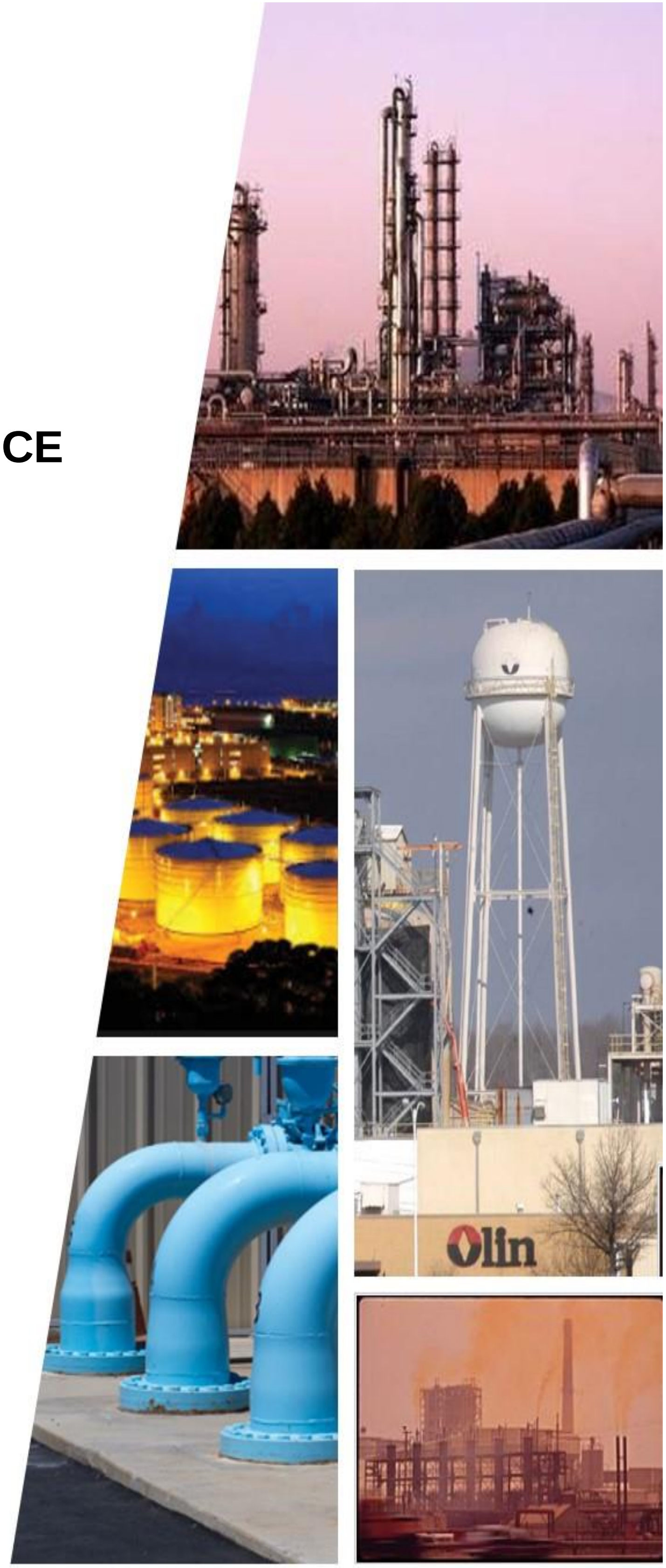
# OPERATION & MAINTENANCE MANUAL
# GIBSON SITE

Olin™

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

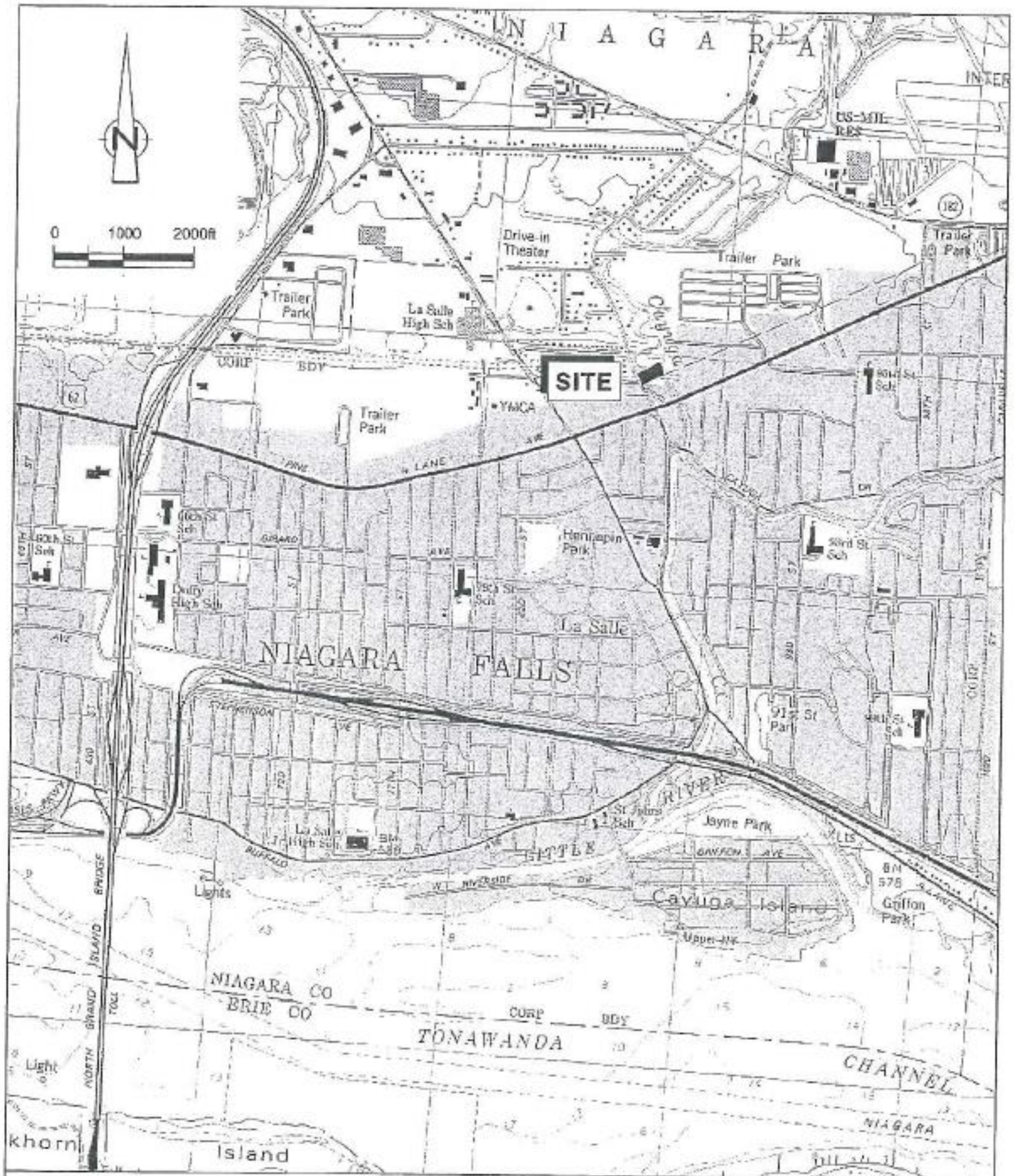
Figure 7.1 presents a map showing the route from the Site to Mount Saint Mary's Hospital.

## 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.

**Olin™**

# FIGURE 1.1




SOURCE:

USGS TONAWANDA WEST, NEW YORK QUADRANGLE, 1980.

figure 1.1

SITE LOCATION MAP
GIBSON SITE
*Niagara Falls, New York*

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08143-40(001)GN-NF001 MAY 31/2000

## FIGURE 1.2

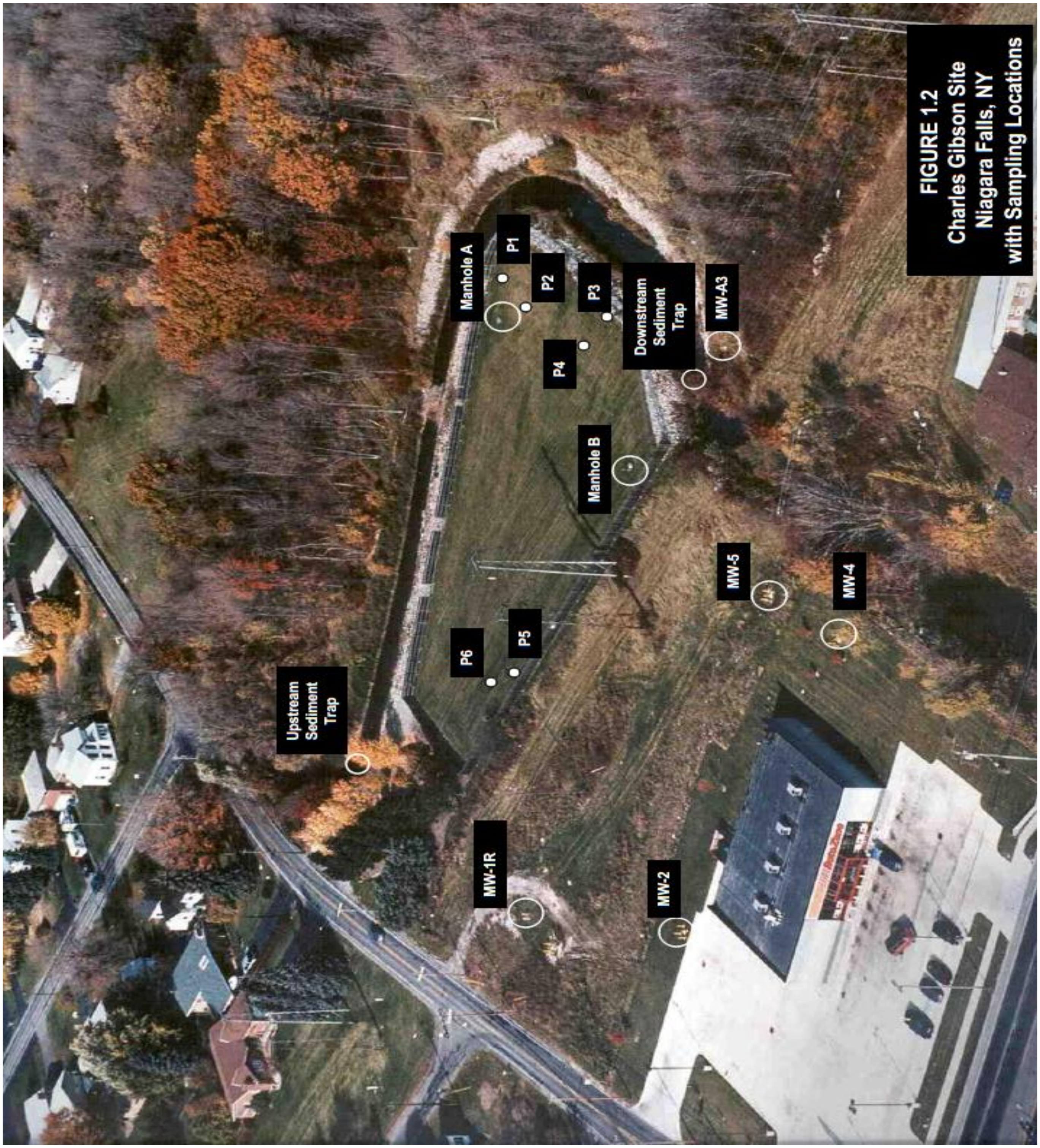


FIGURE 1.2
Charles Gibson Site
Niagara Falls, NY
with Sampling Locations
Manhole A
P1
P2
P3
Downstream Sediment Trap
MW-A3
P4
Manhole B
MW-5
MW-4
P5
P6
Upstream Sediment Trap
MW-1R
MW-2

**FIGURE 1.3**

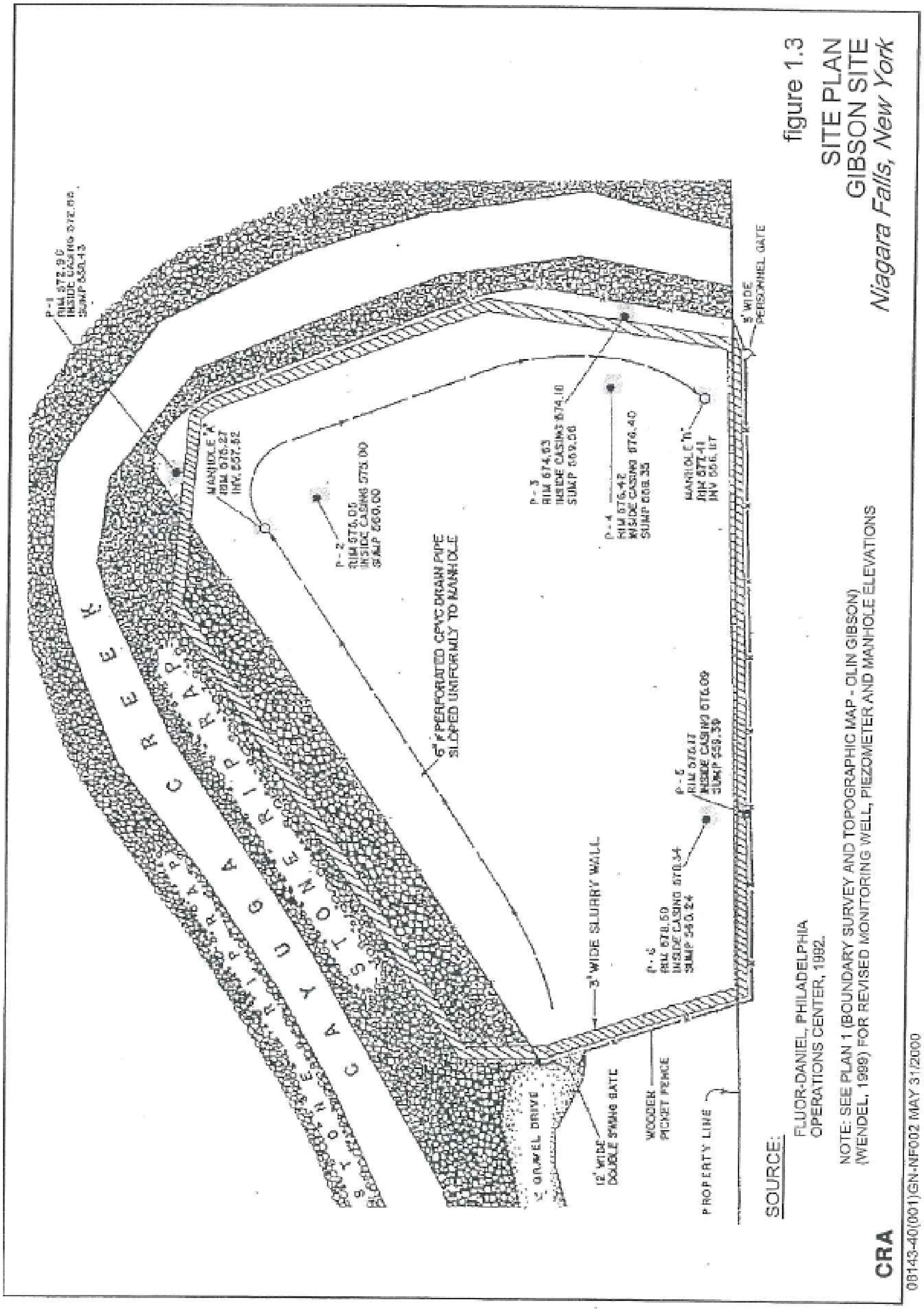
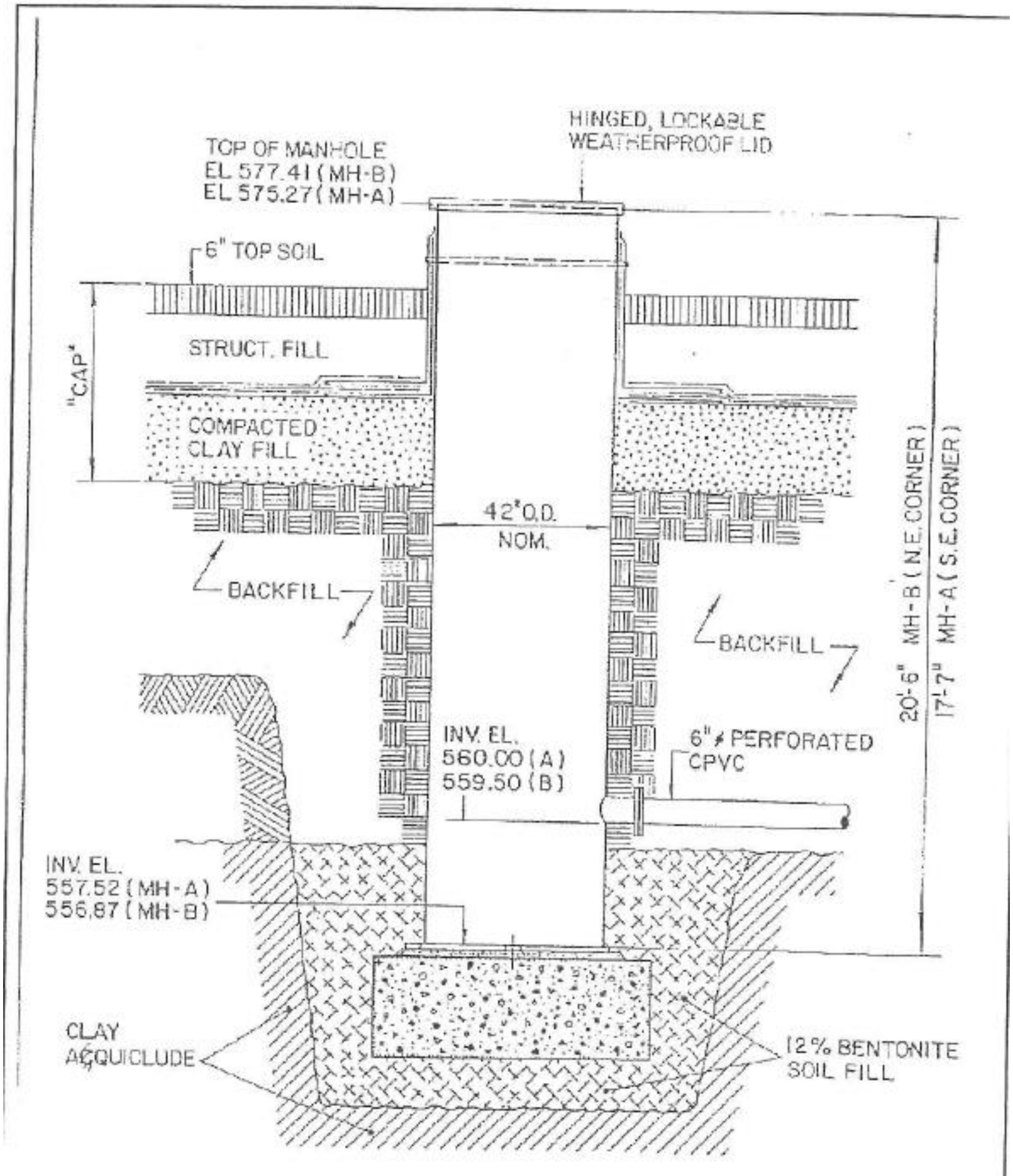


figure 1.3
SITE PLAN
GIBSON SITE
Niagara Falls, New York
CAYUGA CREEK
3' WIDE SLURRY WALL
6" PERFORATED CPVC DRAIN PIPE SLOPED UNIFORMLY TO MANHOLE
WOODEN PICKET FENCE
PROPERTY LINE
12' WIDE DOUBLE SWING GATE
GRAVEL DRIVE
5' WIDE PERSONNEL GATE
SOURCE:
FLUOR-DANIEL, PHILADELPHIA OPERATIONS CENTER, 1992.
NOTE: SEE PLAN 1 (BOUNDARY SURVEY AND TOPOGRAPHIC MAP - OLIN GIBSON) (WENDEL, 1999) FOR REVISED MONITORING WELL, PIEZOMETER AND MANHOLE ELEVATIONS
CRA
08143-40(001)GN-NF002 MAY 31/2000

# FIGURE 3.1




SOURCE:

FLUOR-DANIEL, PHILADELPHIA OPERATIONS CENTER, 1992.

figure 3.1

MANHOLE CONSTRUCTION DETAIL
GIBSON SITE
*Niagara Falls, New York*

CRA

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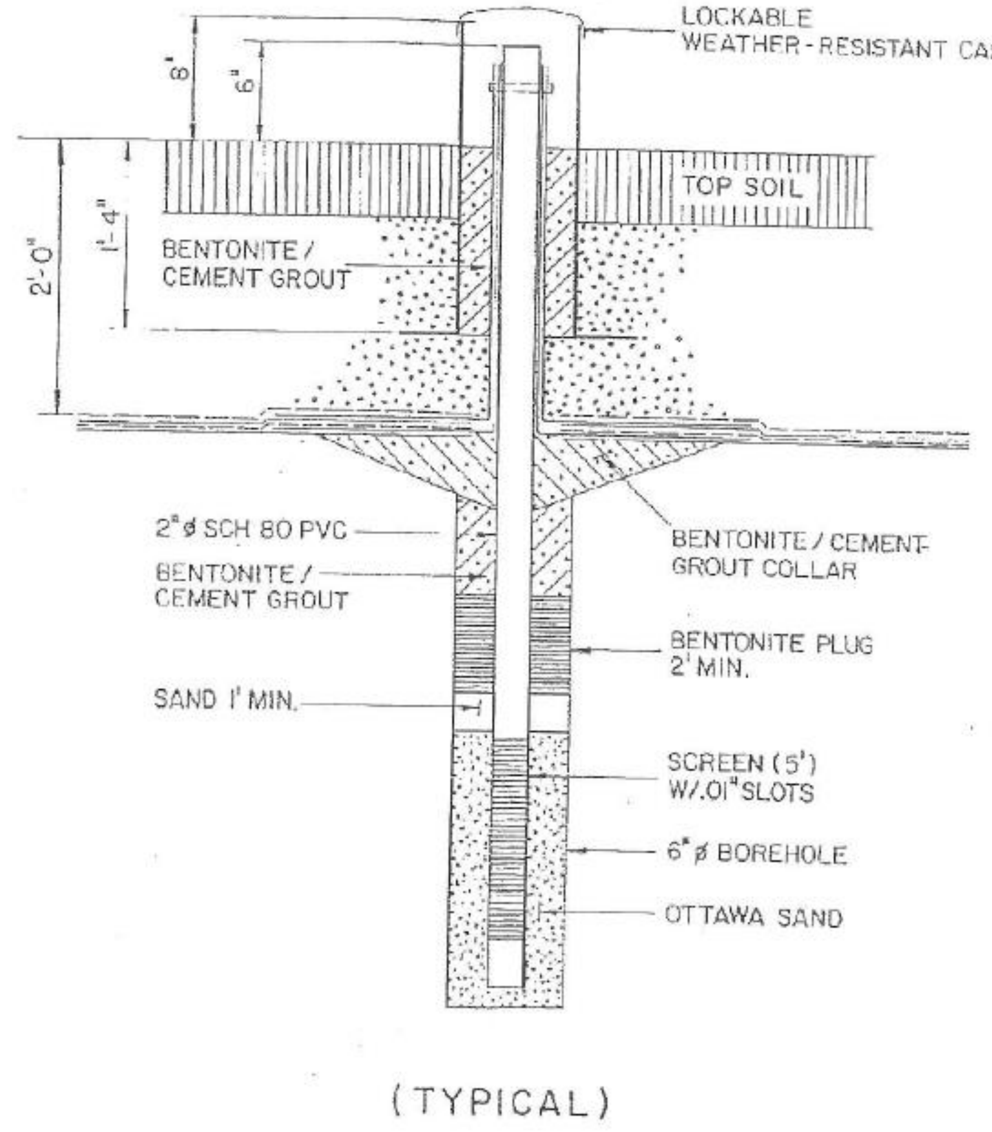
FIGURE 3.2




SOURCE:
FLUOR-DANIEL, PHILADELPHIA OPERATIONS CENTER, 1992.

figure 3.2
PIEZOMETER CONSTRUCTION DETAIL
GIBSON SITE
*Niagara Falls, New York*

CRA
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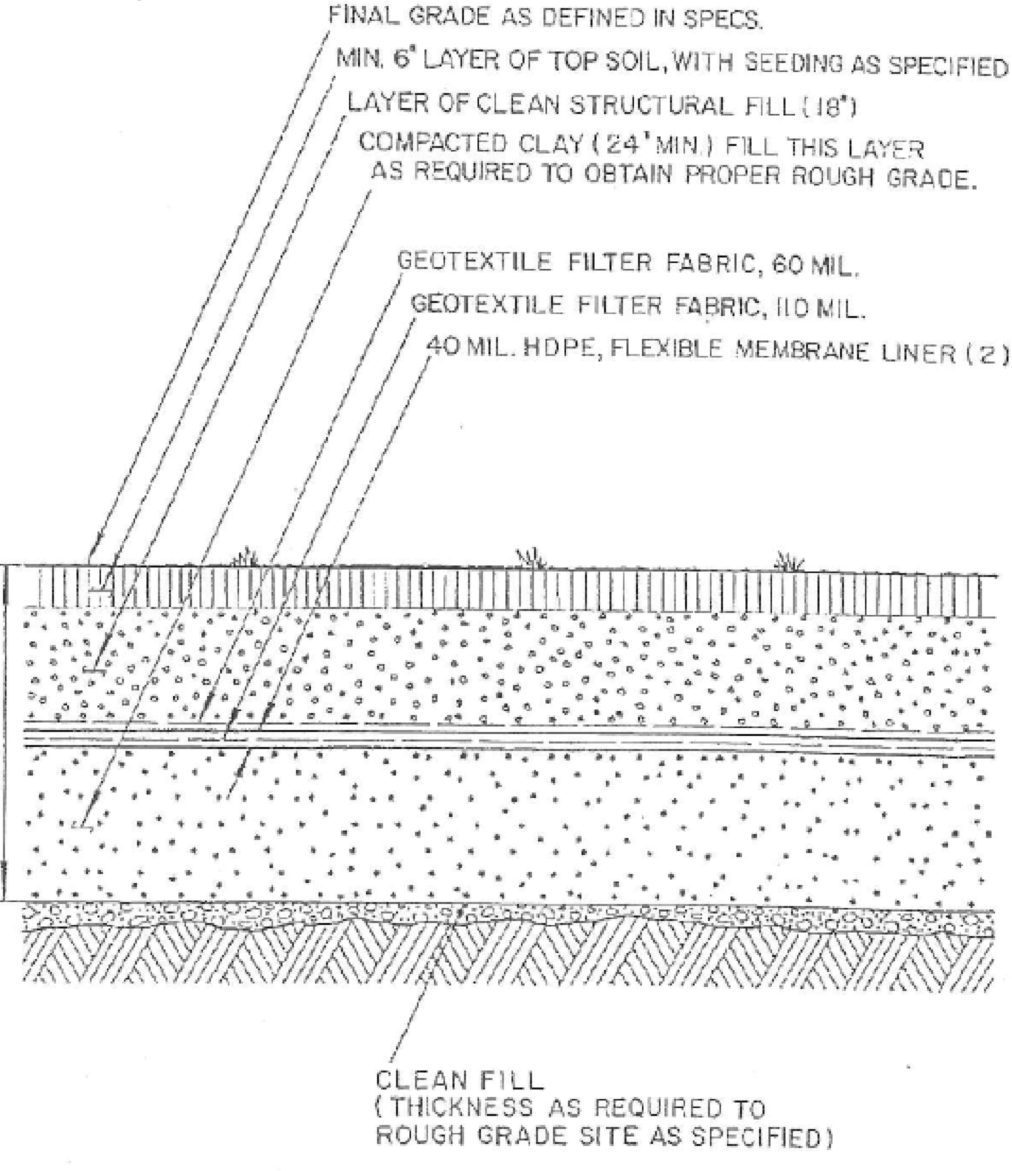
FIGURE 3.3




SOURCE:

FLUOR-DANIEL, PHILADELPHIA OPERATIONS CENTER, 1992.

figure 3.3

FINAL CAP/COVER DETAIL

GIBSON SITE

*Niagara Falls, New York*

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# FIGURE 4.1

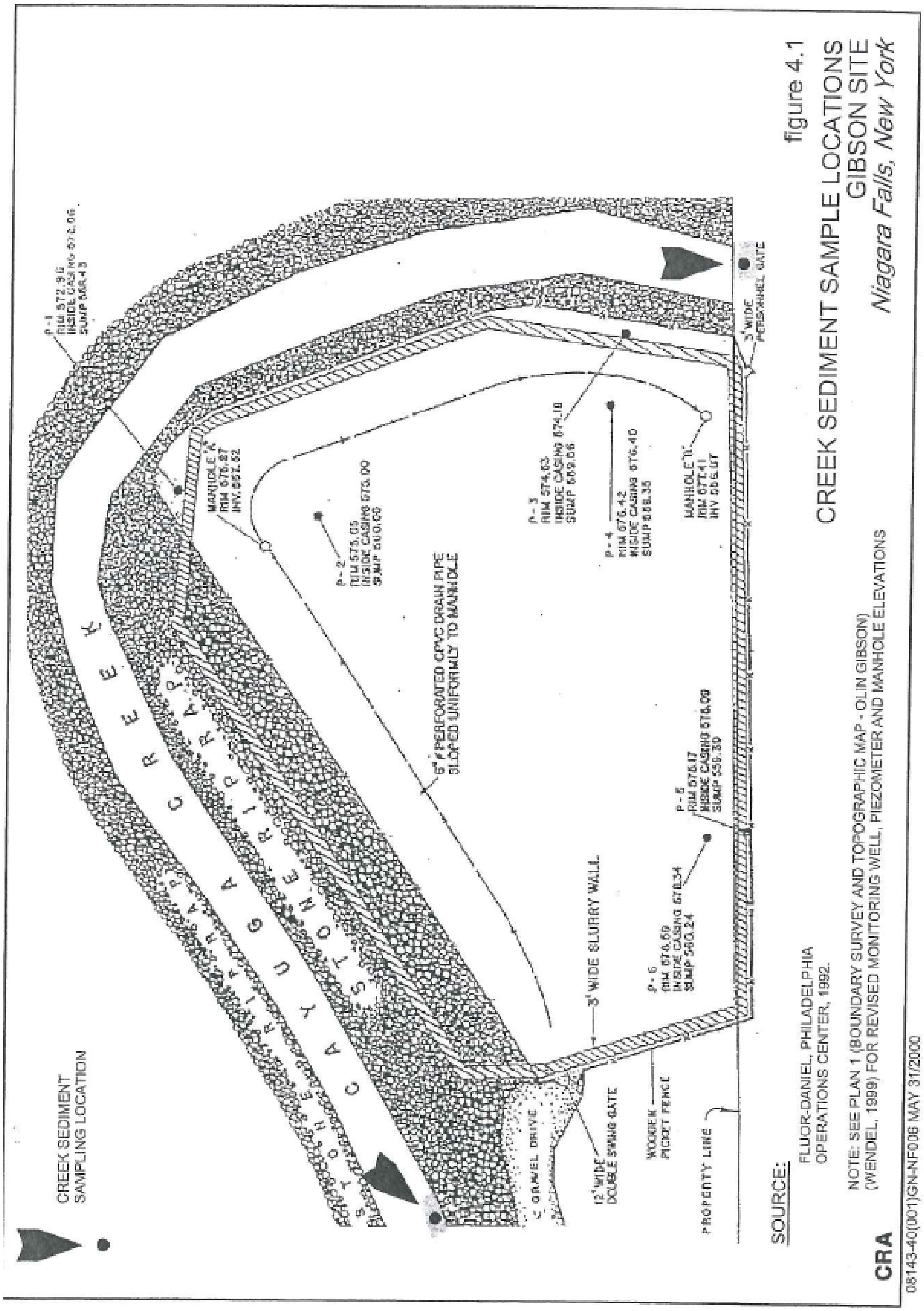
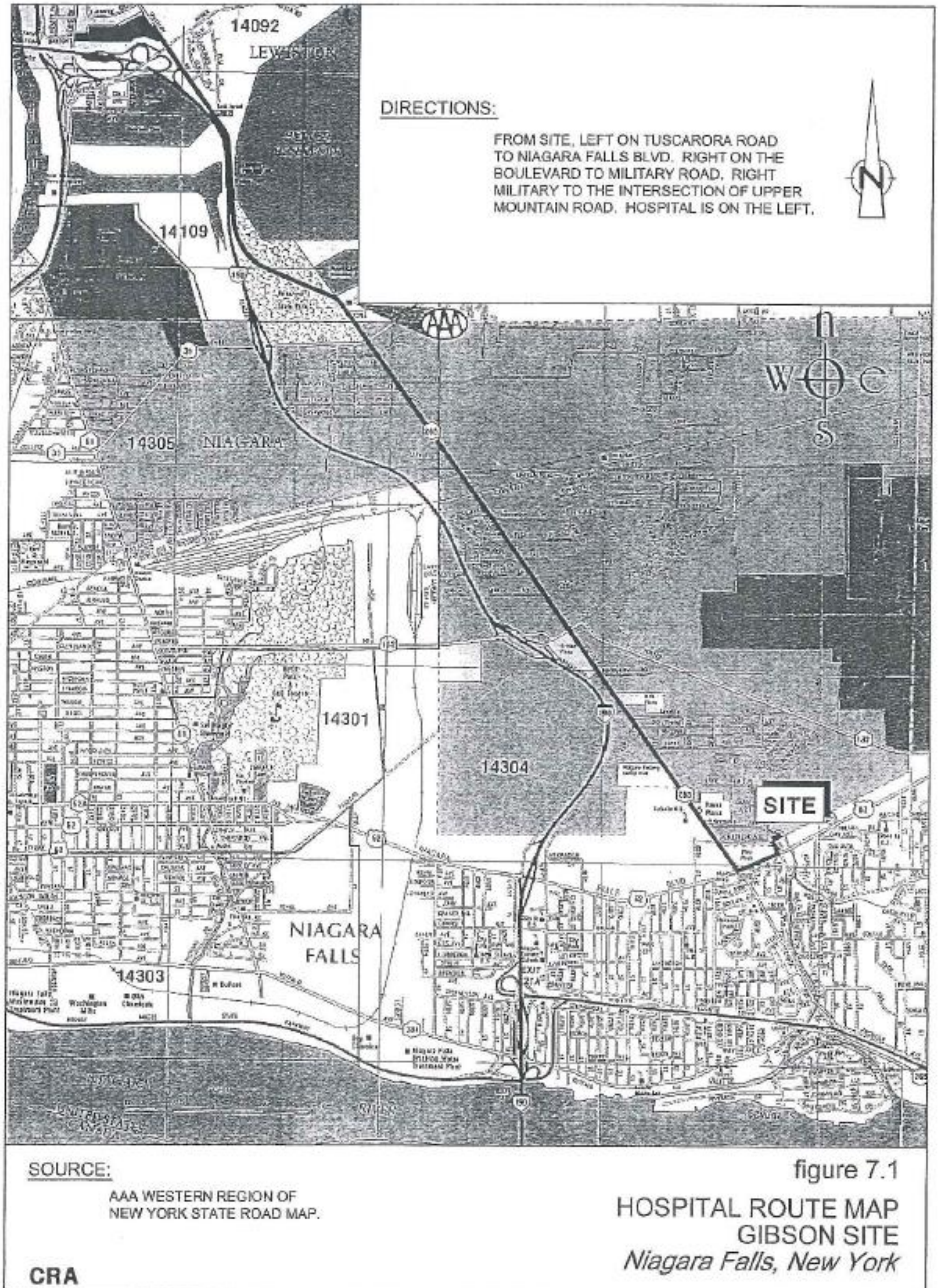


figure 4.1
CREEK SEDIMENT SAMPLE LOCATIONS
GIBSON SITE
Niagara Falls, New York
CREEK SEDIMENT SAMPLING LOCATION
CAYUGA CREEK
STONE RIPRAP
3' WIDE SLURRY WALL
6" PERFORATED CPVC DRAIN PIPE SLOPED UNIFORMLY TO MANHOLE
GRAVEL DRIVE
12' WIDE DOUBLE SWING GATE
WOODEN PICKET FENCE
PROPERTY LINE
3' WIDE PERSONNEL GATE
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
CRA
08143-40(001)GN-NF006 MAY 31/2000

**FIGURE 7.1**




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 | 577.34 | | | |

(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 12.41 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) = <u>SC measured</u>
{{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 |
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# 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.

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## 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