora Site
Niagara Falls, New York

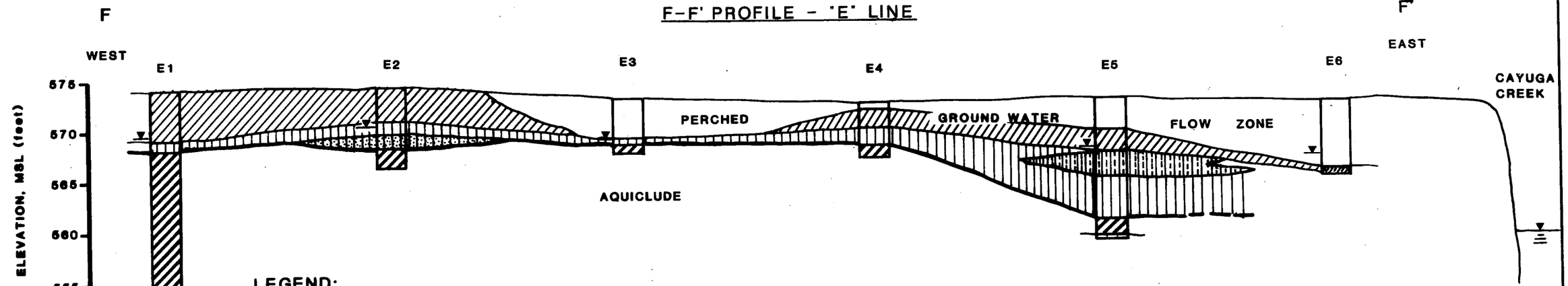
PLATE 7

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
MM	17497,001.12	RC	3/20/86		

E-E' PROFILE - 'D' LINE



F-F' PROFILE - 'E' LINE



LEGEND:

- ORGANIC SILTY CLAY (OL)
- CAKE (suspected BHC-HCB)
- SILT (ML)
- CLAY (CL)
- CLAY (CH)
- SAND (SW)
- SILTY SAND (SM)
- NON-CAKE FILL MATERIAL (soil, const. debris)
- ORGANIC CLAY (OH)
- WATER LEVEL

0 25 50
SCALE FEET
HORIZONTAL

NOTE: Refer to Plate 2 for Boring Location

Harding Lawson Associates
Engineers, Geologists & Geophysicists

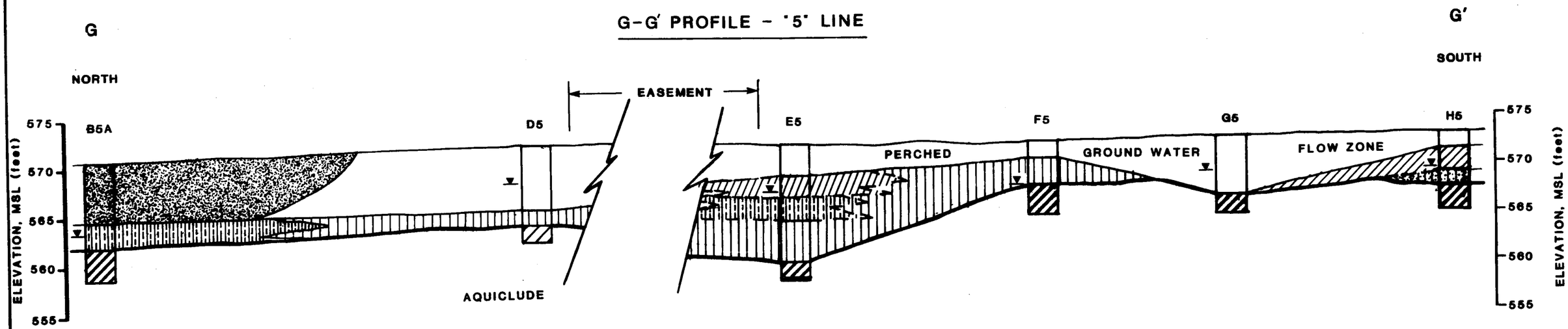
SUBSURFACE PROFILES E-E' & F-F'

Pine and Tuscarora Site
Niagara Falls, New York

PLATE **8**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
Eng. Hog.	17497,001.12	RC	3/20/86		

G-G' PROFILE - "5" LINE



LEGEND:

- ORGANIC SILTY CLAY (OL)
- CAKE (suspected BHC-HCB)
- SILT (ML)
- CLAY (CL)
- CLAY (CH)
- SAND (SW)
- SILTY SAND (SM)
- NON-CAKE FILL MATERIAL (soil, const. debris)
- WATER LEVEL

0 25 50
SCALE FEET
HORIZONTAL

NOTE: Refer to Plate 2 for Boring Location

Harding Lawson Associates
Engineers, Geologists & Geophysicists

SUBSURFACE PROFILE G-G'

Pine and Tuscarora Site
Niagara Falls, New York

PLATE 9

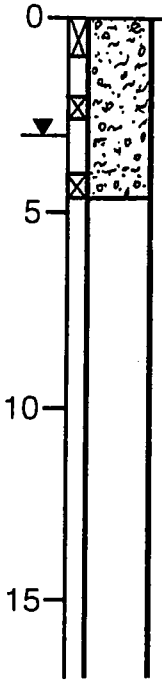
DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
Eg. Hog	17497,001.12	RC	3/20/86	DH	7/23/86

LOG OF BORING MW4

Equipment Hollow-Stem Auger

Elevation - Date 7/6/85

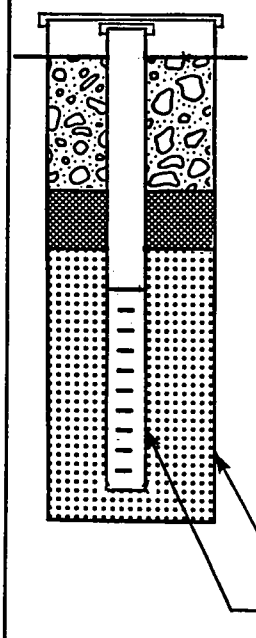
Blows/foot	PID Headspace (ppm)	PID Background (ppm)
24	0.7	0.6
14	6.4	0.5
-	0.5	0.5



GRAY AND BROWN GRAVELLY CLAYEY SAND AND CONSTRUCTION DEBRIS
medium dense, moist
refusal (concrete) encountered at 4.7 feet
End of Boring - 4.7 feet

Fill

MONITORING WELL** DETAIL



WH* - Weight of Hammer

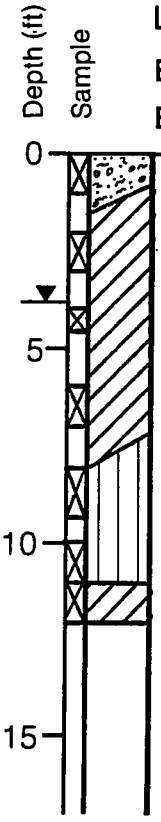
**For Detail refer to plate 12

LOG OF BORING MW4A

Equipment Hollow-Stem Auger

Elevation - Date 7/6/85

Blows/foot	PID Headspace (ppm)	PID Background (ppm)
22	0.7(A) 0.6(B)	0.6
7	1.3	0.4
7	0.5	0.4
11	3.9(A) 0.8(B)	0.4
8	0.4	0.4
2	0.8	0.5
WH*	0.7	0.5



CONSTRUCTION DEBRIS
RED-BROWN AND GRAY CLAY WITH SILT POCKETS
stiff, moist

Fill

brickbat 5.7 to 6 feet
white lime grit and charcoal 6.6 to 6.9 feet

DARK GRAY CLAYEY SILT (ML)
loose, saturated, with wood fibers and roots

RED-BROWN SILTY CLAY (CL)
very soft, saturated
End of Boring - 12 feet

Harding Lawson Associates
Engineers, Geologists & Geophysicists

LOGS OF BORINGS MW4 AND MW4A

Pine and Tuscarora Site
Niagara Falls, New York

PLATE B29

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
ES	17497,001.12		10/10/85		7/24/86

LOG OF BORING MW5

Equipment Hollow-Stem Auger

Elevation - Date 7/8/85

Depth (ft)	Sample	PID Headspace (ppm)	PID Background (ppm)
0			
		0.3	0.5
5			
10			
15			

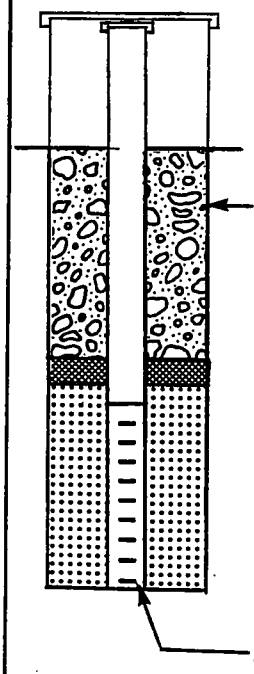
BROWN SANDY CLAYEY SILT
with trace gravel

Fill

refusal (concrete) encountered at 5.2 feet
End of Boring - 5.2 feet

Note: Augered without sampling. Classification based on auger cuttings.

MONITORING WELL * DETAIL



LOG OF BORING MW5A

Equipment Hollow-Stem Auger

Elevation - Date 7/8/85

Depth (ft)	Sample	Blows/foot	PID Headspace (ppm)	PID Background (ppm)
0				
		13	0.4	0.4
5				
		9	0.5(A) 0.5(B)	0.5
10		4	0.7	0.4
15				

BROWN SANDY CLAY AND SILT WITH CONSTRUCTION DEBRIS

Fill

concrete 5.5 to 5.7 feet

DARK GRAY CLAYEY SILT (ML)
loose, saturated, with wood fibers
brown and gray below 10 feet
End of Boring 11.2 feet

Note: Augered without sampling to 5 feet. Classification based on auger cuttings and nearby boring(s).

* For Detail refer to Plate 12

Harding Lawson Associates
Engineers, Geologists & Geophysicists

LOGS OF BORINGS MW5 AND MW5A

Pine and Tuscarora Site
Niagara Falls, New York

PLATE B30

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
EB.	17497,001.12	KJH	10/11/85	BH	7/22/86

APPENDIX E AS BUILT DRAWINGS

AS-BUILT DRAWINGS FOR THE

PINE AND TUSCARORA REMEDIATION PROJECT

NIAGARA FALLS, NEW YORK

SUBMITTED TO

Olin CHEMICALS

OLIN CORPORATION

CHARLESTON, TENNESSEE

DECEMBER 1990

PREPARED BY

ENGINEERING - SCIENCE
290 ELWOOD DAVIS ROAD
LIVERPOOL, NEW YORK

ENGINEERING-SCIENCE

D-T323-840-0-6

TOP OF BANK

BOT. OF BANK (WATERLINE)

EX. STING CREEK CHANNEL TO BE FILLED AS SHOWN ON GRADING PLAN (DWG. 840-0-7) SUBSEQUENT TO DIKING OFF OF CREEK.

CAYUGA CREEK

℄ SLURRY WALL

6'

I.E. 560.50'

I.P.

PROPERTY LINE

DEMOLISHED

1-STORY BRK. HOUSE #1505

BRICK GARAGE

REMOVE POST

A 840-0-8

REMOVE POST 3' WIDE SLURRY WALL BENEATH CAP REF DWG. 840-0-10

MONITORING WELL #7 TO BE CAPPED AND ABANDONED (BY OTHERS)

6"

5'

10'

12'

17'

I.P.

PROPERTY LINE

TUSCARORA ROAD

OE

RR

BATROUNY PROPERTY

REMOVE ALL SHRUBS & TREES IN AREA TO BE CAPPED & BEYOND AS INDICATED BY SPECIFICATIONS.

2

NEW MANHOLE (M.H. A) I.E. 557.50' REF "1"/840-0-9

P-1

2" ϕ PIEZOMETER, DOWN TO A TIP ELEVATION OF 560.0 (TYP.). WHERE PIEZOMETER PENETRATES CAP LINER, PROVIDE 2-40 MIL H.D.P.E. BOOTS" FUSION WELDED TO PIEZOMETER AND CAP LINERS. BAND WITH S.S. HOSE CLAMP AT TOP. DETAIL 3/840-0-9

8

6" ϕ PERFORATED C.P.P.O. DRAIN PIPE, SLOPPED UNIFORMLY TO MANHOLE.

196.0'

DRAIN PIPE I.E. 560.00'

4'

P-2

A 840-0-8

1

PERMANENT FENCE REF. "2"/840-0-9

4'

P-4

8

P-3

NEW MANHOLE (M.H. B) I.E. 557.00' REF "1"/840-0-9

DRAIN PIPE I.E. 559.50

35'

MONITORING WELL #6 TO BE CAPPED AND ABANDONED (BY OTHERS)

ROW OF PINE SEEDLINGS TO BE REMOVED

60'

P-6

2

P-5

TOP OF CAP

TOE OF CAP

2:1 BANK AROUND CAP (TYP.)

ELEC. TOWER

12' GATE

30'

MARKER POST

10"ϕ BRINE LINE

℄ NIAGARA MOHAWK POWER CORP. R.O.W.

ELEC. TOWER

OE

RR

20" W

CITY OF NIAGARA FALLS

NOTE:

SEE DRAWING 840-0-5 FOR LEGEND, GENERAL NOTES AND REFERENCES.

RELEASED FOR CONSTRUCTION
By: [signature] Date: 2/26/90

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
4	AS-BUILT	MAW	JAN 1991	1/11/91	
3	REVISE SLURRY WALL AND DRAIN LOCATION, MOVE PIEZOMETERS AND MANHOLE.	DNA	FEB 1990	2/26/90	
2	ADD MANHOLE & 6 PIEZOMETERS	LWW	MAY 1989		
1	REVISE S.E CORNER OF SLURRY WALL. MOVE M.H., DRAIN, FENCE & GATE.	LWW	MAR 1989		
0	ISSUED FOR CONSTRUCTION	LWW	MAY 1988		GEH 5/18/88
A	ISSUED FOR REVIEW	LWW			GBB 5/19/88

DRAWN L. W. WILSON DATE JUNE 28, 1987
CHECKED DATE 5-17-88
APPROVED

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION

ENLARGED SITE PLAN

PROJECT NO. T323 | C.A.R. NO. | SCALE 1" = 20' | DRAWING NUMBER D-T323-840-0-6 | REV. 4

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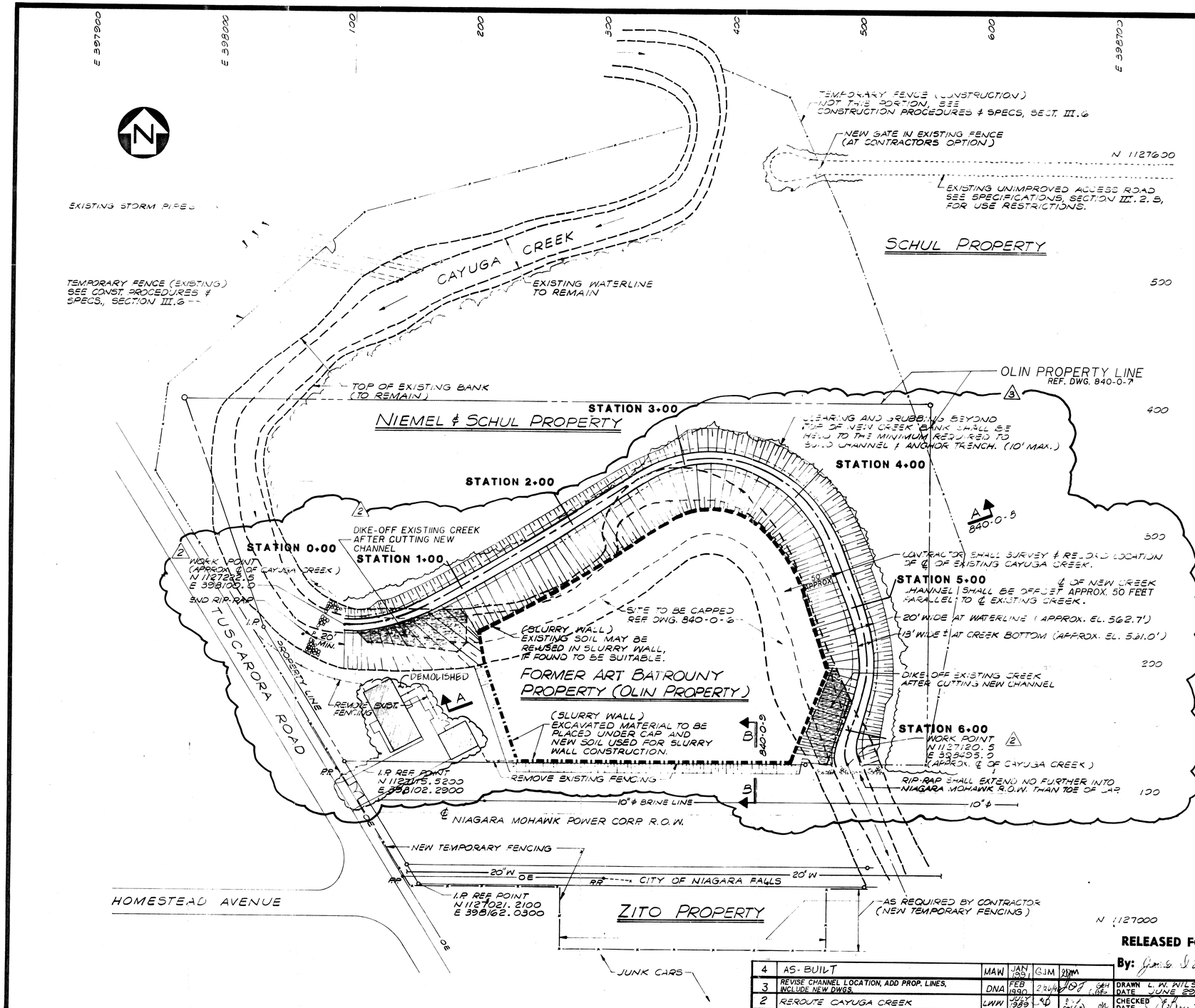
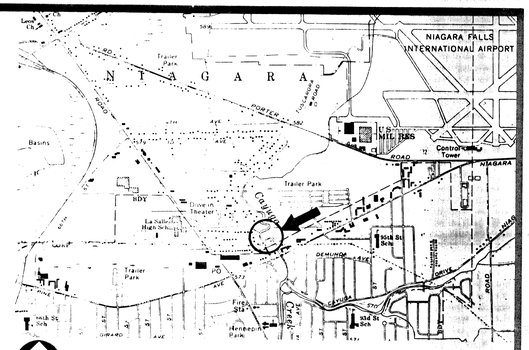
D-T323-840-0-5





LOCATION MAP

GENERAL NOTES :

1. ALL CLEARING AND GRUBBING SHALL BE KEPT TO A MINIMUM.
2. ALL DIMENSIONS MAY BE ADJUSTED SLIGHTLY, IN THE FIELD. (WITH OLIN APPROVAL ONLY)
3. THE "FLOOD OF RECORD" DURING MODERN POWER OPERATING PROCEDURES IS ELEV. 567.7'
4. THESE DRAWINGS TO BE WORKED WITH "CONSTRUCTION PROCEDURE AND SPECIFICATIONS" DOCUMENT, HEREIN REFERRED TO AS SPECIFICATIONS OR SPECS AND THE CONSTRUCTION QA/QC PLAN.
5. ALL GRADES SHOWN ARE "FINAL GRADES". ALLOWANCES MUST BE MADE FOR R-RAP, TOPSOIL, ETC..
6. TEMPORARY FENCING IS SHOWN ON D-T323-TF-5. (DRAWING NOT STORED IN VAULT, COPY IN FILES.)
7. PERMANENT FENCING IS SHOWN ON D-T323-840-0-6.
8. EXISTING UTILITIES SHOWN ON THIS DRAWING ARE FOR REFERENCE ONLY. CONTRACTOR SHALL BE LIABLE FOR LOCATING ALL EXISTING UTILITIES & STRUCTURES, WHETHER SHOWN OR NOT.

LEGEND / ABBREVIATIONS :

I.P.°	IRON PIN		EXISTING BUILDINGS
OE	OVERHEAD ELEC.		FOLIAGE/TREE LINE
P.P.•	POWER POLE		PERMANENT DIKES
20" W	20" WATER LINE		℄ & SLOPE DIRECTION OF NEW SWALE
H.P.•	HIGH POINT		SLOPED BANK AT MIN. 2 HORZ. : 1 VERTICAL
C & G	CLEAR & GRUB		OLIN PROP. LINE
570	EXIST. CONTOUR		
570	NEW CONTOUR		

B.M. - NORTHWEST FLANGE BOLT OF HYDRANT AT NORTHEAST CORNER OF TUSCARORA ROAD & NIAGARA FALLS BLVD. = ELEV. 576.69

REFERENCE DRAWINGS :

D-T323-840-0-6	ENLARGED SITE PLAN
840-0-7	SITE GRADING PLAN
840-0-8	CROSS SECTIONS
840-0-9	SECTIONS & DETAILS
840-0-10	SLURRY WALL PLAN
840-0-11	SLURRY WALL SECTIONS & DETAILS
840-0-12	SUBSURFACE PROFILES
T323-TF-5	TEMPORARY FENCING (INFO. ONLY)
840-0-9A	SECTIONS & DETAILS
840-0-13	CROSS SECTIONS OF NEW CHANNEL

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
4	AS-BUILT	MAW	JAN 1991	GJM	
3	REVISE CHANNEL LOCATION, ADD PROP. LINES, INCLUDE NEW DWGS.	DNA	FEB 1990		GBH
2	REROUTE CAYUGA CREEK	LWW	JULY 1989		
1	REVISE 2 WORK POINTS FOR CHANNEL REVISE S.E. CORNER OF SLURRY WALL	LWW	MAR. 1989		
0	ISSUED FOR CONSTRUCTION	LWW	MAY 1988		GBH
A	ISSUED FOR REVIEW	LWW			

RELEASED FOR CONSTRUCTION
By: GBH 5/19/88 Date: 5/20/88

DRAWN L. W. WILSON DATE JUNE 22 1987
CHECKED DATE 5-17-88
APPROVED GBH 5/18/88
GBH 5/19/88

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION

SITE PLAN

PROJECT NO. T323 | C.A.R. NO. | SCALE 1"=40' | DRAWING NUMBER D-T323-840-0-5 | REV. 4

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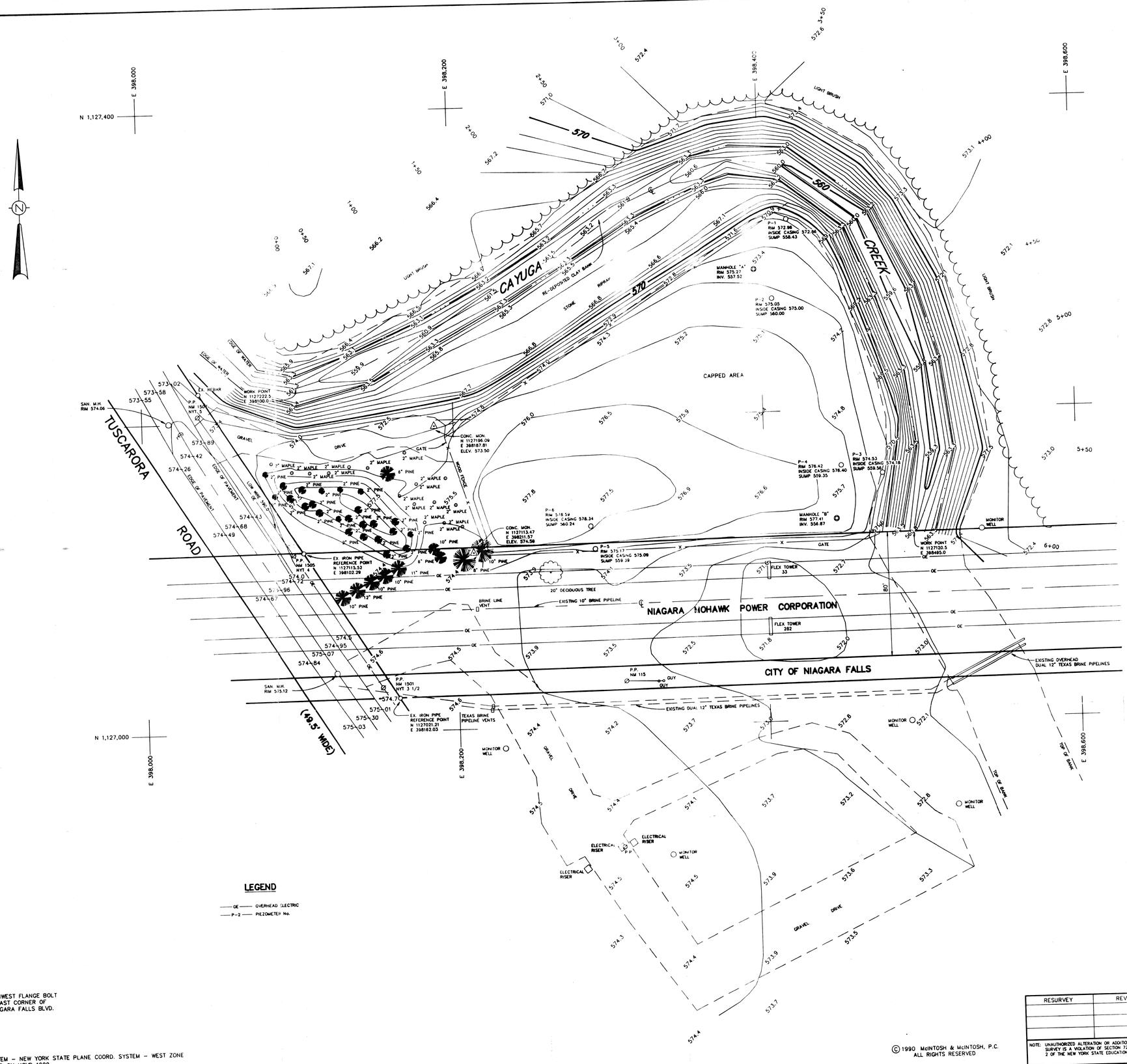

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RESURVEY	REVISION

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209, PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

McINTOSH & McINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
LOCKPORT, NEW YORK PHONE 434-9138
BUFFALO, NEW YORK PHONE 625-8360

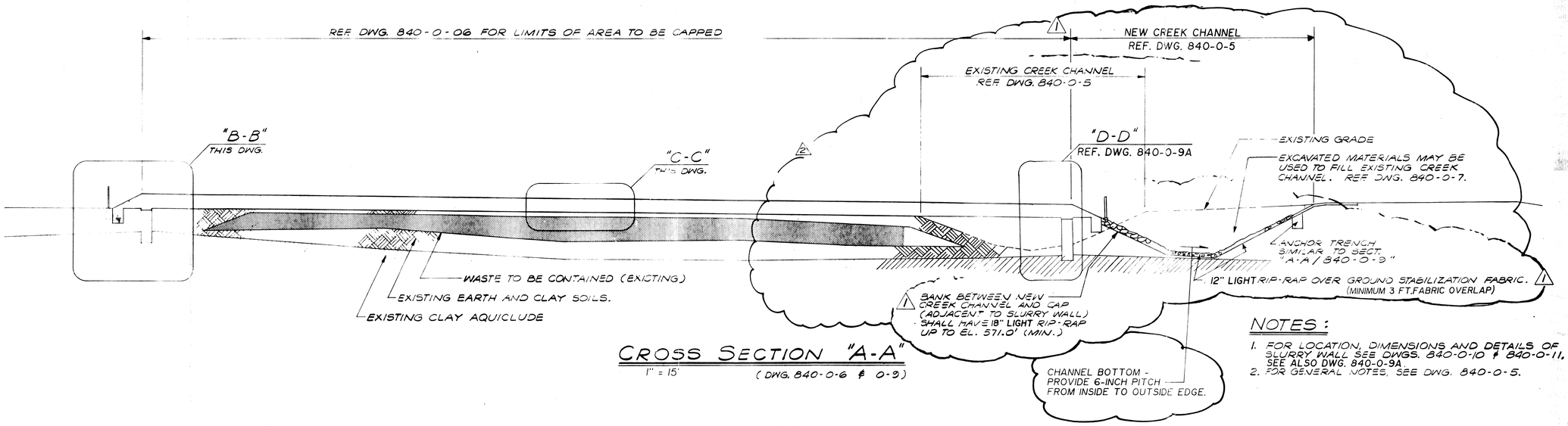
TOPOGRAPHIC MAP OF THE GIBSON SITE – OLIN CORP.

LOCATION CITY OF NIAGARA FALLS & TOWN OF NIAGARA, NIAGARA COUNTY, NEW YORK

JOB No. 5237-A | SCALE: 1" = 30' | DATE: NOVEMBER 16, 1990

DRAWN D.D.
COMP.
DESG.
CHECKED

D-T323-840-0-8

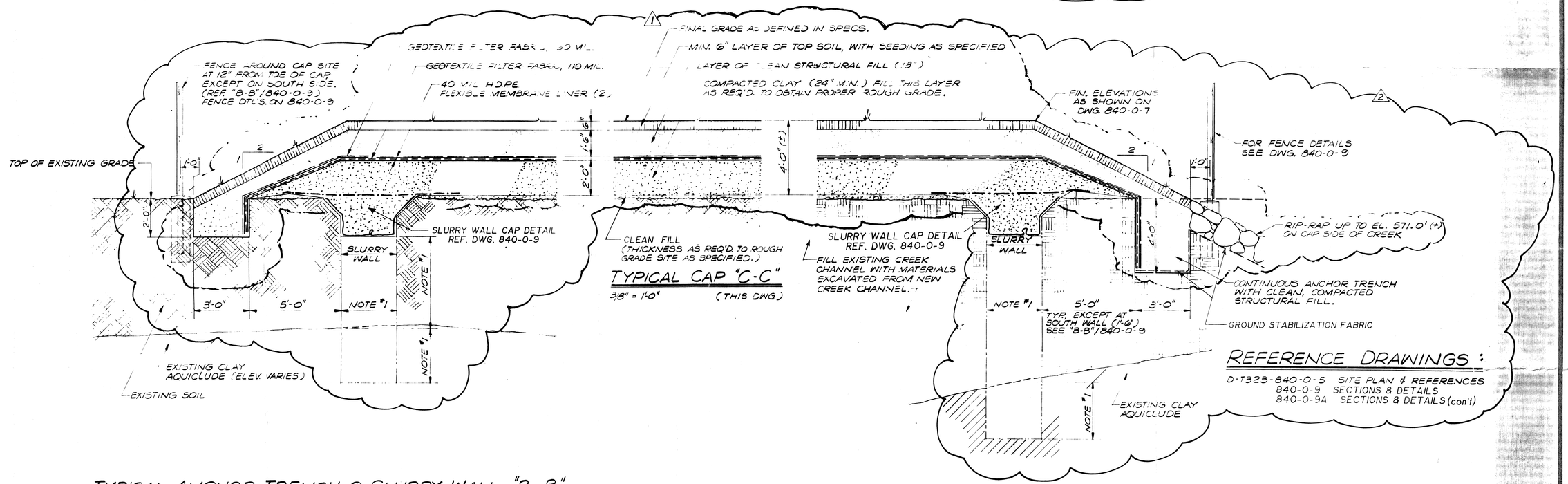


CROSS SECTION "A-A"

1" = 15' (DWG. 840-0-6 & 0-9)

NOTES:

1. FOR LOCATION, DIMENSIONS AND DETAILS OF SLURRY WALL SEE DWGS. 840-0-10 & 840-0-11. SEE ALSO DWG. 840-0-9A
2. FOR GENERAL NOTES, SEE DWG. 840-0-5.



TYPICAL CAP "C-C"

3/8" = 1'-0" (THIS DWG.)

TYPICAL ANCHOR TRENCH @ SLURRY WALL "B-B"

3/8" = 1'-0" (THIS DWG.)

REFERENCE DRAWINGS:

D-T323-840-0-5 SITE PLAN & REFERENCES
840-0-9 SECTIONS & DETAILS
840-0-9A SECTIONS & DETAILS (con't)

RELEASED FOR CONSTRUCTION
By: [signature] Date: 2/26/92

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
3	AS-BUILT	MAW	JAN 1991	1/11/91	DSM
2	REVISE CHANNEL LOCATION, RIP RAP, ANCHOR TRENCH, REMOVE SECTION "D-D", REVISE SLURRY WALL BERM.	DNA	FEB 1990	2/24/90	DSM GBB GBH
1	REVISE CAP, LINER & CREEK CHANNEL	LWW	JULY 1989	CHD	DSM GBH
0	ISSUED FOR CONSTRUCTION	LWW	MAY 1988	CHD	DSM GBH GBB 5/19/88

DRAWN L. W. WILSON DATE OCT. 26, 1987
CHECKED [signature] DATE 5/17/88
APPROVED [signature] DATE 5/18/88

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NIAGARA PLANT

P & T REMEDIATION

CROSS SECTIONS

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		NOTED	D-T323-840-0-8	3

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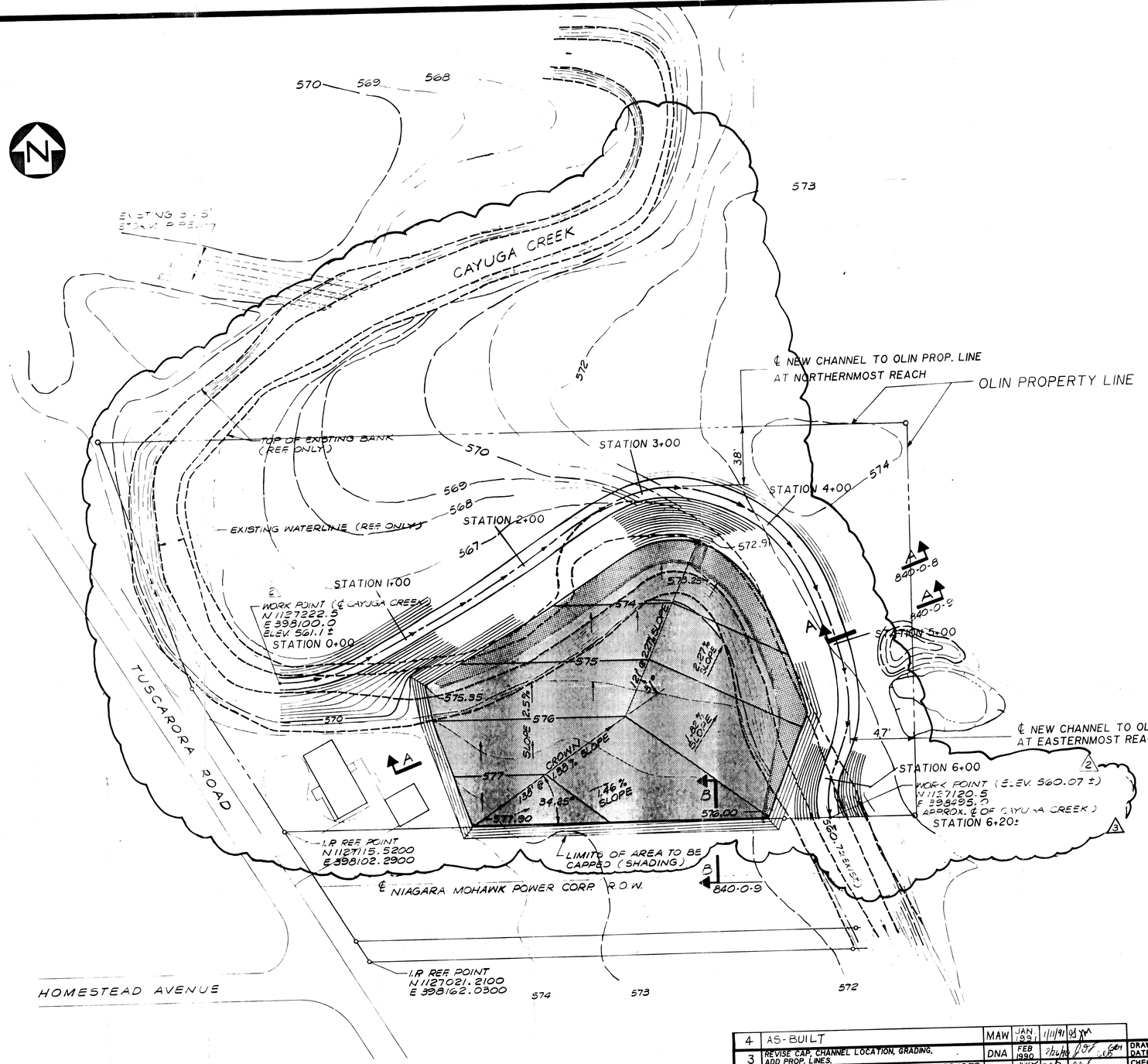
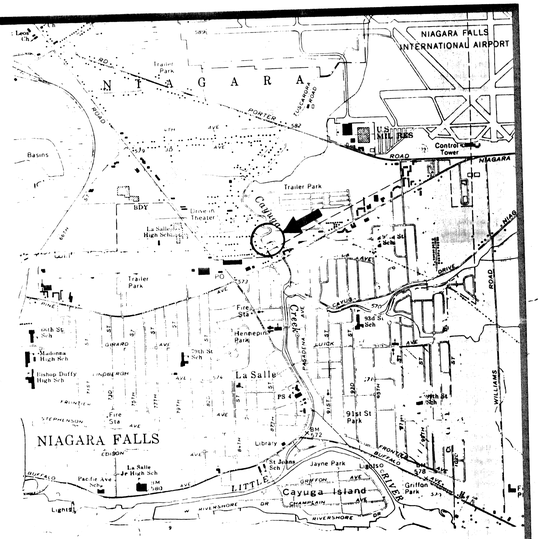
D-T323-840-0-7





LOCATION MAP

NOTES :

1. FOR GENERAL NOTES SEE DWG. 840-0-5.
2. FOR LEGEND & ABBREVIATIONS USED SEE 840-0-5.
3. SEE TOPOGRAPHIC AS-BUILT BY McINTOSH & McINTOSH FOR FINAL SITE GRADING PLAN.

B.M. - NORTHWEST FLANGE BOLT OF HYDRANT AT NORTHEAST CORNER OF TUSCARORA ROAD & NIAGARA FALLS BLVD. = ELEV. 576.69

REFERENCE DRAWINGS :

D-T323-840-0-5	SITE PLAN
840-0-6	ENLARGED SITE PLAN
840-0-8	CROSS SECTIONS

RELEASED FOR CONSTRUCTION
By: _____ Date: 2/26/92

REV	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
4	AS-BUILT	MAW	JAN. 1991	1/11/91	DJ
3	REVISE CAP, CHANNEL LOCATION, GRADING, ADD PROP. LINES.	DNA	FEB 1990	2/26/90	DJ GEH
2	REVISE CHANNEL WORK POINTS, GRADES, CAP SLOPE, ETC.	LWW	JULY 1989	GD	DJ GEH
1	REVISE CHANNEL WORK POINTS, GRADES, CAP LIMITS & SLOPE.	LWW	MAR 1989	GD	DJ GEH
0	ISSUED FOR CONSTRUCTION	LWW	MAY 1988	GD	GEH
A	ISSUED FOR REVIEW	LWW			GBB 5/19/88

DRAWN L. W. WILSON DATE JUNE 28, 1987
CHECKED DATE
APPROVED

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION

SITE GRADING PLAN

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		1" = 40'	D-T323-840-0-7	4

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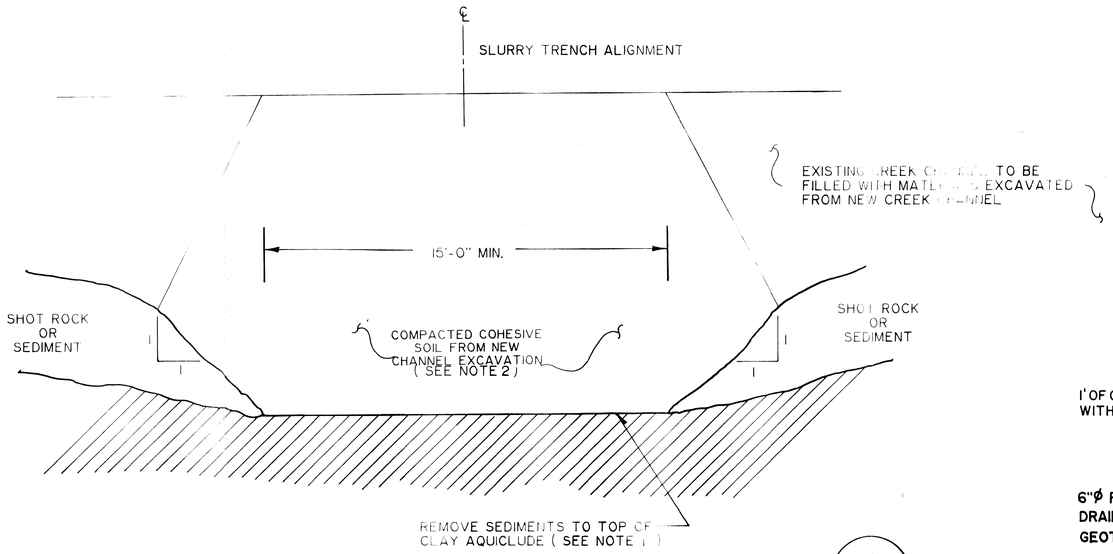
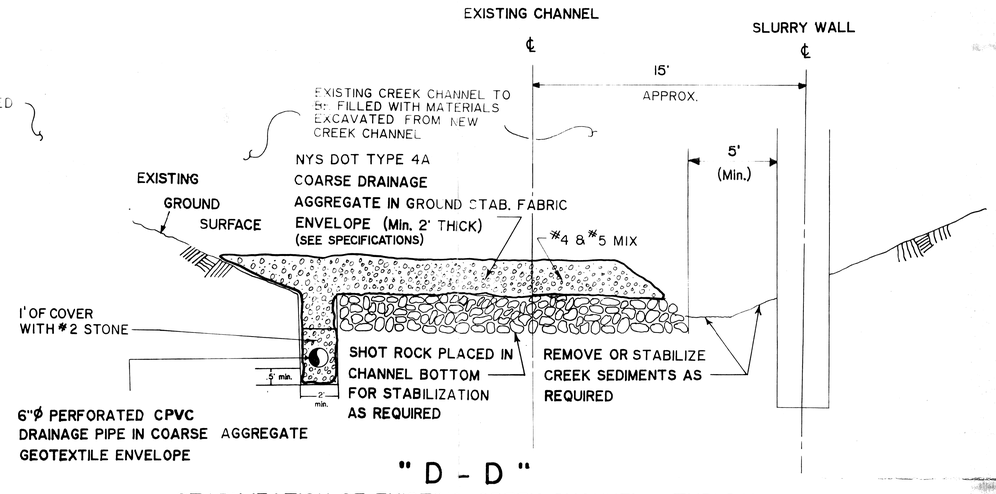


FILL PLACEMENT WHERE SLURRY WALL CROSSES EXISTING CREEK

SCALE: 3/16" = 1'-0"

C 840-0-9A



" D - D "

STABILIZATION OF EXISTING CREEK CHANNEL - TYPICAL

SCALE: 1/4"=1'-0"

NOTES :

1) EXCAVATED EXISTING CREEK SEDIMENTS TO BE PLACED UNDER CAP.
2) CLEAN, COHESIVE SOIL TO BE COMPACTED TO 90% OF MAXIMUM DENSITY (ASTM D698) AT (NEAR) OPTIMUM MOISTURE CONTENT; FIRST TWO LIFTS TO BE LIGHTLY HAND COMPACTED TO PREVENT FURTHER SOFTENING OF UNDERLYING SOFT CLAY.

REFERENCE DRAWINGS

D-T323-840-0-10 SLURRY WALL PLAN
D-T323-840-0-8 CROSS SECTIONS

RELEASED FOR CONSTRUCTION
By: James D Fryer Date: 2/26/90

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
1	AS-BUILT	MAW	DEC. 1990	GJM	GEH 2-23-90
0	ADD DRAWING				GAH

DRAWN DATE 2/14/90 V.O.
CHECKED DATE
APPROVED

Olin

P & T REMEDIATION

SECTIONS & DETAILS

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		AS SHOWN	D-T323-480-0-9A	1

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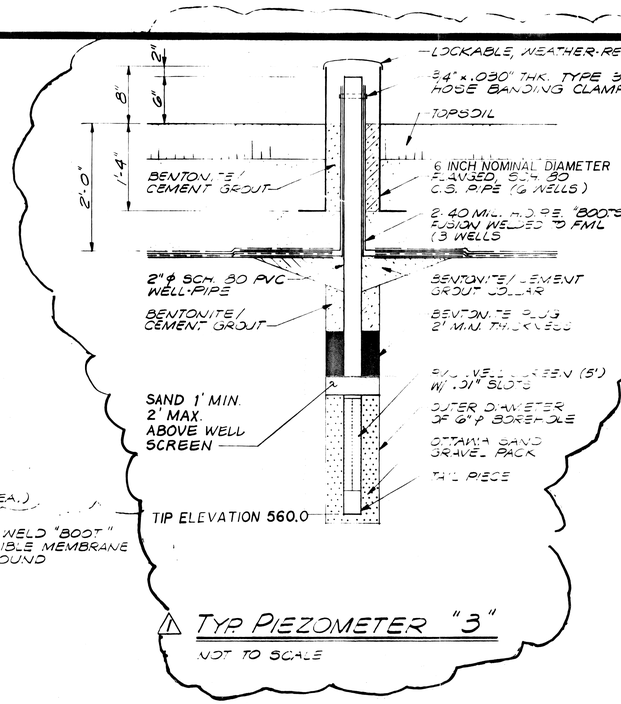
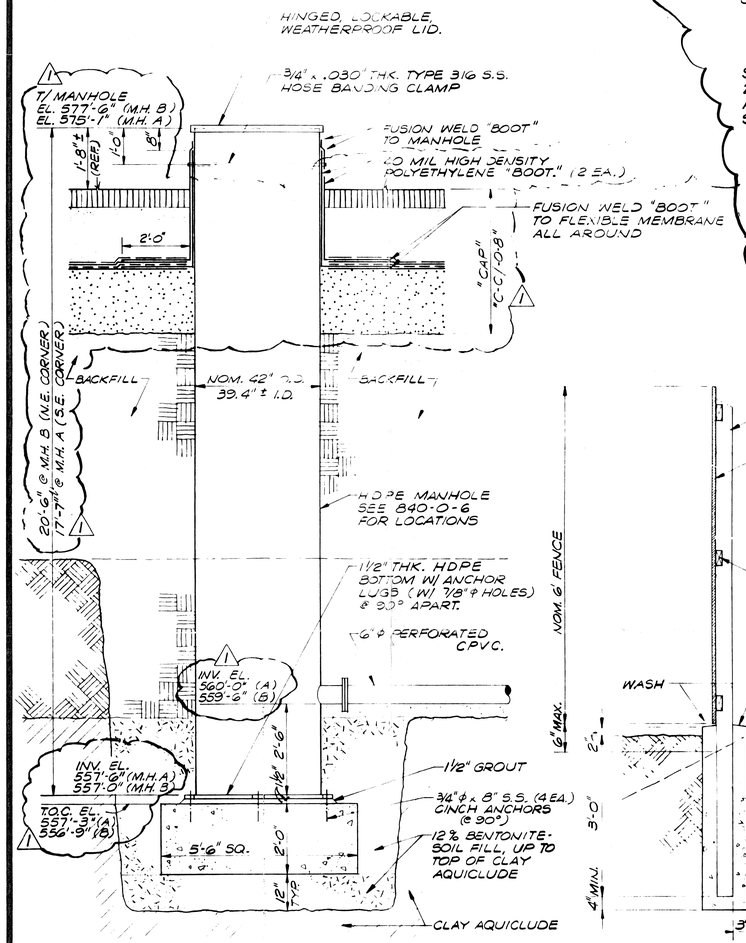


TYP. PIEZOMETER "3"

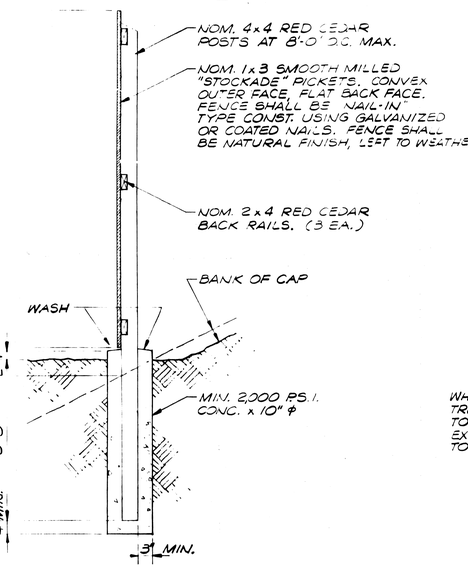
NOT TO SCALE



MANHOLE DETAIL "1"

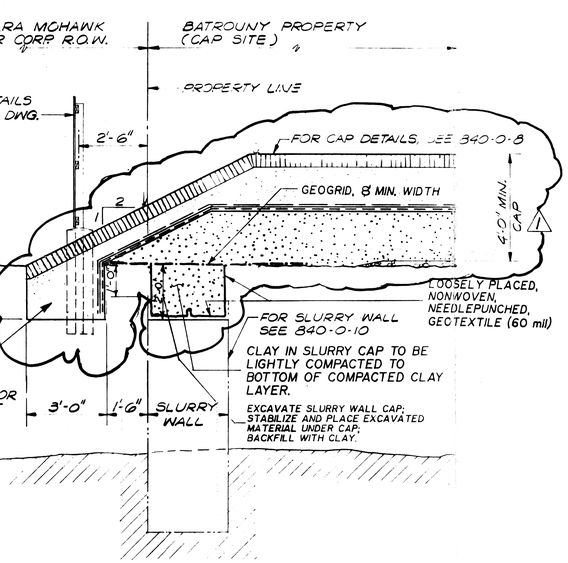
1/2" = 1'-0" (2 REQ'D.) ⚠1

MANHOLE SHALL BE MADE FROM PHILLIPS DRISCOPIPE 8600," OR APPROVED EQUAL, HIGH DENSITY POLYETHYLENE RESIN TO MEET THE REQUIREMENTS OF A.S.T.M. D-1248, TYPE III, CLASS C, CATEGORY 5, P34 CELL CLASS TO MEET A.S.T.M. D-3350. TEST VALUE 355434C. ALL JOINTS AND CONSTRUCTION TO BE FUSION WELDED. MANHOLE SHALL BE FURNISHED COMPLETE WITH 6" ϕ NOZZLE, 4" x 4" x 1½" ANCHOR LUGS, AND HINGED, LOCKABLE, WEATHERPROOF LID.



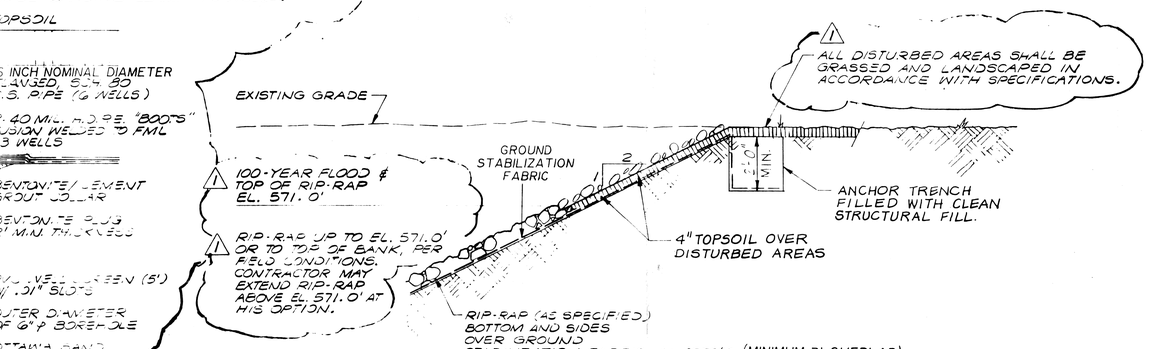
FENCE DETAIL "2"

3/4" = 1'-0"



ANCHOR TRENCH @ SOUTH SLURRY WALL "B-B"

3/8" = 1'-0"



ANCHOR TRENCH @ NEW CREEK CHANNEL ~ SECTION "A-A"

3/8" = 1'-0" (REF. DWG. 840-0-5 & SECT. "A-A"/840-0-8)

NOTES :

1. FOR GENERAL NOTES SEE DWG. 840-0-5.

REFERENCE DRAWINGS :

D-T323-840-0-5	SITE PLAN & REFERENCES
840-0-8	CROSS SECTIONS
840-0-10	SLURRY WALL PLAN

RELEASED FOR CONSTRUCTION
By: [signature] Date: 2/26/90

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
3	AS-BUILT	MAW	DEC. 1990	GJM	
2	REVISED ANCHOR TRENCH, PIEZOMETER TIP ELEVATION, SLURRY WALL BERM DETAIL.	DNA	FEB 1990	DNA	GBB GEH
1	REVISED PER NEW CAP & CHANNEL	LWW	JULY 1989	DNA	GBB GEH
0	ISSUED FOR CONSTRUCTION	LWW	MAY 1988	DNA	GBB GEH

DRAWN L. W. WILSON DATE MAY 2 1988
CHECKED DATE 5/17/88
APPROVED 5/18/88

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION

SECTIONS & DETAILS

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		NOTED	D-T323-840-0-9	3

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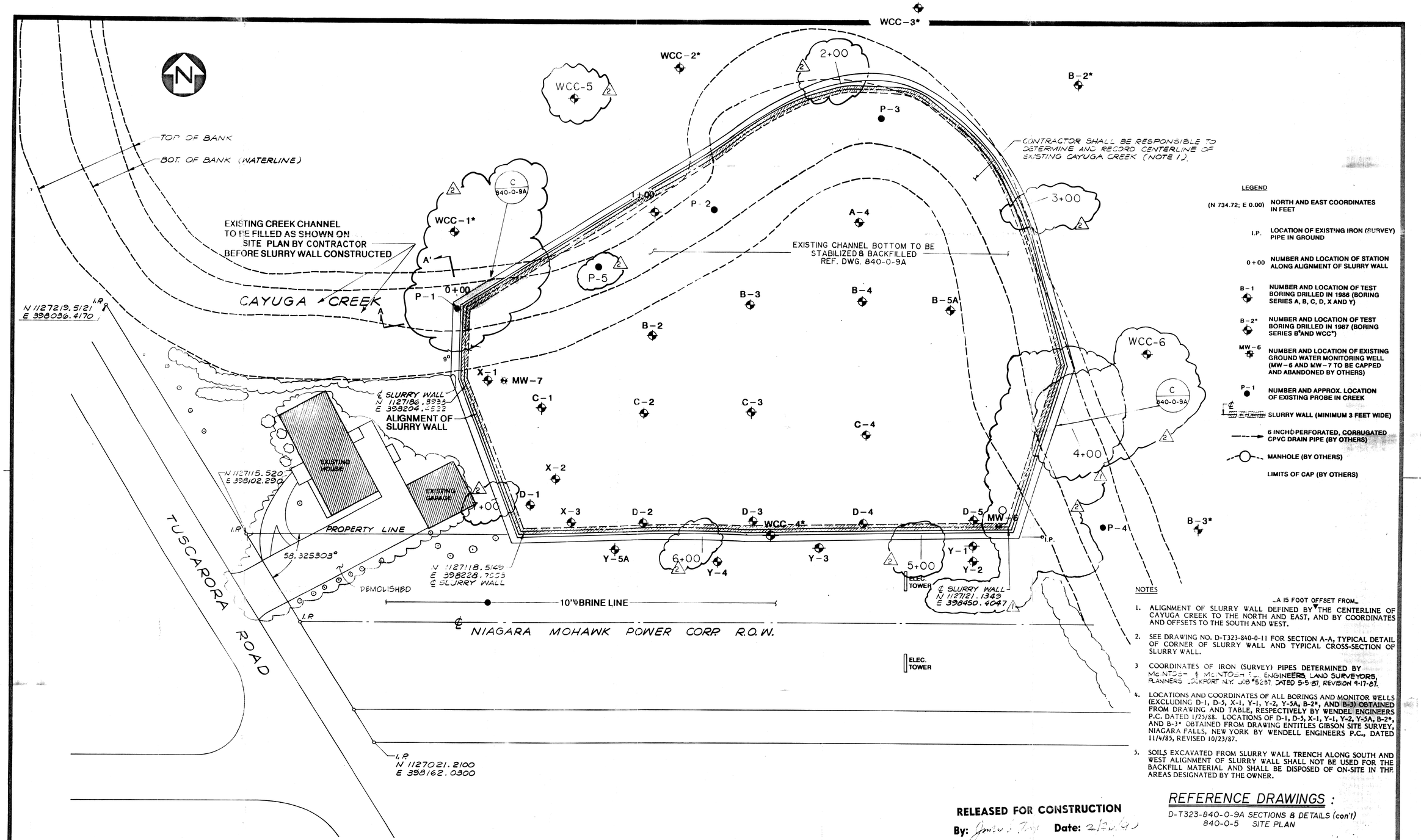

LEGEND

- (N 734.72; E 0.00) — NORTH AND EAST COORDINATES IN FEET
- I.P. — LOCATION OF EXISTING IRON (SURVEY) PIPE IN GROUND
- 0+00 — NUMBER AND LOCATION OF STATION ALONG ALIGNMENT OF SLURRY WALL
- B-1 — NUMBER AND LOCATION OF TEST BORING DRILLED IN 1986 (BORING SERIES A, B, C, D, X AND Y)
- B-2* — NUMBER AND LOCATION OF TEST BORING DRILLED IN 1987 (BORING SERIES B* AND WCC*)
- MW-6 — NUMBER AND LOCATION OF EXISTING GROUND WATER MONITORING WELL (MW-6 AND MW-7 TO BE CAPPED AND ABANDONED BY OTHERS)
- P-1 — NUMBER AND APPROX. LOCATION OF EXISTING PROBE IN CREEK
- SLURRY WALL (MINIMUM 3 FEET WIDE)
- 6 INCH ϕ PERFORATED, CORRUGATED CPVC DRAIN PIPE (BY OTHERS)
- MANHOLE (BY OTHERS)
- LIMITS OF CAP (BY OTHERS)

NOTES

...A IS FOOT OFFSET FROM...

1. ALIGNMENT OF SLURRY WALL DEFINED BY THE CENTERLINE OF CAYUGA CREEK TO THE NORTH AND EAST, AND BY COORDINATES AND OFFSETS TO THE SOUTH AND WEST.
2. SEE DRAWING NO. D-T323-840-0-11 FOR SECTION A-A, TYPICAL DETAIL OF CORNER OF SLURRY WALL AND TYPICAL CROSS-SECTION OF SLURRY WALL.
3. COORDINATES OF IRON (SURVEY) PIPES DETERMINED BY MCINTOSH & MCINTOSH P.C. ENGINEERS, LAND SURVEYORS, PLANNERS LOCKPORT N.Y. JOB #5287 DATED 5-5-87, REVISION 9-17-87.
4. LOCATIONS AND COORDINATES OF ALL BORINGS AND MONITOR WELLS (EXCLUDING D-1, D-5, X-1, Y-1, Y-2, Y-5A, B-2*, AND B-3) OBTAINED FROM DRAWING AND TABLE, RESPECTIVELY BY WENDEL ENGINEERS P.C. DATED 1/23/88. LOCATIONS OF D-1, D-5, X-1, Y-1, Y-2, Y-5A, B-2*, AND B-3* OBTAINED FROM DRAWING ENTITLES GIBSON SITE SURVEY, NIAGARA FALLS, NEW YORK BY WENDELL ENGINEERS P.C., DATED 11/4/85, REVISED 10/23/87.
5. SOILS EXCAVATED FROM SLURRY WALL TRENCH ALONG SOUTH AND WEST ALIGNMENT OF SLURRY WALL SHALL NOT BE USED FOR THE BACKFILL MATERIAL AND SHALL BE DISPOSED OF ON-SITE IN THE AREAS DESIGNATED BY THE OWNER.

RELEASED FOR CONSTRUCTION

By: [signature] Date: 2/24/88

REFERENCE DRAWINGS :

D-T323-840-0-9A SECTIONS & DETAILS (con't)
840-0-5 SITE PLAN

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
3	AS-BUILT	MAW	DEC. 1990	GJM	GBH
2	REVISE SLURRY WALL LOCATION, ADD BORINGS AND DETAILS WHERE SLURRY WALL X-SES EX. CHAN.	DNA	FEB 1990	2/24/90	GBH
1	REVISE S.E. CORNER OF CAP & STATIONING	LWW	MAR 1988		GBBS/19/88
0	ISSUED FOR CONSTRUCTION	BAL	MAY 1988		GBH

DRAWN DATE 1 FEB 1988
CHECKED DATE 1 FEB 1988
APPROVED

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION

SLURRY WALL PLAN

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		1" = 20'	D-T323-840-0-10	3

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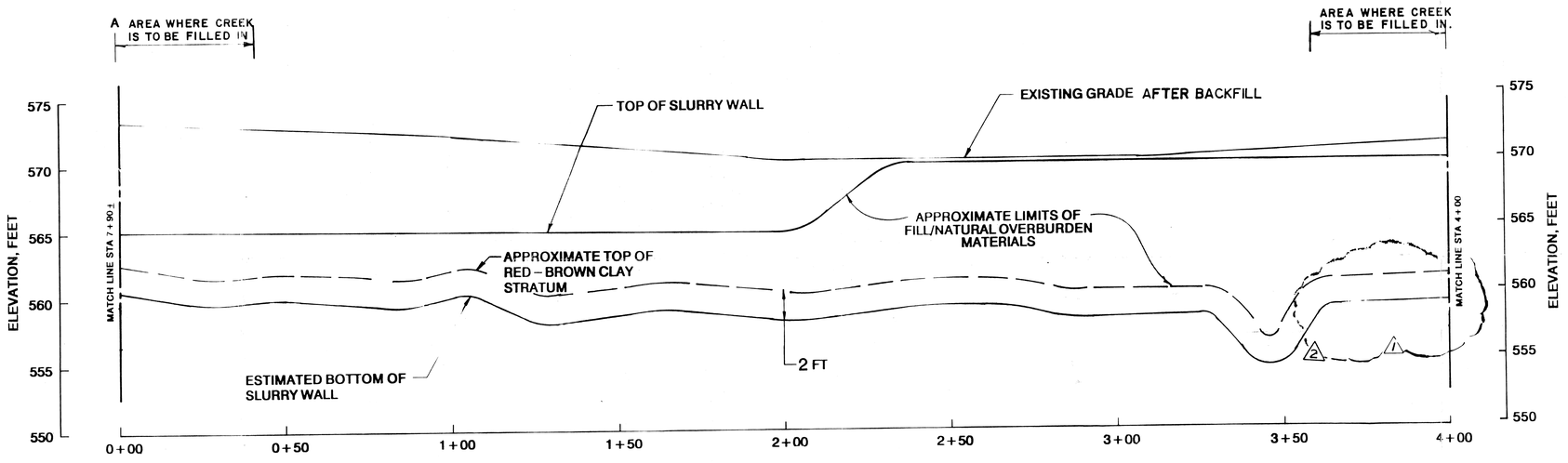
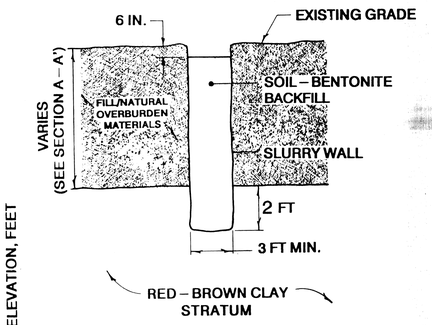
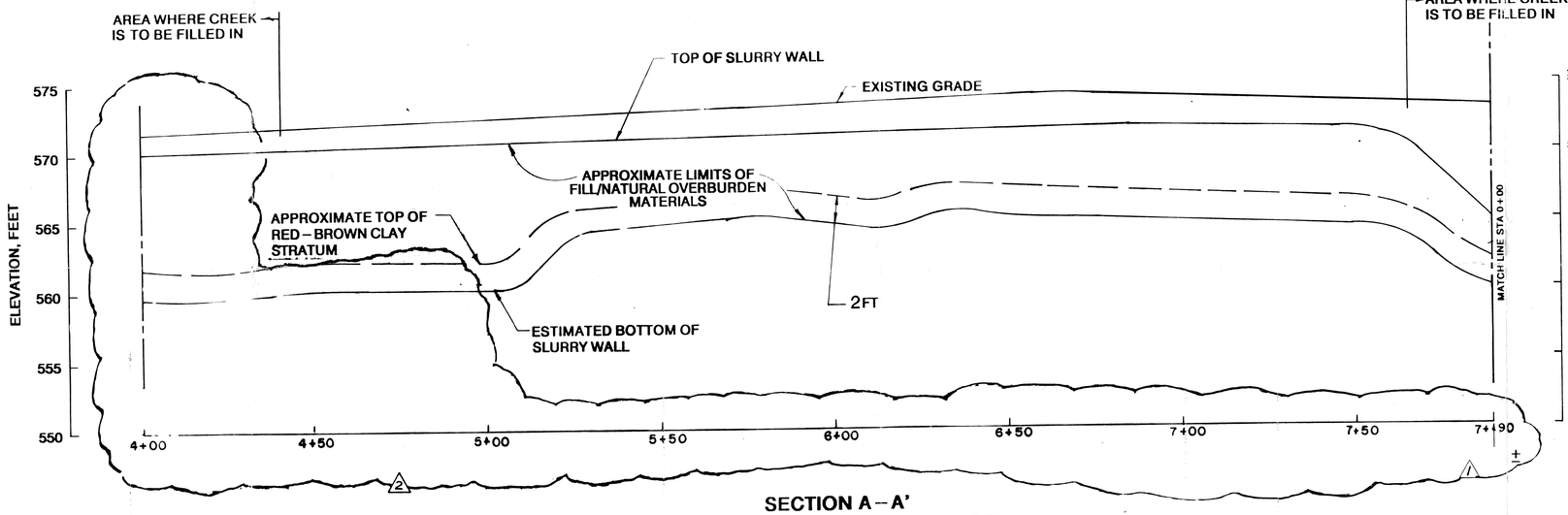


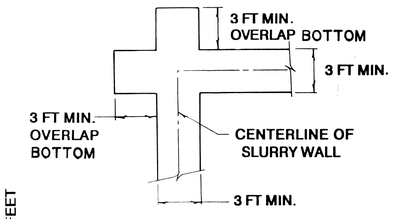


TYPICAL CROSS SECTION OF SLURRY WALL

NOT TO SCALE



SECTION A – A'
PROFILE ALONG ALIGNMENT OF SLURRY WALL



PLAN VIEW
TYPICAL DETAIL OF CORNER OF SLURRY WALL

0 5 10 FT
SCALE

NOTES:
1. SEE DRAWING NO. D – T323 – 840 – 0 – 10 FOR LOCATION OF SECTION A – A'
2. APPROXIMATE TOP OF RED – BROWN CLAY STRATUM ALONG ALIGNMENT OF SLURRY WALL IS INFERRED FROM BORINGS IN THE VICINITY OF BUT NOT NECESSARILY ALONG THE ALIGNMENT OF THE WALL. THE ACTUAL TOP OF THE RED – BROWN CLAY STRATUM MAY VARY FROM ITS ESTIMATED POSITION.
3. ELEVATIONS ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

0 5 10 FT
VERTICAL SCALE
0 20 40 FT
HORIZONTAL SCALE

RELEASED FOR CONSTRUCTION
By: [signature] Date: 2/26/90

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
3	AS-BUILT	MAW	DEC 1989	GJM	
2	REVISE PROFILE AND STATION MARKS	DNA	FEB 1990	2/14	
1	REVISE PROFILE AND STATION MARKS	LWW	MAR 1988		
0	ISSUED FOR CONSTRUCTION	RTL	MAY 1988		

DRAWN DATE 1 FEB 1988 RTL
CHECKED DATE 1 FEB 1988
APPROVED GBA 5/19/88

Olin

SLURRY WALL SECTIONS AND DETAILS

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		NOTED	D – T323 – 840 – 0 – 11	3

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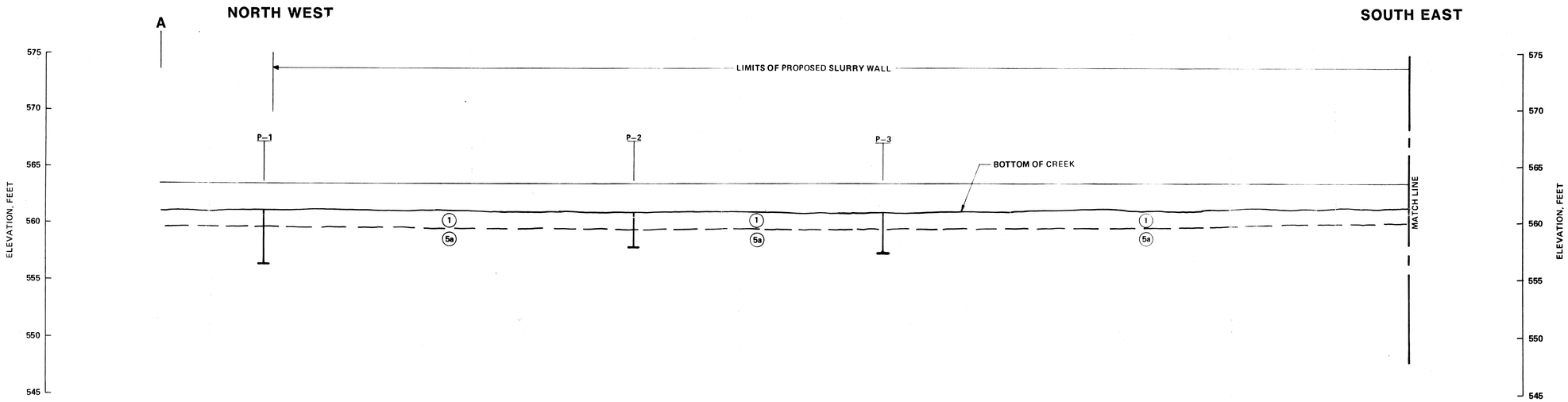
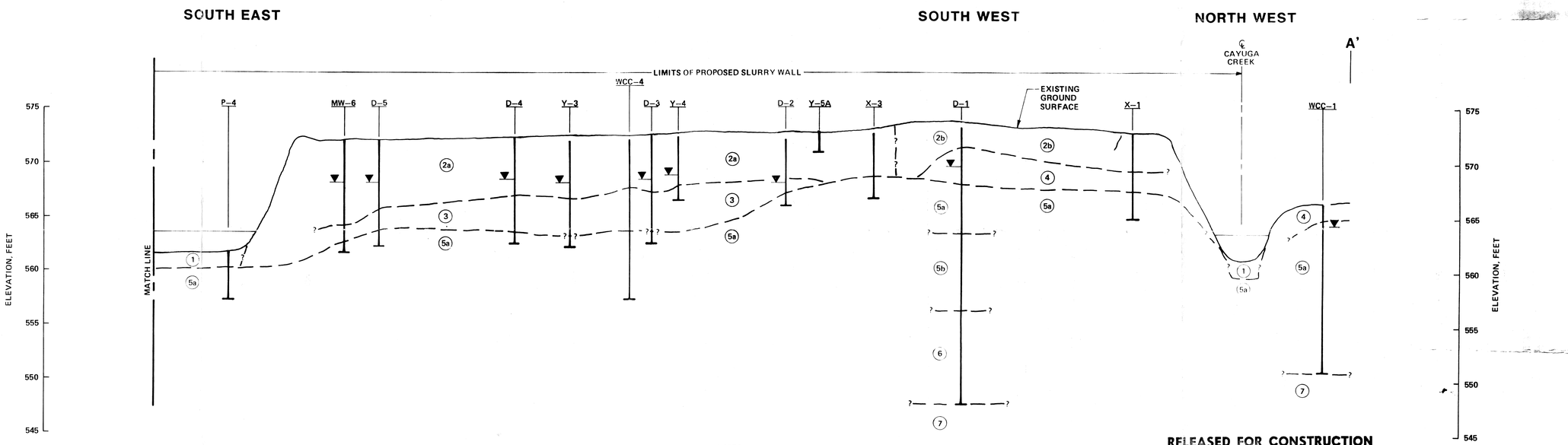
WOODWARD – CLYDE CONSULTANTS – 87C4676





LEGEND

- BOTTOM OF BORING / PROBE
- LOCATION OF GROUND WATER WHEN BORING WAS MADE
- D–5 LOCATION AND NUMBER OF BORING / PROBE
- WATER IN CREEK (LEVEL VARIES)

LEGEND (GENERALIZED SUBSURFACE STRATA)

1. CREEK SEDIMENTS: BROWN CLAY WITH SILT AND ORGANIC MATERIAL
2a. FILL: FLY ASH OR FLY ASH MIXED WITH SAND, CLAY OR MISCELLANEOUS DEBRIS
2b. FILL. BROWN AND GRAY CLAYEY SILT/SILTY CLAY
3. GRAY TO DARK GRAY CLAYEY SILT AND ORGANIC CLAYEY SILT
4. BROWN SILTY CLAY AND CLAYEY SILT
5a. RED – BROWN SILTY CLAY
5b. BROWN SILTY CLAY
6. BROWN SILTY GRAVELLY SAND
7. BEDROCK (DRILLING REFUSAL)

NOTES:

1. SEE FIGURE 2 FOR LOCATION OF SECTION A – A'.
2. SUBSURFACE PROFILE IS INTENDED AS AN AID IN VISUALIZING THE CONTINUITY OF THE STRATA. STRATA BOUNDARIES ARE BASED ON EXTRAPOLATION OF DATA FROM BORINGS AND PROBES AND ARE APPROXIMATE. VARIATIONS IN THE LOCATIONS OF BOUNDARIES MUST BE ANTICIPATED.
3. BORING AND PROBE LOCATIONS SHOWN IN SECTION A – A' ARE LOCATED IN THE VICINITY BUT NOT NECESSARILY ON THE ALIGNMENT OF THE SLURRY WALL.
4. SOIL DESCRIPTIONS ARE GENERALIZED. REFER TO BORING AND PROBE LOGS FOR DESCRIPTIONS OF INDIVIDUAL SAMPLES.
5. SEE FIGURE 2 FOR GROUND SURFACE ELEVATIONS AT BORINGS AND PROBES. ELEVATIONS ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929.

RELEASED FOR CONSTRUCTION

By: [illegible] Date: 2/26/90

0 5 10 FT
VERTICAL SCALE

1 DELETE HORIZONTAL SCALE FEB 1990 DNA

Olin
S.E.E.
NIAGARA PLANT

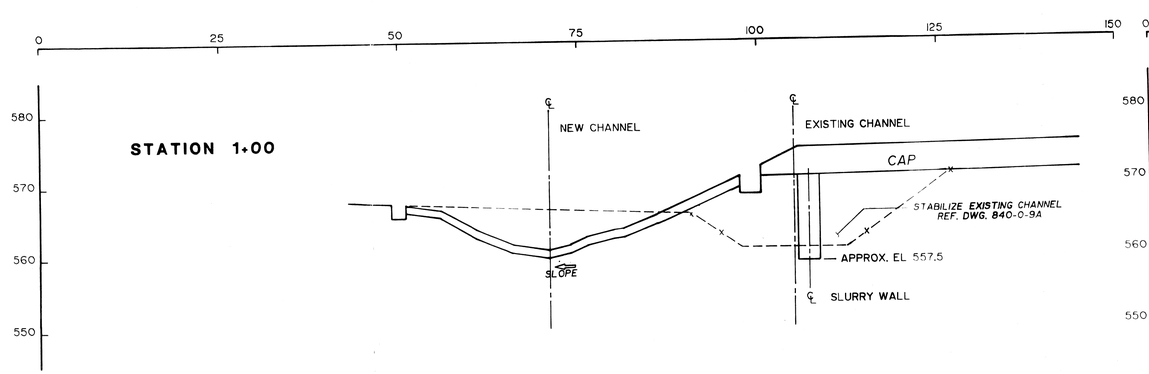
PROJECT NO.	C.A.R. NO.	SCALE
T323		NOTED

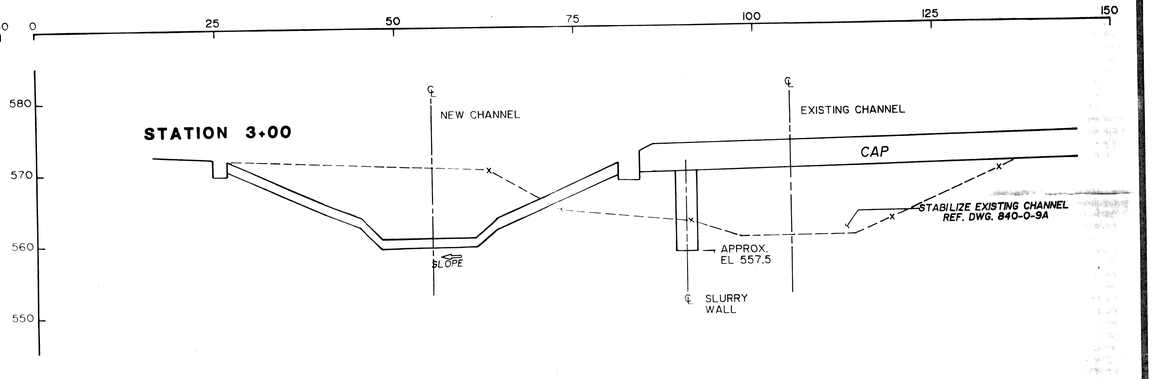
DRAWING NUMBER: D-T323-840-0-12 REV. 1

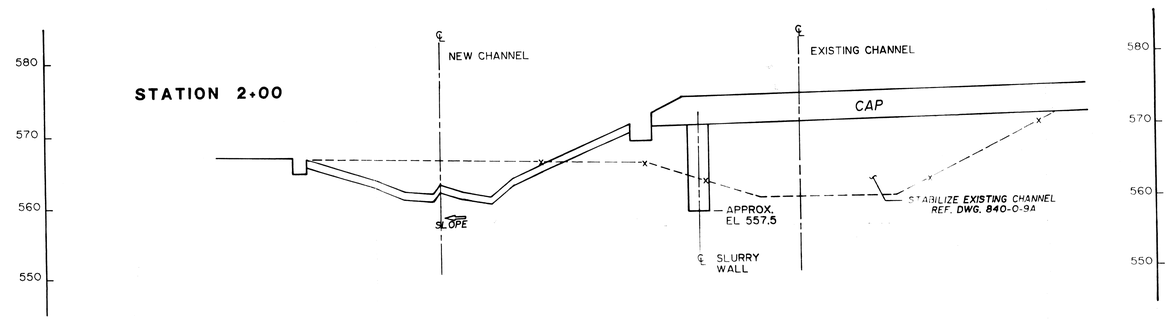
SECTION A-A'
GENERALIZED SUBSURFACE PROFILE ALONG ALIGNMENT OF PROPOSED SLURRY WALL
GIBSON SITE
NIAGARA FALLS, NEW YORK

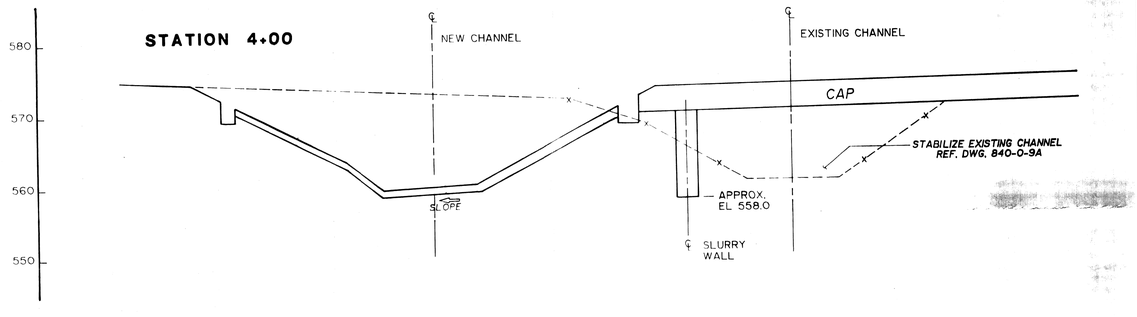
WOODWARD-CLYDE CONSULTANTS, INC.
CONSULTING ENGINEERS, GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS
NEW YORK, NEW YORK

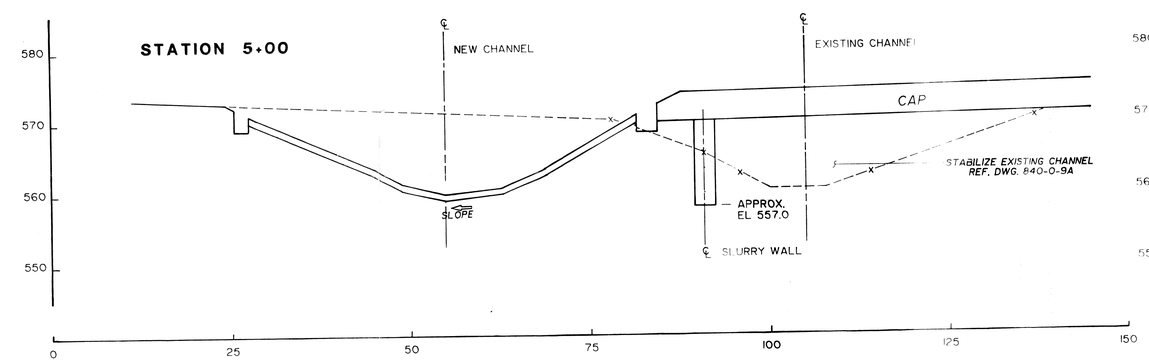
DR. BY:	BAS	SCALE:	AS SHOWN	PROJ. NO.:	87C4678
CK'D. BY:	ALH	DATE:	2 MAR 1988	FIG. NO.:	3

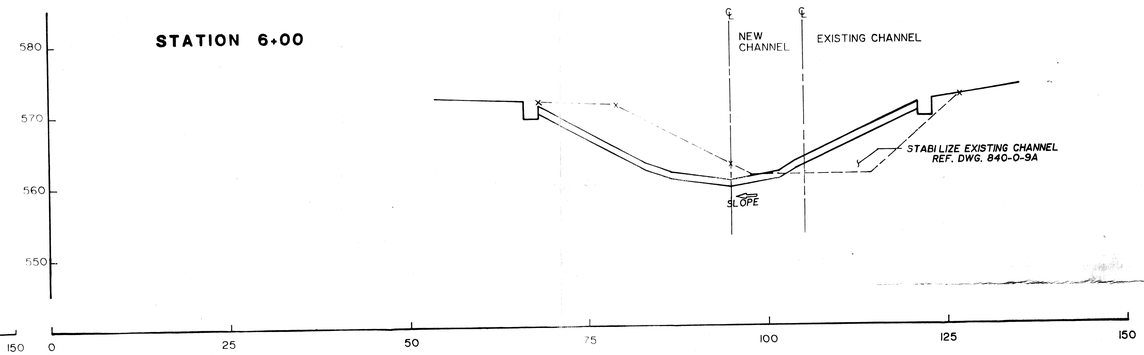












RELEASED FOR CONSTRUCTION
By: Jared Fry **Date:** 2/26/90

NOTE: This drawing is merely a construction aid. Elevations and distances are approximate. The contractor is responsible for new channel and slurry wall alignment as noted on dwg 840-0-5, 7, 10.

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
1	AS-BUILT	MAW	JAN 1991	1/11/91	DJM
0	ADD SHEET	DG	FEB 1990	2/26/90	GEH

DRAWN DATE 2/14/90
CHECKED DATE
APPROVED GEH 2-23-90

Olin

P & T REMEDIATION

CROSS SECTIONS OF NEW CHANNEL

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
T323		1" = 10'	D-T323-840-0-13	1

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REPUTED OWNER
GORDON & DOROTHY R. SCHUL
L-921, P-392

583.34'

REPUTED OWNER
ESTATE OF CASIMER NEIMEL
ESTATE OF EDWARD NEIMEL
FLORENCE HARAK & RICHARD NEIMEL
SEE L-1352, P-510
(UNDER CONTRACT TO BE PURCHASED BY OLIN CORPORATION)

PROPOSED ℄

1,127,333.80
398,419.35
S-69°-38'-06"-E
8.08
1,127,330.99
398,426.92
S-58°-59'-13"-E
7.96
1,127,326.89
398,433.74
S-44°-53'-39"-E
7.67
1,127,321.46
398,439.15
S-38°-02'-30"-E
7.24
1,127,315.76
398,443.61
S-32°-19'-42"-E
6.77'
1,127,310.04
398,447.23
S-22°-59'-50"-E
15.31'
1,127,295.95
398,453.21

0.328±Ac.

CAYUGA CREEK

570
267.9'
N-57°-07'-45"-E
℄ FORMERLY BANK OF CAYUGA CREEK

S-16°-40'-59"-E
69.93'

TOWN OF NIAGARA
CITY OF NIAGARA FALLS

1,127,209.39
398,484.16
S-08°-26'-22"-E
15.20'
1,127,194.36
398,486.39
S-01°-31'-29"-E 7.89'
1,127,186.47
398,486.60
S-10°-24'-43"-W
8.13'
1,127,178.47
398,485.13

1,127,188.39
398,194.33

REPUTED OWNER
OLIN CORPORATION
L-2071, P-195
(FORMER BATROUNY LANDS)
0.637± Ac.

0.026±Ac

S-89°-19'-22"-W
254.3'
244.21
S-89°-00'-35"-W
433.20'

S-12°-00'-45"-W
0.90'

1,127,119.02
398,472.48
S-69°-11'-31"-W
8.78'

1,127,115.90
398,464.27

N-18°-34'-09"-W
5.50

1,127,111.68
398,220.10

REPUTED OWNER
NIAGARA MOHAWK POWER CORPORATION

APPROXIMATE LOCATION OF

CITY OF NIAGARA FALLS

TUSCARORA ROAD (49.5' WIDE)

N 1,127,400
N 1,127,200
N 1,127,000
E 398,000
E 398,200
E 398,400

TOTAL AREA CAPPED & ENCLOSED WITH WOOD STOCKADE FENCE
0.991±Ac.

NOTE: IN ACCORDANCE WITH APPLICABLE PROVISIONS OF 6 NYCRR SECTION 373-3.7, OLIN CORPORATION WILL MAINTAIN THIS UNIT AND WILL NOT PERMIT DISTURBANCE OF THE FINAL COVER, LINER(S) OR OF ANY REQUIRED MONITORING SYSTEM, EXCEPT AS PROVIDED UNDER APPLICABLE REGULATIONS.

SEE TOPOGRAPHIC MAP PREPARED BY McINTOSH & McINTOSH, P.C., JOB NO. 5237-A, DATED NOVEMBER 16, 1990

BEING PART OF LOT-5, TWP.-13, R-9, HOLLAND PURCHASE

LEGEND

SITE BENCHMARK: NORTHWEST FLANGE BOLT OF HYDRANT AT NORTHEAST CORNER OF TUSCARORA ROAD & NIAGARA FALLS BLVD.
ELEVATION = 576.69

NOTE: COORDINATE SYSTEM - NEW YORK STATE PLANE COORD. SYSTEM - WEST ZONE
ELEVATIONS BASED ON NGVD 1929

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RESURVEY	REVISION

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY MAP IS A VIOLATION OF SECTION 7209 PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW

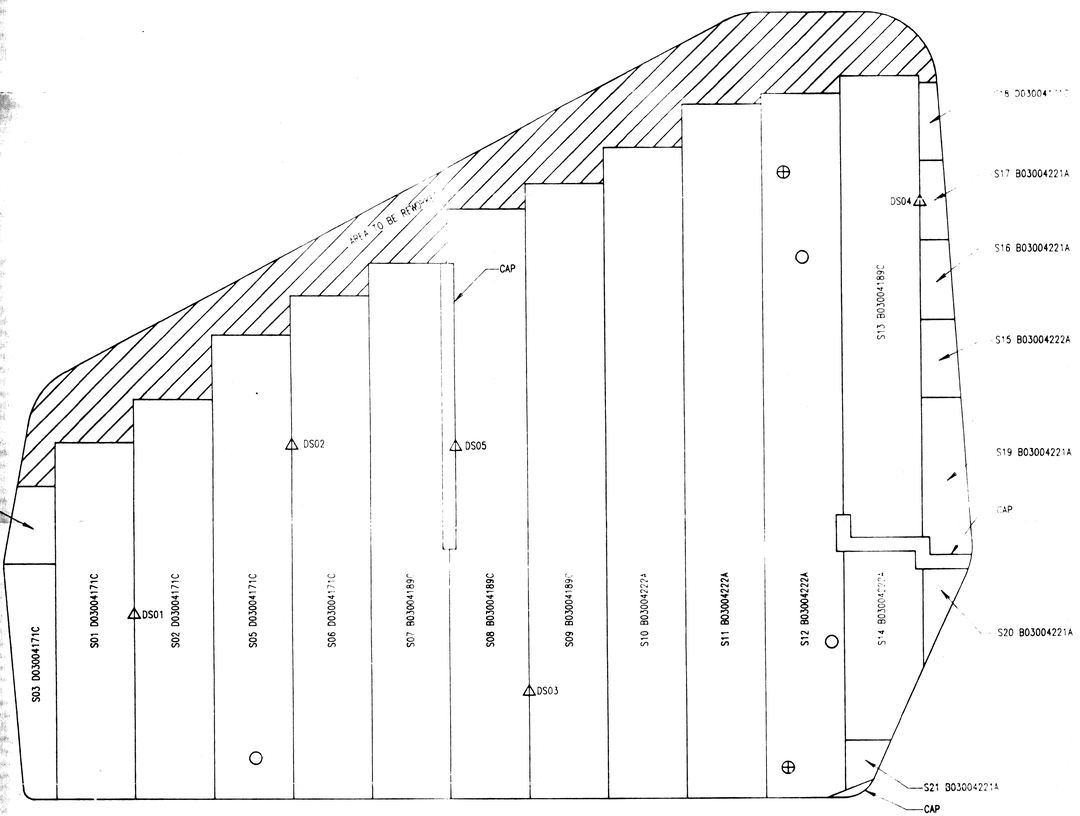
McINTOSH & McINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
LOCKPORT, NEW YORK PHONE 434-9138
BUFFALO, NEW YORK PHONE 625-8360

ENCLOSURE SURVEY MAP OF THE GIBSON SITE - OLIN CORP.

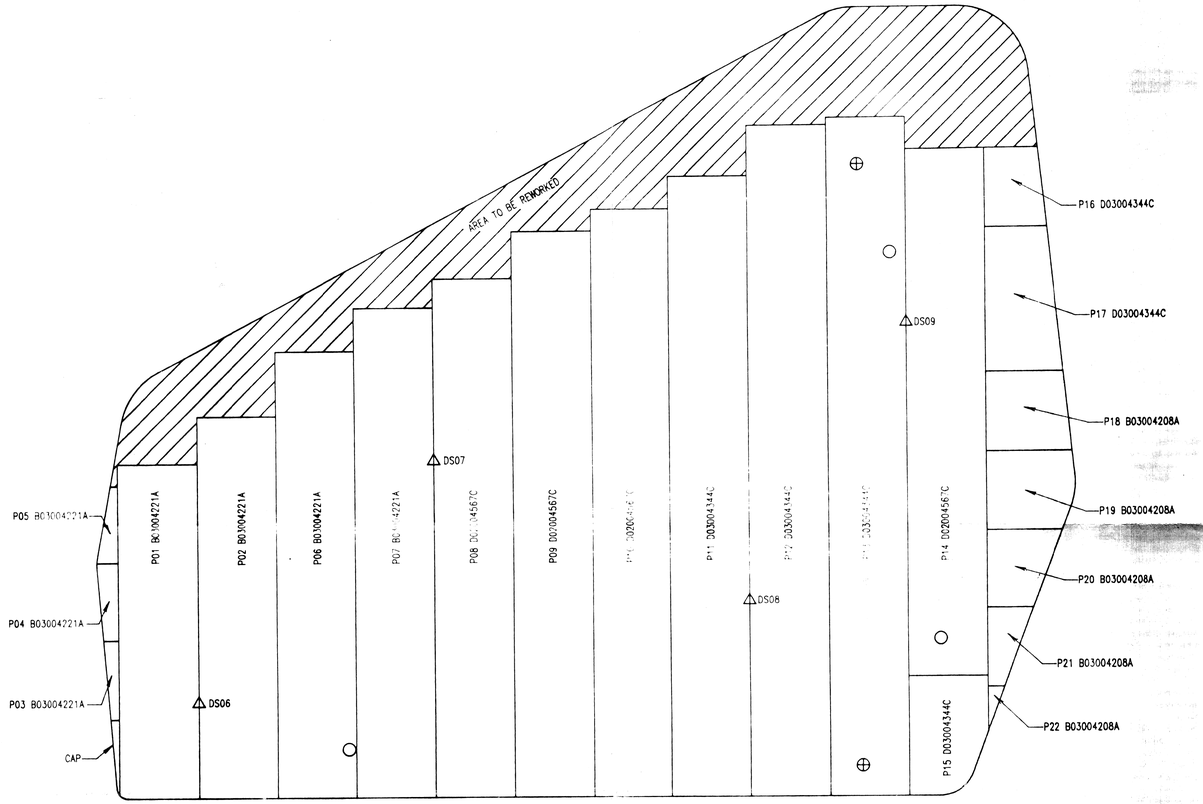
LOCATION CITY OF NIAGARA FALLS & TOWN OF NIAGARA, NIAGARA COUNTY, NEW YORK

JOB No. 5237-B	SCALE: 1" = 30'	DATE: NOVEMBER 16, 1990

DRAWN D.D.
COMP.
DESC.
CHECKED



SECONDARY LINER



PRIMARY LINER

LEGEND

0200XXXX	= PANEL I.D. NO.
P01	= ROLL I.D. NO.
DS01	= DESTUCTIVE SAMPLE I.D. NO.
△	= DESTRUCTIVE SAMPLE LOCATION
⊕	= 42" MANHOLE PENETRATION
○	= 2" PIEZOMETER PENETRATION

NOTE:

1) THIS AS-BUILT IS FOR Q.C. PURPOSES ONLY. DO NOT SCALE FOR AREA TAKE-OFF. FOR LAB SAMPLES ONLY, USE SCALE 1"=20'-0"

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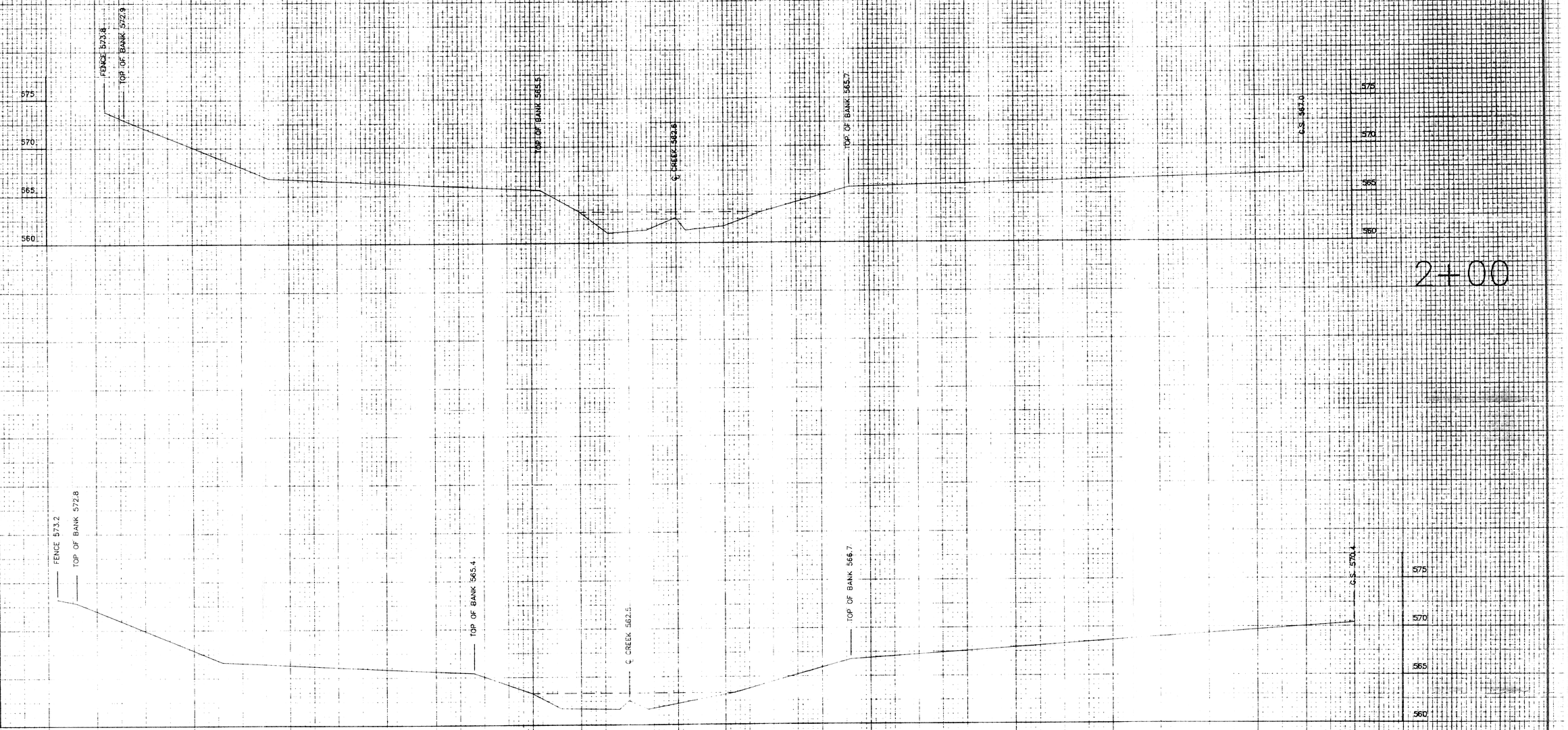
DATE	REV	DESCRIPTION	APPRV'D BY	BY

Gundle®
19103 GUNDLE ROAD
HOUSTON, TEXAS 77073

OWNER:	OLIN CHEMICAL NIAGARA FALLS, NY		
TITLE:	AS-BUILT DRAWING		
DATE: 12-10-90	APPRV'D BY: WK	DRAWN BY: JRB	REV.
SCALE: 1"=20'-0"	SHEET 1 OF 1	DRAWING No.	A053



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RESURVEY	REVISION
	CROSS SECTIONS REVISED JANUARY 7, 1991

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS SURVEY IS A VIOLATION OF SECTION 7209, PROVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

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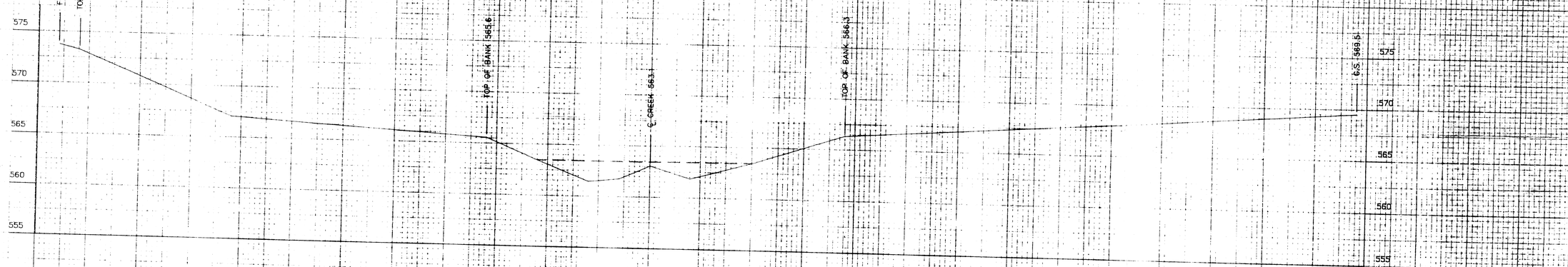
LOCKPORT, NEW YORK PHONE 434-9138
BUFFALO, NEW YORK PHONE 625-8360

CROSS SECTIONS FOR CAYUGA CREEK AT STATIONS 2+00 & 2+50

LOCATION CITY OF NIAGARA FALLS & TOWN OF NIAGARA, NIAGARA CO., NEW YORK

DRAWN D.G.
COMP.
CHKD.
CHKD.

JOB No. 5237 SCALE 1" = 5' DATE NOVEMBER 16, 1990



2+25

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RESURVEY	REVISION

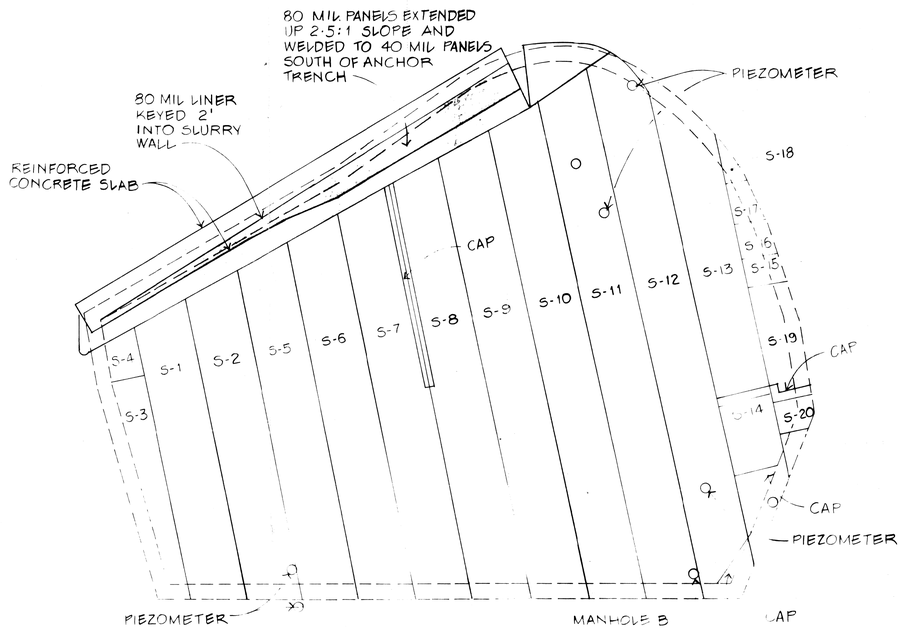
McINTOSH & McINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
LOCKPORT, NEW YORK PHONE 434-9138
BUFFALO, NEW YORK PHONE 625-836D

CROSS SECTIONS FOR CAYUGA CREEK AT STATIONS 2+25

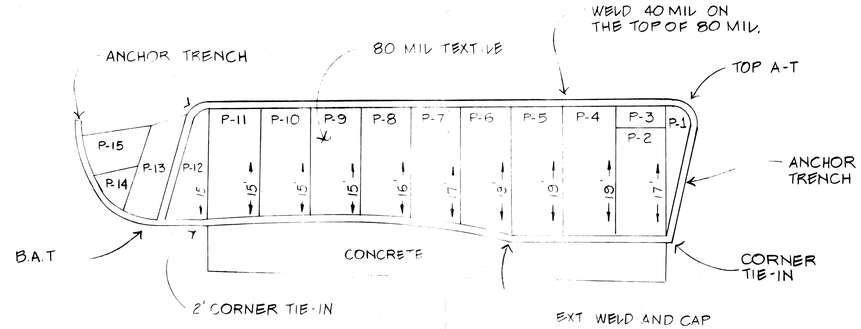
LOCATION CITY OF NIAGARA FALLS & TOWN OF NIAGARA, NIAGARA CO., NEW YORK

JOB No. 5237 SCALE: 1"= 5' DATE: JANUARY 7, 1991

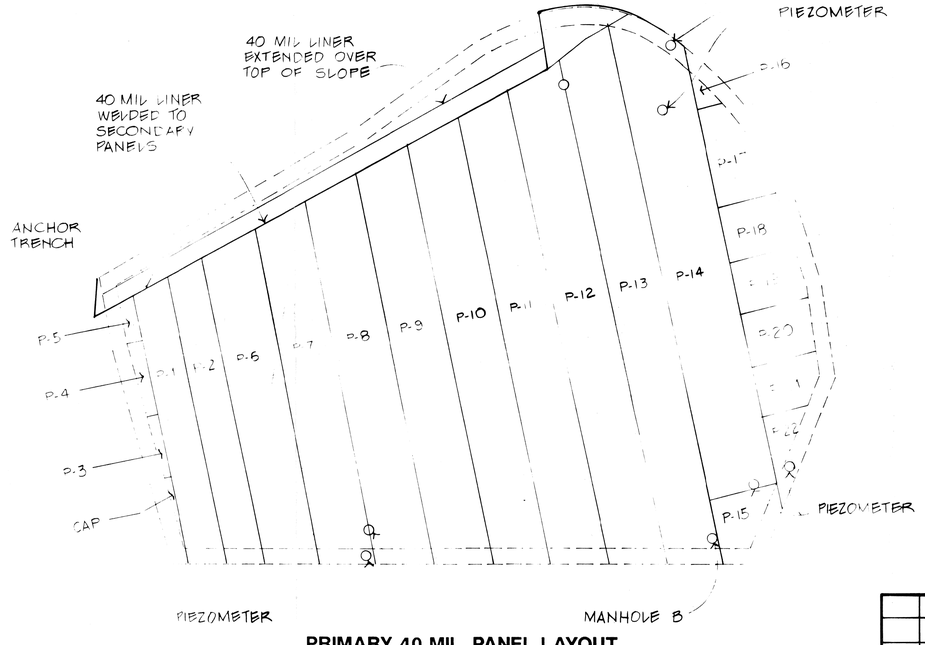
DRAWN LL
CHKD
DES'D
CHECKED



SECONDARY 40 MIL. PANEL LAYOUT



80 MIL. TEXTILE



PRIMARY 40 MIL. PANEL LAYOUT

REV.	DESCRIPTION	DRAWN	DATE	CHKD.	APPR.
0	AS-BUILT	MAW	12/90	GJM	GJM

DRAWN DATE 12/90
CHECKED DATE
APPROVED

Olin
S.E.E.
NIAGARA PLANT

P & T REMEDIATION
CAP LINER AS-BUILT
PANEL LAYOUT

PROJECT NO.	C.A.R. NO.	SCALE	DRAWING NUMBER	REV.
				0

APPENDIX F PERMITS

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

RECEIVED
P 0 1 1995
LORRAINE MILLER

August 28, 1995

RECEIVED
SEP 0 1 1995
LORRAINE MILLER

Ms. Lorraine Miller
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Dear Mrs. Miller,

The City has completed the review of your discharge permit application. Attached is a copy of your facilities discharge permit. Please note all condition, limitations and reporting requirements.

Please contact Mr. Joel Paradise at (716)286-4978 to arrange contact for monitoring and inspections at the site. Please also notify Mr. Paradise prior to initiating the discharge.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ/kkl

cc: W. Bolents
J. Paradise
File 45A

CITY OF NIAGARA FALLS
DEPARTMENT OF WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 45 OLIN CORPORATION - (CHARLES GIBSON SITE)

In accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code; Sewer Use Ordinance, as adopted by City Council on July 25, 1983; et seq. and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: OLIN CORPORATION

located at: CHARLES GIBSON SITE - 1505 TUSCARORA ROAD, NIAGARA FALLS, NY 14304

classified by SIC No(s): NONE

for the contribution of wastewater into the City of Niagara Falls Publicity-Owned Treatment Works (POTW).

Effective this 1ST day of SEPTEMBER, 1995

To Expire this 1ST day of SEPTEMBER, 2000

This permit modified _____

Robert E. Game
Director of Wastewater Facilities

Signed this 25th day of August 1995

DISCHARGE IDENTIFICATION

OUTFALL	DESCRIPTION	LOCATION	RECEIVING
MS # 1	Monitoring Site No. 1 (Manhole B)	1505 Tuscarora Road	Groundwater leachate from inactive hazardous waste landfill

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
A. Discharges to the City Sewer		
1. Identification of all discharges to the City Sewer System on a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED AUGUST 1, 1995
2. Identification of each contributing waste stream to each discharge to the City Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED AUGUST 1. 1995
3. Elimination of all uncontaminated discharges to the City Sewer System. All uncontaminated flows should be clearly identified on a current sewer map certified by a New York State licensed professional engineer.	NONE	
4. Establishment of a control manhole that is continuously and immediately accessible for each discharge to the City Sewer System.	NONE	ESTABLISHED AUGUST 1, 1995
B. Wastewater Discharge Management Practices		
1. Identification of responsible person(s) (day to day and in emergencies).	SUBMISSION REQUIRED	15 DAYS MINIMUM PRIOR INITIATING DISCHARGE
C. Slug Control Plan**		
1. Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the City will evaluate the permittee, a minimum	NONE	PERFORMED BY THE CITY

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
of once every two years for the need for a "Slug Control Plan". If a plan is required by the City then the plan shall contain, at a minimum, the following elements: a) Description of discharge practices, including non-routine batch discharges; b) Description of stored chemicals; c) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow-up written notification within five days; d) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site run-off, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.		
2. A written commitment from a responsible party of manpower, equipment and materials required to expeditiously control and remove any harmful quantity discharged.	SUBMISSION REQUIRED	30 DAYS AFTER EFFECTIVE DATE OF PERMIT

** This section applies to all compounds limited by the City's SPDES Permit and all prohibited wastewater discharges (See Section 250.5.1-A of the Sewer Use Ordinance)

D. General Wastewater Discharge Permit Conditions

1. Flow monitoring should be performed concurrently with any Wastewater Discharge Permit sampling and should be reported at the same time as analytical results. If it is not feasible to perform flow monitoring, an estimate of flow (method of estimated flow preapproved by city) should be submitted with the analytical results.

2. All sampling for billing and pretreatment compliance purposes shall be coordinated through the City's Industrial Monitoring Coordinator.

3. All analysis must be performed by a State certified laboratory using analytical methods consistent with 40 CFR 136 and quality control provisions as required by the City's Environmental Chemist. The permittee shall report the results as directed in Section G of this permit. Results should be reported using the Method Detection Limit (MDL). Reporting results less than MDL shall be indicated in the report by a less than sign (<) followed by the numeric MDL concentration reported by the laboratory. In these cases the pollutant load shall be calculated and reported as zero (0). The MDL shall be defined as the level at which the analytical procedure referenced is capable of determining with a 99% probability that the substance is present. The value is determined in reagent water. The precision at this level is +/- 100%.

4. An estimate of relative production levels for wastewater contributing processes at the time of any pretreatment compliance sampling shall be submitted upon request of the Director of Wastewater Facilities.

5. All samples shall be handled in accordance with EPA approved methods. Chain of Custody records shall be submitted with all sampling results.

6. All conditions, standards and numeric limitations of Section 250 of the Sewer Use Ordinance are hereby incorporated into this permit by reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said ordinance constitutes a violation and is subject to enforcement actions(s) described in Section 250.9 of said ordinance, and in the City's Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide". In the event of a violation, including slug discharges or spills, the City must be notified immediately by phone and confirmed by letter within five (5) working days.

7. In accordance with Federal Regulation CFR 40, Part 403.12(g), any exceedance of a numeric standard noted by the SIU must be re-sampled, analyzed and resubmitted to the City's Wastewater Facilities (WWF) within 30 days.

8. Sampling frequency for any permitted compounds may be increased beyond the requirements set forth in Section F and G of this permit. If the permittee monitors (sample and analysis) more frequent than required under this permit, <u>all</u> results of this monitoring must be reported.

9. As noted in Section 250.6.2 of the Sewer Use Ordinance, "Personnel as designated by the Director shall be permitted at any time for reasonable cause to enter upon all properties served by the City WWF for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Ordinance."

10. As noted in Section 250.5.3 of the Sewer Use Ordinance, significant changes in discharge characteristics or volume must be reported immediately to the WWF.

11. As noted in Section 250.5.4 of the Sewer Use Ordinance, samples required to be collected via a 24 hour composite sampler must be retained refrigerated for an additional 24 hour plus unrefrigerated an additional 48 hours (total 72 hours).

12. As noted in Section 250.5.4 of the Sewer Use Ordinance, all "SIU's shall keep on file for a minimum of 5 years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the WWF."

13. As noted in Section 250.6.8 of the Sewer Use Ordinance, "Permits are issued to a specific user for a specific monitoring station. A permit shall not be reassigned or transferred without the approval of the Director which approval shall not be unreasonably withheld. Any succeeding owner or user to which a permit has been transferred and approved shall also comply with all the terms and conditions of the existing permit."

14. The Annual Average Limitation is equivalent to the specific SIU allocation, and shall be defined as the permissible long term average discharge of a particular pollutant. These limitations are listed in Section F of this permit. The computation of the Annual Average shall be as follows; for each compound listed in Section G of this permit, the Annual Average shall be the average of the present monitoring quarter and three previous quarters data.

15. The Daily Maximum Limitation shall be defined as the maximum allowable discharge on any one day. The Daily Maximum Limitation will allow for periodic short term discharge fluctuations. These specific limitations are listed in Section F of this permit.

16. Enforcement of the Annual Average Limitation shall be based on the reported average of the last four quarters data vs the Annual Average Limited listed in Section F of this permit. Enforcement of the Daily Maximum Limitation shall be based on individual analysis results vs. the Daily Maximum Limit listed in Section F of this permit. These results may be obtained from self monitoring (Section G), City Verification, incident investigation or billing samples.

17. The City's Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the City WWF SPDES Permit. The limits defined in the procedure are values which are based on the quantity of substances discharged which can be easily related to the Treatment Plant's removal capacity.

    The pollutants listed in this procedure which are <u>not</u> specifically listed in Section F and G of this permit may be present in the permittee's wastewater discharge, but at levels which do not require specific permit limitations. Consequently, if any of the limits listed in this procedure, for pollutants <u>not</u> identified in Section F and G of this permit, are exceeded then the permittee shall undertake a short-term, high intensity monitoring program for that pollutant. Samples identical to those required for routine monitoring purposes shall be collected on each of at least three operating

days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the limit was first exceeded.

If levels higher than the limit are confirmed the permit may be reopened by the City for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

Sewer Use billing for Flow, TSS, SOC and any other billable pollutants detected in the permittee's discharge shall be based on quarterly self monitoring report data and City's verification analysis.

2. Flow Measurement and Sample Collection:

a. The estimated volume to be discharged is approximately 200 gallons per day. This flow shall be continuously monitored by a flow measurement system installed in Manhole "B" (MS # 1) as identified on the attached site map. The daily flow as well as average monthly flow shall be reported in the Quarterly Self Monitoring Report.

b. Samples shall be collected during discharge at MS # 1 as required in this permit. The results shall be reported in the permittee's Quarterly Self Monitoring Report.

F. Discharge Limitations & Monitoring Requirements

During the Period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) shall be limited and monitored by the permittee as specified below.

OUTFALL NUMBER/ EFFLUENT PARAMETER	DISCHARGE LIMITATIONS ANNUAL AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM MONITORING REQUIREMENTS MEASUREMENT FREQUENCY	SAMPLE TYPE
MS # 1 Flow	350	500	gal / day	Continuous	By Flow Meter
MS # 1 Total Suspended Solids	100	200	lbs / day	1 / Quarter	1 - Grab Sample
MS # 1 Soluble Organic Carbon	25	50	lbs/ day	1 / Quarter	1 - Grab Sample

F. Discharge Limitations & Monitoring Requirements con't

SAMPLE TYPE FOOTNOTES

(1) Sample shall consist of a laboratory composite of four grabs collected equally throughout the batch discharge period. A total of four samples (batches) will be analyzed and reported each quarter for each outfall.

(2) Sample shall consist of a 24 hour laboratory composite of four grab samples, one taken each six hours, collected for each outfall.

(3) Sample shall consist of a 24 hour flow proportion composite sample collected from each monitoring station.

(4) Flow will be monitored continuously via water meters.

(5) Sample shall consist of a 24 hour time proportion composite sample from each approved discharge monitoring point.

(6) Determination of quantities shall be derived from five 24 hour time proportion composite samples collected from each approved monitoring point.

(7) Same as (3), however, 5 samples will be collected per quarter from the monitoring station and analyzed by and at the City's expense.

G. Discharge Monitoring Reporting Requirements

During the period beginning the effective date of this permit and lasting until its expiration date, discharge monitoring results shall be summarized and reported by the permittee; Monthly - 14 days after monitoring period, Quarterly - by the last day of the monitoring period = February 28, May 31, August 31, November 30. Semiannual reports shall be submitted on the last day of the monitoring period = February 28, August 31. The annual average for each parameter listed in Section F, shall be computed and reported quarterly. The individual sample analysis for present quarter shall also be reported quarterly unless directed otherwise in this permit.

OUTFALL NO	PARAMETER	REPORTING FREQUENCY
MS # 1	Flow *	Quarterly
MS # 1	Total Suspended Solids	Quarterly
MS # 1	Soluble Organic Carbon	Quarterly

NOTE: * DAILY FLOW AND MONTHLY AVERAGE FLOWS SHALL BE REPORTED

H. Comments/Revisions

1.

FILE COPY

Olin CHEMICALS
P.O. BOX 248, 1186 LOWER RIVER ROAD NW, CHARLESTON, TN 37310
Phone: (423) 336-4000

June 12, 1996

Mr. Albert C. Zaepfel
Industrial Monitoring Coordinator
City of Niagara Falls
Department of Wastewater Facilities
Enforcement Division
1200 Buffalo Avenue
Niagara Falls, NY 14302-0069

RE: Charles Gibson Site
Olin Corporation
Wastewater Discharge Permit No. 45
Modified Permit - Intrajurisdictional Agreement

Dear Mr. Zaepfel:

Enclosed is the original signed Intrajurisdictional Agreement for Wastewater Discharge Permit No. 45 for the above referenced site.

Please call me at (423) 336-4381 with any questions or comments.

Sincerely,

OLIN CORPORATION

L. M. Miller
Sr. Associate Environmental Specialist

LMM394

cc: J. E. Reed
M. J. Hinton (NYSDEC)

bcc: J. W. Strassburg
D. L. Cummings

FILE COPY

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

April 18, 1996

RECEIVED
APR 22 1996
LORRAINE MILLER

Ms. Lorraine M. Miller
Sr. Environmental Associate Specialist
Olin Corporation
PO Box 248
1186 Lower River Road NW
Charleston TN 37310

Dear Ms. Miller:

As discussed with you in our recent phone conversation, enclosed are the modified pages of the permit for Olin's Charles Gibson Site. The changes reflect the need to include an intra jurisdictional agreement because the site is located outside of the City boundary.

Please have a "responsible corporate official" sign the agreement. Please also retain a copy for your files and send the original to me.

Sincerely,

DEPARTMENT OF
UTILITIES/WASTEWATER

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:vr
Encs.
cc: File 45 A
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CITY OF NIAGARA FALLS
DEPARTMENT OF WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 45 OLIN CORPORATION - (CHARLES GIBSON SITE)

In accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code; Sewer Use Ordinance, as adopted by City Council on July 25, 1983; et seq. and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: OLIN CORPORATION

located at: CHARLES GIBSON SITE - 1505 TUSCARORA ROAD, NIAGARA FALLS, NY 14304

classified by SIC No(s): NONE

for the contribution of wastewater into the City of Niagara Falls Publicity-Owned Treatment Works (POTW).

Effective this 1ST day of SEPTEMBER, 1995

To Expire this 1ST day of SEPTEMBER, 2000

This permit modified 4/10/96

William G. Bolents

William G. Bolents
Acting Director of Wastewater Facilities

Signed this 15th day of APRIL 1996

days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the limit was first exceeded.

If levels higher than the limit are confirmed the permit may be reopened by the City for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

Sewer Use billing for Flow, TSS, SOC and any other billable pollutants detected in the permittee's discharge shall be based on quarterly self monitoring report data and City's verification analysis.

2. Flow Measurement and Sample Collection:

a) The estimated volume to be discharged is approximately 200 gallons per day. This flow shall be continuously monitored by a flow measurement system installed in Manhole "B" (MS # 1) as identified on the attached site map. The daily flow as well as average monthly flow shall be reported in the Quarterly Self Monitoring Report.

b) Samples shall be collected during discharge at MS # 1 as required in this permit. The results shall be reported in the permittee's Quarterly Self Monitoring Report.

3. Intra-Jurisdictional Agreement

The permittee shall abide by the intra-jurisdictional agreement dated April 10, 1996 identified as Attachment No. 1

ATTACHMENT NO. 1

INTRA JURISDICTIONAL AGREEMENT

THIS AGREEMENT made and entered into as of the 10th day of April 1996, by and between the City of Niagara Falls, a municipal corporation duly established by law in the State of New York, hereinafter referred to as the "City," and business corporate signatories of this Agreement, hereinafter referred to as "User."

WITNESSETH:

WHEREAS, the United States Environmental Protection Agency, hereinafter referred to as "USEPA," established mechanisms and procedures for enforcing national pretreatment standards controlling the introduction of wastes from nondomestic sources into Publicly Owned Treatment Works (POTW's); and

WHEREAS, certain rules have been promulgated by the USEPA for the purpose of implementing those mechanisms and procedures; and

WHEREAS, the City has in operation, a POTW which must comply with the rules promulgated by the USEPA; and

WHEREAS, the rules mandate that the City control the contribution of pollutants to the POTW by each Industrial User to ensure compliance with the applicable pretreatment standards and requirements; and

WHEREAS, in compliance with those rules the City has established by Ordinance adopted July 30, 1984 et. seg., a permit system for the purpose of controlling industrial contribution to the POTW which must be complying with by the User; and

WHEREAS, the User desires to contribute industrial wastes into the City's POTW; and

WHEREAS, the source of the User's industrial waste is located in part or wholly outside the legal jurisdiction of the City and the City and User agrees that the User would not be bound by the City's Ordinance unless the User agreed to be so bound; and

WHEREAS, the User, in consideration of the privilege of contributing its industrial wastes to the City's POTW agrees:

1. To be bound and comply with the requirements of the City's Ordinance referred to in the preamble above;
2. To waive as a defense to any actions, civil or criminal by the City, arising out of the User's contributions to the City's POTW, the fact that the User and User's source are not entirely located within the jurisdiction of the City and its ordinances;
3. To comply with all requirements set forth in the approved wastewater discharge permit; and
4. To pay to the City all fees, costs, charges and expenses which are imposed upon the User in accordance with the requirements of the Ordinance or the permits and rate structure authorized by the ordinance; and
5. To the extent provided in the City's ordinance and the permit, and consistent with the procedures therein established, to promptly comply with any orders, directives or notices issued by the City relative to the User's contributions to the POTW including, but not limited to, suspending or reducing the User's quantity or composition

of the contributed industrial wastes when the City has determined the User to be in violation of the permit or if the safety of the public or the operation of the POTW is believed to be endangered.

IN WITNESS WHEREOF, the City and User have caused their respective corporate seals to be hereunto affixed and attested, and these presents to be signed by their respective officers thereunto duly authorized, and this Agreement to be dated as of the day and year first above written.

APPROVED:

USER: Olin Corporation - Charles Gibson Site
(Located on Tuscarora Road near Niagara Falls Blvd.)

BY: ADR Roseke

TITLE: Senior VP Corporate Affairs

FOR THE CITY OF NIAGARA FALLS:

BY: James C Galie
James C. Galie

TITLE: Mayor - City of Niagara Falls, NY

ATTEST:

Elsie M Paradise
Elsie M. Paradise
City Clerk

City of Niagara Falls, New York
P.O. Box 69, Niagara Falls, NY 14302-0069

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RECEIVED
SEP 20 1999
OLIN-ENVIRONMENTAL
REMEDIATION GROUP

September 14, 1999

Lorraine Miller
Olin Corporation
1186 Lower River Rd. N.W.
P.O. Box 248
Charleston, TN 37310

Dear Ms. Miller:

As you are aware on September 1st, 1995, a Significant Industrial User Permit No. 45 was issued for Olin Chemical's Charles Gibson Site. Since that time discharge data has been routinely collected. The results of the pollutant analysis indicates that very low loadings of pollutants are discharged.

Based on low flow and pollutant loading, the Charles Gibson Site no longer falls within the Federal Pretreatment definition for significant industrial user (SIU). Consequently, the site is reclassified as a commercial/small industrial/residential user (CSIRU). As such, the SIU Permit is no longer required and is hereby rescinded effective September 14, 1999. All monitoring and reporting requirements are terminated.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:rac

Cc J. Paradise
W. Bolents
K. Martineau
File: 45A
Semi-Ann. Report NYSDEC/USEPA

c B. Brayley

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APPENDIX G EXCAVATION WORK PLAN

APPENDIX G – EXCAVATION WORK PLAN (EWP)

The Site remedy does not allow for use other than the current use. Any future intrusive work that will penetrate, encounter or disturb the remaining contamination, and any modifications or repairs to the existing cover system will be performed in compliance with this EWP. Intrusive construction work must also be conducted in accordance with the procedures defined in a HASP and Community Air Monitoring Plan (CAMP) prepared for the Site. The 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 all other applicable Federal, State and local regulations. 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 below. Any intrusive construction work will be performed in compliance with the EWP, HASP and CAMP, and will be included in the periodic inspection reports submitted under the SM Reporting Plan (See SMP Section 7).

G-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. **Table 1.1** includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in **Appendix B** of the SMP**.**

Table G-1: Notifications*

Brian Sadowski, Regional Office NYSDEC Representative and Project Manager	716-851-7220; bpsadows@gw.dec.state.ny.us
Glenn May, NYSDEC Regional Manager	716-851-7220; glenn.may@dec.ny.gov
Olin Emergency Hotline	[phone]
Sevenson, Site Consultant	[phone]

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings 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 to be encountered 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 (HASP), in electronic format, if it differs from the HASP provided in **Appendix F** of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

G-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when 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.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further

discussion of off-site disposal of materials and on-site reuse is provided in **Section E-6** and **Section E-7** of this Appendix.

G-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay 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 impermeable tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Results of inspections will be recorded in a logbook and provided to the NYSDEC upon request.

G-4 MATERIALS EXCAVATION AND LOAG-OUT

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

The owner of the property and remedial party (if applicable) and its contractors are 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).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before

leaving the site until the activities performed under this section are complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

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.

G-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.

Truck transport routes will be identified that will (a) limit transport through residential areas and past sensitive sites; (b) use city-mapped truck routes; (c) minimize off-site queuing of trucks entering the facility; (d) limit total distance to major highways; (e) promote safety in access to highways; and (f) promote 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.

G-6 MATERIALS DISPOSAL OFF-SITE

Material excavated and removed from the site will 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 material 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 debris recovery 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, consistent with 6NYCRR Parts 360through 365. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State C&D debris recovery facility (6NYCRR Subpart 361-5 registered or permitted facility).

G-7 MATERIALS REUSE ON-SITE

Chemical criteria for on-site reuse of material have not been identified for this 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 reuse on-site will be

placed below the demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

G-8 FLUIDS MANAGEMENT

Liquids to be removed from the site, including excavation dewatering 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, and will be managed off-site, unless prior approval is obtained from NYSDEC.

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.

G-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored to the pre-excavation conditions as shown in the As-Built drawings. The existing cover system is comprised of 2 feet of compacted clay, a double HDPE flexible membrane layer, two layers of geotextile filter fabric, 18 inches of clean structural fill, and 6 inches of seeded topsoil. The demarcation layer, consisting of geotextile filter fabric will be replaced to provide a visual reference to the top of the remaining contamination zone, the zone that requires adherence to special conditions for disturbance of remaining contaminated soils defined in this SMP. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

G-10 BACKFILL FROM OFF-SITE SOURCES

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. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

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). Based on an evaluation of the land use, protection of groundwater and protection of ecological resources criteria, the resulting soil quality standards are listed in **Table 4.5** of the Site Management Plan. 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 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.

G-11 STORMWATER POLLUTION PREVENTION

If soil excavation is implemented, barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and available for inspection by the NYSDEC. Necessary repairs shall be made immediately.

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

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.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

G-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities 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 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 Review Report.

G-13 COMMUNITY AIR MONITORING PLAN

A CAMP will be prepared for proposed excavation activities at the Site and submitted to the NYSDEC for review and approval prior to commencement of work. This CAMP will include a map showing the location of air sampling stations based on generally prevailing wind conditions. Monitoring 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.

G-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. 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 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 remedial party'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; and (c) 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.

G-15 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 though the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon 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.

APPENDIX H OPERATIONS AND MAINTENANCE MANUAL

OPERATION & MAINTENANCE MANUAL
GIBSON SITE

Olin Corporation
Environmental Remediation Group
Charles Gibson Site
Niagara Falls, New York

Revised August 2019

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1 Introduction

This Operations and Maintenance (O&M) Plan was prepared for Olin Corporation (Olin) for use at the Charles Gibson Site (Site). Included are specific O&M procedures for Olin and Olin subcontractors for:

- general maintenance and security;
- cap maintenance;
- groundwater and creek sediment sampling;
- sample analysis;
- health and safety; and
- emergencies

1.1 Location

The Charles Gibson Site is located approximately four miles east of downtown Niagara Falls, New York. The Site comprises an area of approximately two acres of land in Niagara County bordered on the south by private property, on the west by Tuscarora Road and on the north and east by Cayuga Creek. The Site has also been referred to as the Pine (Avenue) and Tuscarora (Road) Site as the definition of the Site previously included the private property to the south. This private property and the Site proper is collectively bounded to the west by Tuscarora Road and to the south by Pine Avenue (also known as Niagara Falls Boulevard outside the city limits). Figure 1.1 shows the location of the Site and its current boundary. Figure 1.2 presents an aerial photograph of the Site. Figure 1.3 shows the Site Plan. Plan 1 is a current topographic and boundary survey of the Site.

1.2 Land Use

The Site is located in a commercial/residential area of eastern Niagara Falls, New York. Land use in the area along Niagara Falls Boulevard is primarily commercial, land use to the north and west of the Site is residential.

1.3 History

In the fall of 1957, approximately 400 metal drums containing hexachlorobenzene (HCB) and 100 tons of hexachlorocyclohexane (BHC) residue referred to as alpha-beta cake from the Olin Niagara Falls plant were disposed at the Site. HCB was used as a fungicide and generated as a by-product or impurity in related chemical syntheses. The alpha-beta cake was residue from Olin's manufacturing process that produced a mixture of isomeric forms, which included the alpha, beta, delta and gamma isomers of BHC.

A Stipulation and Consent Judgment Approving Settlement Agreement, Civil Action No. CIV 83-1400, herein referred to as the State/Olin Agreement, was adopted by Judge Curtin on April 29, 1985. Olin's obligations under the State/Olin Agreement included field investigations to determine the extent of chemical contamination of the Site and its environs, and the design and implementation of remedial plans to effectively protect the public health and environment. Harding Lawson and Associates (HLA) completed the Site Remedial Investigation (RI) and submitted it in July 1986 (HLA 1986). Overburden monitoring wells installed during the RI included MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, and MW-7. Only MW-1R (for Replacement), MW-2, MW-4, and MW-5 remain. The other monitoring wells were properly decommissioned during the 1988-1990 Site remediation or later (WCC 1994, WCC 1995, WCC 1995a, WCC 1995b). The RI demonstrated that all waste deposited at the Gibson Site was in a solid form and are of low solubility in water.

The State and Olin modified the State/Olin Agreement by a stipulation effective April 13, 1987 (New York State 1987). The modification provided that the northern and southern portion of the Site would be treated distinctly for purposes of designing and implementing remedial measures. The modification also provided for a supplemental investigation of the southern portion (HLA 1989). This investigation was conducted by HLA in 1987-1988 and results were reported in the report titled Buried Drum and Additional Field Investigation Monitoring Program, submitted November 7, 1989 (MLA 1989). This investigation included the installation of monitoring wells MW-Al, MW-A2, and MW-A3. Monitoring wells MW-A1 and MW-A2 were installed in the (then) southern portion of the Site to investigate possible pockets of HCB and BHC isomers. Monitoring well MW-A3 was installed across Cayuga Creek from the Site. Of these wells, only MW-A3 remains. Monitoring wells MW-Al and MW-A2 were properly decommissioned in 1994 (WCC 1994) and 1995 (WCC 1995, WCC 1995b).

A Feasibility Study report (WCC 1987) for the northern portion of the Site was submitted by Olin to the state in early 1987. The recommended remedy was approved by the State in late 1988. Construction of the containment remedy on the northern portion of the Site was concluded in 1990. The remedy consisted of rerouting Cayuga Creek around and away from the waste, installation of a fully circumscribing soil-bentonite slurry wall barrier, and installation of a double flexible membrane liner (FML) cap with a perimeter collection drain system. Construction details and related items can be found in the Construction Certification Report (WCC 1990c) as well as references WCC 1990, WCC 1990a, WCC 1990b and McIntosh & McIntosh 1990. Construction details shown in this O&M Manual have been selected from the Construction Certification report. The reader should refer to this report for a more complete and proper understanding of the construction details and remedial measures implemented. There are no on-Site personnel except when performing O&M activities.

The previous O&M Manual (HLA 1992) was submitted to the NYSDEC on April 15, 1992 along with an Addendum 1, the Leachate Pumpout Procedure, which specified the procedures to be used for pumping out leachate collected in Manhole A.

After requesting and receiving responses to comments on the O&M Manual, the NYSDEC approved the O&M Manual (and attached Addendum 1 and the responses to its comments) on October 30, 1992 (NYSDEC 1992).

In March 1993 the first round of quarterly groundwater sampling was conducted. Monitoring wells MW-1R, MW-2, MW-3, MW A3 and MW-5 were sampled. MW-2 was substituted for MW-Al at the request of the NYSDEC representative present as MW-Al, located close to the road, had been destroyed. MW-Al was later decommissioned and MW-2 permanently sampled in its place (WCC 1993a, WCC 1994). Also, at this time semi-annual Cayuga Creek sediment samples were collected from locations upstream and downstream from the Site. Groundwater sampling occurred again in June, September, and November 1993 and creek sediment sampling in September 1993.

On October 5, 1993 the NYSDEC informed Olin that it was changing the status of the Gibson Site in the NYSDEC Registry of Inactive Hazardous Waste Disposal Sites from 2 (significant threat to the public health or environment - action required) to 4 (Site property closed - requires continued management) in response to the lining and capping of the site and the initiation of a long-term monitoring program.

In March 1994, as required by the approved O&M Manual, Olin submitted the First Annual Report for the 1993 Monitoring Year (Olin 1994).

On September 1, 1995, Significant Industrial User (SIU) Wastewater Discharge Permit No. 45 (Niagara Falls 1995) was issued to Olin for the Charles Gibson Site by the City of Niagara Falls.

In Apri11997 a petition was presented to the NYSDEC by Harter, Secrest & Emery, Attorneys at Law for Auto Zone, Inc.„ to formally redefine the boundaries of the Site to exclude the southern portion of the Site (Slater 1997). After a request for more information from the NYSDEC and a response (Slater 1997a), the NYSDEC redefined the boundaries of the Site to include only the northern portion of the Site (NYSDEC 1997, NYSDEC 1997a, NYSDEC 19976). An auto parts store was built soon afterwards on the former southern portion of the Site and the area around it asphalted or sodded. AutoZone, Inc. agreed to maintain the monitoring wells on the former southern part of the Site (MW-2, MW-4, MW-5, MW-1R) for the duration of the required monitoring program.

In May 1997 Rust Environmental & Infrastructure (Rust) presented to Olin the Final Report for (the) Direct Discharge System (Rust 1997). Olin had previously received a POTW discharge permit (Permit No. 45) from the City of Niagara Falls which became effective September 1, 1995. There had been no discharges made to the POTW under the permit while Olin continued efforts to complete a sewer tie-in with the Town of Niagara for the ground water collection system at the Site. Leachate collected in Manhole B at the Site had been pumped out into tanker trucks for off-Site treatment. After the sewer tie-in was approved the direct discharge system became operational in March 1997, with discharges permitted to the City of Niagara Falls Waste Water Treatment Facility.

On June 4, 1997 Olin submitted to the NYSDEC the Addendum 2 to the Site O&M Manual (Olin 1997b). This addendum (the Final Report for Direct Discharge System) was added to the O&M Manual to replace the now obsolete Addendum 1 (Leachate Pumpout Procedure).

Also, on June 4, 1997, Olin requested a modification of the long-term monitoring program for the Gibson Site (Olin 1997a). The monitoring wells were originally to be sampled according to the following schedule:

- quarterly monitoring for seven years — if no increases in concentrations or decreasing concentrations, then Olin had the opportunity to petition the NYSDEC to modify the monitoring and fiscal requirements; and
- if the monitoring requirements were not modified, Olin was to continue to sample for 23 years.

The NYSDEC allowed the transition from a quarterly groundwater monitoring program to a semi-annual groundwater monitoring program (NYSDEC 1997d). The first semiannual sampling event was performed in September 1997.
On August 4, 1997 the NYSDEC notified Olin of its acceptance of the Final report of the Direct Discharge System (NYSDEC 1997c). On March 17, 1998 Olin received from the City of Niagara Falls a modified Significant Industrial User Wastewater Discharge Permit No. 45 for the discharge of the leachate collected at the Site (Niagara Falls 1998). The modification of the permit related to the increase to the limitations for flow.

On September 14, 1999, Olin received from the City of Niagara Falls (Niagara Falls 1999) a notice of reclassification of the Site. The Site was reclassified from a Significant Industrial User (SIU) to a Commercial/Small Industrial/Residential User (CSIRU). The change in classification was based on the low flow and low loadings of pollutants discharged from the facility as determined by pollutant monitoring and analysis conducted since September 1995. With the change in classification to CSIRU, all monitoring and reporting required for the City of Niagara Falls was terminated.

This manual provides details on the operations and maintenance of the containment remedy on the Site and includes provisions for Site control and environmental monitoring. The O&M Manual contains required elements as set forth in the State/Olin Agreement and modifications subsequently agreed to. This revised O&M Manual was prepared in September 1999 and incorporates the above mentioned approved changes to the monitoring program. This O&M Manual also includes a revised Site Health and Safety Plan and incorporates all relevant elements of HLA's Gibson Site Final Sampling Plan (HLA 1992). It also includes as Attachment 1, the Direct Discharge System Report. Finally, an updated topographic and boundary survey of the Site, performed in September 1999, is included as Plan 1.

The Operation and Maintenance manual will remain open for revisions as actual monitoring, sampling or operations/maintenance experience dictates changes. Changes will be proposed as modifications to the manual, subject to State review, and their rationale explained.

1.4 Current Site Layout

The Site as now defined incorporates approximately two acres bounded to the east and north by Cayuga Creek, to the west by Tuscarora Road and to the south by Niagara Mohawk Power Corporation right-of-way and the Auto Zone Incorporated auto parts store and parking lot. The Site cap is slightly mounded with the center of the capped area essentially flat. The capped area is enclosed by a chain link fence. A wooden privacy fence is immediately next to and outside of the chain link fence on portions of the perimeter.

1.5 Facility Requirements

Construction of the remedy on the Site was completed in 1990. The State/Olin Agreement lists the essential elements of a post-remedy operation, and maintenance and monitoring program for the containment remedy, as listed below:

- Quarterly groundwater monitoring had been reduced to semiannual, and, in 2009 to annual groundwater monitoring. After seven years of the quarterly monitoring, if no increasing concentrations, Olin has the opportunity to petition the NYSDEC to modify the monitoring and fiscal requirements. Annual sampling will be rotated between quarters to cover seasonal variability. Annual report will be submitted to NYSDEC by January 31 of each year.

- Sample collection and analysis of creek water during high and low water periods

  annually (this requirement was dropped after discussions between Olin and the NYSDEC concluded that the two water samples would not aid in determining if contaminants had leached into the creek bed from the encapsulated area due to the very low solubility of HCB and the BHC isomers).

- Sample collection and analysis of creek sediments annually for 30 years (Creek sediment sampling, originally to be performed at one downstream location twice yearly, at approximate high and low water events, was modified, based on discussions between the NYSDEC and Olin, to a once a year, low water event at two locations, one upstream and one downstream of the Site.

- Establishment of an inward hydraulic gradient at the containment area unless otherwise demonstrated that an inward hydraulic gradient is unnecessary to accomplish isolation of the contaminants from people and the environment (currently accomplished by quarterly piezometer level readings).

- Water level monitoring in the collection manholes, sample collection and analysis, and pump-out and disposal of collected leachate as required (pump-out and disposal of leachate is now accomplished by pumping to the sewer system and treating at the City of Niagara Falls Wastewater Treatment Facility (WWTF)). Sample collection and analysis of wastewater discharged to the sewer system was discontinued effective September 14, 1999 when the City of Niagara Falls informed Olin by letter that, due to low flow and very low loadings of pollutants from the Gibson Site, the Significant Industrial User Wastewater Permit (No. 45) was no longer required and was rescinded. The Site was reclassified as a commercial small industrial residential user (CSIRU). Resumption of the leachate sample collection and analysis from Manhole B will be performed on an annual basis for

the site-specific parameters: alpha-BHC, beta-BHC, delta-BHC, and gamma-BHC. Analysis for hexachlorobenzene will be performed every 5 years (starting in 2000) based on past analytical data generated during the permitting process which were undetected (U) for the compound.

- Protection of the Site from disturbance which might cause migration of contaminants, which is accomplished by regular Site inspections (currently conducted quarterly).

- Establishment of a contingency plan in the event of offsite migration of contaminants.

The State/Olin Agreement also provides that Olin may reduce the frequency and/or duration of monitoring or inspection once it demonstrates, by clear and convincing evidence, that conditions at the Site are such that the stated frequency or duration of the first, second and fifth requirements are no longer necessary to a determination of whether the remediation is effective.
As required by the State/Olin Agreement, the following reporting schedule will be followed:

- the results of groundwater monitoring will be reported to NYSDEC on an annual basis, and

- the results of creek and sediment sampling will be reported to NYSDEC on an annual basis.

An annual report is provided to the State. The report documents Site activities conducted such as the quarterly Site inspections, the quarterly sump inspections, the semi-annual and annual sampling events, maintenance performed on-Site, groundwater elevation measurements obtained, inward and outward hydraulic gradients, and summaries of pump flow rates and volumes. Appendix A presents the yearly inspection and sampling schedule for the Site.

2 General Maintenance and Security

2.1 Security and Access Control

The fence surrounding the Site inhibits trespassers from entering the Site. The fence has two locked gates, one located at the southeast and one located at the northwest portion of the Site (see Figure 1.2). To the west of the Site, a gravel drive provides access from Tuscarora Road to the northwest gate. Vehicles will not be permitted to enter beyond the gates, without approval, in order to avoid damages to the containment cover. The southeast gate provides access from the Niagara Mohawk Power Corporation right-of-way. Security personnel at Olin's Niagara Falls Plant are authorized to grant access to the Site for required services.

All O&M activities at the Site are documented on the appropriate forms (see Appendix B) which are maintained at the project office with Olin's Environmental Remediation Group.

3 Cap Inspection and Maintenance Plan

3.1 General Requirements

Site remediation requirements have been met by Olin through rerouting of Cayuga Creek around and away from the waste, by constructing a fully circumscribing soil-bentonite slurry wall barrier, and through installing a double flexible membrane liner cap as part of the final cover with a perimeter collection drain system. This O&M Plan will safeguard that remedy and provide for monitoring of the Gibson Site in compliance with the State/Olin Agreement.

Inspections, on at least a quarterly basis, of the Gibson Site will be conducted by the Environmental Inspector to identify any potential problems with physical deterioration of structures, possible malfunctions of the slurry wall or of the perforated CPVC drain system, and to ensure that all site remedial measures components are operating effectively, in accordance with the State/Olin Agreement.

The Environmental Inspector will conduct the inspections and will ensure (see Sections 3.3 and 3.4 for details) that the remedial measures at the Site will remain operative in a manner that will minimize the need for extra maintenance. Additionally, the inspections will address (see Sections 3.3 and 3.4) the safeguards to control, minimize or eliminate threats to human health and the environment. The potential post-remediation threats include the release of HCB, BHC, or contaminated leachate to the groundwater, and the creek.

3.2 Post-Remediation

The Site has been remediated using measures designed to accomplish the following goals:

- Capping: Prevents infiltration and percolation of precipitation through the fill and wastes contained within the northern portion of the Site.
- Slurry Wall: Minimizes both the amount of horizontal groundwater movement into the northern portion of the Site and the amount of groundwater leaving the Site into Cayuga Creek.
- Collection Drain: Relieves hydrostatic pressure on the inner side of the slurry wall and enables collection of water from within the containment area. The collected water is routed to a sump at Manhole B which is pumped automatically to depress the water table within the containment area.
- Relocation of the Cayuga Creek channel: Moves a potential surface water contaminant pathway further away from the waste.
- Reconstruction of the North Slurry Wall Cap: Rigid reinforced concrete slab provides an arching effect over the slurry wall and improves the stability of the slope in the north area of the Site.

3.3 Inspection Procedures

Inspections will be conducted using the items listed on the Site Inspection Form presented in Appendix B. Information to be entered on these forms includes the inspector's name, date, and time of inspection, item inspected and any comments. The inspector will indicate on the forms whether the condition of each item was acceptable or unacceptable. If the status of any item proves unacceptable, it will be reported immediately to Olin's Environmental Inspector or the Olin contacts listed in Appendix F of this O&M Plan for prompt repair or replacement. To ensure that the requirements of this O&M Plan are fulfilled, the scheduled Site monitoring inspections will be performed by a qualified individual assigned to inspect the items and systems noted on the Site Inspection Form. The completed Site Inspection Forms will be maintained at the Niagara Falls Plant. Inspections will be performed, at a minimum, on a quarterly basis.

The groundwater monitoring and sampling will be performed on a semi-annual basis. Sample collection and analysis of creek sediments will be performed annually during the second semi-annual groundwater sampling event in the Fall. Coordination of inspection and monitoring site visits can be arranged per the contact list (Appendix F).

3.4 Maintenance Procedures

Olin Corporation will sustain adequate staff to administer the following post-remediation activities: post-remediation site inspections; maintenance; monitoring (see Sections 3.4.1 for details) of the hydraulic gradient within the containment area; water level monitoring; inspection and maintenance of direct (leachate) discharge system; and storage and updating of the facility post-remediation plans. Information concerning proposed changes or modifications to the plan will only be distributed to the State by Olin Corporation.

3.4.1 Liquids Management Maintenance

The liquids management system for the Site consists of the perforated (6-inch diameter) CPVC collection drain system that relieves hydrostatic pressure on the inner side of the slurry wall and of two manholes which enable collection of water from within the containment area. The collected water is routed to Manhole A and then to Manhole B. At Manhole B a 1/2-horsepower submersible pump at the bottom of the manhole pit operates automatically when the water level in the pit rises over 564.93 feet (or approximately 8 feet above the bottom of the pit). The collected water is discharged to the City of Niagara Falls WWTF by way of the Town of Niagara Falls sewers. Figures 3.1 and 3.2 present typical construction details for the manholes and piezometers installed at the Gibson Site during remedial measures. Water level elevations inside Manholes A and B will be maintained by automatic pump startup, set to elevations appropriate to maintain inward hydraulic gradients at the site and to relieve hydraulic pressure under the cap. NYSDEC will be notified prior to any pump level set point changes.

The sump pump flow meter is connected to a Microtel Series 1000 Dialer. The dialer is programmed to access the Olin Corporation Buffalo Avenue Plant and Charleston, Tennessee Remediation Group and transmit a facsimile to both locations daily. The

facsimile contains the flow meter pumping rate, the totalizer volume and a record of any power failures or current irregularities experienced by the system. Since pumping from the manholes only occurs once to twice per year, most of the transmittal facsimiles are identical.

3.4.2 Liquids Disposal Maintenance

Leachate will be disposed of by pumping to the Tuscarora Road sanitary sewer (Town of Niagara Sewer System) which conveys the water to the City of Niagara Falls WWTP.

3.4.3 Final Cover Maintenance

One of the primary purposes of these procedures is to assure that the integrity of the final cover is maintained over the long-term by scheduled inspection and maintenance that is consistent with the final cover design specifications. Deviations from these specifications should be reported to the Environmental Remediation Group in Cleveland, Tennessee so that the anomalies may be evaluated. All repair and upkeep activities will be performed in accordance with Appendix C — Earthwork Specifications for Final Cover Repair and the Construction Procedure and Specifications (reference WCC 1990b) and will be recorded on the Site Inspection Form.

Regular inspection of the Site will be conducted to identify any potential problems with physical deterioration of seeded areas. A detail of the typical final cap/cover system is presented on Figure 3.3.

All Olin employees with access to the Site will be instructed to notice and report in writing to the Environmental Inspector any surface cracking, ponding, or unusual surface conditions at the time they are observed. Entrance of vehicles to areas inside the fence will not be allowed without permission.

3.4.4 Landscape Maintenance

3.4.4.1 General

The following landscape maintenance program has been prepared to preserve the integrity of the containment area vegetative cover. This will ensure the preservation of a long-term vegetative cover which will significantly reduce the volume of precipitation percolating into the soil cap system by means of evapotranspiration. The vegetative cover will also assist in erosion control and visual enhancement.

During construction, the waste deposits were not contacted. Also, the waste area has stabilized over a thirty-five year period since being deposited. Consequently, little settling, or sagging is expected in the cap area. Surface slopes are low,

minimizing the possibility for erosion and none have occurred since construction completion.

3.4.4.2 Maintenance Program

The landscaped area west of the Site and bordering Tuscarora Road will be maintained for aesthetic purposes. Maintenance of this area will primarily consist of the addition of mulch around the planted evergreen trees every few seasons. The main gravel drive and a vehicle barrier are also located in this area.

Mowing and Weed Control

Adequate grass length will be maintained to provide a viable cover and neat appearance. No herbicides will be used for weed control. Weed control on the grass cover, to prevent invasive and unsightly weed growth, will be evaluated and implemented if necessary.

Fertilizer

In the event that problems of vegetative (woody) growth arise, soil conditioning would be considered. This will ensure successful long-range erosion control. Also, a well-functioning grass cover will inhibit the growth of invasive weeds.

Rodent Control

Rodent control would only be considered for burrowing rodents due to their potential for breaching the containment structure. A program would be implemented for burrowing rodents if necessary to deter the burrowing of rodents into the containment structure (for example plugging the burrows with concrete).

Permanent Seeding

Seeded areas will be inspected for dry spots, tall grass, and damage. Maintenance of seeded areas, including mowing, will be performed routinely.

Snow Removal

Snow removal will be performed as needed to facilitate inspection of the manholes (clearing the driveway) at the direction of Olin personnel. Flexibility in scheduling O&M activities will normally obviate the need for snow removal.

3.4.4.3 Channel Maintenance

The channel of Cayuga Creek will be maintained in the realigned condition it was engineered to at the close of the Gibson Site containment remedy. This will assure that the flood carrying capacity of this section of the streambed is preserved. Riprap will be kept free of woody growth by removal of the incipient growth. Chemical herbicides will not be used. Flood trash and debris will be removed from the riprap.

3.5 Recordkeeping and Reporting

All groundwater monitoring data, including results of analyses, chain-of-custody, QA/QC records, field measurements, and field logbooks will be stored and maintained by the Olin Corporation throughout the post-remediation care period of the Gibson Site. These records will be available for review and inspection by the State upon reasonable notice.

4 Groundwater and Sediment Monitoring and Sampling Plan

4.1 Introduction

This sampling plan has been prepared to provide guidance for all field activities undertaken to measure groundwater elevations and collect groundwater samples and sediment samples at the Gibson Site. This plan details measurement procedures, sample collection procedures, sample containerization and labeling, sample shipment, decontamination and disposal.

4.2 Groundwater Elevation Monitoring Piezometers

4.2.1 General

The current groundwater level monitoring system for the Site consists of six piezometers (P-1 through P-6) and two manholes (A and B). Piezometers P-1, P-2 and Manhole A are located in the northeast section of the Site; P-3, P-4, and Manhole B are located in the southeast section; and P-5 and P-6 are located toward the southwest (see Figure 1.3). Figures 3.1 and 3.2 present typical construction details for the manholes and piezometers installed at the Site during remedial measures.

All piezometers are constructed of Schedule 80 PVC and are 2 inches in diameter. Each piezometer has been constructed with 5 feet of screen and were screened at the water table. For a detailed discussion on the drilling and installation of the piezometers and wells, the reader is directed to the Remedial Investigation (.1-ILA 1986).

The construction of the piezometer screens at the water table allows for continued monitoring of the water table elevation inside and outside of the containment area during periods of water level fluctuations. Piezometers P-1, P-3, and P-5 are located outside of the slurry wall that runs along the perimeter of the Site, Piezometers P-2, P-4, and P-6 are inside the slurry wall and paired opposite the three piezometers inside the slurry wall.

Water level elevations will be measured quarterly at the Site. Manholes A and B and piezometers P-1 through P-6 will be measured. Water level elevations will be measured by means of an acoustical sounder or electronic water level probe. The sounder or probe will be lowered into the manhole or piezometer until it makes contact with the free water surface. The depth from the top of the piezometer riser pipe or manhole rim to the water surface will be measured to an accuracy of 0.01 ft. Water level data will be entered into a bound field notebook and onto the Groundwater Elevation Form. Depth to water measurements will be converted into mean sea level elevations by referring to the

surveyed elevation of the top of the piezometer riser pipe or manhole rim provided on the Groundwater Elevation Form. The depth to water measurements for Manholes A and B will be checked to see that they are not greater than 10.27 feet and 12.41 feet, respectively. Greater depths than these would indicate that the automatic sump pump is not functioning and that the water table inside the slurry wall is at an elevation greater than 565 feet above mean sea level and possibly exerting a hydrostatic force against the concrete slab at the north end of the Site.

4.2.2 Quarterly Groundwater Monitoring

Groundwater level monitoring will be conducted in the piezometers and in Manholes A and B. The water level measurements will be obtained with an electronic or acoustical well probe and will be accurate to the nearest 0.01 foot. At each location, the following data will be recorded on the Groundwater Elevation Form:

- Inspector's Name
- Date and Time
- Weather
- Piezometer, manhole, or well number
- Depth to water (feet)
- Water Elevation (calculated)
- Instrument used for measurement
- Comments

Equipment used for measuring water levels will be decontaminated as outlined below:

- Rinse probe with deionized water.
- Place probe in a polyethylene bag or appropriate cover.

4.2.3 Gradient Control

Water level measurements will be obtained from Piezometers P-1 through P-6, and Manholes A and B. In addition, prior to semi-annual sampling, groundwater level measurements will be obtained from monitoring wells MW-1R, MW-A3, MW-2, MW-4, and MW-5. Water level elevations will be measured by means of a calibrated electronic sounding or acoustical sounding probe. The static water level will be measured using the following procedures:

- Remove the locking cap/manhole lid.

- Determine the static water level using the well probe by measuring from the surveyed reference mark on the inner casing. This measurement must be accurate to the nearest 0.01 foot. Record this measurement and all other pertinent data on the Groundwater Elevation Form.

- Reinstall the inner and locking caps and lock the well.

- Item 4, re: returning well keys, has been deleted.

At least annually, the groundwater level data will be evaluated to determine approximate groundwater flow rate and direction.

4.3 Groundwater and Sediment Sampling

4.3.1 Groundwater Sampling (Monitoring Wells)

4.3.1.1 Sampling Objectives, Locations, and Frequency

The objective of sampling the monitoring wells at the Gibson Site is to satisfy Paragraph 5(e) (i) of the Stipulation and Consent Judgement (State/Olin Agreement). Currently five monitoring wells (MW-1R, MW-2, MW-4, MW-5, and MW-A3) are sampled twice per year. Based on data collected during the RI which demonstrated what contaminants were disposed at the Site, all samples collected are submitted for analysis for alpha-BHC, beta-BHC, delta-BHC, and gamma-BHC using USEPA Methods 3510 and 8081. The frequency of sampling and analysis for HCB was modified to annual sampling every other year starting in 2000. This modification is based on analytical groundwater data collected as part of the long-term monitoring program. HCB results are undetected (U) for all sampling events since 1993. The next scheduled sampling for HCB will be in the fall (October) of 2002 (sampling for HCB will alternate between the spring and fall sampling events). HCB will be analyzed using EPA Methods 3510 and 8270. All sampling and analysis procedures will be performed in accordance with the applicable requirements specified in Test Methods for Evaluating Solid Waste - Physical/Chemical Methods, SW-846, Third Edition and its updates.

At the end of the 30-year monitoring period, the data generated will be reviewed to determine whether monitoring requirements may be modified. If at any time during the 30-year monitoring period, the results of analysis of samples collected from the groundwater monitoring wells indicate increased contamination over four consecutive sampling events, the Contingency Plan, Section 7.3 will be implemented.

4.3.1.2 Groundwater Sampling Procedures

NYSDEC will be notified at least one week prior to any sampling activities in order to afford them the opportunity to collect and split samples.

Prior to initiation of sampling activities, a polyethylene drop sheet will be placed on the ground around the base of the well being sampled, to ensure that no sampling equipment touches the ground. A new drop sheet will be used at each sampling location. Disposable latex gloves will be worn during all sampling activities and changed between sampling locations.

Wells will be purged a minimum of three well casing volumes (or until dry). Purge water will be measured for pH, specific conductivity, and temperature after each well volume is purged and the appearance of the purge water noted. If the measured parameters have not stabilized (defined as a less than 10 percent change from the previous measurement for three consecutive measurements) additional well casing volumes will be purged and the field parameters measured until stabilization does occur or until the well is dry.

Purging will commence after the water level in the well has been measured according to the procedures described in Section 4.2.3. At this time the bottom of the well will also be sounded for obstructions and silt build up and the total depth recorded. The total well casing volume will then be calculated (0.16 gallons for each one foot of water in a two-inch diameter well). Purging of the well will be accomplished be means of a peristaltic pump and tubing. Both the small diameter Teflon® tubing inserted down the well and the larger diameter silicone pump drive tubing will be dedicated to a particular well. The Teflon® tubing will be stored in the well between sampling events. The peristaltic pump drive tubing will be stored in individual, labeled plastic pouches between sampling events. The peristaltic pump purge tubing will withdraw water from the bottom of the well and purge water will be pumped into a graduated bucket. As the first volume of purge water is withdrawn, a sample of purge water will be collected in a clean container and the field parameters measured. If a well is purged dry before a minimum of three well casing volumes have been removed, the sample will be collected after the well water level has recovered to within 80 percent of the pre-purge water level, or after 24 hours, whichever comes first.

Alternately, if well conditions or some other circumstances preclude the use of the peristaltic pump the wells may be purged (and sampled) by means of a disposable Teflon® bailer and polypropylene rope.

All measurements and calculations relating to water levels, purge water volumes and characteristics and purging times and techniques will be recorded on the groundwater monitoring field form and in a bound field book.

All purge water removed from the groundwater monitoring wells will be placed in Manhole B.

4.3.1.2.1 Measurement of Field Parameters

All measurements of field parameters, will be noted on the groundwater sampling form and in a bound field book. The following procedures will be used for measurement of field parameters:

- Water Level- The water level in each well will be measured using an acoustical or electronic sounder. The sounder will have permanent marks on the line at intervals of a minimum of 0.01 feet. Portions of the cable that are submerged below fluid levels in wells will be decontaminated according to the decontamination

- Field Chemical Parameters- Conductivity, water temperature, and pH will be measured during purging, prior to sampling.

A conventional pH meter will be used for field pH determinations. A conventional conductivity meter such as a YSI Model 33, will be used for field specific conductance measurements. Temperature will be measured using an ASTM mercury thermometer. If agreement within 0.5°C is maintained between the thermometer on the conductivity meter and the mercury thermometer, either may be used.

Field instruments will be calibrated daily and the results of the calibration along with the type of instrument calibrated, will be noted in a bound field logbook and on the field instrumentation calibration form (Appendix B).

4.3.1.2.2 Sample Collection

The following procedures will be used for sample collection:

<u>Sampling with Peristaltic Pump</u>

- Ensure that the Teflon® tubing is not at the very bottom of the well.

- Start the peristaltic pump at its lowest, slowest setting for minimal water turbulence.

<u>Sampling with disposable, Teflon® Bailers</u>

- Lower the bailer slowly into the well until it contacts the water surface.

- Allow the bailer to sink and fill with minimal surface disturbance.

- Slowly raise the bailer to the surface, ensuring that the bailer rope does not contact the side of the well or the ground.
- Pour the bailer water slowly to ensure that the water flows gently down the side of the sample bottle, with minimal entry turbulence.
- Repeat the above steps as needed to acquire a sufficient sample volume to fill the sample containers.

  (The use of bailers for sampling should only be for when circumstances preclude the use of the peristaltic pump and dedicated tubing.)

4.3.2 Sediment Sampling

4.3.2.1 Sampling Objectives, Location and Frequency

Currently two locations, immediately upstream and downstream of the Site and the adjacent remediated portion of the Cayuga Creek bed, are sampled once per year, in the fall or 'low water' period. A sample is collected downstream of the Site to monitor changes in levels of contaminants in creek sediments, if any. The other sample, immediately upstream of the Site is used to monitor potential upstream contaminant sources or potential 'backwash' effects caused by the changing level of the Niagara River. Beginning with the October 2000 sample event, annual creek sediment samples will be analyzed for BHC isomers only. This modification is based on analytical sediment data collected as part of the long-term monitoring program. HCB results are undetected (U) for all sampling events since 1993.

Figure 4.1 presents the upstream and downstream creek sediment sampling locations in relation to the Site.

4.3.2.2 Sampling Procedures

The use of the "buddy" system will always be followed when entering the creek bed for sediment sampling. One member of the sampling team will remain on the bank top and observe the sampling activities of the second team member.

Sediment sampling will be accomplished by the use of precleaned, stainless steel, 4-inch diameter, I-foot long hand augers with attached handles and/or precleaned carbon steel shovels.

Prior to sediment sampling the stainless steel and carbon steel equipment will be cleaned by scrubbing in tap water and non-phosphate detergent, rinsing with isopropanol, rinsing with deionized water and allowing it to air dry. The equipment will then be wrapped in aluminum foil for transport to the sampling event.

Upstream and downstream sediment samples will be collected by obtaining sediment from as close as practicable to the middle of the stream bed by turning the hand auger into the stream bed sediment. No sediment deeper than three inches will be collected. The hand auger will be withdrawn and the sediment in the hand auger will be deposited into the dedicated stainless steel bowl, using the dedicated stainless steel spoon to dig sediment out of the hand auger, if required. Additional sample volume from the same location will be obtained if required and composited with the sediment sample in the bowl using the stainless steel spoon. The stainless steel spoon will be used to fill the sediment sample jars.

If the hand auger cannot maintain a sample of sediment within its bucket due to washing out when lifting up through the water column the shovel can be used to support the sediment in the auger bucket while lifting the auger out of the water. Alternately the shovel alone may be used to scrap of sediment and lift it from the creek bottom if the sediment is substantial enough not to wash away.

4.3.3 Sample Handling, Packaging, and Shipping

4.3.3.1 Sample Containers

Sample containers will be prepared by the analytical laboratory designated to perform the analyses and shipped in sealed containers to assure they remain clean. Sample containers will be selected to ensure compatibility with the media being collected, preserve sample integrity, and minimize breakage during transportation.

4.3.3.2 Sample Labels

Each sample container will be clearly labeled with a sample label filled out at the time of sampling, and affixed to each sample container to identify the sampling location, sample number, sampler's name, and date and time of sample collection. Sample labels will be secured to each sample container with clear, waterproof tape.

Each sample container will be placed in a clean, insulated, ice chest that is filled with bagged ice. Prior to shipment, additional ice should be added as necessary. The insulated cooler lid will then be closed and sealed with waterproof tape. All drain valves on each ice chest will be closed and sealed with waterproof tape to avoid the entrance of contaminants into the cooler and to avoid leakage from the cooler.

4.3.3.3 Sample Shipment

Samples will be transported to the analytical laboratory (identified in Appendix F —Specific Lists of Contacts for the Gibson Site) in accordance with Department of

Transportation (DOT) and commercial carrier regulations. Shipment of samples will take place on the same day as sample collection or if not possible will be kept at the recommended temperature in a locked and secure location until the following day and then shipped. Samples will be shipped by overnight courier services to ensure that the seven day holding times are met. The analytical laboratory will be notified by telephone as to the schedule of sample shipment.

4.3.4 Sample Custody Documentation

Sample custody procedures will be followed to ensure that an accurate, written, verified record is maintained which can be used to trace the possession and handling of the samples during sample collection, transfer, analysis, and ultimate disposal.

4.3.4.1 Chain-Of-Custody Records

A Chain-of-Custody form will be completed to record the custody of every sample collected. A Chain-of-Custody form will accompany every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession.
The sample portion of the Chain-of-Custody form will include the following information:

- site name (location)
- sample identification
- name of sampler
- sampling information (sampling location, number of samples per location, media type, date and time of sample collection)
- analyses to be performed
- signatures of persons involved in the Chain-of-Custody possession, including dates of possession.

The method of shipment will be recorded, along with the airfoil numbers, or other shipping numbers, in the space provided at the bottom of the Chain-of-Custody form. The completed Chain-of-Custody forms will be placed in a waterproof plastic bag and securely affixed to the inside of the lid of a cooler, with waterproof tape, prior to shipment. One copy of the Chain-of-Custody form will be kept by the sampler. Shipping receipts (e.g., airfoils) will be retained as part of the documentation of the Chain-of-Custody.

4.3.5 Decontamination and Disposal Procedures

All equipment used during sampling will be initially decontaminated and packaged to protect it from exposure. In order to prevent unnecessary contamination of sampling equipment prior to use, a clean dedicated area will be established at each sampling location and covered with a polyethylene drop cloth, such that contaminated media do not come into contact with any sampling tools or equipment.

4.3.5.1 Field Decontamination Procedures

Dedicated or disposable bailers or dedicated Teflon® tubing will be used for sampling, therefore field decontamination of this equipment is not anticipated. Decontamination of equipment will consist of washing with a non-phosphate detergent and rinsing with deionized water. Sampling and monitoring equipment which will be re-used on-Site at groundwater monitoring wells such as steel tapes, or well sounders will be decontaminated as follows:

- rinse with tap water;
- scrub with a soft-bristle brush and a non-phosphate detergent mixed with tap water;
- rinse thoroughly with deionized water;
- allow to dry thoroughly in a clean environment; and
- wrap in plastic and seal with tape.
- Generally, only the wetted end of these devices will require cleaning, provided it is washed and rinsed prior to being reeled onto the take-up spool.

4.3.5.2 Disposal of Contaminants

All purge water removed from the groundwater monitoring wells and all decontamination generated fluids will be placed in Manhole B.

4.4 Record Keeping

4.4.1 Field Logbook

Sampling activities will be recorded in a bound field logbook on a daily basis. The field logbook will contain all pertinent sampling information, including the sampling locations, descriptions of any factors which might affect sampling procedures (prevailing weather, etc.). Any deviations from this sampling plan will be documented in the field logbook. All routine measurements and observations will be recorded in the - field logbook, including

collection of blank samples and water depths, as well as pH, conductivity, temperature, turbidity, color, and odor of the groundwater.

4.4.2 Groundwater and Sediment Sampling Form

All purging, groundwater sampling and sediment sampling information will be summarized on a Groundwater and Sediment Sampling Form (Appendix B). The following groundwater monitoring information will be included on the Groundwater and Sediment Sampling Form: well number, well location, well material, date and time of collection, name of sampler, casing diameter, total depth of casing, well depth, water level depth, number of well volumes to be purged, total volume to be purged, purge method and time, actual purge volume, pH, conductivity, temperature, turbidity, color, and odor of groundwater, well condition, sampling method, sample numbers, volume of each sample container, type of analysis requested, blank samples. The following sediment sampling information will be included on the Groundwater and Sediment Sampling Form: sediment sampling location, date and time of collection, name of sampler, color, odor, and characteristics of sediment, condition of creek at time of sediment sampling, sampling method, sample numbers, volume of each sample container, type of analysis requested, and QC samples collected.

4.4.3 NYSDEC Reporting

A report summarizing the groundwater and sediment monitoring activities and analytical results will be prepared and sent to NYSDEC on an annual basis, or as otherwise requested by NYSDEC.

4.4.4 Field Instrumentation Calibration Log

All groundwater sampling equipment (e.g., specific conductance, temperature, and pH meters) will be calibrated on a daily basis prior to use. The calibration procedures will follow standard manufacturer's instructions to assure that the equipment is functioning within tolerances established by the manufacturers. Copies of the manuals for each instrument will be available in the field with each instrument. Each time an instrument is calibrated, a calibration log will be completed with the following information: date and time of calibration, name of individual performing calibration, instrument, model number of instrument, calibration method, adjustments to instrument required, whether instrument is functioning properly, whether a back-up instrument was required for an instrument not functioning properly, and if so, replacement instrument used and model number.

5 Quality Assurance Project Plan (QAPP)

Following is the quality assurance project plan (QAPP) for the Gibson Site.

5.1 Field Sampling Quality Assurance and Quality Control

The purpose of the groundwater and creek sediment sample collection and analysis is to monitor groundwater and creek sediment at the Site to detect any significant changes which would cause

changes in Site conditions. Currently groundwater samples are collected and analyzed twice per year and creek sediment collected and analyzed annually.

Field sampling quality assurance and quality control procedures will be followed in order to obtain and evaluate data in an accurate, precise, and complete manner so as to provide information that is comparable and representative of actual field conditions. The quality assurance samples which will be collected and used to evaluate these objectives are described below.

Quality control (QC) checks will be accomplished by submitting controlled samples to the laboratory from the field. Two external types of QC samples will be used: blanks (field blanks) and duplicates (replicate samples). A duplicate sample and field blank will be collected during every groundwater sampling event. A duplicate sample will be collected for every creek sediment sampling event. Blank and duplicate samples will be submitted to the laboratory as "blind" samples. Any samples submitted as "blind" samples will be noted in the field logbook and given a sample number that does not indicate to the laboratory that the sample is a QC check. Results of field blank analysis will be reported in the final data package.

5.1.1 Laboratory Quality Control Checks

Laboratory QC checks are accomplished through the use of system checks and QA/QC samples that are introduced into the same analysis stream. Laboratory system checks and QA/QC samples are defined below.

- Initial Calibration - Analysis of analytical standards for a series of different specified concentrations; used to define the linearity and dynamic range of the response of the mass spectrometer to the target compounds.

- Continuing Calibration - Analytical standard run every 12 hours to verify the calibration of the GC/MS system.

- Method Blank - An analytical control consisting of all reagents, internal standards, and surrogate standards carried through the entire analytical procedure. The method blank is used to define the level of laboratory background contamination.

- Calibration Check Compounds (Co) - Target compounds used to evaluate the calibration stability (precision) of the GC/MS system. Maximum percent deviations of the Co are defined in the protocol.

- System Performance Check Compounds (Specs) - Target compounds designated to monitor chromatographic performance, sensitivity, and compound instability or degradation of active sites. Minimum response factor criteria for the Sipco are defined in the protocol.

- Internal Standards - Compounds added to every standard, blank, matrix spike, matrix spike duplicate, and sample extract at a known concentration, prior to

analysis, Internal standards are used as the basis for quantitation of the target compounds.

- Surrogates - Compounds added to every blank, sample, matrix spike, matrix spike duplicate, and standard; used to evaluate analytical efficiency by measuring recovery. Surrogates are brominated, fluorinated or isotopically labeled compounds not expected to be detected in environmental media.

5.1.2 Protect Quality Control Checks

The level and types of project QC check samples that will be introduced into the analytical program for groundwater and sediment samples are described below.
The following project QC check samples will be submitted for analysis to ensure and document groundwater data quality:

- Blanks
  - Field blank
- Field duplicate
- Matrix spike
- Matrix spike duplicate

The following project QC check samples will be submitted for analysis to ensure and document creek sediment data quality:

- Field duplicate

The project QC samples are described in Section 5.1.3 of this document.

5.1.3 Specific Routine Procedures for QA/QC Data Precision, Accuracy, Representativeness, and Completeness

This section summarizes the QA/QC procedures used in assessing the quality of the chemical data and the format for presenting the results of the QA/QC evaluations.

Data evaluation procedures will be used for assessing duplicate and spike samples and checking blank samples that are submitted blind to the analytical laboratories from the field or generated internally by the laboratories. The purpose of implementing these procedures is to assess the chemical data generated for accuracy, precision, representativeness, and completeness for both the laboratory analytical program and field sample collection activities.

The primary goal of the program is to ensure that the data generated are representative of environmental conditions at the Site. To meet this goal, a combination of statistical procedures and qualitative evaluations will be used to check the quality of the data. Accuracy, precision, representativeness, and completeness will be computed in the manner described in the following paragraphs. A qualitative assessment of accuracy,

precision, representativeness, and completeness will be made and will be documented. The goal of the assessment will be to (1) establish site specific precision, accuracy, representativeness and completeness parameters; (2) use the parameters to develop a database with known limitations of data usability; and (3) evaluate these limitations in achieving the project data quality objectives (DQOs). Complex statistical data verification and a significance evaluation will not be performed. If problems arise and the data are found to deviate from previous analyses or surrounding conditions, the data will be annotated. Sample recollection and analysis will be used only in extreme cases of QC problems.

Chemical data will be evaluated according to accuracy, precision, representativeness, and completeness criteria for both the field sample collection activities and laboratory analytical programs.

The QA/QC program will evaluate the data based on three types of quality control samples (matrix spike, blanks, and duplicates). The general definitions of these types of samples are as follows:

- Spikes: Matrix spike/matrix spike duplicates (MS/MSDs) are samples created by spiking known concentrations of target analytes into a prepared portion of a sample just prior to analysis. It provides information on matrix effects encountered during analysis, i.e., suppression or enhancement of instrument signal levels. The matrix spike recovery indicates whether the selected analytical method is appropriate for the recovery of the contaminants of concern for the matrix. Principally used for determination of accuracy, but when used together with a matrix spike duplicate, the matrix spike will yield information on analytical precision by comparing its analyte recoveries with those of the matrix spike duplicate.

- Blanks: Blanks are intended to evaluate whether laboratory or field procedures represent a possible source of contamination of the field samples. There are two types of blanks that may be analyzed: field blanks and equipment blanks.

Field blanks are prepared by the sampler during the sampling event by pouring organic-free, deionized water into the actual sample containers in the field, which are kept with the investigative samples throughout the sampling event. They are then packaged for shipment with the other samples and sent to the laboratory for analysis. At no time after their preparation are the sample containers opened before they reach the laboratory. Field blanks are collected to assess the presence of contamination introduced by sample bottles of from handling of sample during field operations and shipping.

Equipment blanks are defined as samples that are obtained by pouring water through sample collection equipment after decontamination and placing it in the appropriate sample containers for analysis. These samples will be used to determine if decontamination procedures have been sufficient. Equipment blanks will not be routinely collected in this program due to the use of dedicated sampling equipment.

- Duplicate Samples

- Replicate Samples - Samples that have been divided into two or more portions at some step in the sampling and analysis process. Each portion is then carried through the remaining steps in the measurement process. A sample may be replicated in the field or at different points in the analytical process. For field replicated samples, precision information would be gained on homogeneity, handling, shipping, storage, preparation, and analysis. For analytical replicates, precision information would be gained on preparation and analysis.

Because the QA/QC samples are generated for analysis both in the field and internally by the laboratories, a system of cross-checking has been established that provides independent evaluations of the chemical data on two levels (project and laboratory).

The completeness of the data represents the amount of validated data obtained from the field programs versus the amount of data expected under normal conditions. Completeness will be assessed prior to preparation of the final report.

These procedures for evaluating the field and laboratory QA/QC data are the same and are presented below for QA/QC matrix spike, blank, and duplicate samples.

5.1.3.1 Accuracy and Precision

Accuracy and precision for sample data will be calculated in the final report by evaluating data from blanks, duplicate, and spike QA/QC samples. Procedures for evaluating accuracy and precision are described for each QA/QC sample type.

5.1.3.1.1 Spikes

The procedures for assessing spike samples will be as follows:

Tabulate spike sample data and calculate the percent recovery as shown below for each sample:

$$\text{Percent Recovery} = \frac{(T - X)}{A} \times 100$$

Where: T = total concentration found in spiked sample

X = original concentration in sample prior to spiking

A = actual spike concentration added to sample

5.1.3.1.2 Blanks

The evaluation procedures for blanks is a qualitative review of the chemical analysis data reported by the laboratories. The procedures for assessing blank samples will be as follows:

- Tabulate the data from the blank samples.
- Identify any blank samples that have target analyte chemicals detected in the sample.
- If no target analytes are detected in any blank samples, the tables are ready for entry into the data report.
- If chemicals are found in blank samples, the compound and concentration will be reported and the field data for that period of time will be assessed for potential problems with data interpretation. No data will be removed from the database based on chemicals being detected in blank samples. Appropriate notations will be made in the database reports.

5.1.3.1.3 Duplicates

The procedures for assessing duplicate samples will be as follows:

- Tabulate duplicate data and calculate the relative percent difference (RPD) as shown below for each duplicate pair.

$$RPD\ (\%) = \frac{(X_1 - X_2) \times 100\%}{X}$$

Where:

X_1 = concentration of sample 1 of duplicate/replicate

X_2 = concentration of sample 2 of duplicate/replicate

X = average of samples

5.1.3.2 Completeness

Overall completeness for the sample data collected will be determined based on validation of 20 percent of the data collected. Based upon the results of this 20 percent level of validation, a decision will be made to assume the remaining data to be valid or to increase the level of validation accordingly. If the data is considered valid and representative based upon a 20 percent validation effort, completeness of the data will be calculated on this basis.

5.1.3.3 Representatives

Representativeness is addressed previously by describing sampling techniques. Furthermore, representativeness will be assessed by the analysis and interpretation of the results of internal (laboratory) and external (field) QC samples. Precision and accuracy information developed from the evaluation of QC samples will be used to qualitatively evaluate representativeness.

5.1.4 Data, Validation, Reduction, and Reporting

All data collected will be managed, distributed, and preserved to substantiate and document that data are of known quality and are properly maintained. Technical data, including field data and the results of laboratory sample analyses, will be tracked and validated to monitor the performance of the tasks.

5.1.4.1 Data Validation

Technical data, including field data and results of laboratory sample analyses, will be validated to monitor the performance of the sampling activities. The data collection and quality assurance procedures for validating field and laboratory data are described below.

5.1.4.1.1 Laboratory Data Validation

The laboratory (under the direction of the laboratory QA officer) or others qualified and experienced in the field of laboratory data validation will review all analytical data to ensure that results for samples meet all method specified criteria. The requirements to be checked in validation are:

1. Sample Holding Times
2. Blanks
3. Surrogate Recovery
4. Matrix Spike/Matrix Spike Duplicate
5. Field Duplicate
6. Internal Standards Performance
7. Target Compound Identification
8. Interference Check Sample Analysis
9. Compound Quantitation and Reported Detection Limits

10. Overall Assessment of Data

11. Interference check sample analysis

12. Laboratory control sample analysis

The laboratory data validators will conduct an evaluation of data reduction and reporting by the laboratory. These evaluations will consider the finished data sheets, calculation sheets, document control forms, blank data, duplicate data, and recovery data for matrix and surrogate spikes. The material will be checked for legibility, completeness, correctness, and the presence of necessary dates, initials, and signatures. The results of these checks will be assessed and reported, noting any discrepancies and their effect upon acceptability of the data. In addition, validators will check for data consistency by assessing comparability of duplicate analyses, comparability to previous criteria, transmittal errors, and abnormally high or low parameter values. The results of these checks will be reported in writing.

The following is a description of the steps that will be used by the validators to validate the laboratory data. These validation results will be summarized in the Final Report. The validation steps are as follows:

- Compile a list of all samples.
- Compile a list of all QC samples, including:
    - field blanks;
    - laboratory blanks;
    - blank field duplicate samples;
    - split samples taken by other parties;
    - laboratory replicates;
    - QC performance samples;
    - bottle blanks;
    - matrix spikes; and
    - matrix spike duplicates.
- Review laboratory analytical procedures and instrument performance criteria.

- sample holding time;
- unexpected compound or parameter relationships;
- samples in which dilution was necessary;
- samples which may have exhibited carry-over; and
- time and date of sample collection.

A sample data summary will be prepared to assess precision, accuracy, and completeness of the analytical data. Laboratory records and data package requirements will be checked to assess completeness of the data package. The validation effort will be done by personnel qualified and experienced in the field of laboratory data validation.

Despite all efforts to achieve the objectives of the project, the potential for error exists in laboratory chemical analyses and in the data reporting process. Every reasonable effort will be made to compare and double-check data reported from the laboratory and data entered into the database management system.

5.1.4.1.2 Field Measurement Data Validation

Validation of data obtained from field measurements will be performed by the QA/QC Officer. Such validation will be performed by regularly checking procedures utilized in the field and comparing the data to previous measurements. Data that cannot be validated will be so documented.

Field data requiring validation includes the raw data and supportive documentation generated from field investigations and will include, but is not limited to, the following:

- field notebooks;
- field instrument readings and calibration data sheet;
- field log of sampling;
- sample labels;
- chain-of-custody forms;
- sample tracking records; and

- maps

Field measurements that could affect the quality of the data (such as temperature, pH, conductivity, water level) will also be validated. Validation of all field data will be performed in terms of meeting DQOs by checking the procedures utilized in the field and comparing the data to previous measurements. The following areas will be addressed during validation:

- sampling methodology;
- sample holding times and preservation;
- field instrument selection and use;
- field instrument calibration and standardization;
- field instrument preventative and remedial maintenance;
- field deviations; and
- units of measure and reference points from which field data will be measured.

Additional specific evaluations of data critical to the integrity of the decision-making process for this task will be performed on 20% of the data and will include:

- chain-of-custody integrity check;
- review of the appropriateness of field methodologies;
- transcription, calculation, completeness, and accuracy check of field data; and
- analysis of field notes to determine presence of bias.

5.1.4.2 Data Reduction

Data quality arid utility depends on many factors, including sampling methods, sampling preparation, analytical methods, quality control, and documentation. Once all physical and chemical data are validated and assembled, these data are further evaluated with respect to Precision, Accuracy, Representativeness, Completeness and Comparability (PARCC) parameters.

Satisfaction of these criteria will be documented as listed below. Chemical data must meet criteria of (1) quantitative statistical significance, (2) custody and document control, and (3) sample representativeness. Physical data must meet criteria of: (1) sampling location, time, and personnel; (2) documentation; and (3) methodologies.

To evaluate the custody and document control for samples and results, the following items will be documented:

1. Field custody noted in field logbook or chain-of-custody documentation available;
2. Samples hand-delivered to laboratory or chain-of-custody documentation available;
3. Laboratory custody documented by chain-of-custody documentation from either field personnel or shipper;
4. Laboratory custody documented through designated laboratory sample custodian with secured sample storage area;
5. Sample designation number(s) traceable through entire laboratory monitoring system;
6. Field notebooks and all custody documents stored in secure repository or under the control of a document custodian;
7. All forms filled out completely in indelible ink without alternations except as initialed;
8. Identity of sampler; and
9. Date of sample collection, shipping, and laboratory analysis.

To determine sample representativeness the following items must be checked:

1. Compatibility between appropriate field and laboratory measurements or suitable explanation of discrepancy;
2. Analysis within holding time limits suitable for the preservation arid analysis methods used;
3. Sample storage within suitable temperature, light, and moisture conditions;
4. Proper sample containers used;
5. Proper sample collection equipment used, properly decontaminated, not biased;
6. Proper sample preservation techniques used;

7. Proper laboratory preparation techniques used (e.g., grinding, sieving, drying, digestion);

8. An evaluation of factors to determine bias screening; and

9. Sample site selection criteria to provide representativeness.

To evaluate the field physical data that support the analytical data, the following items will be documented:

1. Sampling date and time;
2. Sampling team, observation taker and recorder, and team leader;
3. Sampling location;
4. Physical description of sampling location;
5. Sample collection technique;
6. Field preparation techniques;
7. Visual classification of sample using an accepted classification system (if applicable);
8. A thorough description of the methodology used and a rationale for the use of that methodology;
9. Complete documentation of record-keeping practices;
10. Field notebooks and all custody documents stored in a secure repository or under the control of a document custodian; and
11. All forms filled out in indelible ink without alternations except as initialed.

5.1.4.2.1 Reduction of Analytical Data

Reduction of analytical data will be performed in accordance with validation procedures described previously. These procedures specify the documentation needed and the technical criteria required to validate the data. Once validated, the data will be evaluated with respect to precision, accuracy, completeness and representativeness. The definitions of these parameters have already been presented.

Accuracy is evaluate by assessing the percent recovery for a spiked sample for organic analyses. Matrix spike (MS) and matrix spike duplicates (MSDs) are used to evaluate the data for accuracy. MS and MSDs are actual samples spiked in the laboratory with a representative group of target compound list analyses. One sample for each twenty samples, or one per analytical batch, whichever is less, is required to be used for matrix spike analysis.

Precision is evaluate by assessing the relative percent difference (RPD) of MS recoveries for two matrix spikes of the same sample (MS and MSD recoveries) for organic analyses. Precision will also be assessed by comparing results for field sample duplicates to provide information on homogeneity of field sampling techniques and on laboratory sample preparation and analysis.

Upon completion of the data validation and assessment of the data with respect to precision, accuracy, representativeness and completeness, QA/QC reports will be developed for each analytical data package. This report, along with a field activities documentation report, will be prepared summarizing the results obtained for all samples collected. Where test data have been reduced, the method of reduction will be described in the report.

5.1.4.2.2 Reduction of Field Measurement Data

Reduction of field measurement data will be done in accordance with validation procedures described previously in Section 5.1.4.1. Validity of all data will be determined by checking calibration procedures utilized in the field and by comparing the data to previous measurements obtained at the specific site. The Engineer/Site Manager will summarize the data obtained from field measurements and will include the information in the field activities documentation report, which will be submitted to the designated Project Manager for review.

5.1.4.3 Reporting

Data generated will be appropriately identified, validated, and summarized in the final report. The QA/QC Officer will develop a data storage and information system to facilitate and manipulate data for tracking, data calculations, and transfer of data to various forms and reports and transmittal of data into a data storage system.

The field reports will include: presentation of results, summaries of field data from field measurements, and field location of sampling points. All other information (Chain-of-Custody forms, etc.) will be bound into an appendix. Raw data, when provided, will be transmitted as a separate appendix. The laboratory reports will include at a minimum the following components:

- report title page;
- sample description information;
- analytical tests assigned;

- analytical results;
- quality control report;
- description of analytical methodology;
- description of QC methodology;
- significant QA/QC problems, recommended solutions, and results of corrective actions;
- discussions of whether the QA objectives were met, and the resulting impact on decision making; and
- limitations on the use of the measurement data.

6 Health and Safety Plan

Following is the Health and Safety Plan (HASP) for the Gibson Site.

6.1 Applicability

Collectively, Sections 6 and 7 of this O&M Manual constitute the HASP. This HASP is for Olin on-Site workers, consultants, and contractors that have a need to be at the Site. The HASP will be reviewed and revised as necessary. After reading the HASP, personnel will sign the signature page in Appendix D.

6.2 Purpose

The purpose of this HASP is to describe the procedures to protect on-Site personnel involved with Site operation and maintenance (e.g. routine Site maintenance, cap inspection, groundwater sampling). Personnel involved with these activities will read this HASP and conform to it. The contents of this HASP may be modified by Olin as necessary.

This HASP is not intended to include any activities related to excavation of contaminated soil. If this activity becomes necessary, a new HASP will be prepared as necessary.

This HASP (1) identifies training requirements, (2) identifies potential hazards, (3) establishes standard operation procedures (SOPs) for preventing accidents, injuries, and illnesses, (4) lists required Personal Protective Equipment (PPE), (5) establishes emergency procedures, and (6) list emergency contacts.

6.3 Training and Medical Surveillance

Following is a summary of the required training and medical surveillance program. Personnel involved in activities that do not require training such as cap inspection, routine grounds maintenance, grass cutting or other activities that do not involve exposure to groundwater or other suspected contamination are exempt from this Section (6.3). Activities that require training would include invasive O&M activities, groundwater or sediment sampling and any activities which breach the site cap.

6.3.1 Training

All Olin employees and others engaged in O&M work at the Site involving possible exposure to hazardous chemicals must receive the following:

1. A minimum of 40 hours Occupational Safety and Health Administration (OSHA) 1910.120 health and safety training.
2. A minimum of three days of field experience under the supervision of a trained, experienced supervisor.
3. An annual OSHA 8-hour refresher course.

Olin may request certification that personnel have received this training. Olin reserves the right to refuse Site access to personnel who do not meet these requirements. In addition, the environmental manager will ensure that all employees are knowledgeable of the work requirements, the potential hazards, and the safety rules that apply to the Site. This will be accomplished through safety briefings at the beginning of Site work and at regular intervals thereafter.

6.3.2 Medical Surveillance

Personnel who are required to work in areas where the potential for chemical exposure exists (e.g. groundwater) and who may have to wear protective clothing and equipment will have passed a pre-assignment and/or periodic (annual) medical examination as required in 29 CFR 1910.120 (f). Additional medical testing may be required if an overexposure or signs and symptoms of exposure occur.

Medical records will be maintained by the employee's company. If required by Olin, companies will provide documentation certifying that each employee at the Site has met the requirements of the medical surveillance program.

6.4 General Safety Requirements

The Site Environmental Specialist will ensure that unauthorized persons do not enter the Site during work activities where exposure to hazardous materials is possible, as determined by the Environmental Specialist. The Olin Niagara Falls Plant Environmental Specialist will have responsibility for Health and Safety issues at the Site.
Also:

1. A portable eyewash station, or some comparable means of irrigation, is to be present in the work area, when deemed necessary by the Specialist. The Environmental Specialist or his designee will test the device to ensure it is functioning properly before work begins.

2. No one in a work area may eat food, drink liquids, or chew gum. These activities are permitted only after employees have removed potentially contaminated garments and have washed the face and hands with soap and water. At the conclusion of the work day, employees are to wash their faces and hands, and also shower as soon as possible thereafter. Noticeable contamination on boots, gloves, etc. will be removed before these items are taken off of the Site. Items cannot be cleaned completely will be disposed of as directed by the Environmental inspector. The Environmental Specialist or his designee will ensure that all work is conducted in a manner that minimizes contact with groundwater or creek sediment.

6.5 Potential Environmental Hazards

Two types of hazards exist at the Site: chemical and physical. Proper use of industrial hygiene and personnel protective equipment (PPE) accompanied by sound hygiene practices outlined in this HASP will minimize the potential risks at the Site. Failure of equipment, failure of an individual to adhere to guidelines outlined in this HASP, or failure to use common sense will increase the potential risk.

6.5.1 Chemical Hazards

Based on data compiled from previous subsurface investigations at the Site, there are two major contaminants of concern: hexachlorobenzene (HCB) and hexachlorocyclohexane (BHC). Toxicological information on HCB and BHC is presented in Table 6.1. The principal potential hazard to workers performing tasks in this O&M Manual is skin contact with contaminated water.

BHC has a relatively low solubility and HCB has an exceptionally low solubility. Therefore, the groundwater encountered during groundwater sampling or other potential exposure scenarios will not contain appreciable amounts of the contaminants (no detections of HCB have yet occurred in off-Site monitoring wells). In addition, the vapor pressures of HCB and BHC are relatively low, minimizing the potential for the collection of hazardous vapors in the on- and off-Site piezometers and in manholes A and B. Appendix E contains analytical laboratory testing results of water samples obtained from manholes A and B. In addition, HCB and BHCs tend to sorb onto

particulate matter (e.g. soil) and tend not to partition from water to air (low Henry's Law Constant).

No physical entry of personnel into any of the manholes is anticipated. If this does become necessary the procedures to be followed will be the confined space entry procedures established for this work at the Olin Buffalo Avenue, Niagara Falls Plant.

6.5.2 Physical Hazards

Physical hazards at the Site include those common to any work place such as falls, electric shock, automobile accidents, lightening, and so on. Accidents caused by physical hazards are avoidable by using common sense and standard safety practices. Olin health and safety procedures will be followed during all Site activities. Additional physical hazards that may be found at the Site also include natural hazards and heat/cold stress.

6.5.2.1 Natural Hazards

Snake, tick, and spider bites and irritating plants (e.g. poison ivy) are potential natural hazards. Any snakebite or spider bite should be treated as a medical emergency; therefore, proper medical attention must be provided immediately. Irritating plants should be avoided if possible.

At the end of each day, all personnel should conduct self-checks for tick bites. If bitten by an infectious tick, Lyme disease could develop. Lyme disease can be treated effectively with antibiotics. Lyme disease can cause fever, rashes and headache, and in latter stages, arthritis and heart damage. If you have been bitten by a tick, please notify the company health and safety specialist as soon as possible.

An additional natural hazard located at the Site is the Cayuga Creek streambed. Though generally shallow, the downstream sediment sampling location in the creek bed can be up to three to four feet deep. For this reason, sampling sediments in the creek bed will only performed using the "buddy" system. The second sampler will observe and keep watch on the sampler in the creek bed at all times while sampling is taking place.

6.5.2.2 Heat Stress / Cold Stress

Heat Exposure

When the body temperature rises, the body seeks to dissipate the excess heat. The disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms which occur in the muscles of workers

who sweat profusely in the heat and drink large quantities of water, but fail to replace the body's lost salts and electrolytes.

Heat exhaustion is characterized by extreme weakness or fatigue, dizziness, nausea, and headache. In serious cases, a worker may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and the body temperature can be normal or slightly higher than normal. Treatment consists of rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment. Severe cases may require care for several days. There are no permanent effects.

Heat stroke is caused by the breakdown of the body's heat regulating mechanism. The skin is very dry and hot with a red or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage. Medical assistance should be given quickly. The person should be moved to a cool place. Body heat should be reduced artificially by soaking the person's clothing with water and fanning them. The following steps can be taken to reduce heat stress:

- acclimate the body;
- change work hours to coincide with the cooler part of the day;
- drink more liquids to replace body water lost during sweating;
- slightly increase the amount of salt on food;
- self-monitor by counting the pulse rate during a 30-second period as early as possible in the rest break. If the heart rate exceeds 110 beats per minute at the beginning of the rest break, shorten the next work cycle by one-third and keep the rest break the same. If the heart rate still exceeds 110 beats per minute at the next rest break, shorten the following cycle by one-third.

Cold Exposure

The human body is designed to function at a certain internal temperature. When the body temperature falls, the body compensates for the heat loss by increasing its rate of metabolism. Fatal exposure to cold among workers have almost always resulted from exposures involving failure to escape from low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the drop in the deep core temperature of the body. The deep core temperature should not fall below 96.8°F.

Lower body temperatures will likely result in reduced mental alertness, reduction in rational decision-making capability, loss of consciousness, or death.

Mild to severe pain in the extremities may be the first early warning of cold exposure. During exposure to cold, maximum severe shivering develops when the body core temperature has fallen to 95°F. Useful physical and mental work is limited when severe shivering occurs. Since prolonged cold exposure at temperatures well above freezing can lead to dangerous hypothermia, whole body protection must be provided. If work activities are performed in temperatures below 40°F, adequate insulating clothing to maintain core temperature must be worn by all workers. All workers should be aware of the effect of wind chill on exposed skin. The higher the wind speed, the lower the perceived air temperature in the work area.

6.6 PPE Levels for Cap Inspection and Mowing

PPE for cap inspection will be standard industrial attire: shirt, long pants, and steel-toed work boots. For mowing, it will be the same plus safety glasses.

If any unusual conditions exist (see the Cap Inspection Checklist, Appendix A), the inspector or mower will not enter the impacted area and will stay only long enough to take notes prior to calling Olin ERG.

6.7 PPE Levels for Monitoring Well and Sediment Sampling

PPE for cap inspection will be long-sleeve (shirt, long pants, and work boots) plus chemical-resistant, low phthalate-containing, rubber or PVC gloves. Because of the low tendency of site pesticides to volatilize from water (low Henry's Law constant), breathing zone monitoring (e.g., HNu) and respiratory protection will not be necessary during monitoring well sampling.

During monitoring or sampling activities a temporary exclusion zone will be maintained around the monitoring wells or creek sediment sampling location by the Site Environmental Specialist or his designee. Only adequately trained personnel or visitors will be allowed into the temporary exclusion zones while environmental sampling is in progress.

During monitoring or sampling activities where only one sampler is present a portable cell phone will be kept available for emergency use.

6.8 Decontamination Procedures

Because environmental sampling will largely make use of dedicated equipment decontamination of down-well measuring or sampling equipment will not be required except in the case of groundwater level monitoring probes. Decontamination of groundwater level measuring probes or any other equipment inserted into groundwater monitoring wells or piezometers was presented in Section 4.35.1 — Field Decontamination Procedures, and consisted of:

- rinse with tap water;
- scrub with soft bristle brush and a non-phosphate detergent mixed with tap water;
- rinse thoroughly with deionized water;
- allow to dry thoroughly in a clean environment; and
- wrap in plastic and seal with tape.

The above decontamination procedure (minus the final step) will also apply to all large field equipment (drilling rigs, groundwater purge equipment, etc.) which have come into contact with contaminated soil or water. Cleaning may be confined to the areas of the equipment which actually come into contact with soil or water. The O&M Manual has no provisions for construction or activities within the Site which may actually breach the cap and come into contact with contaminated soils. If these activities are required, a separate health and safety plan will be generated.

Emergency decontamination of personnel due to a chemical exposure is covered in Section 7.2.1.2.

7 Emergencies

Following are the procedures to be used at the Site in an emergency. For all emergencies, call 911.

7.1 Lines of Authority

The Olin Niagara Plant Environmental Specialist is responsible for implementing health and safety procedures and confirming that they are followed. The on-Site Olin employee or their contractor has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to increase the safety of Site personnel. The Olin Project Manager is responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. All project personnel are responsible for assisting in responding to emergency situations within the capabilities of their skills, equipment, and training.

7.2 Emergency Response

Following is information and procedures for emergencies and emergency contacts and notification. A full and more detailed list of contacts for the Site is included as Appendix F.

7.2.1 General Procedures

First-aid should be administered while awaiting an ambulance or paramedics. In the event of an injury on-Site, all activities will be immediately stopped until proper assistance has been provided to ambulance and/or hospital staff responsible for treating the injury.

All injuries and illnesses must be immediately reported to the person's supervisor and to their health and safety specialist.

Attending emergency personnel should be given the telephone number of the person's medical director to obtain immediate access to an employee's medical records and for consultation purposes.

7.2.1.1 Personal Injury

1. Administer first-aid.
2. Call for ambulance transport (911), or transport victim to nearest hospital or emergency medical center, as appropriate.
3. Notify the company health and safety specialist.

7.2.1.2 Chemical Exposure

1. Move the victim from the immediate area of exposure or contamination, taking precautions to prevent additional exposure of other individuals.
2. Decontaminate clothing or remove if safe to do so.
   - For skin or eye contact, thoroughly wash affected areas with water (eyes should flushed for at least 15 minutes).
   - For inhalation exposure, ensure that victim has adequate fresh air.
3. Call for ambulance transport, or transport victim to nearest hospital or emergency medical center, as appropriate.
4. Notify the company health and safety specialist of the exposure incident.

7.2.1.3 Fire of Explosion

1. Immediately evacuate injured personnel and leave the area.
2. Administer first aid as appropriate.
3. Notify emergency services.

7.2.1.4 Emergency Services

Police, Fire, Ambulance: call 911.

7.2.2 Emergency Contacts and Notification

Primary Contact: For all emergency situations call 911.

Secondary Contacts: See Appendix F for the names and numbers of all secondary emergency contacts.

7.2.3 Hospital Directions

Hospital directions from the Gibson Site to Mount St. Mary's Hospital:

Exit the Site onto Tuscarora Road and take a short left to the traffic signal at Niagara Falls Boulevard (Pine Avenue). Make a right onto Niagara Falls Boulevard and go approximately 0.2 miles to the traffic signal at Military Road. Take a right onto Military Road and continue on Military Road for approximately 5.2 miles to the intersection/traffic signal with Upper Mountain Road (on the left) and the 1-190 exit ramp (on the right). Approximately 0.1 mile on the left past this signal is the emergency entrance to Mount St. Mary's Hospital.

The hospital address:

Mount Saint Mary's Hospital
5300 Military Road
Lewiston, New York 14092
Emergency Room: 716-298-2325
Information Desk: 716-298-2262

Figure 7.1 presents a map showing the route from the Site to Mount Saint Mary's Hospital.

7.3 Contingency Plan

The procedures outlined in this Contingency Plan are to be implemented in the event of off-Site migration of contaminants from the Site. An indication of possible off-Site migration of contaminants from the Site would be an increase in the analytical results over four consecutive sampling events from a particular groundwater monitoring well. If this occurs further assessment of the data will be undertaken to attempt to determine the possible nature and extent of contamination and the integrity of the slurry wall/FMC cap containment system. Based on the results of the investigation a meeting will be held with representatives from Olin Corporation and the NYSDEC to discuss the contamination. If necessary, a sampling plan and a remediation program will be developed to address the source and migration of contaminants.

FIGURE 1.1

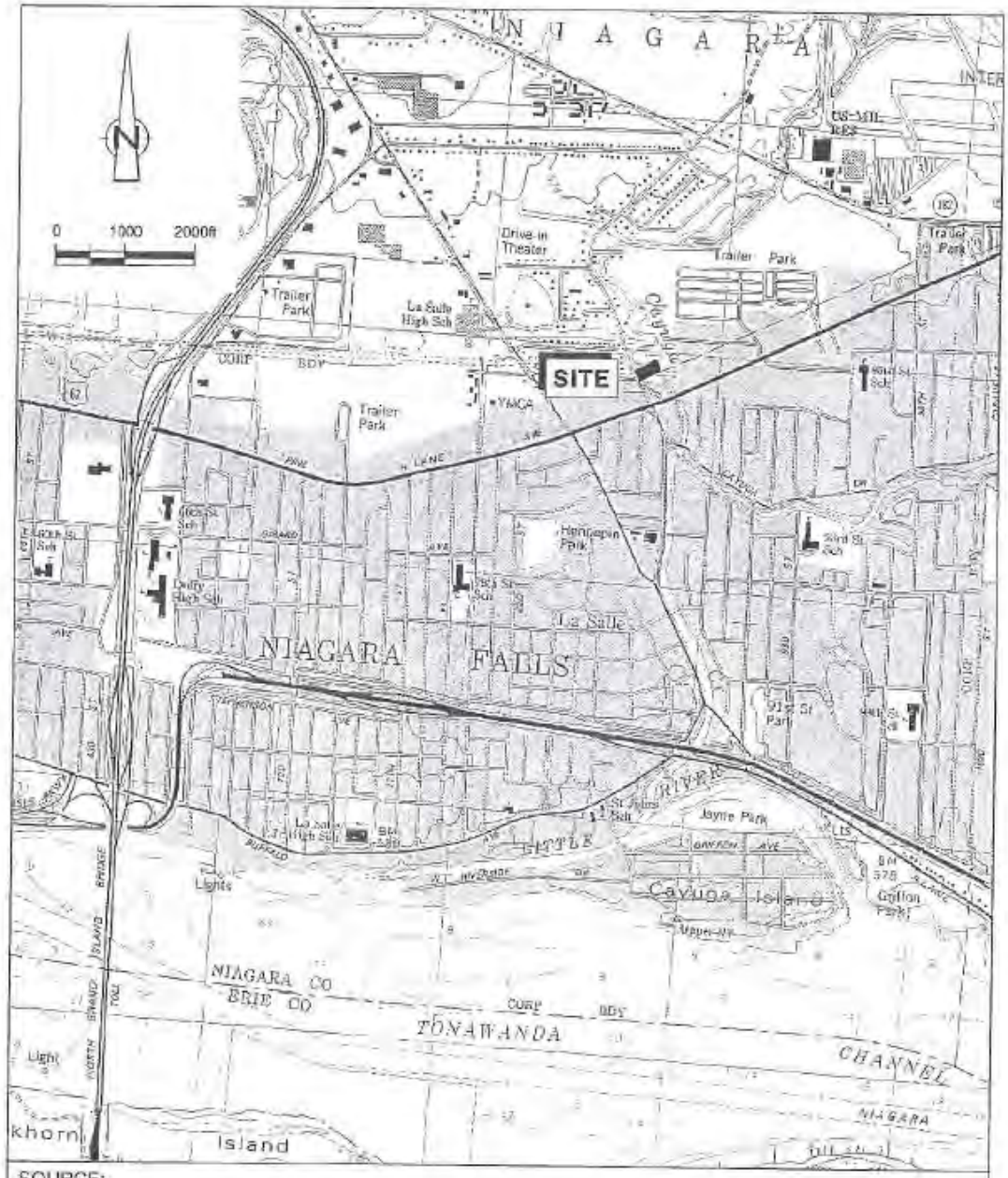

N
0 1000 2000ft
SITE
NIAGARA FALLS
La Salle
Trailer Park
Drive-in Theater
La Salle High Sch
YMCA
Hennepin Park
Joyce Park
Griffon Park
Cayuga Island
NIAGARA CO
ERIE CO
TONAWANDA
CHANNEL
NIAGARA
Island
SOURCE:
USGS TONAWANDA WEST, NEW YORK QUADRANGLE, 1980.
figure 1.1
SITE LOCATION MAP
GIBSON SITE
Niagara Falls, New York
CRA
08143-40(001)GN-NF001 MAY 31/2000

FIGURE 1.2

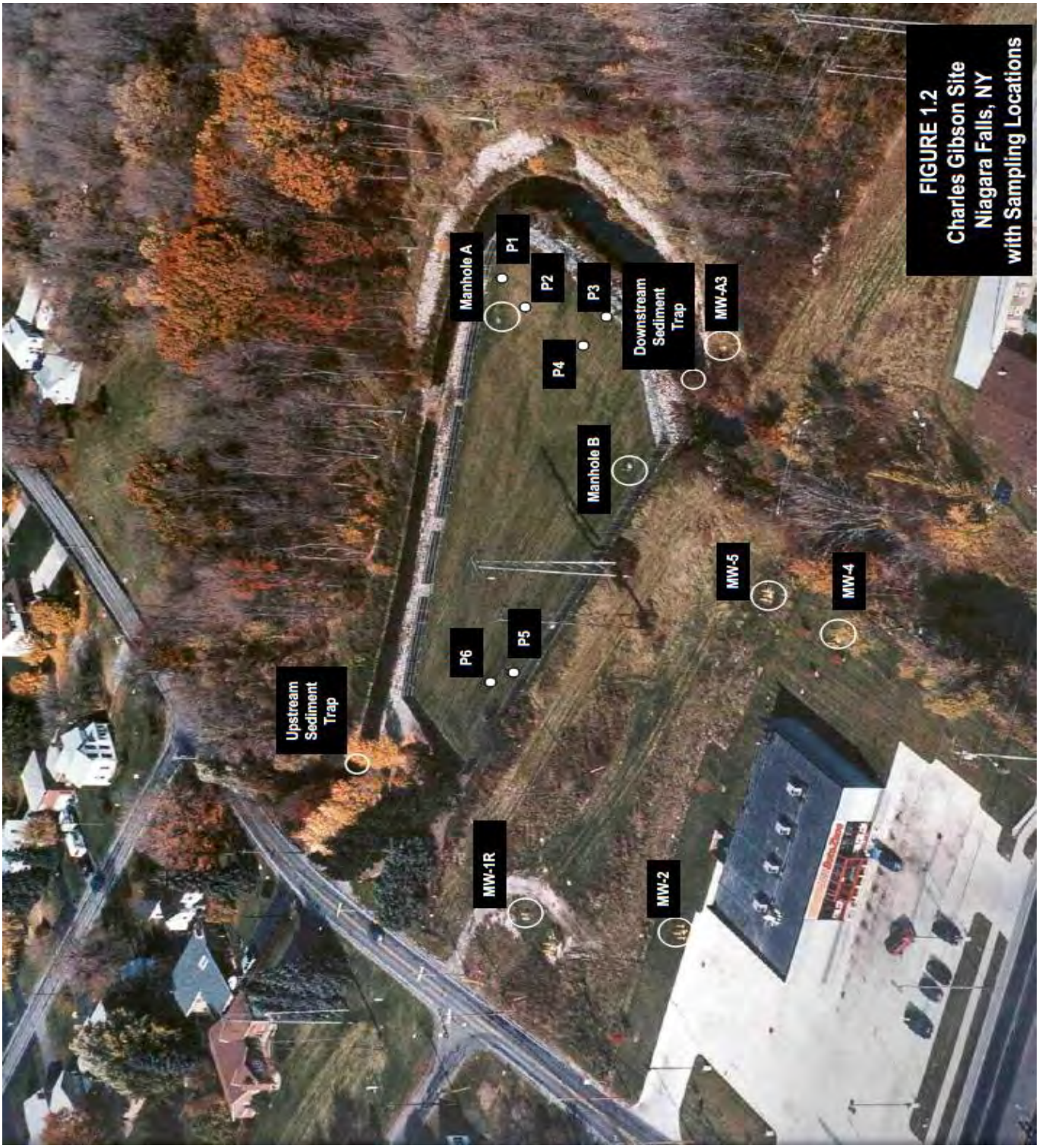


FIGURE 1.2
Charles Gibson Site
Niagara Falls, NY
with Sampling Locations
Manhole A
P1
P2
P3
P4
Downstream Sediment Trap
MW-A3
Manhole B
MW-5
MW-4
P5
P6
Upstream Sediment Trap
MW-1R
MW-2

FIGURE 1.3

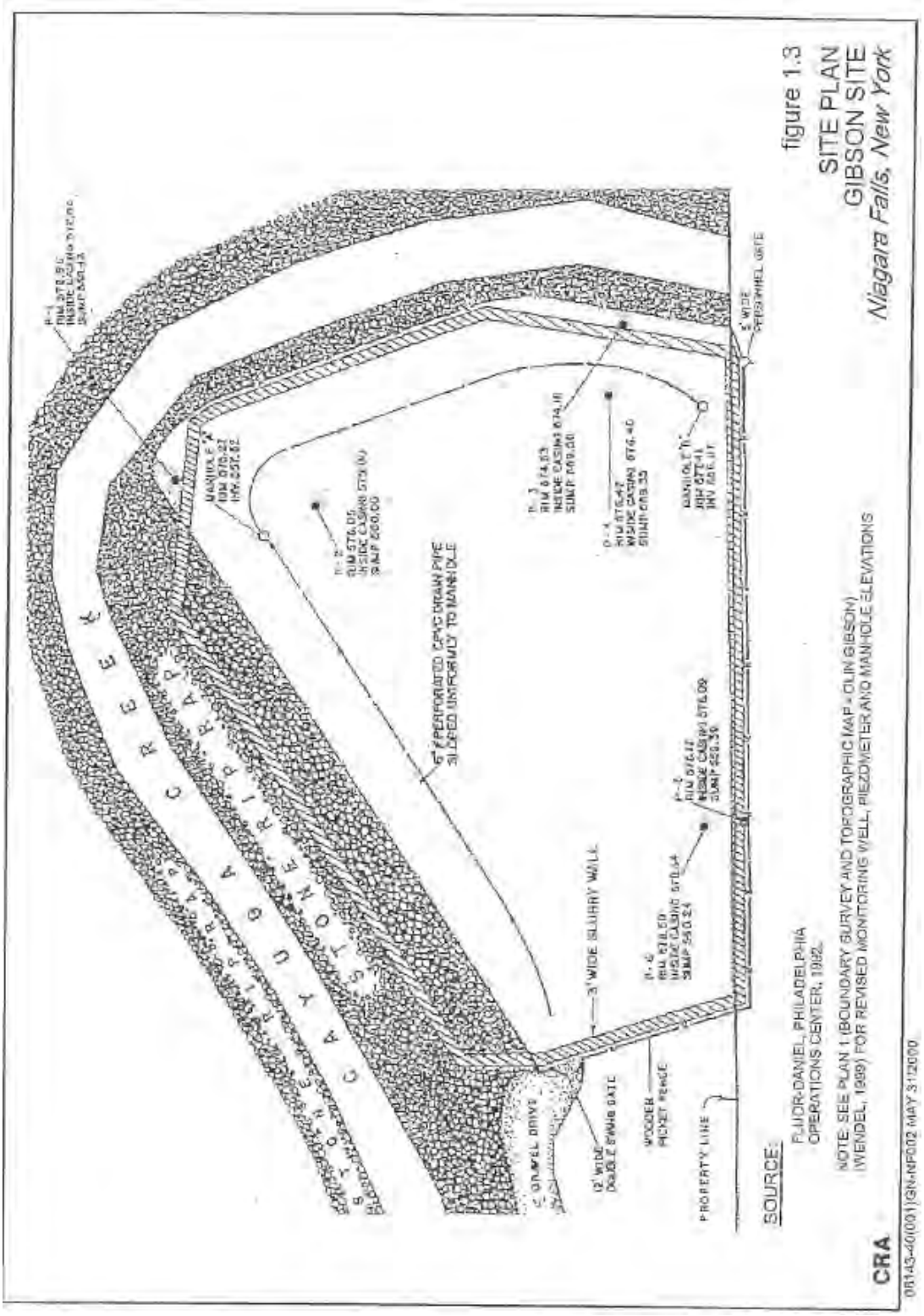
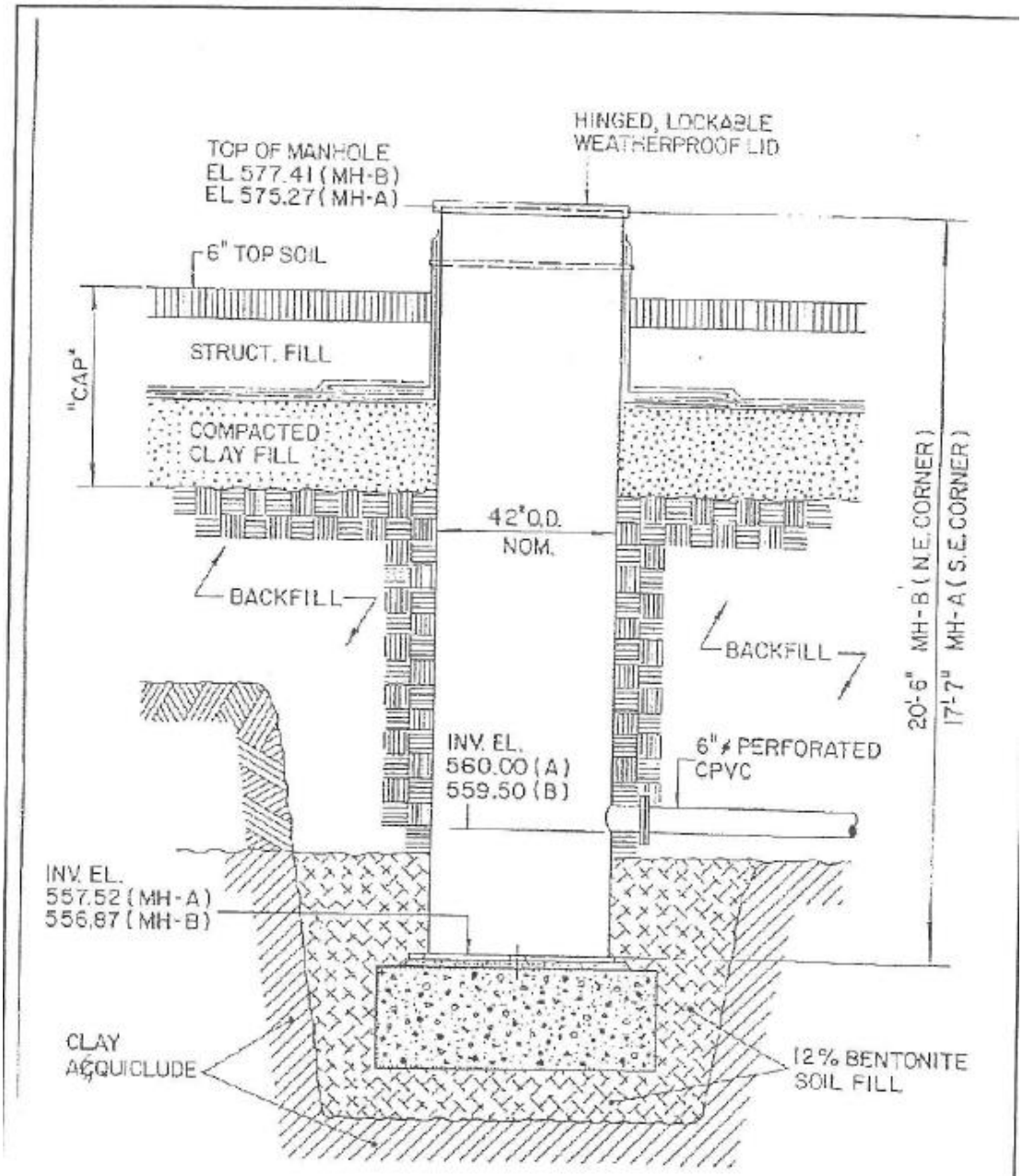


figure 1.3
SITE PLAN
GIBSON SITE
Niagara Falls, New York
SOURCE:
FLUOR-DANIEL, PHILADELPHIA
OPERATIONS CENTER, 1992.
NOTE: SEE PLAN 1 (BOUNDARY SURVEY AND TOPOGRAPHIC MAP - OLIN GIBSON)
(WENDEL, 1989) FOR REVISED MONITORING WELL, PIEZOMETER AND MANHOLE ELEVATIONS
CRA
06143-40(001)GN-NP002 MAY 3 1 2000
NIAGARA GORGE
3' WIDE SLURRY WALL
12' WIDE DOUBLE SWING GATE
WOODEN PICKET FENCE
PROPERTY LINE
5' WIDE CHAIN LINK GATE
6" PERFORATED CPVC DRAIN PIPE SLOPED UNIFORMLY TO MANHOLE

FIGURE 3.1



SOURCE:

FLUOR-DANIEL, PHILADELPHIA
OPERATIONS CENTER, 1992.

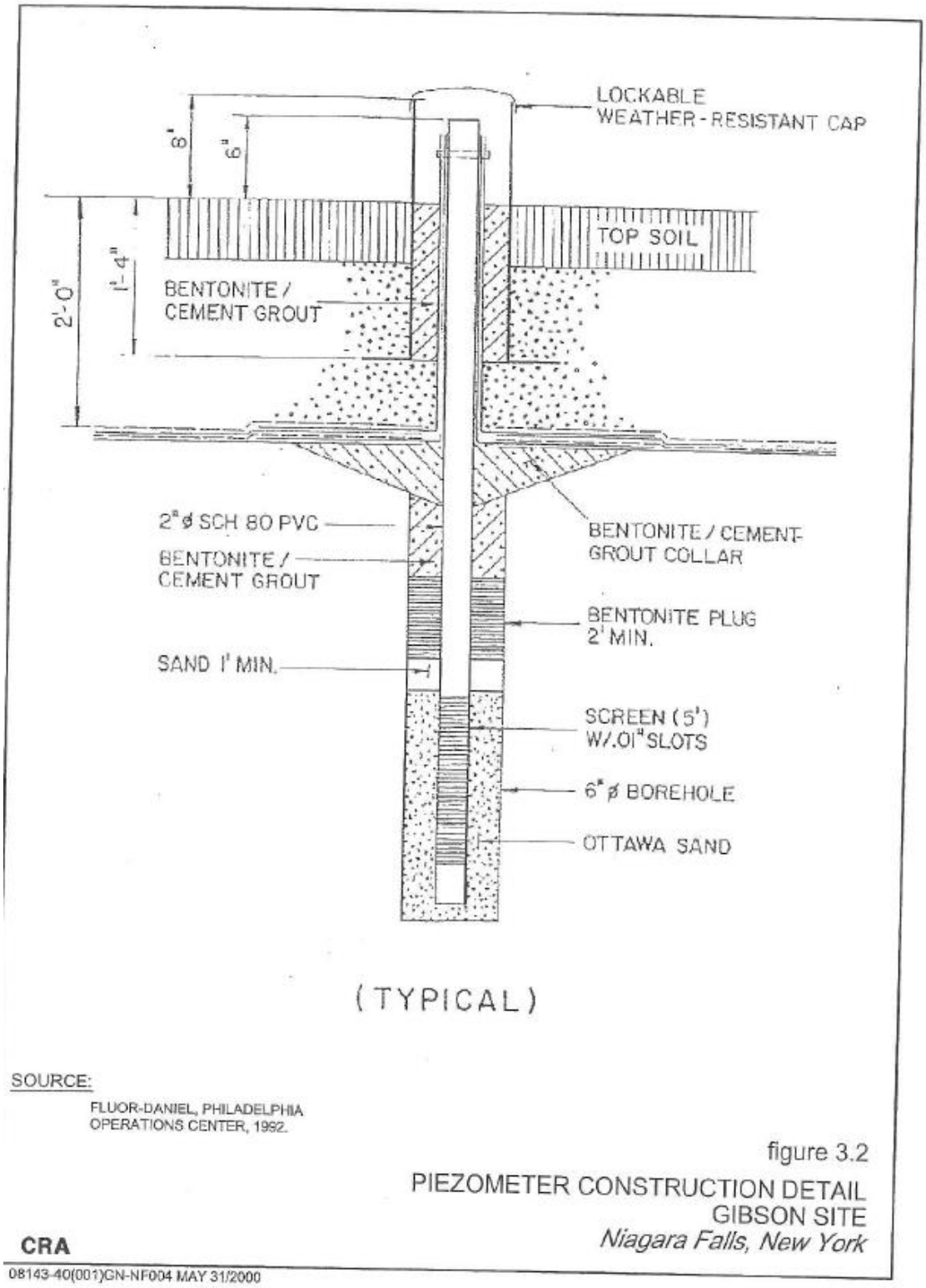
figure 3.1

MANHOLE CONSTRUCTION DETAIL
GIBSON SITE
Niagara Falls, New York

CRA

08143-40(001)GN-NF003 MAY 31/2000

FIGURE 3.2



SOURCE:

FLUOR-DANIEL, PHILADELPHIA
OPERATIONS CENTER, 1992.

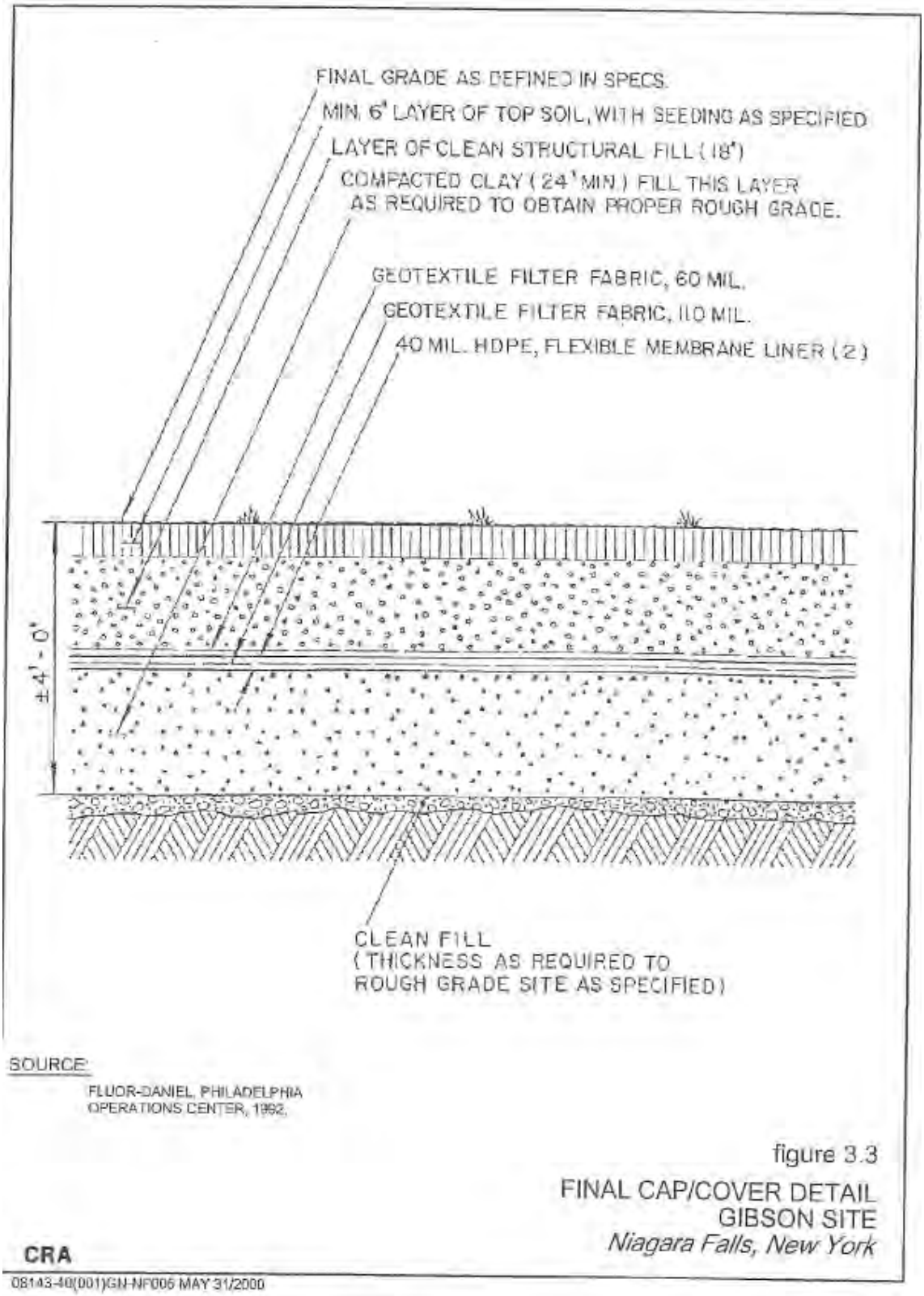
figure 3.2

PIEZOMETER CONSTRUCTION DETAIL
GIBSON SITE
Niagara Falls, New York

CRA

08143-40(001)GN-NF004 MAY 31/2000

FIGURE 3.3



SOURCE:

FLUOR-DANIEL, PHILADELPHIA OPERATIONS CENTER, 1992.

figure 3.3

FINAL CAP/COVER DETAIL
GIBSON SITE
Niagara Falls, New York

CRA

08143-40(001)GN-NF006 MAY 31/2000

FIGURE 4.1

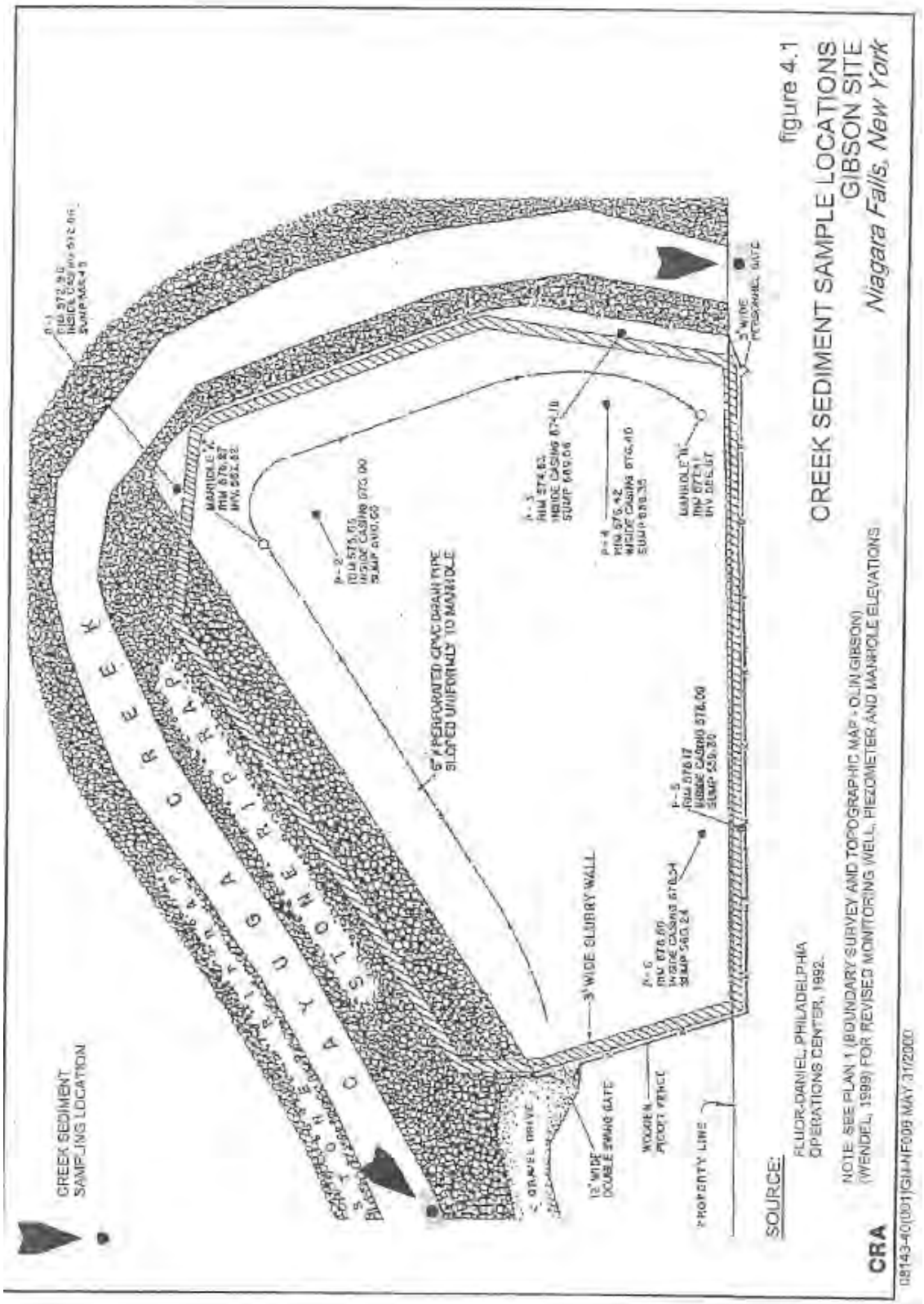
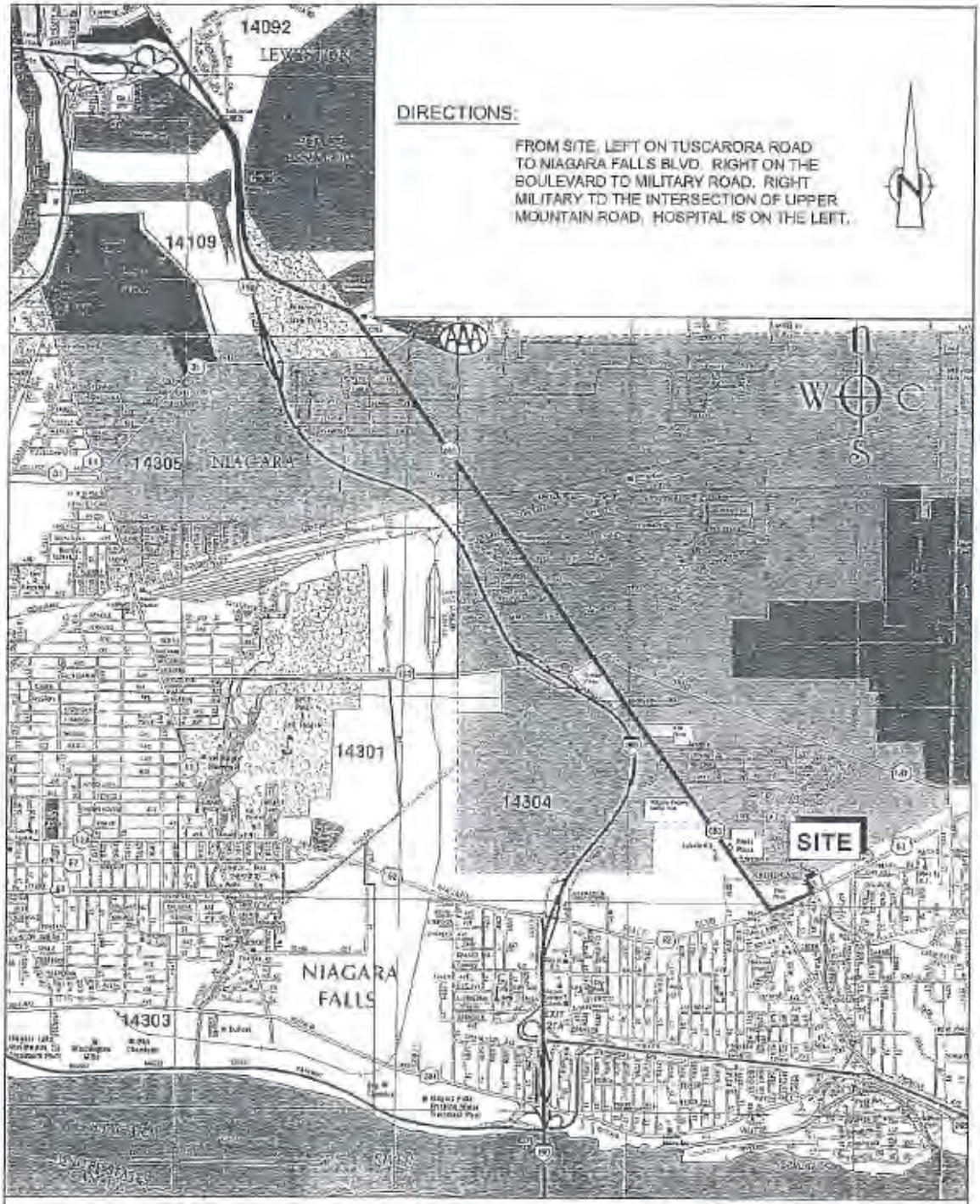


Figure 4.1
CREEK SEDIMENT SAMPLE LOCATIONS
GIBSON SITE
Niagara Falls, New York
CREEK SEDIMENT SAMPLING LOCATION
CRA
SOURCE:
FLUOR-DANIEL, PHILADELPHIA
OPERATIONS CENTER, 1992.
NOTE: SEE PLAN 1 (BOUNDARY SURVEY AND TOPOGRAPHIC MAP - OLIN GIBSON)
(WENDEL, 1999) FOR REVISED MONITORING WELL, PIEZOMETER AND MANHOLE ELEVATIONS
08143-40(001)GN-HF009 MAY 31/2000
CREEK
3' WIDE SLURRY WALL
12' WIDE DOUBLE SWING GATE
WOODEN PICKET FENCE
PROPERTY LINE
GRAVEL DRIVE
6" PERFORATED CPVC DRAIN PIPE SLOPED UNIFORMLY TO MANHOLE
3' WIDE PEDESTRIAN GATE

FIGURE 7.1


14092
LEWISTON
DIRECTIONS:
FROM SITE, LEFT ON TUSCARORA ROAD TO NIAGARA FALLS BLVD. RIGHT ON THE BOULEVARD TO MILITARY ROAD. RIGHT MILITARY TO THE INTERSECTION OF UPPER MOUNTAIN ROAD. HOSPITAL IS ON THE LEFT.
N
14109
AAA
W
E
S
14305
NIAGARA
14301
14304
SITE
NIAGARA FALLS
14303
SOURCE:
AAA WESTERN REGION OF NEW YORK STATE ROAD MAP.
figure 7.1
HOSPITAL ROUTE MAP
GIBSON SITE
Niagara Falls, New York
CRA
08143-40(001)GN-NF008 MAY 31/2000

APPENDIX A

YEARLY INSPECTION AND SAMPLING SCHEDULE

INSPECTION AND SAMPLING SCHEDULE
GIBSON SITE
NIAGARA FALLS, NEW YORK

Quarterly	Site Inspection (including Site Cover/Cap, Site Fence, Creek Riprap, Site Structures, CPVC Drain/Sump System).
Quarterly	Piezometer and sump groundwater level elevation measurements.
Annually	Groundwater monitoring well sampling for BHC isomers, rotating quarters
Annually	Cayuga Creek sediment sampling (October) for BHC isomers
Annually	Leachate sample collection and analysis (Manhole B) for BHC isomers (starting in 2000).
Annually	Annual report to NYSDEC (January).
Biennially	Groundwater monitoring well sampling (starting in April 2000) for HCB. The biennial sampling events following 2000 will alternate seasonally between April and October sampling. Next HCB sampling is October 2002.
Every Five Years	Leachate sample collection and analysis (Manhole B) (for HCB) (starting in 2000).

APPENDIX B

EXAMPLE OF FORMS

- SITE INSPECTION FORM
- GROUNDWATER ELEVATION FORM
- GROUNDWATER AND SEDIMENT SAMPLING FORM

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
SITE INSPECTION FORM

THIS FORM TO BE USED FOR QUARTERLY AND ALL OTHER SITE INSPECTIONS		
DATE:		TIME:
INSPECTOR:		COMPANY:
REASON FOR INSPECTION (QUARTERLY OR OTHER):		
GENERAL SITE CONDITIONS: U=Unacceptable A=Acceptable		
(Note: For general site conditions note existence of bare areas (number, size), cracks, subsidence (sinking), ponded water, stressed vegetation, soil discoloration or seeps, and rodent burros. For site security, note absence of locks, gates open or damaged, missing signs or evidence of vandalism. Note any other unusual occurrences.)		
	U / A	COMMENTS
ACCESS ROAD		
TREES		
WATER		
EROSION (CAP)		
EROSION (BANK)		
SECURITY:		
FENCE/LOCKS		
PIEZOMETERS/LOCKS		
MONITORING WELLS/LOCKS		
MANHOLES/LIDS/LOCKS		
ELECTRICAL PANEL		
ADDITIONAL COMMENTS:		

CHARLES GIBSON SITE

NIAGARA FALLS, NEW YORK

NYSDEC REGISTRY NO. 9-32-063

GROUNDWATER ELEVATION FORM

THIS FORM TO BE USED FOR ALL QUARTERLY PIEZOMETER AND MANHOLE GROUNDWATER ELEVATION MEASURING EVENTS				
DATE:			TIME:	
INSPECTOR:			COMPANY:	
WEATHER:				
PIEZOMETER	**RISER ELEVATION (INSIDE CASING)**	**DEPTH TO WATER (FT)**	**WATER ELEVATIONS**	**COMMENTS**
P-1	572.72			
P-2	574.89			
P-3	574.16			
P-4	576.14			
P-5	575.05			
P-6	578.28			
MANHOLE A	575.22			
MANHOLE B	577.41			

(Note: Manhole A empties into Manhole B by gravity feed and Manhole B is pumped automatically to the Town of Niagara Tuscarora Road sanitary sewer line by a float controlled sump pump which maintains groundwater elevations in Manhole B (and by extension Manhole A) below an elevation of 565 ft. above mean sea level. Therefore, Depth to water distance from the manhole rim should not be less than 14.07 ft. at Manhole B and 10.22 ft. at Manhole A. (Note: riser elevations (re)surveyed September, 1999 by Wendel Surveyors)

ADDITIONAL COMMENTS/OBSERVATIONS:

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
GROUNDWATER AND SEDIMENT SAMPLING FIELD FORM

RECORDED BY:			SAMPLE ID:
SAMPLED BY:			SAMPLING EVENT/DATE:
COMPANY:			MONITORING WELL:
			CONDITION:
GROUNDWATER PURGE DATA			**PURGE DATE:**
DEPTH TO BOTTOM FROM TOP OF RISER:		(FT)	NOTE: ALL GIBSON SITE MONITORING WELLS ARE 2" DIAMEMTER STAINLESS STEEL. WELL DEPTHS: MW-1R 12.10' MW-2 12.13' MW-A3 11.95' MW-4 13.75' MW-5 15.28'
DEPTH TO WATER FROM TOP OF RISER:		(FT)	
WATER COLUMN:		(FT)	
2" DIA. WELL CONSTANT:		0.16	
ONE WELL VOLUME=		(GALS)	
PURGE METHOD:			
BOTTOM OF WELL/SILT BUILDUP:			
PURGE START TIME:			PURGE STOP TIME:
PURGE OBSERVATIONS:			

FIELD PARAMETER MEASUREMENTS:

WELL VOLUME	pH	SPECIFIC CONDUCTIVITY (ohms/cm)	TEMP. (C or F)	NOTES
1				
2				
3				
4				
5				

TOTAL VOLUME PURGED:		
GROUNDWATER OR SEDIMENT SAMPLING DATA:		SAMPLE DATE:
MEDIA:	GROUNDWATER:	SAMPLE TIME:
	CREEK SEDIMENT:	
LOCATION:		
SAMPLING METHOD:		
SAMPLING OBSERVATIONS:		
QC SAMPLES TAKEN:		
OTHER OBSERVATIONS/COMMENTS:		

Note: specific conductivity formula to 25 degrees Celsius: $SWCA(25a) = \frac{SC\ measured}{\{\{T-25)(0.2)\} + 1}$

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
GROUNDWATER SAMPLING FIELD PARAMETERS
FIELD INSTRUMENTATION CALIBARTION FORM

DATE:	**SEMI-ANNUAL SAMPLING EVENT:**		
PERSON CALIBRATING METERS:			
pH METER USED	MANUFACTURER:		
	MODEL		
	IDENTIFICATION/CONTROL NUMBER:		
	CALIBRATION STANDARDS USED:		
	STANDARD 7.00 METER READ:		
	STANDARD 4.00 METER READ:		
	STANDARD 10.00 METER READ:		
METER CALIBRATION COMMENTS:			
SPECIFIC CONDUCTIVITY METER USED	MANUFACTURER:		
	MODEL:		
	IDENTIFICATION/CONTROL NUMBER:		
	CALIBRATION STANDARDS USED:		
	STANDARD 0 USED:	_____ AIR	_____ WATER
	STANDARD:	READ:	
	STANDARD:	READ:	
	STANDARD:	READ:	
METER CALIBRATION COMMENTS:			
THERMOMETER USED	TYPE:		
	MANUFACTURER:		
	IDENTIFICATION/CONTROL NUMBER:		
	COMMENTS: (Does thermometer temperature agree with specific conductivity meter temperature?)		
	OTHER:		
OTHER INSTRUMENTS USED	TYPE:		
	MANUFACTURER:		
	IDENTIFICATION/ CONTROL NUMBER:		
	CALIBRATIONS PERFORMED:		
OTHER CALIBRATION COMMENTS:			

HEALTH AND SAFETY PLAN SIGNATURE PAGE
GIBSON SITE
NIAGARA FALLS, NEW YORK

By signing below, I certify that I have read Sections 6 and 7 of this O&M Manual about health, safety, and emergency procedures for the Olin Gibson Site and that I agree to confirm to those procedures.

Signature	Printed Name	Organization	Date

APPENDIX C

EARTHWORK SPECIFICATIONS FOR FINAL COVER REPAIR

APPENDIX C

EARTHWORK SPECIFICATIONS FOR FINAL COVER REPAIR

INTRODUCTION

The following sections document the general construction practices to be performed in the event that repairs to the final cover are required.

SITE PREPARATION

A. Mechanical or hand equipment used in the repair and compaction of cover soils will be of standard practice and shall be suitable for performing the required work in a timely and efficient manner.

B. Excess vegetation and all deleterious material in the repair area shall be disposed of at an Olin-approved location off-site. This removal should be completed in conjunction with fill placement or excavation in the repair area.

C. Where the total repair volume exceeds 10 cubic yards, all materials used for the repair area must be inspected by a qualified engineer.

D. The ground surface prepared to receive fill should be carefully scarified to avoid damage to the FML materials until it is uniform and free of uneven features which may prevent uniform compaction. The scarified ground surface shall then be brought to the specified moisture content and compaction. If the scarified zone is greater than 12 inches in depth, the excess shall be removed and placed in lifts of 6 to 8 inches in thickness.

E. If additional soil is necessary to complete repairs, the material will be selected from approved borrow areas, and shall be tested to ensure that the characteristics of the borrow material are consistent the soil characteristics of the layer being repaired.

REPAIR CONSTRUCTION

A. **CLAY LAYER** shall be restored, in the event of required repairs, to a minimum of 24" of compacted clay with a saturated hydraulic conductivity less than 1 x 10^{-7} centimeters per second (cm/sec). The clay barrier shall be placed in lifts not exceeding 8" in loose thickness. Each lift shall be compacted to a minimum of 90 percent Standard Proctor Density (ASTM D698-91) using approved hand-held equipment. Clay in-place density and moisture content shall be controlled and verified by field testing to be maintained within the range demonstrated likely to produce an in-place permeability of less than 1 x 10^{-7} cm/sec. The clay is to be free of rocks, sticks or other deleterious materials that could cause possible damage to the FML. The finished surface of the clay shall be smooth, uniform and free of voids.

B. **FLEXIBLE MEMBRANE LINER (FML**) repairs shall be designed and inspected by a qualified QA engineer and an installer approved by Gundle, the geomembrane manufacturer. Several repair procedures are listed below. The final decision as to the appropriate repair procedure and equipment shall be agreed upon between Olin and the qualified QA engineer:

1. Patching is used to repair large holes, tears, and contamination by foreign matter;
2. Grinding and rewelding is used to repair small section of extruded seams;
3. Spot welding or seaming is used to repair small tears, pinholes, or other minor localized flaws;
4. Capping is used to repair large lengths of failed seams;
5. Topping is used to repair areas of inadequate seams which have an exposed edge;
6. Removing base seam and replacing it with a strip of new material welded into place is used with large lengths of fusion seams.

In addition, the following provisions shall be satisfied.

1. Surfaces of the geomembrane which are to be repaired shall be ground no more than one hour prior to the repair;
2. All surfaces must be clean and dry at the time of the repair;
3. Patches or caps shall extend at least six inches (6") beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least three inches (3"");
4. The geomembrane below large areas should be appropriately cut to avoid water collection between the two liners.
5. The QA engineer and the installer will use the Construction Quality Assurance/Quality Control Plan for non-destructive tests to verify the integrity of all repairs. At the discretion of the QA engineer, large caps may require destructive test sampling. Failed tests indicate that a repair shall be redone and retested until a passing test results.

C. **GEOTEXTILE FILTER FABRIC** repairs will be performed as required. The fabric shall be placed over each FML, spread smoothly and lap spliced. Thicknesses of the fabrics shall be 60 mil (ASTM D1777-96) over the top FML and 110 mil (ASTM D1777-96) between FMLs.

D. **STRUCTURAL FILL MATERIAL** shall be place in lifts with a maximum loose thickness of five inches (5"), and shall be prudently compacted by hand to 90 percent maximum Standard Proctor Density near the optimum water content. Each layer shall be spread evenly and thoroughly mixed to obtain near uniform condition of material in each layer. The surface of the structural fill layer shall be prepared by tilling prior to placement of topsoil to obtain a better bond between the two layers.

E. **TOPSOIL LAYER** shall be restored to ± 6" of friable, fertile soil. The soil shall be free of roots, stones larger than 2" in greatest dimension, sticks litter and other deleterious material. Provide soil that is from a well-drained site, and that is characteristic of local soils capable of sustaining healthy plant life. Topsoil shall not be delivered to the site or used while in a frozen or muddy condition. The soil shall have a pH between 6.0 and 7.0, and shall be classified as sandy loam, loam or silty loam by the USDA textural classification system. All areas will be permanently seeded as soon as possible after grading. The seed mix indicated in the construction specifications will be applied. Straw mulch will be distributed evenly over the permanent seed. Newly seeded areas will be watered initially and in hot or arid weather conditions.

APPENDIX D

HASP SIGN OFF SHEET

Health and Safety Plan Signature Page
Gibson Site
Niagara Falls, New York

By signing below, I certify that I have read Sections 6 and 7 of this O&M Manual about health, safety, and emergency procedures for the Olin Gibson Site and that I agree to conform to those procedures.

Signature	Printed Name	Organization	Date

APPENDIX F

SPECIFIC LISTS OF CONTACTS FOR THE GIBSON SITE

Olin Corporation in Niagara Falls. New York

OLIN CORPORATION
2400 Buffalo Avenue
Niagara Falls, NY 14302
(716) 278-6411

General Number	*(716) 278-6411*
Rob Meyer, Environmental Specialist	*(716) 278-6422*
Craig Dickman, Security/Safety	*(716) 278-6537*
Gate 4/Guardhouse (24 hours)	*(716) 278-6469*

Olin Corporation — Environmental Remediation Group, Cleveland, TN
3855 North Ocoee Street, Suite 200
Cleveland, TN 37312

Adam B. Carringer Project Manager (423) 336-4057

Environmental Consultants / Samplers
Stevenson Environmental Services, Niagara Falls, NY

Michael Walker Site Overseer (716) 583-4460 (cell)

APPENDIX F

SPECIFIC LISTS OF CONTACTS FOR THE GIBSON SITE

EMERGENCY CONTACTS AND NOTIFICATION

Olin Corporation — Niagara Falls
Security/Safety ..... (716) 278-6445
or
Gate 4 (24 Hour) ..... (716) 278-6469

Rob Meyer Environmental Specialist 716-278-6422

Olin Corporation — Cleveland, Tennessee
Adam B. Carringer, Project Manager ..... (423) 336-4057

Ambulance
Niagara Ambulance ..... *(716) 284-4228*

Hospital
Mount St. Mary's Hospital ..... (716) 297-4800

Police ..... 911 or (716) 286-4711

Fire .....911 or (716) 286-4725

Western New York Poison Control 1-800-888-7655

Contacts in the Event of a Spill Incident
Olin Security/Safety Niagara Fall Plant ..... (716) 278-6469
NYSDEC 24-Hour Emergency 1-800-457-7362
National Response Center 1-800-424-8002

APPENDIX I SITE MANAGEMENT FORMS

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
SITE INSPECTION FORM

THIS FORM TO BE USED FOR QUARTERLY AND ALL OTHER SITE INSPECTIONS		
DATE:		TIME:
INSPECTOR:		COMPANY:
REASON FOR INSPECTION (QUARTERLY OR OTHER):		
GENERAL SITE CONDITIONS: U=Unacceptable A=Acceptable		
(Note: For general site conditions note existence of bare areas (number, size), cracks, subsidence (sinking), ponded water, stressed vegetation, soil discoloration or seeps, and rodent burros. For site security, note absence of locks, gates open or damaged, missing signs or evidence of vandalism. Note any other unusual occurrences.)		
	U / A	COMMENTS
ACCESS ROAD		
TREES		
WATER		
EROSION (CAP)		
EROSION (BANK)		
SECURITY:		
FENCE/LOCKS		
PIEZOMETERS/LOCKS		
MONITORING WELLS/LOCKS		
MANHOLES/LIDS/LOCKS		
ELECTRICAL PANEL		
ADDITIONAL COMMENTS:		

CHARLES GIBSON SITE

NIAGARA FALLS, NEW YORK

NYSDEC REGISTRY NO. 9-32-063

GROUNDWATER ELEVATION FORM

THIS FORM TO BE USED FOR ALL QUARTERLY PIEZOMETER AND MANHOLE GROUNDWATER ELEVATION MEASURING EVENTS				
DATE:			TIME:	
INSPECTOR:			COMPANY:	
WEATHER:				
PIEZOMETER	**RISER ELEVATION (INSIDE CASING)**	**DEPTH TO WATER (FT)**	**WATER ELEVATIONS**	**COMMENTS**
P-1	572.72			
P-2	574.89			
P-3	574.16			
P-4	576.14			
P-5	575.05			
P-6	578.28			
MANHOLE A	575.22			
MANHOLE B	577.41			

(Note: Manhole A empties into Manhole B by gravity feed and Manhole B is pumped automatically to the Town of Niagara Tuscarora Road sanitary sewer line by a float controlled sump pump which maintains groundwater elevations in Manhole B (and by extension Manhole A) below an elevation of 565 ft. above mean sea level. Therefore, Depth to water distance from the manhole rim should not be less than 14.07 ft. at Manhole B and 10.22 ft. at Manhole A. (Note: riser elevations (re)surveyed September, 1999 by Wendel Surveyors)

ADDITIONAL COMMENTS/OBSERVATIONS:

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
GROUNDWATER AND SEDIMENT SAMPLING FIELD FORM

RECORDED BY:			SAMPLE ID:
SAMPLED BY:			SAMPLING EVENT/DATE:
COMPANY:			MONITORING WELL:
			CONDITION:
GROUNDWATER PURGE DATA			**PURGE DATE:**
DEPTH TO BOTTOM FROM TOP OF RISER:		(FT)	NOTE: ALL GIBSON SITE MONITORING WELLS ARE 2" DIAMEMTER STAINLESS STEEL. WELL DEPTHS: MW-1R 12.10' MW-2 12.13' MW-A3 11.95' MW-4 13.75' MW-5 15.28'
DEPTH TO WATER FROM TOP OF RISER:		(FT)	
WATER COLUMN:		(FT)	
2" DIA. WELL CONSTANT:		0.16	
ONE WELL VOLUME=		(GALS)	
PURGE METHOD:			
BOTTOM OF WELL/SILT BUILDUP:			
PURGE START TIME:			PURGE STOP TIME:
PURGE OBSERVATIONS:			

FIELD PARAMETER MEASUREMENTS:

WELL VOLUME	pH	SPECIFIC CONDUCTIVITY (ohms/cm)	TEMP. (C or F)	NOTES
1				
2				
3				
4				
5				

TOTAL VOLUME PURGED:		
GROUNDWATER OR SEDIMENT SAMPLING DATA:		SAMPLE DATE:
MEDIA:	GROUNDWATER:	SAMPLE TIME:
	CREEK SEDIMENT:	
LOCATION:		
SAMPLING METHOD:		
SAMPLING OBSERVATIONS:		
QC SAMPLES TAKEN:		
OTHER OBSERVATIONS/COMMENTS:		

Note: specific conductivity formula to 25 degrees Celsius: $SWCA(25a) = \frac{SC\ measured}{\{\{T-25)(0.2)\} + 1}$

CHARLES GIBSON SITE
NIAGARA FALLS, NEW YORK
NYSDEC REGISTRY NO. 9-32-063
GROUNDWATER SAMPLING FIELD PARAMETERS
FIELD INSTRUMENTATION CALIBARTION FORM

DATE:	**SEMI-ANNUAL SAMPLING EVENT:**		
PERSON CALIBRATING METERS:			
pH METER USED	MANUFACTURER:		
	MODEL		
	IDENTIFICATION/CONTROL NUMBER:		
	CALIBRATION STANDARDS USED:		
	STANDARD 7.00 METER READ:		
	STANDARD 4.00 METER READ:		
	STANDARD 10.00 METER READ:		
METER CALIBRATION COMMENTS:			
SPECIFIC CONDUCTIVITY METER USED	MANUFACTURER:		
	MODEL:		
	IDENTIFICATION/CONTROL NUMBER:		
	CALIBRATION STANDARDS USED:		
	STANDARD 0 USED:	_____ AIR	_____ WATER
	STANDARD:	READ:	
	STANDARD:	READ:	
	STANDARD:	READ:	
METER CALIBRATION COMMENTS:			
THERMOMETER USED	TYPE:		
	MANUFACTURER:		
	IDENTIFICATION/CONTROL NUMBER:		
	COMMENTS: (Does thermometer temperature agree with specific conductivity meter temperature?)		
	OTHER:		
OTHER INSTRUMENTS USED	TYPE:		
	MANUFACTURER:		
	IDENTIFICATION/ CONTROL NUMBER:		
	CALIBRATIONS PERFORMED:		
OTHER CALIBRATION COMMENTS:			

APPENDIX J MANHOLE B SAMPLING PROCEDURE

Sampling procedure for the Olin Corp. Charles Gibson Site.

A. Procedure for obtaining a water sample from Manhole B.
Make sure that this sample is taken prior to dumping in the purge water from other sampling activities on site.

1. Spread polyethylene sheeting on the ground at the work area.
2. Set up the sample pump and the instruments for measurement of parameters.
3. Unlock and open the hinged manhole cover.
4. Carefully, reach in and retrieve the dedicated tubing that is to be used in the sample pump. It will be hanging on the discharge piping just inside the manhole opening. Mount one end of the tubing onto the pump according to the pump directions.
5. Run the pump for 60 seconds, to flush out the hose, recycle the water back into the manhole.
6. Take the sample by discharging the water into the appropriate, labeled bottle.
7. Measure for field parameters according to the O&M manual, pack the sample according to the O&M manual and ship to the lab for analysis.
8. Disassemble the hose from the pump and return it securely to the discharge piping in the well, for future use.
9. Clean up the work area and make sure that the manhole cover is closed and locked before leaving the area.

APPENDIX K FINAL REPORT FOR DIRECT DISCHARGE SYSTEM

#932063

FINAL REPORT
FOR
DIRECT DISCHARGE SYSTEM

CHARLES GIBSON SITE
TOWN OF NIAGARA, NEW YORK

Prepared for:
Olin Corporation

Prepared by:
Rust Environment & Infrastructure
Greenville, South Carolina

May 1997

RECEIVED
JUN - 9 1997
NYSDEC-REG. 9
FOIL
___REL ___UNREL

List of Attached Drawings:

Drawing No.

	Cover Sheet
1	Site Plan
2	Civil/Mechanical Details
3	Electrical Details

1.0 INTRODUCTION

The Charles Gibson Site (Site) is a remediated inactive hazardous waste disposal site (NYSDEC Registry No. 9-32-063) located in Niagara Falls, New York. The remedy consisted of re-routing a section of Cayuga Creek around and away from the disposal area, installation of a fully circumscribed slurry wall barrier and installation of a double flexible membrane liner cap with a perimeter collection drain system. The remedial action was completed in 1990. Plans for the operation and maintenance (O&M) of the containment remedy for the site and long term groundwater monitoring are in place.

During 1996, construction of a sewer connection was completed which allows direct discharge of groundwater from the perimeter collection drain system to the local wastewater treatment facility. The direct discharge system became fully operational during March 1997 and is monitored under a discharge permit (No. 45) issued by the City of Niagara Falls Wastewater Treatment Facility (Appendix A).

1.1 Background

Prior to the construction of the direct discharge system, groundwater was pumped from the Site (Manhole B) on a periodic basis and transported to an approved TSD facility for disposal. The objectives of the direct discharge system were to minimize operation and maintenance, and allow for real time measurement of the volume of groundwater being discharged to the sanitary sewer system.

1.2 Direct Discharge System Approvals

Design and installation of the direct discharge system were completed with active participation of the New York State Department of Environmental Conservation (NYSDEC), Town of Niagara, and the City of Niagara Falls. All sanitary sewer system tie-in requirements for the Town of Niagara were met during design and construction. The NYSDEC was provided design drawings.

2.0 DIRECT DISCHARGE SYSTEM

The direct discharge system consists of an automatic pumping system that discharges, through dual containment pipe, to the sanitary sewer system. A flow monitoring system records daily discharge data via telemetry to Olin Corporation.

2.1 Groundwater Collection and Transfer

Groundwater is collected in a perimeter collection drain system installed as part of the Site remedy. A ½ hp submersible pump was installed at the bottom of Manhole B, located in the southeast corner of the Site. The pump operates automatically based on the level of groundwater within Manhole B. Float switches for the pump are set so that the pump maintains a groundwater level which provides an inward gradient. The pump float switches are set to turn the pump on at elevation 564.474 feet, and to turn the pump off at elevation 561.00 feet.

Collected groundwater is pumped to the sanitary sewer line on Tuscarora Road through a dual containment pipe. The dual containment piping was installed using directional drilling techniques. The pipe was installed under the Site cap as shown on the attached drawings. The carrier pipe is a 2-inch, high density polyethylene (HDPE) pipe. Secondary containment is provided using a 4-inch HDPE pipe. All pipe connections were made using butt fusion techniques. The pipe penetration at Manhole B was extrusion welded to the HDPE manhole. The 4-inch pipe was connected to the existing house connection. A cleanout was installed downstream of the connection for maintenance purposes.

2.2 Instrumentation and Control Functional Description

All the instrumentation and control equipment is located in a NEMA 4X enclosure as shown on the attached drawings. A Sparling (Tiger Mag) magnetic flow meter was installed in Manhole B. The magnetic flow meter transmits a pulse output (one pulse equals 10 gallons pumped) to the flow meter transmitter. The flow meter transmitter totalizes daily flows and communicates with the phone dialer. The phone dialer transmits daily flow totals via telemetry to Olin Corporation. The detailed Instruction, Operation and Maintenance Manual for the instrumentation is included in Appendix B.

3.0 MONITORING AND REPORTING

The Site monitoring and reporting requirements for the City of Niagara Falls Wastewater Discharge Permit No. 45 are summarized in Table 1.

TABLE 1

CHARLES GIBSON SITE
1505 Tuscarora Road
Niagara Falls, NY 14304
Discharge Monitoring Permit No. 45
Permit Monitoring Station Identification: **MS#1 (Manhole B)**

DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

PARAMETER	DISCHARGE LIMITATIONS			MONITORING REQUIREMENTS	
	Annual Avg.	Daily Max.	Units	Measurement Frequency	Sample Type
Flow	350	500	gal/day	Continuous	Flow meter
Total Suspended Solids	100	200	lbs/day	1/ quarter	1 grab sample
Soluble Organic Carbon	25	50	lbs/day	1/ quarter	1 grab sample

DISCHARGE MONITORING REPORTING REQUIREMENTS

PARAMETER	REPORTING FREQUENCY	REPORTING DATES
Flow	Quarterly	2/28, 5/31, 8/31, 11/30
Total Suspended Solids	Quarterly	2/28, 5/31, 8/31, 11/30
Soluble Organic Carbon	Quarterly	2/28, 5/31, 8/31, 11/30

DISCHARGE MONITORING AND SAMPLING SCHEDULE

QUARTER	SAMPLE DATE
FIRST	2nd week in December
SECOND	2nd week in March
THIRD	2nd week in June
FOURTH	2nd week in September

Note: Grab samples are required to be collected at Manhole B (MS#1).

APPENDIX A

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

RECEIVED
SEP 01 1995
LORRAINE MILLER

August 28, 1995

RECEIVED
SEP 01 1995
LORRAINE MILLER

Ms. Lorraine Miller
Olin Corporation
P.O. Box 248
1186 Lower River Road NW
Charleston, TN 37310

Dear Mrs. Miller,

The City has completed the review of your discharge permit application. Attached is a copy of your facilities discharge permit. Please note all condition, limitations and reporting requirements.

Please contact Mr. Joel Paradise at (716)286-4978 to arrange contact for monitoring and inspections at the site. Please also notify Mr. Paradise prior to initiating the discharge.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ/kkl

cc: W. Bolents
J. Paradise
File 45A

CITY OF NIAGARA FALLS
DEPARTMENT OF WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 45 OLIN CORPORATION - (CHARLES GIBSON SITE)

In accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code; Sewer Use Ordinance, as adopted by City Council on July 25, 1983; et seq. and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: OLIN CORPORATION

located at: CHARLES GIBSON SITE - 1505 TUSCARORA ROAD, NIAGARA FALLS, NY 14304

classified by SIC No(s): NONE

for the contribution of wastewater into the City of Niagara Falls Publicity-Owned Treatment Works (POTW).

Effective this 1ST day of SEPTEMBER, 1995

To Expire this 1ST day of SEPTEMBER, 2000

This permit modified _____

Robert E. Game
Director of Wastewater Facilities

Signed this 25th day of August 1995

DISCHARGE IDENTIFICATION

OUTFALL	DESCRIPTION	LOCATION	RECEIVING
MS # 1	Monitoring Site No. 1 (Manhole B)	1505 Tuscarora Road	Groundwater leachate from inactive hazardous waste landfill

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
A. Discharges to the City Sewer		
1. Identification of all discharges to the City Sewer System on a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED AUGUST 1, 1995
2. Identification of each contributing waste stream to each discharge to the City Sewer System clearly marked on, or referenced to, a current plant sewer map certified by a New York State licensed professional engineer.	NONE	SUBMISSION RECEIVED AUGUST 1. 1995
3. Elimination of all uncontaminated discharges to the City Sewer System. All uncontaminated flows should be clearly identified on a current sewer map certified by a New York State licensed professional engineer.	NONE	
4. Establishment of a control manhole that is continuously and immediately accessible for each discharge to the City Sewer System.	NONE	ESTABLISHED AUGUST 1, 1995
B. Wastewater Discharge Management Practices		
1. Identification of responsible person(s) (day to day and in emergencies).	SUBMISSION REQUIRED	15 DAYS MINIMUM PRIOR INITIATING DISCHARGE
C. Slug Control Plan**		
1. Pursuant to Section 40 CFR 403.12 (v) of the Federal Pretreatment Standards the City will evaluate the permittee, a minimum	NONE	PERFORMED BY THE CITY

WASTEWATER DISCHARGE PERMIT REQUIREMENTS FOR:	ACTION REQUIRED	REQUIRED DATE OF SUBMISSION
of once every two years for the need for a "Slug Control Plan". If a plan is required by the City then the plan shall contain, at a minimum, the following elements: a) Description of discharge practices, including non-routine batch discharges; b) Description of stored chemicals; c) Procedures for immediately notifying the POTW of slug discharges, including any discharge that would violate a prohibition under 40 CFR 403.5 (b), with procedures for follow-up written notification within five days; d) If necessary, procedures to prevent adverse impact from accidental spills, including inspection and maintenance of storage areas, handling and transfer of materials, loading and unloading operations, control of plant site run-off, worker training, building of containment structures or equipment, measures for containing toxic organic pollutants (including solvents), and/or measures and equipment necessary for emergency response.		
2. A written commitment from a responsible party of manpower, equipment and materials required to expeditiously control and remove any harmful quantity discharged.	SUBMISSION REQUIRED	30 DAYS AFTER EFFECTIVE DATE OF PERMIT

** This section applies to all compounds limited by the City's SPDES Permit and all prohibited wastewater discharges (See Section 250.5.1-A of the Sewer Use Ordinance)

D. General Wastewater Discharge Permit Conditions

1. Flow monitoring should be performed concurrently with any Wastewater Discharge Permit sampling and should be reported at the same time as analytical results. If it is not feasible to perform flow monitoring, an estimate of flow (method of estimated flow preapproved by city) should be submitted with the analytical results.

2. All sampling for billing and pretreatment compliance purposes shall be coordinated through the City's Industrial Monitoring Coordinator.

3. All analysis must be performed by a State certified laboratory using analytical methods consistent with 40 CFR 136 and quality control provisions as required by the City's Environmental Chemist. The permittee shall report the results as directed in Section G of this permit. Results should be reported using the Method Detection Limit (MDL). Reporting results less than MDL shall be indicated in the report by a less than sign (<) followed by the numeric MDL concentration reported by the laboratory. In these cases the pollutant load shall be calculated and reported as zero (0). The MDL shall be defined as the level at which the analytical procedure referenced is capable of determining with a 99% probability that the substance is present. The value is determined in reagent water. The precision at this level is +/- 100%.

4. An estimate of relative production levels for wastewater contributing processes at the time of any pretreatment compliance sampling shall be submitted upon request of the Director of Wastewater Facilities.

5. All samples shall be handled in accordance with EPA approved methods. Chain of Custody records shall be submitted with all sampling results.

6. All conditions, standards and numeric limitations of Section 250 of the Sewer Use Ordinance are hereby incorporated into this permit by reference. These conditions, standards and numeric limitations must be complied with. Failure to comply with any part of said ordinance constitutes a violation and is subject to enforcement actions(s) described in Section 250.9 of said ordinance, and in the City's Pretreatment Administrative Procedure Number Five (5) - "Enforcement Response Guide". In the event of a violation, including slug discharges or spills, the City must be notified immediately by phone and confirmed by letter within five (5) working days.

7. In accordance with Federal Regulation CFR 40, Part 403.12(g), any exceedance of a numeric standard noted by the SIU must be re-sampled, analyzed and resubmitted to the City's Wastewater Facilities (WWF) within 30 days.

8. Sampling frequency for any permitted compounds may be increased beyond the requirements set forth in Section F and G of this permit. If the permittee monitors (sample and analysis) more frequent than required under this permit, all results of this monitoring must be reported.

9. As noted in Section 250.6.2 of the Sewer Use Ordinance, "Personnel as designated by the Director shall be permitted at any time for reasonable cause to enter upon all properties served by the City WWF for the purpose of, and to carry out, inspection of the premises, observation, measurement, sampling and testing, in accordance with provisions of the Ordinance."

10. As noted in Section 250.5.3 of the Sewer Use Ordinance, significant changes in discharge characteristics or volume must be reported immediately to the WWF.

11. As noted in Section 250.5.4 of the Sewer Use Ordinance, samples required to be collected via a 24 hour composite sampler must be retained refrigerated for an additional 24 hour plus unrefrigerated an additional 48 hours (total 72 hours).

12. As noted in Section 250.5.4 of the Sewer Use Ordinance, all "SIU's shall keep on file for a minimum of 5 years, all records, flow charts, laboratory calculations or any other pertinent data on their discharge to the WWF."

13. As noted in Section 250.6.8 of the Sewer Use Ordinance, "Permits are issued to a specific user for a specific monitoring station. A permit shall not be reassigned or transferred without the approval of the Director which approval shall not be unreasonably withheld. Any succeeding owner or user to which a permit has been transferred and approved shall also comply with all the terms and conditions of the existing permit."

14. The Annual Average Limitation is equivalent to the specific SIU allocation, and shall be defined as the permissible long term average discharge of a particular pollutant. These limitations are listed in Section F of this permit. The computation of the Annual Average shall be as follows; for each compound listed in Section G of this permit, the Annual Average shall be the average of the present monitoring quarter and three previous quarters data.

15. The Daily Maximum Limitation shall be defined as the maximum allowable discharge on any one day. The Daily Maximum Limitation will allow for periodic short term discharge fluctuations. These specific limitations are listed in Section F of this permit.

16. Enforcement of the Annual Average Limitation shall be based on the reported average of the last four quarters data vs the Annual Average Limited listed in Section F of this permit. Enforcement of the Daily Maximum Limitation shall be based on individual analysis results vs. the Daily Maximum Limit listed in Section F of this permit. These results may be obtained from self monitoring (Section G), City Verification, incident investigation or billing samples.

17. The City's Administrative Procedure Number 6 "Procedure for Determination and Use of Local Limits" lists all pollutants noted in the City WWF SPDES Permit. The limits defined in the procedure are values which are based on the quantity of substances discharged which can be easily related to the Treatment Plant's removal capacity.

    The pollutants listed in this procedure which are <u>not</u> specifically listed in Section F and G of this permit may be present in the permittee's wastewater discharge, but at levels which do not require specific permit limitations. Consequently, if any of the limits listed in this procedure, for pollutants <u>not</u> identified in Section F and G of this permit, are exceeded then the permittee shall undertake a short-term, high intensity monitoring program for that pollutant. Samples identical to those required for routine monitoring purposes shall be collected on each of at least three operating

days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the limit was first exceeded.

If levels higher than the limit are confirmed the permit may be reopened by the City for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

Sewer Use billing for Flow, TSS, SOC and any other billable pollutants detected in the permittee's discharge shall be based on quarterly self monitoring report data and City's verification analysis.

2. Flow Measurement and Sample Collection:

a. The estimated volume to be discharged is approximately 200 gallons per day. This flow shall be continuously monitored by a flow measurement system installed in Manhole "B" (MS # 1) as identified on the attached site map. The daily flow as well as average monthly flow shall be reported in the Quarterly Self Monitoring Report.

b. Samples shall be collected during discharge at MS # 1 as required in this permit. The results shall be reported in the permittee's Quarterly Self Monitoring Report.

F. Discharge Limitations & Monitoring Requirements

During the Period beginning the effective date of this Permit and lasting until the expiration date, discharge from the permitted facility outfall(s) shall be limited and monitored by the permittee as specified below.

OUTFALL NUMBER/ EFFLUENT PARAMETER	DISCHARGE LIMITATIONS ANNUAL AVERAGE	DAILY MAXIMUM	UNITS	MINIMUM MONITORING REQUIREMENTS MEASUREMENT FREQUENCY	SAMPLE TYPE
MS # 1 Flow	350	500	gal / day	Continuous	By Flow Meter
MS # 1 Total Suspended Solids	100	200	lbs / day	1 / Quarter	1 - Grab Sample
MS # 1 Soluble Organic Carbon	25	50	lbs/ day	1 / Quarter	1 - Grab Sample

F. Discharge Limitations & Monitoring Requirements con't

SAMPLE TYPE FOOTNOTES

(1) Sample shall consist of a laboratory composite of four grabs collected equally throughout the batch discharge period. A total of four samples (batches) will be analyzed and reported each quarter for each outfall.

(2) Sample shall consist of a 24 hour laboratory composite of four grab samples, one taken each six hours, collected for each outfall.

(3) Sample shall consist of a 24 hour flow proportion composite sample collected from each monitoring station.

(4) Flow will be monitored continuously via water meters.

(5) Sample shall consist of a 24 hour time proportion composite sample from each approved discharge monitoring point.

(6) Determination of quantities shall be derived from five 24 hour time proportion composite samples collected from each approved monitoring point.

(7) Same as (3), however, 5 samples will be collected per quarter from the monitoring station and analyzed by and at the City's expense.

G. Discharge Monitoring Reporting Requirements

During the period beginning the effective date of this permit and lasting until its expiration date, discharge monitoring results shall be summarized and reported by the permittee; Monthly - 14 days after monitoring period, Quarterly - by the last day of the monitoring period = February 28, May 31, August 31, November 30. Semiannual reports shall be submitted on the last day of the monitoring period = February 28, August 31. The annual average for each parameter listed in Section F, shall be computed and reported quarterly. The individual sample analysis for present quarter shall also be reported quarterly unless directed otherwise in this permit.

OUTFALL NO	PARAMETER	REPORTING FREQUENCY
MS # 1	Flow *	Quarterly
MS # 1	Total Suspended Solids	Quarterly
MS # 1	Soluble Organic Carbon	Quarterly

NOTE: * DAILY FLOW AND MONTHLY AVERAGE FLOWS SHALL BE REPORTED

H. Comments/Revisions

1.

FILE COPY

Olin CHEMICALS
P.O. BOX 248, 1186 LOWER RIVER ROAD NW, CHARLESTON, TN 37310
Phone: (423) 336-4000

June 12, 1996

Mr. Albert C. Zaepfel
Industrial Monitoring Coordinator
City of Niagara Falls
Department of Wastewater Facilities
Enforcement Division
1200 Buffalo Avenue
Niagara Falls, NY 14302-0069

RE: Charles Gibson Site
Olin Corporation
Wastewater Discharge Permit No. 45
Modified Permit - Intrajurisdictional Agreement

Dear Mr. Zaepfel:

Enclosed is the original signed Intrajurisdictional Agreement for Wastewater Discharge Permit No. 45 for the above referenced site.

Please call me at (423) 336-4381 with any questions or comments.

Sincerely,

OLIN CORPORATION

L. M. Miller
Sr. Associate Environmental Specialist

LMM394

cc: J. E. Reed
M. J. Hinton (NYSDEC)

bcc: J. W. Strassburg
D. L. Cummings

FILE COPY

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

April 18, 1996

RECEIVED
APR 22 1996
LORRAINE MILLER

Ms. Lorraine M. Miller
Sr. Environmental Associate Specialist
Olin Corporation
PO Box 248
1186 Lower River Road NW
Charleston TN 37310

Dear Ms. Miller:

As discussed with you in our recent phone conversation, enclosed are the modified pages of the permit for Olin's Charles Gibson Site. The changes reflect the need to include an intra jurisdictional agreement because the site is located outside of the City boundary.

Please have a "responsible corporate official" sign the agreement. Please also retain a copy for your files and send the original to me.

Sincerely,

DEPARTMENT OF
UTILITIES/WASTEWATER

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:vr
Encs.
cc: File 45 A
\33.96

CITY OF NIAGARA FALLS
DEPARTMENT OF WASTEWATER FACILITIES
SIGNIFICANT INDUSTRIAL USER
WASTEWATER DISCHARGE PERMIT

PERMIT NO. 45 OLIN CORPORATION - (CHARLES GIBSON SITE)

In accordance with all terms and conditions of Chapter 250 of the City of Niagara Falls Municipal Code; Sewer Use Ordinance, as adopted by City Council on July 25, 1983; et seq. and also with all applicable provisions of Federal and State Law or regulation:

Permission is Hereby Granted To: OLIN CORPORATION

located at: CHARLES GIBSON SITE - 1505 TUSCARORA ROAD, NIAGARA FALLS, NY 14304

classified by SIC No(s): NONE

for the contribution of wastewater into the City of Niagara Falls Publicity-Owned Treatment Works (POTW).

Effective this 1ST day of SEPTEMBER, 1995

To Expire this 1ST day of SEPTEMBER, 2000

This permit modified 4/10/96

William G. Bolents

William G. Bolents
Acting Director of Wastewater Facilities

Signed this 15th day of APRIL 1996

days and analyzed. Results shall be expressed in terms of both concentration and mass, and shall be submitted no later than the end of the third month following the month when the limit was first exceeded.

If levels higher than the limit are confirmed the permit may be reopened by the City for consideration of revised permit limits.

E. Specific Wastewater Discharge Permit Conditions

1. Billing Agreement:

Sewer Use billing for Flow, TSS, SOC and any other billable pollutants detected in the permittee's discharge shall be based on quarterly self monitoring report data and City's verification analysis.

2. Flow Measurement and Sample Collection:

a) The estimated volume to be discharged is approximately 200 gallons per day. This flow shall be continuously monitored by a flow measurement system installed in Manhole "B" (MS # 1) as identified on the attached site map. The daily flow as well as average monthly flow shall be reported in the Quarterly Self Monitoring Report.

b) Samples shall be collected during discharge at MS # 1 as required in this permit. The results shall be reported in the permittee's Quarterly Self Monitoring Report.

3. Intra-Jurisdictional Agreement

The permittee shall abide by the intra-jurisdictional agreement dated April 10, 1996 identified as Attachment No. 1

ATTACHMENT NO. 1

INTRA JURISDICTIONAL AGREEMENT

THIS AGREEMENT made and entered into as of the 10th day of April 1996, by and between the City of Niagara Falls, a municipal corporation duly established by law in the State of New York, hereinafter referred to as the "City," and business corporate signatories of this Agreement, hereinafter referred to as "User."

WITNESSETH:

WHEREAS, the United States Environmental Protection Agency, hereinafter referred to as "USEPA," established mechanisms and procedures for enforcing national pretreatment standards controlling the introduction of wastes from nondomestic sources into Publicly Owned Treatment Works (POTW's); and

WHEREAS, certain rules have been promulgated by the USEPA for the purpose of implementing those mechanisms and procedures; and

WHEREAS, the City has in operation, a POTW which must comply with the rules promulgated by the USEPA; and

WHEREAS, the rules mandate that the City control the contribution of pollutants to the POTW by each Industrial User to ensure compliance with the applicable pretreatment standards and requirements; and

WHEREAS, in compliance with those rules the City has established by Ordinance adopted July 30, 1984 et. seg., a permit system for the purpose of controlling industrial contribution to the POTW which must be complying with by the User; and

WHEREAS, the User desires to contribute industrial wastes into the City's POTW; and

WHEREAS, the source of the User's industrial waste is located in part or wholly outside the legal jurisdiction of the City and the City and User agrees that the User would not be bound by the City's Ordinance unless the User agreed to be so bound; and

WHEREAS, the User, in consideration of the privilege of contributing its industrial wastes to the City's POTW agrees:

1. To be bound and comply with the requirements of the City's Ordinance referred to in the preamble above;
2. To waive as a defense to any actions, civil or criminal by the City, arising out of the User's contributions to the City's POTW, the fact that the User and User's source are not entirely located within the jurisdiction of the City and its ordinances;
3. To comply with all requirements set forth in the approved wastewater discharge permit; and
4. To pay to the City all fees, costs, charges and expenses which are imposed upon the User in accordance with the requirements of the Ordinance or the permits and rate structure authorized by the ordinance; and
5. To the extent provided in the City's ordinance and the permit, and consistent with the procedures therein established, to promptly comply with any orders, directives or notices issued by the City relative to the User's contributions to the POTW including, but not limited to, suspending or reducing the User's quantity or composition

of the contributed industrial wastes when the City has determined the User to be in violation of the permit or if the safety of the public or the operation of the POTW is believed to be endangered.

IN WITNESS WHEREOF, the City and User have caused their respective corporate seals to be hereunto affixed and attested, and these presents to be signed by their respective officers thereunto duly authorized, and this Agreement to be dated as of the day and year first above written.

APPROVED:

USER: Olin Corporation - Charles Gibson Site
(Located on Tuscarora Road near Niagara Falls Blvd.)

BY: ARR Roseke

TITLE: Senior VP Corporate Affairs

FOR THE CITY OF NIAGARA FALLS:

BY: James C. Galie
James C. Galie

TITLE: Mayor - City of Niagara Falls, NY

ATTEST:

Elsie M Paradise
Elsie M. Paradise
City Clerk

FILE COPY

Olin CHEMICALS

P.O. BOX 248, 1186 LOWER RIVER ROAD NW, CHARLESTON, TN 37310
Phone: (615) 336-4000

November 28, 1995

Mr. Albert C. Zaepfel
Industrial Monitoring Coordinator
City of Niagara Falls
Department of Wastewater Facilities
Enforcement Division
1200 Buffalo Avenue
Niagara Falls, NY 14302-0069

RE: Charles Gibson Site
Olin Corporation
Wastewater Discharge Permit No. 45

Dear Mr. Zaepfel:

This letter is provided to comply with the Wastewater Discharge Permit Requirements for: Wastewater Discharge Management Practices (Section B.1) for the above referenced site.

The designated Olin person responsible for day to day or emergency contacts relating to the site for the City of Niagara Falls Wastewater Treatment Facilities is Mr. James E. Reed. Mr. Reed can be reached at the Olin Niagara Falls operating facility listed below:

OLIN CORPORATION
2400 Buffalo Avenue
Niagara Falls, NY 14303

Phone: (716) 278 - 6422 or (716) 278 - 6469

As an update on status, the site has not yet initiated any discharge to the POTW under this permit. You will be notified prior to initiating any discharge. For any environmental issues concerning the site please contact me at (423) 336-4381.

Sincerely,

OLIN CORPORATION

L. M. Miller

L. M. Miller
Sr. Associate Environmental Specialist

LMM/cp
359

cc: J. W. Strassburg
D. L. Cummings
L. E. Murray
J. E. Reed
M. J. Hinton NYSDEC
D. Woodcook Jr.

City of Niagara Falls, New York

FILE COPY

P.O. Box 69, Niagara Falls, NY 14302-0069

RECEIVED
NOV 27 1995
LORRAINE MILLER

November 27, 1995

Ms. Lorraine M. Miller
Associate Environment Specialist
Olin - Charles Gibson Site
P.O. Box 248
Charleston, TN 37310-0248

Dear Ms. Miller:

At long last I have updated the City's Self Monitoring Report Form. Hopefully, I have included a complete list of all the pollutants for quarterly reporting. The update was completed in hopes you will no longer have to hand write additional pollutants on the form. The other changes makes it more convenient for the Organic Chemical and Synthetic Fibers Categorical Users (OCPSF) to report their semi - annual analysis results.

Please begin using the new form in the next quarter or two.

Sincerely,

DEPARTMENT OF WASTEWATER FACILITIES

Albert C. Zaepfel
Industrial Monitoring Coordinator

ACZ:md
Enc.
cc: File 45 E

CITY OF NIAGARA FALLS
DEPARTMENT OF WASTEWATER FACILITIES
ENFORCEMENT DIVISION

SELF MONITORING REPORT
SIGNIFICANT INDUSTRIAL USERS

PERMIT NO. _____ QUARTER _____

INDUSTRY NAME _____

Pursuant to federal pretreatment reporting requirements and the City Sewer Use Ordinance Chapter 250, Significant Industrial Users shall submit periodic self monitoring and compliance reports. Such reports shall be submitted using this form, according to the following schedule:

Quarterly	-	1st Quarter by February 28th
	-	2nd Quarter by May 31st
	-	3rd Quarter by August 31st
	-	4th Quarter by November 30th
Semi - Annual	-	by February 28th AND
	-	by August 31st

Each section of this report form shall be filled out for those parameters listed in Section "G" of the company's Wastewater Discharge Permit. The analysis results must be reported in both concentration and mass. In addition, the calculated annual average load (lbs/day) for each pollutant shall also be reported.

The samples shall be collected at the monitoring points identified in the user permit. Identification of those points in this report should be as listed on Page two (2) of the user permit.

SELF MONITORING REPORT
SIGNIFICANT INDUSTRIAL USERS

PAGE 2

PART II of the report is the Compliance Monitoring section. The user is obligated to determine if the analysis results indicates compliance or non-compliance. All violations noted should be brought to the City's attention immediately upon noting and should also be reported in this section. The analysis result should be compared against all applicable federal, state and local standards and limitations. If no violations are noted then "NO VIOLATIONS" should appear on the report.

Pursuant to 40 CFR Part 403.12 g of the federal standards, all violations noted must be followed up by a sample recollect/analysis and the results submitted to the City within thirty (30) days of first becoming aware of the violation.

Pursuant to 40 CFR Part 403.12 g , all Periodic Self Monitoring Reports must be signed by a "responsible company official" certifying the following statement.

> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who mange the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signed: _____ DATE: _____

\SMRSIU

PART I
ANALYTICAL RESULTS

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS mg / L		RESULTS LBS / DAY		ANNUAL AVERAGE mg / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
TOTAL SUSPENDED SOLIDS						
SOLUBLE ORGANIC CARBON						
TOTAL PHOSPHOROUS						
TOTAL PHENOL						
OIL AND GREASE						
CADMIUM						
CHROMIUM						
COPPER						
LEAD						
MERCURY						
NICKEL						
ZINC						
ARSENIC						
BERYLLIUM						
BARIUM						
TOTAL CYANIDE						
pH (STANDARD UNITS)						
RESIDUAL CHLORINE						
SODIUM CHLORIDE						

PART I
ANALYTICAL RESULTS

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS ug/L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
BENZENE						
CARBON TETRACHLORIDE						
CHLORODIBROMOMETHANE						
MONOCHLOROBENZENE						
DICHLOROBROMOMETHANE						
CHLOROFORM						
1,1 - DICHLOROETHYLENE						
1,2 - DICHLOROETHYLENE						
BROMOFORM						
DICHLOROPROPYLENES						
ETHYLBENZENE						
1,1,2,2 - TETRACHLOROETHANE						
TETRACHLOROETHYLENE						
TOLUENE						
1,1,1 - TRICHLOROETHANE						
1,1,2 - TRICHLOROETHANE						
TRICHLOROETHYLENE						
METHYLENE CHLORIDE						
MONOCHLOROTOLUENES						
MONOCHLOROBENZOTRIFLURIDE						
VINYL CHLORIDE						
TETRAHYDRAFURAN						
XYLENE						

PART I
ANALYTICAL RESULTS

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS ug / L		RESULTS LBS DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
DIMETHYL PHTHALATE						
BUTYL BENZYL PHTHALATE						
DIBUTYL PHTHALATE						
NITROSODIPHENYLAMINE						
DICHLOROBENZENES						
DICHLOROTOLUENE						
ACENAPHTHENE						
FLUORANTHENE						
CHRYSENE						
NAPHTHALENE						
BENZO (a) ANTHRACENE						
PYRENE						
TRICHLOROBENZENE						
TRICHLOROTOLUENE						
HEXACHLOROBUTADIENE						
TETRACHLOROBENZENE						
HEXACHLOROCYCLOPENTADIENE						
HEXACHLOROBENZENE						
DICHLOROBENZOTRIFLUORIDE						

PART I
ANALYTICAL RESULTS

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS ug/L		RESULTS LBS / DAY		ANNUAL AVERAGE ug/L	ANNUAL AVERAGE LBS/DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
PHENANTHRENE						
MONOCHLOROPHENOL						
DICHLOROPHENOL						
MONOCHLOROCRESOL						
TRICHLOROPHENOL						
PENTACHLOROPHENOL						
HEXACHLOROCYCLOHEXANES						
PCB'S						
ENDOSULFAN I + ENDOSULFAN II + ENDOSULFAN SULFATE						
MIREX						
DECHLORANE PLUS						
HEPTACHLOR + HEPTACHLOR EPOXIDE						

PART I
ANALYSIS RESULTS
(OCPSF SEMI - ANNUAL POLLUTANT LIST)

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS ug / L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
1,2,4 - TRICHLOROBENZENE						
1,2 - DICHLOROETHANE						
1,1,1 - TRICHLOROETHANE						
HEXACHLOROETHANE						
1,1 - DICHLOROETHANE						
1,1,2 - TRICHLOROETHANE						
CHLOROETHANE						
1,2 - DICHOROBENZENE						
1,3 - DICHLOROBENZENE						
1,4 - DICHLOROBENZENE						
1,1 - DICHLOROETHYLENE						
1,2 - TRANS - DICHLOROETHYLENE						
1,3 - DICHLOROPROPYLENE						
METHYL CHLORIDE						
NITROBENZENE						
2 - NITROPHENOL						
4 - NITROPHENOL						
4,6 - DINITRO-O-CRESOL						
BIS (2 - ETHYLHEXYL) PHTALATE						
ANTHRACENE						
DIETHYL PHTHALATE						
FLUORENE						

PART I
ANALYSIS RESULTS
(OCPSF SEMI - ANNUAL POLLUTANT LIST) CON'T

SIU PERMIT NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION (AS PER PERMIT) _____

	RESULTS ug / L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
1,2 - DICHLOROPROPANE						
VINYL CHLORIDE						
ACENAPHTHENE						
BENZENE						
CARBON TETRACHLORIDE						
CHLOROBENZENE						
HEXACHLOROBENZENE						
CHLOROFORM						
ETHYLBENZENE						
FLUORANTHENE						
METHYLENE CHLORIDE						
HEXACHLOROBUTADIENE						
NAPHTHALENE						
DI - N - BUTYL PHTHALATE						
DIMETHYL PHTHALATE						
PHENANTHRENE						
PYRENE						
TRACHLOROETHYLENE						
TOLUENE						
TRICHLOROETHYLENE						
TOTAL CYANIDE						
TOTAL LEAD						
TOTAL ZINC						

PART II
COMPLIANCE MONITORING

INDUSTRY NAME:

PERMIT NO.

VIOLATION PARAMETER	DATE	FLOW (MGD)	SAMPLE POINT LOCATION	ACTUAL* DISCHARGE	PERMIT LIMIT	TYPE LIMIT VIOLATED**

NOTE:

* - ACTUAL DISCHARGE - LIST ACTUAL ANALYTICAL RESULTS AND APPROPRIATE UNITS

** - TYPE LIMIT VIOLATED - LIST TYPE:

A.A. = ANNUAL AVERAGE

D.M. = DAILY MAXIMUM

LL = LOCAL LIMITS (ORDINANCE 250.5.1)

TOPOGRAPHIC MAP OF THE GIBSON SITE – OLIN CORP.

REVISION	REVISED

McINTOSH & McINTOSH, P.C.
CONSULTING ENGINEERS, LAND SURVEYORS, PLANNERS
LOCKPORT, NEW YORK BUFFALO, NEW YORK
PHONE 434-9138 PHONE 625-8380

STEAM – NEW YORK STATE PLANE COORD. SYSTEM – WEST ZONE
REFERENCED ON NGVD 1929

RTHWEST FLANGE BOLT
NEAST CORNER OF
NIAGARA FALLS BLVD.

LEGEND

OVERHEAD EL CTRIC
P-2 — MEADOWTER P.K.

CITY OF NIAGARA FALLS

NIAGARA MOHAWK POWER CORPORATION

CAPPED AREA

CREEK

CATUGA

ROAD

TUSCARORA

N 1,127,800
N 1,127,600
N 1,127,400
N 1,127,200
N 1,127,000
E 398,800
E 398,600
E 398,400
E 398,200
E 398,000

FILE COPY

Olin CHEMICALS

P.O. BOX 248, 1186 LOWER RIVER ROAD NW, CHARLESTON, TN 37310
Phone: (615) 336-4000

September 25, 1995

Mr. Albert C. Zaepfel
Industrial Monitoring Coordinator
City of Niagara Falls
Department of Wastewater Facilities
Enforcement Division
1200 Buffalo Avenue
Niagara Falls, NY 14302-0069

RE: **Charles Gibson Site - Olin Corporation**
Wastewater Discharge Permit No. 45

Dear Mr. Zaepfel:

This letter is provided to comply with the Wastewater Discharge Permit Requirements for: Slug Control Plan (Section C.2) of the above referenced permit.

Olin is committed to provide the manpower, equipment and materials required to expeditiously control and remove any harmful quantity discharged as a slug to the City Sewer System from the site.

Sincerely

OLIN CORPORATION

D. L. Cummings
Manager, Environmental Remediation

DLC/cp
lmm346

cc: J. W. Strassburg
L. E. Murray
J. E. Reed
L. M. Miller
M. J. Hinton - NYSDEC

FILE COPY

City of Niagara Falls, New York

P.O. Box 69, Niagara Falls, NY 14302-0069

RECEIVED
SEP 23 1996
LORRAINE MILLER

September 12, 1996

Mr. James E. Reed
Olin - Charles Gibson Site
PO Box 748
Niagara Falls NY 14302-0748

Dear Mr. Reed:

Attached is a revised page of the Standard Self Monitoring Report form developed by the City. It has been brought to my attention that two (2) Base Neutral compounds were missing. Consequently, Diethyl Phthalate and Di-N-Octyl Phthalate have been added. The City has also taken the time to change Dibutyl Phthalate to Di-N-Butyl Phthalate. These changes accurately reflect the City's current SPDES Permit pollutant list.

Sincerely,
DEPARTMENT OF UTILITIES/WASTEWATER

Albert C. Zaepfel
Industrial Monitoring Coordinator

Att
ACZ:vr
cc: File - To All SIU's

PART I
ANALYTICAL RESULTS

SIU PER NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION: _____

	RESULTS ug / L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
BENZENE						
CARBON TETRACHLORIDE						
CHLORODIBROMOMETHANE						
MONOCHLOROBENZENE						
DICHLOROBROMOMETHANE						
CHLOROFORM						
1,1 - DICHLOROETHYLENE						
1,2 - DICHLOROETHYLENE						
BROMOFORM						
DICHLOROPROPYLENES						
ETHYLBENZENE						
1,1,2,2 - TETRACHLOROETHANE						
TETRACHLOROETHYLENE						
TOLUENE						
1,1,1 - TRICHLOROETHANE						
1,1,2 - TRICHLOROETHANE						
TRICHLOROETHYLENE						
METHYLENE CHLORIDE						
MONOCHLOROTOLUENES						
MONOCHLOROBENZOTRIFLURIDE						
VINYL CHLORIDE						
TETRAHYDRAFURAN						
XYLENE						

PART I
ANALYTICAL RESULTS

SIU PER NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION: _____

	RESULTS ug / L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW IN MGD						
PHENANTHRENE						
MONOCHLOROPHENOL						
DICHLOROPHENOL						
MONOCHLOROCRESOL						
TRICHLOROPHENOL						
PENTACHLOROPHENOL						
HEXACHLOROCYCLOHEXANES						
PCB'S						
ENDOSULFAN I + ENDOSULFAN II + ENDOSULFAN SULFATE						
MIREX						
DECHLORANE PLUS						
HEPTACHLOR + HEPTACHLOR EPOXIDE						

PART I
ANALYTICAL RESULTS

SIU PER NAME: _____

SIU PERMIT NO: _____

SAMPLE LOCATION: _____

	RESULTS ug / L		RESULTS LBS / DAY		ANNUAL AVERAGE ug / L	ANNUAL AVERAGE LBS / DAY
DATE SAMPLED						
24 HOUR FLOW, IN MGD						
DIMETHYL PHTHALATE						
BUTYL BENZYL PHTHALATE						
Di-N-BUTYL PHTHALATE						
Di-N-OCTYL PHTHALATE						
DIETHYL PHTHALATE						
NITROSODIPHENYLAMINE						
DICHLOROBENZENES						
DICHLOROTOLUENE						
ACENAPHTHENE						
FLUORANTHENE						
CHRYSENE						
NAPHTHALENE						
BENZO (a) ANTHRACENE						
PYRENE						
TRICHLOROBENZENE						
TRICHLOROTOLUENE						
HEXACHLOROBUTADIENE						
TETRACHLOROBENZENE						
HEXACHLOROCYCLOPENTADIENE						
HEXACHLOROBENZENE						
DICHLOROBENZOTRIFLUORIDE						

APPENDIX B

OLIN LEACHATE

INSTRUCTION, OPERATION AND MAINTENANCE MANUALS

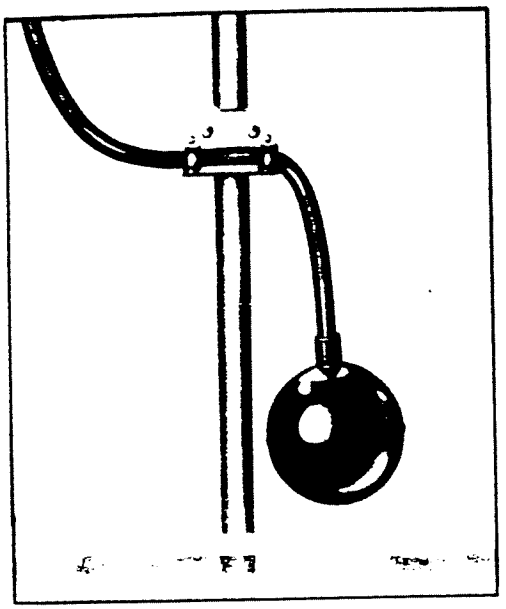
- ANCHOR SCIENTIFIC ROTO FLOAT SST
- MICROTEL SERIES 1000 DIALER
- SPARLING TIGERMAG FM625
- DRAWINGS 11596-JR-1
  103196-JR-1 (2 PAGES)

anchor scientific inc.
Box 378, Long Lake, MN 55356 / 612-473-7115 / FAX 612-473-6002

roto-float-SST

Type P—Pipe Mounted

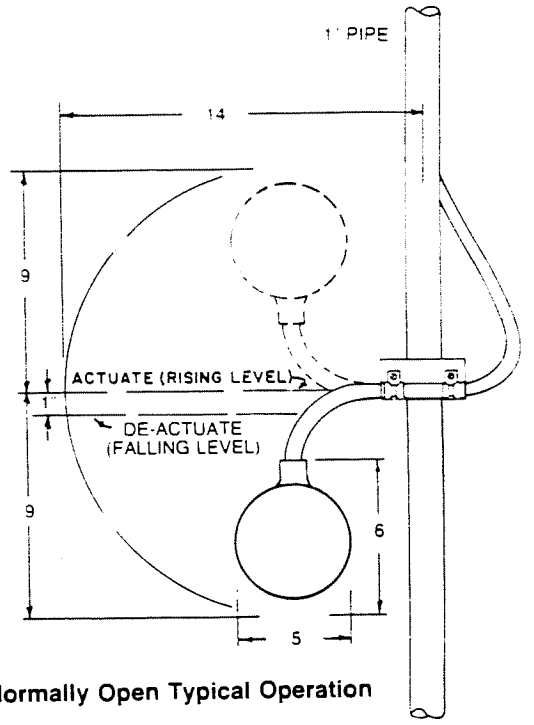
Form 2900-E



ROTO-FLOAT SST
(Teflon® coated)

APPLICATIONS:

- Sewage Lift Stations
- High Pressure Tanks
- Long Life Applications
- Severe Environments



Normally Open Typical Operation

GENERAL DESCRIPTION

The Roto-Float SST is a direct acting float switch. It has been designed and constructed for extremely long life in the most demanding applications. Each Roto-Float-SST contains a single pole mercury switch in a normally open or normally closed circuit configuration, which actuates or deactuates with changes in fluid level.

The mercury switch has been inserted into the #316 stainless steel, Teflon® coated housing, then encapsulated in epoxy, forming an impact and corrosion resistant unit. The cable used is a 14-3 conductor, type SO jacketed, with each conductor having 105 strands of copper for extra flexibility. Each float has a green wire as an internal ground and THIS MUST RUN TO A SUITABLE EXTERNAL GROUND, per N.E.C. The Roto-Float SST comes with a mounting clamp, which attaches to a 1" mounting pipe, (supplied by others). #316 stainless steel pipe stabilizing brackets for mounting the pipe are available and designated 'WSTB'.

SPECIFICATION DATA

Cable
105°C., SO type, 14-3 105 strand.
Oil and water resistant.

Float Housing
#316 stainless steel, 5" diameter, grounded, Teflon® coated.

Potting Material
Moisture resistant epoxy.

Electrical Data
Contact rating: 20A., 120 VAC
10A., 230 VAC
Specify normally open or normally closed.

ORDERING INFORMATION

Specify mounting style P, cable length (20, 30, and 40 feet are in stock), circuit configuration, (NO for normally open, NC for normally closed). Add the suffix '-SST' to indicate stainless steel, Teflon® coated.

	List Price
Model P20NO-SST	. . . . .
Model P30NO-SST	. . . . .
Model P40NO-SST	. . . . .

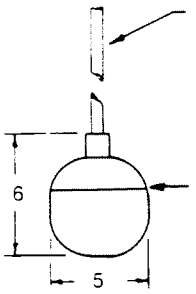
GENERAL DESCRIPTION

The Roto-Float-SST is a direct acting float switch. Each Roto-Float-SST contains a single pole mercury switch which actuates when the longitudinal axis of the float is horizontal, and deactuates when the liquid falls 1" below the actuation elevation.

The Float is a chemical resistant, Teflon* coated, 316 stainless casing, with a firmly bonded electrical cable protruding. One end of the cable is permanently connected to the glass enclosed mercury switch and the entire assembly is encapsulated to form a completely water tight and impact resistant unit.

Roto-Float-SST can be mounted on a 1" support pipe. (Type P). Advantages of the Roto-Float-SST are low cost, simplicity and reliability. Various circuit configurations, other than the ones listed below, are available.

SPECIFICATIONS:



Type SO 14-3 AWG 105 Strand 600 V. 105 C
Conductors 20', 30', 40' lengths standard
Other lengths available
Cable Diameter .56
Temperature Limit 90 C (water)

Teflon* coated 316 Stainless Casing Contains Hermetically Sealed Mercury Switch

- Electrical Rating
  20 A @ 115 VAC
  10 A @ 230 VAC
- Mounting Arrangement
  Type P — Pipe Mounted Model

USE N.O. FOR PUMP OUT
N.C. FOR PUMP IN

MODELS:

SWITCH ARRANGEMENT	CABLE LENGTH	PIPE MOUNTED TYPE P	
		MODEL NO.	SHIP WT.
NORMALLY OPEN	20	P20NO-SST	5.00
	30	P30NO-SST	6.25
	40	P40NO-SST	7.50
NORMALLY CLOSED	20	P20NC-SST	5.00
	30	P30NC-SST	6.25
	40	P40NC-SST	7.50

SUBMITTAL APPROVAL

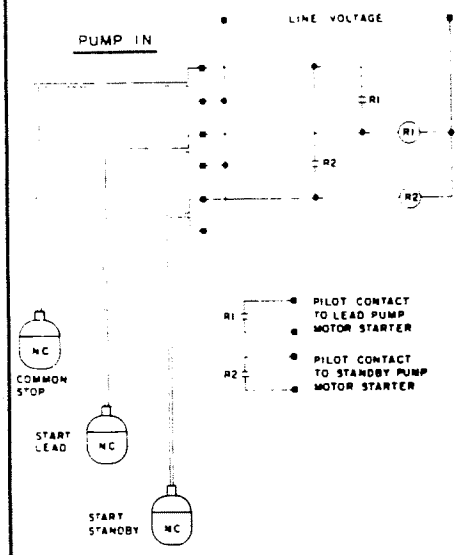
NAME

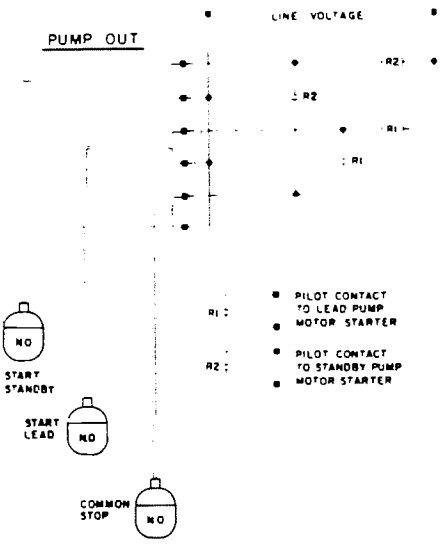
DATE

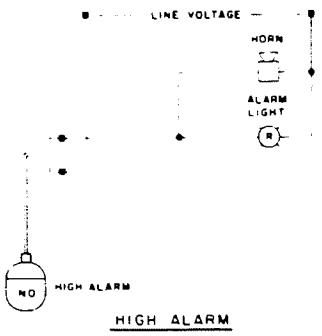
APPLICATIONS:

For use in controlling pumps or other machines and measuring alarm levels in water, sewage and many other liquids. Roto-Floats may be used for pump in or pump out control, for low level cutout, or for low and high level alarms.

TYPICAL 2 PUMP CIRCUITS





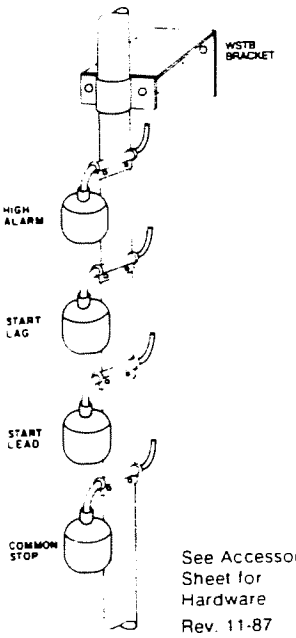


HIGH ALARM

Important Note: Green wire should be properly grounded per NEC. Use in accordance with local electrical code and authority having jurisdiction. Do not use Roto-Floats in gasoline, volatiles or other combustibles. Roto-Floats are compatible with intrinsically safe relays.

This product contains mercury. Dispose of in accordance with Local, State and Federal Regulations so that mercury does not contaminate the environment.

TYPICAL MOUNTING TYPE P



See Accessory Sheet for Hardware

Rev. 11-87

LETTER	REVISIONS	DATE

DWN BY: PL	DATE: 9-9-80	anchor scientific inc.
CKD BY: JA	DATE: 9-9-80	
APPD BY: DS	DATE: 9-9-80	ROTO-FLOAT-SST SPECIFICATION DATA AND INSTRUCTION SHEET
PROJECT NAME: ROTO-FLOAT-SST		DWG. NO. 2910-1
FACTORY ORDER NO.		

Microtel Series 1000 Dialer

Installation, Operation, and Maintenance

Manual

Doc 600R1000 Rev B
July, 1996

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MICROTEL

206 West Judge Perez Drive
Chalmette, Louisiana 70043
504/276-0571
Fax: 504/276-0574

Record of Changes

Rev	Date	Changes	Submitted By
-	March 1995	Original Document	Art Felgate
A	January 1996	Added the command ****058n**, updated the example FAX reports, updated some command description, updated the examples, added better chapter summaries. Also, made visual changes. Things are rearranged for easier use. The document was also reformatted.	Mike Freimanis
B	July 1996	Updated the command ****c5MMSS**. It now can have separate **ON** and **OFF** delay times for a channel. This change is included on new Fax Report and Testset pages. Cleared up an explanation of the Call On Alarm value for I/O Alarm Configurations. Identified default dialer Access Code. In the Callout Theory of Operation, clearly defined dialer callout procedures.	Mike Freimanis M. Freimanis 7/30/96 B Elmt 7/30/96

MICROTEL/TANO SERIES 1000 DIALER

QUICK START PROCEDURE

*****Necessary equipment: A touch-tone telephone is required.*****

The following procedures allow quick set-up and operation of the S1000 Dialer. Please read the rest of this manual for additional information on programming and operating your S1000 Dialer.

I. Plug the touch-tone telephone into the Dialer PHONE jack. Take the telephone off-hook.

II. Turn on the Power Switch and verify the Dialer has power.

The red Power/Fault light will pulse with a 95% duty cycle indicating no errors. The Off Hook light should be ON (red) indicating the unit is ready to accept touch-tone commands from the local telephone.

III. Press the # key of your telephone to prompt system activation.

Listen for the Dialer to voice respond "**System ready.**"

NOTE: If at any time while entering commands you wish to start over, simply press the # key and listen for the Dialer to voice respond "System ready."

IV. Set Time and Date. (See Section 3.3, *Setting Time and Date*)

- Enter the command ****060HHMM**, where the actual 24-hour time is substituted for HHMM. For example, if the time is 1:00 p.m., enter ****0601300**.
- Listen for the Dialer to voice respond, "**The time is one three zero zero**" for the above example.
- Enter the command ****061MMDDYY** where the actual date is substituted for MMDDYY. For example, if the date is January 2, 1995, enter ****061010295**.
- Listen for the Dialer to voice respond, "**The date is zero one zero two nine five**" for the above example.

V. Enter the telephone number of the Dialer. (See Section 3.2.9, *System Telephone Number*)

****The FCC requires the telephone number of the Dialer to be entered for FAX transmission.****

Enter the command ****010p****, where p is the telephone number (up to 16 digits) of the Dialer telephone line. For example, the Dialer is connected to 504-243-2400.

Enter ****0105042432400****.

Listen for the Dialer's voice response. "**The system telephone number is 5042432400.**"

VI. Enter Telephone Numbers to Call upon Alarm. (See Section 3.5, *Telephone Numbers*)

Enter ****01np****, where **n** = 1,2,3....9, is the directory index of telephone numbers and **p** is the actual telephone number with optional escape codes of up to 60 digits.

Example: The second phone number of the directory is 555-1212.

Enter ****012 5551212****.

Listen for the Dialer's voice response. "**Telephone number two is 5551212.**"

Example: Sending a FAX. (**See Section 3.5.4, *Telephone Number Command***)

Send an alarm status report to a FAX machine (for example, the third number on the list) at 555-1213 after the first two numbers have been called.

Enter ****013 *991 5551213 ****. (***991** is required to send a FAX.)

Listen for the Dialer's voice response. "**Telephone number three is star 9915551213.**"

TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

COMMAND SUMMARY PROGRAMMING GUIDE

Series 1000 COMMAND SUMMARY

*000		Report system status
*001	**001-	Voice system name
*002	**002MM	Call spacing time
*003	**003nn	Ring count
*004	**004nnnn	Access code (0000 = Disabled)
*005	**005nn	Message repeat count
*006	**006n	Keypcard/Voice feedback delay

*01n	**01np**	Telephone n (n=1 to 9) In/System
*02n	**02nDDHHMM	Telephone n disable timer
*03n		Alarms armed for telephone n

	050/051	Print status/Print config. report
	052/053	Enable/Disable printing
	054/055	Enable/Disable testset
	056n/057n	Fax status/configuration to phone n
	058/0581	Answer Mode - Voice/Data

*060	**060HHMM	Time (24 hour format)
*061	**061MMDDYY	Date
*062	**062wHHMM	Call at time
*063	**063t*	System telephone list

	**070	End call
	**071	Acknowledge current alarms.
	**072c	Acknowledge alarm on channel c
*074	**074DDHHMM	Snooze delay

*c0	**c0	I/O c status/clear counters
*c1	**c1-	I/O c voice name
*c2	**c20n	I/O c TYPE of module (0=Spare, 1=DI NO, 2=DI NC, 3=DO, 4=AO, 5=AI, 6=DOL)
*c3	**c3nn	I/O c status REPORT format (00=None,01=State,02=Counts,04=RunTime,08=TimeInAlarm)
*c41	**c41t*	I/O c telephone list
*c5	**c5nMMSS	I/O c delay (n=1 On/n=2 Off)
	c60/c61	I/O c output force OFF/ON
*c8	**c8n	I/O c alarm configuration (0=Status,1=Latch,2=COA,3=COA Latch,4=COA RTN)
*c90	**c90aaa	I/O c analog input high setpoint
*c91	**c91aaa	I/O c analog input low setpoint
*c92	**c92aaa	I/O c analog output setpoint

Phone Number Escape Codes

*0	Tone dial (default)
*1	Pulse dial
*2	2 second pause
*3	Flash hook (go on hook for 100 milliseconds)
*4	Wait for voice or answer
*5n	Wait n seconds for tone
*6n	Wait n seconds for quiet
*7nn	Set wait time-out to abort call (nn seconds)
*8nn	Set wait time-out to continue (nn seconds)
*90	Auto acknowledge this call
*91	Dial '*' *92 Dial '#'
*93n	Turn ON output module n
*94n	Set this call alternate message repeat count
*95n	Set this call alternate voice interact delay
*96n	Turn OFF output module n
*980	Dial 'A' *981 Dial 'B'
*982	Dial 'C' *983 Dial 'D'
*984	Dial channel in alarm (digital pager)
*990	Modem Call
*991	Fax Call
*992	Peer to Peer Call

-	speech (# while recording - mic cut off)
MM	time value in minutes (00-99 minutes)
n	one digit numeric value (0-9)
nn	two digit numeric value (00-99)
nnnn	numeric value (0000-9999)
DDHHMM	time value in Days, Hours, Minutes format
MMSS	time value in Minutes, Seconds format
c	input/output channel number 1-8 (9=pf)
t	telephone selections (1-9) upto 9 digits
aaa	analog value 00.0% to 99.9%
w	day of week selection (1=Sunday-7=Saturday,0=all days)
p	0-60 digit phone number, with escape codes

MICROTEL
Technical Support &
Service
504/276-0571

1.0 INTRODUCTION

Thank-you for choosing the Microtel *Series 1000* Dialer to implement your remote alarm monitoring solution. This manual contains instructions on installing, configuring, and operating your dialer. In addition, a couple of maintenance procedures are described. The *Series 1000* has been designed and manufactured to operate with minimal operator intervention once it has been set up to match your specific monitoring application. Any problems you might encounter are easily diagnosed in the *Troubleshooting* section. Supplemental information you might find interesting is included in the Appendices.

This manual is designed to be read beginning with the ***Installation*** procedure, followed by ***Configuring the Dialer***, and ***Operation***. The *Operation* section in particular should be read by any personnel who may be required to respond to alarm calls from the dialer. The additional sections can be read at a later time, or when necessary by authorized personnel to maintain the dialer or troubleshoot any problems you might encounter.

We ask that you *please* refer to **Section 5.0, *Troubleshooting***, *before* calling **MICROTEL** for technical assistance. We believe the manual is very thorough, yet broken up into sections so that you can immediately find relevant information. An emphasis has been placed on cross-referencing additional information throughout its contents.

If, however, you encounter a difficulty that cannot be resolved using the information in this manual, then call **MICROTEL**'s Toll-Free 24 hour Technical Support line:
504/276-0571.

Thank-you, once again, for choosing **MICROTEL**.

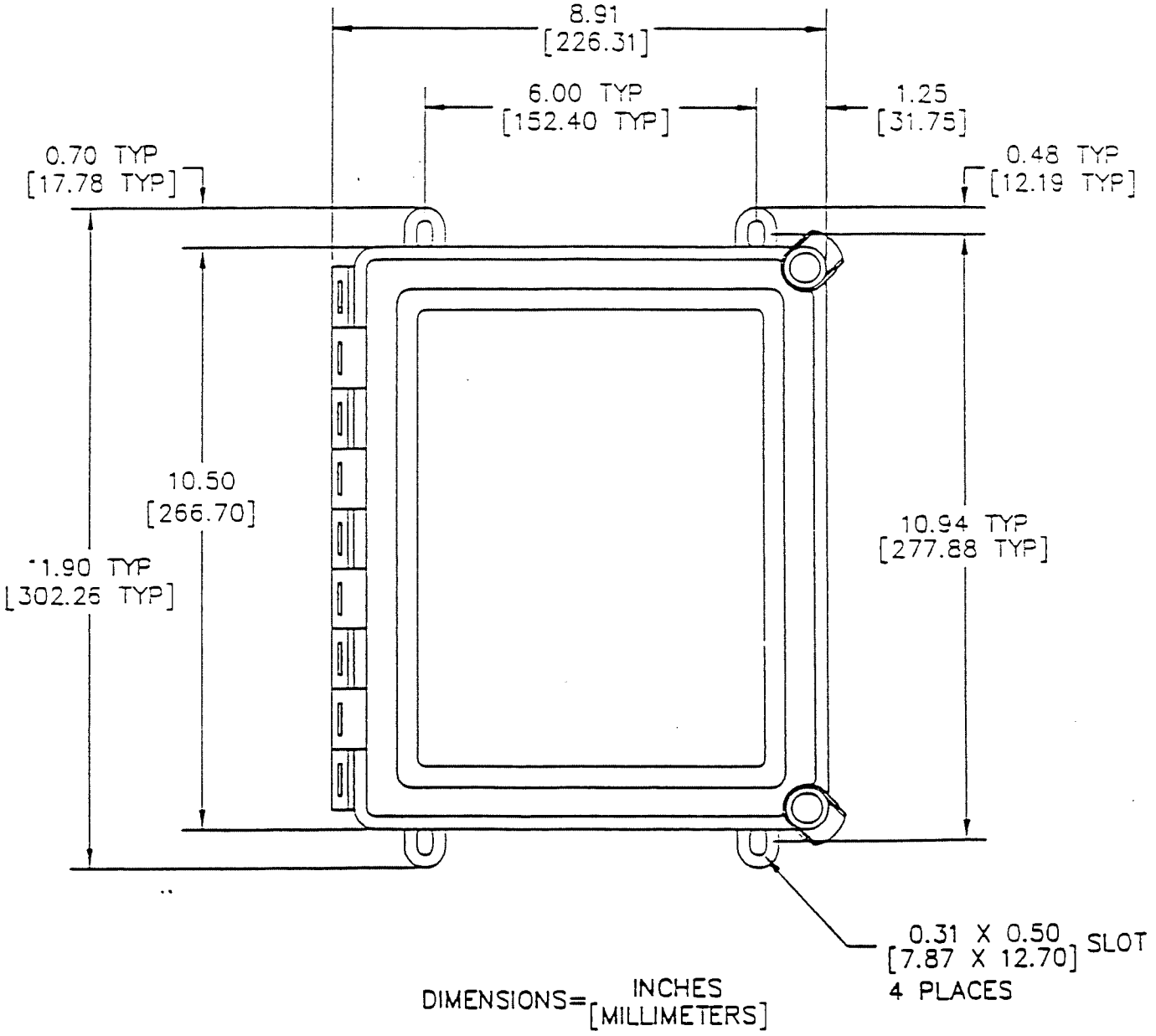
Before sending a fax message, the sending telephone number must be programmed into the *Series 1000* Dialer as follows:

1. Plug a touch-tone telephone into the PHONE jack of the dialer.
2. Pick up the handset of the telephone, and press the '#' key.
3. Listen for the dialer to speak, "System ready".
4. Enter the telephone number of your *Series 1000* Dialer with the command, **010nnnnnnnnnn**, where two STAR keys are used to terminate the variable length telephone number (it may be up to 16 digits).
5. Listen for the dialer to speak back the number that you entered.
6. You may review the number entered again by pressing *010 (single star), and listening for the dialer to respond.

Please refer to **Section 3.2.8,** ***System Telephone Number*****(010)**, for additional explanation and example.

2.0 INSTALLATION

2.1 PHYSICAL INSTALLATION-ENCLOSURE MOUNT, FIGURE 1



2.3 POWER SUPPLY CONNECTION

Connect the supplied external Stancor transformer to the **12 VDC** terminals as shown in the Figure below. Plug the transformer into a **MicroMax Surge Suppressor** (supplied with the dialer).

Alternatively, you may connect any **12** to **16 Volt DC** power supply (A **12 Volt DC** source might be a solar power system, for example). Connect the positive side of the voltage source to pin 1, and the COMMON lead to pin 2 of the power supply terminal block of the dialer.

NOTE: A power supply voltage greater than **12 VDC** is required to operate the *Series 1000* battery charger.

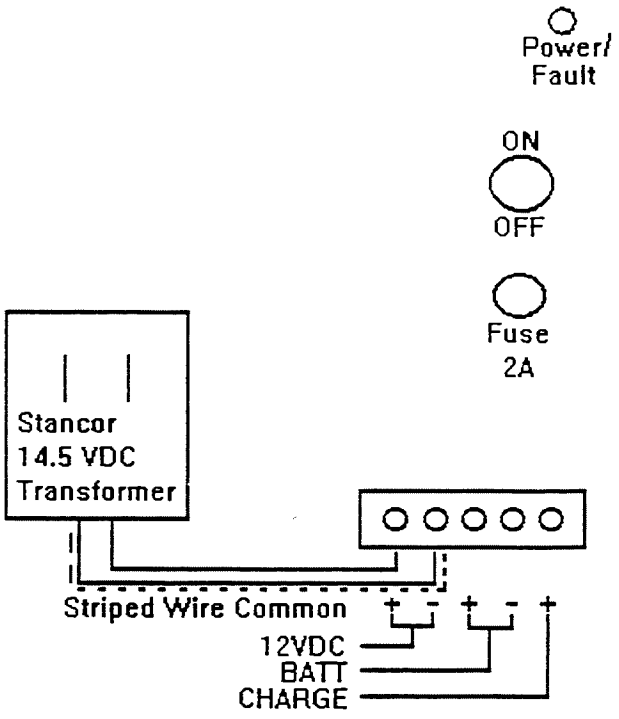


Figure 3. POWER SUPPLY CONNECTION

2.5 TELEPHONE CONNECTIONS

For protection of your *Series 1000* dialer from telephone line transients and surges which could damage the dialer, or disrupt its operation, use a MicroMax Surge Suppressor:

1. Connect the dialer's LINE jack to the EQUIPMENT Phone jack of the MicroMax Surge Suppressor using the cable supplied with your dialer.
2. Connect the Telephone LINE jack of the MicroMax Surge Suppressor to the RJ11 jack of your outside line using the cable supplied with the MicroMax Surge Suppressor.

Connect a local telephone (optional) to the dialer's PHONE jack, as shown in Figure 5 below.

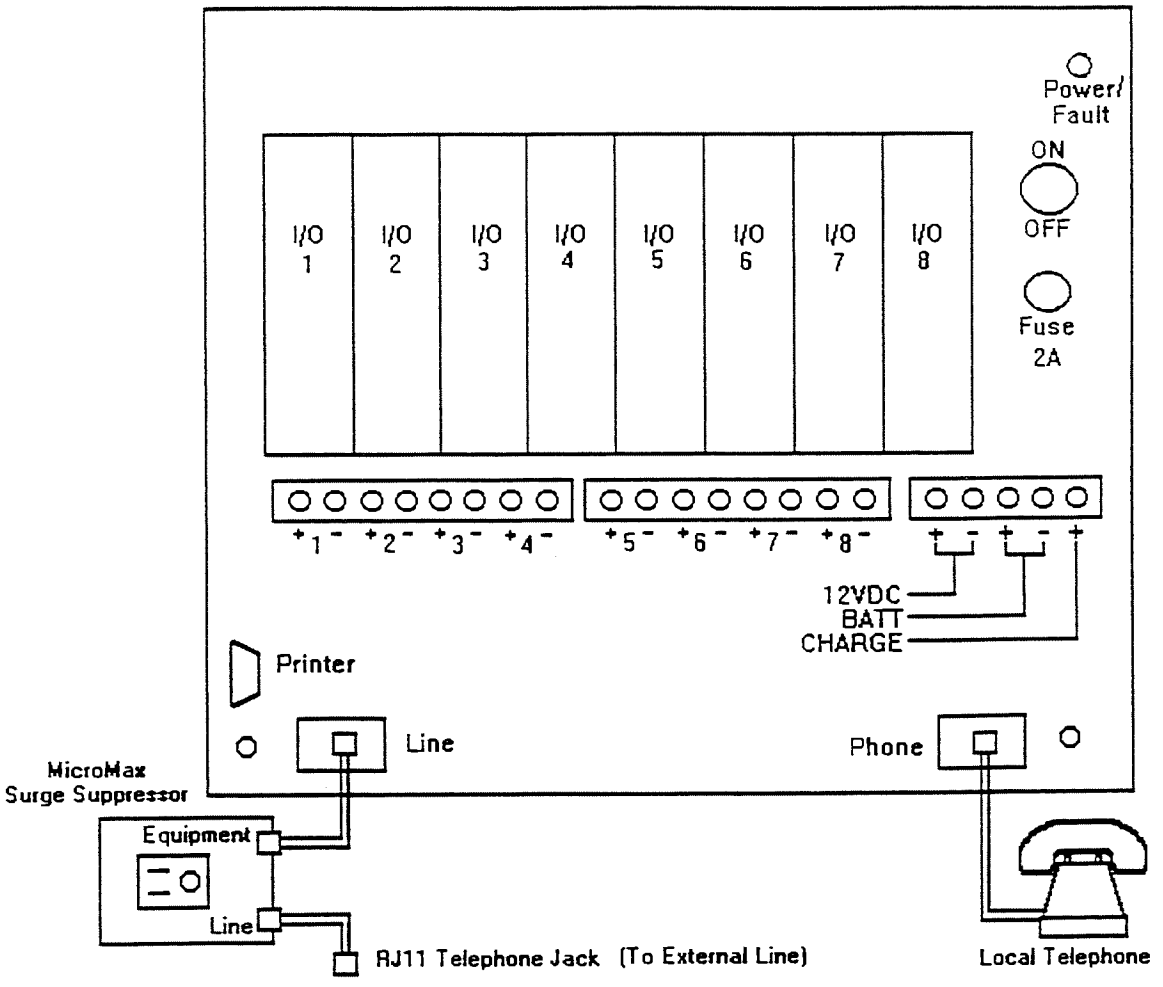


Figure 5. TELEPHONE CONNECTION AND LOCAL HANDSET CONNECTION

2.7 PRINTER INSTALLATION

2.7.1 Printer Interface and Handshaking

The *Series 1000* supports a serial printer interface **only**. Therefore, you must have a serial printer, or install a serial interface card in the printer you have. Serial printer interfaces are inexpensive and readily available at your local computer store.

The dialer transmits serial printer data at 2400 baud, 8 data bits, 1 stop bit, and no parity.

In addition, the printer's serial interface must support DTR (Data Terminal Ready) hardware handshaking. With this method, when the printer buffer level surpasses some high water mark, the printer asserts the DTR signal, telling the dialer to halt transmission. After the printer has emptied most of the data out of its buffer, it will de-assert the DTR signal, indicating to the dialer that it may resume data transmission. The DTR hardware handshaking protocol is a common method supported by most serial interfaces.

2.7.2 Cable Connections

Connect a DTE-to-DCE (Straight) RS232C cable with a 9 pin female D-SUB connector on one end to the dialer's PRINTER port. Connect the other end (25 pin female D-SUB) to the serial interface port of your printer.

NOTE: If you are using TERM8 to configure your dialer from a local computer, then you may use the same RS232 cable.

2.7.3 Configuring the Dialer to Print

Because the RS232 port on the *Series 1000* is used to support other features such as a local computer interface (**Testset**), it must be configured to support printing as follows:

1. Plug a touch-tone telephone into the dialer's PHONE jack.
2. Pick up the telephone handset and press the **'#'** key.
3. Listen for the dialer to speak, "**System ready**".
4. Enter ****052** on the telephone's keypad.
5. Listen for dialer's response, "**Printing Enabled**".

Turn the Printer power OFF, then ON again to reset it.

This completes the installation of a local printer. Refer to **Section 4.0, *Operations*** for commands to print reports and enable continuous event logging.

3.0 CONFIGURING THE DIALER

3.1 INTRODUCTION

The Microtel *Series 1000* features a single level, interactive command structure--there are no multi-level menu structures to navigate. Commands are sent to the *Series 1000* through your telephone either locally or during a call to or from the dialer, by pressing a sequence of touch-tones on your telephone. Each command entered is acknowledged with a spoken response from the dialer, providing verification that the command was entered correctly and understood by the dialer.

The configuration commands described in this section modify basic dialer operation and store information about the dialer's operational behavior in nonvolatile memory. You should only have to configure your dialer once -- all changes are saved permanently, even if AC and battery power are removed from your dialer. In addition to the configuration commands, there are several commands that may be used to initiate one-time events. These are described in **Section 4.0, *Operation***.

All programming commands (commands that modify dialer configuration or cause an action to occur) begin with '**' (two stars). All review (report) commands begin with a '*' (single star). After each command is entered, the dialer will respond with a voice message.

Most commands require exactly the same number of keys every time, but some commands have a variable data length. The end of variable length data commands is performed with the '**' (two stars).

An errant or unwanted command can be terminated at any time by pressing the '#' key. The dialer will respond, "System ready", indicating it is ready to accept a new command.

Throughout this manual, all commands are highlighted for quick reference as follows:

***nnn**	Review item
****nnnddd**	Configure item

If your telephone line is not yet installed, you can still configure your dialer:

1. With power to the dialer off, connect the telephone to dialer's PHONE jack.
2. Take the telephone off-hook.
3. Turn ON power to the dialer.
4. The telephone should now be connected to the dialer (indicated by the PHONE LED being ON and the Dialer reporting **'SYSTEM READY'**).
5. You may now enter any of the touch-tone commands to query/configure the dialer.

3.1.2 Configuring the Dialer from a Local Computer

In addition to its interactive touch-tone/voice interface, the *Series 1000* may also be configured from a local computer. In this case a menu structure is presented on the computer screen, and menu navigation/data entry is accomplished from the computer keyboard. **If you wish to create custom text messages to be printed on FAX reports from the dialer (optional), you must use the local computer (or remote Windows Dialer Configurator) interface to enter them.** To configure the *Series 1000* from a local computer, obtain the TERM8 program to run on your PC. A separate document, *Microtel Series 1000 TERM8 Laptop Operation*, describes its use. The following two (2) commands pertaining to operating the dialer's resident testset are listed here for reference:

**054	Enable test set

This command will enable the testset on the printer (RS232) serial port, allowing local computer interface to the dialer for configuration. (The printer must be Disabled for this action to work (See **Section 4.8, *Using a Local Printer***))

Example-
Command: ****054**
Response: *Enabled.*

**055	Disable test set

This command will disable the testset.

Example-
Command: ****055**
Response: *Disabled.*

3.1.3 Configuration Sections

Section #	Section Name	Description
3.2	System Info	Set/Query various system values
3.3	Time/Date	Set/Query the Dialer's Time and Date
3.4	Auto CallOuts	Set/Query the Dialer's independent Call At Times
3.5	Telephone Numbers	Set/Query each of the outgoing phone numbers
3.6	Configuring I/O Modules	Set/Query the Dialer's I/O Point configurations

3.2.1 Voice System Name (001)

*001	Play system name
**001~	Record system name

Once the command to Record the system name has been typed in, the Dialer will respond by saying **'Ready'**. When you hear this, speak the message. Once you have finished speaking, you can either wait until it finishes recording or press the **'#'** key to trim off the end of the message. If the message is trimmed, type **'*001'** to replay the message.

Example voice responses-

Microtel SERIES 1000 (default in the normal system voice)

-or-

Jonesburg remote site number 6 (recorded)

3.2.2 Call Spacing Delay (002)

*002	Review call spacing
002MM**	Program call spacing

Time the dialer waits after an answered Callout before beginning another Callout (01-99 minutes).

Example-

Command: ****00260**

Response: *The call delay period is six zero minutes.*

3.2.3 Ring Count (003)

*003	Review ring count
003nn**	Program ring count

The number of rings the dialer will see before answering an incoming call.

Example-

Command: ****00305**

Response: *The ring count is five.*

3.2.7 Snooze Delay (074)

*074	Review snooze delay time interval
**074DDHHMM	Program snooze delay time interval

The snooze delay is the time in which the dialer will re-arm an acknowledged alarm and begin calling again as a reminder that the alarm condition still exists.

Example-
Command: **074001234
Response: *The snooze delay is one two hours three four minutes.*

3.2.8 Answer Mode (058)

**058n	Program the dialer's answer mode (**n - 1=Data, 0=Voice**)

The Answer Mode is how the dialer answers an incoming call (**n=1** is **Data Mode** and **n=0** is **Voice Mode**). When in **Data Mode**, the dialer will answer the telephone as a modem by emitting a carrier tone. If the dialer doesn't connect within ~5 seconds, it will switch to **Voice Mode** for this call to allow users to still make callins while the answer mode is in **Data Mode**.

When the Answer Mode is set to **Voice Mode**, the dialer will answer a call with voice prompts. If the access code is enabled, it will then prompt the user for the access code. Once the correct access code is typed in, the user can then type in any of the user configuration and operational commands.

When the Answer Mode is set to **Data Mode**, the dialer will try to connect to an incoming call via modem. Once it connects, the dialer will respond to ascii commands that are sent to the dialer. Each command should start on a new line and followed by a carriage return.

Command	Response
SETUP	Reports the current setup for the Dialer
STATUS	Reports current readings of the I/O Points on the Dialer
ACK	Will acknowledge the current alarms on the Dialer

A call should be terminated by the party calling the dialer. Once the dialer loses carrier and is hung-up on, the dialer will continue to answer callins and make callouts as normal.

Example-
Command: **0581
Response: *Data mode enabled.*

3.3 SETTING TIME AND DATE

The *Series 1000* has an onboard real-time clock used to Time/Date stamp dialer events, as well as allow status callouts to occur at specific times. Time and Date are maintained even if power is lost to the dialer. Use the following two commands to initialize your dialer's local time, or to set it back/ahead in conjunction with Daylight Savings Time.

Section #	Setting	Current Setting	Change Setting	Meaning
3.3.1	Time	*060	**060HHMM	Current time (24 hour format)
3.3.2	Date	*061	**061MMDD YY	Current date

3.3.1 Time (060)

*060	Report Time
060HHMM**	Set Time

Current dialer time in 24 hour format (military format).

Example-
Command: ****0600327**
Response: *The time is three two seven.*

3.3.2 Date (061)

*061	Report Date
061MMDDYY**	Set Date

Current date in MMDDYY format.

Example-
Command: ****061080394**
Response: *The date is eight zero three nine four.*

3.4.1 Call At Time (062)

*062	Report Next Call At time
**062wHHMM	Program Call At time

When a timer in the HHMM format matches the current time, a status update call will be placed to the system calling list (described below). The time that can be set as either once a week or once a day at a specified time. Once the command is entered, the response will report the next Call At Time.

Examples-

Command: ****06210832**
Response: *The Call At time is Sunday zero eight three two.*

If the current time is 11am on Wednesday,
Command: ****06291210**
Response: *The Call At time is Wednesday one two one zero.*
-or-
Command: ****06291010**
Response: *The Call At time is Thursday one zero one zero.*

w	0	1	2	3	4	5	6	7	9
Value	**None**	**Sun**	**Mon**	**Tues**	**Wed**	**Thurs**	**Fri**	**Sat**	**Daily**

3.4.2 Call At List (063)

*063	Report Call At telephone list
**063t*	Program Call At telephone list

A list of phone numbers to call when the Call At Time occurs. (**t** is a list of 0 to 9 digits followed by a *).

Example-

Command: ****06328***
Response: *The system telephone list is two eight.*

When the system Call At Time is reached, phone calls will be placed to phone numbers 2 then 8, repeatedly, until the alarm is acknowledged.

3.5.2 Call Progress Decoding

When the dialer is off-hook, it has the capability to detect dial tone, busy, ringback, modem, and voice signals. This allows it to detect if a called party answered or not, thus reducing the time to alert authorized personnel of existing alarm conditions. If a call is not answered, or the called number is busy, the dialer will abort the call and begin calling the next number for that channel in its alarm's calling list. Call progress decoding is also useful for sensing pager terminal tones, or long distance service access prompts before continuing a dialing sequence. It is even possible for one *Series 1000* dialer to call another dialer, gain access to it, and actuate outputs on that dialer. The call progress features of the *Series 1000* is also flexible enough to traverse preset menus via touchtone commands.

The dialer implements a default 10 second *wait for dial tone* when going off-hook to place a call, and a default 30 second *wait for answer* after dialing the telephone number. In both default cases, the dialer will abort the telephone call if the condition does not occur. By using the telephone number escape codes defined for the *Series 1000*, these defaults can be overridden on a telephone number by number basis. Thus, it is possible to "blind dial" or continue dialing even if a specific call progress event does not occur.

3.5.3 Telephone Number Escape Codes

Code	Command
***0**	Tone Dial (Default)
***1**	Pulse Dial
***2**	2-Second Pause
***3**	Flash Hook (go on hook for 100 milliseconds)
***4**	Wait for Voice or Answer
***5n**	Wait for Tone (**n** seconds)
***6n**	Wait for Quiet (**n** seconds)
***7nn**	Set Wait Timer to Abort (if condition does not occur in **nn** seconds)
***8nn**	Set Wait Timer to Continue (if condition does not occur in **nn** seconds)

***90**	Auto Acknowledge this Call
***91**	Dial '*****'
***92**	Dial '**#**'
***93n**	Close (Turn **ON**) Digital Output Channel **n**
***94n**	Set this Call Alternate Message Repeat Count of **n**
***95n**	Set this Call Alternate Voice Interact Delay (See **Section 3.2.6**)
***96n**	Open (Turn **OFF**) Digital Output Channel **n**

***980**	Dial '**A**'
***981**	Dial '**B**'
***982**	Dial '**C**'

Example 2- Program phone number 1
Dial 9
Pause for 2 seconds
Dial 555-1212
Terminate telephone entry

Command: ****011 9 *2 5551212 ****

Response: *Telephone one is nine STAR two five five five one two one two.*

Here, nothing comes after the actual dialed telephone number, so a default 30 second wait-for-answer will occur. In general, if the dialer must wait for some event to occur before continuing to dial the remaining digits, then you must program the Wait Timer and Wait For condition as shown in Example 1 above.

Example 3- Program phone number 2
Key a P.A. (public address) with I/O channel 1
Repeat the status message one time
Auto Acknowledge all alarms
Terminate telephone entry

Command: ****012 *931 *941 *90 ****

Response: *Telephone two is STAR nine three one STAR nine four one STAR nine zero.*

Example 4- Program phone number 4
To send a Fax report
To 555-1212
Terminate telephone entry

Command: ****014 *991 5551212 ****

Response: *Telephone four is STAR nine nine one five five five one two one two.*

The ***991** escape sequence shown must be embedded within telephone numbers of FAX machines. This tells the dialer to begin to generate a FAX report before it goes off-hook and dials the remote machine. Always put the ***991** sequence, as well as any other non-call progress sequences (such as auto acknowledge), at the beginning of the telephone number string before the dialer goes off-hook to dial regular telephone digits.

3.6 CONFIGURING I/O MODULES

The *Series 1000* features true modularity--I/O channels operate completely independently of each other. Using the following commands, each I/O module in your dialer can be configured to operate uniquely to satisfy your application requirements. For each I/O module you may record a voice message, choose the format of spoken status reports, program an alarm integration delay, alarm call out operation, and telephone number calling sequence. Analog inputs also have user-selectable low and high alarm setpoints.

Always verify the I/O module TYPE before proceeding to configure any other values for that module. The dialer will reset the module's settings when a module's TYPE is modified. If you are adding a new I/O module to your dialer, you must configure the module's TYPE first (Section 3.6.2).

Input modules come from the factory configured as STATUS only. At the very least, you must configure your inputs to *Call On Alarm* (Section 3.6.6).

Section #	I/O Channel Setting	Current Setting	Change Setting	Meaning (c = Channel #)
3.6.0	Status/Clear Counters	*c0	**c0	Reports the channel status (See **3.6.3 Report Format**)
3.6.1	Voice Name	*c1	**c1~	User defined channel name
3.6.2	Type	*c2	**c20n	Type of module for this channel
3.6.3	Report Format	*c3	**c3nn	Selects the information that will be reported for a particular channel
3.6.4	Telephone List	*c41	**c41t	List of numbers to call when in alarm
3.6.5	Alarm **ON/OFF** Delay	*c5	**c5nMMSS	Waits this long for a channel to be in fault before reporting it
3.6.6	Open Digital Output (Force **OFF**)	*c6	**c60	Forces a Digital Output **OFF**
"	Close Digital Output (Force **ON**)	*c6	**c61	Forces a Digital Output **ON**
3.6.7	Alarm Configuration	*c8	**c8n	Determines how the Alarm operation for a channel should be handled
3.6.8	Analog Input High Setpoint	*c90	**c90aaa	High Setpoint for an analog input
3.6.9	Analog Input Low Setpoint	*c91	**c91aaa	Low Setpoint for an analog input
3.6.10	Analog Output Level	*c92	**c92aaa	Set an Analog output level

Selection of I/O channel type (**c** = 1 to 8 for I/O module index, starting at leftmost slot).

n	Setting	Meaning
0	SPARE	No Type Selected
1	Digital Input Normally Open	Contact closure Normally Open
2	Digital Input Normally Closed	Contact closure Normally Closed
3	Digital Output	Digital Output that is user definable to be Open or Closed
4	Analog Output (00.0 - 99.9%)	Analog Output that is user definable to be at some setting
5	Analog Input (00.0 - 99.9%)	Current Percentage of an input value
6	Local Alarm Output	Digital Output that Closes when there is a local alarm

Example-
Command: ****3201**
Response: *Channel three type is one normally open digital input.*

Note: Whenever the Type of Channel is changed, all of that channel's information is defaulted, I.e. all user programming is erased. Make sure this is your first step in programming a particular channel.

3.6.3 I/O Channel Report Format (c3)

***c3**	Review I/O channel **c** status REPORT format
****c3nn**	Program I/O channel **c** status REPORT format

Selection of spoken status Report Format. This entry selects which data is reported during an alarm call. More than one data item can be chosen at a time by entering a value that is the sum of the desired data items, (for example, to report the counter value and run time, use the value of **nn**=06, 2 for counter plus 4 for run time).

nn	Voice Response	*Spoken Status*/Meaning
00	None	*Channel c report format is zero none.* Will only report the name and if it's in alarm
01	Report Current Status	*Channel c report format is one status.* The current setting of the I/O Channel
02	Report Counter Value	*Channel c report format is two count.* For Digital, the number of transitions from Open to Closed
04	Report Run Time	*Channel c report format is four run time.* Total length of time this channel has been in a fault

To program the **ON** and **OFF** delays, the command ****c51MMSS** will be used (**n=1**). This will set both the **ON** and **OFF** delay times to the set time period (**MMSS**). To program the **OFF** delay, the command ****c52MMSS** will be used (**n=2**). This will set only the **OFF** delay time.

Example-

Command: ****1510030**
Response: *Channel one alarm on delay is three zero seconds and off delay is three zero seconds.*

If then this command:

Command: ****1520004**
Response: *Channel alarm one on delay is three zero seconds and off delay is four seconds.*

3.6.6 I/O Channel Digital Output (c6)

***c6**	Report I/O channel **c** Digital Output status
****c60**	Program Digital Output channel **c** to be **OFF**
****c61**	Program Digital Output channel **c** to be **ON**

Opens(Turns **OFF**) or Closes(Turns **ON**) a Digital Output Channel. If a non-latched channel is Closed, it will be a momentary closure.

Example-

Command: ****560**
Response: *Channel five output is OFF.*

3.6.7 I/O Alarm Configuration (c8)

***c8**	Review I/O channel **c** alarm configuration
****c8n**	Program I/O channel **c** alarm configuration

Selection of channel **c** alarm operation. For instance, latched, call on alarm, etc.:

n	**Value**	**Meaning**
0	None	no alarms generated
1	LATCHED	no alarms generated
2	COA (call on alarm)	A call is placed when input changes from normal to alarm after the I/O delay time. If the monitored input goes back to a normal condition, no more alarm callouts will be made for that previous fault.

3.6.10 I/O Channel Analog Output (c92)

*c92	Review I/O **c** analog output setting
**c92aaa	Program I/O **c** analog output setting

The value the dialer will set the analog output to.

Example-

Command ****292250**

Response: *Channel two analog output is two five point zero percent.*

4.0 OPERATION

4.1 ALARM CALLOUT THEORY OF OPERATION

When a new alarm event occurs, recognized by the dialer as an external event monitored by the I/O channels, it begins to place a series of telephone calls starting at the top of the individual alarm channel's calling list in an attempt to receive an acknowledgment for this alarm.

When the unit's outgoing call is answered, it reports the current alarm status on the dialer. It will report which channels are in alarm, which channels are in alarm that have been acknowledged, and which channels that are now normal (a channel that has gone into and out of alarm without being acknowledged).

Unacknowledged but **answered** alarm callouts are separated by the user programmed *Call Spacing Period.* This allows a called party the opportunity to acknowledge the alarm by calling the dialer back before it begins to call the next telephone number on the calling list. This feature is necessary if a called party does not have a touch-tone phone to enter the DTMF acknowledge code remotely. When the dialer is called back, it will report which alarms have been callback acknowledged.

Unacknowledged, **unanswered** alarm callouts are *not* separated by the Call Spacing period. The Call Progress features of the dialer allow it to determine if the called telephone number is busy or did not answer. In this case, the dialer will only wait a telephone network recovery period (10 seconds) before going off-hook and placing a call to the next number on the calling list.

If an alarm callout has been answered and the alarm is acknowledged by one of the following, then all current alarms that have the called telephone number on their individual calling lists are acknowledged:

A. Entering the '*' key during message playback.
B. Calling back the dialer during the Call Spacing Period (callback acknowledge).
C. An auto acknowledge code embedded in the telephone number (***90**).

Any alarms which do not include the called number on their calling list are not acknowledged, and will cause independent alarm calls to be placed. This assures that acknowledgments only apply to alarms associated with each channel's own call list.

The user can arbitrarily acknowledge all alarms or a selection of alarms by entering the commads ****071** (all) or ****072n** (channel **n; 0**=System).

Each I/O channel has its own independent snooze timer. When an alarm is acknowledged, the snooze timer for that individual channel is started, and alarm calls for that channel are suspended until its snooze period expires. If the snooze delay expires before the alarm condition has been removed, then the dialer will begin a new alarm dialing sequence (starting with the first number on the specific channel's calling list).

If an incorrect or no access code is entered during a timed access code entry time (10 seconds), the dialer will disconnect and initialize the system Call Spacing delay timer. If the alarm condition(s) were acknowledged, then the snooze timer(s) associated with the reported alarm condition(s) will be initialized with a value equal to the programmed system Snooze Delay. If alarm conditions were not acknowledged, calls will continue to be placed to the next telephone numbers on the channel's calling list after the system Call Spacing delay has expired.

In addition to voice reporting of alarms, the Microtel *Series 1000* is capable of transmitting a hard copy alarm status report, or a report of all programmed setup data, to a FAX machine. To cause a FAX report to be sent during an alarm calling sequence, the special ***991** dial sequence must be included in the telephone number of the FAX machine (refer to **Section 4.4, *Forcing a Test Call or Sending a Fax***).

Any digital output configured as a local alarm type will be turned on whenever a new alarm condition exists within the dialer (regardless of whether the telephone line is in use or not). This output could be connected to a siren or bell to warn of an alarm existing.

4.2 LED INDICATOR MEANINGS

The *Series 1000* has three indicator LEDs (light emitting diodes) as shown in Figure 7 (see next page) as well as LEDs on any digital type I/O modules. The indicator LEDs indicate conditions from within the dialer.

The PHONE LED located adjacent to the PHONE connector is turned on whenever the dialer senses that a telephone connected to the phone jack is off-hook, or during FAX transmissions (If you have no external phone line, see **Section 3.1, *Introduction*** on how to use a phone locally).

The LINE LED located adjacent to the LINE connector indicates call progress while the dialer is off-hook and ring detection when on-hook.

The POWER/FAULT LED located in the upper right corner, above the power on/off switch indicates normal run status, I/O faults, power fail and dialer internal errors as follows:

Normal:	Flicker 95% ON	5% OFF
Power fail:	Blink 10% ON	90% OFF
Internal error or I/O fault:	Blink 50% ON	50% OFF

Refer to **Section 5.0, *Troubleshooting*** to diagnose Internal Errors indicated on the LED.

OUTPUT MODULE LEDS are ON when the module's output circuit is CLOSED.

Any LOCAL ALARM Output module will have its LED on when any unacknowledged alarm condition exists within the dialer.

Any DIGITAL INPUT MODULE will have its LED on when the external circuit it is monitoring is energized.

4.3 USING A LOCAL TELEPHONE ON THE OUTSIDE LINE

A telephone connected to the *Series 1000* PHONE jack can be used both as a normal telephone by pressing a '**9**' for a connection to the line, or as the human-to-machine interface to configure and inquire the *Series 1000* dialer.

To use the outside line:

1. Pick up the local telephone connected to the *Series 1000* jack labeled PHONE.
2. Dial '**9**'.
3. The telephone will now be connected to the outside phone line.
4. Listen for the dial tone.
5. You may now place a telephone call.
6. To get back to the *Series 1000*, hang-up the phone, then pick it up again.

When the local telephone rings, you may receive the call by picking up the handset before the dialer's answer delay (ring count) elapses.

4.5 RECEIVING AN ALARM CALL

When the *Series 1000* calls you, you may wish to respond to the call differently depending on what type of alarm has occurred and other factors such as who is on duty, the time of day, severity of the alarm, etc.

If you wish the dialer to go to the next phone number on its calling list, then:

1. Hang up the phone.
2. The dialer will continue on after the call spacing delay to the next phone number on the list until it receives an acknowledgment or the unlatched alarm goes away by itself.

If you wish to acknowledge the call from your touch-tone phone, then:

1. Press the '*' key on your telephone *while* the alarm message is being spoken.
2. If an access code is required, then enter the 4 digit access code.
3. After gaining access to the dialer, entering either of the following commands will acknowledge the alarm(s):

**071	Acknowledge alarms

Acknowledge all alarms (not just ones armed to call your telephone number), including any system errors that were enunciated.

Example-

Command: ****071**
Response: *Acknowledge alarms accepted.*

**072c	Acknowledge alarms on channel **c**

Acknowledge alarms for I/O channel **c**. If no other unacknowledged alarms still exist, then no additional calls will be made. If any unacknowledged alarm exists, the calls will be made to that alarm's telephone list. **c=0** would acknowledge only System alarms.

Example-

Command: ****0721**
Response: *Channel one alarm acknowledged.*

4.6 OBTAINING A SYSTEM STATUS REPORT

A spoken system status report can be received from the dialer by entering the following command from a touch-tone telephone either locally, or remotely after answering or calling the dialer:

*000 Report system status

The dialer will speak a voice message of system name, software version, system errors if present, current alarms, counter values and run time accumulators of individual I/O modules. The data spoken for each I/O channel will depend upon the user-configured status report format.

Example-

Command: ***000**

Sample Response:

MICROTEL SERIES ONE THOUSAND
two point zero
Channel one normally closed digital input in alarm
Channel two normally open digital input
Channel three normally open digital input is open
Channel nine power normal

*c0 Report I/O channel **c** status

A spoken status message for I/O channel **c** only. The data spoken is dependent upon the user-configured **report format** (**3.6.3**) for channel **c**. This will also specify the current alarm condition for that channel. It will say if the channel is currently in alarm, in alarm acknowledged, or is now normal (an unacknowledge fault condition cleared).

Example voice messages-

Digital Input Type	*Channel one is Normal.*
Digital Output Type	*Channel two is ON.*
Counter Input	*Channel three is at one zero zero two counts.*
Analog Input	*Channel four is at seven five point zero percent.*
Power Fail	*Power Normal.*

c0 Reset I/O channel **c counter and runtime

Clear I/O channel number **c** counter and runtime registers. (See **Section 3.6.3** to change the channel **report format**)

Example-

Command: ****10**

Response: *Channel one normally closed digital input zero counts runtime is zero.*

4.8 USING THE DISABLE TIMERS

The disable timers provide a way to temporarily prevent unwanted calls to be placed.

When **disable timer 0** has been set to any non-zero value, no calls will be placed until either the timer counts down to zero or is programmed back to zero. Typical uses of this function would include disabling false calls during planned maintenance on equipment monitored by the dialer.

When **disable timer one through nine** is non-zero, then calls to that corresponding phone number alone are disabled. An example use would be disabling phone one for whatever time period required while the person responsible for responding to phone one calls is not available. Use the following command syntax to review/set disable timers:

*02**n**	Report disable timer current value
02nDDHHMM**	Set disable timer **n**

Disable the dialer from placing calls to this phone number **n** while this timer is non-zero (0-99 days, 0-23 hours, 0-59 minutes format). If **n=0** then calls to all phone numbers are disabled.

Examples-

Command: ****020000105**
Response: *The system disable timer is one hour five minutes.*

-and-

Command: ****021010105**
Response: *Telephone number one disable timer is one day one hour five minutes.*

Example of use:

The on-call person is going out of town for 3 days. He wishes his family not to be disturbed while he is gone. The dialer is instructed to skip his phone number during an alarm call-out sequence. In this case, the command ****021030405** would prohibit alarm calls to be placed to phone 1 for 3 days, 4 hours, and 5 minutes beginning at the time the command is sent.

4.9.3 Enable Printing (052)

**052	Enable printing

This command will enable continuous printer logging of all dialer status changes (input and output state changes, callouts, alarm acknowledgments, power on/off cycles, etc.).

Example-

Command: ****052**
Response: *Printing Enabled.*

4.9.4 Disable Printing (053)

**053	Disable printing

This command will disable printing.

Example-

Command: ****053**
Response: *Printing disabled.*

5.0 TROUBLESHOOTING

Symptom: Voice data lost or clock and calendar lost.
Cause: 3v battery replacement.
Cause: Jumper J14 on processor board not installed.

Symptom: **Unable to place telephone calls (Line LED comes on but no ring at called telephone number).**
Cause: Phone number not entered correctly.
Cause: Call being placed to different number list than expected.
Cause: Phone line not plugged-in, phone line broken or in use.

Symptom: **Unable to program with local telephone.**
Cause: Incorrect command format (all commands begin with * or **). To clear out the message buffer at any time, press the '#' key.
Cause: Touch-tone phone must be used (listen for tones when keys are pressed).
Cause: Phone not plugged in correctly (local telephone must be plugged into PHONE jack, and OFF HOOK LED should be on).
Cause: Dialer off-hook placing call (LINE LED is on).
Cause: Very loud or noisy environment -- program from remote phone or use a mute button on the local phone.

Symptom: **Not placing alarm call (Line LED does not come on).**
Cause: I/O channel not really in alarm or is not a new alarm.
Cause: Channel is not configured to call(COA). See section 3.6.7.
Cause: Non-latched alarm is self clearing before call is made.
Cause: Local telephone is off-hook.
Cause: System or telephone disable timer set.
Cause: Intercall (Snooze or Call-spacing) delay set.
Cause: No valid telephone numbers to call.

Symptom: **Dialer is dead (Power LED is on steady, not flickering).**
Cause: Non-recoverable CPU error (Call Toll-free Support number).

Symptom: **Dialer is dead (Power LED is off).**
Cause: Check power to dialer. Make sure it is wired properly.
Cause: Non-recoverable CPU failure (Call Toll-free Support number).

Symptom: **Dialer is dead (Power LED is blinking).**
Cause: Enter *000 through local telephone. Listen to spoken status report. It should say "System Data Error" or "System Timer Error."

System Data Error - Some configuration data was corrupted. Review all configuration data and reprogram errant items.

Symptom: **MicroMax Surge Protector - Dialer is not responding locally and seemingly hangs up the call right after the first ring (Power LED is blinking).**
Cause: If you have a MicroMax surge protector on the line, the surge protector may be interfering with the dialer's operation. Possible Cure: Try unplugging the line connector from the dialer so it isn't connected to any device and then turn on and off the dialer a few times trying to get it to pick up locally (It may take a few times for it to work). If it still doesn't respond, try connecting the wall jack directly to the dialer and try cycling power a few times while trying to again connect locally. If none of this works, (Call Toll-free Support number).

6.0 MAINTENANCE

6.1 SYSTEM BATTERY

Battery life is dependent upon a number of factors, predominantly the number of power outages and the age of the battery. A battery in typical standby use will last approximately 2 to 4 years. A new battery should take no longer than 24 hours to gain full charge, capable of powering the system through a power outage of typically 6 hours. Because of the modular nature of the *Series 1000*, however, battery backup time may vary by a few hours. The battery backup time is proportional to the number and types of I/O modules you have installed in your dialer.

Check the System Battery by using a DC voltmeter to measure the open circuit (no-load) terminal voltage of the battery at room temperature (20 degrees Celsius). If the voltage is less than 12.5 volts, the battery has a residual capacity of less than 50%. If the voltage is less than 12.0 volts, the battery is completely worn out.

Refer to **Section 2.4, *Battery Connection***, for instructions on installing a new battery and adjusting the dialer's battery charging circuit.

6.2 ONBOARD CLOCK

After initially setting time and date, periodically check the accuracy of your dialer's onboard clock. It may run a couple of minutes fast or slow per month. In addition, you will have to set the time back/forward to correspond with Daylight Savings Time. The time can be conveniently reviewed and adjusted over the telephone by entering the touch tone command with the new time in 24-hour format (****060HHMM**). Refer to **Section 3.3, *Setting Time and Date***, for additional explanation and examples.

An internal 3 Volt lithium cell maintains time/date when power to the dialer is removed. It has a capacity of approximately a year. If power to your dialer is to be removed for an extended period, consult the factory about removing an internal jumper to preserve battery energy.

6.3 FUSE REPLACEMENT

For:	**Use the following:**
Series 1000 Dialer	Littelfuse Micro 2A273 -- Microfuse 2A/125V
Grayhill Output Modules	Littelfuse Metric (5 X 20 mm) -- Use Amp/Volt rating of old fuse
Opto 22 Output Modules	Wickmann TR5 Sub-Miniature -- Use Amp/Volt rating of old fuse

APPENDICES

APPENDIX A: TECHNICAL SPECIFICATIONS

A.1 COMMUNICATIONS

Phone Interface:	FCC 68 Registration Number: 1QEUSA-21532-AL-E Pass-through Phone Handset
Ringer Equivalence Number:	1.2B(ac)
LED Indicators:	Dialer Off-hook/Ring Detect/Call Progress Telephone Off-hook/FAX-in-progress System Status/Power-fail
Dialing Capacity:	9 Phone Numbers, 60 Digits Each Tone or Pulse Dial Special Sequences for Selection of Pulse/Tone, Pause, Call Progress Detection, Turning ON/OFF Output Modules, Auto Acknowledging Alarms, Communicating with FAX machines or Computers.
Call Progress Detection	Dial Tone Detect Busy Detect Ring Back Detection Quiet/Voice/Answer/Pager Terminal Tone detect
Answer Delay:	1-99 Rings (Call Back Acknowledge)
Fax:	Group 3 Fax Compatible Single-page Alarm Status or Dialer Configuration Reports

A.2 ELECTRICAL

Input Power:	120 VAC 14.5 VDC Plug in Wall Transformer or 12-16VDC @ 0.5 Amp (Dialer only) or 14.5-16VDC (Dialer with Battery) Solar Power Interface Compatible Power On/Off Switch Power-fail Indicator Externally Accessible Fuse

A.6 SPEECH

Type:	Digitized Resident and User-Recorded Messages ADPCM
Recordable Message Lengths:	6 Seconds System Message 3.25 Seconds Each I/O Name

A.7 I/O MODULES

Capacity: 8 I/O Socket Locations for Plug-in Modules

I/O Module Types:

MOD No.	Tin No.	Description
MOD-DI5	61558	Digital Input, Isolated, Dry Powered
MOD-DO4	61556	Digital Output Contact, Dry, N.O.
MOD-DO5	61557	Digital Output Contact, Dry, N.C.
MOD-AI1	61549	Analog Input, 4-20 mA, Isolated
MOD-AO1	61550	Analog Output, 4-20 mA, Isolated

Additional Modules Supported.

A.8 I/O FUNCTIONAL MODES

Discrete Status:	ON/OFF or OPEN/CLOSED
Discrete Alarm Inputs:	ALARM/NORMAL/STATUS
Analog Status Inputs:	0.0 to 99.9%
Analog Alarm Inputs:	High and Low Set Points
Analog Outputs:	0.0 to 99.9%
Counter Inputs:	32-Bit Accumulator (1 pps. Channels 1-7, 50 pps. Channel 8)
Run Time Inputs:	00:00:00 (DD:HH:MM)
Local Alarm Output:	Alarm/Normal
Power Fail Detection:	Power Fail/Normal

APPENDIX B: GLOSSARY OF DIALER TERMINOLOGY

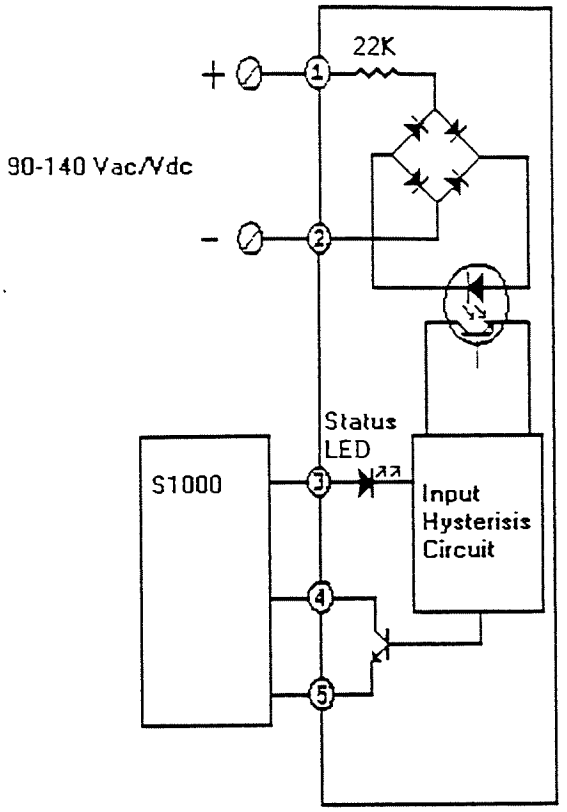
Acknowledge	Telling the dialer that an alarm should not cause additional calls to be placed. Acknowledgment can be made by entering the '*' during alarm playback, with the acknowledgment command (**071,**072c), with call back acknowledge, or by an auto acknowledge phone escape sequence (*90) embedded within the telephone number.
Alarm condition	An event detected by the dialer usually causing a phone call.
Analog	An I/O channel type that uses a numerical value (0.0% to 99.9%).
Call-spacing	The time delay between successive answered unacknowledged telephone calls.
Interaction delay	A programmable time delay between a keyboard command and its voice message response, to allow the user to move the phone handset to the ear. If the keypad is located separately from the ear piece, then a 0 delay will speed Interaction delay.
I/O channel	A dialer to outside world connection.
Latched type	An I/O channel parameter that will store an alarm condition even if the alarm condition goes away. The alarm condition will be held until the alarm is acknowledged.
New alarm	Any alarm that has not yet initiated a call out sequence or an alarm still present after the snooze delay.
Phone list	A sequence up to 9 digits indicating which phone numbers to call from the telephone directory.
Phone number	A sequence of up to 60 digits used to dial a phone number or perform a dial escape sequence function.
Report format	A selection of what data is spoken during a call within a status message.
Snooze delay	The time between when an alarm is acknowledged and when it begins to cause calls again.
Unlatched type	An I/O channel parameter that causes an alarm to self-clear if the alarm condition goes away.

APPENDIX C: PERCENT/CURRENT/VOLTAGE/TEMPERATURE CONVERSIONS

0%	4.00ma.	1.00volts	-40°F	-40°C	50%	12.00ma.	3.00volts	50°F	10°C
1%	4.16ma.	1.04volts	-38°F	-39°C	51%	12.16ma.	3.04volts	52°F	11°C
2%	4.32ma.	1.08volts	-36°F	-38°C	52%	12.32ma.	3.08volts	54°F	12°C
3%	4.48ma.	1.12volts	-35°F	-37°C	53%	12.48ma.	3.12volts	55°F	13°C
4%	4.64ma.	1.16volts	-33°F	-36°C	54%	12.64ma.	3.16volts	57°F	14°C
5%	4.80ma.	1.20volts	-31°F	-35°C	55%	12.80ma.	3.20volts	59°F	15°C
6%	4.96ma.	1.24volts	-29°F	-34°C	56%	12.96ma.	3.24volts	61°F	16°C
7%	5.12ma.	1.28volts	-27°F	-33°C	57%	13.12ma.	3.28volts	63°F	17°C
8%	5.28ma.	1.32volts	-26°F	-32°C	58%	13.28ma.	3.32volts	64°F	18°C
9%	5.44ma.	1.36volts	-24°F	-31°C	59%	13.44ma.	3.36volts	66°F	19°C
10%	5.60ma.	1.40volts	-22°F	-30°C	60%	13.60ma.	3.40volts	68°F	20°C
11%	5.76ma.	1.44volts	-20°F	-29°C	61%	13.76ma.	3.44volts	70°F	21°C
12%	5.92ma.	1.48volts	-18°F	-28°C	62%	13.92ma.	3.48volts	72°F	22°C
13%	6.08ma.	1.52volts	-17°F	-27°C	63%	14.08ma.	3.52volts	73°F	23°C
14%	6.24ma.	1.56volts	-15°F	-26°C	64%	14.24ma.	3.56volts	75°F	24°C
15%	6.40ma.	1.60volts	-13°F	-25°C	65%	14.40ma.	3.60volts	77°F	25°C
16%	6.56ma.	1.64volts	-11°F	-24°C	66%	14.56ma.	3.64volts	79°F	26°C
17%	6.72ma.	1.68volts	-9°F	-23°C	67%	14.72ma.	3.68volts	81°F	27°C
18%	6.88ma.	1.72volts	-8°F	-22°C	68%	14.88ma.	3.72volts	82°F	28°C
19%	7.04ma.	1.76volts	-6°F	-21°C	69%	15.04ma.	3.76volts	84°F	29°C
20%	7.20ma.	1.80volts	-4°F	-20°C	70%	15.20ma.	3.80volts	86°F	30°C
21%	7.36ma.	1.84volts	-2°F	-19°C	71%	15.36ma.	3.84volts	88°F	31°C
22%	7.52ma.	1.88volts	-0°F	-18°C	72%	15.52ma.	3.88volts	90°F	32°C
23%	7.68ma.	1.92volts	1°F	-17°C	73%	15.68ma.	3.92volts	91°F	33°C
24%	7.84ma.	1.96volts	3°F	-16°C	74%	15.84ma.	3.96volts	93°F	34°C
25%	8.00ma.	2.00volts	5°F	-15°C	75%	16.00ma.	4.00volts	95°F	35°C
26%	8.16ma.	2.04volts	7°F	-14°C	76%	16.16ma.	4.04volts	97°F	36°C
27%	8.32ma.	2.08volts	9°F	-13°C	77%	16.32ma.	4.08volts	99°F	37°C
28%	8.48ma.	2.12volts	10°F	-12°C	78%	16.48ma.	4.12volts	100°F	38°C
29%	8.64ma.	2.16volts	12°F	-11°C	79%	16.64ma.	4.16volts	102°F	39°C
30%	8.80ma.	2.20volts	14°F	-10°C	80%	16.80ma.	4.20volts	104°F	40°C
31%	8.96ma.	2.24volts	16°F	-9°C	81%	16.96ma.	4.24volts	106°F	41°C
32%	9.12ma.	2.28volts	18°F	-8°C	82%	17.12ma.	4.28volts	108°F	42°C
33%	9.28ma.	2.32volts	19°F	-7°C	83%	17.28ma.	4.32volts	109°F	43°C
34%	9.44ma.	2.36volts	21°F	-6°C	84%	17.44ma.	4.36volts	111°F	44°C
35%	9.60ma.	2.40volts	23°F	-5°C	85%	17.60ma.	4.40volts	113°F	45°C
36%	9.76ma.	2.44volts	25°F	-4°C	86%	17.76ma.	4.44volts	115°F	46°C
37%	9.92ma.	2.48volts	27°F	-3°C	87%	17.92ma.	4.48volts	117°F	47°C
38%	10.08ma.	2.52volts	28°F	-2°C	88%	18.08ma.	4.52volts	118°F	48°C
39%	10.24ma.	2.56volts	30°F	-1°C	89%	18.24ma.	4.56volts	120°F	49°C
40%	10.40ma.	2.60volts	32°F	0°C	90%	18.40ma.	4.60volts	122°F	50°C
41%	10.56ma.	2.64volts	34°F	1°C	91%	18.56ma.	4.64volts	124°F	51°C
42%	10.72ma.	2.68volts	36°F	2°C	92%	18.72ma.	4.68volts	126°F	52°C
43%	10.88ma.	2.72volts	37°F	3°C	93%	18.88ma.	4.72volts	127°F	53°C
44%	11.04ma.	2.76volts	39°F	4°C	94%	19.04ma.	4.76volts	129°F	54°C
45%	11.20ma.	2.80volts	41°F	5°C	95%	19.20ma.	4.80volts	131°F	55°C
46%	11.36ma.	2.84volts	43°F	6°C	96%	19.36ma.	4.84volts	133°F	56°C
47%	11.52ma.	2.88volts	45°F	7°C	97%	19.52ma.	4.88volts	135°F	57°C
48%	11.68ma.	2.92volts	46°F	8°C	98%	19.68ma.	4.92volts	136°F	58°C
49%	11.84ma.	2.96volts	48°F	9°C	99%	19.84ma.	4.96volts	138°F	59°C

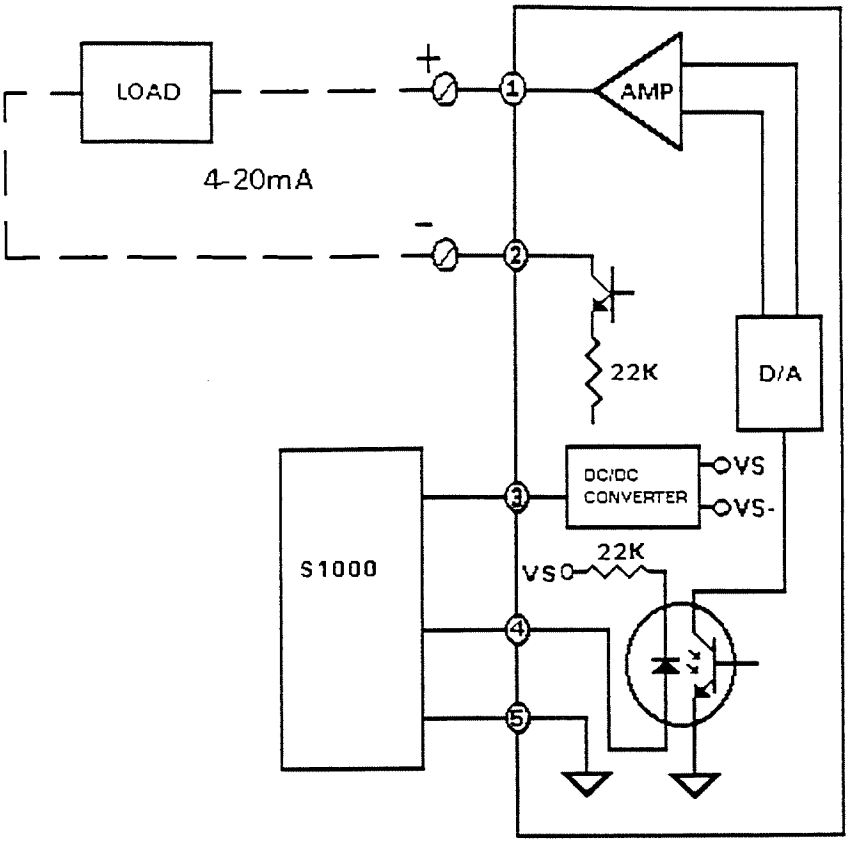
APPENDIX D: I/O MODULE WIRING DIAGRAMS

D.1 120 Vac INPUT



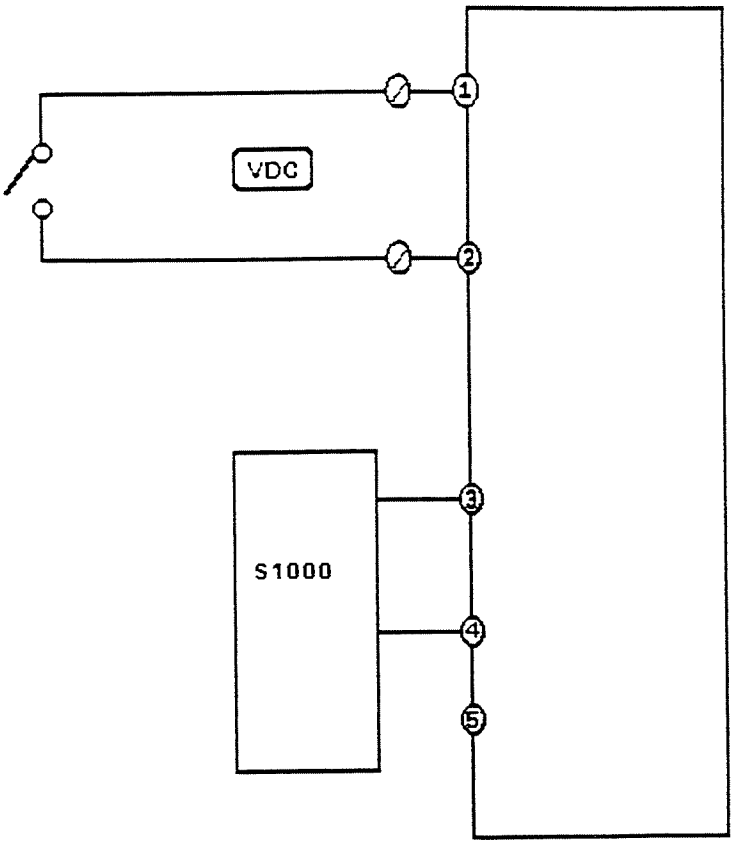
PART NUMBER:	CALL FACTORY
CASE COLOR:	YELLOW
INPUT VOLTAGE RANGE:	90-140 Vac
NOMINAL INPUT RESISTANCE:	22K Ohms
MAXIMUM PICKUP VOLTAGE(LOW)	90 Vac
MINIMUM DROP OUT VOLTAGE(HIGH)	25 Vac

D.3 4-20 mA ANALOG OUTPUT



PART NUMBER:	MOD-AO1
COLOR:	ORANGE
MAXIMUM OUTPUT CURRENT (SOURCE):	20 mA, 450 Ohm max. loop resistance
ACCURACY, FULL SCALE AT 25C:	±0.3%
RESOLUTION:	3.9uA (12 BITS)
ISOLATION:	2500 Vrms

D.5 ISOLATED DRY CONTACT INPUT



PART NUMBER:	MOD-DI5
COLOR:	WHITE
MAXIMUM DRY CONTACT VOLTAGE RATING:	25 Vdc
MINIMUM DRY CONTACT CURRENT RATING:	5 mA
CONTACT RESISTANCE (OUTPUT LOW):	≤ 1.25 K Ohm
CONTACT RESISTANCE (OUTPUT HIGH):	> 20 K Ohm
ISOLATION:	2500 Vrms

APPENDIX E: EXAMPLES OF FAX REPORT

The attached pages are actual FAX reports sent from a Microtel *Series 1000* dialer.

Notice the time/date stamp, custom system text message, and dialer's identifying telephone number printed at the top of each FAX report. Customized text messages must be configured using a local computer.

The **Status Report** indicates any system errors, current alarm conditions, and current State, Runtime, and Counter data for each installed I/O module.

The **Setup Report** lists all configured System parameters, the System Telephone Directory, Call At Schedule, and I/O Module Programmed Configuration Data. The example shown here lists default system and I/O configuration data.

Alarm calls send Status Reports only; you must enter a command to force the dialer to send a Setup Report (See **Section 4.4, *Forcing a Test Call or Sending a Fax***).

JONESVLL LFT STA Setup Report 7/29/96 15:14:55 5042456229

Software Version: S1000 VER 2.2

Snooze delay: 00:01:00 (DD:HH:MM)
Call-spacing delay: 1 minute(s)
Rings before answer: 1
Message repeat count: 3
Remote menu access code: 1732
Voice interaction delay: 0.1 seconds
System telephone list: 53421
Answer Mode: Data Mode
Printing: DISABLED Testset: ENABLED

System Telephone Directory

1. *9401800454523l*2*2*2*25042456229*91*984
2. *9404236957*2*2*2*22456229*91*984
3. *9902456300
4. 4524908
5. 4547291
6.
7.
8. *991105
9. *991*9402760574

Call At Schedule

Day:	Sun	Mon	Tue	Wed	Thu	Fri	Sat
HHMM	0700	0700	0700	0700	0700	0700	0700

I/O Module Programmed Configuration Data

I/O Channel	TYPE	Report Format	Delay (Secs)	Alarm Configuration		Setpoints Low	Setpoints High	Calling List
1 HIGH WETWELL LVL	DI N.O.	01	0020/0005	COA				4521
2 PUMP #1 FAIL	DI N.C.	01	0020/0005	COA				451
3 PUMP #2 START	DO	01	0020/0005	STATUS	LATCH			123456789
4 VALVE POSITION	AO	01	0020/0005	STATUS		0.1%	100.0%	123456789
5 TEMPERATURE	AI PER	01	0020/0010	STATUS		10.0%	90.0%	123456789
6 LOCAL ALERT	DO LA	15	0020/0005	STATUS	LATCH			123456789
9 Power Fail	PF	01	0060/0010	COA				451

JONESVLL LFT STA Status Report 7/29/96 15:17:21 5042456229

Software Version: S1000 VER 2.2

The Alarm Status is NORMAL

I/O Module Status Data

I/O Channel	State	Run Time DD:HH:MM	Current Alarm Time HH:MM:SS	Counter
1 HIGH WETWELL LVL	0	00:00:00	00:00:00	0000000000
2 PUMP #1 FAIL	1	00:00:00	00:00:00	0000000001
3 PUMP #2 START	0	00:00:00		0000000000
4 VALVE POSITION	0.0%	00:00:00	00:00:00	
5 TEMPERATURE	0.0%	00:00:10	00:10:38	
6 LOCAL ALERT	0	00:00:00	00:00:00	0000000000
9 Power Fail	1	00:00:00	00:00:00	0000000000

TIGERMAG™

INSTALLATION OPERATION & MAINTENANCE MANUAL

Issue Date: November 1996

FM626

FM656

SPARLING

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cont'd.

1.0 General

1.1 Measuring System

The Sparling TigermagEP™ Model FM626 and FM656 flowmeters are obstructionless devices for monitoring the volumetric flow of conductive liquids in full closed pipes.

The flowmeter consists of a sensor (wafer or flanged) with a non-magnetic liner and a measuring transmitter.

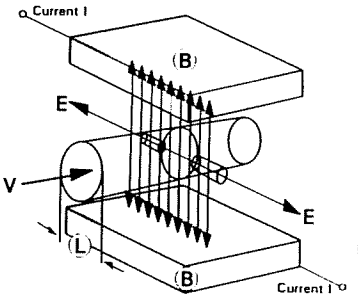
1.2 Operating Principle

Operation is based on Faraday's Law of Magnetic Induction. An electrically conductive liquid flowing through a magnetic field induces a voltage which is perpendicular to this field and to the direction of the flow. This voltage is proportional to the average flow velocity. See Figure 1.1.

The mathematical formula describing Faraday's law reads:

$E = B \times L \times V$

E = Induced voltage
B = Magnetic field intensity (flux density)
L = Distance between the electrodes (pipe diameter)
V = Average flow velocity of liquid



Measuring Prindple
Figure 1.1

1.3 Application to Magnetic Flow Measurement

In a magnetic flowmeter the liquid acts as a moving conductor as it flows through the pipe. The induced voltage (E) in the liquid is measured by two sensing electrodes mounted opposite each other in the meter sensing head.

The length of the conductor is equal to the distance between sensing electrodes and also the internal diameter (D) of the pipe. The flux density is proportional to the coil current (I), times a constant (k). The above formula can be restated as follows:

$$E = I \times k \times D \times V$$

$$V = \frac{\text{flow}}{\text{cross sectional area}} = \frac{Q}{A}$$

$$E = \frac{Q \times I \times 4 \times k}{D^2}$$

Note that if I is held constant, E is proportional to Q or *the induced voltage is directly proportional to the average flow rate* (V).

1.4 Interference

1.4.1 Electrochemical Interference

The signal voltage is measured by two electrodes. Galvanic elements form on the surface areas between the ion-conducting liquid and the metal electrodes. The polarization voltages which result are dependent on temperature, pressure, and the chemical composition of the electrodes and liquid. These are direct voltages which cannot be predicted and which can be different at each electrode. The signal voltage must be separated from the interference direct voltage. Proper grounding eliminates these unpredictable voltages from interfering with the signal voltage.

1.4.2 Induction Interference (Quadrature)

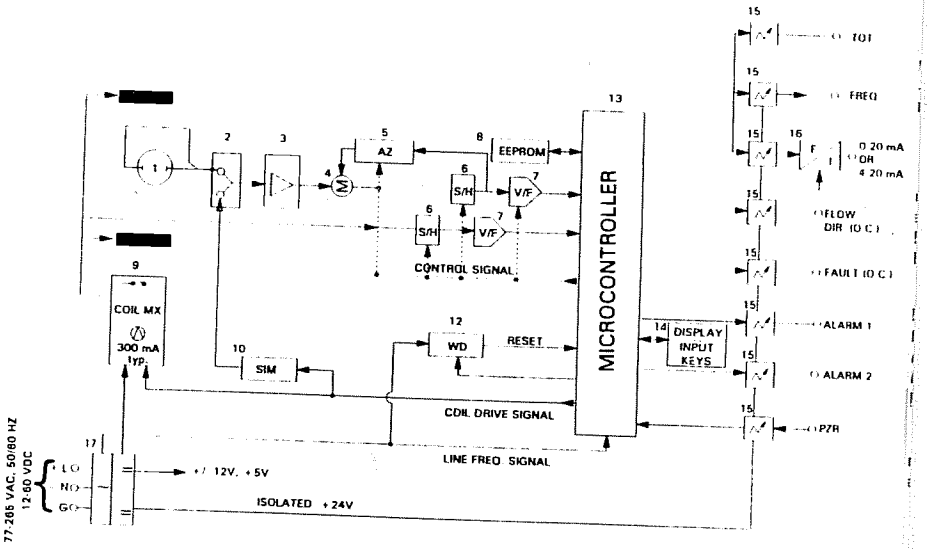
Electrode cables connect the electrodes with the meter electronics. Because these cables must run within the magnetic field, a voltage is induced which is proportional to the rate of change of the magnetic field strength. The meter design minimizes the length of conductor within the magnetic field in order to keep the value of this interference as low as possible.

1.4.3 Other Interference Voltages

Pipes and the liquids within them are often used as a conductor for electrical grounding. This creates a voltage potential between electrodes which can be high relative to the signal voltage. **Proper grounding of the flowmeter to the liquid is necessary to achieve correct meter operation. Grounding rings should be installed if the flowing medium has a voltage potential, if piping is non-conductive (plastic or *lined*) or if conductivity is below 20 micromhos/cm. See Section 3.8 – Grounding.**

1.5 System Operation

The Sparling TigermagEP™ uses the autozeroing, bi-polar, pulsed-DC measuring technique. The circuitry in Figure 1.2 energizes the coil with 300 mA typical current at a frequency up to 100 Hz. The signal generated at the electrodes is measured near the end of each measuring cycle to eliminate the capacitive effects of coatings. The Hi-Z ($10^{12}\ \Omega$) input impedance eliminates the resistive effects. The field current alternates to a positive and negative state and the two measured signals are averaged to eliminate the effect of a zero offset—auto-zeroing.



1. Measuring Sensor
2. Electrode Cable PCB
3. Input Amplifier
4. Summing Point
5. Autozero Circuit
6. Sample and Hold
7. Voltage to Frequency Converter
8. Non-volatile EEPROM (constants)
9. Coil Current Multiplexer
10. Built-in Simulator
11. Adjustable Empty Pipe Detection (in software)
12. Watchdog Timer
13. Microcontroller
14. LCD Display with Hall Effect Switches
15. Optocouplers
16. Frequency to Current Converter
17. Power Supply Section

Block Diagram
Figure 1.2

1.6 Construction

16.1 Sensor

TheFM626consists of a ceramic or optional *Teflon*® (PTFE) lined stainless steel sensor which is fitted into a steel housing. The FM656 flow sensor is a welded fabrication of 304 stainless steel, fitted with two carbon steel flanges. The flow sensor contains a non-conductive liner of ceramic, polyurethane, *Teflon*®, hard rubber, soft rubber, or neoprene. BothTigermagEPs™are structurally sound waterproof assemblies capable of handling a wide range of highly corrosive and abrasive liquids.

Electrodes in ceramic-lined meters over 0.50" are sealed by a double "O"-ring seal. The primary O-ring seal is ethylene propylene. This seal is backed by a secondary seal of viton. The combination of seals makes the meter suitable for nearly all conductive liquids. In ceramic lined meter sizes from 0.10" to 0.50", one Viton "O" ring is used. The electrodes in all other liners are self-sealing.

All internal cavities of the FM626 sensor housing are filled with a high temperature silicone potting compound to prevent the possibility of moisture damage and to avoid the possibility of collection of explosive gases.

▼ **WHEN PROPERLY CONNECTED WITH LIQUID-TIGHT CONDUIT, THE REMOTE FLOW SENSOR WILL WITHSTAND ACCIDENTAL SUBMERGENCE. SEE FIGURE 3.15 ON PAGE 21.**

1.6.2 Integral Transmitter

The transmitter is housed in a CSA and Factory Mutual approved, NEMA-4X and NEMA-7 instrument enclosure. The power and signal electrical connections are made in a separate section of the housing which is isolated from the electronics.

1.6.3 Remote Transmitter

The transmitter is housed in a NEMA-4X enclosure.

Remote mounting of the electronics is required when process temperatures exceed 212° F (100°C), when pipe vibration is excessive or when flooding is possible. Remote mounting should be used when high process temperatures exist at high ambient temperatures.

The optional remote mounting kit includes interconnecting cable between the sensor and transmitter enclosure. The standard interconnecting cable length is 15 feet. Shorter or longer cables should be ordered from the factory. The cable may be shortened in the field.

CAUTION

DO NOT MAKE CONNECTIONS WHILE POWER IS APPLIED. DISCONNECT POWER BEFORE PROCEEDING

1.7 Specifications

Power Requirements	See Nameplate
Fuses	Slo-Blo (12-60 Vdc) ..... 2.0 amp Slo-Blo (77-265 Vac) ..... 1.0 amp Spare fuse provided on connector PCB.
Wire Size	Power ..... 16 AWG; 14 AWG Max Signal ..... 18 AWG
Ground Cable	Third wire ground of power cable
Accuracy (Frequency Output)	0.1" - 0.5" 0.5% of span (1-3 fps) 0.25% of span (≤ 50% of span) (3-33 fps) 0.5% of flowrate (≥ 50% of span) (3-33 fps) 1.0" - 12.0" 0.25% of span (≤ 50% of span) (1-3 fps) 0.5% of flowrate (≥ 50% of span) (1-3 fps) 0.1% of span (≤ 20% of span) (3-33 fps) 0.5% of flowrate (≥ 20% of span) (3-33 fps)
Reference Conditions	25°C, 6 fps full scale. Temperature effect, 0.025% Full Scale/°C. Accuracy statement based on digital outputs
Repeatability	Within ±0.1% full scale
Power Consumption	Less than 20 VA
Output Signals	Simultaneous isolated analog and digital (all referenced to the same isolated ground) Analog: 0 to 20 or 4-20 mAdc into 800 ohms max. Digital: Scaled pulse and frequency a. Scaled, 24 Vdc pulse with 12.5/25/50/100 ms on time, 0-60 Hz max into 150 ohm impedance min. b. Scaled frequency. 15 Vdc square wave, 50/50 duty cycle, 0 -1000 Hz max into 1000 ohms min. c. Fault, with open collector d. Two flow alarms e. Flow direction with open collector f. RS232 Communication
Fault	Open collector. Active on self test failure, empty pipe and during programming, low/no coil drive and failure of external totalizer to keep up with the flow (registration too small.
Input Signal	Positive zero return (PZR). Connect to remote dry contact to drive analog and digital outputs to zero when an empty pipe condition can occur.
Minimum Conductivity	5 micromho/cm
Flow Direction	Open collector (rating: 100mA at 30 Vdc). Active in reverse flow

1.7 Specifications Cont'd.

Full Scale Velocity Ranges	0-3 to 0-33 fps (0-1 to 0-10 mps)
Ambient Temp Limits	-20° to 140°F (-30° to 60°C) (Display may darken above 158°F)
Process Temp	**Integral Mount** Hard rubber, Soft rubber, Neoprene, Polyurethane .... -40 - 180°F Teflon, Ceramic: .... -40 - 212°F **Remote Mount (opt)** Teflon, Ceramic: .... -40 - 266°F **High Temp Coils (opt)** Teflon: .... -40 - 350°F Ceramic: .... -40 - 420°F Temperatures above 212° F (100° C) require mounting the electronics separately (max. distance 15 feet at liquid conductivity of 5 micromhos and min. velocity of 1 fps).
Storage Temp Limits	-20° to 140° F (-30° to 60° C)
Construction	Metering Tube .... Model 626 – Steel Model 656 – 0.5"-4" Steel, epoxy coated Model 656 - 6"-12" 304 SS welded, epoxy coated Flanges .... Carbon steel ANSI compatible Lining .... Model 626 – Aluminum Oxide 99.5% or PTFE Model 656 – Polyurethane, Aluminum Oxide 99.5% PTFE, Hard Rubber, Soft rubber, Neoprene Electrodes .... 316 SS. Others as required Integral Housing (XMTR) ... Cast Aluminum, Hi-build Epoxy Coated Remote Housing (XMTR) .... Fiberglass Protection rating Integral .... NEMA-4X, NEMA-7 Remote NEMA-4X

Electrical rating

Remote Mount - General Purpose

Integral Mount - Hazardous Locations

FM Approved* for Class I, Division 1, Groups B, C, D; Class II Groups E, F, G

CE Approved

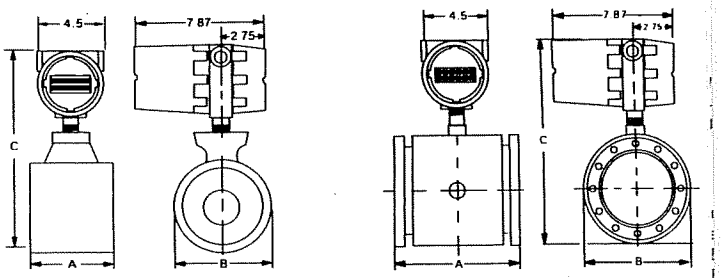
CSA Approved* for Class 1, Division 2, Groups A, B, C, D

Cenelec Approved (optional)

*FM and CSA applies to integrally mounted transmitters up to 150 psi only.

1.8 Interchangeability

The TigermagEP™ transmitter is designed to be used with any FM626 or FM656 sensor. Electronics are completely interchangeable. Meter identification (tube ID, Serial Number, K, Offset, etc.) is stored on an EEPROM chip independent of transmitter electronics. This provides universal compatibility between all Tigermag EP electronics modules, eliminating the need for reprogramming when switching modules. FM656 0.5"- 4" sizes have the same face to face dimensions as FM626 wafer-style meters (0.5"- 4") See Figure 1.3.



Dimensions
Figure 1.3

Table 1 – Flow & Dimensions Table

Nominal Meter Size		Nominal Flow Rates - Full Scale GPM						Dimensions (Inches)					Weight			
		Ceramic			Other			A	B		C		626		656	
		± 1 %	Min	Max	± 1 %	Min	Max									
Inches	mm	1 FPS	3 FPS	33 FPS	1 FPS	3 FPS	33 FPS	626/656	626	656	626	656	lbs	kg	lbs	kg
0.1	2.5	0.04	0.12	1.3	N/A	N/A	N/A	4.00	2.31	N/A	9.0	N/A	15	7	N/A	N/A
0.25	6	0.22	0.67	7.2	N/A	N/A	N/A	4.00	2.31	N/A	9.0	N/A	15	7	N/A	N/A
0.5	12	0.50	1.5	16.5	0.9	2.7	29	4.00	2.31	3.50	9.0	9.60	15	7	18	8
1.0	25	1.62	4.85	53.4	2.3	6.9	76	4.00	2.92	4.25	9.6	10.00	15	7	20	9
1.5	40	4.40	13.2	145.2	5.5	16.5	182	4.00	3.62	5.00	10.5	11.10	20	9	26	12
2.0	50	7.00	21.0	231.0	9.8	29.4	323	4.00	4.12	6.00	11.0	12.00	20	9	30	14
3.0	80	20.30	61.8	680.0	22.9	68.8	757	6.00	5.70	7.50	13.0	14.00	30	14	48	22
4.0	100	35.40	106.1	1168.0	40.4	121	1333	6.00	6.60	9.00	14.1	15.10	35	16	55	25
6.0	150	N/A	N/A	N/A	85	254	2800	13.00	N/A	11.75	N/A	18.25	N/A	N/A	75	73
8.0	200	N/A	N/A	N/A	145	436	4800	13.00	N/A	14.25	N/A	20.75	N/A	N/A	105	77
10.0	250	N/A	N/A	N/A	238	709	7800	17.75	N/A	17.13	N/A	23.63	N/A	N/A	155	86
12.0	300	N/A	N/A	N/A	333	1000	11000	19.00	N/A	20.13	N/A	26.63	N/A	N/A	235	117

Note 1: Dimensions and chart values for 150 lb. flanges (ANSI template).
Note 2: Allow 1/4" for 0.5 to 6" meters and 1/2" for 8" and larger meters for grounding rings and gaskets.

2.0 Pre-Installation

2.1 Receiving and Inspection

When the equipment is received, the outside of the package should be inspected for damage. If any damage or shortage is found, notation to that effect should be made on the carrier's delivery receipt.

Visually inspect the sensor and transmitter for damage from rough handling or faulty packaging. If concealed damage is discovered, notify the delivering carrier at once and request an inspection. Confirm telephone conversations in writing. If inspection is not made, prepare an affidavit stating that you notified the transportation company and that they failed to inspect. Save containers and packaging material.

It is essential that the carrier be notified within 15 days from the date of delivery in order to be in a position to present your claim. Make your claim promptly.

Unpacking and handling of TigermagEP™ Magnetic Flowmeters should be consistent with the procedures used to handle field instruments.

2.2 Storage

This equipment should be stored in a clean, dry environment. Do not store outside in an unprotected area. Observe the storage temperature requirements. Unpowered storage should not exceed two years.

2.3 Return of Equipment

Obtain an RGA *(Returned Goods Authorization)* number from the factory prior to returning any materials. The RGA number should be marked on the outside of the package. Failure to obtain authorization will unnecessarily delay any work to be performed at the factory.

3.0 Installation

3.1 Application Considerations

The TigermagEP™ can be used to accurately measure the volumetric flow rate of liquids having a conductivity of at least 5 micromho/cm.

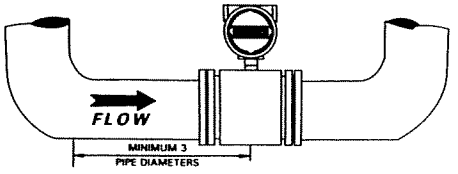
The presence of entrained air or gases in the process liquid will not prevent meter operation, but will produce a positive (+) error equal to the % by volume gas entrainment.

▼ **FULL SCALE FLOW RATES SHOULD BE SELECTED ABOVE 3 FEET PER SECOND (1 METER PER SECOND) FOR BEST ACCURACY.**

3.2 Site Selection

Select a pipe location which will always be full of liquid. The equipment should be located where the flowmeter will be accessible for adjustment. Provide a minimum of 18" clearance to the electronics enclosure.

The meter may be located in any position from vertical to horizontal. Flow may be in either direction through the meter. Vertical installation with the liquid flowing upwards, minimizes the possibility of slurry separation and assures a full pipe condition.



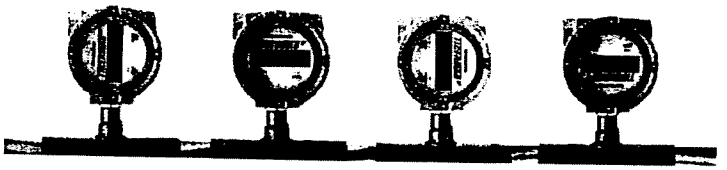
Full Pipe Required
Figure 3.1

Horizontal installation requires that the sensing electrodes be positioned in the horizontal plane. See Figure 3.7.

Provide at least three pipe diameters of straight piping approach between an upstream elbow and the midpoint of the meter. In small meters this can be achieved within the meter itself. More straight approach should be provided after valves or multiple elbows. Provide at least 10 diameters after expanders or laterals which are smaller diameter than the line size.

3.3

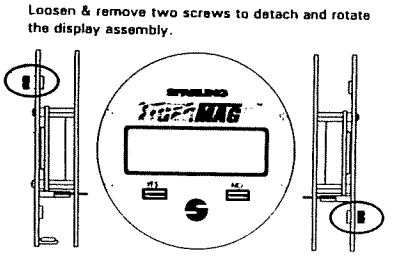
Rotating the Transmitter Display



The Sparling TigermagEP's modular display is designed to allow you to rotate the display in four different orientations. By simply removing the two screws circled in Figure 3.2 below, the display assembly can be rotated, at 90° intervals, to the desired position for ease of reading.

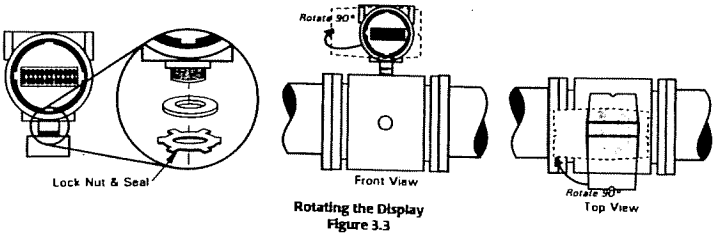
The display features long lasting LCD numerals. The display may darken if ambient temperatures exceed its temperature rating of -4° to +158°F. Darkening usually occurs when the electronics are installed in direct sunlight. To avoid this problem install a sun shield when the flowmeter is in direct sunlight.

Display assembly can be replaced in the field without replacing the entire electronics, by following the same procedures as utilized for rotating the display.



Removing the Rotatable Display
Figure 3.2

The transmitter enclosure can be rotated 90° in either direction. Loosen the lock nut securing the transmitter to the standoff. Rotate the transmitter by hand in the desired direction. **DO NOT ROTATE THE TRANSMITTER MORE THAN 90° IN EITHER DIRECTION. DOING SO WILL DAMAGE INTERNAL WIRING.** Tighten the lock nut to prevent further rotation and to prevent moisture entering the enclosure. Additional rotation can be achieved by removing the meter from the line, rotating the entire meter, reversing the flow through the meter.



Rotating the Display
Figure 3.3

3.4 Removable Electrodes (optional)

The line must be de-pressurized and drained in order to check and replace the removable electrodes.

3.4.1 How the Design Works

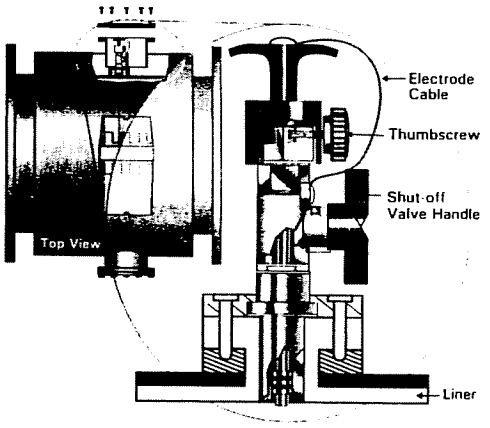
This design utilizes electrodes which are installed through an accessible parts provided on the sensor body. Electrodes are sealed using two o-rings. One o-ring acts as a primary seal while the other is a back-up seal. This redundant sealing approach provides positive sealing.

To withdraw the electrodes, process line has to be de-pressurized and drained. The outer cover must be removed by unscrewing cap bolts using an 11/32 nut driver to allow access to the electrode cavity. Remove cables from electrodes by removing nuts and lock washers. Using a 3/4" socket, unscrew and remove electrode assembly.

3.4.2 The Need for Replacement

Sparling's flowmeter design utilizes High Impedance circuitry (Hi-Z) which is not affected by coating build-up on the electrodes. Replacement of the electrode only becomes neces sary when physical damage due to errosion or corrosion has occurred.

3.5 Hot-Tap Removable Electrodes (optional)



Hot-Tap Removable Electrode
Figure 3.4

Sparling's optional hot-tap removable electrode design allows the inspection or replace ment of electrodes without stopping the flow or depressurizing the line. The electrode assembly is sealed with multiple o-rings to maintain isolation from the pressurized medium. During removal of the electrode, a stainless steel ball valve is closed to keep the process fluid from leaking out while the electrodes are inspected or cleaned. The electrode housing, wired as a backup electrode, functions as a redundant electrode assembly providing the flow signal to the electronics. In other words, even when the electrode is withdrawn, the flowmeter keeps on providing important flow information.

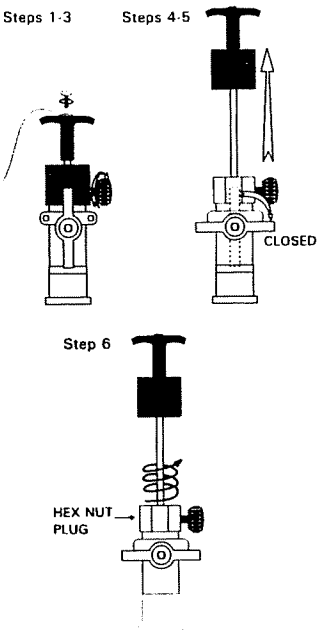
3.5 Hot-Tap Removable Electrodes (cont'd)

3.5.1 Electrode Removal

1. Use a cross recessed (phillips) screwdriver to remove the screw and lockwasher from the handle.
2. Gently remove the electrode cable (orange wire) and place aside.
3. Secure cable then loosen the side knob.
4. Using the handle on the electrode head, pull electrode straight to the point that the valve can be closed.
5. Close the ball valve clockwise.
6. Unscrew the hex plug from the valve counter-clockwise and remove the electrode assembly.

3.5.2 Electrode Installation

1. Install hex plug clockwise. Seal tight into closed valve assembly.
2. Open ball valve counter-clockwise).
3. Push electrode assembly in, aligning the slot in the cover with the screw, until firmly seated.
4. Tighten the side knob.
5. Place electrode cables on handle.
6. Install the lockwasher and screw, tighten.
7. Replace gasket, cover, cover screws and tighten securely.



Removing the Electrode
Figure 3.5

CAUTION

- ***Avoid scratching or damaging the withdrawn electrode.***
- ***Ball valve must be closed before the hex-head electrode assembly is unscrewed and removed.***
- ***Electrode hex-head assembly must be replaced and secured tightly before opening the ball valve and re-inserting the electrode.***

3.5.3 When to Replace

Sparling's flowmeter design utilizes High Impedance circuitry (Hi-Z) which is not affected by coating build-up on the electrodes. Replacement of the electrode only becomes necessary when physical damage due to errosion or corrosion has occurred.

3.6 Pipe Connections

MODEL FM626 FLANGELESS (WAFER) SENSOR

The flangeless sensor is installed between two process pipe flanges. The sensor contains a non-conductive ceramic or *Teflon®* liner. The integrity of this liner must be maintained for the flowmeter to function. ***CARE SHOULD BE TAKEN DURING INSTALLATION TO INSURE THAT THIS LINER IS NOT DAMAGED.*** Depending upon meter size, four (4) or eight (8) steel bolts are required for installation of the FM626. These bolts are used to install the meter between existing flanges. See Table 4. Gaskets are required between the meter and the pipe flanges and between grounding rings and the mating surfaces.

Install the two bolts at the bottom of the meter. Place the meter temporarily between the flanges to confirm correct positioning. The meter should rest directly on the bolts. Remove the meter.

▼ ***REINSTALL THE METER TAKING CARE TO KEEP THE GASKET CENTERED. INSTALL ALL BOLTS AND TIGHTEN FINGER TIGHT. COMPLETE INSTALLATION WITH TORQUE WRENCH. IT IS IMPORTANT THAT THE BOLTS BE TIGHTENED ALTERNATELY SO THAT EXCESSIVE FORCE IS NOT APPLIED TO A CONCENTRATED POINT. SEE FIGURE 3.6. DO NOT EXCEED THE TORQUE LIMITS IN TABLE 4.***

MODEL FM656 FLANGED SENSOR

The flanged sensor is installed between two process pipe flanges. The sensing head tube interior is covered with an electrically non-conductive liner which overlaps the flange seal surfaces. The integrity of this liner must be maintained for the flowmeter to function. ***CARE SHOULD BE TAKEN DURING INSTALLATION TO INSURE THAT THIS LINER IS NOT DAMAGED. FLANGE GASKETS MUST BE USED.***

▼ ***THE GASKETS, METER FLANGES, AND MATING PIPE FLANGES SHOULD BE DUSTED WITH GASKET TALC PRIOR TO INSTALLATION TO PREVENT DAMAGE TO THE LINER. SHOULD IT BE NECESSARY TO REMOVE THE METER FROM THE LINE. DO NOT USE GRAPHITE TO DUST THE GASKET. A CONDUCTIVE FILM WILL COAT THE METER INTERIOR AND CAUSE A MALFUNCTION. DO NOT EXCEED THE TORQUE LIMITS IN TABLE 4.***

Gasket material should be selected which is compatible with the piping and process conditions. The table below contains typical satisfactory gasket materials. Do not use spiral wound metal gaskets as they may cause liner damage.

Table 2 – Gasket Material

LINER MATERIAL	GASKET MATERIAL
Ceramic	Teflon
Teflon	Teflon Coated Asbestos
Hard or Soft Rubber	Asbestos Neoprene Rubber
Neoprene	Asbestos Neoprene Rubber
Polyurethane	Asbestos Neoprene Rubber

Table 3 – Meter I.D.

Nominal I.D.	Actual I.D.			
	Ceramic		Other	
in	in	mm	in	mm
0.10	0.125	3.17	N/A	N/A
0.25	0.302	7.67	N/A	N/A
0.50	0.452	11.48	0.60	15 24
1.00	0.812	20.62	0.97	24 64
1.50	1.34	34.04	1.50	38 10
2.00	1.69	42.93	2.00	50 80
3.00	2.90	73.66	3.06	77 72
4.00	3.80	96.52	4.06	103 12
6.0	N/A	N/A	6.00	152 4(
8.0	N/A	N/A	7.75	196 8!
10.0	N/A	N/A	10 00	254 0(
12.0	N/A	N/A	12 00	304 8(

3.7 Special Mounting Bolts & Gaskets

Sparling provides carbon steel mounting hardware with wafer meter sizes 0.1"to 4", On flanged meters, ***special*** mounting bolts are provided for meter sizes 0.5", 1.5" and 3" only. Gaskets are provided for ceramic sensors only.

Optional 304SS mounting bolts for these sizes are available at extra cost.

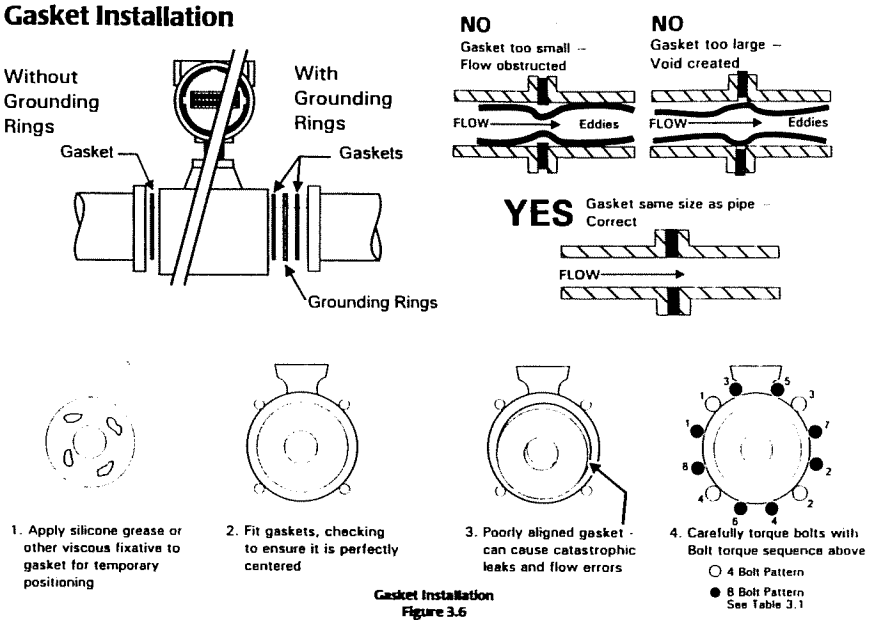
▼ ***FM656 METER SIZES 0.5" - 4" HAVE THE SAME FACE-TO-FACE DIMENSIONS AS FM628 WAFER-STYLE METERS (0.5" - 4") SEE FIGURE 1.3.***

Table 4 – Torque, Flange & Bolt Specifications

Nom. Meter Size(in)	Maximum Torque		ANSI / AWWA Flange & Bolt Specs						DIN Flange & Bolt Specs					
	ft-lbs	kg-m	Mating Flange	Pressure Rating	OD Inch	Bolt Circle	Hole Dia	Bolt Size	Mating Flange	Pressure Rating	OD mm	Bolt Circle	Hole Dia	Bolt Size
0.1	17	2.3	0.5	150	3-1/2	2-3/8	4 @ 5/8	7/16-14 x 6-3/4	15	10	95	65	4 @ 14	M10 X 170
	17	2.3	0.5	300	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4	15	25	95	65	4 @ 14	M12 X 170
	17		0.5	600	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4						
0.25	17	2.3	0.5	150	3-1/2	2-3/8	4 @ 5/8	7/16-14 x 6-3/4	15	10	95	65	4 @ 14	M10 X 170
	17	2.3	0.5	300	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4	15	25	95	65	4 @ 14	M12 X 170
	17		0.5	600	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4						
0.5	17	2.3	0.5	150	3-1/2	2-3/8	4 @ 5/8	7/16-14 x 6-3/4	15	10	95	65	4 @ 14	M10 X 170
	17	2.3	0.5	300	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4	15	25	95	65	4 @ 14	M12 X 170
	17		0.5	600	3-3/4	2-5/8	4 @ 5/8	1/2-13 x 6-3/4						
1.0	17	2.3	1	150	4-1/2	3-1/8	4 @ 5/8	7/16-14 x 6-3/4	25	10	115	85	4 @ 14	M12 X 170
	17	2.3	1	300	4-7/8	3-1/2	4 @ 3/4	5/8-11 x 7-1/2	25	25	115	85	4 @ 14	M12 X 170
	17		1	600	4-7/8	3-1/2	4 @ 3/4	5/8-11 x 7-1/2						
1.5	17	2.3	1.5	150	5	3-7/8	4 @ 5/8	1/2-13 x 6-3/4	40	10	150	110	4 @ 18	M16 X 190
	17	2.3	1.5	300	6-1/8	4-1/2	4 @ 7/8	3/4-10 x 7-1/2	40	25	150	110	4 @ 18	M16 X 190
	17		1.5	600	6-1/8	4-1/2	4 @ 7/8	3/4-10 x 7-1/2						
2.0	17	2.3	2	150	6	4-3/4	4 @ 3/4	5/8-11 x 7-1/2	50	10	165	125	4 @ 18	M16 X 190
	17	2.3	2	300	6-1/2	5	8 @ 3/4	5/8-11 x 7-1/2	50	25	165	125	4 @ 18	M16 X 190
	17		2	600	6-1/2	5	8 @ 3/4	5/8-11 x 7-1/2						
3.0	24	3.3	3	150	7-1/2	6	4 @ 3/4	5/8-11 x 9-1/2	80	10	200	160	8 @ 18	M16 X 240
	24	3.3	3	300	8-1/4	6-5/8	8 @ 7/8	3/4-10 x 10-1/2	80	25	200	160	8 @ 18	M16 X 240
4.0	30	4	4	150	9	7-1/2	8 @ 3/4	5/8-11 x 9-1/2	100	10	220	180	8 @ 18	M12 X 240
	30	4	4	300	10	7-7/8	8 @ 7/8	3/4-10 x 10-1/2	100	25	235	190	8 @ 22	M20 X 260
6.0	92	12.7												
8.0	133	18.4												
10.0	70	9.7												
12.0	83	11.5												

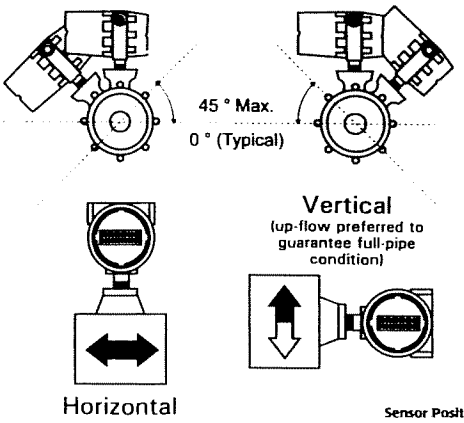
All specifications per Customer requirements and in compliance with recognized standards such as: ANSI / AWWA/ DIN

FM626
Gasket Installation



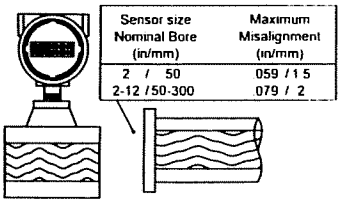
Gasket Installation
Figure 3.6

Sensor Position



Sensor Position
Figure 3.7

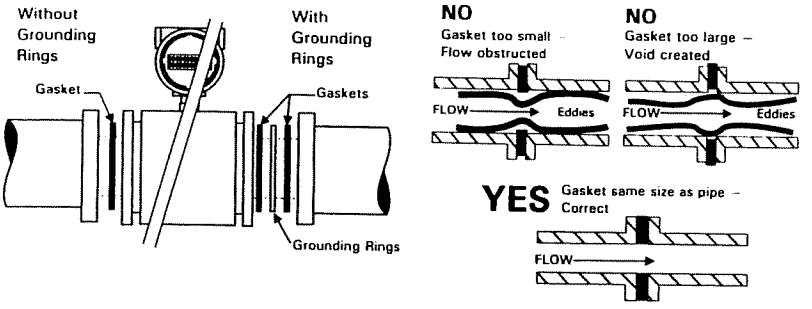
Sensor Alignment

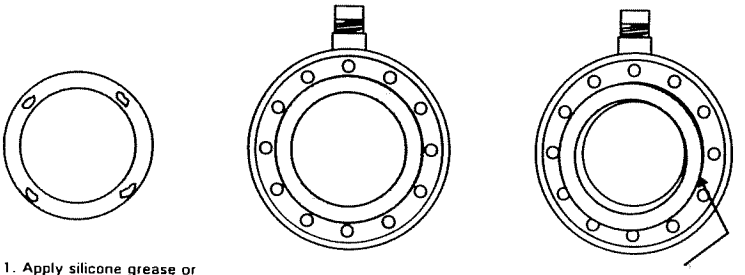


Sensor size Nominal Bore (in/mm)	Maximum Misalignment (in/mm)
2 / 50	059 / 1 5
2-12 / 50-300	079 / 2

FM656

Gasket Installation





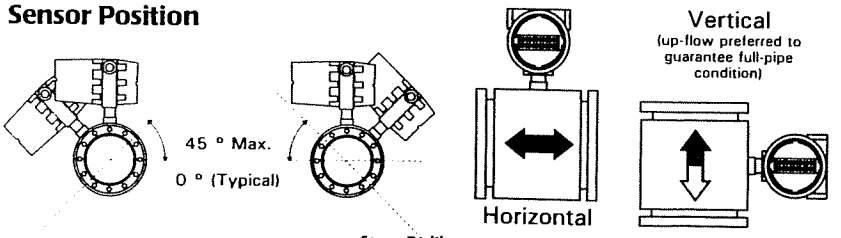
1. Apply silicone grease or other viscous fixative to gasket for temporary positioning

2. Fit gaskets, checking to ensure it is perfectly centered

3. Poorly aligned gasket - can cause catastrophic leaks and flow errors

Gasket Installation
Figure 3.8

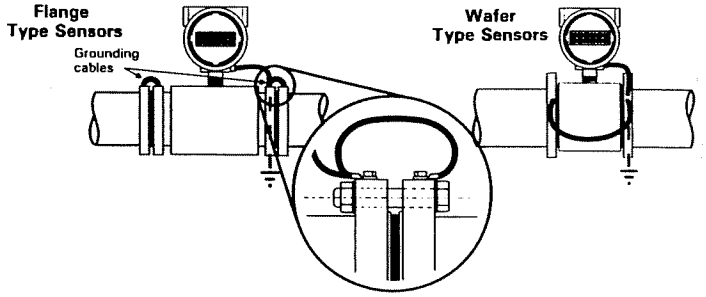
Sensor Position



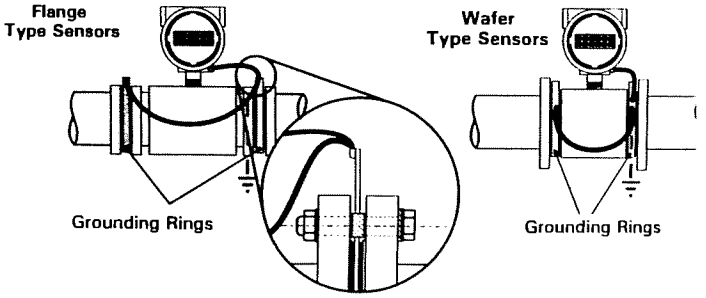
Sensor Position
Figure 3.9

3.8 Grounding

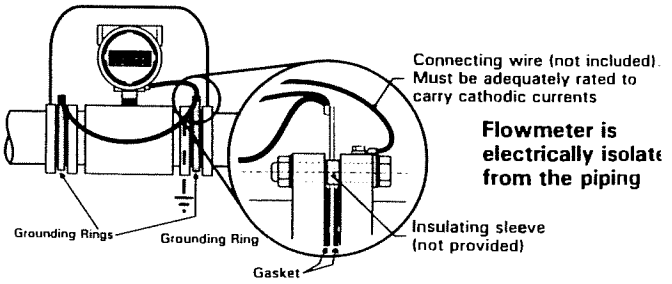
Mounting in Unlined Metal Pipelines



Mounting in Plastic or Lined Pipeline, or where Conductivity <20 micromhos/cm



Mounting in Pipes with Cathodic Protection



Grounding
Figure 3.10

3.8 Grounding Cont'd.

DC and AC voltages can be transmitted through conductive fluids which can lead to magnetic flow meter instrument errors. Adequate grounding between the liquid and the instrument is essential to ensure correct flow measurement. Magnetic flow meters should always be grounded at four places: 1) Flowmeter tube, 2) Transmitter, 3) Receiving instrument, 4) the fluid.

▼ **EXTERNAL GROUNDING RINGS SHOULD BE INSTALLED ON ANY METER WHERE THERE IS LINED OR NON-CONDUCTIVE PIPE OR CONDUCTIVITY IS LESS THAN 20 MICROMHOS/CM. SEE FIGURE 3.10.**

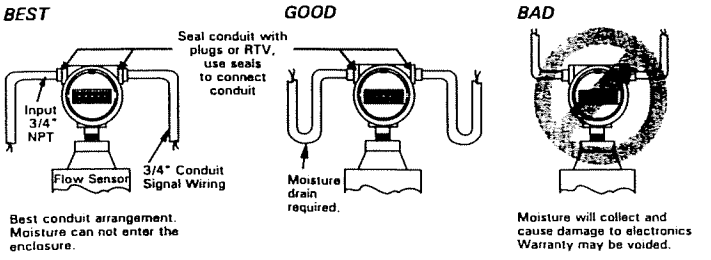
The grounding rings are in continuous contact with the process liquid providing a direct means for grounding electrical noise in the liquid. The electrical noise potential in the process liquid is at a similar level to the electrical ground plane to which the ac power supply ground is connected. This grounding method stabilizes the electrical field within the sensor measuring section permitting accurate flow detection. Grounding resistance must be less than 20 ohms.

▼ **CONTACT OUR TECHNICAL SUPPORT GROUP IF PROCESS LIQUID NEEDS TO BE MAINTAINED AT A POTENTIAL ABOVE OR OTHER THAN GROUND.**

3.9 Electrical Connections

Unscrew the small blind cover of the electronics enclosure to gain access to the I/O PCB. Separate 3/4" NPT conduit entrances are provided for power and signal wiring. Conduit connections should follow good practice and should be routed from below the meter. If conduit cannot be routed from below, provide moisture traps and seals to prevent moisture from entering the meter enclosure. See Figure 3.11. ***Be sure to tighten conduit connections.***

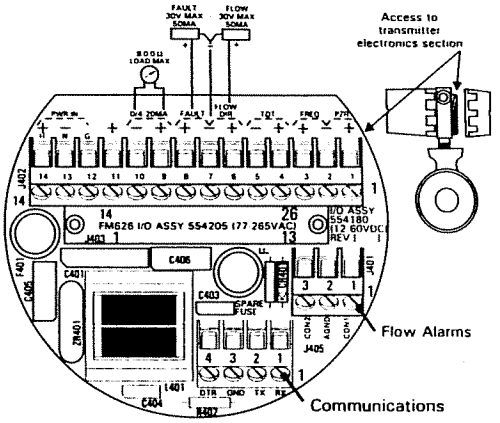
CAUTION ***WATERTIGHT CONDUIT, FITTINGS AND SEALS ARE REQUIRED TO MAINTAIN THE MOISTURE-FREE INTEGRITY OF ALL ENCLOSURES AND ELECTRONICS IN THE SYSTEM. ENTRY OF MOISTURE MAY VOID SPARLING'S WARRANTY. ALL FITTINGS MUST CONFORM TO NEMA-6 CLASSIFICATIONS***



Conduit Connections
Figure 3.11

3.9 Electrical Connections Cont'd.

A connection diagram is located in the cover of the connection section and in Figure 3.12. Determine which of the outputs (4-20 mA, fault, flow direction, pulse or frequency) are to be used. Connect the required outputs as shown in Figure 3.12. Install 1N4004 diodes across the load when driving inductive loads. If required, connect the Positive Zero Return (PZR) input. Note that meter outputs are forced to zero when terminals 1 and 2 are connected together through relay contacts.



Electrical Connections I/O PCB
Figure 3.12

Connect power leads to terminals 13 and 14 on the terminal strip. Be sure to connect a good ground to terminal 12.

The external load on the outputs must be within the limits specified. Calculate the external load by summing the input resistance, including all interconnecting cable. Signal cable of 18-22 gauge is normally adequate.

External load limits		
	Analog output	800 ohms max. impedance
	Pulse output	150 ohms min. impedance
	Frequency	1000 ohms min. impedance

All outputs are floating and use the same isolated ground. If more than one output is used simultaneously, only one of the common legs can be grounded. If both are grounded, a ground loop will occur causing erroneous signals. ***Do not ground any part of current loop if another output is already grounded.***

CAUTION

ONLY ONE LOAD MAY HAVE A LEG STRAPPED TO GROUND UNLESS THE LOADS ARE ISOLATED FROM EACH OTHER

The TigermagEP™ series is equipped with a switching power supply (standard) which accommodates power sources of 77-265 Vac 50/60 Hz. An optional 12-60 Vdc power supply is available. No adjustments or jumpers are required.

3.10 Remote Mounted Transmitter

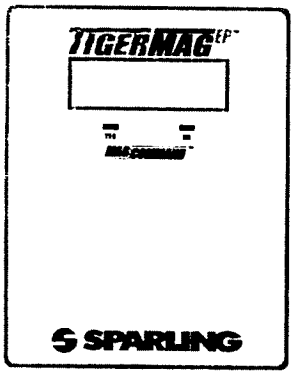


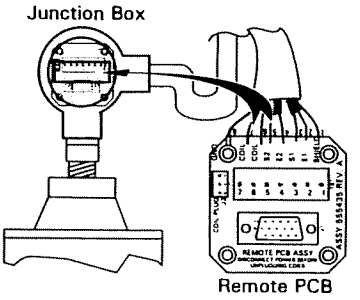
Figure 3.13
Tigermag EP Remote Display

Remote mounting of the electronics is required when process temperatures exceed 212° F (100° C), when pipe vibration is excessive or when flooding is possible. Remote mounting should be used when high process temperatures exist at high ambient temperatures.

A bracket for wall or pipe mounting is furnished as part of the optional remote mounting kit. Interconnecting cable is supplied between the sensor and transmitter enclosure. Also supplied is a sensor mounted NEMA-7 rated junction box and a transmitter-mounted junction box in which coil and electrode connections are made.

The standard interconnecting cable length is 15 feet. Shorter or longer cables should be ordered from the factory. The cable may be shortened in the field. DO ***NOT*** SPLICE CABLE IN THE FIELD.

Connect terminals 1 through 7 and ground both junction boxes with the special cable provided. See Figure 3.14. Installation in metal conduit is required for RFI protection as well as physical protection. See Figure 3.15. Also see Section 3.9 for electrical connections.

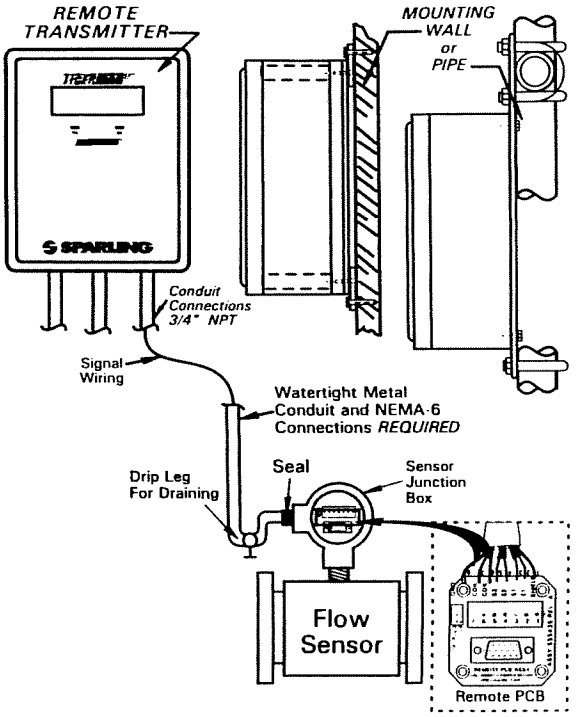


Sensor Wiring - Remote Transmitter
Figure 3.14

CAUTION

DO NOT MAKE CONNECTIONS WHILE POWER IS APPLIED. DISCONNECT POWER BEFORE PROCEEDING.

3.10 Remote Mounted Transmitter Cont'd.



Remote Mounted Transmitter
Figure 3.15

WARNING

CONDENSATE DRAINING THROUGH CONDUIT CAN BE AVOIDED BY USING DRIP LEGS, DRAINS AND SEALS WHICH WILL NOT LET MOISTURE INTO THE ELECTRICAL ENCLOSURE.

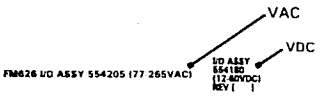
WATERTIGHT METAL CONDUIT, FITTINGS AND SEALS ARE REQUIRED TO MAINTAIN THE MOISTURE-FREE INTEGRITY OF ALL ENCLOSURES AND ELECTRONICS IN THE SYSTEM. ENTRY OF MOISTURE MAY VOID SPARLING'S WARRANTY. ALL FITTINGS MUST CONFORM TO NEMA-6 CLASSIFICATIONS.

4.0 Start-Up

4.1 Start-Up Procedure

Prior to applying power, the following checks should be made:

a) Check the flowmeter nameplate to insure that the power supply voltage is correct.
b) Verify that all electrical connections are correct. See Figures 3.12 and 3.14. The power supply voltage rating will be marked on the I/O PCB See Figure 3.16.
c) Check the polarity of external loads connected to the outputs.
d) Check to see that the two hall effect switches on the front of the transmitter are in place with the dark side of the switch ***facing up*** towards the LCD display. Do not remove these switches unless authorized by factory personnel. If you suspect that one of the hall effect switches is defective, contact the factory.



Power Supply Voltage Ratings
Figure 3.16

5.0 Calibration

5.1 Calibration

All flowmeters are calibrated before leaving the factory. No field recalibration is required.

The 4 and 20 mA current level may be checked if desired by following the procedure in Appendix I DIAGNOSTICS. The meter can be used as a current calibrator to ***check connected equipment***. See Appendix1, para. 2.3.3.

6.0 Maintenance

No routine maintenance is required.

7.0 Troubleshooting

The following sections describe field tests and bench tests that can be performed on Sparling's magnetic flow meters.

7.1 General

Each flowmeter is rigorously tested during production. The final test stage is a wet flow calibration in a Sparling precision primary flow laboratory traceable to the National Institute of Standards and Technology (NIST).

Before troubleshooting, carefully verify the operating conditions of the meter:

1. Verify the interconnecting wiring by using a local milliammeter connected to the current output with no other load connected.
2. Verify that the sensor is completely filled with liquid. An empty or partially full sensor will continue to send an erratic flow signal even with no flow.
3. Verify that any flow test comparison is valid before assuming that the meter is in error.
4. If in doubt, verify the conductivity of the liquid to see that it exceeds 5 micromho/cm.

7.2 Trouble-shooting Chart

The following trouble shooting chart should assist in correcting meter malfunction. For additional assistance, contact Technical Support 800/800-FLOW (818/444-0571 in California).

WARNING

a) "WARNING - EXPLOSION HAZARD - SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS 1, DIVISION 2";

"AVERTISSEMENT - RISQUE D'EXPLOSION- LA SUBSTITUTION DE COMPOSANTS PEUT RENDRE CE MATERIEL INACCEPTABLE POUR LES EMPLACEMENTS DE CLASSE 1, DIVISION 2".

b) "THIS EQUIPMENT IS SUITABLE FOR USE IN CLASS 1, DIVISION 2, GROUPS (AS APPLICABLE) OR NON-HAZARDOUS LOCATIONS ONLY".

Troubleshooting Chart

SYMPTOM	POSSIBLE CAUSE AND CURE
1. Erratic Reading (Output Wandering)	1. A. Installation a. Is sensor properly grounded? A good liquid ground is required. b. Empty pipe? Pipe must be full of liquid. c. Air in pipe? De-aerate d. Chemical being injected upstream of flowmeter? Change the chemical dosage downstream of the flowmeter. B. Electrical a. VFD's? Need additional filtering and improved grounding. b. Marginal Connection (particularly for remote units)? Rewire to insure good contacts. C. Moisture intrusion? Use leak tight fittings and keep the covers tight.
2. Inaccurate Reading	2. A. Run simulator test (47000/K) - Appendix 1, Section 2.3.6. B. Coil drive blown? Electronic module has to be returned to factory for repair C. Conductive coating? Clean sensor.
3. Output Incorrect (Pulse & Analog)	3. A. Disconnect wires and check circuit output with DVM. Reprogram current output. If program is OK, hardware failure, return to factory. B. For pulse output need oscilloscope. If there is flow no pulse output, hardware failure, return to factory.
4. Analog Output Zero	4. A. No external power required, unit is not loop powered. If external voltage was connected, electronics are damaged and should be returned back factory for repair.
5. Display Readings Locked	5. A. Program errors? Cycle the power off and on, then reprogram if necessary.
6. Meter Reads Zero	6. Did it ever work? A. Blown coil drive? Return for repair B. Not properly wired (remote units)? Re-wire correctly C. Conductive coating? Clean sensor.
7. Blank Display	7. A. Blown fuse? Replace Fuse B. Power supply damage? Return for repair.
8. Display is turning black around edges	8. Temperature is too high inside the enclosure. Relocate the meter or shield against the heat source. Continuing to power the meter in this condition will permanently damage the display.
9. Display is difficult to read	9. Improve the lighting conditions if ambient light is dim. Remove large cover and adjust the pot directly above the display for best contrast while viewing from the intended viewing angle.

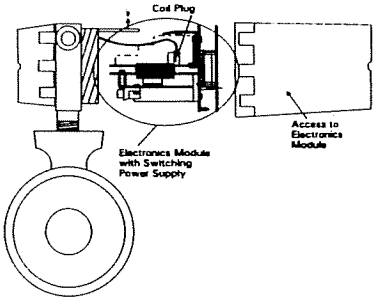
If the above steps fail to correct the problem, try different flow rates and disconnecting loads temporarily and s if the problem persists. Perform simulator check and call the factory. ***Please have the following information availat when you call:***

- Meter serial number; G, I, Z values from "SHOW METER DATA?".
- Description of the problem. (Display, current output, totalizer/frequency, all of the above.)
- When does the symptom occur or repeat?
- What are the flow rates, the orientation of the meter in t pipeline, environmental conditions, output loads on t meter, pipe material and grounding technique?
- How did you verify the discrepancy?

Contact Technical Support 800/800-FLOW (in California 818/444-0571) for additional assistance.

7.3 Electronics Self Test

Using the MAG-COMMAND™ magnetized screwdriver, enter programming mode by holding the magnet to the "NO" switch for five seconds. See Appendix 1 for detailed instructions. Answer NO to all prompts until the DIAGNOSTICS menu appears. Answer YES to the DIAGNOSTICS menu. Follow the menu instructions. See Appendix 1, Section 2.3.



Access to Electronics
Figure 7.1

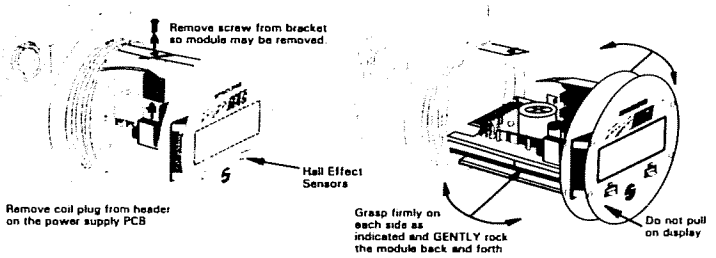
7.4 Electronics Module Replacement

To remove the electronics module, first unscrew the larger enclosure cover and remove the screw fastening the module bracket. Now unplug the coil cable converter. See Figures 7.1 and 7.2.

Grasp the module at each side and pull firmly while rocking the boards gently from side to side. ***Do not pull the module out by the display.*** See Figure 7.2

WARNING

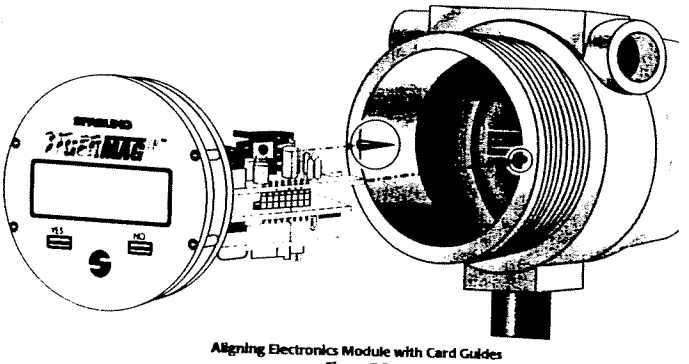
DO NOT REMOVE ELECTRONICS MODULE WHILE POWER IS APPLIED. DISCONNECT POWER BEFORE PROCEEDING



Removing the Electronics Module
Figure 7.2

▼ ***METER ELECTRONICS ARE CONTAINED IN A PLUG IN MODULE. THIS MODULE CONTAINS NO USER SERVICEABLE PARTS.***

7.4 Electronics Module Replacement Cont'd.



Aligning Electronics Module with Card Guides
Figure 7.3

When re-installing the electronics module, observe the connector in the bottom of electronics enclosure. Line up the electronics module with card guides and the connec See Figure 7.3. Plug in the replacement module. Plug in coil connector. **Be certain the p wires are routed properly and will not interfere with the housing cover. Don't forge replace the screw that fastens the module to the bracket. See Figure 7.2**

Apply power and observe display. Now, reprogram any values which were modified fr factory preset levels. To obtain factory settings, look at meter calibration record ship with meter. If sensor EEPROM chip is damaged or has lost its data, call factory with the se number and request another copy of the EEPROM chip programmed with constants in factory.

7.5 Sensor Testing

The sensor consists of a measuring section with electrodes and coils in a steel enclosu The following paragraphs describe field tests that can be performed by the instrum technician. Defective sensors should be returned to the factory for repair. OBTAIN RETURNED GOODS AUTHORIZATION (RGA) PRIOR TO RETURNING MATERIALS PREVENT DELAYS.

7.6 Coil Continuity Testing

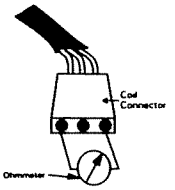
WARNING

DO NOT MAKE OR BREAK COIL CONNECTION WHILE POWER IS APPLIED. DISCONNECT POWER BEFORE PROCEEDING.

Unplug coil cable plug. Using a short 22 gauge (or appropriate) test lead, connect ohmmeter between coil wires and measure resistance. See Figure 7.4.

▼ **COIL RESISTANCE SHOULD MEASURE 110 OHMS ±10% AT ROOM TEMPERATURE. HOT COILS MAY READ AS HIGH AS 150 OHMS.**

If the coil resistance is too high or low (including open and short circuits) the sensor must be returned to the factory for inspection and/or repair.



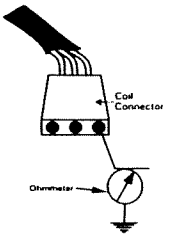
Coil Resistance Testing
Figure 7.4

7.7 Coil Insulation Test

Required test equipment: Insulation tester 10^{12} ohm

Disconnect power and signal cables. Disconnect coil connector, Figure 7.5. Connect insulation tester between coil wire and housing ground. Test the insulation at 500 Vdc. A reading below 10,000 meg ohms indicates moisture in the sensor. The sensor must be returned to the factory for inspection and/or repair.

Connect insulation tester between coil wire and housing ground. Test the insulation at 500 Vdc. A reading below 10,000 meg ohms indicates moisture in the sensor. The sensor must be returned to the factory for inspection and/or repair.



Coil Insulation Test
Figure 7.5

7.8 Electrode Circuit Insulation Test

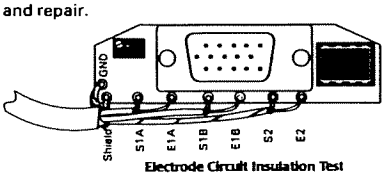
Unplug coil and remove module from electronic enclosure.

▼ ***Sensor must be empty and dry.***

Connect insulation tester three ways (see Figure 7.6.):

1. Between top post labeled E1A and S1A (shield)
2. Between center post labeled E1B and S1B (shield).
3. Between bottom post labeled E2 and S2 (shield).

Any leakage or fault indication will determine that the sensor should be returned to the factory for inspection and repair.



Electrode Circuit Insulation Test
Figure 7.6

8.0 Replacement Parts List

Description	*Part Num*
1. Electronics Module, 77 - 265 Vac	554
Electronics Module, 12 - 60 Vdc	554
2. I/O PCB	
12-60 Vdc	554
77-265 Vac	554
3. Fuse, Slo-Blo, (12-60 Vdc) 2.0 amp	148
Fuse, Slo-Blo (77-265 Vac) 1.0 amp	148
4. Kit, remote mount for Transmitter	555
Assembly includes:	
a) Mounting bracket with U-bolt	
b) Cable grip	
c) Sensor junction box	
d) 15 ft. cable assembly	
For Pipe mounting of remote transmitter order:	
Mounting bracket with U-bolt (optional)	555
5. Remote mount PCB	555
6. Replacement remote mount cable	150
7. Grounding rings	Contact Fac

Your TigermagB™ can be fitted with an optional digital communication capabil
utilizing HART® protocol. In order to operate this feature, you must have a Sparling mo
KP602 transmitter interface. Consult factory for more details.

HART® is a registered trademark of Rosemou
Teflon® is a registered trademark of D

A.1 Appendix 1– Programming Firmware Ver. 1.0

1.1 General

The 16 character 2 line alpha-numeric display is located directly above two magnetically operated Hall effect switches. The left switch is labeled "YES" and the right switch is labeled "NO". THESE SWITCHES ARE THE ONLY CONTROLS REQUIRED TO SELECT AND CHANGE PARAMETERS ON THE TigermagEP. DO NOT ADJUST POTS.

The TigermagEP is configured to the user's installation (programmed) using the MAG-COMMAND magnetic probe furnished with each meter. It can also be programmed with any high strength magnet. See Figure A1.1. Either switch is activated by momentarily holding the MAG-COMMAND probe close to the switch.

IT IS NOT NECESSARY TO OPEN THE ELECTRONICS COMPARTMENT IN ORDER TO CHANGE PROGRAM SETTINGS.

Refer to Figure A 1.2 to determine how to get to each section of the program.

1.2 Entering Data

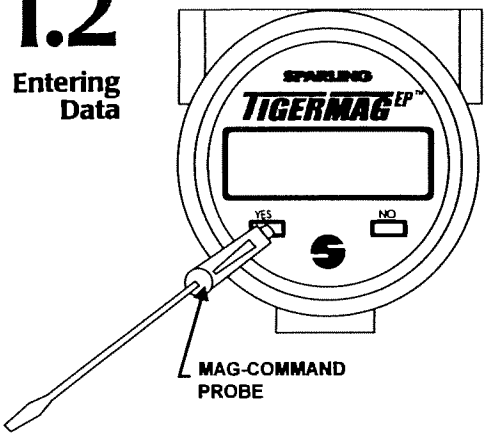


Figure A 1.1
Tigermag EP Display

Alphanumeric data is required for the password and to enter or change constants. When data is required, the cursor will be positioned under the first character. A "NO" answer will cause the next valid character to be displayed in turn. A "YES" answer accepts the displayed character or digit and moves the cursor to the next position. After answering "YES" to the last character, you will be prompted with the entire data just entered. Answer "NO" if you wish to change. Answer "YES" when it is correct.

1.3 Batching Modes

If your TigermagEP is equipped with the optional batching function, answer "YES" whi
the meter is in normal operation mode to display batching information. For detail, se
Appendix 2, Batch Programming.

1.4 Show Meter Data

Hold the MAG-COMMAND probe next to the "NO" switch for approximately 5 seconds. The meter will respond:

SHOW METER DATA?

a) Answer "YES" and the meter will display the model number, firmware version, serial number, tag number, K factor (pulses/gallon) liner and electrode material. The last three values, G, I, & Z, are useful when calling factory technical assistance when troubleshooting the meter. As each data line is displayed a "YES" answer will display the next item. *A 'NO' answer at any item (or lack of response for 12 seconds) will return the meter to the operating display.*

b) A failure to answer this prompt within a few seconds will automatically bring the PASSWORD menu. See Section 1.5.

c) Answer "NO" and the PASSWORD prompt appears. A failure to enter a correct password will return the meter to operation.

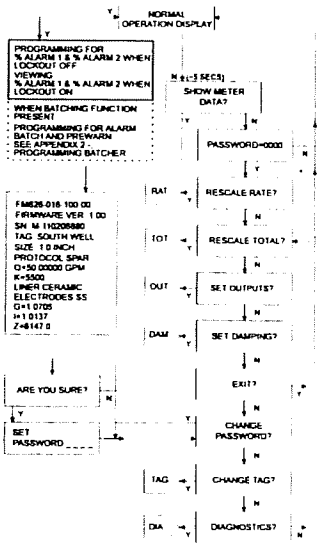


Figure A 1.2
Main Program

1.5 Password Entry

PASSWORD=0000

To go beyond this point, a valid password is required. Every meter is shipped with th
default password "0001". Any user with a valid password can change the password.

▼ Default Password "0001"

The meter password is entered by responding to each digit of the password with a "YES
or "NO". A "YES" moves the cursor under the next digit to the right. A "NO" scrolls to th
next higher value for the underlined digit and then back to 0 again. The same 12 secon
time limit applies to each digit selection, i.e., a lack of response advances the cursor to th
next position. Upon entry of a valid password, the meter enters a program mode an
activates the fault output to signal remotely that programming is taking place.

1.6 Rescale Rate

RESCALE RATE?

A "YES" answer enters the Rescale Rate loop. A "NO" answer continues to the next menu item.

A menu is presented to select the engineering units in which rate is displayed and scaled. By answering "NO" each menu selection is presented in turn. A "YES" selection chooses the unit displayed and moves on to the next item.

1.6.1 Select Rate Units

RATE UNITS=GPM

An answer of "YES" will display the rate in "GPM". Otherwise answer "NO". A "NO" answer will bring the other pre-defined choices in turn, i.e., liters/min., cu. ft./sec., liters/sec., cubic meters/hour, million gallons/day, ft./sec, meters/sec. and ???. Answer "YES" to the predefined rate units or to "???". A "NO" to each item brings you back to the beginning of the loop. *A "YES" answer is required to one of the selections to leave the loop.*

Select one of the presented units of measure by answering "YES" and skip to Sec. 1.6.2. If no appropriate choice is diaplayed, select "???" and define your own units in 1.6.1a.

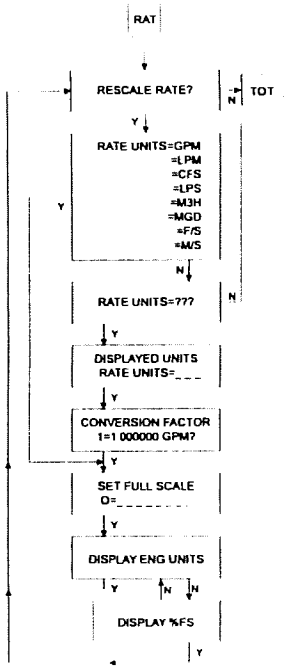


Figure A 1.3
Rescale Rate Flowchart

1.6.1a User Defined Rate Units

RATE UNITS=AAA

Note the cursor under the first A. Select the three alphabetic or numeric characters which you want displayed for your selected rate units by answering "NO" until the correct character is displayed in the current cursor position. A "YES" answer then accepts that character and moves the cursor one position to the right. A "YES" to the last character brings the conversion factor menu.

1.6.1b Conversion Factor

1=1.200000 GPM?

The conversion factor is defined as U.S. GPM/user unit. Enter the number of GPM which is equal to 1 of your selected units.

Example: To set the conversion factor for gallons per hour, enter the number of gallons per minute which is equal to 1 gallon per hour. One gallon per minute is equal to 0.016666 gallons per hour (1÷ 60). In this case, enter 0.0166666.

1.6 Rescale Rate Cont'd.

1.6.2 Set Full Scale

The full scale flow rate defines only the flow rate at which the current output is set to mA and at which the frequency output is set to 1000 Hz. *It does not affect the displa the accuracy of the frequency or pulse output.*

Q=5.000000 GPH?

In the case above, entering 5.0 GPH here will set the current output to 20 milliamps the frequency to 1000 Hz when the fluid flow reaches 5.0 GPH. Full scale flow is sele in the units defined in 1.6.1 above. Thus, if "GPH" were defined, full scale would defined in GPH not GPM. By answering "YES" or "NO" to each digit, it is possible to e the full scale flow rate. A full scale below 1 FPS or above 35 FPS will receive a warnin "OUT OF RANGE LOW" or "OUT OF RANGE HIGH". Unit is still functional, but is opera out of recommended range.

1.6.3 Select Rate as Percent of Full Scale

DISPLAY:RATE UNITS

A "YES" answer will display flow in engineering units as defined in 1.6.2 "NO" displays rate as a percentage of full scale. Either choice will affect only the format of the display and nothing else.

1.7 Rescale Total

If your TigermagEP is equipped with the optional remote batcher, refer to Appendix 2.

RESCALE TOTAL?

A "YES" answer enters the Rescale Total loop. A "NO" answer continues to the next menu item.

1.7.0 Lockout

LOCKOUT: ON

LOCKOUT: OFF

LOCKOUT: OFF allows you to reprogram the high and low flow alarms when the "YES" key is activated while in normal operating mode. No password is required.

LOCKOUT: ON will only allow the viewing of high and low flow alarms while in normal operating mode. To reprogram these values you will need to enter the Mag-Command Rescale Total menu which requires a password.

After choice is made select "YES" to continue.

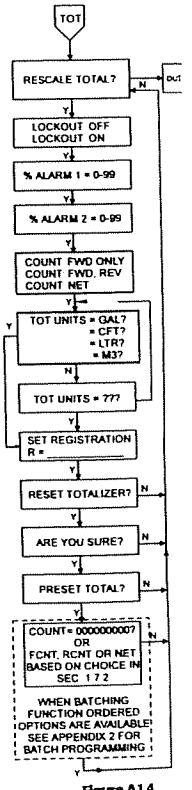


Figure A1.4
Rescale Total Flow Cha

1.7 Rescale Total Cont'd.

1.7.1 Alarms

% ALARM 1 = 0-99

% ALARM 2 = 0-99

Using Mag-Command, you can set these alarm contacts to activate when flow rate exceeds the set value in percent of full scale desired, from 0 through 99%. These contacts enable you to activate alarms, small relays, equipment, etc. at a preset percentage of full scale. Most commonly used as high and low flow alarms (through complementary contacts of externally supplied relays), these can be set to warn you of conditions outside your process parameters.

1.7.2 Count Direction

The internal totalizer can be programmed to totalize in the forward direction, to totalize separately for forward and reverse or provide you with net flow.

COUNT:FWD ONLY

Answer "YES" to count in the forward direction ***only*** (shown in the "operate" mode as "COUNT=")

COUNT:FWD,REV

Answer "YES" to have separate internal counters for forward and reverse flow (displayed as "F CNT=" and "R CNT=" respectively).

COUNT:NET

Answer "YES" to count net flow ***only.***

1.7.3 Select Total Units

A menu is presented to select the engineering units in which totalization or frequency is displayed and scaled. By answering "NO" each menu selection is presented in turn. A "YES" selects the unit displayed and moves on to the next item.

TOT UNITS=GAL

Answer "NO" to view the available pre-defined totalization units. Select "YES" to the preferred engineering units for totalization. One of the options will be ???. This permits the definition of any desired units. A "YES" must be selected to one of the options to exit this loop.

1.7.3a User Defined Totalizer Units

TOT UNITS = AAA

Select the desired 3 character abbreviation as in 1.6.1a on the previous page.

1.7.3b Conversion Factor

1=1.2500000 GAL?

Enter the number of U.S. gallons which is equivalent to 1 of your selected units.

For example, the conversion factor from U.S. Gallons to Imperial Gallons is 1.25 because there are 1.25 U.S. Gallons to each 1 Imperial Gallon.

1.7 Rescale Total Cont'd.

1.7.4 Set Registration

R=100.000 GAL?

Enter the number of your engineering units of totalization which is equivalent to one co of the internal totalizer and external "TOT" output. This is normally an even number s as 0.1, 1, 10, 100, etc. In the above case 100 gallons will produce one totalizer puls

1.7.5 Reset Totalizer

Allows you to zero or reset the starting number on the totalizer.

RESET TOTALIZER?

Answer "YES" to advance, "NO" to return to RESCALE TOTAL?

ARE YOU SURE?

Answer "YES" to perform the reset of totalizer(s), "NO" to return to RESCALE TOT (This is your last chance to abort before you lose your present value of totalizer(s).)

PRESET TOTAL?

Answer "YES" to be able to initialize the new nonzero beginning total, "NO" to return to RESCALE TOTAL? with totalizer(s) already reset to zero in the last step.

COUNT=.000000000?

Enter new beginning total. If counting FWD, REV or NET were selected earlier (1.7.2) then FCNT and RCNT can be preset to their starting values.

1.8 Set Outputs

SET OUTPUTS?

A "YES" answer enters the Set Outputs loop. A "NO" answer continues to the next menu item.

OUTPUT:4-20 MA

This permits the selection of 4-20 or 0-20 mA dc outputs. Answer "YES" to the output desired. Most North American installations will use 4-20.

1.8.1 Select Pulse Width

ONTIME:12.5

This selects the totalizer output of 0-60 Hz 12.5/25/50/100 ms, 24 Vdc. The choise is based on the external device requirement as well as your values of Q (Sect. 1.6.2) and R so that pulses don't run together at the maximum flow. The frequency output of 0-1000 Hz, 50/50 duty cycle is always available (Section 1.6.2). See Figure 3.12, Electrical Connections.

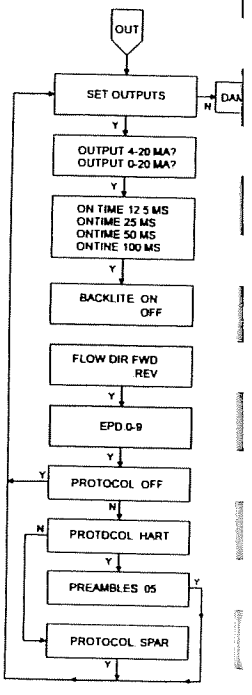


Figure A 1.5
Set Outputs Flow Chart

1.8 Set Outputs Cont'd.

1.8.2 Backlite

BACKLITE:ON
BACKLITE:OFF

This allows you to turn the the display backlight on or off. "NO" toggles between the choices. "YES" selects and advances.

1.8.3 Set Flow Direction

FLOW DIR: FWD
FLOW DIR: REV

This allows the user to reverse the ***normal flow direction.*** The default flow direction is from left to right as you face the display. *If flow is in the opposite direction a minus sign (-) will appear in the display, the flow direction output will be active and the internal totalizer will be inhibited in the count forward direction.* Apart from that, the meter will operate properly in either direction. Both pulse and analog outputs will operate in both directions. Answer "NO" to reverse the normal flow direction.

1.8.4 Empty Pipe Detection

It allows the user to set the EPD control between 0 (=off) and 9 as part of "SET OUTPUTS?" menu. Numerically, this represents approximate delay in seconds before the activation of EPD state (outputs driven to zero, totalizer on hold, message "OUTPUT INHIBITED" on display). Note EPD setting functions like a "volume" control, with "0" serving as an "EPD-off" click and "1" thru "9" enabling various levels of detection. Typical setting may be between 3 and 6, the lower the number, the higher the possibility of "false" detection of a single air bubble. Factory setting is "0" (off).

1.8.5 Protocol

Selects between "SPAR"-Sparling Mag-Command and "OFF"-no programming interface. "HART" will also appear if meter has been equipped with the optional HART interface and will allow you to set the number of HART's preambles in a message..

1.9 Damping Adjustments

SET DAMPING?

Display and current output are damped *independently*. Answer "YES" to enter this loop.

1.9.1 Display Damping

DISP DAMPING - 5

A "NO" answer scrolls from 0 (no damping) through 9 (maximum damping). Answer "YES" to the desired degree of display damping. Some experimentation may be necessary to obtain optimum results.

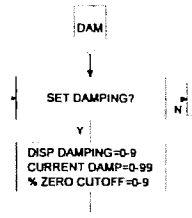


Figure A 1.6
Set Damping Flow Chart

1.9.2 Current Damping

CURRENT DAMP=15

Current damping may be selected from 0-99 seconds. This corresponds approximately the number of seconds to respond 90% of the way to a step change in inpu

1.9.3 Low Flow Cutoff

% ZERO CUTOFF=2

This is the minimum flow rate below which meter outputs are forced to zero. The numb entered corresponds to the selected percentage of full scale as set for "Q" in Secti 1.6.2. Choices range from 0 (low flow cutoff disabled) through 9%.

2.0 Exit Programming

EXIT?

A "YES" answer stores the changes which have been made and returns the meter operation. A "NO" goes to the next menu item.

2.1 Change Password

CHANGE PASSWORD?

ARE YOU SURE?

Answer "NO" to return to CHANGE PASSWORD. Answer "NO" again to continue to t next item.

A "YES" answer permits changing the password by scrolling through the four availab digits. Be sure to record the new password.

▼ *FAILURE TO RE-ENTER THE NEW PASSWORD WILL RESULT IN NOT BEING ABLE REPROGRAM AT A LATER DATE.*

2.2 Change Tag

CHANGE TAG?

Answer "YES" to change the tag. Default is "SPAR".

TAG=_ _ _ _ _ _ _ _ _ _ _ _

A "NO" answer scrolls through your character choices. Answer "YES" to skip to next letter. When you have finished the tag name, "YES" will bring you back to the "CHANGE TAG" menu. "NO" will advance to "DIAGNOSTICS", "YES" will enter the TAG loop again.

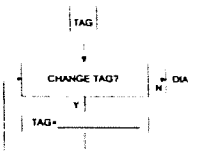


Figure A 1.7
Change Tag

2.3 Diagnostics

DIAGNOSTICS?

Answer "YES" to enter the diagnostics loop. A "NO" answer returns to the RESCALE RATE menu.

WARNING

IT IS RECOMMENDED THAT DIAGNOSTICS NOT BE PERFORMED UNLESS MALFUNCTION IS SUSPECTED. REFER TO THE TROUBLE-SHOOTING SECTION FOR COIL AND ELECTRODE TESTS WHICH CAN BE PERFORMED.

WARNING—THE METER TOTALIZERS AND RATE WILL CEASE TO BE UPDATED WHILE YOU ARE IN THIS LOOP. OUTPUTS WILL BE AFFECTED BY SOME TESTS AS WELL AS TOTALIZER COUNT. USE CAUTION.

2.3.1A Check HART Transmission

This option is only available if your meter is equipped with HART® communications. Toggle between MARK and SPACE by selecting "NO". Enter next box by selecting "YES".

2.3.1B Check Coil Current

STOP COIL DRIVE?

Answer "YES"

COIL=HIGH

Note the value on the second line of the display. To test low coil, enter "NO"

COIL=LOW

Again, note its value. Both values should match closely. The typical coil current should range around 1/4 to 1/3 amp. Coil currents are affected by temperature. Unit is operating correctly unless currents don't match and are widely out of this range. To test high coil again, enter "NO". To end this test, enter "YES".

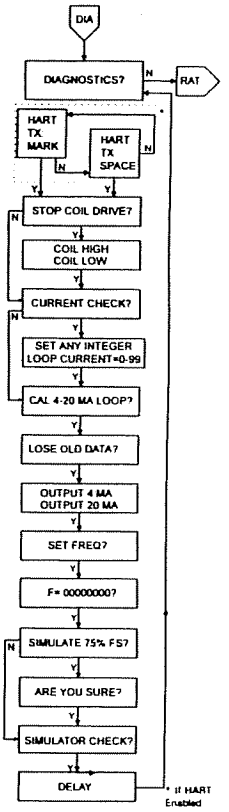


Figure A 1.8
Diagnostics Flow Chart

2.3 Diagnostics Cont'd.

2.3.2 Check Current Loop

LOOP CURRENT=04

By answering "NO" the loop current can be scrolled by 1 mA increments, from 4 mA up
mA and then back to 4. Answer "NO"to step to the next desired value. Answering "YE
any time will exit the loop. Check the 4 mA and 20 mA positions with a digital milliamm
Each should be accurate within ±0.02 mA (no damping is used).

The current output can also be used to test other equipment in the current loop suc
recorders and controllers.

2.3.3 Calibrate 4-20 mA Loop

CAL 4-20mA LOOP?

Answer "YES" to enter the calibrate mode. You must leave your recently calibr
milliammeter connected in series with the 4-20 loop at this time.

LOSE OLD DATA?

Answer "YES" to continue, "NO" will exit leaving calibration unchanged. This is your
chance to abort if your setup is not ready.

OUTPUT: 4mA?

Answer "YES" if your meter reads 4.00 mA. "NO" will allow you to calibrate freque
for zero flow.

I= 4.0000000?

Enter in the actual reading value from your digital milliammeter to calibrate zero flow.
Answer "YES" to continue.

OUTPUT: 20mA?

Answer "YES" if your meter reads 20.00 mA. "NO" will allow you to calibrate freque
for full scale.

I= 20.000000?

Enter in the actual reading value from your digital milliammeter to calibrate full scale.
Answer "YES" to continue.

2.3.4 Set Frequency

Set frequency can be used to verify or set the frequency received by other device
insure compatibility.

SET FREQ?

Select "YES" to enter the set frequency mode, select "NO" to continue.

F = .000000000

Enter desired frequency in the 1-1250 Hz range to appear as the frequency output or se
"YES" to zero value and end this test.

2.3 Diagnostics Cont'd.

2.3.5 Simulate 75% FS

This step will drive all outputs to 75% of full scale rate including the display.

CAUTION

THIS TEST WILL ALTER THE TOTALIZER COUNTS. ON EXIT FROM THIS TEST, RESET OR PRESET TOTALIZERS TO THEIR PROPER VALUE.

Enter "YES" to get last chance to abort "ARE YOU SURE?" Enter "YES" only if you wish to continue at which point the meter will begin simulated 75% of its full scale (as signified by the letter "S" in the third from the last position on the top line of display (just before "12" for alarms - See figure A 1.9). To end, re-enter diagnostics and reply "NO" to either "SIMULATE 75% FS?" or "ARE YOU SURE?" that follows.

2.3.6 Simulator Check

Simulator Check is used to verify that electronics are working satisfactorily by comparing actual values to the factory pre-set values. Testing is done internally.

SIMULATOR CHECK?

Select "YES" to enter the simulator check mode, select "NO" to continue.

PLEASE WAIT

"PLEASE WAIT" is displayed while electronics self-check.

SELF TEST PASSED

The electronics are working satisfactorily.

SELF TEST FAILED

The electronics are not working satisfactorily. Replace electronics module. The second line of the display will show a 47000 ÷ K value as GPM. Obtain K from meter record and calculate 47,000/K to check for match.

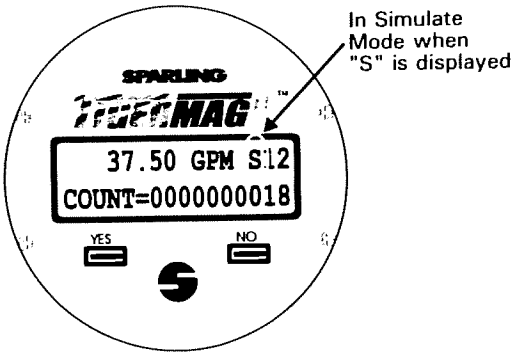


Figure A1.9
Simulate Mode

A.2 Appendix 2
Batch Programming & Operation - Firmware Ver. 1.0

This section of the manual covers only the batching function. For programming of ot
loops not associated with the batching function, see Appendix 1.

1.1 General

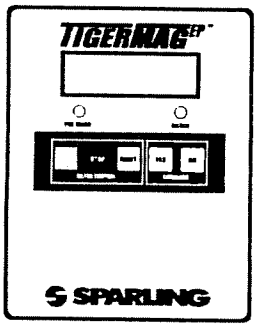


Figure A 2.1
Enclosure for TigermagEP with Batching

The TigermagEP Batcher utilizes a touch pad
programming both meter and batch operations. The "Y
and "NO" buttons are the only controls required to sel
and change parameters on the TigermagEP. Nothing e
is required for programming the meter with M
Command. IT IS NOT NECESSARY TO OPEN T
ELECTRONICS COMPARTMENT IN ORDER TO CHAN
PROGRAM SETTINGS.

1.2 Programming

The batching mode is activated in the Rescale Total menu. Refer to Figure A1.2 to determine how to reach this section.

RESCALE TOTAL?

"YES" to enter the Rescale Total menu.

1.2.0 Lockout

LOCKOUT: ON
LOCKOUT: OFF

LOCKOUT: OFF allows you to reprogram batch size and prewarn levels while in norr
operating mode. No password is required.

LOCKOUT: ON will only allow you to view batch size and prewarn levels while in norn
operating mode. To reprogram these values you will need to enter the Mag-Comma
Rescale Total menu which requires a password.

After choice is made select "YES" to continue.

1.3 Rescale Total

1.3.1 Batch On/Off

BATCH: ON

BATCH: OFF

"NO" toggles between 'Batch On' and 'Batch Off'.

BATCH: ON

1) gives you access to TigermagEP's batching functions while in normal operation mode
2) disables Alarms 1 and 2.
3) batch size and prewarn levels become accessible for viewing or reprogramming while in normal operation mode.

BATCH: OFF

1) turns off the TigermagEP's batching functions.
2) allows access to TigermagEP's Alarm 1 and Alarm 2
3) % Alarm 1 and % Alarm 2 become accessible for viewing or reprogramming while in normal operation mode.

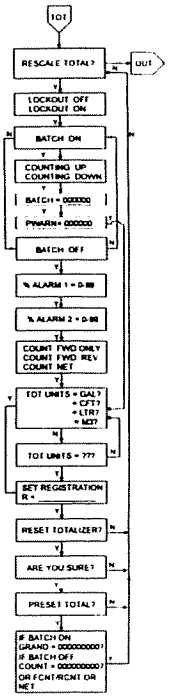


Figure A 2.2
Rescale Rate - Batcher

1.3.2 Alarms

% ALARM 1 = 0-99

% ALARM 2 = 0-99

Using Mag-Command, you can set these alarm contacts to activate at any percent of full scale desired, from 0 through 99%. These contacts enable you to activate alarms, equipment, etc. at a preset percentage of full scale. Most commonly used as high and low flow alarms, these can be set to warn you of conditions outside your process parameters.

Alarms 1 & 2 are only available when batch mode is turned off (BATCH: OFF). Alarm 1 and Alarm 2 can be set to activate at the percentage of full scale specified here. After setting, "YES" accepts selection of Alarm 1 and advances to Alarm 2. When lockout status is on (LOCKOUT: ON) you will be able to view % Alarm 1 and % Alarm 2 values from normal operation mode. When lockout status is off (LOCKOUT: OFF) you will be able to change the values of % Alarm 1 and % Alarm 2.

1.3.3 Count Direction

The internal totalizer can be programmed to totalize in the forward direction, to totalize separately for forward and reverse or provide you with net flow.

COUNT:FWD ONLY

Answer "YES" to count in the forward direction *only* (shown in the "operate" mode as "COUNT=")

COUNT:FWD,REV

Answer "YES" to have separate internal counters for forward and reverse flow (displayed as "F CNT=" and "R CNT=" respectively).

COUNT:NET

Answer "YES" to count net flow *only*.

1.3 Rescale Total Cont'd.

1.3.4 Select Total Units

A menu is presented to select the engineering units in which totalization or frequer displayed and scaled. By answering "NO" each menu selection is presented in tu "YES" selects the unit displayed and moves on to the next item.

```
TOT UNITS=GAL
```

Answer "NO" to view the available pre-defined totalization units. Select "YES" to the ferred engineering units for totalization. One of the options will be ???. This permit definition of any desired units. A "YES" must be selected to one of the options to exi loop.

1.3.5a User Defined Totalizer Units

```
TOT UNITS = AAA
```

Select the desired 3 character abbreviation as in 1.6.1a on the previous page.

1.3.5b Conversion Factor

```
1=1.2500000 GAL?
```

Enter the number of U.S. gallons which is equivalent to 1 of your selected units.

For example, the conversion factor from U.S. Gallons to Imperial Gallons is 1.25 bec there are 1.25 U.S. Gallons to each 1 Imperial Gallon.

```
RESCALE TOTAL
```

A "YES" answer enters the Rescale Total loop. A "NO" answer continues to tha next m item. See Section 1.7.5 for details.

```
RESET TOTALIZER?
```

A "NO" answer ends this loop.

If batch is on (BATCH: ON) display will read:

```
GRAND = 000000000?
```

Enter

If batch is off (BATCH: OFF) display will read:

```
COUNT = 000000000?
```

1.4 Description of Operation

1.4.1 Description of Operation

This option, if available, can be either enabled (BATCH: ON) or disabled (BATCH: OFF) in users menu of "RESCALE TOTAL?" When enabled, the batch menu offers the choice of display direction of counting (up or down) and the limits of the prewarn (relay #2) and the batch (relay #1). The status of the relays will be displayed on line 1 (last two places) as digits 1 and/or 2 whenever the corresponding relay coil gets energized. Line 2 wil show GRAND total, batch size, and the status of the batch.

Once the programming is in place, the cycle starts when RESET is pushed. The display line 2 will stop toggling between GRAND and BATCH and show 'BATCH=xxxxxx PZR' indicating that PZR input has reset the 626 for the next batch. Pushing START activates both relays (shown in line 1 and changes 'PZR' to 'RUN' as the batch starts counting off. Reaching PREWARN level drops out relay #2 and 'PRE' replaces 'RUN' in line 2. At the end of the batch, relay #2 drops out and line 2 reverts to toggling between Grand and 'BATCH=XXXXXX HLD' as the batching is on hold until RESET starts it again. To abort batch in progress, push STOP. This overrides relays ON command dropping them out (noteline 1 will report them as ON). The flow and the count off will stop, at which point one can resume this batch by pushing START or abort it via RESET for another batch (note however that GRAND will include any flow that went into the batch prior to pushing STOP).

A.3 Appendix 3 – Comunications

1.1 RS232 Sparling Protocol

Wiring (3-wire cable less than 50 ft.

Connect as follows:

PC "COM" Port 25 pin		626 J405 on I/O PCB
2-TX	to	1-RX
3-RX	to	2-TX
7-GND	to	3-GND
4-RTS to 5-CTS		4 - No Connection

Set up the PC communications software (any 3rd party dumb-terminal emulator i.e. BitCom, XTalk, Procom, etc.) as follows:

E.G. Windows Terminal
1200 baud
8 data bits
1 stop bit
Odd Parity
(Flow control = none)

Conversation
Control-Q (11 hex) starts it (626 will reply; PZR/PGM on the PC screen),
Control-U (15 hex) ends it (626 - no reply, its display - back to run mode).
Menu follows MagCommand.
Keyboard exceptions (for compatibility with existing programmers):
(Space Bar) steps over existing characters
(Backspace) clears characters
(Enter) or "Y" key serves as "yes", anything else as "no".

Burst mode
Control-S (13 hex) starts it.
The 626 will continuously copy its 2-line display to RS232 line.
Press and hold Control-U to end it.

Problems checklist:
- Check wiring
- Check PC setup
- Verify that 626 in its "SHOW METER DATA?" menu (or user's "SET OUTPUTS?) has PROTOCOL: SPAR and not PROTOCOL: OFF nor PROTOCOL: HART.

1.2

RS485 (one-on-one only, no multidrop, less than 4000 ft.)
On digital PCB, U105 should be removed and U108 installed.

RS485

Wire and use as RS232

Line 485		626 (J405 on I/O PCB)
(+) or A	to	2-TX (also line load)
(1) or B	to	1-RX (also line load)
Shield	to	3-GND

Problems checklist:

- See Section 1.1, RS232
- Line must terminate in its characteristic impedance at BOTH ends, eg. for 24 AWG twisted pair install terminating 120-ohm resister between 1 & 2 of J405 as well as across the other end. See Figure 3.12.

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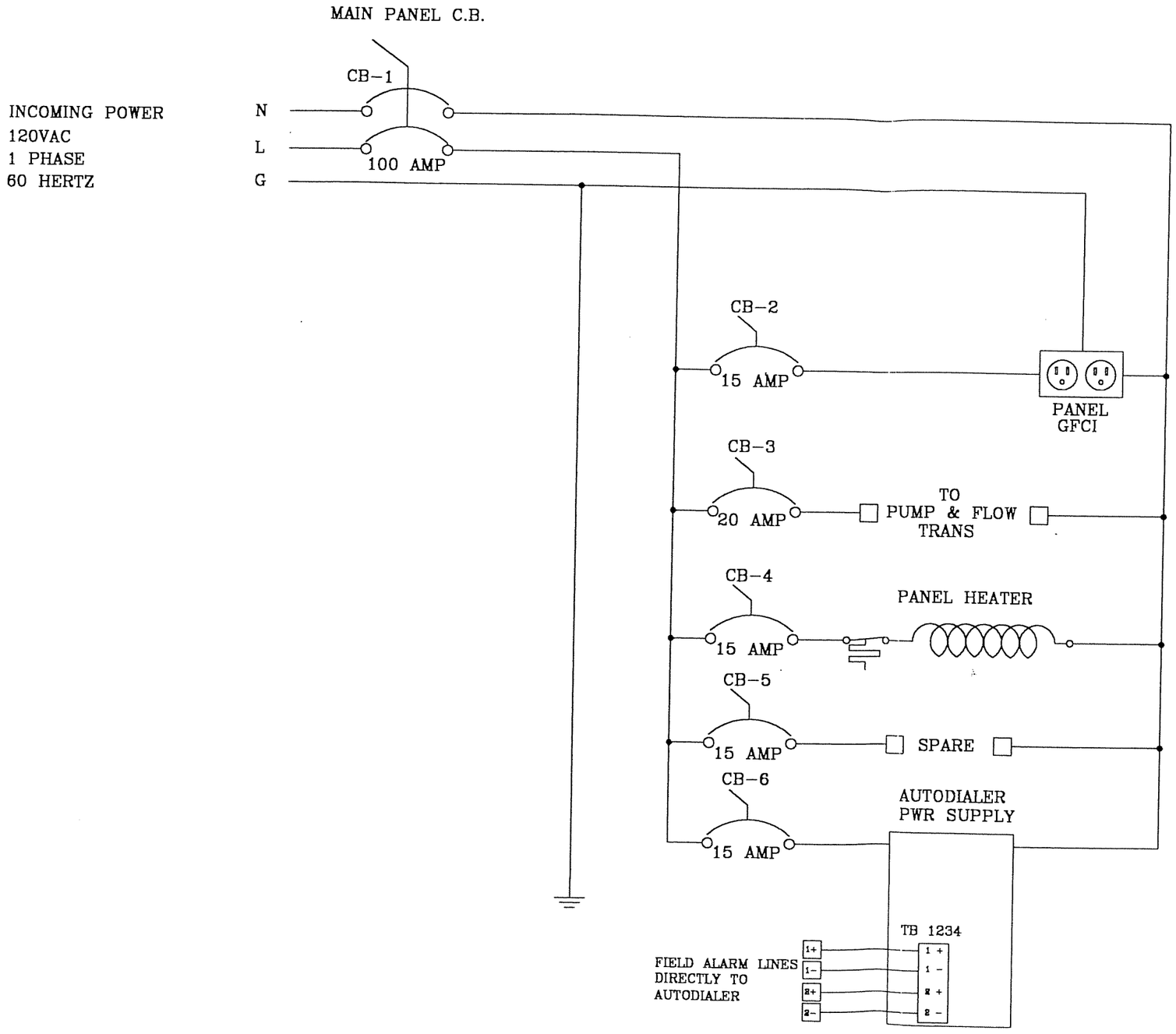
SYMBOL	REQ'D	CAT. NUMBER	MANU.	DESCRIPTION
ENCL	1	2P363012	HAMMOND	36X30X12 NEMA 4X ENCL
ENCL	1	18P3327	HAMMOND	33X27 BACK PANEL
ENCL	1	1481S30K	HAMMOND	30" DRIP SHIELD
ENCL	1	1481FC12K	HAMMOND	12" MOUNTING FEET
ENCL	1	2QPL	HAMMOND	ENCLOSURE LOCK HASP
BREAKER PNL	1	BR1220B100	WESTINGHOUSE	CIRCUIT BREAKER PANEL
CB-1	1	BR2100	WESTINGHOUSE	100 AMP 2 POLE CB
CB-2,4,5,6	4	BR115	WESTINGHOUSE	15 AMP 1 POLE CB
CB-3	1	BR120	WESTINGHOUSE	20 AMP 1 POLE CB
HEATER	1	040100C1-EV11M	WATLOW	100W HEATER W\T-STAT
AUTODIALER	1	MODEL 1000	MICROTEL	PHONE AUTODIALER
TB'S	AS REQ	3001035	PHOENIX	TERMINAL BLOCK

TITLE
120VAC EQUIPMENT PANEL

JOB # OLIN CHEMICAL

CUSTOMER
C.I.R. ELECTRIC

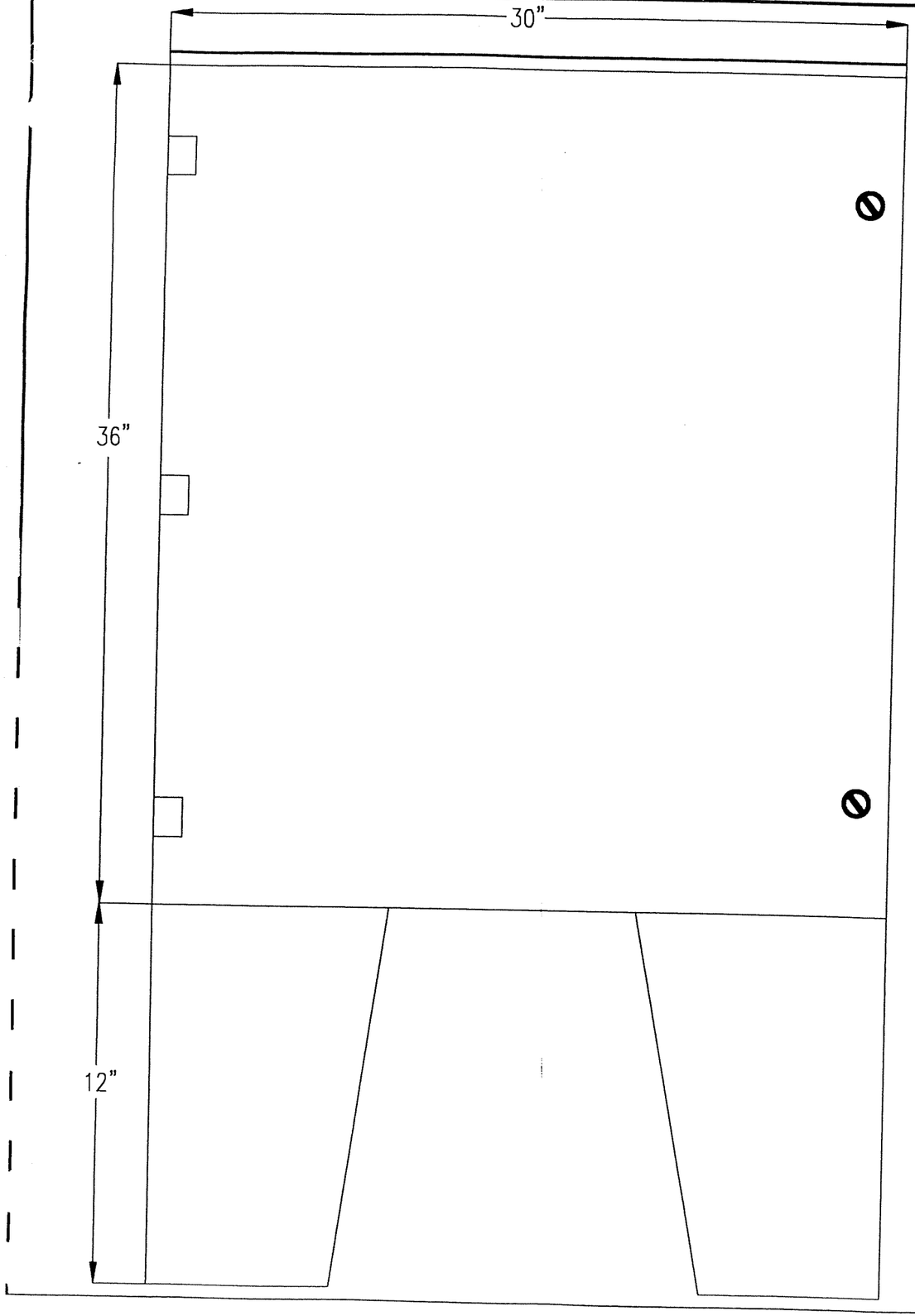
DR J.R.	DATE 11/15/96	JOB		
CHKD. S.G	DIV.		DRAWING NO. 111596-JR-1	PAGE 1 OF 1
APPRVD. S.G.	SCALE			REV. 1

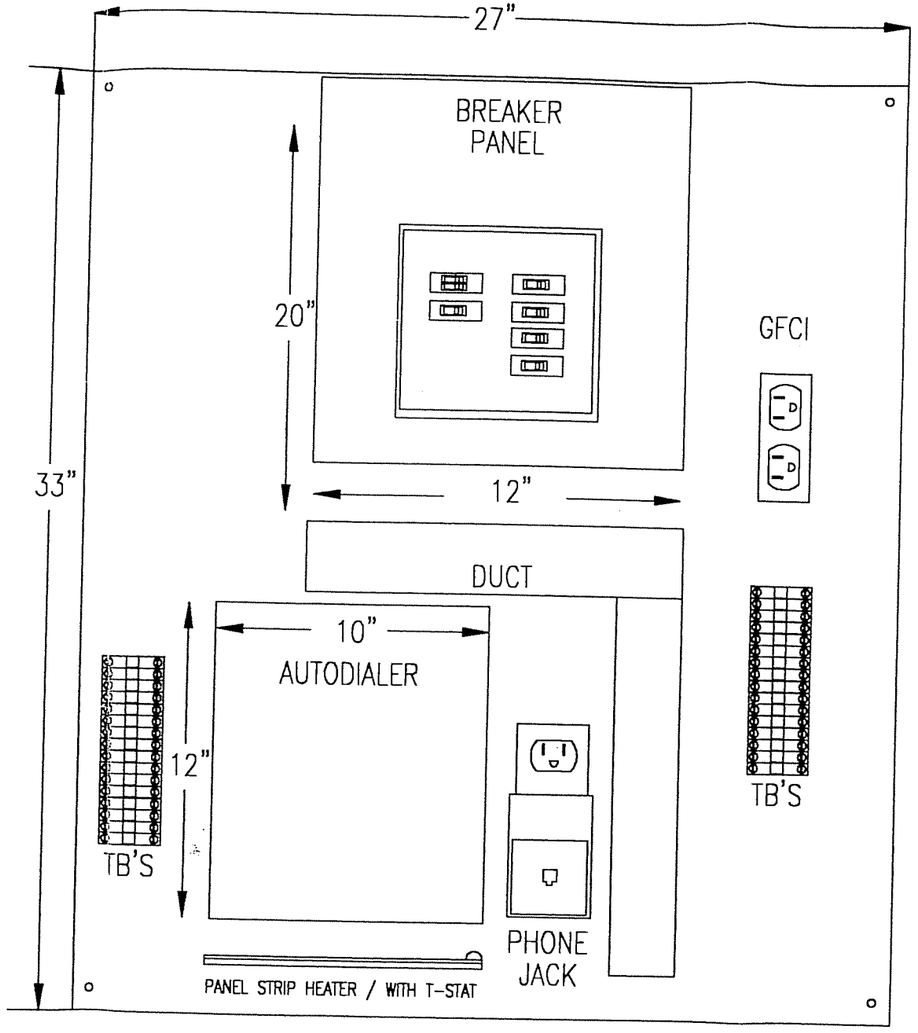


NOTES:

1. ENCLOSURE TO BE INSULATED WITH 1" STYROFOAM INSULATION
2. USE COPPER WIRE ONLY
3. MAIN BREAKER TO BE 100 AMP 2 POLE
4. ☐ INDICATES TERMINAL BLOCKS

TITLE: 120VAC EQUIPMENT PANEL				
JOB#: OLIN CHEMICAL				
CUSTOMER: C.I.R. ELECTRIC				
TYPE: NEMA 4X				
DR: JR	DATE: 11/15/96			
CHKD: SG	DIV:	SIZE: B	DRAWING NUMBER: 103196-JR-1	REV: 1
APPRVD: SG	SCALE:			





NOTES:

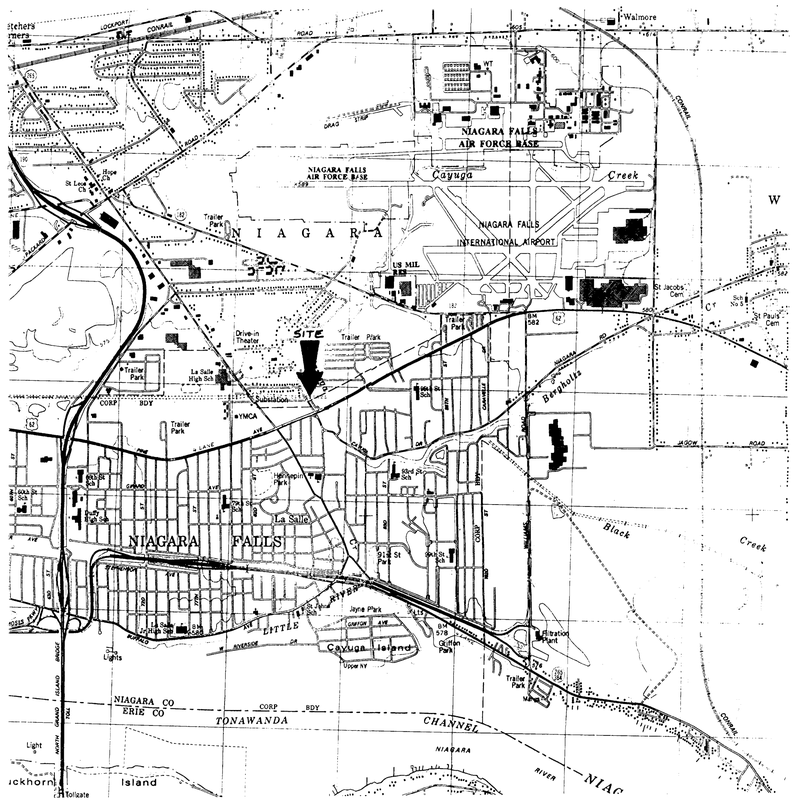
1. ENCLOSURE TO BE INSULATED WITH 1" STYROFOAM INSULATION
2. USE COPPER WIRE ONLY
3. MAIN BREAKER TO BE 100 AMP 2 POLE

TITLE	120VAC EQUIPMENT PANEL		
JOB#	OLIN CHEMICAL		
	CUSTOMER C.I.R. ELECTRIC		
TYPE	NEMA 4X		
DR JR	DATE 11/15/96		
CHKD SG	DIV	SIZE B	DRAWING NUMBER 103186-JR-1 REV 1
APPRVD SG	SCALE		

OLIN CORPORATION

CHARLES GIBSON SITE
LEACHATE TRANSFER SYSTEM

TOWN OF NIAGARA, NEW YORK



LOCATION PLAN

SCALE: 1" = 25000'

DRAWING SCHEDULE

DWG. NO.	DESCRIPTION
	COVER SHEET (SHEET 1 of 4)
1	SITE PLAN (SHEET 2 of 4)
2	CIVIL/MECHANICAL DETAILS (SHEET 3 of 4)
3	ELECTRICAL DETAILS (SHEET 4 of 4)

STATE OF NEW YORK
DAVID BENJAMIN WILKINSON
LICENSED PROFESSIONAL ENGINEER

RUST ENVIRONMENT & INFRASTRUCTURE

BUFFALO, NEW YORK
Quality through teamwork

SHEET NO. 1 of 4

CADD FILE: 4996TITL.DGN PLOT DATE: 2/22/96

NOTES:

1. CONTRACTOR SHALL COORDINATE LOCATION OF NEW UTILITY POLE WITH NIAGARA MOHAWK. NIAGARA MOHAWK SHALL INSTALL UTILITY POLE.
2. MINIMUM 4'-0" OF EARTHEN COVER SHALL BE MAINTAINED OVER 4" DIA. HDPE PIPE.
3. SCOPE OF WORK
   - A. CONNECT EXISTING 6" ACP AND 4" x 2" HDPE LEACHATE FORCE MAIN.
   - B. INSTALL 4" x 2" HDPE LEACHATE FORCE MAIN FROM EXISTING MANHOLE B TO EXISTING 6" ACP HOUSE CONNECTION. CONTRACTOR TO TEMPORARILY MOVE EXISTING FENCE SURROUNDING CAP AREA DURING INSTALLATION OF FORCE MAIN AND CONDUIT AND WIRING. FENCE SHALL BE REPLACED WHEN WORK IS COMPLETED
   - C. ~~INSTALL NEW POWER POLE.~~ UTILIZE EXISTING POWER POLE(S).
   - D. INSTALL NEW EQUIPMENT PANEL ADJACENT TO ~~NEW~~ EXISTING POWER POLE.
   - E. INSTALL CONDUIT AND WIRING FROM ~~NEW~~ EXISTING POWER POLE TO NEW EQUIPMENT PANEL.
   - F. INSTALL CONDUIT AND WIRING FROM NEW EQUIPMENT PANEL TO NEW SPLICE BOX AT EXISTING MANHOLE B. INSTALL WIRING FROM NEW SPLICE BOX TO PUMP, FLOAT SWITCH AND FLOWMETER.
   - G. INSTALL NEW SUMP PUMP, PIPING, MAGNETIC FLOWMETER AND FLOAT SWITCH IN EXISTING MANHOLE B.

CHARLES GIBSON SITE

CAYUGA CREEK

EXIST. GRAVEL DRIVE

I.P.

UTILITY POLE SEE NOTE 1 SEE DETAIL 1 | 1/3

EQUIPMENT PANEL SEE DETAIL 2 | 1/3

TYPICAL TRENCH SEE DETAIL 1 | 1/2

PROPERTY LINE

±24'

8'

EXIST. 10" ACP SEWER LINE

APPROXIMATE LOCATION OF 6" ACP SEWER TIE-IN. CONTRACTOR TO FIELD VERIFY LOCATION BY SURVEY PRIOR TO EXCAVATION

SEWER TIE-IN SEE DETAIL 2 | 1/2

EXISTING UTILITY POLE SEE NOTE 1 SEE DETAIL 1 | 1/3

TUSCARORA ROAD

OE

B 1/2 (SEE NOTE 3)

EXIST. SLURRY WALL

A 1/2

TOP OF CAP

2:1 BANK AROUND CAP (TYP.)

NEW LEACHATE FORCE MAIN

MANHOLE B SEE DETAIL 3 | 1/2

PROPERTY LINE

CONCRETE HOUSEKEEPING PAD (3' x 3' x 6")

TOE OF CAP

ELEC. TOWER

MARKER POST

10" DIA. BRINE LINE

NIAGARA MOHAWK POWER CORP. R.O.W.

ELEC. TOWER

20" W

OE

PR

P.P.

CITY OF NIAGARA FALLS

0 20 40

SCALE IN FEET

NO.	REVISIONS	MADE	CHK	DATE
1	AS-BUILT	IAB	JAG	5/21/97
0	ISSUED FOR CONSTRUCTION	KAP	DBW	8/1/96

NAMES		DATE
DRAWN:	JWH	2/1/96
DESIGN:	SBW	2/1/96
CHECKED:	JG	2/1/96
PE:	DBW	3/7/96
APP'D:		
APP'D:		
APP'D:		

CHARLES GIBSON SITE
LEACHATE TRANSFER SYSTEM
SITE PLAN

OLIN CORPORATION

NIAGARA FALLS NEW YORK

RUST ENVIRONMENT & INFRASTRUCTURE

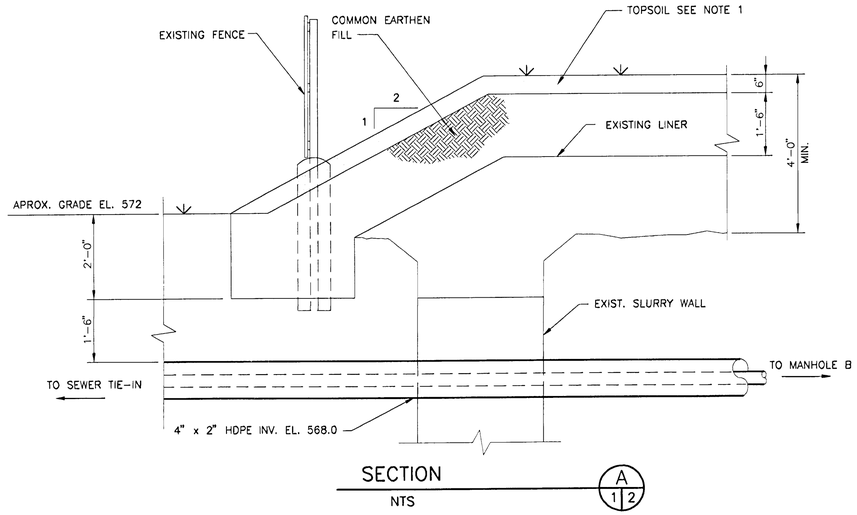
PROJECT NUMBER 34996.000 DATE 2/1/96

RUST DWG NUMBER 1 FILE NUMBER 4996NP01.DGN

CLIENT DWG NUMBER SHEET NUMBER 2 of 4

The drawings, specifications and other documents prepared by the Engineer for this project are instruments of the Engineer's service for use solely with respect to this project and, unless otherwise provided, the Engineer shall be deemed the author of these documents and shall retain all common law, statutory and other reserved rights, including the copyright.

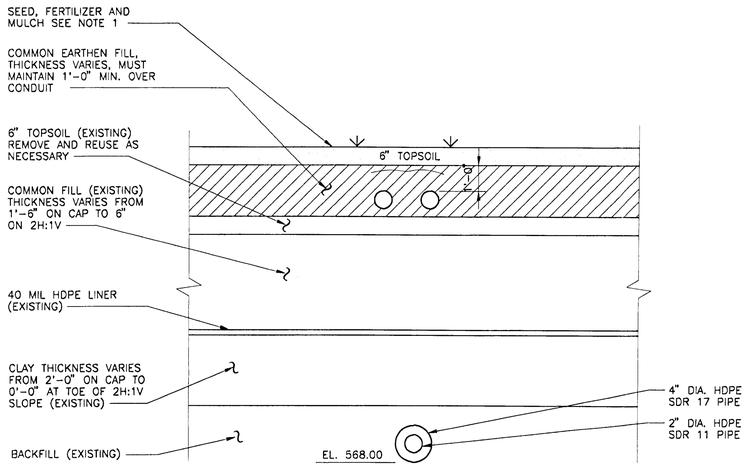
PLOT DATE: 8/1/96



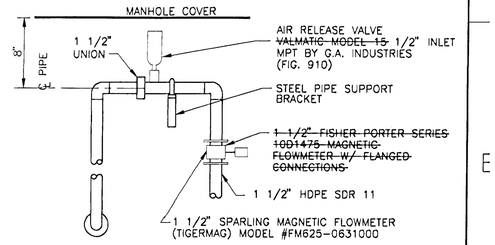
SECTION
NTS
A 1|2

NOTES:

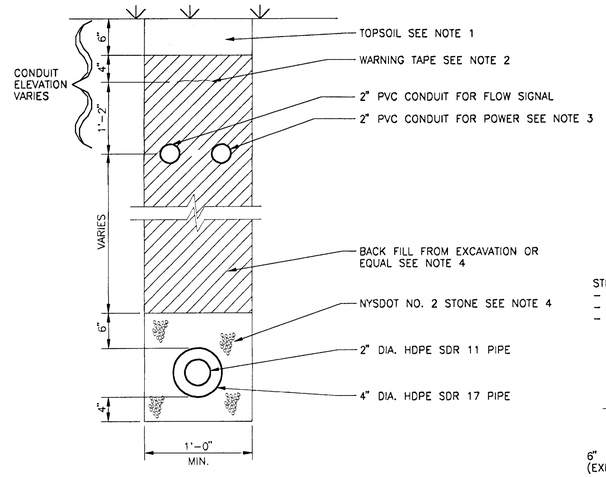
1. TOPSOIL SHALL BE FRIABLE LOAM CONTAINING LIBERAL AMOUNTS OF HUMUS, HAVING A pH BETWEEN 5.5 AND 7.6, AND SUITABLE FOR GROWTH OF GRASS. CONTRACTOR SHALL SUPPLY AND PLACE FERTILIZER MEETING REQUIREMENTS OF SECTION 713-03, NYSDOT STANDARD SPECIFICATIOS. CONTRACTOR SHALL SUPPLY AND PLACE GRASS SEED MIXTURES NOS. 1 OR 2 MEETING REQUIREMENTS OF SECTION 610-2.02, NYSDOT STANDARD SPECIFICATIONS. CONTRACTOR SHALL MULCH IN ACCORDANCE WITH SECTION 610-3.03, NYSDOT STANDARD SPECIFICATIONS. CONTRACTOR SHALL WATER AND MAINTAIN SEEDED AREAS UNTIL 2 INCHES VERTICAL GROWTH OF ACCEPTABLE INITIAL STAND OF GRASS IS ESTABLISHED.
2. UNDERGROUND LINE WARNING TAPE, BRIGHT COLORED, VINYL TAPE, MADE FOR DIRECT BURIAL WITH EMBEDDED CONTINOUS METALLIC STRIP.
3. POWER CONDUIT SHALL BE PLACED 6-INCHES, MINIMUM FROM CONDUITS FOR TELEPHONE AND FLOAT SWITCH LINES.
4. COMPACT TRENCH BACKFILL MATERIAL TO ELIMINATE FUTURE SUBSIDENCE. CONTRACTOR SHALL REGRADE AND SEED ANY AREAS WHERE SUBSIDENCE OCCURS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR UTILITY ACCESS AND BURIED UTILITY CLEARANCE.
6. NYSDOT NO. 2 STONE SHALL BE PLACED AROUND SEWER TIE-IN TO AN ELEVATION 6-INCHES ABOVE THE 4-INCH HDPE PIPE AND THE 6-INCH ACP.



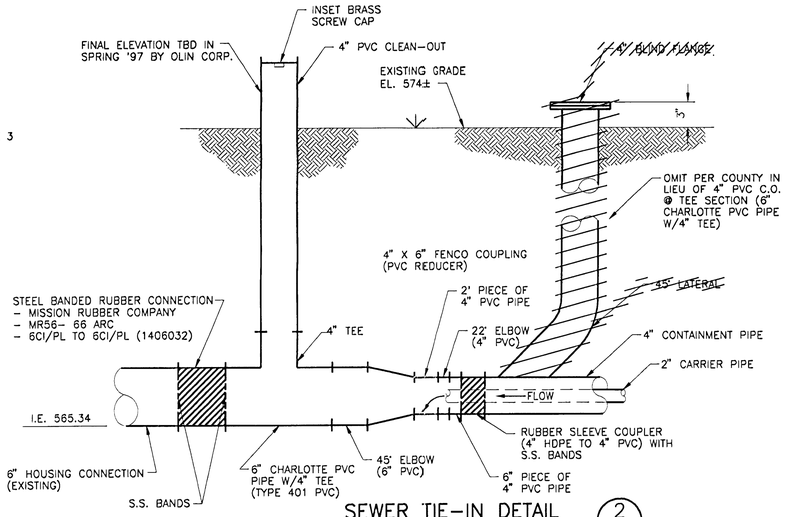
SECTION
NTS
B 1|2



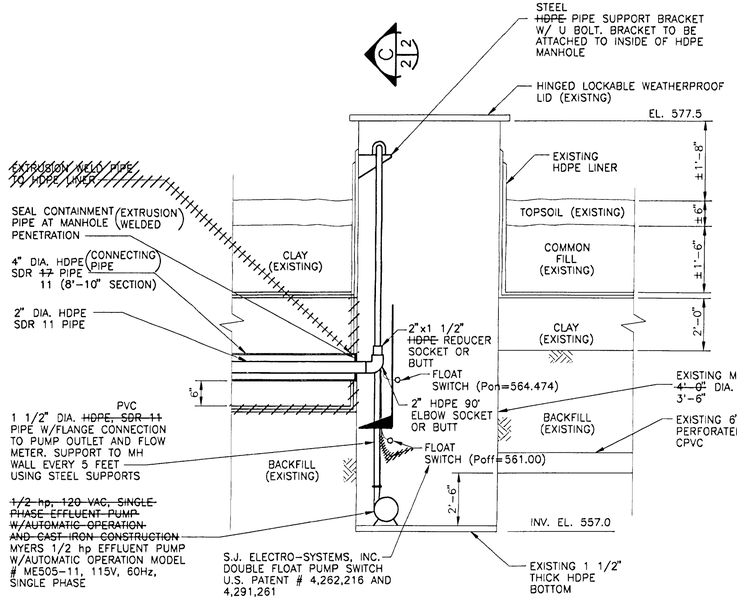
SECTION
NTS
C 2|2



TYPICAL TRENCH DETAIL
NTS
1 1|2



SEWER TIE-IN DETAIL
NTS
2 1|2



MANHOLE B DETAIL
NTS
3 1|2

NO.	REVISIONS	MADE	CHK	DATE
1	AS-BUILT	KAP	JAG	5/21/97
0	ISSUED FOR CONSTRUCTION	KAP	JAG	8/1/96

NAMES	DATE
DRAWN: JWH	2/1/96
DESIGN: SBW	1/31/96
CHECKED: JG	2/21/96
PE:	
APP'D:	
APP'D:	
APP'D:	

CHARLES GIBSON SITE LEACHATE TRANSFER SYSTEM CIVIL/MECHANICAL DETAILS

OLIN CORPORATION
NIAGARA FALLS NEW YORK

RUST ENVIRONMENT & INFRASTRUCTURE
BUFFALO, NEW YORK

PROJECT NUMBER 34996 DATE 2/1/96
RUST DWG NUMBER 2 FILE NUMBER
CLIENT DWG NUMBER SHEET NUMBER 3 of 4

CAD FILE NAME: 4996ND02.DWG
PLOT DATE: 5/20/97

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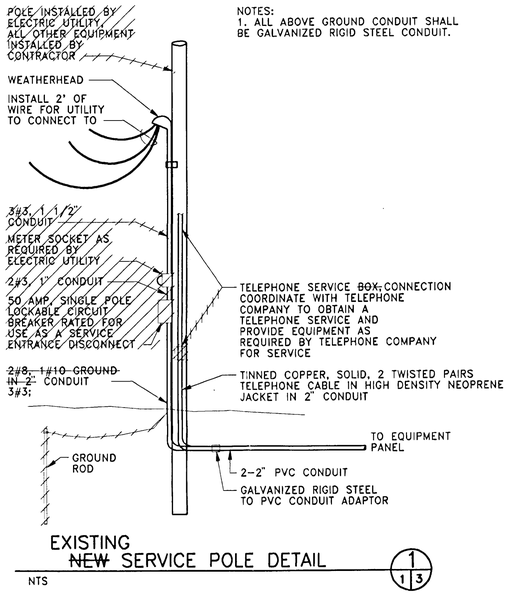
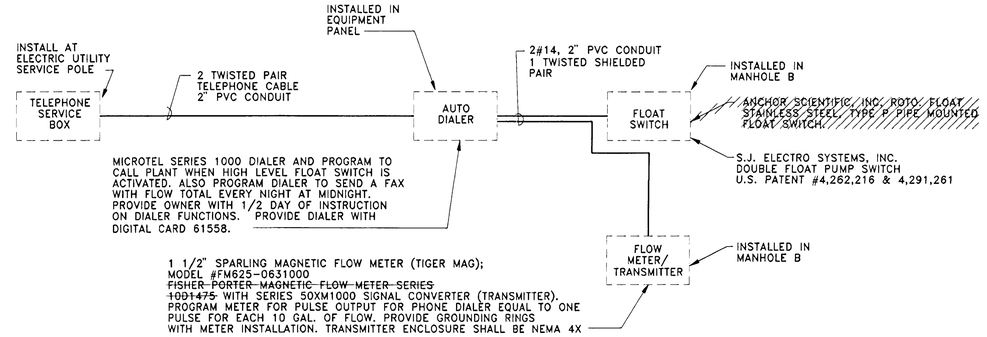


NOTES:
1. ALL ABOVE GROUND CONDUIT SHALL BE GALVANIZED RIGID STEEL CONDUIT.

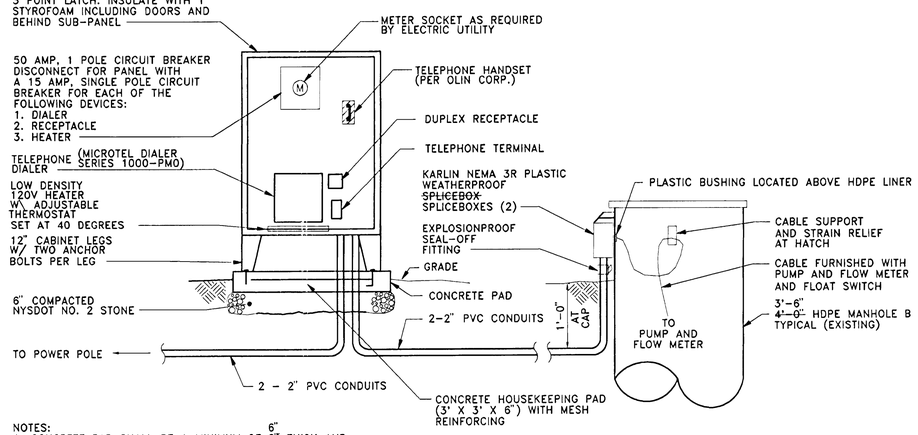
EXISTING
~~NEW~~ SERVICE POLE DETAIL (1 | 1 3)

NTS



INSTRUMENTATION AND CONTROL RISER DIAGRAM

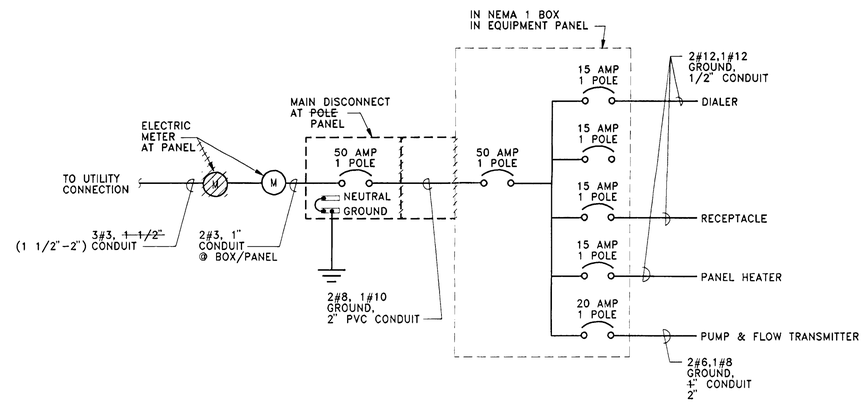
GENERAL ELECTRICAL NOTES:
1. ALL WORK SHALL BE DONE IN ACCORDANCE WITH THE NATIONAL ELECTRIC CODE AND ANY APPLICABLE LOCAL CODES.
2. ABOVE GROUND CONDUIT SHALL BE GALVANIZED RIGID STEEL. USE SCHEDULE 40 PVC CONDUIT BELOW GRADE.
3. INSTALL TYPE THWN STRANDED SINGLE CONDUCTOR NO. 12 AWG MINIMUM FOR BRANCH AND FEEDER CIRCUITS.
4. CIRCUIT BREAKER SHALL PROVIDE THERMAL AND MAGNETIC PROTECTION AND BE RATED FOR 10,000 SYMMETRICAL AMP MINIMUM OF FAULT CURRENT.
5. INSTALL GROUND RODS AND GROUNDING AT THE ELECTRIC SERVICE AS REQUIRED BY THE NATIONAL ELECTRIC CODE.
6. PROVIDE A WATER TIGHT CONDUIT SYSTEM BELOW GRADE.
7. INSTALL ALL WIRE IN CONDUIT.
8. ELECTRICAL WORK PERFORMED BY CIR ELECTRICAL CONST. CORP.; BUFFALO, NY (716) 822-1416, CONTACT (ROGER KETCH)



NOTES:
1. CONCRETE PAD SHALL BE A MINIMUM OF ~~8"~~ 6" THICK AND SIZED AS REQUIRED FOR ENCLOSURE. CONCRETE PAD SHALL BE REINFORCED WITH ~~#4 @ 12" O.C. E.W.~~ MESH
2. FOR LOCATION OF EQUIPMENT ENCLOSURE AND MANHOLES SEE SITE PLAN, DWG. NO. 1.

EQUIPMENT PANEL MOUNTING DETAIL (2 | 1 3)

NTS



120 VOLT, SINGLE PHASE POWER DISTRIBUTION RISER DIAGRAM

NO.	REVISIONS	MADE	CHK	DATE
1	AS-BUILT	KAP	JAG	5/21/97
0	ISSUED FOR CONSTRUCTION	KAP	JAG	8/1/96

NAMES	DATE
DRAWN: JWH	2/1/96
DESIGN: WB	1/31/96
CHECKED: JG/SBW	2/1/96
PE: DBW	3/7/96
APP'D:	
APP'D:	
APP'D:	

CHARLES GIBSON SITE
LEACHATE TRANSFER SYSTEM
ELECTRICAL DETAILS

OLIN CORPORATION

NIAGARA FALLS NEW YORK

RUST ENVIRONMENT & INFRASTRUCTURE
BUFFALO, NEW YORK

PROJECT NUMBER 34996 DATE 2/1/96
RUST DWG NUMBER 3 FILE NUMBER
CLIENT DWG NUMBER SHEET NUMBER 4 of 4

CAD FILE NAME: 4996ND03.DWG
PLOT DATE: 05/20/97

The drawings, specifications and other documents prepared by the Engineer for this project are instruments of the Engineer's service for use solely with respect to this project and, unless otherwise provided, the Engineer shall be deemed the author of these documents and shall retain all common law, statutory and other reserved rights, including the copyright.

RECEIVED
JUN 2 1997
Processed
for Public Use

APPENDIX L FEDERAL EMERGENCY MANAGEMENT ACT FLOODPLAN MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD 83, GRS1980. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. Those flood elevations must be converted to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NINGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was provided in digital format by the New York State Office of Cyber Security & Critical Infrastructure Coordination. This information was provided as 30-centimeter and 60-centimeter resolution natural color and 30-centimeter resolution color infrared orthoimagery from photography dated April 2015.

This map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

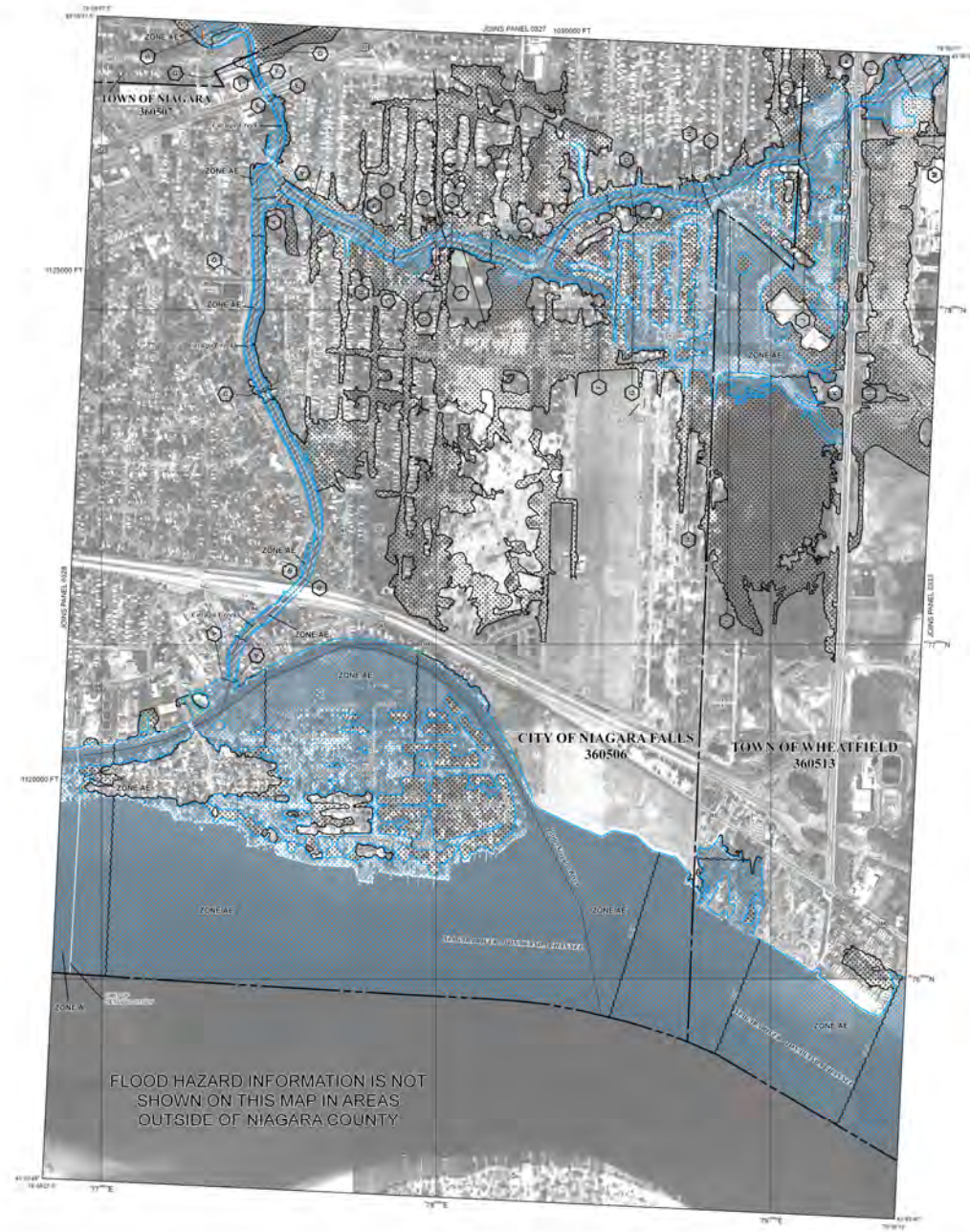
Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/.

CTP Cooperating Technical Partners

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- **ZONE A** — No Base Flood Elevations determined.
- **ZONE AE** — Base Flood Elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE AR** — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- **ZONE A99** — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- **ZONE V** — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- **ZONE VE** — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- **ZONE X** — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside the 0.2% annual chance floodplain.
- **ZONE D** — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

- Cross section line
- Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

4276000 FT — 1000-meter Universal Transverse Mercator grid values, zone 18

600000 FT — 5000-foot ticks: New York State Plane coordinate system, west zone (NAD83/2011), Transverse Mercator

DX5510 X — Bench mark (see explanation in notes to Users section of this FIRM panel)

M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTY-WIDE FLOOD INSURANCE RATE MAP
September 17, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

This community may revise or revoke prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
125 0 150 300 METERS

NFIP

PANEL 0329E

FIRM

FLOOD INSURANCE RATE MAP

for NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)

CONTAINS:

COMMUNITY	NUMBER
NIAGARA, TOWN OF	360507
NIAGARA FALLS, CITY OF	360506
WHEATFIELD, TOWN OF	360513

PANEL 329 OF 430
MAP SUFFIX: E
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
36063C0329E

EFFECTIVE DATE
SEPTEMBER 17, 2010

NATIONAL FLOOD INSURANCE PROGRAM

Federal Emergency Management Agency

APPENDIX M SUMMARY OF GREEN REMEDIATION METRICS FOR SITE MANAGEMENT

APPENDIX M

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		

Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a prG-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**