FINAL ENGINEERING REPORT

Industrial Welding Site
Niagara Falls, New York

Site # 932050

Prepared for:
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In Association With

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Kennesaw, Georgia

September 15, 2000

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EXECUTIVE SUMMARY

A Remedial Design was prepared in response to requirements for the Industrial Welding Site (IWS) Remedial Action set forth in the Remedial Design Work Plan, September 1997, and the addendum to the Remedial Design Work Plan, October 1997. This Final Engineering Report for the IWS presents documentation that the IWS construction activities performed in 1999 were in accordance with the approved Final Remedial Design and, where deviations from the approved Final Remedial Design were made, describes the changes to both the specifications and drawings. Documentation includes as-built drawings for the construction activities and sealed certification by a Professional Engineer registered in the State of New York.

This Final Engineering Report describes the remedial activities for the IWS, including the former American Legion Post (ALP) property completed in July – November 1999. These activities include:

- Consolidation of impacted materials and construction of a multi-layer cover system at the IWS
- Construction of an asphalt concrete cover system over property purchased by Olin in 1999 from the ALP
- Construction of a containment system, including a clay containment barrier keyed into the underlying clay stratum and surrounding the two cover systems, and a leachate collection and recovery system beneath the cover systems
- Construction of surface drainage systems for each cover system
- Monitoring well and piezometer decommissioning and installation of new monitoring wells and piezometers
- Landscaping and security fencing

The Final Remedial Design Report, Industrial Welding Site (Law Engineering and Environmental Services, P.C. (LAW), September 1999) presents the detailed design information. The Final Remedial Design was approved by NYSDEC on November 1, 1999. A compressed design and construction schedule required variations from the normal sequence of report submissions, approvals, and construction. A summary of the remedial action, community communications activities, construction quality assurance and construction quality control, design modifications approved during construction, and as-built drawings are presented in this report. A Certification of Construction, certifying completion of the Remedial Action in accordance with the NYSDEC approved design and sealed by a New York registered engineer, is also included in this report.

1.0 BACKGROUND INFORMATION

This document presents the Final Engineering Report (the report) for the Industrial Welding Site (IWS or Site) located in the City of Niagara Falls, New York. The report documents the implementation of the Remedial Design, September 1999, approved by the New York State Department of Environmental Conservation (NYSDEC) in November 1999. Gill Creek Excavation and Restoration was completed in 1998, prior to, and independent of, the IWS Remedial Action.

The American Legion Post (ALP) property, which adjoins the south side of the IWS, was purchased by Olin in July 1999 and is now part of the IWS.

1.1 SITE LOCATION

The IWS is located in the City of Niagara Falls, Niagara County, New York. The Site lies immediately west of Veterans Drive and approximately 0.2 miles north of Buffalo Avenue. A Site Location Map is provided as Figure 1.1.

1.2 PROJECT AREA

The project area is shown on Drawing GR-101 AB (Site Plan) presented in Appendix A. The overall project area comprises approximately 9.4 acres. Within this area, the IWS cover (northern cover area) is approximately 4.5 acres and the ALP cover (southern cover area) is approximately 2.8 acres.

1.3 SELECTED REMEDY

The Record of Decision (ROD) for this site was issued November 3, 1994. An Explanation of Significant Differences (ESD), issued by NYSDEC on October 6, 1999, provided for the use of an asphalt concrete cover as an equivalent cover to the remedy provided in the ROD. The Final Remedial Design was issued on September 29, 1999. The Remedial Design was approved by letter from NYSDEC to Olin dated November 1, 1999 (Appendix B) with conditions regarding the discharge from the Leachate Collection and Recovery System (LCRS), the sampling of storm drainage, and the submittal of an operations and maintenance (O & M) plan. A general description of the designed and constructed remedy components for the IWS and ALP properties is presented in this section.

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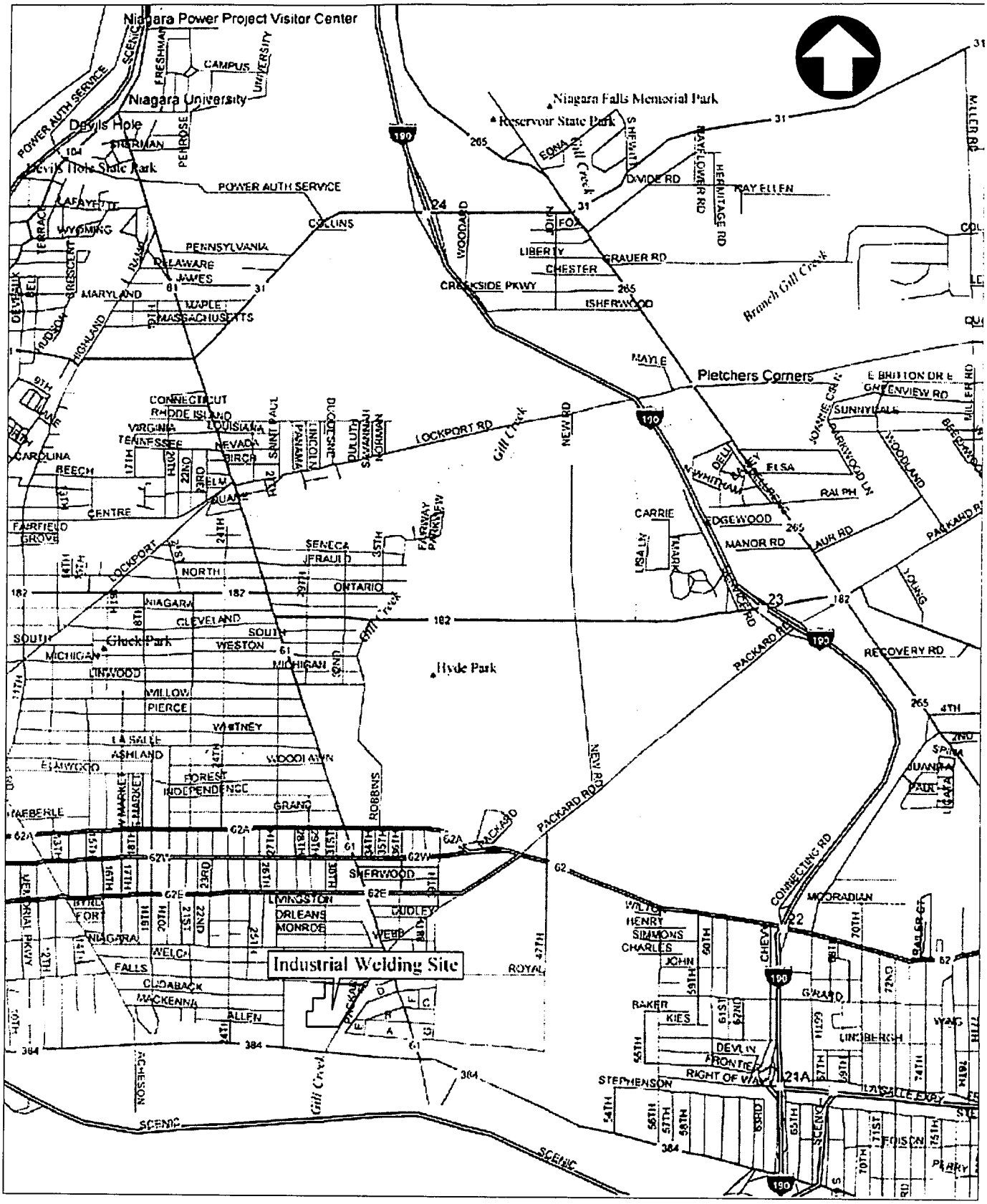

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Olin

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE AND
AMERICAN LEGION POST PROPERTY
NIAGARA FALLS, NEW YORK

LOCATION MAP

JOB NO. 12000-7-0232 FIG. NO. 1.1

The ESD recognized that Olin's acquisition of the ALP property created opportunity to consider changes to the ROD remedy. The ESD addressed leaving ALP soils in-place, extending the IWS leachate collection system across the ALP property, and containing the ALP soils beneath an asphalt concrete cover. These changes were considered appropriate for maintaining an equivalent remedy to the ROD remedy.

1.3.1 Monitoring Wells/Piezometers

Twenty-two monitoring wells and seven piezometers from the Remedial Investigation/Feasibility Study (RI/FS) work were decommissioned during the construction activities. Six new piezometers and two new monitoring wells were installed during construction activities for incorporation into the long-term monitoring plan for the Site.

1.3.2 Industrial Welding Site Property

The remedy for the IWS property consists:

- Consolidation of impacted materials and construction of a multi-layer cover (Northern Cover System).at the IWS
- Construction of a clay containment barrier keyed into the underlying clay stratum around the cover perimeter.
- Construction of a leachate collection and recovery system extending beneath both the northern and southern covers.

The Gill Creek sediments (6,850 cubic yards), placed on the IWS property in 1998 under a temporary protective cover (20-mil PVC geomembrane), were consolidated under the northern cover. In addition to these sediments, 7200 cubic yards of other materials were placed under the northern cover. These materials consisted of soils from the LCRS trench drain, soils from discharge pipe trenches, soils from the clay barrier trenches, soils from drain pipe trenches along the south side of the APL, soil from drainage ditches around the northern cover, soils and debris from the west portion of the property known as the "Area of Mounds", soils from excavations in the "Dog Leg" area west of the northern cover, selected debris from ALP building demolition, soils from the paving activities along the alley, and the temporary protective cover that had been placed over the Gill Creek sediment.

The multi-layer Northern Cover System for the IWS consists of:

- A 6-inch (minimum) buffer layer
- 40-mil high-density polyethylene (HDPE) geomembrane
- An 18-inch protective/drainage soil layer
- A 6-inch topsoil layer seeded and mulched to establish vegetative cover

The cover was graded to control surface water run-on and to direct surface water run-off into two catch basins located outside the northern cover at low points near the northeast and southeast corners. Runoff flows directly from the catch basins through storm water drainpipes to Gill Creek.

1.3.3 American Legion Post Property

The remedy selected for the ALP property consists:

- Construction of an asphalt concrete cover (Southern Cover System) meeting equivalency requirements of the IWS cover system.
- Construction of a clay containment barrier keyed into the underlying clay stratum around the cover perimeter.
- Construction of a leachate collection and recovery system extending beneath both the northern and southern covers.

Soils excavated within the ALP property for the clay barrier trench and LCRS trench drain and some of the building demolition debris were consolidated under the northern cover. The concrete block and brick demolition debris was segregated, crushed and used as part of the aggregate base for the cover system. Surface drainage from the asphalt concrete cover system is directed to Gill Creek via three catch basins and a storm drainpipe.

1.3.4 Containment System

The LCRS was constructed to recover perched water contained in the fill material located beneath the IWS and ALP properties. The LCRS consists of a 3-foot wide, 710-foot long collection trench constructed northeast to southwest across the eastern portion of both the IWS and ALP properties. A 4-inch diameter perforated pipe was installed in the trench at depths beneath the surface ranging from 5 feet at the northeast end to 9 feet at the southwest end. The pipe depths were set to intercept the perched water beneath the IWS. A recovery well was set at the southwest end of the collection trench. The water

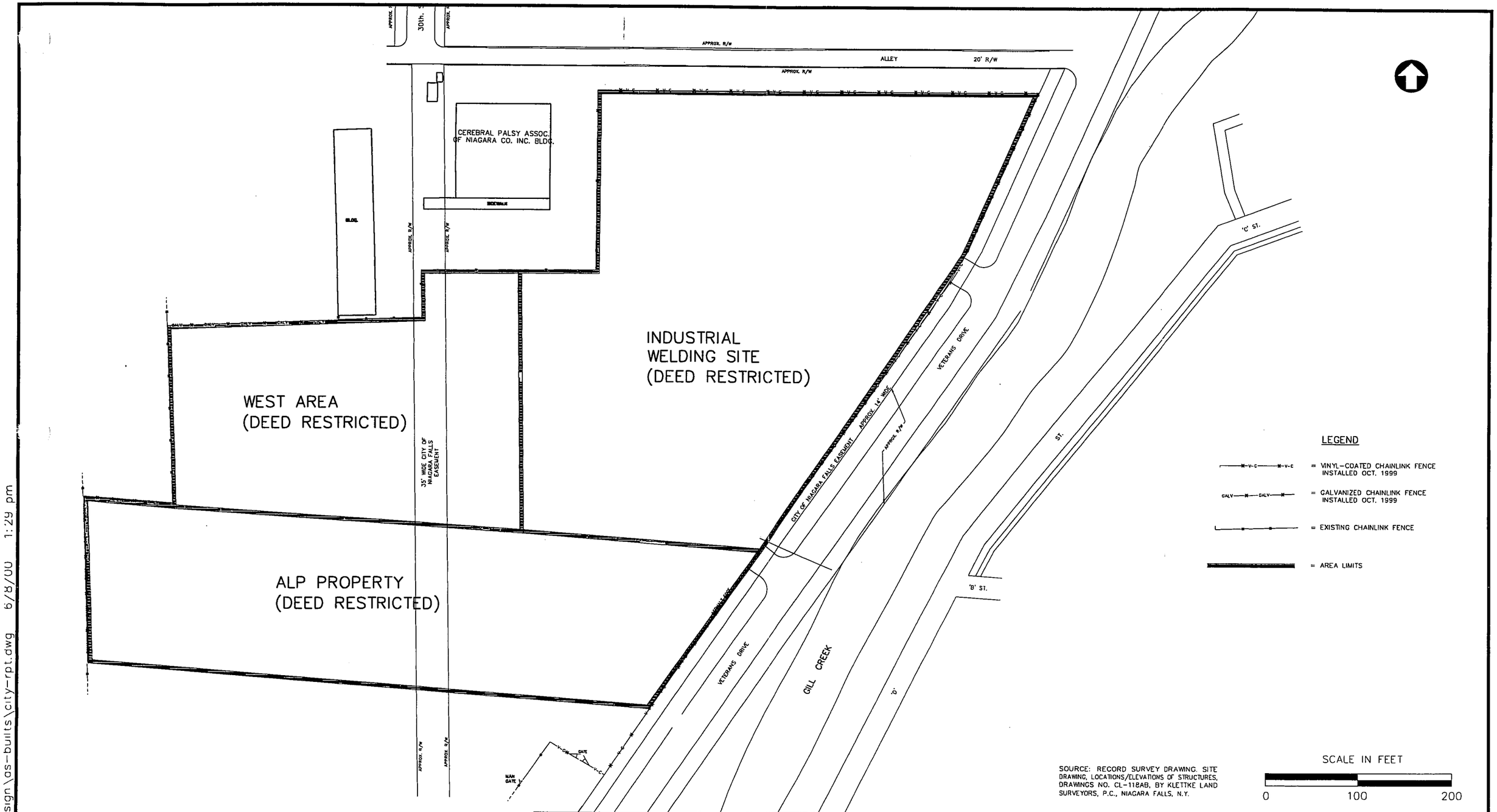
recovered by the LCRS is discharged into a manhole (MH-1 on the drawings) which discharges to the City of Niagara Falls combined sewer system. Clay barrier trenches were installed around the perimeter of the northern and southern covers as shown on the drawings in Appendix A.

1.3.5 Landscaping

Olin worked with the local community to minimize the height of the cap, to develop improvements in lighting and paved parking along the alley, and in the selection of both the size and color of chain link fencing installed around the site. Final landscaping was reviewed with the Community Action Panel on March 29, 2000.

1.3.6 Institutional Controls

Land use restrictions will be applied to the IWS, including the ALP property (Figure 1.2). Land use restrictions will preclude future activities that could materially threaten, compromise, or damage the remedies. The ALP property will be available for future development, subject to NYSDEC approval of use, as long as the integrity of the cover is not diminished.



OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW
LAWGIBB Group Member

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK

INSTITUTIONAL CONTROLS

JOB NO. 12000-7-0232 FIGURE 1.2

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2.0 REMEDIAL ACTION ACTIVITIES

This section presents a summary of the Remedial Action (RA) construction activities performed from August through November 1999. The construction activities included consolidation of the soils, ALP demolition debris, and Gill Creek sediments under the IWS final multi-layer cover system; construction of the ALP property asphalt concrete cover system; installation of a containment system that includes a leachate collection and recovery system (LCRS) and clay barrier trenches; construction of surface water drainage systems; and installation of security fencing and landscaping. A chronological summary of RA construction activities is presented in Table 2.1. The As-Built (AB) drawings are presented in Appendix A.

2.1 REMEDIAL ACTION CONTRACTORS

The following companies provided construction-related services to the remediation project:

- Sevenson Environmental Services, Inc., Niagara Falls, New York (Sevenson) was the general contractor for Olin
- Law Engineering and Environmental Services, P.C. (LAW), was the project designer and provided construction quality assurance/construction quality control for Olin.
- Glynn Geotechnical Engineering, Lockport, New York (Glynn) provided construction oversight support and physical testing laboratory services as a subcontractor to LAW
- Klettke Land Surveyors, P.C., Niagara Falls, New York (Klettke) provided site surveying as a subcontractor to LAW
- Conestoga-Rovers and Associates, Niagara Falls, New York (CRA) provided health and safety officer and community air monitoring services for Olin

Table 2.1
Chronology of Construction Activities

Industrial Welding Site
Niagara Falls, NY

Activity	Start Date	End Date
Piezometer/Monitoring Well Decommissioning	7/28/99	7/30/99
Mobilization for Construction	8/25/99	11/12/99
Construction of Leachate Collection Trench and Recovery Well	8/30/99	9/14/99
Removal of Temporary Liner/Regrade of IWS Cover Area	8/30/99	9/18/99
Clay Barrier Trench – IWS	9/1/99	9/18/99
Clay Barrier Trench – ALP	9/3/99	9/10/99
Force Main Installation / LCRS	9/10/99	10/4/99
IWS Drainage System	9/18/99	10/29/99
Buffer Layer Placement	9/18/99	10/7/99
Piezometer/Monitoring Well Installation	9/20/99	9/23/99
ALP Drainage	9/24/99	10/29/99
ALP Grading	9/29/99	10/18/99
Testing of the Dog Leg Area	10/1/99	10/6/99
Geomembrane Installation	10/6/99	10/9/99
Protective Drainage Layer Placement	10/8/99	10/13/99
ALP Pavement Placement	10/13/99	11/8/99
Topsoil Placement	10/15/99	10/21/99
LCRS Electrical/Mechanical Installation	10/15/99	11/30/99
Hydroseeding/Mulching	10/22/99	10/29/99
Fencing	10/25/99	11/6/99
Piezometer/Monitoring Well Development	11/11/99	11/11/99
Storm Drain Sampling Port Installation	11/30/99	11/30/99

Note: Not all events were performed continuously until completion. Due to availability of equipment or resources, some tasks were delayed and then restarted.

2.2 SITE PREPARATION

Site preparation activities were conducted by Sevenson from July 19, 1999, to August 23, 1999. Site preparation included the following:

- Equipment mobilization and trailer setup
- Temporary utilities
- Temporary fencing
- Clearing and grubbing of vegetation

2.3 CONSOLIDATION OF SOILS, SEDIMENTS, AND DEMOLITION DEBRIS

2.3.1 Gill Creek Sediments

Sediments resulting from the Gill Creek Excavation and Restoration project were placed on the IWS in 1998. These sediments were covered with a temporary protective cover that consisted of a 20-mil polyvinyl chloride (PVC) geomembrane. At the start of remedial construction, the temporary cover was removed and placed under the northern cover. The sediment was bladed to facilitate air drying as required for final placement and grading of the sediments and other materials.

2.3.2 American Legion Post Building Demolition Debris

Broken concrete blocks from the ALP building demolition were placed as part of the aggregate base beneath the asphalt concrete pavement in the western portion of the ALP property. The remaining concrete demolition debris was placed under the northern cover.

2.3.3 Excavated Materials

Excavated materials placed under the northern cover system include:

- Soil from excavation of drainage ditches and clay barrier trench around the northern cover - 2300 cu yds
- Soil from excavation of clay barrier trenches around the southern cover – 850 cu yds
- Soil and fill from excavation of LCRS trench drain and LCRS discharge pipe trench - 600 cu yds

- Selected debris from ALP building - 50 cu yds
- Soil from drain pipe trench excavations along the south side of the ALP - 300 cu yds
- Piles of soil and debris existing in the west portion of the IWS property prior to remediation and referred to as the "Area of Mounds" - 1900 cu yds
- Soils from excavation in the "Dog Leg" area west of northern cover - 850 cu yds
- Soils from the alley parking area - 350 cu yds

2.4 LEACHATE COLLECTION AND RECOVERY SYSTEM

The LCRS provides for the collection and recovery of perched water from the beneath the final cover systems in a collection trench/recovery well system.

2.4.1 Trench

The trench construction began at the recovery well sump area and continued northeast to the terminus near the northern perimeter of the IWS, as shown on Drawing CL-102AB. The trench excavation encountered fill from depths of 2 feet to 9 feet below the original grade. The fill consisted of soil and construction debris (mostly bricks and concrete fragments). At the south end (on the ALP property), the trench excavation encountered buried concrete that was apparently old structural foundations. These foundations and footings were demolished using a hydraulic ram attached to an excavator, and placed on the IWS.

The collection trench was excavated to provide a collection pipe slope of 0.4 percent downward from the northeast to southwest. During the excavation, water was first encountered approximately 7 feet below the original ground surface. The water entered the excavation and was pumped into temporary holding tanks.

Samples of the water were collected and analyzed for acetone, dichloroethanes, trichloroethylenes, BHCs (total), mercury (total), Soluble Organic Carbon, and Total Suspended Solids as required by the CNF permit dated June 15, 1999, for temporary construction water discharge. The permit included a maximum flow discharge of 7,000-gallons per day, which was increased to 20,000-gallons per day by a CNF letter dated September 7, 1999. On two occasions, special agreements were made with the CNF to accept

higher daily volumes of collected water due to high rainfall events. Once the results of analyses were received and accepted by the CNF, the water was pumped to a combined sewer manhole (MH-1 on the drawings in Appendix A) for discharge to the Publicly Owned Treatment Works (POTW) for treatment.

2.4.2 Geotextile

The collection trench was lined with a woven geotextile to filter water as it enters the collection trench and to prevent sediment from entering the coarse stone that beds and covers the collection pipe. The fabric was wrapped over the stone at the top of the trench. The geotextile placement is shown on Drawing CL-104AB.

2.4.3 Coarse Stone Aggregate

Coarse stone aggregate was placed in the collection trench to bed and cover the collection pipe. It also provides additional drainage to the recovery well. The depth of the aggregate fill extended from the bottom of the trench to the original ground elevation. Aggregate placement is shown on Drawing CL-104AB.

2.4.4 Collection Piping

The collection piping installed was a perforated, four-inch (outside diameter), high-density polyethylene (HDPE) pipe. The collection pipe was perforated in the field. Factory-welded tees were installed for placement of the two vertical standpipes. An inclined cleanout stickup at the north end of the trench was attached to the pipe with a "Y" section. A cap was placed on the end of the "Y" section. The cleanout and standpipes were also constructed of HDPE but were solid (not perforated) wall pipes. The south end of the collection pipe was connected to a 12-inch diameter recovery well. Locations of the standpipes and cleanout are shown on Drawing CL-102AB, and sections are shown on Drawing CL-104AB.

2.4.5 Recovery Well

The recovery well was constructed to serve as a sump for pumping to MH-1. The recovery well was constructed of 12-inch diameter solid wall HDPE SDR 11 pipe. A factory-installed stub on the recovery well was used to butt-fuse weld the collection pipe to the well. The bottom 2-foot portion of the well is solid wall pipe to form the sump. A round solid HDPE plate was welded to the bottom of the recovery

well to form a closed bottom. Above the 2-foot long solid wall portion is a 3-foot long slotted section. The slots are ¼-inch wide and ½-inch apart. The well riser above the slotted section is solid wall. The recovery well location is shown on Drawing CL-102AB and the section is shown on Drawing CL-104AB.

2.4.6 Leachate Extraction Pumping System

The mechanical assembly was installed in a heated fiberglass shelter over top of the recovery well riser. The configuration of these components is shown on Drawing ME-101AB. Control panel wiring and controls are shown on Drawing ME-102AB. The pumping system consists of:

- A Grundfos Rediflo4 submersible pump – pump capacity 1- to 7.5-gallons per minute (gpm) with a total head of 20 feet.
- PVC piping and valves
- Magnetic flow meter and transmitter
- Pressure gauge
- Sample port
- High and low level controls and mounting hardware
- Pump control panel
- Automatic telephone dialer

Power and telephone services are supplied to the system via underground lines from a power pole located east of the northern cover. Each line runs in a two-inch diameter, PVC conduit buried approximately two feet deep.

2.4.7 Force Main

The force main was installed from the pumping assembly to MH-1 in the CNF combined sewer system, as shown on Drawing CL-102AB. The force main was constructed using a seamless 1-inch HDPE conveyance pipe nested in a 3-inch HDPE containment pipe. An anti-seep collar was attached to the containment pipe, embedded in the northern perimeter of the clay barrier trench, and sealed with a bentonite/cement mix. The trench for the force main pipe was graded so that the containment pipe slopes from the recovery well enclosure to MH-1.

2.4.8 Clay Barrier

A clay barrier wall was constructed around the perimeter of the covers. The materials excavated from the barrier trench were placed under the northern cover. The position of the clay barrier trench is depicted on cross-sections shown on Drawings CL-104AB, CL-105AB, and CL-106AB.

The clay barrier was constructed by excavating a continuous trench around the perimeter of the covers and backfilling the trench with compacted clay. No clay barrier wall was installed on the common boundary between the IWS and ALP properties. The trench was a minimum of 3-feet wide at the bottom and deep enough to penetrate a minimum of 1 foot into native clay. At the two locations where the clay barrier trench crossed the existing 12-inch diameter sewer in the 30-foot CNF easement, the sewer was cut and a cement/bentonite plug or seal was placed around the sewer.

2.5 NORTHERN COVER SYSTEM

The northern cover system incorporates a buffer layer, a 40-mil geomembrane liner, a protective/drainage layer, and a layer of topsoil with vegetation. Final surface elevations of the cover are shown on Drawing CL-111AB. Cross-sections of the cover are shown on Drawings CL-103AB through CL-106AB. Grading of the cover directs surface runoff to a perimeter swale that drains into two catch basins located outside the cover at its northeast and southeast corners. The catch basins discharge to Gill Creek.

2.5.1 Buffer Layer

The buffer layer consists of a minimum 6-inch layer of clay. The clay was placed in one lift and compacted using bulldozers and smooth-drum rollers. Compaction was tested using a nuclear density gauge per the procedures of ASTM D 2922. The thickness of the buffer layer was verified by survey. In locations where initial density or thickness was insufficient, additional placement of buffer material and compaction were performed to comply with the design specifications.

2.5.2 Geomembrane Liner

A 40-mil high-density polyethylene (HDPE) geomembrane liner was installed over the buffer layer by certified liner installers from GSE Lining Technology, Inc. A smooth surfaced geomembrane was installed on the 2 percent (minimum) slopes and a textured surface geomembrane was installed on slopes

greater than 10 percent. The liner was keyed into the clay barrier trench a minimum of 1 foot to provide containment of the materials beneath the cover. The key trench was backfilled with compacted clay. Drawing CL-113AB shows the panel layout for liner installation and locations of destructive tests and repairs made during the installation.

2.5.3 Protective/Drainage Soil Layer

An 18-inch thick layer of protective/drainage soil was placed over the geomembrane liner to protect the liner and to drain infiltration from the liner surface. The soil was obtained from the Pine Hill borrow source in Buffalo, New York. The soil was placed in two 9-inch lifts beginning on the northwest side of the liner and proceeding east and south so that the trucks and earth-moving equipment were always on the protective layer.

2.5.4 Vegetative Soil Layer and Vegetative Cover

A 6-inch layer of vegetative soil (topsoil) was placed on the protective/drainage cover soil layer to support vegetative cover growth. The topsoil was obtained from a source located in the southeast quadrant of the Loveland and Route 425 intersection in the Town of Wheatfield, New York. The vegetative cover provides stability, minimizes the erosion potential, and reduces the long-term maintenance of the cover system.

2.6 AMERICAN LEGION POST PROPERTY

The remedial action on the former ALP property consisted of the clay barrier trench for perched water containment, the LCRS for perched water recovery, and an asphalt concrete cover to prevent surface infiltration and eliminate the risk of contact with the materials under the cover. The ALP building was demolished prior to start of remedial construction on the ALP. Some of the ALP building debris was placed under the northern cover and broken concrete block from the building was used as subgrade material for the southern cover.

2.7 SOUTHERN COVER SYSTEM

The purpose of the asphalt pavement cover on the southern area (former ALP property) is to prevent infiltration of precipitation into the site soils, prevent exposures to site soils, reduce the hydrostatic head

on the underlying clays, and to construct a cover suitable to facilitate future development. Drawing CL-111AB shows final surface elevations of the southern cover. Cross sections of the southern cover are shown on Drawings CL-103AB through CL-106AB.

2.7.1 Subgrade

Prior to fill placement, the stability of the ground surface in the areas to receive fill was evaluated by Construction Quality Assurance/Construction Quality Control (CQA/CQC) personnel. The evaluation was done by the contractor making passes over the surface with a double-wheeled steel drum roller at slow speed and CQA personnel observing the surface for excessive deflection or rutting that would indicate unstable near-surface soils. After the ground surface was determined to be stable, crushed block from the ALP building demolition and crushed stone imported from the approved borrow source were placed on the site. The stone and crushed block were placed using dump trucks, spread by dozers, and compacted by steel drum vibratory rollers.

2.7.2 Aggregate Base Course

The aggregate base course for the asphalt concrete pavement cover consists of compacted crushed stone. The aggregate base course has a minimum thickness of six inches. The aggregate base course is shown in cross sections on Drawings CL-103AB through CL-106AB.

2.7.3 Asphalt Concrete Pavement (Binder and Top Course)

The lateral extent and the surface elevations of the asphalt concrete pavement are shown on Drawing CL-111AB. The cross sections that show the 2.5-inch thick binder course and the 1-inch thick top course are on Drawings CL-103AB through CL-106AB.

The material used for the topcourse in all areas except the steeper perimeter slopes was modified from a standard NYSDOT asphalt concrete mix design to provide a coefficient of hydraulic conductivity no greater than $1x10^{-7}$cm/sec. This meets the design criteria for the cover to minimize the infiltration of precipitation into the underlying soils. The standard topcourse mix was used on the steeper outer slopes that occur on the east, north, and west edges of the southern cover to provide the higher stability required for compaction.

The compaction of both courses was achieved using vibratory and static passes on a double-wheeled steel drum roller. On the steeper side slopes, the binder and top courses were placed manually and rolled using manually guided compactors.

2.8 STORM DRAINAGE SYSTEM

The storm drainage system conveys surface runoff from the cover areas to Gill Creek in a controlled manner that avoids ponding of water on the cover and minimizes surface erosion of the soils in the storm drainage ditches.

2.8.1 Industrial Welding Site Storm Drainage

The final northern cover is graded to direct surface runoff to drainage ditches constructed around the perimeter of the cover. The drainage ditches are graded so that runoff from the northerly portion of the cover is directed to a catch basin at the northeast corner of the cover (CB-1) and runoff from the southerly portion of the cover is directed to a catch basin at the southeast corner of the cover (CB-2). Both catch basins discharge to Gill Creek. The drainage ditches, catch basins, drainpipes, and headwall structures are shown on Drawing CL-102AB. The drainage ditches are also shown in cross sections on Drawings CL-103AB, CL-104AB, and CL-106AB. On the west side of the cover, a culvert was placed in the drainage ditch to provide an access road onto the cover. Water flowing eastward in the south drainage ditch enters a drainpipe that leads to the catch basin at the southeast corner of the cover. Similarly, water flowing southward in the east drainage ditch enters a drainpipe that leads to the catch basin in the southeast corner of the cover. These two drainpipes were installed to reduce the slope and depth of the final cover surface in the areas. A culvert was placed on the south side of the cover to form an access road to the cover. Locations of these culverts and access roads are shown on Drawing CL-102AB.

The primary drainage from the southern cover is directed to three catch basins on the south side of the cover (CB-3, CB-4, and CB-5). At each catch basin, an impoundment area, located off the cover, directs the surface flow into the catch basin. A small portion of the runoff (that which falls on the outermost slopes of the west and east sides of the ALP and on the westerly portion of the north side) drains to the adjacent land surface outside the cover.

2.8.2 Catch Basins

The storm drainage system includes five catch basins (CB-1 through CB-5). Two of these (CB-1 and CB-2) are on the IWS property and three (CB-3, CB-4, and CB-5) are immediately south of the ALP property. The locations of the catch basins are shown on Drawing CL-102AB. The catch basins are precast concrete. Catch basin cross sections are shown on Drawing CL-105AB.

To facilitate drainage of water from the protective/drainage layer at CB-1 and CB-2, ½-inch diameter holes were drilled in the sides of CB-1 and CB-2 at the elevation of the protection/drainage layer. These two catch basin excavations were lined with woven geotextile and backfilled with crushed stone. The geotextile was wrapped over the stone and the excavation was backfilled with the protective/drainage sand. Drainpipe connections to the catch basins were made with banded rubber boots.

Catch basins CB-3, CB-4, and CB-5 were placed immediately south of the ALP cover. These three catch basins are connected in series, with drainage flowing from CB-3 to CB-4 to CB-5, and then discharging to Gill Creek. Drainpipe connections to CB-3, CB-4, and the west side of CB-5 were made with banded rubber boots. The drain pipe connection to the east side of CB-5 was made with a concrete seal.

2.8.3 Storm Drain Piping

Reinforced concrete pipe (RCP) was installed to convey the storm water from catch basins CB-1, CB-2, and CB-5 to Gill Creek (Drawing CL-102AB). The placement of this pipe required three separate cuts across Veterans Drive. Bell and spigot RCP was laid from headwalls at Gill Creek to the catch basins.

RCP draining from CB-1 and CB-2 has an inside diameter of 15 inches. The RCP draining from CB-5 has an inside diameter of 24 inches. The trenches for the pipe were excavated and then filled with approximately 1 foot of gravel to bed the pipe. The discharge ends of the RCP are in precast concrete headwalls that are set in the western bank of Gill Creek. The pipes discharge onto 6-inch riprap on the bank between the headwalls and the creek. The riprap placement in Gill Creek was completed under a Nationwide Permit (No. 13) provided by the U.S. Army Corps of Engineers (USACE), Buffalo District.

An anti-seep collar was installed on the RCP between CB-5 and Gill Creek. The collar is a concrete-bentonite mix placed around the pipe. The collar is approximately eight feet long and positioned with its east end approximately five feet west of the east property line.

HDPE pipe (24-inch, outside diameter) was installed between CB-3, CB-4, and CB-5. The trenches for this pipe were excavated on the south side of the clay barrier trench that runs along the south side of the ALP. The pipe trenches were filled with approximately 1 foot of pipe bedding material (crushed stone) and the butt-fused pipe was placed on top of the gravel. The openings in the catch basins where the HDPE pipe enters were bricked and mortared to seal around the pipes.

A storm drain sampling port was installed on the RCP that drains from CB-5 to Gill Creek. The sampling port is located immediately west of the east property line, as shown on Drawing CL-102AB. The sampling port consists of a section of six-inch diameter PVC pipe (solid wall) encased in concrete. A hole was cored in the top of the RCP and the PVC was set in a gasketed bell end. The sampling port is shown in cross section on Drawing CL-105AB.

2.9 LANDSCAPING AND SECURITY FENCING

2.9.1 Landscaping

The IWS property was initially planted with winter wheat in addition to the specified grass mix to prevent erosion over the winter. Final seeding was a mixture consisting of equal amounts (by weight) of Quest Perennial Ryegrass, Ice Perennial Ryegrass, Kentucky Bluegrass, and Creeping Red Fescue. Conceptual landscaping plans also considered the placement of shrubbery off-site to the east of the site as well as maintaining the grass-covered cap. Through public availability sessions and Community Advisory Panel meetings, it was determined that neither the near-neighbors nor the community wanted shrubbery planted. Consequently, the only landscaping for the site is the seeding required to maintain the grass cover. This landscaping effort was completed in July 2000.

2.9.2 Security Fencing

A new 6-foot high chain link fence, including some sections of galvanized and some sections of vinyl-coated chain link, was constructed to join with existing chain link fence and provide complete perimeter security. Drawing GR-101AB shows the perimeter fence.

3.0 OPERATIONS AND MAINTENANCE PLAN

An Operations and Maintenance (O & M) Manual for the long-term O & M activities, including monitoring, is presented under separate cover.

4.0 COMMUNITY COMMUNICATIONS

A program for community communications was implemented by Olin to inform the public of planned activities and address community concerns during construction. Olin worked closely with the local community on issues relating to the lighting and paving of the alley north of the IWS, the type of grass to be planted on the IWS cover, and future landscaping plans. A summary of community communications activities performed by Olin prior to and during construction is listed below:

- March 29, 1999 – Olin Community Advisory Panel Meeting: Project status and landscaping were discussed with community representatives.
- June 16, 1999 - Olin Community Advisory Panel Meeting: IWS design and construction activities were discussed with the community representatives at this meeting.
- July 7, 1999 - Public Availability Session: Obtained input from near-neighbors on final design near their properties. Fact Sheet was distributed to the community.
- September 9, 1999 - Community Fact Sheet mailed by Olin.
- September 15, 1999 - Olin Community Advisory Panel Meeting: Update on project status provided to community representatives.
- September 23, 1999 - Olin meeting with neighbors on regarding alley parking area.
- September 1999 - Door-to-door contact with neighbors regarding paving of parking area.
- October 12, 1999 – Olin communicated with local resident regarding complaint of noise and lack of information on the construction. Olin followed up with letter to resident.
- December 15, 1999 - Olin Community Advisory Panel Meeting: Update on project status was provided.
- March 29, 2000 – Olin Community Advisory Panel Meeting and Update on status was provided. Community interest and feedback on site area landscaping and Gill Creek re-vegetation was solicited.

5.0 CONSTRUCTION QUALITY ASSURANCE/CONSTRUCTION QUALITY CONTROL

This section describes the Construction Quality Assurance (CQA) and Construction Quality Control (CQC) Activities conducted during remediation. CQA/CQC responsibilities, tasks, and organization were as described in the project CQA Plan.

5.1 HEALTH AND SAFETY

The work was performed under a written Health and Safety Plan (HASP) that was reviewed by the NYSDEC/NYSDOH. The project Health and Safety Officer (HSO) was present on site to observe the work activities relating to health and safety practices. The HSO also presided over weekly meetings with site workers.

The HSO also implemented the Community Air Monitoring plan as contained in the Health and Safety Plan (HASP). Appendix C presents the results of the air monitoring sampling and analysis. All of the analyte concentrations were below the action limits presented in the Health and Safety Plan.

On site, direct-read instruments were used in the areas were work was being performed. The instruments used were designed to detect mercury, volatile organic compounds, and nuisance dust. On several days, machine operators and laborers wore respirators due to odors in the excavations. Site workers also donned Tyvek® coveralls due to the potential contamination on the site prior to cover installation. No levels measured by the instruments were above the HASP action levels.

5.2 MONITORING WELL AND PIEZOMETER DECOMMISSIONING AND INSTALLATION

The specified 22 monitoring wells and 7 piezometers were decommissioned in accordance with NYSDEC procedures. The decommissioning work was performed from July 28 through 30, 1999. The Well Decommissioning Report is included in Appendix D. The report includes field observation reports, field monitoring logs, well and piezometer decommissioning logs, and a site plan showing locations for all decommissioned monitoring wells and piezometers. Per agreement with NYSDEC, monitoring wells P-7S and P-8S were not decommissioned.

Six new piezometers and two new monitoring wells were installed at locations shown on Drawing CL-102AB. During construction CQA/CQC personnel confirmed piezometer and monitoring well installation, as shown in the table on Drawing CL-103AB. The piezometer and well construction details are contained in Appendix D.

5.3 LEACHATE COLLECTION AND RECOVERY SYSTEM

The location of the LCRS components, consisting of the 710-foot long trench drain, recovery well, standpipes, cleanout, and discharge line, were surveyed for construction by the contractor and documented by survey. During construction, CQA/CQC personnel confirmed the 3-foot long minimum trench widths, as shown in cross section on Drawing CL-104AB. The top and bottom elevations of the recovery well were measured by survey (Drawing CL-104AB).

During construction, the depth and slope of the trench were checked by the contractor using a surveyor's laser level with a receiver and measuring rod placed in the trench. The depth was checked every 50 feet by the contractor's foreman and verified by on-site CQA/CQC personnel. Invert elevations of the collection pipe were measured at the cleanout and two standpipes by the surveyor. These are shown on Drawing CL-102AB. CQA/CQC personnel confirmed that material from the trench excavation was placed beneath the IWS cover.

The contractor submitted manufacturer's quality control documentation (Appendix E) to the Engineer documenting that the geotextile used in the trench satisfied the specifications. The geotextile used was FX-77, manufactured by Carthage Mills. Placement of the fabric was confirmed by CQA/CQC personnel. Installation was achieved by cutting the fabric in lengths that were long enough to line the bottom and sides of the trench and overlap over the top of the stone. The lengths of geotextile were overlapped at least 2 feet, as specified.

Coarse stone aggregate was placed in the trench to bed and cover the collection pipe and to backfill the trench. The contractor submitted supplier's gradation information, documenting that the stone met the specified gradation requirements of the New York State Department of Transportation (NYSDOT) size NO. 2 coarse aggregate. The gradation is included in Appendix F.

The HDPE SDR 17 collection pipe has an outside diameter of 4 inches. It is perforated with three rows of 3/8-inch diameter holes drilled 120° apart spaced every 6 inches along the length of the pipe. The pipes

are butt-fuse welded above ground and placed on a minimum of 6 inches of coarse stone aggregate. The two vertical standpipes and the inclined cleanout stickup at the north end of the trench are also constructed of HDPE SDR 17.

The collection pipe was inspected in the field by CQA/CQC personnel and determined to be compliant with the specifications. Perforation size and spacing were measured and the butt-fusion welds, used to connect the pipe sections, were inspected for cracks.

CQA/CQC personnel measured the dimensions of the recovery well with regard to the slotted section and the distance between the bottom of the well and the connection for the collection pipe. Proper installation of the recovery well riser was confirmed by inspection by CQA/CQC personnel and measurements by survey.

The contractor submitted manufacturer's data for the pump and related controls, documenting that the components satisfied the specifications. Proper operation of the equipment that pumps water from the recovery well to MH-1 was confirmed by operating the system in the presence of CQA/CQC personnel after installation. The electrical connection and testing of the Recovery Well Pumping System was performed on November 11, 1999, by CIR Electric. Approximately 210 gallons of water were pumped over a 30-minute time period from the LCRS to the POTW as part of this test. R. L. Stone programmed the flow meter on November 18, 1999. Subsequent to testing the pump, it was determined that there was a ground wire issue, making the "AUTO" setting inoperable. CIR Electric repaired this problem on November 30, 1999.

The discharge line (force main) from the Recovery Well to the City of Niagara Falls manhole consists of a seamless 1-inch HDPE pipe within a 3-inch HDPE containment/leak detection pipe. These pipes were installed without any fixtures other than the end connections. The pipes are roll materials, bedded in a trench that has a continuous downward slope from the recovery well enclosure to MH-1. Installation of the dual-containment pipe, the anti-seep collar, and the connection of the discharge pipe to MH-1 were observed by CQA/CQC personnel. Hydrostatic testing was performed on the discharge pipe. The test was monitored by CQA/CQC personnel and did not reveal any leaks in the pipe.

5.4 CLAY BARRIER

CQA/CQC personnel observed excavation of the clay barrier trenches, confirmed penetration of the excavation at least 1-foot into natural clays, and measured cross-sections of the trench. Materials excavated to allow installation of the clay barrier were placed under the northern cover. The cross sections are shown on Drawings CL-104AB, CL-105AB, and CL-106AB. Clay for the barrier trenches and the buffer layer was obtained from a previously-approved borrow source (the Mawhennie Borrow Pit) on Albright Road in Lewiston, New York. A sample from this borrow source was taken and analyzed in 1998 in connection with the Gill Creek Excavation and Restoration. The analytical report, showing acceptable results, is included in Appendix F. Geotechnical laboratory tests were performed on samples of the clay borrow. The geotechnical laboratory reports are in Appendix F. These included classification tests (grain size analysis and Atterberg limits), which determined the soil classification to be low plasticity (lean) clay with a Unified Soil Classification System Group Symbol of CL. The classification satisfies the specifications.

Laboratory compaction tests (ASTM D-698) were run on samples of the clay borrow to determine optimum moisture content and the "Standard Proctor" maximum dry density. Laboratory permeability testing was performed on a sample of the clay borrow soil. The test indicated that the clay soil, compacted to 90 percent of the Standard Proctor maximum dry density, had a coefficient of hydraulic conductivity of 3.1×10^{-8} cm/sec. This value satisfies the specification of not greater than 1×10^{-7} cm/sec. Clay backfill was placed in the trench in 10- to 12-inch lifts and compacted to a density sufficient to produce a coefficient of hydraulic conductivity equal to or less than 1×10^{-7} centimeters per second (cm/sec). Field trial compaction testing was conducted to establish the correlation between dry density of the compacted soil and compaction procedures. The trial compaction was conducted at the initiation of clay placement in the barrier trench. In the trial, clay was placed in a shallow trench allowing for the safe entry of personnel. Compaction procedures and lift thickness were recorded and the resulting soil densities were measured using the procedures of ASTM D 2922: Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (shallow depth). During the clay placement in the barrier trenches, compaction procedures determined in the trial compaction testing were used to assure a degree of compaction that produced the required coefficient of hydraulic conductivity. The clay borrow soil was mixed with water prior to placement in the barrier trenches, as necessary to achieve the specified moisture content.

The field trial compaction testing established the compaction procedures required to achieve dry densities of at least 90 percent of the maximum dry density in the clay barrier trenches. CQA/CQC personnel observed the compaction process and confirmed use of the compaction procedures identified in the field trial compaction testing. The successful compaction process consisted of placing the clay in a loose lift thickness of 6- to 13-inches and applying not less than two compaction coverages with the back of the backhoe bucket. CQA/CQC personnel measured moisture content of the clay upon the clay's delivery to the site and verified that the contractor's mixing of water with the clay prior to placement produced moisture contents within the specified range from optimum to 4 percent greater than optimum.

5.5 BUFFER LAYER

Prior to placement of the buffer layer, the temporary PVC cover over the Gill Creek sediments was removed and the sediments were bladed to facilitate air drying required for final placement and grading of the sediments and other materials. The material to be under the final northern cover was graded to the configuration shown on Drawing CL-112AB prior to placement of the buffer layer. The buffer layer consists of a minimum 6-inch layer of clay. The buffer layer soil was the same clay as used for the clay barrier trench backfill. The soil satisfies the specifications for Select Soil Fill.

CQA/CQC personnel observed placement of the buffer layer material and performed in-place density measurements using nuclear methods. Buffer material was spread uniformly in lifts not exceeding eight inches in loose-lift thickness. Each lift was compacted to a minimum of 92 percent of the material's maximum dry density as determined by ASTM D 698. The graded surface was shaped to be free from irregular surface changes. The surface was inspected by CQA/CQC personnel and found to be free of protrusions. Final slopes of the buffer layer are not flatter than 2 percent or steeper than 33 percent. When a change of slope occurred, a rolled transition section with a minimum radius or approximately 8 feet was constructed. The completed Buffer Layer was surveyed to check that the surface slopes were consistent with the design and that the surface is suitable for geomembrane placement. The surveyed elevations were reviewed and approved by the CQA/CQC personnel.

5.6 GEOMEMBRANE

The geomembrane was placed directly over the buffer layer. Prior to shipment of geomembrane materials, the following items were submitted to the CQA/CQC personnel for review and approval:

- Documentation of manufacturers' qualifications
- Manufacturer's quality control program manual
- Material properties sheet
- Samples of the geomembrane material
- Manufacturers' certification of product compliance with the specifications
- Documentation of installers' qualifications and experience
- Example Material Warranty and Liner Installation Warranty
- Resin certification and information
- Manufacturer's Certification of geomembrane and extrudate properties
- Descriptions of geomembrane materials other than the base polymer
- Shop drawings

The manufacturer's quality control certifications, including results of source quality control testing of the each roll of geomembrane, accompanied the shipment of geomembrane. The packing lists and Roll Test Data Reports are included in Appendix E. The results of the manufacturer's tests satisfied the specifications.

The rolls were delivered approximately one week prior to installation. The rolls were unloaded, inventoried, and stacked as specified. The rolls were stored on a concrete slab pending installation. A liner inventory log was prepared by CQA/CQC personnel to document the rolls of geomembrane received and stored on site. The inventory log is included in Appendix E.

Prior to deployment of the geomembrane, conformance samples were collected by CQA/CQC personnel. Conformance laboratory tests were performed and reported by Geotechnics. The test results satisfied the specifications and the laboratory reports and are included in Appendix E.

The geomembrane is an unmodified seamless HDPE, containing no plasticizers, fillers, chemical additives, or extenders. The geomembrane was supplied in rolls as a continuous sheet with no factory seams. The panel layout maximized roll length and width to provide the largest manageable sheets with the fewest field seams.

Prior to geomembrane installation, the installer, GSE Lining Technology, Inc. inspected the subgrade surface to confirm that the surface was acceptable for liner installation. The Subgrade Surface Acceptance reports are included in Appendix E.

The as-built geomembrane panel layout is shown on Drawing CL-113AB. The perimeter of the geomembrane is also shown on Drawing CL-102AB. An HDPE Deployment Log, correlating the panel

numbers to geomembrane roll numbers, is included in Appendix E. Textured HDPE geomembrane was installed on all cover slopes steeper than 10 percent. Smooth HDPE geomembrane was installed on slopes flatter than 10 percent.

The geomembrane installation was observed by CQA/CQC personnel. The following observations were made by CQA/CQC personnel during the installation:

- Geomembrane was placed so as to minimize wrinkles and subsequent fishmouths at the seam interface. "Leister" welds or "tack" welds were not be used to temporarily hold sheets in position; however, "Leister" welds were used to secure small patches prior to extrusion welding.
- All geomembrane handling and installation were performed by workers wearing shoes with bonded soles and heels without heavy tread or lug surfaces. No foot traffic was allowed on the geomembrane without approved shoes. No vehicular traffic traveled on the geomembrane.
- Only the panels that could be anchored and seamed together in one day were deployed. Sandbags were used to hold the geomembrane material in position during installation.
- Geomembrane was installed so that there will be neither tension nor wrinkles at the average expected temperature of the final use condition (anticipated buried temperature). Geomembrane was not allowed to "bridge over" (be pulled taut over) voids or low areas in the subgrade. Geomembrane in these areas was cut and patched to provide adequate material to allow the geomembrane to rest on the subgrade surface.

In general, seams were oriented with the long dimension parallel to (down) the line of the maximum slope. The long dimension of the outermost panels on the east and west sides were oriented perpendicular to the slope (cross slope) to minimize seaming. Seams were not located at low points in the subgrade. The panels were overlapped prior to seaming to an extent that was necessary to effect a good weld. In no case was this overlap less than 3 inches for extrusion welding or 5 inches for fusion welding. The Geomembrane Installer labeled panels at the time of deployment with date of deployment, roll number and panel number. Extra care was taken to clean and remove dirt, dust and other foreign materials from the surfaces of the geomembrane to be seamed. Surfaces were cleaned immediately prior to seaming.

Seaming was performed using an automatic double wedge fusion welding system, equipment, and techniques. Extrusion welding was only be used where fusion welding was not possible, such as at pipe penetrations or patches. The fusion-welding apparatus was an automated device, and was equipped with gauges giving applicable temperatures and pressures. The extrusion welding apparatus was equipped

with gauges giving the temperature in the apparatus and at the nozzle. The extruder was purged prior to beginning a seam until all heat-degraded extrudate has been removed from the barrel. Whenever the extruder was stopped, the barrel was purged of all heat-degraded extrudate.

The surface of the seam edges was prepared as recommended by the manufacturer to provide a seam to satisfy the specified seam strength requirements. The welding process bonded the exposed edge of the panel to the underlying membrane. Seaming extended to the outside edges of panels to be placed in the key trenches.

At the three piezometers, two standpipes, and one cleanout pipe, an extrusion weld geomembrane boot was welded to the geomembrane and clamped to the pipe to provide a watertight connection.

Test seams were performed by GSE Lining Technology and observed by CQA/CQC personnel to verify that seaming conditions were adequate. Test seams were conducted by each seamer at the beginning of each seaming period, and any time the seaming apparatus was not operating for more than one hour. Test seaming was performed under the same conditions and with the same equipment as production seaming. The test seam was at least 10 feet long for hot shoe welding and 3 feet long for extrusion welding with the seam centered lengthwise. Results of the test seaming were recorded by CQA/CQC personnel on a Pre-Weld/Trial Seam Data log, which is included in Appendix E.

Destructive tests were performed on seams during the installation. Two adjoining one-inch wide specimens were die-cut from each opposite end and from the center of the test seam. Each specimen was tested in peel and shear. Results of the destructive tests were recorded on a Field Destructive Seam Testing Summary log, which is included in Appendix E.

All field seams were non-destructively tested by GSE Lining Technology over their full length within a day after being welded. Each seam was assigned a unique number consisting of the adjacent panel numbers. The location, date, test unit, name of tester, and results of all non-destructive testing were observed and recorded by CQA/CQC personnel. The test data were recorded on a Fusion Weld Seam Data Summary, which is included in Appendix E. All fusion weld seam testing provided results that satisfied the specifications. On the Data Summary, seam number designations including the letter "R" indicate a seam joining a small piece of geomembrane to a panel, where the piece was too small to be given a panel number and the "R" was used to designate the small piece as a repair, rather than a panel.

Extrusion welds were tested by non-destructive means using vacuum boxes in compliance with ASTM D 4437. Extrusion welds were used for repair of destructive test locations and liner penetration welds. Test equipment was furnished by GSE Lining Technology. The vacuum testing results were recorded by CQA/CQC personnel on a Repair Summary log, which is included in Appendix E. All test results were passing, and satisfied the specifications. Locations of all panels, seams, destructive tests, penetrations, repairs, and limits of geomembrane in the key trench were surveyed. The locations are shown on Drawing CL-113AB.

5.7 PROTECTIVE/DRAINAGE SOIL LAYER AND TOPSOIL

The protective/drainage soil layer consists of a minimum 18-inch layer of soil placed directly on top of the HDPE liner. The protective/drainage soil was obtained from the Pine Hill borrow pit in Buffalo, New York. CQA/CQC personnel took samples from the borrow pit and shipped the samples to Quanterra laboratory in Pittsburgh, Pennsylvania for Target Compound List organics and Priority Pollutant List metals analyses. The analytical laboratory report, showing acceptable results, is in Appendix F. Geotechnical laboratory tests were performed on samples of the soil. The geotechnical laboratory reports are in Appendix F. The soil classification tests (grain size analysis) determined the soil classification to be silty sand with a Unified Soil Classification System Group Symbol of SM. The classification satisfies the specifications. Laboratory compaction tests were conducted by the procedures of ASTM D-698 to determine the sand's maximum dry density and optimum moisture content.

The protective/drainage soil was placed in two 9-inch thick lifts. A minimum thickness of 9-inches was maintained between the spreading equipment and installed geomembrane during spreading activities. The material was placed using lightweight tracked equipment. The soil was lifted and tumbled forward over the geomembrane to prevent wrinkling of the geomembrane.

CQA/CQC personnel used nuclear methods to measure the degree of compaction achieved in the protective/drainage soil layer. The protective/drainage soil was compacted to a minimum of 90 percent of the material's maximum dry density as determined by ASTM D 698, which satisfies the specifications. A 6-inch layer of topsoil was placed over the drainage/protective layer to provide a proper medium for vegetative growth. Shallow-root grasses were planted to prevent erosion of the protective layer. The area was hydroseeded and mulched with straw.

The topsoil was obtained from the Loveland borrow pit at Loveland and SR 425 in Wheatfield, New York. CQA/CQC personnel took samples from the borrow pit and shipped the samples to Quanterra laboratory in Pittsburgh, Pennsylvania for Target Compound List organics and Priority Pollutant List metals analyses. The laboratory report, showing acceptable results, is in Appendix F. Geotechnical laboratory tests were performed on samples of the topsoil by Glynn Geotechnical Engineering. The geotechnical laboratory reports are in Appendix F. The soil classification tests (grain size analysis) indicated an acceptable percentage of soil particles finer than the No. 200 mesh sieve. Four percent organics and four pH tests were performed and indicated acceptable results.

5.8 AGGREGATE BASE COURSE

The base course for the asphalt concrete cover is a minimum 6-inch thickness of compacted coarse aggregate. Gradation information on the aggregate base course material was obtained from the supplier. The gradation information is included in Appendix F.

Laboratory compaction test was performed on the aggregate base course material using procedures of ASTM D-1557, Method C, to determine the material's maximum dry density and optimum moisture content. The laboratory report is included in Appendix F. CQA/CQC personnel measured in-place densities of the compacted aggregate using a Troxler Nuclear Gage. Each lift was compacted to a density of at least 95 percent of the material's maximum dry density determined by the procedures of ASTM D-1557. CQA/CQC personnel confirmed that compaction of each lift was compacted until the surface was tightly bound and showed no undue rutting or movement under the roller. The moisture content of the material was maintained within zero to three percentage points above the material's optimum moisture during compaction by spraying water as needed from a water truck.

5.9 ASPHALT CONCRETE COVER

The asphalt concrete pavement which forms the cover over the ALP property consists of a 2.5-inch thick asphalt concrete binder course and a one-inch thick asphalt concrete surface course. The binder course was the NYSDOT Type 3RA/HD Binder. The surface course is NYSDOT Type 7F Top (Low Volume), modified to increase the asphalt content from 6.6 to 8 (± 0.4) percent. The Contractor submitted the following information documenting that material properties and quantities used in the asphalt concrete pavement satisfies the specifications. These items are included in Appendix F:

- Job-Mix formulas for asphalt concrete binder and surface courses,
- Worksheets showing calculations of mix properties and aggregate gradations
- The supplier's certificate stating that the materials meet the specified requirements.

Asphalt concrete and bituminous materials were only placed on dry days when the temperature was at least 35°F and rising.

The binder course was placed and spread in a single lift which, after compaction, resulted in a compacted thickness of at least 2.5 inches. The binder course was allowed to cure for at least 24 hours before the top course was applied.

The asphalt concrete was compacted with rollers to at least 98 percent of the 35 blow Marshall Test density. Acceptance of each day's placement of material was determined provisionally by QCA/CQC personnel using a nuclear gage and the procedure described in AASHTO T 238. A minimum of five tests were conducted for every 3000 square yards of material placed and a minimum of five tests per lot. Pavement areas where the density falls outside the specified range were recompacted until the required density was obtained.

Density determined by the nuclear density test method was verified by testing drilled cores. A minimum of two cores were obtained by CQA/CQC personnel for each 3000 square yards of asphalt concrete surface area, for each lift. CQA/CQC personnel transported the cores, with appropriate identification, to the laboratory facilities where densities were confirmed. Laboratory density testing of asphalt cores confirmed that the specified density had been achieved. Core holes were filled with compacted asphalt concrete the same day cored.

The asphalt contractor tested the finished surface of asphalt concrete with a 10-foot straight edge applied parallel to, and perpendicular to, the alignment of the paving machine while CQA/CQC personnel observed. The deviation of the finished surface of the surface course from the testing edge of the straightedge did not exceed 1/4 inch.

5.10 RECORD SURVEY

A New York State registered land surveyor (RLS) prepared, certified and submitted record survey drawings to the Engineer. Record survey drawings prepared by the RLS are included in Appendix A (Drawing Nos. CL-111AB, CL-112AB, and CL-113AB). Additionally, Drawing No. CL-102AB is based

upon a record drawing prepared by the RLS. Horizontal grid control is tied to NAD 83 datum on the New York West Zone Coordinate System. Vertical datum refers to NAVD 29 elevations. The RLS performed a boundary survey to establish property lines and corners for horizontal control. The RLS established permanent benchmarks and grid points with second-order accuracy. Temporary bench marks, grid points, work outlines, grade stakes, and centerlines were established with third-order accuracy.

6.0 MODIFICATIONS TO FINAL DESIGN

Modifications were made to the original design documents based on conditions encountered in the field. All modifications were documented on Field Change Approval (FCA) forms and approved by the Engineer, Owner and NYSDEC (Appendix G). Because construction began based on NYSDEC approval of the Pre-Final Design, several changes were made in the field that were incorporated in the Final Design approved by NYSDEC. Only the changes made after the Final Remedial Design, approved by NYSDEC, are discussed below. All modifications are included in Appendix H.

6.1 VEGETATIVE LAYER (TOPSOIL)

Design Specification Section 2314 states that the topsoil used for the vegetative layer should comply with section 713.01 of the NYSDOT specifications. The percent passing of a #200 mesh sieve should be 20 to 80. The pH of the samples should be between 5.5 and 7.6.

The soil sampled had 90 percent passing the #200 sieve and a pH of 5.1. The particle size distribution of the topsoil was approved by the Engineer. Sevenson and its seeding contractor adjusted for the soil pH in the hydroseeding process by adding lime to the mixture.

6.2 ASPHALT COMPACTION SPECIFICATIONS

Final Design Specification Section 2743 Part 3.04B states "Binder course shall be placed over aggregate base in one lift to achieve a thickness of 2 inches when compacted." It should state "Binder course shall be placed over aggregate base in one lift to achieve the thickness shown on the Drawings."

Final Design Specification Section 2743 Part 3.04C states "Surface course shall be placed over binder course in one lift to achieve a thickness of 1 ½ inches when compacted". It should state "Surface course shall be placed over binder course in one lift to achieve the thickness shown on the Drawings."

Final Design Specification Section 2743 Part 3.04J states "...average minimum density of 98 percent of maximum theoretical density...." The actual compaction should be 98 percent of a 35 blow Marshall Test density. The specification is based on "Lining of Waste Containment and Other Impoundment Facilities" published by the EPA in 1988 Table 4.38 on page 4-166. According to a footnote, all of the values in this table are based on a 35 blow Marshall Test equal to 100 percent.

6.3 CHANGES TO THE NORTHERN COVER LIMITS

The Final Design called for the northern cover to include the portion of the IWS property bounded on the north by the fence across the southern boundary of the Cerebral Palsy Association property, on the west by the utility easement and on the south by the ALP property (an area referred to as the "Dog Leg").

It was determined that the "Dog Leg" area was not necessary to be included as part of the cover footprint because the volume of material for consolidation was less than originally estimated. NYSDEC approval for this change was contingent on review of previous site data. This review identified four 50-foot by 50-foot areas for excavation. It was agreed that 2 feet of soil would be removed from three of identified areas and that 4 feet of soil would be removed from the fourth area. Approximately 1,000 cubic yards of soil were removed during the excavation of these areas and placed within the IWS cover limits.

Additional soil samples were taken in the area southwest of the "dog leg." Based upon the 25-foot grid sampling plan approved by NYSDEC, 20 locations were sampled on October 1, 1999. Six of the twenty soil samples were split with NYSDEC. The direct push method was used to obtain soil samples laid out in the area designated by NYSDEC. The soil samples were collected in macro core open samplers fitted with clear acetate liners.

Each soil sample was removed from the liner, placed in a pre-cleaned stainless steel bowl and mixed to homogenize. The soil sample was then placed in a laboratory clean glass jar and the jars put on ice for transport. Samples were split with the NYSDEC field representative upon request. The samples were sent to a New York State ELALP certified laboratory under chain of custody for expedited analysis.

A second round of confirmatory samples was collected from the excavated areas using driven split-spoon samplers. The result of this additional sampling was that additional soil was excavated and placed within the limits of the northern cover. Fourteen grid area locations were excavated to a depth of 2 feet. Approximately 700 cubic yards of soil was removed during the excavation and placed within the IWS cover limits.

The report of the sampling and analysis performed in the "Dog Leg" area is contained in Appendix H.

6.4 INDUSTRIAL WELDING SITE SOUTH DRAINAGE DITCH

The excavation of soils from the southwestern most area of the original IWS cover limits resulted in the relocation of that soil within the modified limits of the northern cover (FCA 1222-009). The relocation of this soil occurred after 75 percent of the clay buffer material had been placed. To keep the project on schedule, the contractor placed the approximately 1,700 additional cubic yards on the extreme southern end of the IWS. The change in volume altered the drainage ditch position west and south of the IWS, resulting in a deeper ditch on the south side. The extra height resulted in side slopes of greater than 3H: 1V and created the potential for slope failure or ongoing erosion maintenance on the south side of the ditch.

To shore the side slope and still maintain proper drainage, 180 linear feet of 15-inch diameter ADS drainpipe was placed on the original ditch invert. The ditch was then backfilled with common fill to cover the pipe and to create side slopes of 3H: 1V or less. Cover over the pipe was graded to drain east toward the existing catch basin or back toward the "daylight" or west end of the pipe. A 2-foot extension was also added to the original catch basin design to allow for proper drainage of the area.

6.5 SOUTH BOUNDARY FENCING

The Final Design called for galvanized chain link fence to be installed along the south boundary of the ALP. This feature was eliminated because Olin now owns the property on both sides of the proposed fence. The ALP and IWS properties are contained by a perimeter fence that extends around Olin's property west of Veterans Drive and north of Buffalo Avenue.

The proposed gates that allowed access to the IWS from Veterans Drive were eliminated due to the steep slopes and swale along the east boundary of the site. A double gate was installed in the southeast corner of the ALP property.

6.6 ACCESS TO THE NORTHERN COVER AREA

Two 20-foot long culvert pipes were added to the swale around the northern cover to provide vehicle access for maintenance and monitoring activities. Access from the south is across a section of 15-inch diameter ADS pipe covered with crushed stone. Access from the west is across a section of 24-inch HDPE covered by soil fill.

6.7 CATCH BASIN MODIFICATIONS

There was no opening for rainwater draining through the drainage soil layer to enter the catch basins. The Contractor drilled holes in wall of catch basins and placed geotextile wrapped No. 2 stone around catch basins to allow water to enter without sediments.

6.8 RESIDENTIAL PARKING AREA SOUTH OF THE ALLEY

The parking area between the north side of the IWS and south side of the alley was a concern to the near-neighbors. The area was asphalt paved as a good will gesture to the neighbors. This offer resulted in 11,000 square feet of base stone, binder and top course being installed. In addition, curb bumpers were installed to control parking and to protect the IWS fencing bordering the area.

6.9 AMERICAN LEGION POST PAVING MATERIALS ON THE SIDE SLOPES

The slopes of the ALP paving area are generally 3H: 1V along the edges of the west, north, and east ends of the ALP paving limits. All paving on these slopes had to be done by hand and rolled using narrow rollers. The increased asphalt cement in the top course mix made the material too "fat" to roll on the steep slopes. The mix had to be modified to a lower asphalt cement content to allow application on the slopes.

7.0 AS-BUILT DRAWINGS

A listing of drawings included in Appendix A of the Engineering Report is presented below. Drawing identification (ID) references are presented to identify the numbering scheme for the report.

Table 7.1

Drawing Identification References

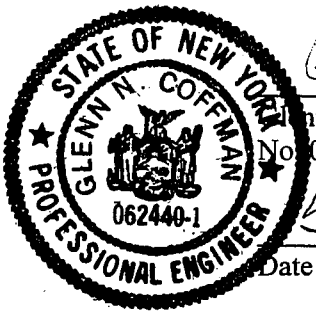
CATEGORY	DRAWING ID	PAGE NO.	DRAWING TITLE
General			
		1	Cover Sheet and Index of Drawings
	GR-101 AB	2	As-Built and Final Site Plan
Civil			
	CL-111-AB	3	Record Survey Drawing - Top of Asphalt Conc. Pavement (ALP) & Top of Vegetative Soil (IWS)
	CL-112 AB	4	Record Survey Drawing - Surface Prior to Installation of Aggregate Base Course & Buffer Layer
	CL-121	5	Preconstruction Topographic Survey
	CL-102 AB	6	As-Built and Final Surface Water Drainage and Leachate Collection and Recovery System
	CL-103 AB	7	As-Built and Final Cover System Details and Sections
	CL-104 AB	8	As-Built and Final Containment System and Leachate Collection and Recovery System Details and Sections
	CL-105 AB	9	As-Built and Final Storm Drainage System Details and Sections
	CL-106 AB	10	As-Built and Final Cross Sections of Clay Barriers
	CL-113 AB	11	Record Survey Drawing - Geomembrane Panels Destructive Tests & Repairs
Mechanical			
	ME-101AB	12	As-Built and Final Leachate Collection and Recovery System -Details
	ME-102AB	13	As-Built and Final Drawing For: Leachate Collection and Recovery Control Panel Wiring & Controls

8.0 CLOSURE CERTIFICATION

Certification that the remedial construction activities for the Industrial Welding Site were accomplished as specified in the Contract Documents and as documented in this report is documented on the following page.

CERTIFICATION OF CONSTRUCTION QUALITY ASSURANCE FOR OLIN CORPORATION'S INDUSTRIAL WELDING SITE NIAGARA FALLS, NEW YORK

I hereby certify that the construction of the Industrial Welding Site and former American Legion Post property, now a part of the Industrial Welding Site located adjacent to Veteran's Drive, Niagara Falls, New York, was accomplished as specified in the Final Remedial Design and as documented in this report, and that I, or a person under my direct supervision, witnessed the performance of the Work. I am a Registered Engineer as established under the laws and regulations of the State of New York.



Glenn N. Coffman, P.E.
No. 062440

Sept 15, 2000
Date

9.0 REFERENCES

Law Engineering and Environmental Services, P.C., 1998, "Preliminary Remedial Design Report for Industrial Welding Site, Niagara Falls, New York, prepared for Olin Corporation.

Law Engineering and Environmental Services, P.C., 1999a, "Final Remedial Design for Industrial Welding Site, Niagara Falls, New York, prepared for Olin Corporation.

Law Engineering and Environmental Services, 1999b, "Final Engineering Report for Gill Creek Excavation and Restoration, Niagara Falls, New York," prepared for Olin Corporation.

Law Engineering and Environmental Services, 2000, "Preliminary Draft Operations and Maintenance Manual for Industrial Welding Site, Niagara Falls, New York," prepared for Olin Corporation.

Letter from City of Niagara Falls, Department of Wastewater Facilities to Olin Corporation, June 15, 1999.

Letter from City of Niagara Falls, Department of Wastewater Facilities to Olin Corporation, September 7, 1999.

Explanation of Significant Differences, Industrial Welding, Inactive Hazardous Waste Site, City of Niagara Falls, Niagara County, New York, October 6, 1999, New York State Department of Environmental Conservation, Buffalo, New York.

Letter from A. Barkat (New York State Department of Environmental Conservation) to L. Miller (Olin Corp.), November 1, 1999.

Record of Decision, Industrial Welding, Inactive Hazardous Waste Site, City of Niagara Falls, Niagara County, New York, November 1994, New York State Department of Environmental Conservation, Buffalo, New York.

City of Niagara Falls, Engineering Department Standard Specifications (Rev. April 1, 1994).

USACOE, Application No. 2000-00169(0), Verification of Applicability, October 20, 1999.

USEPA, 1988, "Lining of Waste Containment and Other Impoundment Facilities," prepared for U.S. Environmental Protection Agency, Office of Research and Development by Matrecon, Inc., EPA/600/2-88/052.

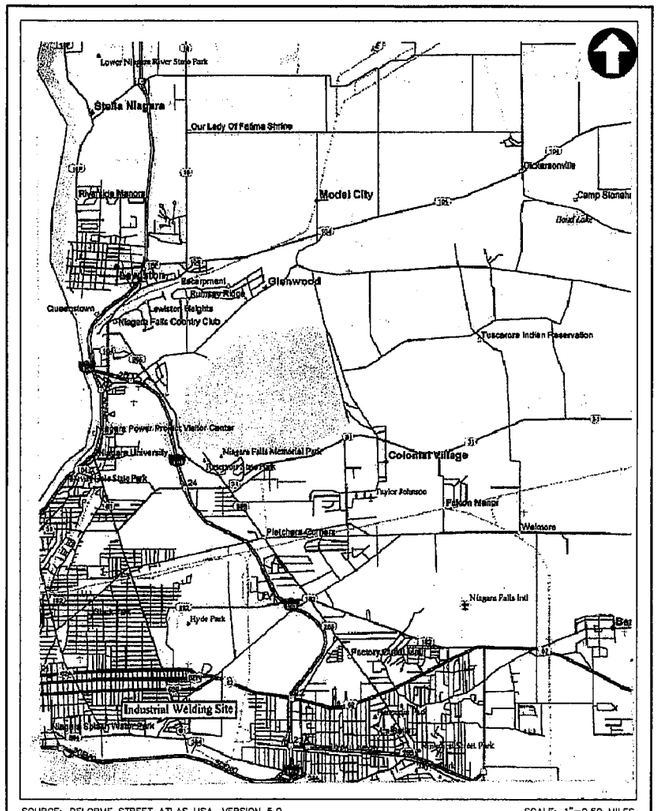
APPENDIX A

AS-BUILT DRAWINGS

AS-BUILT DRAWINGS

FOR

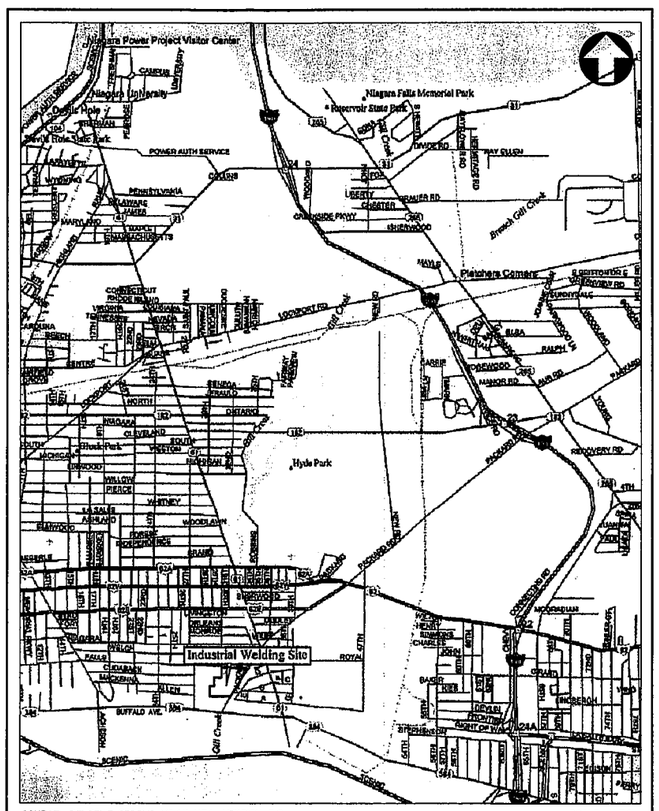
INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK



SOURCE: DELORME STREET ATLAS USA, VERSION 5.0 SCALE: 1"=0.50 MILES

GENERAL SITE MAP

INDEX OF DRAWINGS



SOURCE: DELORME STREET ATLAS USA, VERSION 5.0 SCALE: N.T.S.

SITE LOCATION MAP

PREPARED FOR:

OLIN CORPORATION
CHARLESTON, TENNESSEE

PREPARED BY:

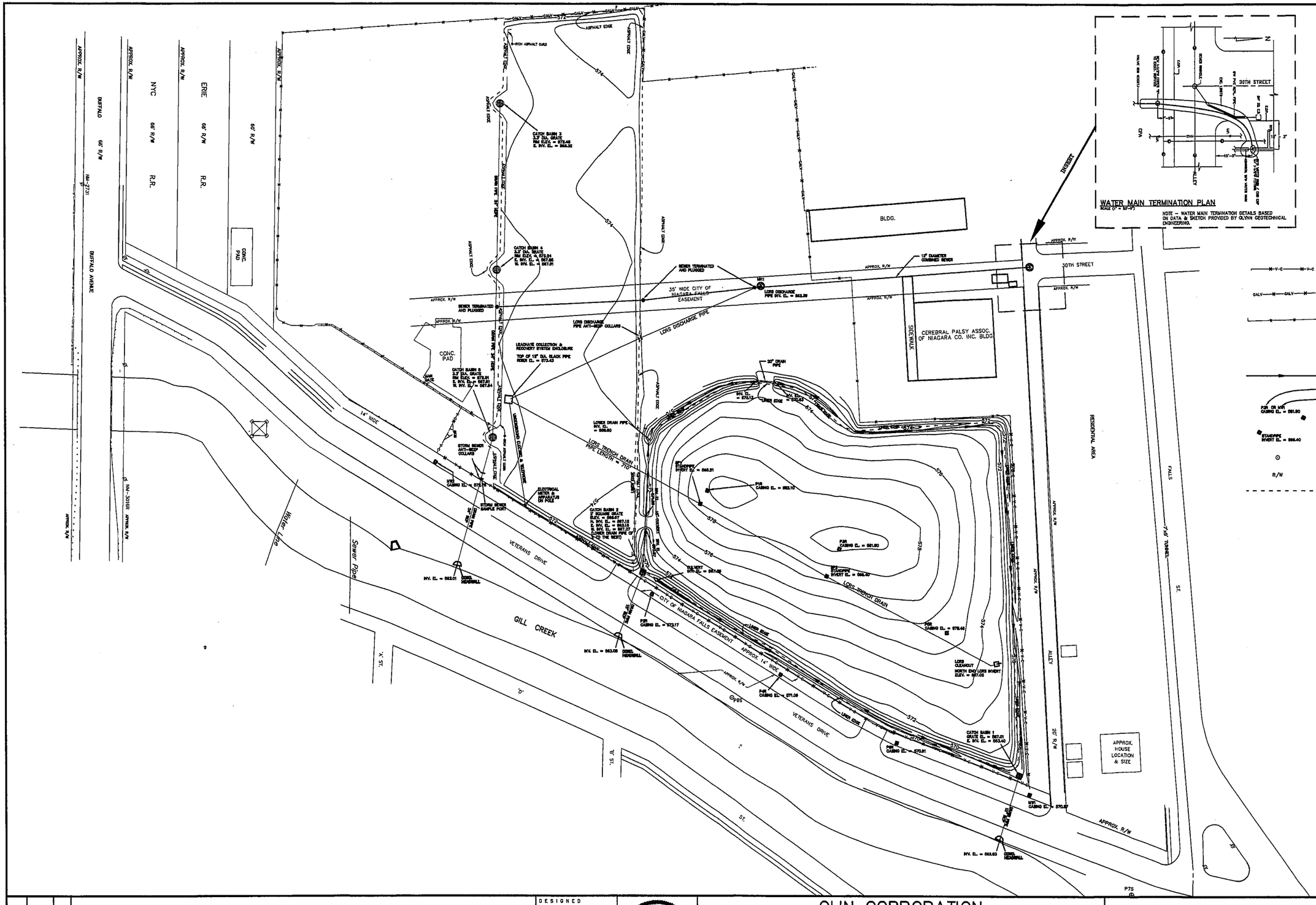
LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

IN ASSOCIATION WITH:

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, INC.
112 TOWNPARK DRIVE
KENNESAW, GEORGIA
PHONE: (770) 421-3400

STATE OF NEW YORK GLENN N. COTTRAM PROFESSIONAL ENGINEER

LMAN:
XREF: XREF
J:\olin\WS\design\as-builts\gn-cover.dwg 3/29/00 6:24 am



WATER MAIN TERMINATION PLAN

SCALE (1" = 50'-0")

NOTE – WATER MAIN TERMINATION DETAILS BASED ON DATA & SKETCH PROVIDED BY GLYNN GEOTECHNICAL ENGINEERING.

LEGEND

- M-V-C — M-V-C = VINYL-COATED CHAINLINK FENCE INSTALLED OCT. 1999
- GALV — M — GALV — M = GALVANIZED CHAINLINK FENCE INSTALLED OCT. 1999
- = EXISTING PRECONSTRUCTION CHAINLINK FENCE
- = OLIN PROPERTY LINE THE NORTHERLY PROPERTY LINES & WESTERLY PROPERTY LINES (NEAR THE CEREBRAL PALSY BUILDING) ARE PROPOSED PROPERTY LINES, SUBJECT TO NEGOTIATION BETWEEN OLIN & OTHER PARTIES.
- = DITCH WITH FLOW DIRECTION
- = PIEZOMETER IDENTIFICATION OR MONITORING WELL IDENTIFICATION
- FOR OB NO1 CASING EL. = 581.90 = ELEVATION OF (RISER) INNER CASING
- STANDPIPE INVERT EL. = 566.40 = STANDPIPE FOR LEACHATE COLLECTION & RECOVERY SYSTEM
- = PRECONSTRUCTION PIEZOMETER
- R/W = RIGHT-OF-WAY
- = EDGE OF LINER AND EDGE OF ASPHALT

NOTES

1) SOURCE: RECORD SURVEY DRAWING, SITE DRAWING, LOCATIONS/ELEVATIONS OF STRUCTURES, DRAWINGS NO. CL-11BAB, BY KLETTKE LAND SURVEYORS, P.C., NIAGARA FALLS, N.Y.
2) STRUCTURES SHOWN HERE-ON (MANHOLES, CATCH BASINS, MON. WELLS, HEADWALLS, ETC.) MAY BE NOT-TO-SCALE, BUT EXAGGERATED FOR THE PURPOSE OF VISIBILITY.
3) CLAY BARRIER TRENCH AROUND IWS COINCIDES WITH LINER EDGE EXCEPT THERE IS NO CLAY BARRIER TRENCH ALONG JUNCTION BETWEEN IWS AND ALP COVERS.
4) CLAY BARRIER TRENCH AROUND ALP PERIMETER COINCIDES WITH ALP PROPERTY LINE EXCEPT THERE IS NO CLAY BARRIER TRENCH ALONG JUNCTION BETWEEN IWS AND ALP COVERS.
5) ELEVATIONS SHOWN HERE-ON ARE BASED ON BM J-20, ELEV. = 571.52 (NGVD 1929, AS PUBLISHED BY USC&GS MAY 6, 1943).
6) BASE MAP, SHOWING BUILDINGS, STREETS ALLEYS, RIGHT OF WAYS, CREEKS, ETC. SUPPLIED BY LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.
7) 1 FT. CONTOURS ARE 1999 POST CONSTRUCTION (TOP OF ASPHALT/TOPSOIL)
8) LENGTH OF PIPE

FROM	TO	LENGTH (FT.)
CATCH BASIN 1	HEADWALL	85
CATCH BASIN 2	HEADWALL	88
CATCH BASIN 3	CATCH BASIN 4	214
CATCH BASIN 4	CATCH BASIN 5	214
CATCH BASIN 5	SAMPLING POINT	53
SAMPLING POINT	HEADWALL	115
LCRS ENCLOSURE	SANITARY SEWER	355
LCRS ENCLOSURE	LCRS CLEANOUT	710

SCALE IN FEET
0 60 120

REV	DATE	BY	SUB
			AS-BUILT AND FINAL, GR-101AB, 9/15/00
			FINAL DESIGN, GR-101, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK GLENN N. COFFMAN 062741 PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK

AS-BUILT AND FINAL SITE PLAN

SCALE AS SHOWN
CONTRACT 12000-7-0232
DWG. NO. GR-101AB | REV 0 | PAGE NO 2

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PLOT DATE:

KLETTKE LAND SURVEYORS, P.C.

IVAN R. KLETTKE L.S. 048157 – NEAL R. KLETTKE L.S. 049505 – MATTHEW F. KLETTKE L.S. 050034
2470 STOELTING ST. (BERGHOLZ), NIAGARA FALLS, NEW YORK, 14304 (716)731–5613

RECORD SURVEY DRAWING, OLIN CORPORATION'S INDUSTRIAL WELDING SITE

LOCATION CITY OF NIAGARA FALLS, NIAGARA COUNTY, NEW YORK

DATE SURVEY DATA OBSERVED SEPTEMBER THROUGH NOVEMBER 1999

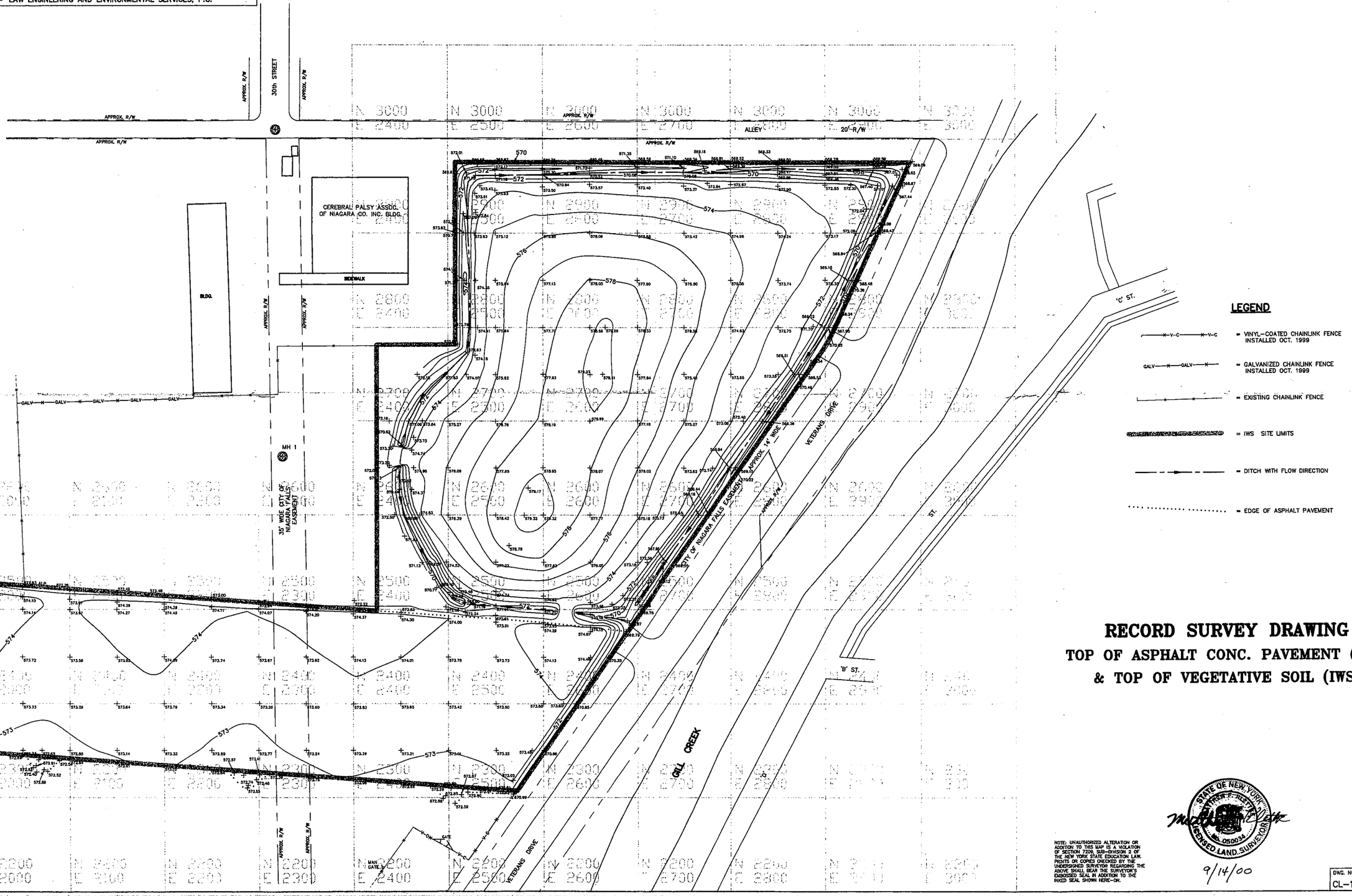
E 1" = 50'

Io. 4483–C1 | REQUESTED BY – LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

NOTES

1) ELEVATIONS SHOWN HERE–ON ARE BASED ON BM J–20, ELEV. = 571.52 (NGVD 1929, AS PUBLISHED BY USC&GS MAY 6, 1943).

2) BASE MAP, SHOWING BUILDINGS, STREETS ALLEYS, RIGHT OF WAYS, CREEKS, ETC. SUPPLIED BY LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.



LEGEND

- X–V–C X–V–C = VINYL–COATED CHAINLINK FENCE INSTALLED OCT. 1999
- GALV X GALV X = GALVANIZED CHAINLINK FENCE INSTALLED OCT. 1999
- X X = EXISTING CHAINLINK FENCE
- = IWS SITE LIMITS
- = DITCH WITH FLOW DIRECTION
- = EDGE OF ASPHALT PAVEMENT

RECORD SURVEY DRAWING

TOP OF ASPHALT CONC. PAVEMENT (ALP) & TOP OF VEGETATIVE SOIL (IWS)

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS MAP IS A VIOLATION OF SECTION 7209, SUB–DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW. PRINTS OR COPIES CHECKED BY THE UNDERSIGNED SURVEYOR REGARDING THE ABOVE SHALL BEAR THE SURVEYOR'S EMBOSSED SEAL IN ADDITION TO THE INKED SEAL SHOWN HERE–ON.

STATE OF NEW YORK · MATTHEW F. KLETTKE · 050034 · LICENSED LAND SURVEYOR

9/14/00

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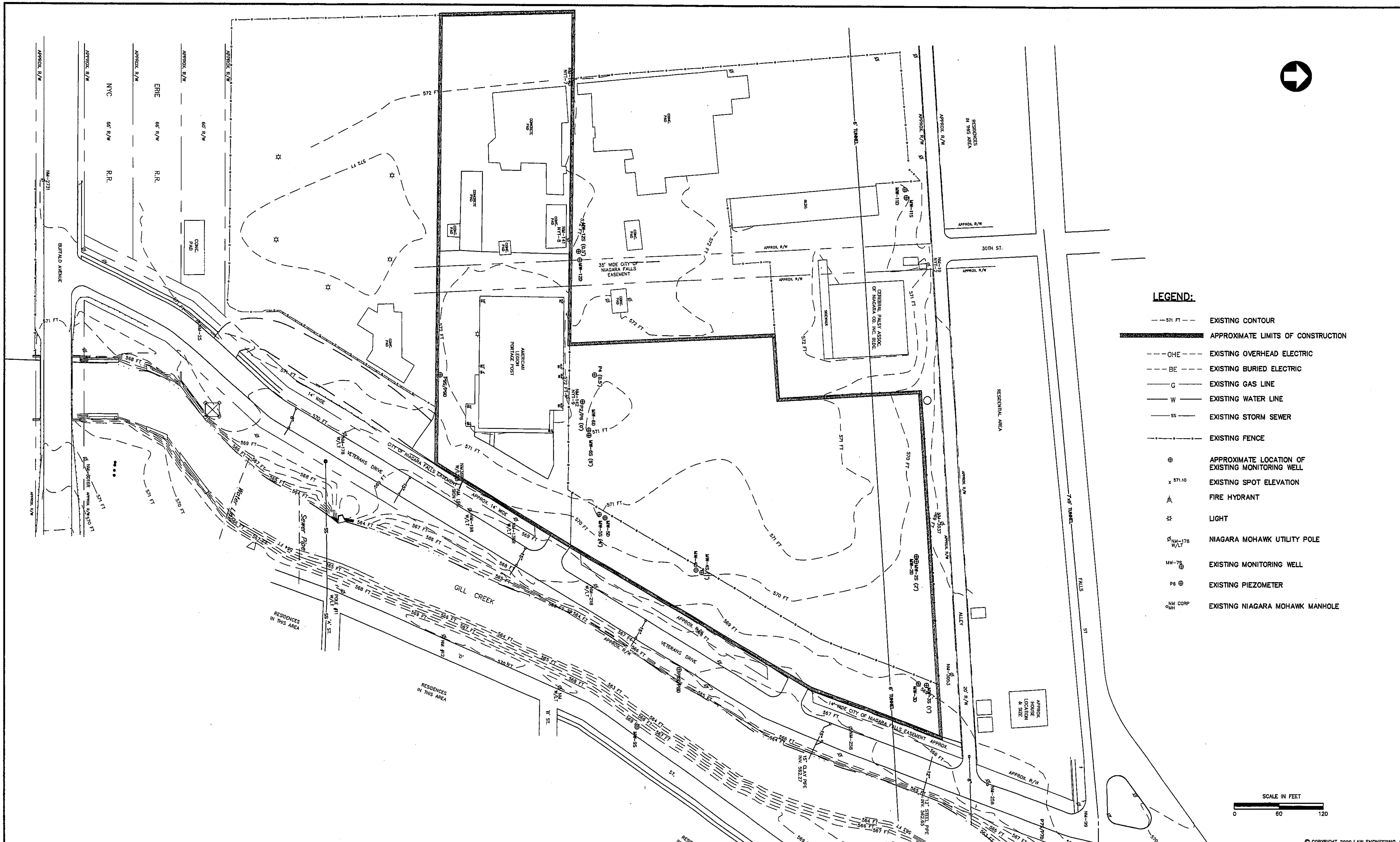
CL–111AB		3



REV	DATE	BY	SUB

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK · GLENN N. COFFMAN · 062401 · PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK

PRECONSTRUCTION
TOPOGRAPHIC SURVEY

SCALE: AS SHOWN
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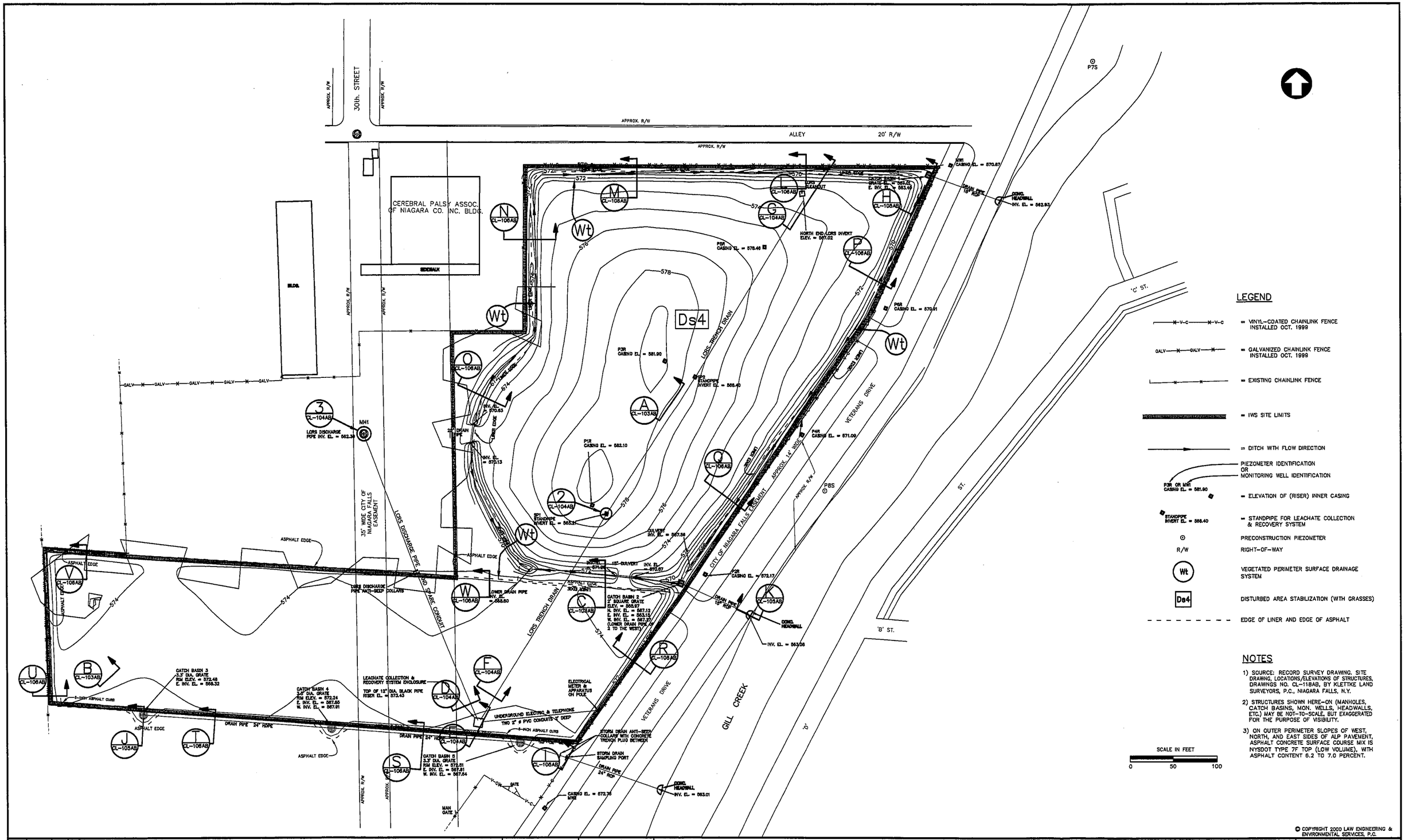

LEGEND

- V-C V-C = VINYL-COATED CHAINLINK FENCE INSTALLED OCT. 1999
- GALV GALV = GALVANIZED CHAINLINK FENCE INSTALLED OCT. 1999
- = EXISTING CHAINLINK FENCE
- = IWS SITE LIMITS
- = DITCH WITH FLOW DIRECTION
- P3S OR MW1 CASING EL. = 581.90 = PIEZOMETER IDENTIFICATION OR MONITORING WELL IDENTIFICATION
- = ELEVATION OF (RISER) INNER CASING
- STANDPIPE INVERT EL. = 568.40 = STANDPIPE FOR LEACHATE COLLECTION & RECOVERY SYSTEM
- ⊙ = PRECONSTRUCTION PIEZOMETER
- R/W = RIGHT-OF-WAY
- Wt = VEGETATED PERIMETER SURFACE DRAINAGE SYSTEM
- Ds4 = DISTURBED AREA STABILIZATION (WITH GRASSES)
- = EDGE OF LINER AND EDGE OF ASPHALT

NOTES

1) SOURCE: RECORD SURVEY DRAWING. SITE DRAWING, LOCATIONS/ELEVATIONS OF STRUCTURES, DRAWINGS NO. CL-118AB, BY KLETTKE LAND SURVEYORS, P.C., NIAGARA FALLS, N.Y.
2) STRUCTURES SHOWN HERE-ON (MANHOLES, CATCH BASINS, MON. WELLS, HEADWALLS, ETC.) MAY BE NOT-TO-SCALE, BUT EXAGGERATED FOR THE PURPOSE OF VISIBILITY.
3) ON OUTER PERIMETER SLOPES OF WEST, NORTH, AND EAST SIDES OF ALP PAVEMENT, ASPHALT CONCRETE SURFACE COURSE MIX IS NYSDOT TYPE 7F TOP (LOW VOLUME), WITH ASPHALT CONTENT 6.2 TO 7.0 PERCENT.

SCALE IN FEET
0 50 100

REV	DATE	BY	SUB
			AS-BUILT AND FINAL, CL-102AB, 9/15/00
			FINAL DESIGN, CL-102, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK GLENN N. COFFMAN 062446 PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
AS-BUILT AND FINAL SURFACE WATER DRAINAGE AND LEACHATE COLLECTION AND RECOVERY SYSTEM

SCALE AS SHOWN
CONTRACT 12000-7-0232
DWG. NO. CL-102AB | REV 0 | PAGE NO 6

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PLOT DATE:

PIEZOMETERS AND MONITORING WELLS

DEPTHS:

1. PIEZOMETERS AND MONITORING WELLS WITHIN IWS COVER AREA EXTEND TO TOP OF NATURAL CLAYS AND SILTS, AS DETERMINED BY ENGINEER DURING INSTALLATION BY VISUAL EXAMINATION OF SPLIT-SPOON SAMPLES.
2. PIEZOMETERS AND MONITORING WELLS EAST OF IWS COVER AREA EXTEND TO 7.0 FEET BELOW GROUND SURFACE.

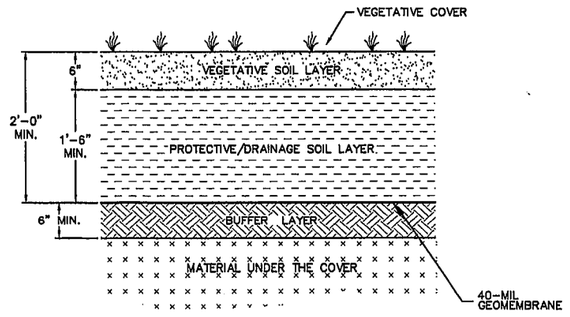
SCREEN LENGTHS: 2.5 FEET

RISER STICKUPS: 2.5 FEET MIN.

NOTE; FOR AS-BUILT DETAILS OF MONITORING WELLS AND PIEZOMETERS, SEE MONITORING WELL / PIEZOMETER INSTALLATION LOGS APPENDED TO CERTIFICATION OF REMEDIAL ACTIVITIES REPORT.

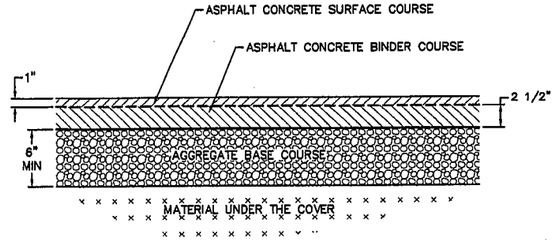
NO.	DESCRIPTION	BOTTOM OF SAND PACK ELEV.	BOTTOM OF SCREEN ELEV.	SCREEN LENGTH	CONCRETE SURFACE PAD ELEV.*	TOP OF RISER ELEV.*
P-1R	COVER AREA PIEZOMETER	564.2	564.7	2.5 ft	579.31	582.10
P-2R	EAST EASEMENT PIEZOMETER	562.3	562.8	2.5 ft	569.45	572.17
P-3R	COVER AREA PIEZOMETER	564.0	564.5	2.5 ft	579.26	581.90
P-4R	EAST EASEMENT PIEZOMETER	561.4	561.8	2.5 ft	568.59	571.09
P-5R	COVER AREA PIEZOMETER	563.4	564.2	2.5 ft	575.65	578.46
P-6R	EAST EASEMENT PIEZOMETER	561.1	561.1	2.5 ft	568.03	570.91
MW-1	NE EASEMENT MONITORING WELL	561.4	561.9	2.5 ft	568.53	570.87
MW-2	SE EASEMENT MONITORING WELL	562.6	563.1	2.5 ft	570.19	572.76

*FROM RECORD SURVEY DATA BY KLETTKE LAND SURVEYORS, P.C.



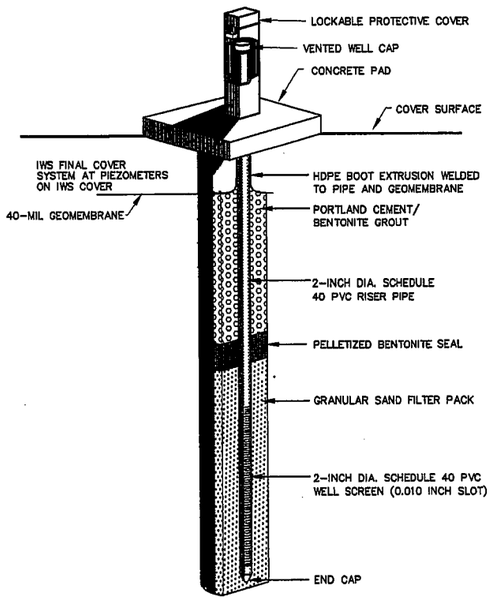
IWS FINAL COVER SYSTEM

SECTION A — SCALE: 1"=1'-0" — CL-103AB CL-102AB



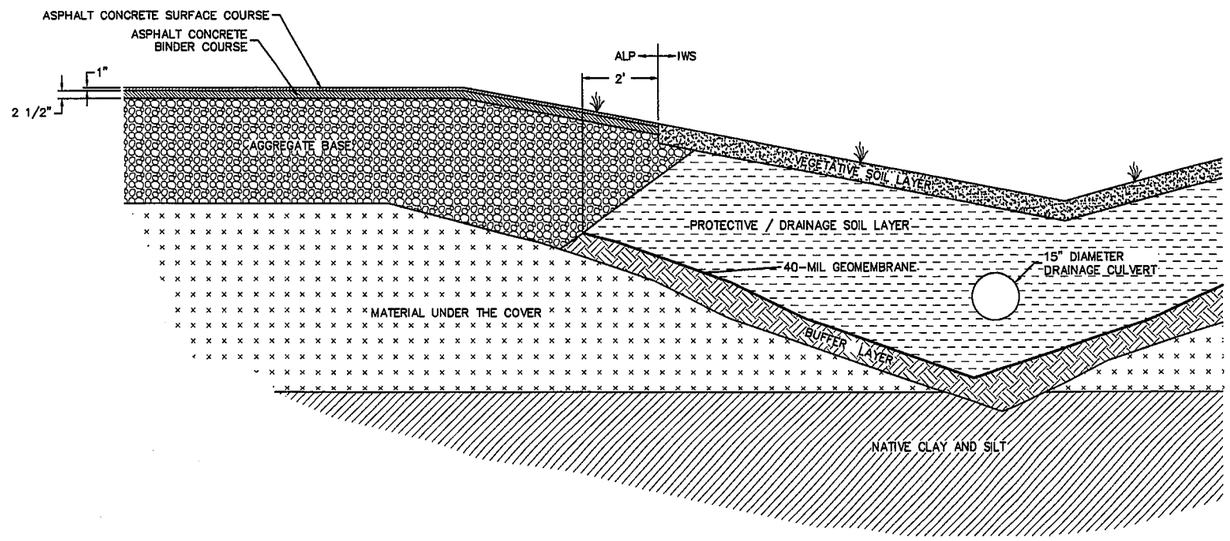
ASPHALT CONCRETE COVER

SECTION B — SCALE: 1 1/2"=1'-0" — CL-103AB CL-102AB



PIEZOMETER AND MONITORING WELL

DETAIL 1 — N.T.S. — CL-103AB GR-101AB



TIE-IN BETWEEN IWS FINAL COVER SYSTEM AND ASPHALT CONCRETE COVER

SECTION C — SCALE: 1/2"=1'-0" — CL-103AB CL-102AB

REV	DATE	BY	SUB	APP	DESCRIPTION
					AS-BUILT AND FINAL, CL-103AB, 9/15/00
					FINAL DESIGN, CL103, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK — GLENN N. COFFMAN — 068442 — PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
AS-BUILT AND FINAL
FINAL COVER SYSTEM
DETAILS AND SECTIONS

SCALE: AS SHOWN
CONTRACT: 12000-7-0232
DWG. NO.: CL-103AB
REV: 0
PAGE NO: 7

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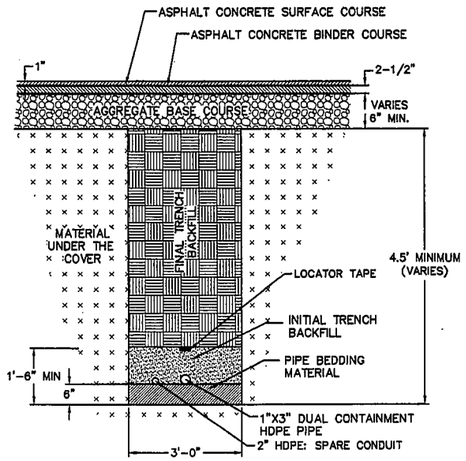
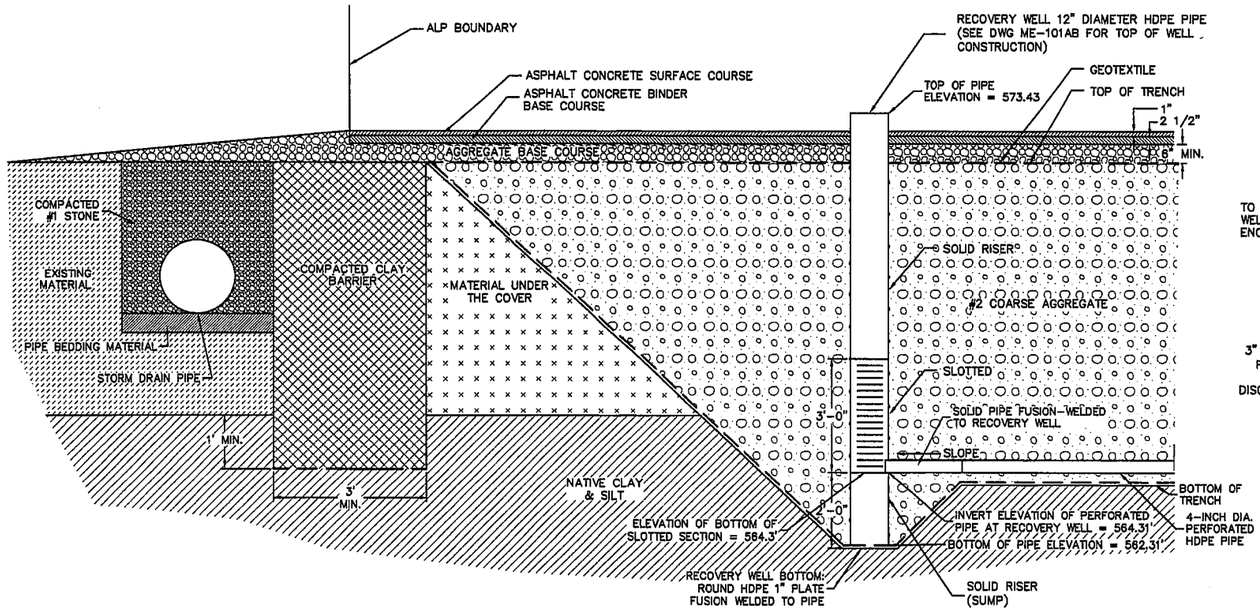
PLOT DATE:



NOTE:
1. LCRS DISCHARGE PIPE SLOPES DOWNWARD FROM BOTTOM OF LCRS RECOVERY WELL ENCLOSURE TO SEWER TIE-IN

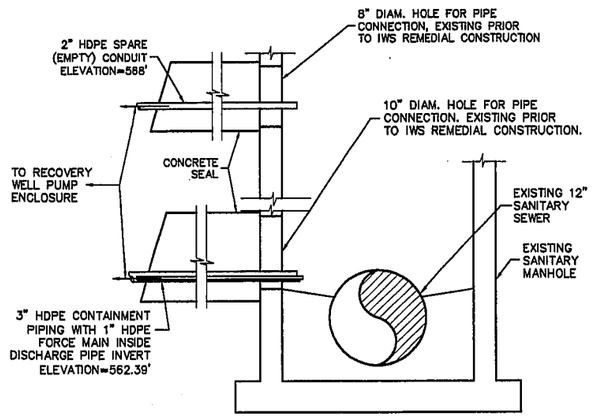
LCRS DISCHARGE PIPE

SECTION D — CL-104AB — CL-102AB
1/2"=1'-0"



ALP PERIMETER CONTAINMENT SYSTEM AND LCRS RECOVERY WELL AND COLLECTION TRENCH

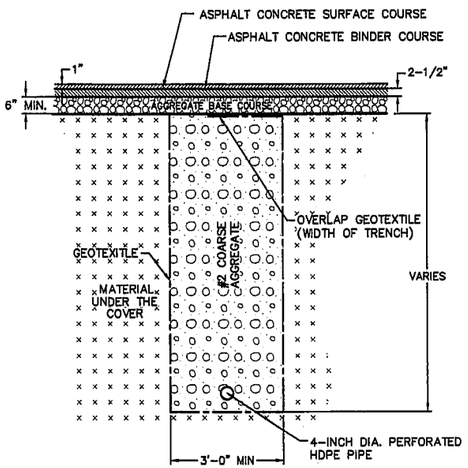
SECTION E — CL-104AB — CL-102AB
SCALE: 1/2"=1'-0"



NOTES: 1. MANHOLE RIM ELEVATION=571.1'
2. CONCRETE SEALS EXTEND TO EAST SIDE OF CNF 35' EASEMENT.

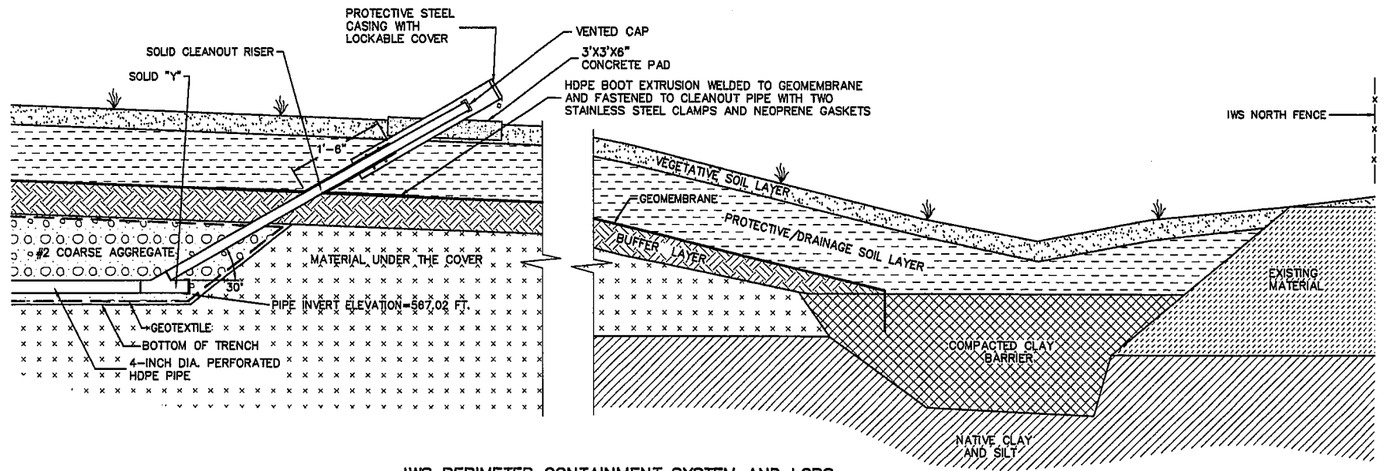
LCRS DISCHARGE PIPE TERMINATION

DETAIL 3 — CL-104AB — CL-102AB
N.T.S.



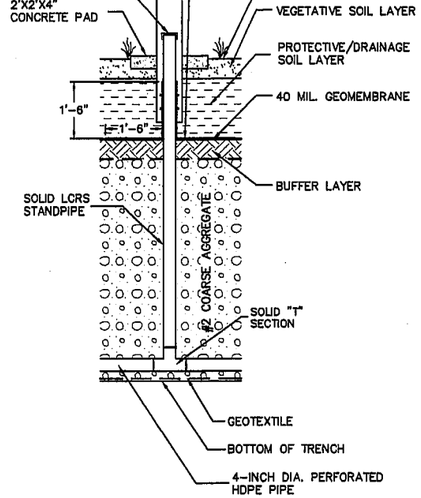
LCRS COLLECTION TRENCH

SECTION F — CL-104AB — CL-102AB
SCALE: 1/2"=1'-0"



IWS PERIMETER CONTAINMENT SYSTEM AND LCRS COLLECTION TRENCH AND CLEANOUT

SECTION G — CL-104AB — CL-102AB
SCALE: 1/2"=1'-0"



STANDPIPE (TYP.)

DETAIL 2 — CL-104AB — CL-102AB
N.T.S.

REV	DATE	BY	SUB	APP	DESCRIPTION
					AS-BUILT AND FINAL, CL-104AB, 9/15/00
					FINAL DESIGN, CL-104, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

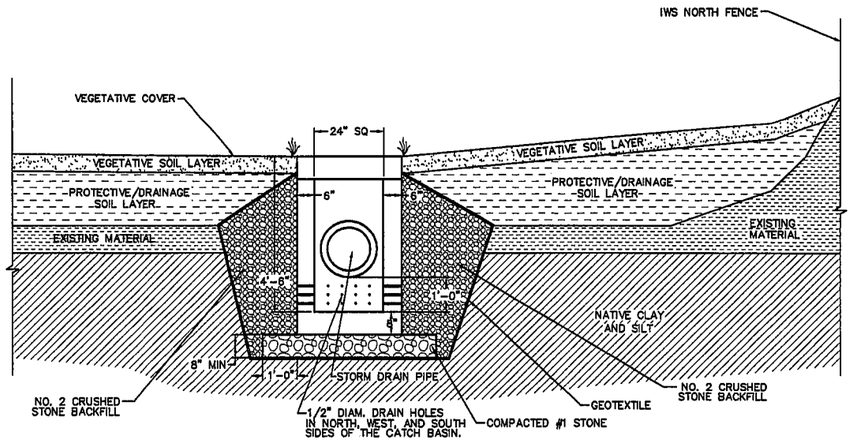
STATE OF NEW YORK — GLENN N. COFFMAN — 062496 — PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

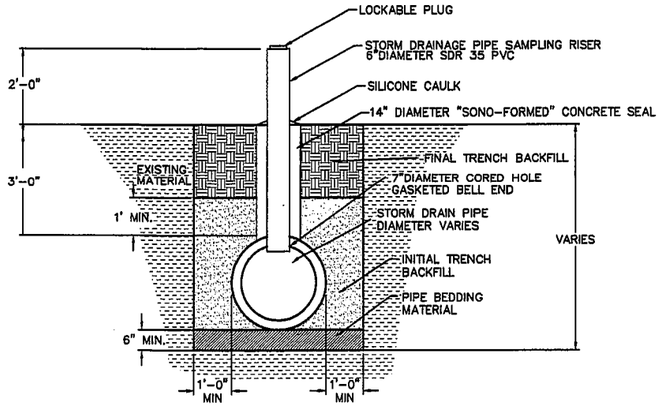
INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
AS-BUILT AND FINAL
CONTAINMENT SYSTEM AND
LEACHATE COLLECTION AND RECOVERY
SYSTEM DETAILS AND SECTIONS

SCALE: AS SHOWN
CONTRACT: 12000-7-0232
DWG. NO.: CL-104AB
REV: 0
PAGE NO: 8



CATCH BASIN NO.1

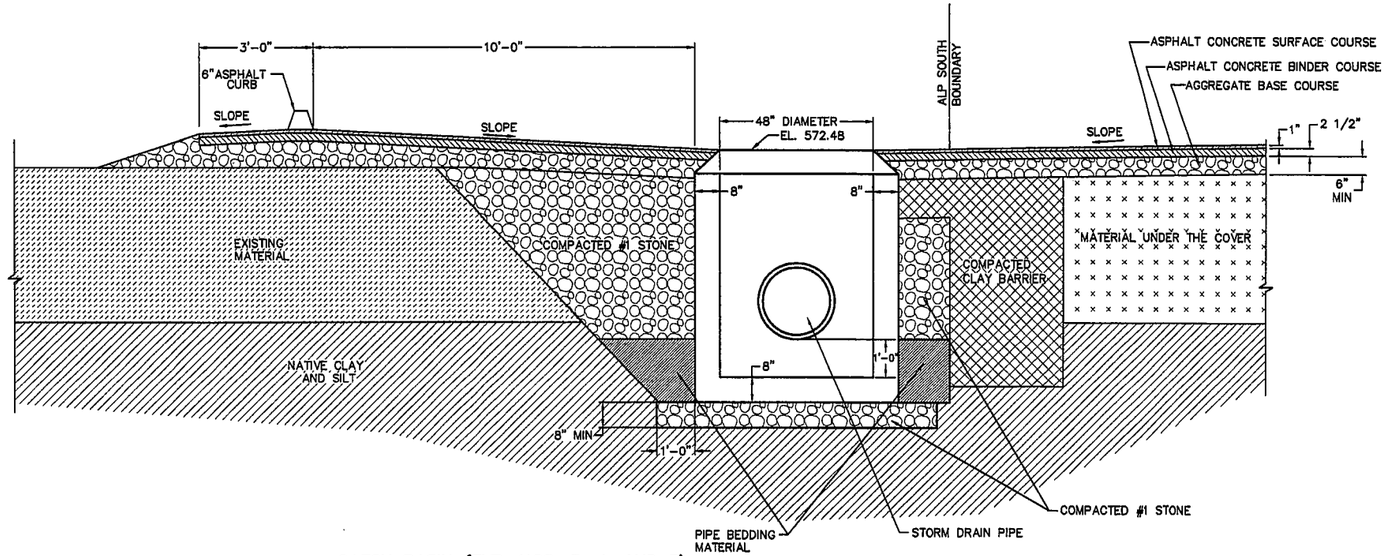
SECTION H
1/2"=1'-0" CL-105AB CL-102AB



NOTE:
1. TYPICAL EXCEPT:
   A) FOR PIPE WITHIN PAVEMENT LIMITS OF VETERANS DRIVE DRIVE, COMPLY WITH CITY OF NIAGARA FALLS STANDARD SPECIFICATIONS, REQUIREMENTS FOR EXCAVATIONS WITHIN PAVEMENTS.
   B) SAMPLING RISER OCCURS ONLY AT SECTION I.
2. CALCULATED STORM DRAIN INVERT ELEVATION AT SECTION I = 566.16'

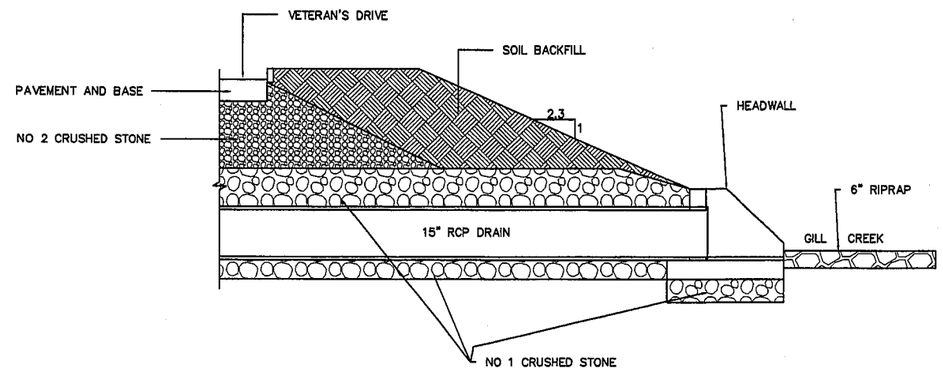
STORM DRAINAGE PIPE

SECTION I
1/2"=1'-0" CL-105AB CL-102AB



CATCH BASIN (TYP. NOS. 3, 4, AND 5)

SECTION J
1/2"=1'-0" CL-105AB CL-102AB



HEADWALL AT DRAIN PIPE FROM CATCH BASIN NO.2 TO GILL CREEK (TYPICAL)

SECTION K
1/2"=1'-0" CL-105AB CL-102AB

REV	DATE	BY	SUB	APP	DESCRIPTION
					AS-BUILT AND FINAL CL-105, 9/15/00
					FINAL DESIGN CL-105, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN F.S.DIUGU
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK — GLENN N. COFFMAN — 065410-1 — PROFESSIONAL ENGINEER

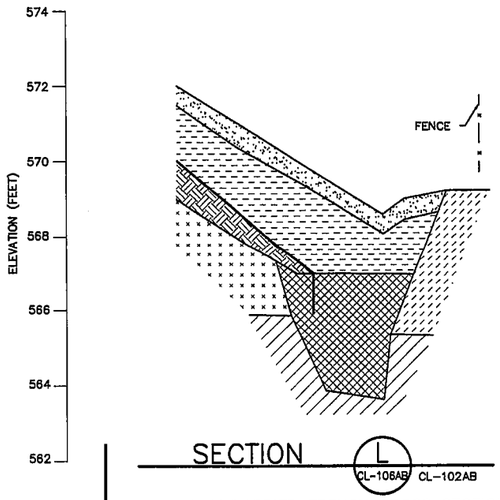
OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW
ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

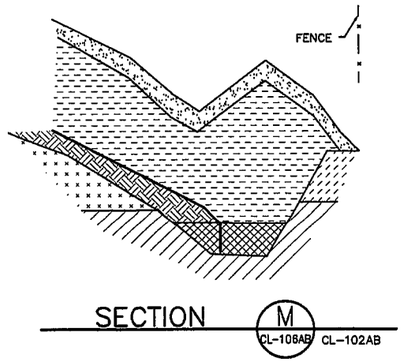
INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
AS-BUILT AND FINAL
STORM DRAINAGE SYSTEM
DETAILS AND SECTIONS

SCALE: AS SHOWN
CONTRACT: 12000-7-0232
DWG. NO.: CL-105AB
REV: 0
PAGE NO: 9

XREF:
CADD FILE: J:\olin\VWs, ..-gn\as-builts\dt-storm.dwg 9/14/00 10:27 am
PLOT DATE:

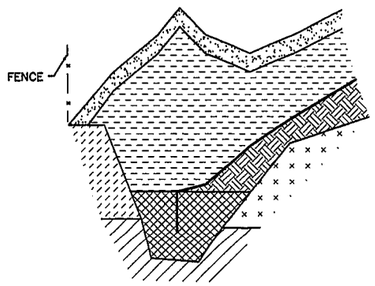


SECTION L (CL-106AB / CL-102AB)

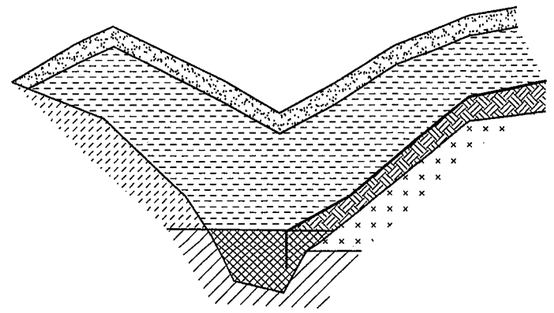


SECTION M (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON NORTH SIDE IWS LOOKING WEST

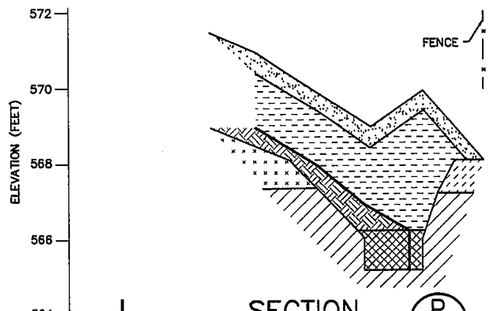


SECTION N (CL-106AB / CL-102AB)



SECTION O (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON WEST SIDE OF IWS LOOKING NORTH



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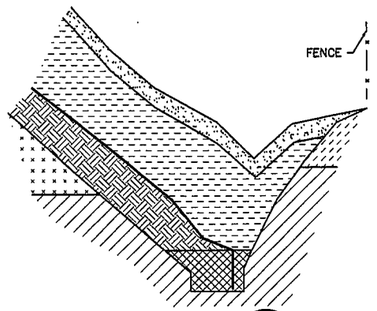
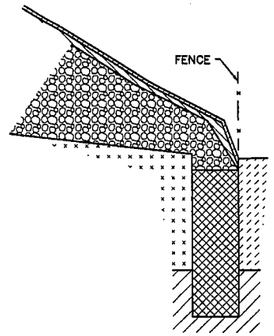


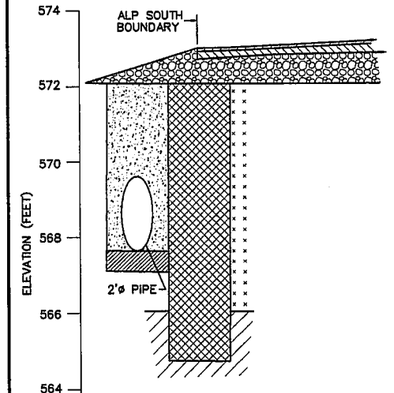
SECTION Q (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON EAST SIDE IWS LOOKING NORTH

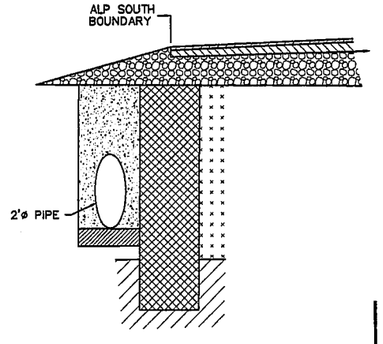


SECTION R (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON EAST SIDE ALP LOOKING NORTH

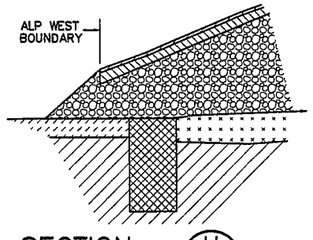


SECTION S (CL-106AB / CL-102AB)



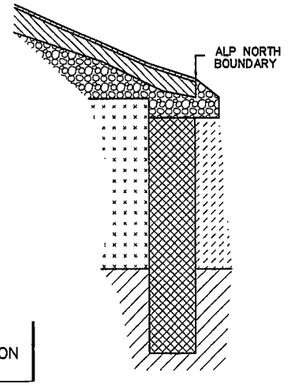
SECTION T (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON SOUTH SIDE ALP LOOKING WEST

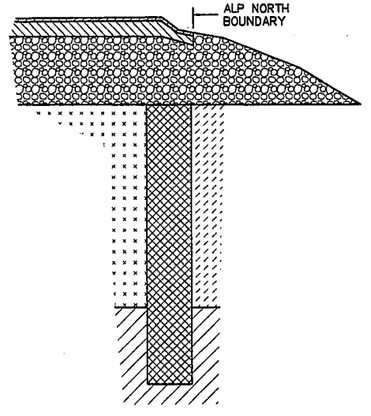


SECTION U (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON WEST SIDE ALP LOOKING NORTH

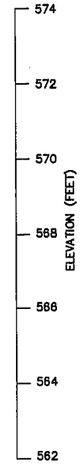


SECTION V (CL-106AB / CL-102AB)



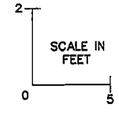
SECTION W (CL-106AB / CL-102AB)

CLAY BARRIER TRENCH CROSS SECTION ON NORTH SIDE ALP LOOKING WEST



LEGEND

- MATERIAL UNDER THE COVER
- EXISTING MATERIAL
- NATIVE CLAY AND SILT
- COMPACTED CLAY BARRIER
- BUFFER LAYER (COMPACTED CLAY)
- PROTECTIVE/DRAINAGE LAYER
- VEGETATIVE SOIL LAYER
- GEOMEMBRANE
- AGGREGATE BASE COURSE
- ASPHALT CONCRETE BINDER COURSE WITH 1-INCH ASPHALT CONCRETE SURFACE COURSE
- PIPE BEDDING MATERIAL
- COMPACTED NO.1 CRUSHED STONE BACKFILL



J:\olin\IWS\design\xs-built\X-SECT.dwg 3/29/00 6:50 am

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

STATE OF NEW YORK GLENN N. COFFMAN 059106 PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK

AS-BUILT AND FINAL CROSS SECTIONS OF CLAY BARRIERS

SCALE AS SHOWN
CONTRACT 12000-7-0232
DWG. NO. CL-106AB | REV 0 | PAGE NO 10

KLETTKE LAND SURVEYORS, P.C.

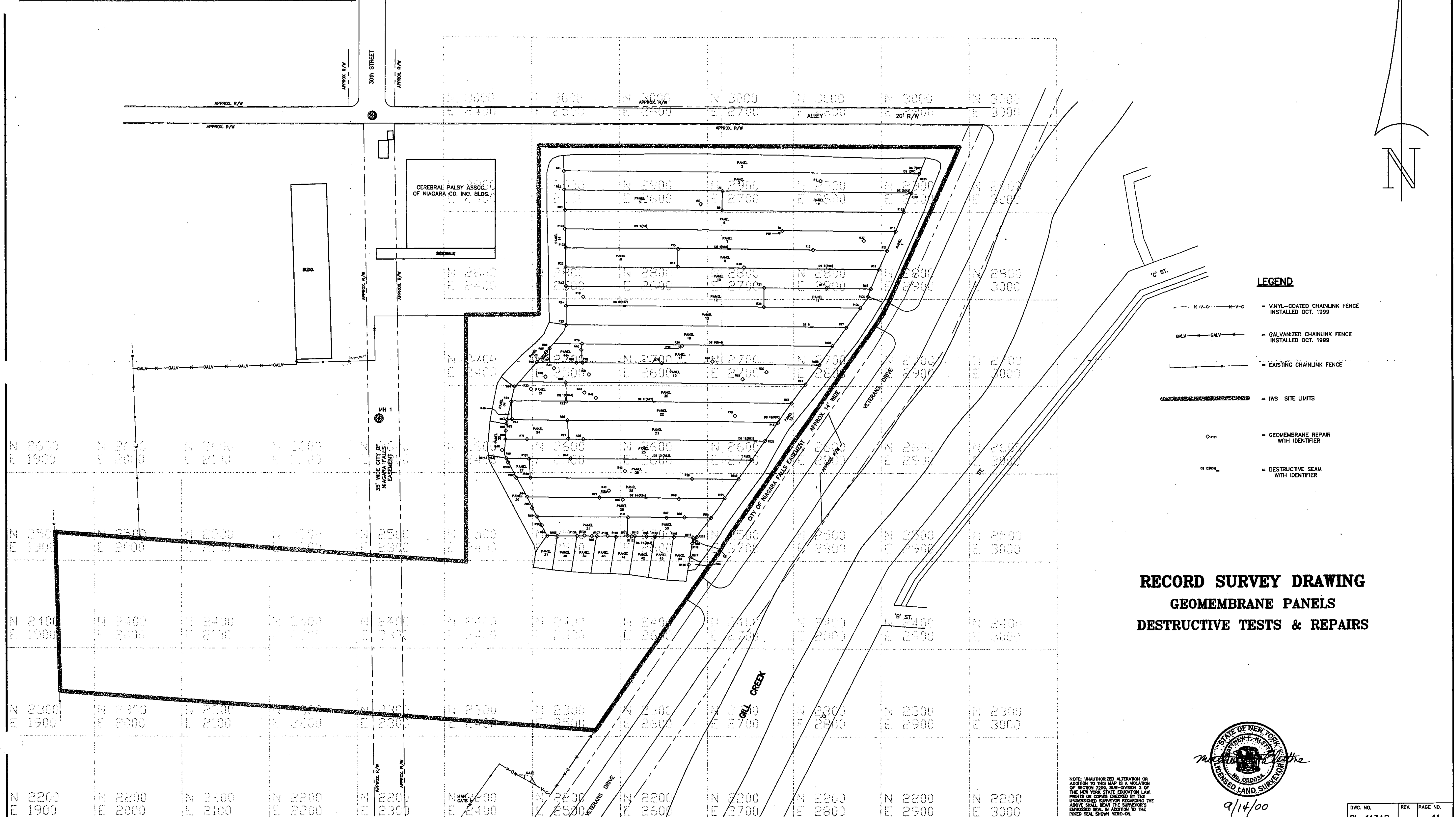
IVAN R. KLETTKE L.S. 048157 – NEAL R. KLETTKE L.S. 049505 – MATTHEW F. KLETTKE L.S. 050034
2470 STOELTING ST. (BERGHOLZ), NIAGARA FALLS, NEW YORK, 14304 (716)731-5613

RECORD SURVEY DRAWING, OLIN CORPORATION'S INDUSTRIAL WELDING SITE	
LOCATION CITY OF NIAGARA FALLS, NIAGARA COUNTY, NEW YORK	
DATE SURVEY DATA OBSERVED SEPTEMBER THROUGH NOVEMBER 1999	
SCALE 1" = 50'	
No. 4483-C1	REQUESTED BY – LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

NOTES

1) BASE MAP, SHOWING BUILDINGS, STREETS ALLEYS, RIGHT OF WAYS, CREEKS, ETC. SUPPLIED BY LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

2) DESTRUCTIVE TEST & REPAIR LOCATIONS PROVIDED BY GLYNN GEOTECHNICAL ENGINEERING (GGE) OR A COMBINATION OF GGE & KLETTKE DATA.



LEGEND

- VINYL-COATED CHAINLINK FENCE INSTALLED OCT. 1999
- GALVANIZED CHAINLINK FENCE INSTALLED OCT. 1999
- EXISTING CHAINLINK FENCE
- IWS SITE LIMITS
- GEOMEMBRANE REPAIR WITH IDENTIFIER
- DESTRUCTIVE SEAM WITH IDENTIFIER

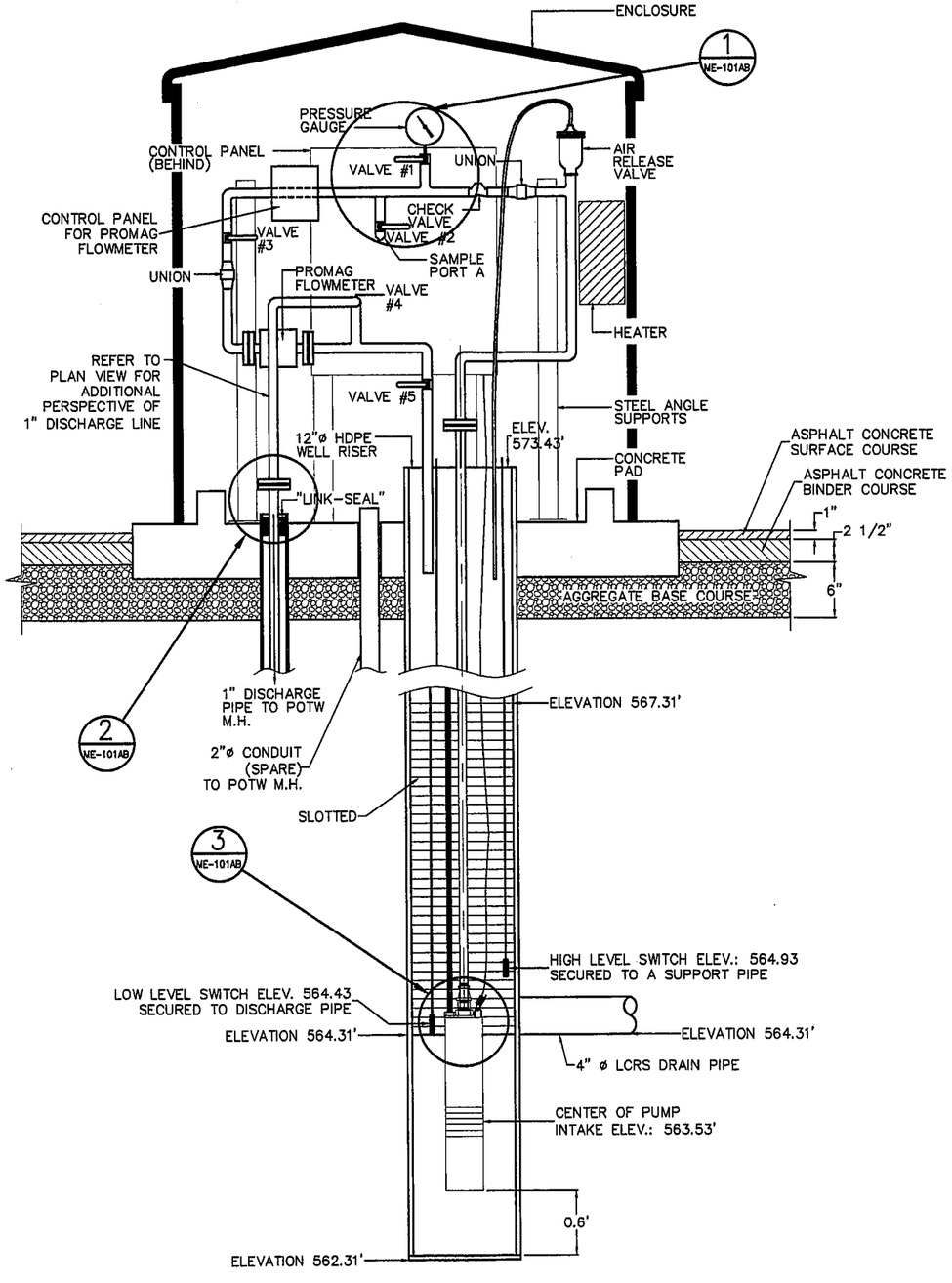
RECORD SURVEY DRAWING
GEOMEMBRANE PANELS
DESTRUCTIVE TESTS & REPAIRS

NOTE: UNAUTHORIZED ALTERATION OR ADDITION TO THIS MAP IS A VIOLATION OF SECTION 7209, SUB-DIVISION 2 OF THE NEW YORK STATE EDUCATION LAW. PRINTS OR COPIES CHECKED BY THE UNDERSIGNED SURVEYOR REGARDING THE ABOVE SHALL BEAR THE SURVEYOR'S EMBOSSED SEAL IN ADDITION TO THE INKED SEAL SHOWN HERE-ON.

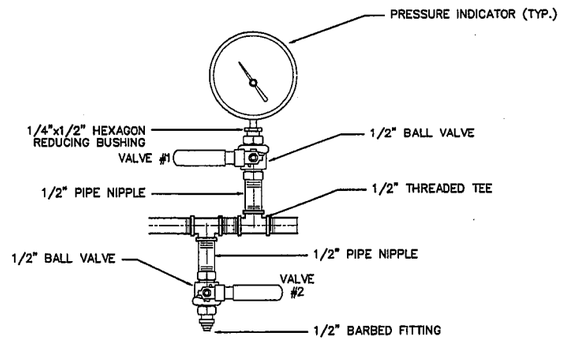
STATE OF NEW YORK – MATTHEW F. KLETTKE – No. 050034 – LICENSED LAND SURVEYOR

9/14/00

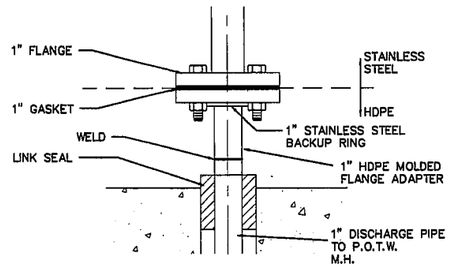
DWG. NO.	REV.	PAGE NO.
CL-113AB		11



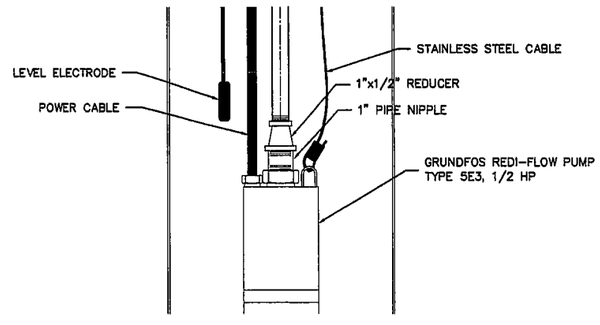
SOUTH ELEVATION OF LEACHATE RECOVERY SYSTEM
SCALE (1 1/2" = 1')



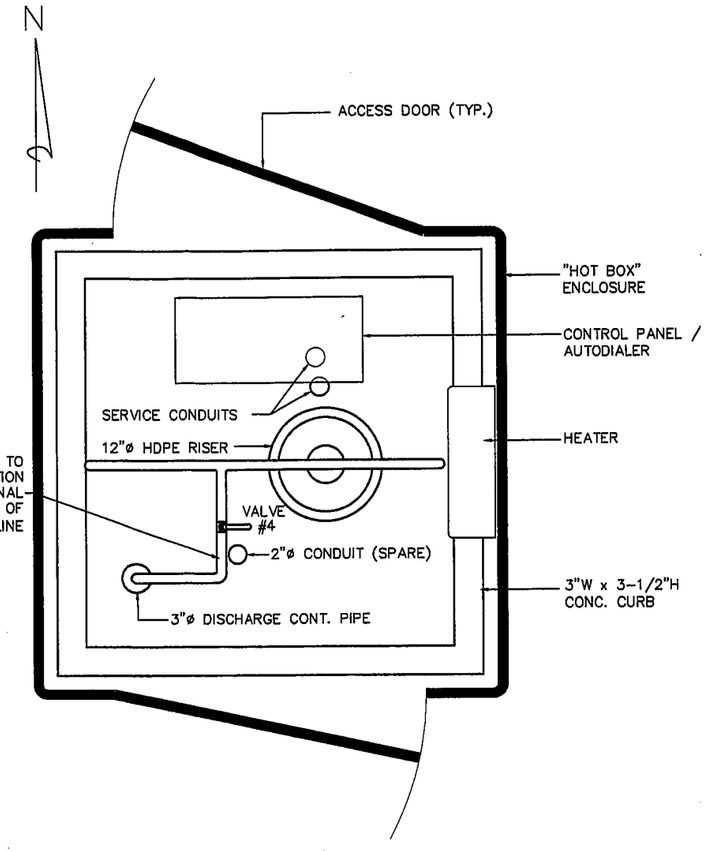
PRESSURE INDICATOR/SAMPLE PORT DETAIL
N.T.S. — 1 ME-101AB — ME-101AB



DETAIL 2
N.T.S. — 2 ME-101AB — ME-101AB



SUBMERSIBLE PUMP CONNECTIONS DETAIL
N.T.S. — 3 ME-101AB — ME-101AB



PLAN VIEW OF LEACHATE RECOVERY SYSTEM
SCALE (1 1/2" = 1')

NOTES:

1. STRUCTURAL STEEL SUPPORT FRAME FOR PIPING NOT SHOWN FOR CLARITY. ACTUAL FRAME LAYOUT DETERMINED BY THE CONTRACTOR. FRAME FABRICATED FROM 1"x1"x1/4" GALVANIZED STEEL ANGLE. FRAME WELDED CONSTRUCTION WITH FILLET WELDS FOR ALL JOINTS. PIPING SECURED USING GRINELL LIGHT WEIGHT U-BOLTS.
2. AT LOCATIONS WHERE FRAME IS ATTACHED TO CONCRETE PAD, THE ANGLE IS WELDED TO 6"x6"x1/2" GALVANIZED STEEL PLATE. PLATE MOUNTED TO CONCRETE PAD WITH FOUR 1/2" GALVANIZED STEEL ANCHORS.
3. STRUCTURAL STEEL SUPPORT FRAME FOR THE CONTROL PANEL AND FLOWMETER TRANSMITTER FABRICATED IN THE SAME MANNER AS THE PIPING FRAME.
4. THE DISCHARGE LINE (FORCE MAIN) FROM THE RECOVERY WELL TO THE CITY OF NIAGARA FALLS MANHOLE CONSISTS OF A SEAMLESS 1-INCH HDPE PIPE WITHIN A 3-INCH HDPE CONTAINMENT/LEAK DETECTION PIPE. THE PIPES EXIST WITHOUT FIXTURES OTHER THAN THE END CONNECTIONS. THESE PIPES WERE INSTALLED IN A TRENCH HAVING A CONTINOUS DOWNWARD SLOPE TOWARDS THE MANHOLE. THE INVERT ELEVATION OF THE MANHOLE IS EL. 562.38. THE CONNECTION AT THE RECOVERY WELL IS SHOWN ON THIS DRAWING.

REV	DATE	BY	SUB	APP	DESCRIPTION
					AS-BUILT AND FINAL, ME-101AB, 9/15/00
					FINAL DESIGN, ME-101, 9/29/99

DESIGNED L.D. WHEELESS
DRAWN C.F. SANDERS
CHECKED L.D. WHEELESS
IN CHARGE G.N. COFFMAN
DATE 9/15/00

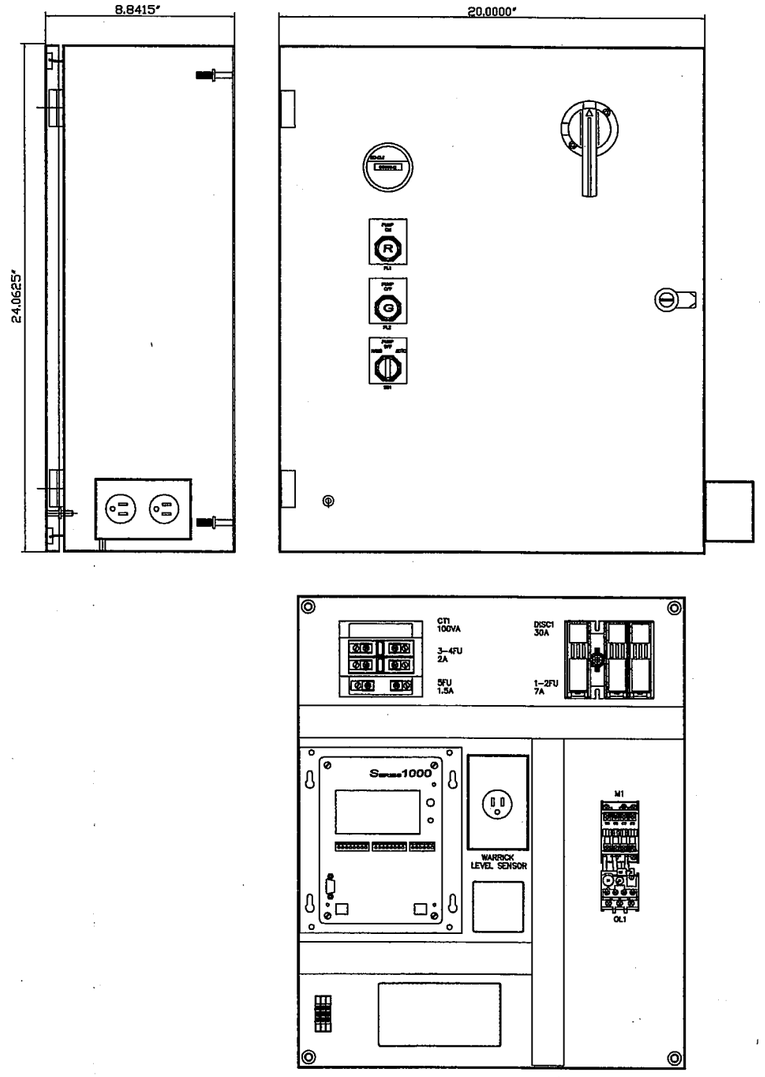
OLIN CORPORATION
CHARLESTON, TENNESSEE

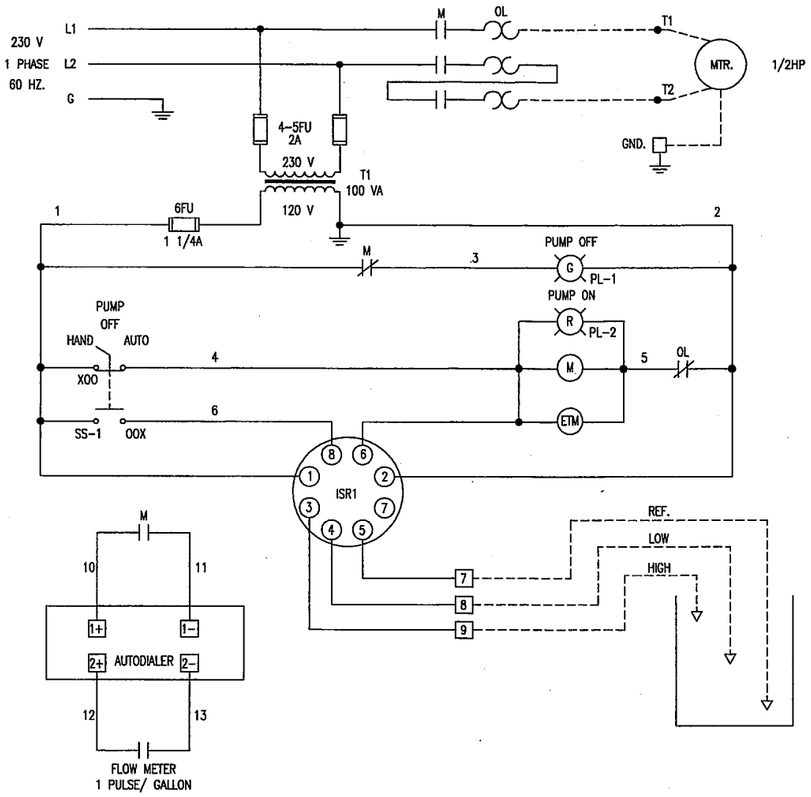
LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
AS-BUILT AND FINAL LEACHATE COLLECTION AND RECOVERY SYSTEM-DETAILS

SCALE AS SHOWN
CONTRACT 12000-7-0232
DWG. NO. ME-101AB | REV 0 | PAGE NO 12

XREF: XREF
CADD FILE: J:\olin\WS\design\as-builts\ME-001-B.dwg 9/14/00 10:34 am
PLOT DATE:





DESCRIPTION	MODEL#	QTY
24X20X8 NEMA 4X S.S.	EN4SD242088SS	1
ENCL BACKPANEL	EP2420	1
FUSED DISCONNECT	OESACF30J6SW	1
DISCONNECT SHAFT	OXZS49	1
DISCONNECT HANDLE	OHBZX102	2
7 AMP CLASS J FUSE	AJT7	2
IEC CONTACTOR	A9-30-10-84	1
AUX CONTACT	CA5-01	1
OUTLET	LEVITRON GFI	1
OUTLET	OUTDOOR BOX	1
OUTLET	OUTDOOR COVER	1
OVERLOAD RELAY	TA25DU6.5	1
MICROTEL AUTODIALER	SERIES 10000	1
WARRICK LEVEL SENSOR	16MA1MO	1
100VA CPT	PT100MQMJ-3	1
2 AMP CLASS CC FUSE	ATDR2	2
1.5 AMP TIME DELAY FUSE	TRM1 1/2	1
HOUR METER	EAGLE F/K	1
GREEN PILOT LIGHT	CBK-KLF1G	1
RED PILOT LIGHT	CBK-KLF1R	1
3 POSITION SELECTOR	CBK-C3MK-20	1

DATE 6/9/99
FILE # RL1000592
JOB NO. 001086
R.L. STONE PO# 1000592

RL Stone company inc

Project
Industrial Welding Site
Niagara Falls New York

As Built and Final Drawing For:
Leachate Collection and Recovery
Control Panel Wiring & Controls

DWN	JPR			
CHK	CD	9/21/99	ADD OUTLET	JPR
Q.A.	CD	9/9/99	RELEASE	JPR

SCALE DIM REF

DRAWING ME-102AB

APPENDIX B

REMEDIAL DESIGN APPROVAL LETTER

FILE COPY

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 9
270 Michigan Avenue, Buffalo, New York, 14203-2999
Phone: (716) 851-7220 • **FAX:** (716) 851-7226
Website: www.dec.state.ny.us

John P. Cahill
Commissioner

November 1, 1999

Ms. Lorraine M. Miller
Environmental Group
Olin Corporation
P.O. Box 248
1186 Lower River Road, NW
Charleston, Tennessee 37310-0248

Dear Ms. Miller:

Olin Industrial Welding Site #932050
Final Remedial Design Dated
September 29, 1999

The purpose of this letter is to advise you that the Department has approved the above-mentioned remedial design document subject to the following conditions:

- The design of the leachate collection and disposal system will be revised to insure that the untreated leachate from the site does not overflow at the Regulator #5 and discharge to the Niagara River during wet weather conditions.

- During the O & M period, samples of storm water will be collected from the storm drainage system which outfalls into the Gill Creek. A sampling structure should be installed in the storm pipe at the end of the site on the east.

- The Statement of Works which is a part of the Consent Order requires submission of the draft O & M plan with 90% design submittal. This has not yet been done. The submission should be expedited.

Please contact me at 716/851-7220 if you have any questions.

Sincerely,

Abul Barkat

Abul Barkat, P.E.
Project Manager

AB:lj

cc: Mr. David Leemhuis, NYSDEC/Division of Water
Ms. Dawn Hettrick, NYSDOH/Division of Environmental Exposure

a:miller.ab

APPENDIX C

COMMUNITY AIR MONITORING REPORT

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd., Suite Three
Niagara Falls, NY 14304

(716) 297-6150 Office (716) 297-2265 Fax

January 17, 2000

Reference No. 14934

Ms. Lorraine Miller
Sr. Assoc. Environmental Specialist
OLIN CORPORATION
1186 Lower River Road, NW
Charleston, TN 37310

Dear Ms. Miller:

Re: Air Monitoring/Sampling Program
Industrial Welding Site
Niagara Falls, New York

Conestoga-Rovers & Associates (CRA) conducted continuous air monitoring and air sampling activities during construction activities at the Industrial Welding Site (Site) in Niagara Falls, New York beginning September 2, 1999 through October 5, 1999. Perimeter air sampling and monitoring activities were performed in accordance with the Health and Safety Plan (HASP) contained in Appendix F of the Final Remedial Design (September 29, 1999). The air monitoring and air sampling activities included:

i) collection of air samples in accordance with the Community Air Monitoring Program (CAMP) in Section 4.0 of the HASP;

ii) collection of perimeter air samples daily during intrusive activities to be archived for 30 days and analyzed if requested by New York State Department of Health (NYSDOH); and

iii) analysis of air samples for total particulates (dust), mercury, and benzene hexachlorides (BHCs).

WORK PERFORMED

Air monitoring and air sampling was performed using SKC Aircheck Model 224-PXCR8 sampling pumps. The pumps were calibrated before and after each sampling event using a mini-buck calibrator Model M-5, in accordance with the calibration procedures described in the Occupational Safety and Health Administration (OSHA) Industrial Hygiene Technical Manual.

In accordance with the HASP, air samples were collected on three occasions; prior to construction activities for background levels, two days during the first week of intrusive activities, and one day during the midpoint of intrusive activities. A total of 12 air pumps were placed along the approximate midpoints of the perimeters of the Site; three at the north perimeter, three along the south, three along the east, and three along the west perimeter.

The air samples were collected in accordance with the CAMP. A total of 64 samples were collected. Sevenson Environmental Services (SES) of Niagara Falls, New York collected the air samples before construction began using SKC sampling pumps; CRA collected air samples during intrusive activities. After sample collection and post calibration of the pumps, the samples were labeled, packaged, and shipped via overnight courier to Philip Analytical Services of Reading, Pennsylvania, which is an American Industrial Hygiene Association (AIHA) accredited laboratory. The air samples were analyzed in accordance with the National Institute for Occupational Safety and Health (NIOSH) approved procedures. The NIOSH procedures used for the analysis included Method 0500 for total particulates, Method 6009 for mercury, and Method 5510 (modified) for BHCs. The sample records are presented in Appendix A.

RESULTS

Laboratory analytical air sample results are presented in Appendix B. All of the analyte concentrations were below the action limits presented in the HASP. NYSDOH did not request analysis for any of the archive samples. The archive samples were properly disposed of.

Should you have any questions regarding this information, please do not hesitate to contact us.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Dustin Steiner

DS/mk/js/3
Encl.
c.c.: K. McIntosh
A. Kisiel

APPENDIX A

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter Fence **Date:** 9/2/97

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090297-DRS-001

Pump Number: #1 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0852

Sample End Time: 1643

Sample Duration: 471 Minutes

Sample Volume: 93.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, Wind SW → NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter **Date:** 9/2/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090299-DRS-002

Pump Number: #2 **Sampling Badge Number:**

Sampling Pump Design Flow: 2 L/min

Sample Start Time: 0853

Sample End Time: 1643

Sample Duration: 470 min.

Sample Volume: 924.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot, high of 85°F 3-5 mph wind 5mph or so

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter **Date:** 9/2/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090299-DRS-003

Pump Number: #3 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0854

Sample End Time: 1643

Sample Duration: 469 min

Sample Volume: 478.3L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 95°F, wind SW 7 NE @ 5mph

Sample Collected By: DRS

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (551UM)

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter Date: 9/2/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090299-DRS-004

Pump Number: #4 Sampling Badge Number:

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0909

Sample End Time: 1651

Sample Duration: 462

Sample Volume: 92.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 95°F, wind SW → NE @ 5 mph

Sample Collected By: DRS

Analysis Requested: mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter **Date:** 9/2/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090299-DRS-005

Pump Number: #5 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0911

Sample End Time: 1651

Sample Duration: 460

Sample Volume: 889.3L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW-NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: PAS.

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter **Date:** 9/2/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090299-DRS-006

Pump Number: #6 **Sampling Badge Number:**

Sampling Pump Design Flow: 1L/min

Sample Start Time: 1130

Sample End Time: 1651

Sample Duration: 321 minutes

Sample Volume: 325.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SW → NE @ 5mph

Sample Collected By: DRS

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (5510M)

Laboratory: P.A.S.

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter **Date:** 9/2/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090299-DRS-007

Pump Number: #7 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0919

Sample End Time: 1657

Sample Duration: 458 min

Sample Volume: 91.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW→NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: P.A.S.

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter **Date:** 9/2/94

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090294-DRS-005

Pump Number: #8 **Sampling Badge Number:**

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0920

Sample End Time: 1657

Sample Duration: 457 minutes

Sample Volume: 915.6L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SW→NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: P.A.S.

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter **Date:** 9/2/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090299-DRS-001

Pump Number: #9 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0921

Sample End Time: 1657

Sample Duration: 456 min

Sample Volume: 445.8L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW→NE @ 5m/h

Sample Collected By: DRS

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (5510M)

Laboratory: P.A.S

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter **Date:** 9/2/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090299-DRS-010

Pump Number: #10 **Sampling Badge Number:**

Sampling Pump Design Flow: 200 cc/min,n

Sample Start Time: 0928

Sample End Time: 1705

Sample Duration: 457 min

Sample Volume: 93.0 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SW→NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: P.A.S.

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter **Date:** 9/2/94

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090294-DRS-011

Pump Number: #11 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0929

Sample End Time: 1705

Sample Duration: 456 min.

Sample Volume: 913.7 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW → NE @ 5 mph

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: P.A.S.

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: west Perimeter Date: 9/2/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090299-DRS-012

Pump Number: #12 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0930

Sample End Time: 1705

Sample Duration: 455 min

Sample Volume: 464.7L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SE-7 NE @ 5mph

Sample Collected By: DRS

Analysis Requested: BTEX
Sampling/Analytical Method: NIOSH 5502 (5510 m)

Laboratory: P.A.S.

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter **Date:** 9/3/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090399-DRS-013

Pump Number: 1 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0813

Sample End Time: 1555

Sample Duration: 462 min

Sample Volume: 93 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW => NE @ 5mph

Sample Collected By: DRS

Analysis Requested: mercury
Sampling/Analytical Method: Niosh 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter **Date:** 9/3/99

Employee/Area:

Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090399-DRS-014

Pump Number: 2 **Sampling Badge Number:**

Sampling Pump Design Flow: 2 L/min

Sample Start Time: 0813

Sample End Time: 1555

Sample Duration: 462 min

Sample Volume: 908.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny hot 85°F, wind SW → NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Total particulates

Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: Soil Perimeter **Date:** 9/3/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090399-DRS-015

Pump Number: 3 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0813

Sample End Time: 1555

Sample Duration: 462 min

Sample Volume: 473.0L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F
Wind SW → NE @ 5 mph

Sample Collected By: DRS

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (5510M)

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter **Date:** 9/3/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-040399-DRS-016

Pump Number: 4 **Sampling Badge Number:**

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0824

Sample End Time: 1608

Sample Duration: 464 min

Sample Volume: 93.3 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 85°F, wind SW → NE @ 5 mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter **Date:** 9/3/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090399-DRS-017

Pump Number: 5 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2 L/min.

Sample Start Time: 0824

Sample End Time: 1608

Sample Duration: 464 min

Sample Volume: 931.9 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 95°F, wind SW → NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: Fast perimeter Date: 9/3/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090399-DRS-01S

Pump Number: 6 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0824

Sample End Time: 1608

Sample Duration: 464 min

Sample Volume: 466.2 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SW → NE @ 5mph

Sample Collected By: DRS

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (5510m)

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Date: _____

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-040399-DRS-019

Pump Number: 7 Sampling Badge Number: _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0830

Sample End Time: 1604

Sample Duration: 454 min

Sample Volume: 89.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): _____
Sunny, hot 85°F, wind SW-NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter **Date:** 9/3/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090399-DRS-020

Pump Number: 8 **Sampling Badge Number:**

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0830

Sample End Time: 1604

Sample Duration: 454 min

Sample Volume: 900.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 95°F, wind SW->NE @ 5mph

Sample Collected By: DRS

Analysis Requested: Total particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Date: 9/3/94

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090394-DRS-021

Pump Number: 9 Sampling Badge Number: _____

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0830

Sample End Time: 1604

Sample Duration: 454 min.

Sample Volume: 448.1 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): _____
Sunny, hot 85°F, wind SW→E @ 5 mph

Sample Collected By: DRS

Analysis Requested: BTEX
Sampling/Analytical Method: NIOSH 5502 (5510m)

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Date: 9/3/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090399-DRS-022

Pump Number: 10 Sampling Badge Number:

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0838

Sample End Time: 1601

Sample Duration: 443 min.

Sample Volume: 91.0 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 85°F, wind SW → NE @ 5 mph

Sample Collected By: DRS

Analysis Requested: Mercury
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter **Date:** 9/3/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-090399-DRS-023

Pump Number: 11 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2L/min.

Sample Start Time: 0838

Sample End Time: 1601

Sample Duration: 443min.

Sample Volume: 904.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Sunny, hot 95°F, wind SW→NE@ 5mph

Sample Collected By: DRS

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Date: 9/3/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-090399-DRS-024

Pump Number: 12 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min

Sample Start Time: 0838

Sample End Time: 1601

Sample Duration: 443min.

Sample Volume: 442.0 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc):
Sunny, hot 95°F, wind SW → NE @ 5mph

Sample Collected By:

Analysis Requested: BHCs
Sampling/Analytical Method: NIOSH 5502 (550m)

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter Fence **Date:** 9/22/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-14934-APK-001

Pump Number: #1 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 200 cc/min.

Sample Start Time: 0904

Sample End Time: 1623

Sample Duration: 439 minutes

Sample Volume: 90 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Hg
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter Fence **Date:** 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protectior respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-002

Pump Number: #1 **Sampling Badge Number:**

Sampling Pump Design Flow: 200 cc/min.

Sample Start Time: 0904

Sample End Time: 1623

Sample Duration: 439 minutes

Sample Volume: 90L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F.

Sample Collected By: APK

Analysis Requested: Hg (pre-filter)
Sampling/Analytical Method: NIOSH 6009 M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter Fence **Date:** 9/22/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-14934-APK-003

Pump Number: #2 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0904

Sample End Time: 1623

Sample Duration: 439 minutes

Sample Volume: 900.8 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F.

Sample Collected By: APK

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: South Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-004

Pump Number: #3 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min.

Sample Start Time: 0904

Sample End Time: 1623

Sample Duration: 439 minutes

Sample Volume: 430.1 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy. wind from the west, sunny high of 65°F.

Sample Collected By: APIC

Analysis Requested: BHC's
Sampling/Analytical Method: NIOSH 5510 M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter Fence Date: 9/22/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-14934-APK-005

Pump Number: #4 Sampling Badge Number: _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0917

Sample End Time: 1616

Sample Duration: 419 minutes

Sample Volume: 84.3 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F.

Sample Collected By: APK

Analysis Requested: Hg
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-AHK-006

Pump Number: #4 Sampling Badge Number:

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0917

Sample End Time: 1616

Sample Duration: 419 Minutes

Sample Volume: 84.3 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: AHK

Analysis Requested: Hg C pre-filter)
Sampling/Analytical Method: NIOSH 6009 M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-007

Pump Number: #5 Sampling Badge Number:

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0917

Sample End Time: 1616

Sample Duration: 419 minutes

Sample Volume: 819.6L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Total particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: East Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-008

Pump Number: #6 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min.

Sample Start Time: 0917

Sample End Time: 1616

Sample Duration: 419 minutes

Sample Volume: 433.2L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy wind from the west, sunny, high of 65°F.

Sample Collected By: APIC

Analysis Requested: BHC's
Sampling/Analytical Method: NIOSH 5510 M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Fence **Date:** 9/22/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-14934-APK-009

Pump Number: #7 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0920

Sample End Time: 1612

Sample Duration: 412 minutes

Sample Volume: 83.3 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Hg
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-010

Pump Number: #7 Sampling Badge Number:

Sampling Pump Design Flow: 200 cc/min.

Sample Start Time: 0920

Sample End Time: 1612

Sample Duration: 412

Sample Volume: 83.3L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Hg (pre-filter)
Sampling/Analytical Method: NIOSH 6009M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-011

Pump Number: #8 Sampling Badge Number:

Sampling Pump Design Flow: 2 L/min

Sample Start Time: 0920

Sample End Time: 1612

Sample Duration: 412 minutes

Sample Volume: 826.5 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): slightly breezy, wind from the west, sunny, high of 65°F.

Sample Collected By: APK

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: North Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-012

Pump Number: #9 Sampling Badge Number:

Sampling Pump Design Flow: 1L/min.

Sample Start Time: 0920

Sample End Time: 1612

Sample Duration: 412 minutes

Sample Volume: 426.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F.

Sample Collected By: APK

Analysis Requested: BHC's
Sampling/Analytical Method: NIOSH 5510 M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Fence Date: 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-013

Pump Number: #10 Sampling Badge Number:

Sampling Pump Design Flow: 200 cc/min

Sample Start Time: 0924

Sample End Time: 1609

Sample Duration: 405 minutes

Sample Volume: 80.6 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Hg
Sampling/Analytical Method: NIOSH 6009

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Fence **Date:** 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-014

Pump Number: #10 **Sampling Badge Number:**

Sampling Pump Design Flow: 200 cc/min.

Sample Start Time: 0924

Sample End Time: 1609

Sample Duration: 405 minutes

Sample Volume: 80.6 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Hg (Pre-filter)
Sampling/Analytical Method: NIOSH 6009M

Laboratory: Philip Analytical Services

Sample Results:

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Fence **Date:** 9/22/99

Employee/Area: _____
Social Security Number: _____

Job Title: _____

Operation Monitored: _____

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other): _____

Sample ID Number: A-14934-APK-015

Pump Number: #11 **Sampling Badge Number:** _____

Sampling Pump Design Flow: 2L/min

Sample Start Time: 0924

Sample End Time: 1609

Sample Duration: 405 minutes

Sample Volume: 812.4 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: Total Particulates
Sampling/Analytical Method: NIOSH 0500

Laboratory: Philip Analytical Services

Sample Results: _____

INDUSTRIAL HYGIENE SAMPLE RECORD

Location: West Perimeter Fence **Date:** 9/22/99

Employee/Area:
Social Security Number:

Job Title:

Operation Monitored:

Personal Protective Equipment Worn (e.g. eye protection,respirator, glove, boot, clothing,other):

Sample ID Number: A-14934-APK-016

Pump Number: #12 **Sampling Badge Number:**

Sampling Pump Design Flow: 1L/min.

Sample Start Time: 0924

Sample End Time: 1609

Sample Duration: 405 minutes

Sample Volume: 401.9 L

Remarks (describe weather conditions,possible interferences,temperature, barometric pressure,level of exertion,etc): Slightly breezy, wind from the west, sunny, high of 65°F

Sample Collected By: APK

Analysis Requested: BHC's
Sampling/Analytical Method: NIOSH 5510 M

Laboratory: Philip Analytical Services

Sample Results:

APPENDIX B

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE
- EPA/NVLAP 101262-0
- AIHA ACCREDITATION NO. 100439

ENVIRONMENTAL TESTING
- NY DOH 10903
- PA DER 06-353
- NJ DEP 77678

ANALYTICAL REPORT

Client: Sevenson Environmental Services, Inc.

Report to: Mark Nicklas
Sevenson Environmental Services, Inc.
2749 Lockport Road
P.O. Box 396
Niagara Falls NY 14304

Project: 185539
Received: 27-AUG-99
Reported: 31-AUG-99

PURCHASE ORDER: IE38598

Project Description: E624
Mercury/BHC/Total Particulate Analysis

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
Hg-N-082599 Air Volume: 106.8 L Lab Sample: 1372137 sampled: 25-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00019	mg/m3	6009
Hg-E-082599 Air Volume: 111.6 L Lab Sample: 1372138 sampled: 25-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00018	mg/m3	6009
Hg-W-082599 Air Volume: 117.8 L Lab Sample: 1372139 sampled: 25-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00017	mg/m3	6009
Hg-S-082599 Air Volume: 111.4 L Lab Sample: 1372140 sampled: 25-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00018	mg/m3	6009

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 05-353

Client: Sevenson Environmental Services, Inc.
Project: 185539

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
TP-N-082599					
Air Volume: 1004.9 L					
Lab Sample: 1372141					
sampled: 25-AUG-99 by: MN					
Particulate, Total	< 0.10	mg/sample	< 0.100	mg/m3	0500
TP-E-082599					
Air Volume: 986.0 L					
Lab Sample: 1372142					
sampled: 25-AUG-99 by: MN					
Particulate, Total	< 0.10	mg/sample			0500
TP-W-082599					
Air Volume: 988.8 L					
Lab Sample: 1372143					
sampled: 25-AUG-99 by: MN					
Particulate, Total	0.24	mg/sample			0500
TP-S-082599					
Air Volume: 993.6 L					
Lab Sample: 1372144					
sampled: 25-AUG-99 by: MN					
Particulate, Total	< 0.10	mg/sample			0500
BHC-N-082599					
Air Volume: 520.1 L					
Lab Sample: 1372145					
sampled: 25-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-E-082599					
Air Volume: 522.9 L					
Lab Sample: 1372146					
sampled: 25-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101252-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-333

Client: Sevenson Environmental Services, Inc.
Project: 185539

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
BHC-E-082599					
Lab Sample: 1372146 - continued					
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-W-082599					
Air Volume: 517.2 L					
Lab Sample: 1372147					
sampled: 25-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-S-082599					
Air Volume: 511.2 L					
Lab Sample: 1372148					
sampled: 25-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Hg-N-082699					
Air Volume: 104.2 L					
Lab Sample: 1372149					
sampled: 26-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00019	mg/m3	6009
Hg-E-082699					
Air Volume: 109.9 L					
Lab Sample: 1372150					
sampled: 26-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00018	mg/m3	6009

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77673
• AIHA ACCREDITATION NO. 100439 • PA DER 05-353

Client: Sevenson Environmental Services, Inc.
Project: 185539

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
Hg-W-082699					
Air Volume: 112.3 L					
Lab Sample: 1372151					
sampled: 26-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00018	mg/m3	6009
Hg-S-082699					
Air Volume: 107.5 L					
Lab Sample: 1372152					
sampled: 26-AUG-99 by: MN					
Mercury	0.02	ug/sample	0.00019	mg/m3	6009
TP-N-082699					
Air Volume: 1002.7 L					
Lab Sample: 1372153					
sampled: 26-AUG-99 by: MN					
Particulate, Total	0.36	mg/sample	0.359	mg/m3	0500
TP-E-082699					
Air Volume: 981.6 L					
Lab Sample: 1372154					
sampled: 26-AUG-99 by: MN					
Particulate, Total	< 0.10	mg/sample			0500
TP-W-082699					
Air Volume: 991.7 L					
Lab Sample: 1372155					
sampled: 26-AUG-99 by: MN					
Particulate, Total	0.12	mg/sample			0500
TP-S-082699					
Air Volume: 998.9 L					
Lab Sample: 1372156					
sampled: 26-AUG-99 by: MN					
Particulate, Total	< 0.10	mg/sample			0500

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE — ENVIRONMENTAL TESTING

- EPA/NVLAP 101262-0
- AIHA ACCREDITATION NO. 100439
- NY DOH 10903
- PA DER 06-353
- NJ DEP 77678

Client: Sevenson Environmental Services, Inc.
Project: 185539

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
BHC-N-082699					
Air Volume: 515.0 L					
Lab Sample: 1372157					
sampled: 26-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-E-082699					
Air Volume: 520.3 L					
Lab Sample: 1372158					
sampled: 26-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-W-082699					
Air Volume: 514.1 L					
Lab Sample: 1372159					
sampled: 26-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
BHC-S-082699					
Air Volume: 518.4 L					
Lab Sample: 1372160					
sampled: 26-AUG-99 by: MN					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	

Final sample concentrations calculated from air volumes supplied on chain of custody.
< indicates less than the limit of quantitation.

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

ANALYTICAL REPORT

Client: Conestoga-Rovers & Associates

Report to: Dustin Sterner
Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite Three
Niagara Falls NY 14304

Project: 185802
Received: 07-SEP-99
Reported: 15-SEP-99

Project Description: 14934 OLIN/IWS

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-090299-DRS-001					
Air Volume: 93.8 L					
Lab Sample: 1373350					
sampled: 02-SEP-99 by: DS					
Mercury	0.04	ug/sample	0.0004	mg/m3	6009
A-090299-DRS-002					
Air Volume: 924.4 L					
Lab Sample: 1373351					
sampled: 02-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090299-DRS-003					
Air Volume: 478.3 L					
Lab Sample: 1373352					
sampled: 02-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
A-090299-DRS-004					
Air Volume: 92.8 L					
Lab Sample: 1373353					
sampled: 02-SEP-99 by: DS					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 185802

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-090299-DRS-005					
Air Volume: 889.3 L					
Lab Sample: 1373354					
sampled: 02-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090299-DRS-006					
Air Volume: 325.8 L					
Lab Sample: 1373355					
sampled: 02-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.06	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.06	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.06	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.06	ug/m3	5510
A-090299-DRS-007					
Air Volume: 91.4 L					
Lab Sample: 1373356					
sampled: 02-SEP-99 by: DS					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009
A-090299-DRS-008					
Air Volume: 915.6 L					
Lab Sample: 1373357					
sampled: 02-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090299-DRS-009					
Air Volume: 445.8 L					
Lab Sample: 1373358					
sampled: 02-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510

PHILIP
ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 185802

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-090299-DRS-010					
Air Volume: 93.0 L					
Lab Sample: 1373359					
sampled: 02-SEP-99 by: DS					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009
A-090299-DRS-011					
Air Volume: 913.7 L					
Lab Sample: 1373360					
sampled: 02-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090299-DRS-012					
Air Volume: 464.7 L					
Lab Sample: 1373361					
sampled: 02-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
A-090399-DRS-013					
Air Volume: 93.1 L					
Lab Sample: 1373362					
sampled: 03-SEP-99 by: DS					
Mercury	< 0.01	ug/sample	< 0.0001	mg/m3	6009
A-090399-DRS-014					
Air Volume: 908.8 L					
Lab Sample: 1373363					
sampled: 03-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090399-DRS-015					
Air Volume: 473.0 L					
Lab Sample: 1373364					
sampled: 03-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0
• AIHA ACCREDITATION NO. 100439
• NY DOH 10903
• PA DER 06-353
• NJ DEP 77678

Client: Conestoga-Rovers & Associates
Project: 185802

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-090399-DRS-015					
Lab Sample: 1373364 - continued					
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
A-090399-DRS-016					
Air Volume: 93.3 L					
Lab Sample: 1373365					
sampled: 03-SEP-99 by: DS					
Mercury	0.04	ug/sample	0.0004	mg/m3	6009
A-090399-DRS-017					
Air Volume: 931.9 L					
Lab Sample: 1373366					
sampled: 03-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-090399-DRS-018					
Air Volume: 466.2 L					
Lab Sample: 1373367					
sampled: 03-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
A-090399-DRS-019					
Air Volume: 89.4 L					
Lab Sample: 1373368					
sampled: 03-SEP-99 by: DS					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009
A-090399-DRS-020					
Air Volume: 900.4 L					
Lab Sample: 1373369					
sampled: 03-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 185802

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-090399-DRS-021					
Air Volume: 448.1 L					
Lab Sample: 1373370					
sampled: 03-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.04	ug/m3	5510
A-090399-DRS-022					
Air Volume: 91.0 L					
Lab Sample: 1373371					
sampled: 03-SEP-99 by: DS					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009
A-090399-DRS-023					
Air Volume: 904.8 L					
Lab Sample: 1373372					
sampled: 03-SEP-99 by: DS					
Particulate, Total	0.19	mg/sample	0.21	mg/m3	0500
A-090399-DRS-024					
Air Volume: 442.0 L					
Lab Sample: 1373373					
sampled: 03-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510
Beta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510
Gamma BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510
Blank Tube					
Air Volume: Blank					
Lab Sample: 1373374					
sampled: 03-SEP-99 by: DS					
Mercury	0.02	ug/sample			6009

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ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0
• AIHA ACCREDITATION NO. 100439
• NY DOH 10903
• PA DER 06-353
• NJ DEP 77678

Client: Conestoga-Rovers & Associates
Project: 185802

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
Blank Cassette					
Air Volume: Blank					
Lab Sample: 1373375					
sampled: 03-SEP-99 by: DS					
Particulate, Total	< 0.10	mg/sample			0500
Blank Cassette					
Air Volume: Blank					
Lab Sample: 1373376					
sampled: 03-SEP-99 by: DS					
Alpha BHC	< 0.02	ug/sample			5510
Beta BHC	< 0.02	ug/sample			5510
Gamma BHC	< 0.02	ug/sample			5510
Delta BHC	< 0.02	ug/sample			5510

Final sample concentrations calculated from air volumes supplied on chain of custody.
< Indicates less than the limit of quantitation.

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ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

ANALYTICAL REPORT

Client: Conestoga-Rovers & Associates

Report to: Dustin Sterner
Conestoga-Rovers & Associates
2055 Niagara Falls Blvd.
Suite Three
Niagara Falls NY 14304

Project: 186443
Received: 24-SEP-99
Reported: 07-OCT-99

Project Description: 14934 Olin/IWS
Mercury, Particulates, BHCs (5502)

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-14934-APK-001					
Air Volume: 90 L					
Lab Sample: 1376223					
sampled: 22-SEP-99					
Mercury	0.03	ug/sample	0.0003	mg/m3	6009
A-14934-APK-005					
Air Volume: 84.3 L					
Lab Sample: 1376224					
sampled: 22-SEP-99					
Mercury	0.07	ug/sample	0.0008	mg/m3	6009
A-14934-APK-009					
Air Volume: 83.3 L					
Lab Sample: 1376225					
sampled: 22-SEP-99					
Mercury	0.02	ug/sample	0.0002	mg/m3	6009
A-14934-APK-013					
Air Volume: 80.6 L					
Lab Sample: 1376226					
sampled: 22-SEP-99					
Mercury	0.02	ug/sample	0.0002	mg/m3	6009

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0
• AIHA ACCREDITATION NO. 100439
• NY DOH 10903
• PA DER 06-353
• NJ DEP 77678

Client: Conestoga-Rovers & Associates
Project: 186443

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
FB-14934-APK-017					
Air Volume: 0 L					
Lab Sample: 1376227					
sampled: 22-SEP-99					
Mercury	0.02	ug/sample			6009
The SKC Lot #982 has a history of trace mercury present. The In-house blank and the client's blank had 0.02 ug present. The results were not blank corrected.					
A-14934-APK-003					
Air Volume: 900.8 L					
Lab Sample: 1376228					
sampled: 22-SEP-99					
Particulate, Total	< 0.10	mg/sample	< 0.11	mg/m3	0500
A-14934-APK-007					
Air Volume: 819.6 L					
Lab Sample: 1376229					
sampled: 22-SEP-99					
Particulate, Total	< 0.10	mg/sample	< 0.12	mg/m3	0500
A-14934-APK-011					
Air Volume: 826.5 L					
Lab Sample: 1376230					
sampled: 22-SEP-99					
Particulate, Total	< 0.10	mg/sample	< 0.12	mg/m3	0500
FB-14934-APK-019					
Air Volume: 0 L					
Lab Sample: 1376231					
sampled: 22-SEP-99					
Particulate, Total	< 0.10	mg/sample			0500
A-14934-APK-004					
Air Volume: 430.1 L					
Lab Sample: 1376232					
sampled: 22-SEP-99					
Alpha BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 186443

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
A-14934-APK-004					
Lab Sample: 1376232 - continued					
Beta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Gamma BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Delta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
A-14934-APK-008					
Air Volume: 433.2 L					
Lab Sample: 1376233					
sampled: 22-SEP-99					
Alpha BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Beta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Gamma BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Delta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
A-14934-APK-012					
Air Volume: 426.4 L					
Lab Sample: 1376234					
sampled: 22-SEP-99					
Alpha BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Beta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Gamma BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510
Delta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
A-14934-APK-016					
Air Volume: 401.9 L					
Lab Sample: 1376235					
sampled: 22-SEP-99					
Alpha BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Beta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Gamma BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
Delta BHC	< 0.02	ug/sample	< 0.05	ug/m3	5510M
FB-14934-APK-020					
Air Volume: 0 L					
Lab Sample: 1376236					
sampled: 22-SEP-99					
Alpha BHC	< 0.02	ug/sample			5510M
Beta BHC	< 0.02	ug/sample			5510M
Gamma BHC	< 0.02	ug/sample			5510M

PHILIP ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 186443

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
FB-14934-APK-020					
Lab Sample: 1376236 - continued					
Delta BHC	< 0.02	ug/sample			5510M
A-14934-APK-015					
Air Volume: 812.4 L					
Lab Sample: 1376237					
sampled: 22-SEP-99					
Particulate, Total	< 0.10	mg/sample	< 0.10	mg/m3	0500
A-14934-APK-002					
Air Volume: 90 L					
Lab Sample: 1376308					
sampled: 22-SEP-99 by: APK					
Mercury	< 0.01	ug/sample	< 0.1	ug/m3	6009M
A-14934-APK-006					
Air Volume: 84.3 L					
Lab Sample: 1376309					
sampled: 22-SEP-99 by: APK					
Mercury	< 0.01	ug/sample	< 0.1	ug/m3	6009M
A-14934-APK-010					
Air Volume: 83.3 L					
Lab Sample: 1376310					
sampled: 22-SEP-99 by: APK					
Mercury	< 0.01	ug/sample	< 0.1	ug/m3	6009M
A-14934-APK-014					
Air Volume: 80.6 L					
Lab Sample: 1376311					
sampled: 22-SEP-99 by: APK					
Mercury	< 0.01	ug/sample	< 0.1	ug/m3	6009M

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ANALYTICAL SERVICES

INDUSTRIAL HYGIENE ENVIRONMENTAL TESTING

• EPA/NVLAP 101262-0 • NY DOH 10903 • NJ DEP 77678
• AIHA ACCREDITATION NO. 100439 • PA DER 06-353

Client: Conestoga-Rovers & Associates
Project: 186443

	RESULT	UNITS	CONCENTRATION	UNITS	METHOD
FB-14934-APK-018					
Air Volume: 0 L					
Lab Sample: 1376312					
sampled: 22-SEP-99 by: APK					
Mercury	< 0.01	ug/sample			6009M

Final sample concentrations calculated from air volumes supplied on chain of custody.
< Indicates less than the limit of quantitation.

APPENDIX D

MONITORING WELL AND PIEZOMETER DECOMMISSIONING AND INSTALLATION REPORTS

APPENDIX D-1

MONITORING WELL AND PIEZOMETER DECOMMISSIONING

GLYNN GEOTECHNICAL ENGINEERING

LETTER OF TRANSMITTAL

TO:

Law Engineering and Environmental Services, Inc.
112 TownPark Drive
Kennesaw, GA 30144

DATE:	February 1, 2000
ATTENTION:	David Wheeless
	Industrial Welding Site
GGE PROJECT NO:	99-1076-B

WE ARE SENDING ATTACHED:

☐ LABORATORY TEST DATA ☐ FIELD REPORT ☒ REPORT

☐ ENGINEERING DRAWINGS ☐ _____

COPIES	DATE	REPORT NO.	DESCRIPTION
1	02/01/00	N/A	Revised Monitoring Well/Piezometer Decommissioning Report

THESE ARE BEING SENT:

☐ FOR YOUR USE ☒ PER YOUR REQUEST ☐ _____

SINCERELY,
GLYNN GEOTECHNICAL ENGINEERING

Edward Lover
Senior Engineering Technician

DISTRIBUTION

DOCFILE:Lot.xlsLaw - DWXL

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

• VISIT OUR WEB SITE AT www.glynngroup.com / E-MAIL: gge@glynngroup.com •

September 24, 1999

Olin Chemical
1186 Lower River Road
P.O. Box 248
Charleston, TN 37310

Attn: Mr. John Burns

Subject: **Industrial Welding Site**
Well Decommissioning Report Revision
GGE 99-1076

Dear Mr. Burns:

Attached you will find the requested revisions to the monitoring well and piezometer decommissioning report for the work performed from July 28, 1999 through July 30, 1999, including field observation reports (FORs) field monitoring logs, well and piezometer decommissioning logs and a site plan showing locations for all decommissioned wells.

All wells and piezometers were decommissioned in accordance with NYSDEC procedures. Please call Jesse Grossman if you should have any questions.

Sincerely,

GLYNN GEOTECHNICAL ENGINEERING

Jesse E. Grossman, P.E.
Senior Project Manager

Mark W. Glynn, P.E.
Consulting Engineer, Principal

JEG/MWG:lmk

Encl.

DOCFILE:99-1076\W

GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-01 DATE: 07/28/99 PAGE: 1 OF 3

PROJECT: Industrial Welding Site DAY: Wednesday

SUBJECT: Well Decommisioning CQC/CQA - DSR PROJECT TIME: 7:15 am - 5:00 pm

CLIENT: Olin Corporation/Law Engineering SITE TIME: 8:00 am - 5:00 pm

WEATHER: Sunny, 85 ° F PHOTOS: YES No X

- I arrived on site at 8:00 am and met with Jerry Castiglione of Sevenson. Jerry Jones of Maxim arrived at 8:15 am along with drillers Rick and Mike.

- A total of 15 wells were abandoned using either the "grouting in place" method or the "casing pulling" method.

- All wells were monitored with a Jerome Hg meter and an HNU photo ionization detector before and during decommissioning procedures for Hg vapors and organic gases. Readings for all wells were found to be comparable to background levels. Since no outstanding levels were detected, PPE consisted of Tyvec, PVC boots and rubber gloves. A health and safety briefing was given by Paul of Sevenson prior to beginning construction. Monitoring logs are attached to this report.

- All decommissioning was performed to specifications, with the exception of the protective casing removal and subsurface excavation of grouted wells within the IWS and ALP construction perimeter. Protective casings were left intact on wells decommissioned by the grouting in place method located within the IWS and ALP perimeter due to unssuccessful attempts at removing the protective casings off of MW-3S, MW-3D and MW-4D. Attempts were not made to remove the protective casings off the remainder of the wells located within the IWS and ALP perimeter due to the difficulty in attempting to remove the protective casings from MW-3S, MW-3D and MW-4D. SES will remove these protective casings as soon as an excavator is delivered to the site and construction begins.

- All wells were grouted at or above the ground surface using Portland Type 1 Cement.

PERSONNEL ON SITE / CONTACTED:

Jerry Castiglione, Paul Hitcho - SES

Jerry Jones, Mike Guzice, Rick Rose - Maxim Technologies

Steve - Union (SES)

DISTRIBUTION:

John Burns - Olin Corp.

DAILY MANHOURS: 9.25

REPORTED BY: Edward Lover

REVIEWED BY: Mark W. Glynn, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-01 DATE: 07/28/99 PAGE: 2 OF 3

- Depths of all wells were checked prior to decommissioning and compared to documented depths. Attempts were made to flush out any material that may cause a discrepancy in depths.

- The following is a summary of the well decommissioning:

MW - 3S start: 8:59am finish: 10:00am

- depth was measured at 15.8 ft., documented depth was 20.5 ft.
- material at the bottom of the well was solid and could not be flushed.
- well was successfully grouted.
- protective casing will be removed by Sevenson at the onset of construction.

MW - 3D start: 9:40am finish: 10:00am

- depth was measured at 24.5 ft., documented depth was 24.5 ft.
- well was successfully grouted.
- protective casing will be removed by Sevenson at the onset of construction.

MW - 4D & 4S start: 10:15am finish: 10:50am

- measured depths were 22.8 ft. for MW-4D and 17.5 ft. for MW-4S.
- documented depths were 22.8 ft. and 17.5 ft. respectfully.
- wells were successfully grouted.
- protective casings will be removed by Sevenson at the onset of construction.

MW - 5S & 5D start: 10:55am finish: 11:10am

- measured depths were 15 ft. for MW-5S and 22.3ft for MW-5D.
- documented depths were 15 ft. and 22.3 ft. respectfully.
- wells were successfully grouted.
- protective casings will be removed by Sevenson at the onset of construction.

MW - 12S & 12D start: 11:25am finish: 12:45pm

- measured depths were 14.4 ft for MW-12S and 29.7 ft. for MW-12D.
- documented depths were 14.4 ft. and 29.7 ft. respectfully.
- wells are labeled opposite of the locations found in the field on the site plan.
- both wells were successfully grouted, although 12S took 1 min. to stabilize.
- protective casings will be removed by Sevenson at the onset of construction.

MWG 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-01 DATE: 07/28/99 PAGE: 3 OF 3

P4 start: 12:45pm finish: 1:20pm

- Hg meter needed to be regenerated prior to beginning decommissioning.
- measured depth was 5 ft., documented depth was 5 ft..
- protective casing and screen were successfully removed.
- well was successfully grouted.

P6 &P2 start: 1:20pm finish: 1:35pm

- measured depths were 8 ft. for P6 and 5 ft. for P2.
- documented depths were 8 ft. and 5 ft. respectfully.
- both wells were successfully removed and grouted.

MW 6S & 6D start: 1:35pm finish: 2:05pm

- depth on 6S found to be 3 ft. shallow at 15.5 ft., with a hard plastic object in the bottom of the well, most likely a bailer. It was not possible to remove the object. Documented depth was 18.5 ft.
- measured depth on 6D was 17.0 ft., documented depth was 17.0 ft..
- both wells were successfully grouted.
- protective casings will be removed by Sevenson at the onset of construction.

P9S & P9D start: 2:15pm finish: 3:00pm

- measured depths were 7 ft. for P9S and 14.8 ft. for P9D.
- documented depths were 7 ft. and 14.8ft. Respectfully.
- due to the concrete road box incasing P9S and P9D, P9S could not be removed by the "casing pulling" method and was subsequently grouted in place.
- both wells were successfully grouted.

- The minor amounts of flushed materials encountered were mixed with the grout and contained with in the wells.
- After completing P9S and P9D, the remainder of the day was spent determining locations and accessibility of the remainder of the wells to be abandoned.
- Maxim and GGE left the site at 4:00pm.

MW 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-02 DATE: 07/29/99 PAGE: 1 OF 3

PROJECT: Industrial Welding Site DAY: Thursday

SUBJECT: Well Decommissioning CQC/CQA - DSR PROJECT TIME: 6:30 am - 5:00 pm

CLIENT: Olin Corporation/Law Engineering SITE TIME: 7:00 am - 4:00 pm

WEATHER: Sunny, 85 ° F PHOTOS: YES No X

- I arrived on site at 7:00 am and met with Jerry Castiglione of Sevenson and Steve from the union. Maxim arrived at 7:15am.
- A total of 9 wells were decommissioned using the "grouting in place" method.
- All wells were monitored with a Jerome Hg meter and an HNU photo ionization detector before and during decommissioning procedures for Hg vapors and organic gases. Readings for all wells were found to be at or below background levels. Since no outstanding levels were detected, PPE consisted of Tyvec, PVC boots and rubber gloves. Paul of Sevenson visited the site in the morning to make sure all the instruments were working properly. Monitoring logs are attached to this report.
- All wells were decommissioned in accordance with NYSDEC procedures.
- All wells were grouted at or above the ground surface using Portland Type 1 Cement.
- Depths of all wells were checked prior to decommissioning and compared to documented depths. Attempts were made to flush out any material that may cause a discrepancy in depths. The minor amounts of flushed materials encountered were mixed with the grout and contained with in the wells.

PERSONNEL ON SITE / CONTACTED:

Jerry Castiglione, Paul Hitcho - Sevenson

Mike Guzice, Rick Rose - Maxim Technologies

Steve - Union (Sevenson)

DISTRIBUTION:

John Burns - Olin Corp.

DAILY MANHOURS: 10.00

REPORTED BY: Edward Lover

REVIEWED BY: Mark W. Glynn, P.E. 9.27.99

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-02 DATE: 07/29/99 PAGE: 2 OF 3

- The following is a summary of the well decommissioning:

MW - 1S, MW - 1D & MW - 15D start: 8:59am finish: 10:00am

- measured depths were 8.5 ft., 13.5 ft., and 28.5 ft. respectfully.
- documented depths were 8.5 ft., 13.5 ft., and 28.5 ft. respectfully.
- soil was excavated by hand around each well to a depth of approximately 2 ft..
- the protective casing and riser were cut at the excavated depth with a torch.
- all wells were successfully grouted, with dry grout having to be added to 15D to stabilize.

MW- 2S & 2D start: 10:30am finish: 11:00am

- MW- 2D was found to be 1.5 ft. shallow, at 17.8 ft., with a very hard bottom.
- documented depth was 19.3 ft..
- an unsuccessful attempt was made at flushing out 2D.
- measured depth on 2S was 13.5 ft.
- documented depth on 2S was 13.5 ft.
- both wells were successfully grouted.
- Sevenson will remove protective casings at the onset of construction.

P-8D & P-8S start: 11:30am finish: 11:45am

- P-8S was not decommissioned.
- P-8D and P-8S are located in the same protective casing so casing removal and excavation could not be performed.
- measured depth for P-8D was 14.2 ft..
- documented depth for P-8D was 14.2 ft..
- P-8D was successfully grouted.

P-7D & P-7S start: 11:45am finish: 12:00pm

- P-7S was not decommissioned.
- P-7D and P-7S are located in the same protective casing so casing removal and excavation could not be performed.
- measured depth for P-7D was 14.5 ft.
- documented depth for P-7D was 14.5 ft.
- P-7D was successfully grouted.

MWG 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-02 DATE: 07/29/99 PAGE: 3 OF 3

MW-11S & 11D start: 12:30pm finish: 3:00pm

- removed concrete posts around wells.
- measured depths were 10.4 ft. and 29.6 ft. respectfully.
- documented depths were 10.4 ft. and 29.6 ft. respectfully.
- an attempt to remove the protective casing on 11S removed entire well.
- 11D was excavated to a depth of approximately 2 ft. and cut with torch.
- both were successfully grouted.

- All wells located off of Olin property were restored to conditions equivalent to their surroundings.
- All time not accounted for was spent locating wells and mobilizing equipment.
- All previously grouted wells were checked for grout subsidence and topped off where necessary.
- Jerry Castiglione scheduled with Dupont to abandon the wells on their property at 8:00am on 7/30/99.
- Maxim left the site at 3:30 pm and GGE left the site at 4:00pm.

MW 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-03 DATE: 07/30/99 PAGE: 1 OF 3

PROJECT: Industrial Welding Site DAY: Friday

SUBJECT: Well Decommissioning CQC/CQA - DSR PROJECT TIME: 7:15 am - 4:30 pm

CLIENT: Olin Corporation/Law Engineering SITE TIME: 7:45 am - 3:45 pm

WEATHER: Sunny, 90 ° F PHOTOS: YES No X

- I arrived on site at 7:45 am and met with Rick and Mike from Maxim.

- A total of 5 wells were decommissioned using the "grouting in place" method.

- All wells were monitored with a Jerome Hg meter and an HNU photo ionization detector before and during decommissioning procedures for Hg vapors and organic gases. A Biosystems PhD Ultra combustible gas indicator and oxygen sensor was also used to comply with the monitoring requested by Dupont. Readings for for all wells were comparible to background levels with the exception of MW - 14S & 14D, where readings were detected over the general area and not just at the wells. Oxygen levels were at 21.2%, the LEL was at 3% and Hg peaked at .010 mg/m3. Although the mercury readings were above background, they were still below the recommended level of .025 mg/m3 for increasing PPE as suggested by Paul Hitcho. Monitoring logs are attached to this report.

- All wells were decommissioned in accordance with NYSDEC procedures.

- All wells were grouted at or above the ground surface using Portland Type 1 Cement.

- Depths of all wells were checked prior to abandonment and compared to documented depths. Attempts were made to flush out any material that may cause a discrepancy in depths. The minor amounts of flushed materials encountered were mixed with the grout and contained within the wells.

PERSONNEL ON SITE / CONTACTED:

Jerry Castiglione - Sevenson

Mike Guzice, Rick Rose - Maxim Technologies

Steve - Union (Sevenson)

Dan - URS Greiner

DISTRIBUTION:

John Burns - Olin Corp.

DAILY MANHOURS: 8.75

REPORTED BY: Edward Lover

REVIEWED BY: Mark W. Glynn, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-03 DATE: 07/30/99 PAGE: 2 OF 3

- The following is a summary of the well decommissioning:

MW - 13S & MW - 13D start: 8:00am finish: 11:00am

- met with Dupont representative (Dan - URS) at the Dupont well location.
- large wasp nest in 13D had to be disposed of prior to starting.
- 13 D was measured to be 1 ft. shallow, at 29.1 ft., and was successfully flushed upon grouting.
- documented depth was 30.1 ft.
- 13S was measured at 10.5 ft., documented depth was 10.5 ft.
- concrete posts were removed around wells.
- soil was excavated by hand around each well to a depth of approximately 2 ft..
- the protective casings and risers were cut at the excavated depth with a torch.
- both wells were successfully grouted.

MW - 14D & MW - 14S start: 11:00am finish: 1:15pm

- concrete posts were removed from around wells.
- Hg and LEL levels were found slightly above background.
- measured depths were 30.0 ft. and 6.2 ft. respectfully.
- documented depths were 30.0 ft. and 6.2 ft. respectfully.
- 14S was entirely removed due to the fact that it was only 6 ft. deep and that the LEL was at 3%, preventing any unnecessary torch use.
- 14D was excavated to approximately 2 ft. and cut with a torch.
- both wells were successfully grouted.

MW - 9S start: 1:45pm finish: 2:30pm

- measured depth was 17.5 ft., documented depth was 17.5 ft..
- soil was excavated by hand around the well to a depth of approximately 2 ft..
- the protective casing and riser was cut at the excavated depth with a torch.
- well was successfully grouted.

- All work performed in grass areas of private property, at MW-9S, MW-11S and MW-11D, was covered with topsoil and seeded to restore to previous conditions. Areas of work on private property not located in grass, at MW-14S, MW-14D, MW-13D, MW-14D, MW-15D, MW-1S and MW-1D were restored to conditions equivalent to their sorroundings.

- All removed debris from abandoned wells was placed within the IWS perimeter.

- Maxim left the site at 3:30pm and GGE left at 3:45pm.

9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

FIELD OBSERVATION REPORT

PROJECT NO.: 99-1076 REPORT NO.: 99-03 DATE: 07/30/99 PAGE: 3 OF 3

- A total of 29 wells were abandoned to complete this phase of the project, with 2 wells remaining as requested by the Olin Corporation.

MWG 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

AIR MONITORING SUMMARY

Project: Industrial Welding Site
GGE No.: 99-1076 (Pre-construction - Well Decommissioning)
Client: Olin Environmental Management, Inc.

Date	Time	Location	Hg (mg/m^3) "Jerome"	VOC's (ppm) Hnu	O_2 (%) CGI	LEL (%) CGI
7.28.99	0810	Background - Parking Lot	0.007			
"	0812	"	BDL			
"	0815	"		0.8		
"	0830	MW-4D	BDL			
"	0832	MW-4S	BDL			
"	0836	MW-4D	BDL			
"	0840	MW-4S		0.8		
"	0842	MW-4D		0.6		
"	0850	MW-3D	BDL			
"	0852	MW-3S		0.8		
"	0854	MW-3S	BDL			
"	0854	MW-3D		0.6		
"	0858	MW-5D	BDL	0.8		
"	0900	MW-5S	BDL	0.8		
"	0940	MW-3S	BDL	1.0		
"	0945	MW-3S	0.004			
"	0947	MW-3D	BDL			
"	1040	MW-4S	0.005			
"	1042	MW-4S		1.0		
"	1044	MW-4D	0.005			
"	1100	MW-5S	0.003			
"	1105	MW-5D	0.003			
"	1135	MW-12D	BDL			
"	1135	MW-12S		0.8		
"	1137	MW-12S	BDL			
"	1137	MW-12D		0.8		
"	1147	MW-12D	0.008			
"	1313	P4	0.003	0.8		
"	1320	P4	0.006			
"	1330	P6	0.007	0.8		
"	1331	P2	0.002	0.5		
"	1335	P2/P6	0.005			
"	1345	MW-6S	0.004	0.5		
"	1347	MW-6D	0.003	0.5		
"	1353	MW-6S	0.006			
"	1356	MW-6D	0.005			
"	1433	P9S	BDL	0.5		
"	1435	P9D	BDL	0.8		

MWP 9.27.99

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GLYNN GEOTECHNICAL ENGINEERING

AIR MONITORING SUMMARY

Project: Industrial Welding Site
GGE No.: 99-1076 (Pre-construction - Well Decommissioning)
Client: Olin Environmental Management, Inc.

Date	Time	Location	Hg (mg/m^3) "Jerome"	VOC's (ppm) Hnu	O_2 (%) CGI	LEL (%) CGI
7.29.99	0752	Bckground - At Truck	0.004	0.7		
"	0755	MW-1D	BDL			
"	0756	MW-1S	BDL			
"	0756	MW-15D	BDL			
"	0757	MW-1D		1.2		
"	0757	MW-1S		1.2		
"	0758	MW-15D		1.0		
"	0807	MW-1D	BDL	0.8		
"	0820	MW-1S	0.005	0.5		
"	0855	MW-15D	0.003	1.1		
"	0954	MW-15D	BDL			
"	1010	MW-1S	BDL			
"	1050	MW-2S	BDL	0.6		
"	1052	MW-2D	BDL	0.7		
"	1058	MW-2D	BDL			
"	1059	MW-2S	0.004			
"	1136	P8D	BDL	0.3		
"	1150	P7D	BDL			
"	1154	P7D		0.3		
"	1256	MW-11S	0.003	0.4		
"	1326	MW-11D	BDL			
"	1328	MW-11D		1.0		
7.30.99	0850	Background - At Truck		0.6	20.8	0.0
"	0853	MW-13S			20.5	0.0
"	0857	MW-13S		0.4		
"	0920	Background - At Truck	BDL			
"	0922	MW-13S	BDL			
"	0935	MW-13D			20.5	0.0
"	0935	MW-13D	0.003			
"	0940	MW-13D		20.0*		
"	1108	MW-14S	0.003	0.5		
"	1111	MW-14S			21.2	3.0
"	1116	MW-14D			21.2	3.0
"	1118	MW-14D	0.01	0.5		
"	1300	MW-14D	0.006			
"	1345	MW-9S	BDL	0.5		
"	1347	MW-9S			20.9	0.0

* After spraying for wasps.

MWG 9.27.99

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WELL DECOMMISSIONING SUMMARY

Project: Industrial Welding Site
GGE No.: 99-1076 (Pre-construction - Well Decommissioning)
Client: Olin Environmental Management, Inc.

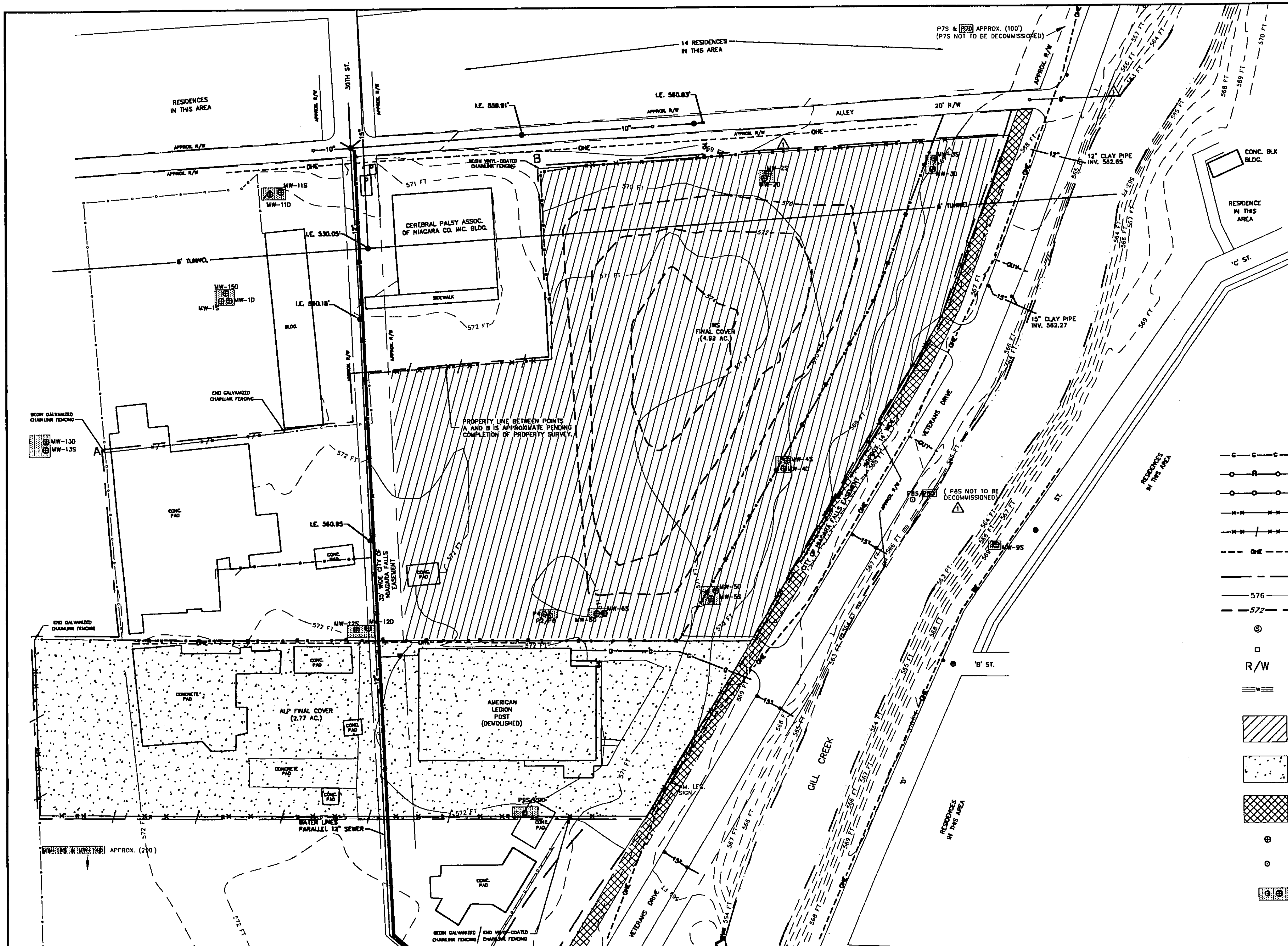
Date	Time	Location	Documented Depth	Measured Depth	Decommissioning Method	Pro-casing To Be Removed At Onset of Construction	Successfully Dcommissioned
7/28/1999	8:59 am - 10:00 am	MW - 3S	20.5 ft.	15.8 ft.	GROUTING IN PLACE	X	X
7/28/1999	9:40 am - 10:00 am	MW - 3D	24.5 ft.	24.5 ft.	GROUTING IN PLACE	X	X
7/28/1999	10:15 am - 10:40 am	MW - 4D	22.8 ft.	22.8 ft.	GROUTING IN PLACE	X	X
7/28/1999	10:15 am - 10:50 am	MW - 4S	17.5 ft.	17.5 ft.	GROUTING IN PLACE	X	X
7/28/1999	10:55 am - 11:10 am	MW - 5S	15.0 ft.	15.0 ft.	GROUTING IN PLACE	X	X
7/28/1999	10:55 am - 11:10 am	MW - 5D	22.3 ft.	22.3 ft.	GROUTING IN PLACE	X	X
7/28/1999	11:25 am - 12:45 am	MW - 12S	14.4 ft.	14.4 ft.	GROUTING IN PLACE	X	X
7/28/1999	11:25 am - 12:45 am	MW - 12D	29.7 ft.	29.7 ft.	GROUTING IN PLACE	X	X
7/28/1999	12:45 pm - 1:20 pm	P - 4	5 ft.	5 ft.	CASING PULLING		X
7/28/1999	1:20 pm - 1:35 pm	P - 6	8 ft.	8 ft.	CASING PULLING		X
7/28/1999	1:20 pm - 1:35 pm	P - 2	5 ft.	5 ft.	CASING PULLING		X
7/28/1999	1:35 pm - 2:05 pm	MW - 6S	18.5 ft.	15.5 ft.	GROUTING IN PLACE	X	X
7/28/1999	1:35 pm - 2:05 pm	MW - 6D	17.0 ft.	17.0 ft.	GROUTING IN PLACE	X	X
7/28/1999	2:15 pm - 3:00 pm	P - 9S	7.0 ft.	7.0 ft.	GROUTING IN PLACE *		X
7/28/1999	2:15 pm - 3:00 pm	P - 9D	14.8 ft.	14.8 ft.	GROUTING IN PLACE *		X
7/29/1999	8:59 am - 10:00 am	MW - 1S	8.5 ft.	8.5 ft.	GROUTING IN PLACE		X
7/29/1999	8:59 am - 10:00 am	MW -1D	13.5 ft.	13.5 ft.	GROUTING IN PLACE		X
7/29/1999	8:59 am - 10:00 am	MW - 15D	28.5 ft.	28.5 ft.	GROUTING IN PLACE		X
7/29/1999	10:30 am - 11:00 am	MW - 2S	13.5 ft.	13.5 ft.	GROUTING IN PLACE	X	X
7/29/1999	10:30 am - 11:00 am	MW - 2D	19.3 ft.	17.8 ft.	GROUTING IN PLACE	X	X
7/29/1999	11:30 am - 11:45 am	P -8D	14.2 ft.	14.2 ft.	GROUTING IN PLACE *		X
7/29/1999	11:45 am - 12:00 pm	P - 7D	14.5 ft.	14.5 ft.	GROUTING IN PLACE *		X
7/29/1999	12:30 pm - 3:00 pm	MW - 11S	10.4 ft.	10.4 ft.	GROUTING IN PLACE		X
7/29/1999	12:30 pm - 3:00 pm	MW - 11D	29.6 ft.	29.6 ft.	GROUTING IN PLACE		X
7/30/1999	8:00 am - 11:00 am	MW - 13S	10.5 ft.	10.5 ft.	GROUTING IN PLACE		X
7/30/1999	8:00 am - 11:00 am	MW - 13D	29.1 ft.	30.1 ft.	GROUTING IN PLACE		X
7/30/1999	11:00 am - 1:15 pm	MW - 14D	30.0 ft.	30.0 ft.	GROUTING IN PLACE		X
7/30/1999	11:00 am - 1:15 pm	MW - 14S	6.2 ft.	6.2 ft.	GROUTING IN PLACE		X
7/30/1999	1:45 pm - 2:30 pm	MW - 9S	17.5 ft.	17.5 ft.	GROUTING IN PLACE		X

* Denotes where "gouting in place" method was used in place of "casing pulling" method - see decommissioning summary

9.27.99

APPENDIX D-2

Monitoring Well/Piezometer Installation Report



NOTES:

1) CONTRACTOR SHALL PROTECT EXISTING CHAINLINK FENCING AND OTHER STRUCTURES NOT INDICATED TO BE REMOVED INSIDE OR ADJACENT TO THE CONSTRUCTION LIMITS FROM DAMAGE DURING CONSTRUCTION ACTIVITIES. DAMAGES SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.

2) CONTRACTOR SHALL BE RESPONSIBLE FOR LOCATING AND PROTECTING EXISTING UTILITIES.

3) CONTRACTOR SHALL DEMOLISH CONCRETE PADS, AS NECESSARY, TO FACILITATE GRADING AND FINAL COVER SYSTEMS.

4) FENCE POSTS TO BE REMOVED, SHALL BE CUT AT GROUND LEVEL OR REMOVED ENTIRELY, BY THE CONTRACTOR.

LEGEND

- APPROXIMATE LOCATION OF GAS LINE
- EXISTING CHAINLINK FENCING & POSTS TO BE REMOVED
- EXISTING CHAINLINK FENCING
- PROPOSED VINYL-COATED CHAINLINK FENCING
- PROPOSED GALVANIZED CHAINLINK FENCING
- LOCATION OF OVERHEAD ELECTRICAL TRANSMISSION LINE
- CONSTRUCTION LIMITS
- 576 EXISTING GROUND SURFACE CONTOURS
- 572 EXISTING SEDIMENT PILE CONTOURS
- STORM SEWER MANHOLE
- EXISTING CATCH BASINS
- R/W RIGHT-OF-WAY
- APPROXIMATE LOCATIONS OF WATER LINES
- LIMITS OF IWS FINAL COVER SYSTEM
- LIMITS OF ALP ASPHALT CONCRETE COVER SYSTEM
- CITY OF NIAGARA FALLS EASEMENT
- MONITORING WELL TO BE DECOMMISSIONED ⚠1
- PIEZOMETER TO BE DECOMMISSIONED, EXCEPT P7S AND PBS. ⚠1
- DECOMMISSIONED WELLS AND PIEZOMETERS

REV	DATE	BY	SUB	APP	DESCRIPTION
1	8/5/99				MOVED CONSTRUCTION LIMIT NORTH OF IWS PROPERTY AND ADDED TEXT FOR WELL DECOMMISSIONING

DESIGNED / DRAWN / CHECKED / IN CHARGE / DATE 06/22/99

OLIN CORPORATION
CHARLESTON, TENNESSEE

LAW ENGINEERING AND ENVIRONMENTAL SERVICES, P.C.

INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK

SITE PLAN

SCALE: SCALE IN FEET 0 50 100

CONTRACT 12000-7-0232

DWG NO GR-001 | REV 1 | PAGE NO 2

GLYNN GEOTECHNICAL ENGINEERING

FAX TRANSMITTAL

ATTN: David Wheeless
COMPANY: Law Engineering & Environmental Services, Inc.

Date: January 18, 2000
Fax No: (770) 421 - 3486
Page: 1 of 5

Project Number: 99-1076-B Project Name: Industrial Welding site

Subject: Well Installation Summary

Dave,

Attached are revised piezometer / well installation schematics and summary installation logs revised as discussed. I apologize for the back and forth on these.

Hard copies of this data are being forwarded via Fedex.

Sincerely,

GLYNN GEOTECHNICAL ENGINEERING

Sent by: JEG Time:

Hard Copy of Data to Follow: [X] YES [ ] NO

Copies To:

[ ] Via Fax
[ ] Hard Copy

Jesse E. Grossman
Project Manager

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

DOCFILE:FaxVL

GLYNN GEOTECHNICAL ENGINEERING

PIEZOMETER / MONITORING WELL INSTALLATION SUMMARY

Project: Industrial Welding Site (Record Piezometer / Monitoring Well Installations)
GGE No.: 99-1076
Client: Law Engineering and Environmental Services, Inc.
Date: January 18, 2000

No.	Description	Bottom of Sand Pack Elev.	Bottom of Screen Elev.	Screen Length	Native Silty-Clay Elev.	Concrete Surface Pad Elev.*	Top of Riser Elev.*
P-1R	Cover Area Piezometer	564.2	564.7	2.5 ft.	564.6	579.31	582.10
P-2R	East Easement Piezometer	562.3	562.8	2.5 ft.	567.3	569.45	572.17
P-3R	Cover Area Piezometer	564.0	564.5	2.5 ft.	564.0	579.26	581.90
P-4R	East Easement Piezometer	561.4	561.8	2.5 ft.	566.5	568.59	571.09
P-5R	Cover Area Piezometer	563.4	564.2	2.5 ft.	564.4	575.65	578.46
P-6R	East Easement Piezometer	561.1	561.6	2.5 ft.	565.8	568.03	570.91
MW-1	NE Easement Monitoring Well	561.4	561.9	2.5 ft.	567.0	568.53	570.87
MW-2	SE Easement Monitoring Well	562.6	563.1	2.5 ft.	567.7	570.19	572.76

*From Record Survey Data by Klettke Land Surveyors, P.C.

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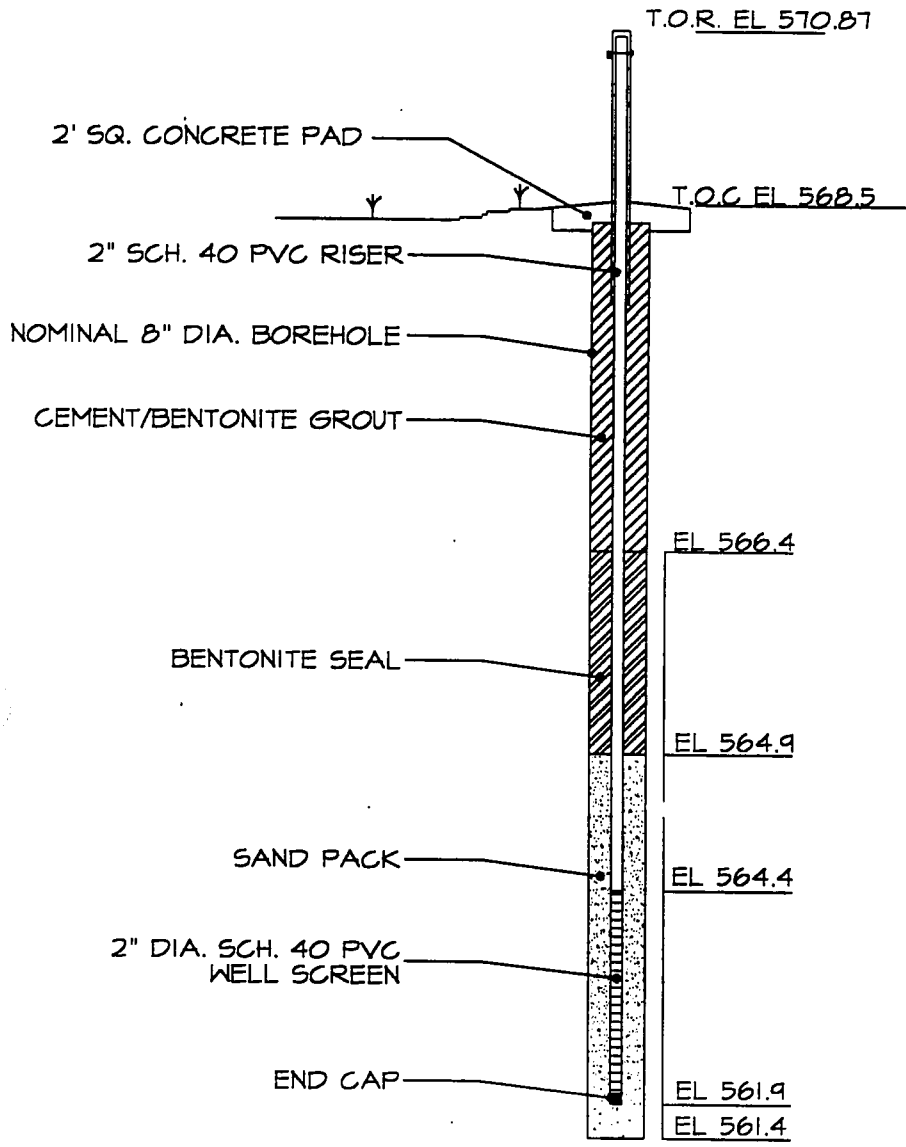

SOIL INVESTIGATION LOG

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	28	BROWN CLAYEY FILL	10"
		GRAY CLAY	
2-4'	14		12"
4-6'	9	GRAY & BROWN MOTTLED CLAY	18"
6-7'	N/A		6"

WELL DRY AT TIME OF INSTALLATION

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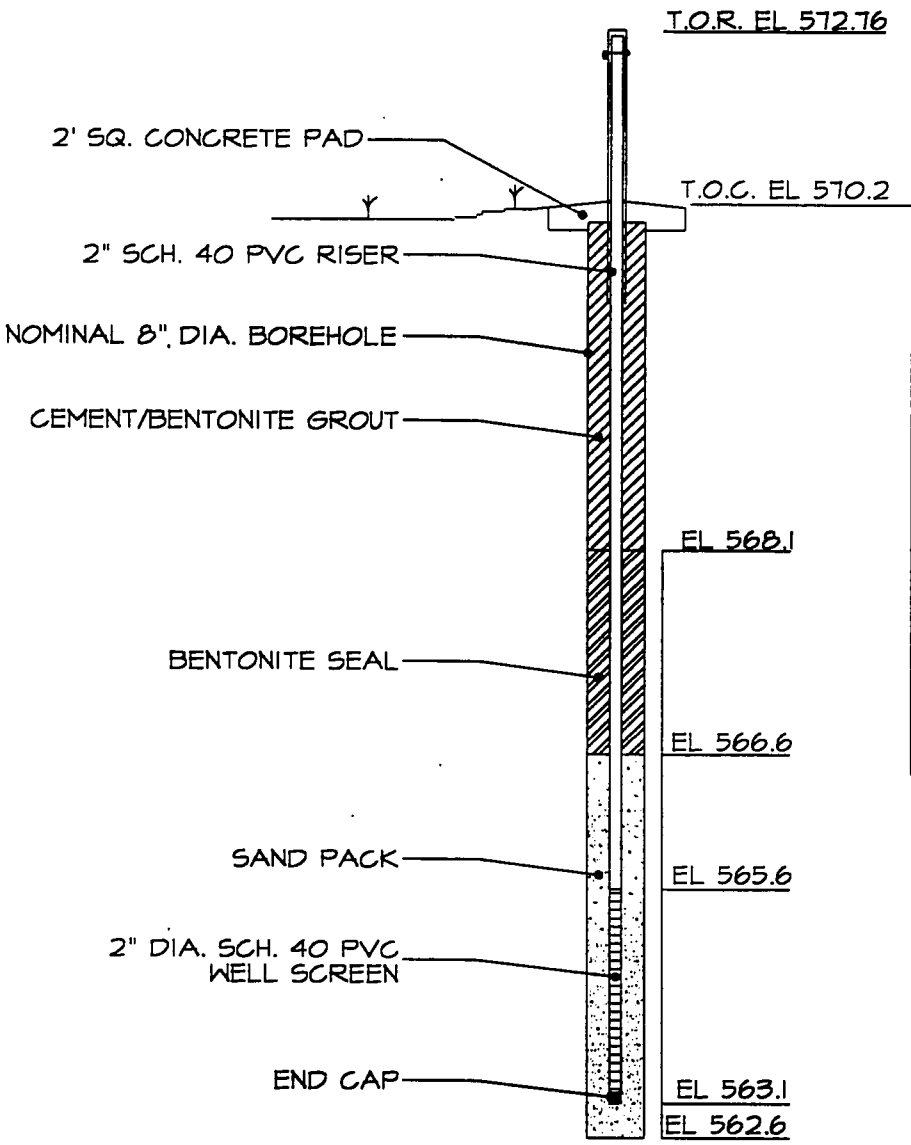
GGE FILE: 98-1076 9-20-99 REVISED 11-16-99

INDUSTRIAL WELDING SITE
MONITORING WELL
DETAIL

NO SCALE

FIGURE: MW1



SOIL INVESTIGATION LOG

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	19	BLACK & BROWN CLAYEY FILL	6"
2-4'	8		10"
		GRAY CLAY	
4-6'	11	GRAY & BROWN CLAY	12"
6-7'	N/A		12"

WELL DRY AT TIME OF INSTALLATION

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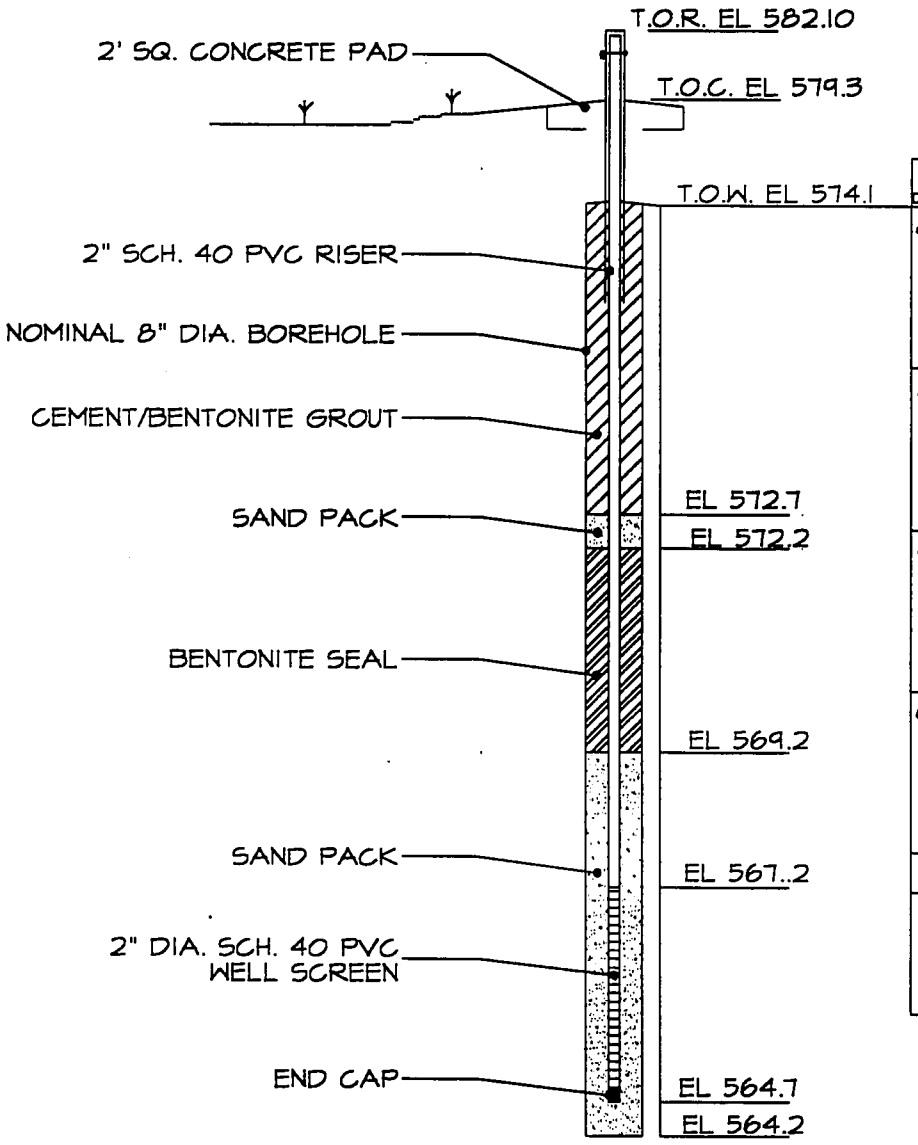
INDUSTRIAL WELDING SITE
MONITORING WELL
DETAIL
NO SCALE

FIGURE:
MW2



SOIL INVESTIGATION LOG*

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	9	BROWN & GRAY SANDY FILL, SOME CONCRETE	4"
2-4'	38	BROWN & GRAY CLAYEY FILL	6"
4-6'	50/2" REF	CONCRETE & SLAG FRAGMENTS	8"
6-8'	15		6"
8-10'	14	BROWN CLAYEY FILL AND CONCRETE WATER @ 8.5'	10"
		BROWN LEAN CLAY	

* WELL INSTALLATION FROM EXISTING TOP OF WASTE PRIOR TO COVER CONSTRUCTION

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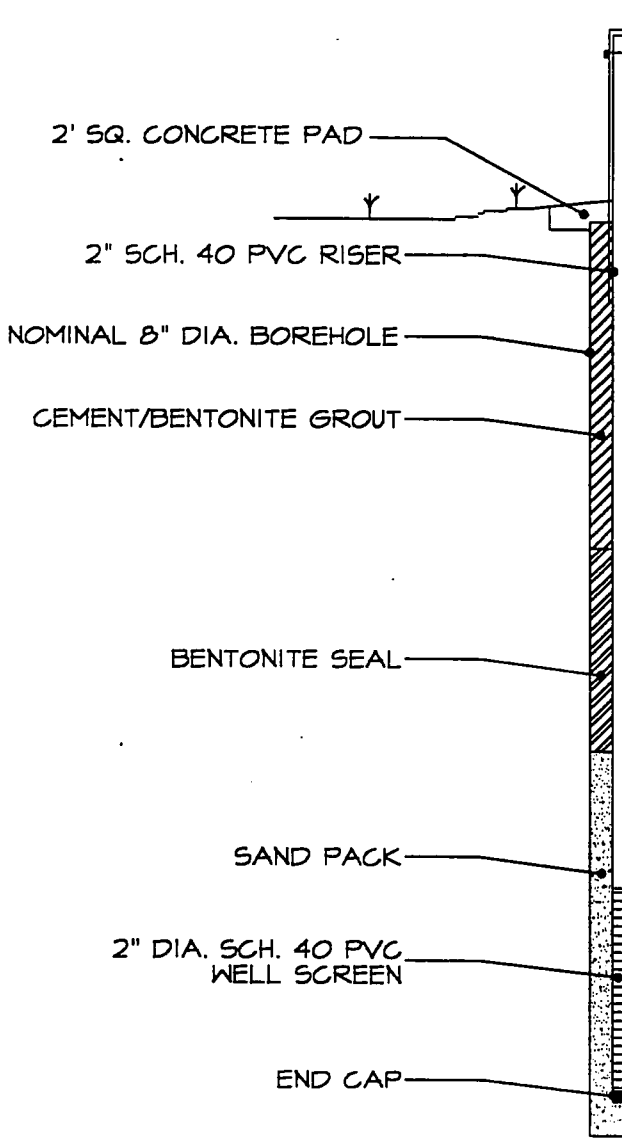
GGE FILE: 98-1076 9-20-99 REVISED 11-16-99

INDUSTRIAL WELDING SITE
PIEZOMETER DETAIL
NO SCALE

FIGURE: P|R



SOIL INVESTIGATION LOG

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	19	BROWN CLAYEY FILL	12"
2-4'	18	LIGHT BROWN MOTTLED CLAY	12"
4-6'	18		18"
6-7'	N/A		10"

WELL DRY AT TIME OF INSTALLATION

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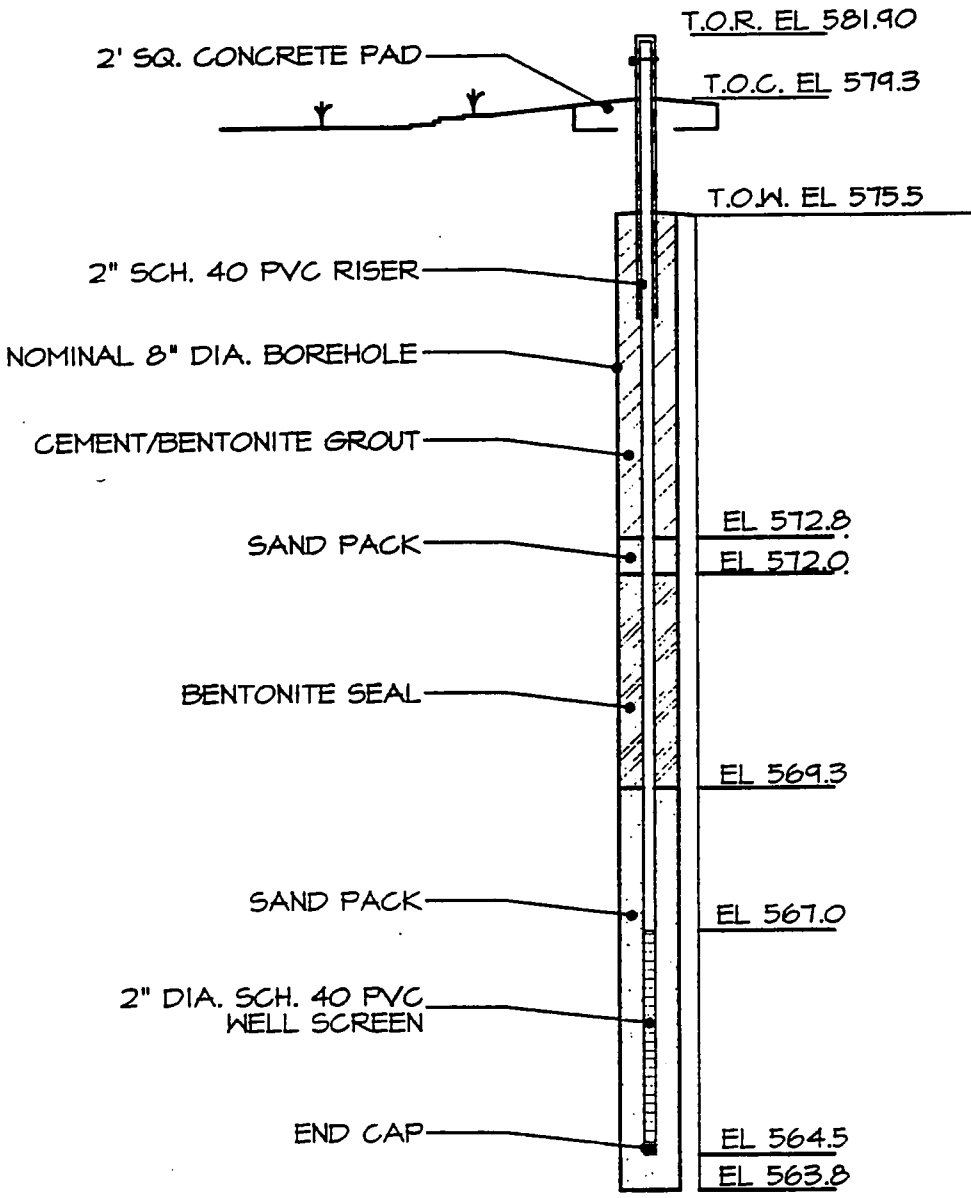
INDUSTRIAL WELDING SITE
PIEZOMETER
DETAIL
NO SCALE

FIGURE:
P2R



SOIL INVESTIGATION LOG*

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	6	BROWN CLAYEY FILL, TRACE ROCK	6"
2-4'	6		6"
4-6'	21		6"
6-8'	15	BROWN CLAYEY FILL, LITTLE ROCK TRACE BRICK	6"
8-10'	17	NO RECOVERY	0"
10-12'	35	BROWN CLAYEY FILL	6"
		BROWN LEAN CLAY	

WELL DRY AT TIME OF INSTALLATION

* WELL INSTALLATION FROM EXISTING TOP OF WASTE PRIOR TO COVER CONSTRUCTION

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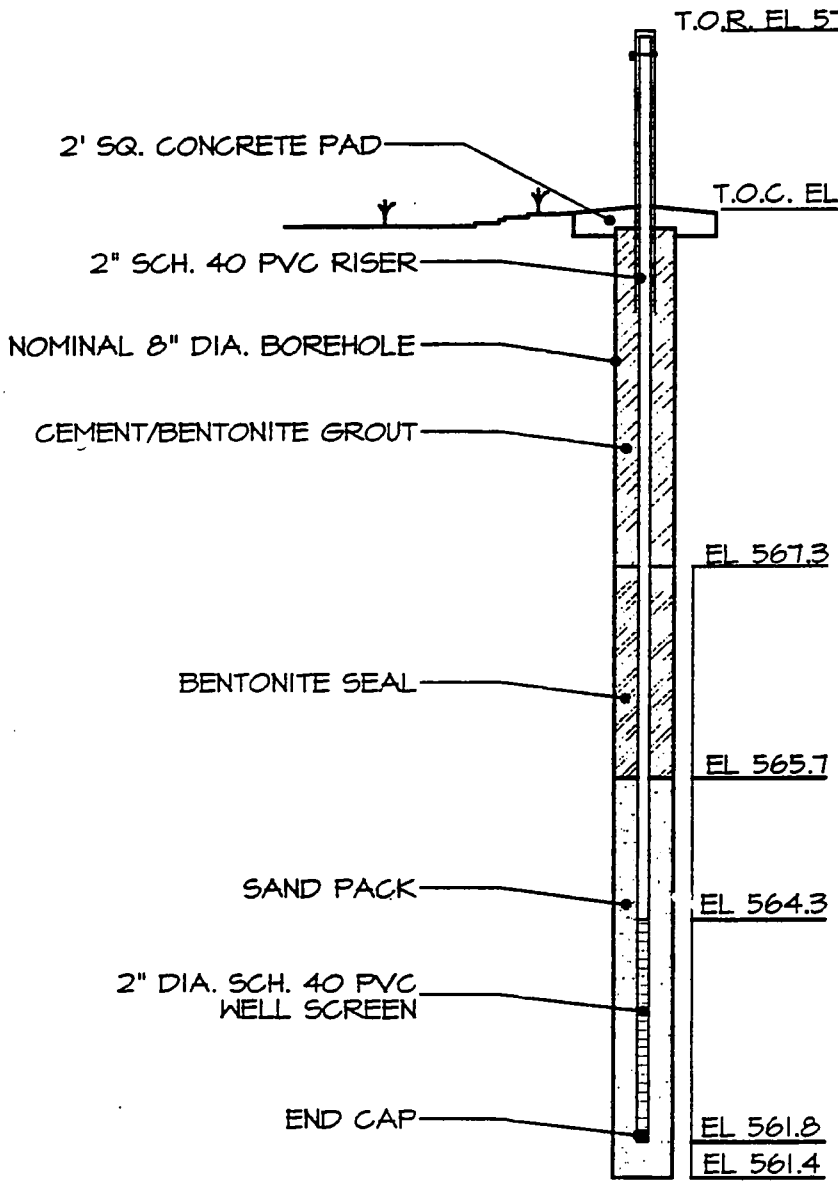
GGE FILE: 99-1076 REVISED 1.18.00

INDUSTRIAL WELDING SITE
PIEZOMETER DETAIL
NO SCALE

FIGURE: P3R



SOIL INVESTIGATION LOG

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	14	BROWN CLAYEY FILL	10"
2-4'	17	LIGHT BROWN & GRAY MOTTLED CLAY	18"
4-6'	17	REDDISH BROWN CLAY	18"
6-7'	N/A		10"

WELL DRY AT TIME OF INSTALLATION

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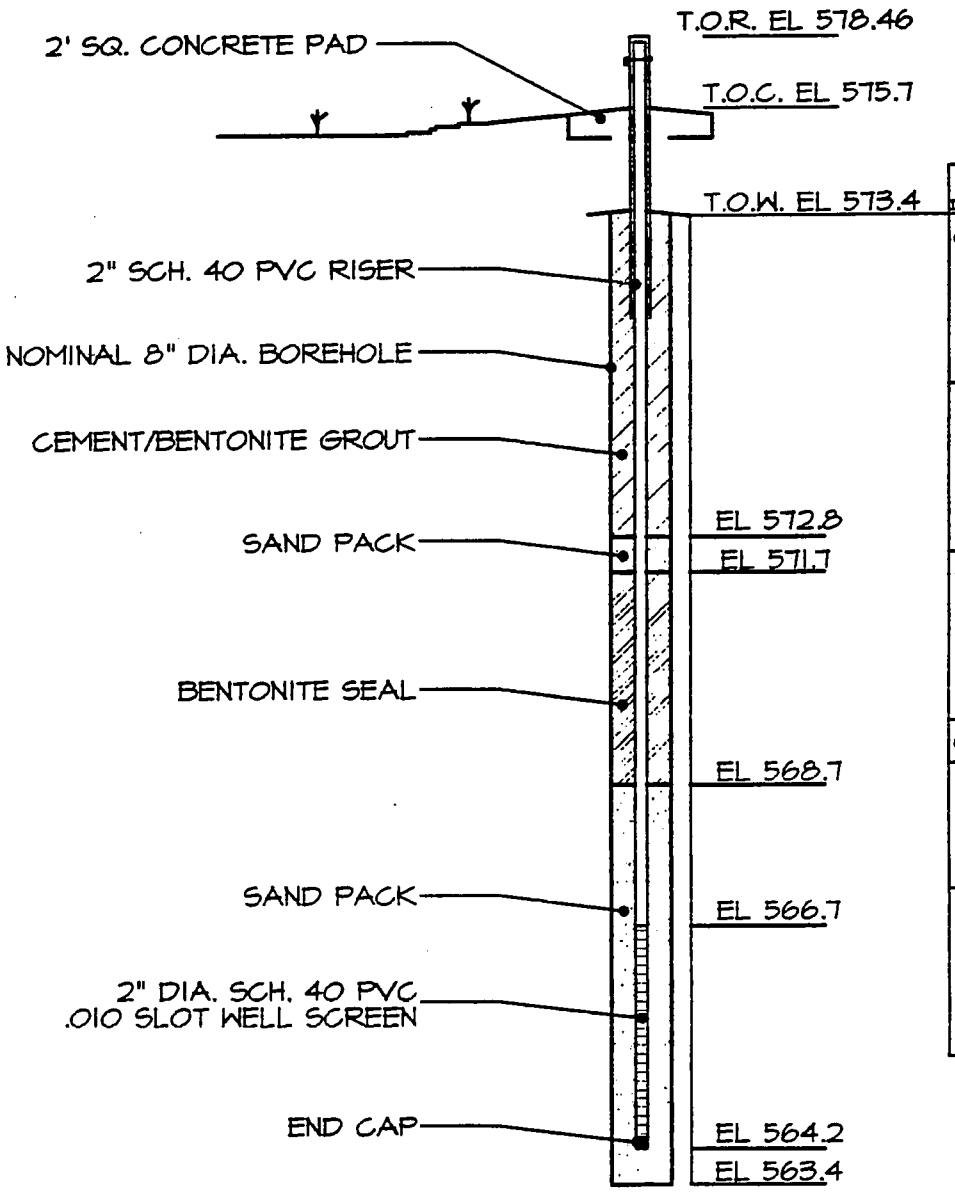
GGE FILE: 99-1076 REVISED 1.15.00

INDUSTRIAL WELDING SITE
PIEZOMETER
DETAIL
NO SCALE

FIGURE:
P4R



SOIL INVESTIGATION LOG*

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	14	BROWN CLAYEY FILL	18"
2-4'	18	ROCK & BRICK FILL	6"
4-6'	11	ROCK, BRICK, CLAY, WOOD FILL	10"
6-8'	15	WATER @ 8.5'	2"
8-10'	5	GRAY CLAY	10"

* WELL INSTALLATION FROM EXISTING TOP OF WASTE PRIOR TO COVER CONSTRUCTION

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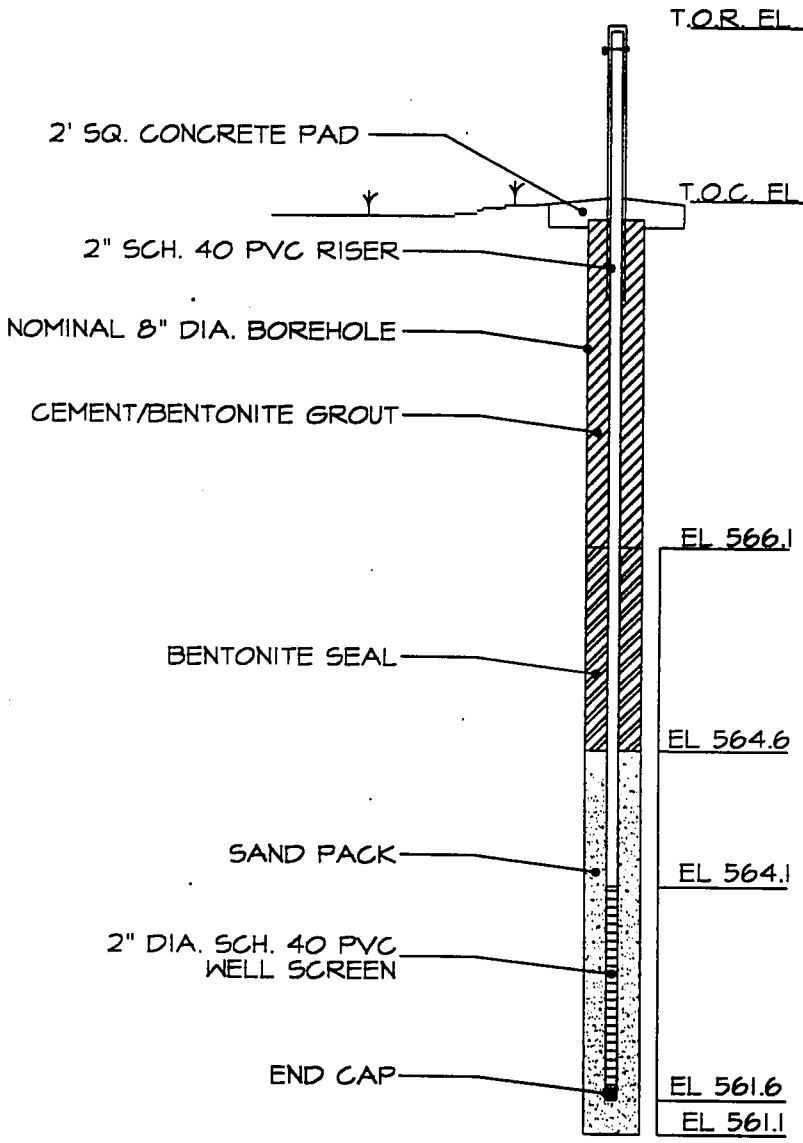
GGE FILE: 99-1076 REVISED 1.18.00

INDUSTRIAL WELDING SITE
PIEZOMETER
DETAIL
NO SCALE

FIGURE:
P5R



SOIL INVESTIGATION LOG

DEPTH	N VALUE	SOIL DESCRIPTION	REC
0-2'	17	LIGHT BROWN SAND AND CLAY FILL	12"
2-4'	19	LIGHT BROWN & GRAY MOTTLED CLAY	12"
4-6'	16		12"
6-7'	N/A	REDDISH BROWN CLAY	10"

WELL DRY AT TIME OF INSTALLATION

GGE GLYNN GEOTECHNICAL ENGINEERING
LOCKPORT, NEW YORK • (716) 625-6933

GGE FILE: 98-1076 9-20-99 REVISED 11-16-99

INDUSTRIAL WELDING SITE
PIEZOMETER
DETAIL
NO SCALE

FIGURE: P6R

APPENDIX E

QUALITY ASSURANCE DOCUMENTS: GEOTEXTILE, GEOMEMBRANE

APPENDIX E-1

GEOTEXTILE:

Manufacturer's Quality Control Data

Carthage Mills

"Since 1958 - America's First Geotextile Company"

September 27, 1999

To: **Sevenson Environmental**
Niagara Falls NY

Ref: Certification of Compliance

Carthage Mills hereby certifies that the FX-77, as furnished to Sevenson Environmental, is a woven geotextile composed of 100% polypropylene slit film yarns, as defined by ASTM D-123. FX-77 conforms to following physical properties:

Property	Testing Method	Value
Weight, oz/sy	ASTM D-3776	8.0
Grab Tensile Strength, lbs	ASTM D-4632	4750x 400
Elongation @ Break, %	ASTM D-4632	20
Mullen Burst, psi	ASTM D-3786	790
Puncture, lbs	ASTM D-4833	225
Trapezoidal Tear, lbs	ASTM D-4533	140
AOS, US Std Sieve	ASTM D-4751	50
Permittivity, sec/-1	ASTM D-4491	.16
UV Degradation, % retained	ASTM D-4355	90 (500 hrs)

CARTHAGE MILLS

Jim Paulsen
Regional Manager

4243 Hunt Road • Cincinnati, Ohio 45242 • 513-794-1600 • 800-543-4430 • 513-794-3434 FAX

Quality Control
Program Outline

Definition of Lot:

A planned production quantity satisfying all of the following:

- Manufactured under the same material specification, including yarn and weave specifications.
- Identified as the same style (fabric designation).
- When tested, having physical characteristics consistent with published values.

Quality Control Sampling of Each Lot:

As a minimum, a number of production units shall be selected at random from each lot in accordance with Table 1.

TABLE 1 Number of Units to be Selected as Lot Sample Specification Conformance

Number of Units in Lot			Number of Units Selected
1	to	2	1
3	to	8	2
9	to	27	3
28	to	64	4
65	to	125	5
126	to	216	6
217	to	343	7
344	to	512	8
513	to	729	9
730	to	1000	10
1001	to	more	11

Note: A production unit is considered to be a shipment roll.

Typically, the first shipment roll from each loom roll will be sampled. It will be necessary to consider the minimum planned production quantity to determine if more frequent sampling and testing is required.

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Quality Control Testing of Each Sample:

Each quality control sample shall be sent to the quality control lab before the end of the shift during which the sample was taken. Full identification of the sampled shipment roll and corresponding loom roll shall be provided with the sample.

The following tests shall be run on every sample received in the Q.C. lab:

Test Property	Test Method
Weight	ASTM D3776
Thickness	ASTM D1777
Grab Tensile	ASTM D4632
Wide Width Tensile	ASTM D4595
Mullen Burst	ASTM D3786
Puncture	ASTM D4833
Trapezoid Tear	ASTM D4533
A.O.S.	ASTM D4751
Permittivity	ASTM D4491
Percent Open Area	C.O.E. 02215

Note: It is not necessary to always run any of these tests which are not listed on the published literature of the material being tested.

Quality Control Test Results:

All quality control test results shall be maintained by the Quality Control Manager with the corresponding shipment roll identification.

The Quality Control Manager will make lot testing summaries available, upon request, detailing the individual test results and aggregate mean, minimum and standard deviations of each test property for the shipment rolls under consideration.

Failing Test Results:

Individual test results falling below published minimums do not of the themselves define failing production. First, duplicate test should be run on the material in question to determine if the problem is in the test procedure. If the retest shows similarly failing results, then the Quality Control Manager shall require an additional sample from an associated loom roll (i.e. common beam and/or fill yarn box depending on the property in question.). If this additional testing shows similarly failing results, then all material from all associated loom rolls will be given a different, unique style number (i.e. downgraded).

If the additional testing produces satisfactory test results, then the additional test results will be averaged with the initial test results and used as representative of the material produced. If the averaged test results fall below published limits, then all material from all associated loom rolls will be downgraded.

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Publishing Physical Property Values:

Every manufacturing process has inherent variability. Not only do actual properties of the finished product vary randomly around "target" production values, the "trend" or "drift" of these properties varies with time around the target. Therefore, characteristic properties of material produced during any given time will likely be different than properties of material produced at a later time.

As a result, it is not possible to provide values months in advance of production which will accurately reflect actual material properties at all times. At best, historical results can be reported with hopes that production enhancements can be made to reduce manufacturing availability and improve reported physical properties. Realistically, since so many properties are being "balanced", it is most clear and honest to report manufacturing "target" or "typical" values and "minimum" values below which the material is considered to have physical characteristics excessively different from those of other material in the same lot (i.e. greater than 2.5 to 3 standard deviations below the "target" values).

Minimum Average Roll Values (MARV):

Industry has coined the term MARV to reflect a 95% confidence level. To the Manufacturer this means that 97.5% of all material produced should exceed a given MARV. Statistically, this is equivalent to the mean, $\bar{x}$, less two standard deviations, 2σ.

Since $\bar{x}$ and σ vary over time and are unique to any given period of production the MARV for a given month of production may be significantly higher or lower than a MARV calculated (i.e. averaged) over an entire year.

As a result, it is only possible to confidently certify a MARV specification after referring to the actual test results for the shipment rolls to be provided (and others produced in the same time frame).

Packaging and Shipments:

All geotextile rolls shall be furnished with suitable wrapping for protection against moisture and extended ultraviolet exposure prior to placement. Each roll shall be labeled or tagged to provide product identification sufficient for inventory and quality control purposes. Rolls shall be stored in a manner which protects them from the elements. If stored outdoors, they shall be elevated and protected with a waterproof cover.

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APPENDIX E-2

GEOMEMBRANE:

Manufacturer's Quality Control Data

Shipping Order - Packing List - Original - Not Negotiable

GSE

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Order Form

GSE Lining Technology, Inc. at HOUSTON,TEXAS

SHIPPERS NO. 8286

Received at Houston, Texas from GSE Lining Technology, Inc. the property described below, in apparent good order, except as noted (contents and condition of packages unknown), marked, consigned, and destined as indicated below, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to c[illegible] to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination, and as to each party at any [illegible]erested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the Shipper noted herein is GSE Lining Technology, Inc. as indicated by the [illegible]tion of the "Shipper" to be GSE Lining technology, Inc., then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between t[illegible]rties, or (b) if the Shipper noted herein is not GSE Lining Technology, Inc., then GSE Lining Technology, Inc. is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, GSE Lining Technology, Inc. accepts no liability for loss of cargo, damage to containers, or any other consequences occuring during transportation, Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by GSE Lining Technology, Inc.

Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

Ship To: IWS/Olin Chemical Landfill Cap
Niagara Falls NY

Roll Certifications Included

Roll Certifications Included 9/20/99

Shipping Instructions: Jerry Castiglione 716/284-0431

Sales Order 8231

No. Line	Roll #	QTY Shipped	UM	Kind of Package, Description of Articles, Special Marks, and Exceptions	Weight
1	199907260	9	BX	HDROD5MM 5 mm HD Welding Rod HD Welding Rod	135.00
2	104102683	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,926.78
3	103102283	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,674.37
4	104102685	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,902.80
5	104102686	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,905.80
	104102687	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,906.80
7	104102688	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,902.80
8	104102689	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,926.78
9	104102690	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5' LOT #	2,954.75
10	104102692	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,948.75
11	103102284	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,675.37
12	103102285	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,699.37

Project# 503519

TERMS: (Prepaid) Collect

Customer P.O. #: NOA

Section 7

Load Verification

Signed

X

Pick Up # 4740

Seal #

Truckers P.O. #

Total Quantity ~~180,000~~ ETA' 9-23 Total Weight 38,198.728

55179703

Driver Requirements:

1) Driver must pre call 24 hrs prior to delivery and on Friday for Monday delivery.
2) Driver must call (281) 230-6781 when unloaded.
3) Driver must call and advise any delay in transit.
4) A copy of this B/L must accompany Freight Invoice.

CARRIER NAME: Rick Smith

CARRIER SIGNATURE: _____

DATE: _____

Sign Here For Shipper

Shipper: [signature] 9/20

Address: GSE Lining Technology Inc.
19103 Gundle Rd.
Houston, Tx. 77073-3598

Sign Here For Agent Of Shipper

Agent for Shipper: _____

(GSE LINING TECHNOLOGY, INC.
APPROVED AGENT FOR SHIPPER)

Agent must sign, detach and retain a copy of this Shipping Order

ORIGINAL

Shipping Order - Packing List - Original - Not Negotiable

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Order Form

GSE Lining Technology, Inc. at HOUSTON,TEXAS

SHIPPERS NO. 8286

Received at Houston, Texas from GSE Lining Technology, Inc. the property described below, in apparent good order, except as noted (contents and condition of packages unknown), marked, consigned and destined as indicated below, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either: (a) if the Shipper noted herein is GSE Lining Technology, Inc. as indicated by the designation of the "Shipper" to be GSE Lining technology, Inc., then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties, or (b) if the Shipper noted herein is not GSE Lining Technology, Inc., then GSE Lining Technology, Inc. is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail-water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, GSE Lining Technology, Inc. accepts no liability for loss of cargo, damage to containers or any other consequences occuring during transportation, Carrier having agreed that the transportation arrangement was initiated by the Shipper and not by GSE Lining Technology, Inc.

Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

Ship To: IWS/Olin Chemical Landfill Cap
Niagara Falls NY

Roll Certifications Included

Date: 9/20/99

Shipping Instructions: Jerry Castiglione 716/284-0431

Sales Order 8231

No. Line	Roll #	QTY Shipped	UM	Kind of Package, Description of Articles, Special Marks, and Exceptions	Weight
13	103102286	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,639.36

Roll Info
9-20-99
PSPX 3139
Lot 199909

ETA: 9-23

Project# 503519

~~TERMS:~~ Prepaid / Collect

Customer P.O. #: NOA

Section 7

Load Verification

Signed

X

Pick Up # 4740

Seal #

Truckers P.O. # 55179703

Total Quantity 180,009 Total Weight 38,198.728

Driver Requirements:
1) Driver must pre call 24 hrs prior to delivery and on Friday for Monday delivery.
2) Driver must call (281) 230-6781 when unloaded.
3) Driver must call and advise any delay in transit.
4) A copy of this B/L must accompany Freight Invoice.

CARRIER NAME: Rick Smith
CARRIER SIGNATURE: _____
DATE: _____

~~Sign Here For Shipper~~
Shipper: _____
Address: GSE Lining Technology Inc.
19103 Gundle Rd.
Houston, Tx. 77073-3598

Sign Here For Agent Of Shipper
Agent for Shipper: _____
(GSE LINING TECHNOLOGY, INC.
APPROVED AGENT FOR SHIPPER)

Agent must sign, detach and retain a copy of this Shipping Order

CONSIGNEE

Shipping Order - Packing List - Original - Not Negotiable

RECEIVED, subject to the classifications and tariffs in effect on the date of the issue of this Order Form

GSE Lining Technology, Inc. at HOUSTON,TEXAS

SHIPPERS NO. 8288

from at Houston, Texas from GSE Lining Technology, Inc. the property described below, in apparent good order, except as noted (contents and condition of packages unknown), marked, consigned as indicated below, which said Carrier (the word "Carrier" being understood throughout this Shipping Order as meaning the person or corporation in possession of the property) agrees to carry to the place of delivery at said destination. It is mutually agreed as to each Carrier of all or any of said property, over all or any portion of said route to destination, and as to each party at any time interested in all or any of said property, that every service performed hereunder shall be subject to either (a) if the Shipper noted herein is GSE Lining Technology, Inc. as indicated by the designation of the "Shipper" to be GSE Lining Technology, Inc., then the Shipper and Carrier are subject to the terms and conditions contained in the Contract for Truck Transportation existing between the parties, or (b) if the Shipper noted herein is not GSE Lining Technology, Inc., then GSE Lining Technology, Inc. is acting solely as the agent for the denoted Shipper, and thus every aspect of the service to be performed hereunder between the Shipper and the Carrier shall be subject to all the terms and conditions of the Uniform Domestic Straight Bill of Lading set forth (1) in Official, Southern, Western, and Illinois Freight Classifications in effect on the date hereof, if this is a rail/water shipment, or (2) in the applicable motor carrier classification or tariff if this is a motor carrier shipment. When acting in the capacity of an agent for a Shipper in placing the material in transit on behalf of a Shipper, GSE Lining Technology, Inc. accepts no liability for loss of cargo, damage to containers, or any other consequences occuring during transportation. Carrier having agreed that the transportation arrangement was indicated by the Shipper and not by GSE Lining Technology, Inc.

Subject to the above terms and conditions as to which party is the Shipper, Shipper hereby certifies that he is familiar with the terms and conditions that govern the transportation of this shipment, and the said terms and conditions are hereby agreed and accepted for himself and his assigns.

Ship To: IWS/Olin Chemical Landfill Cap
Niagara Falls NY

Date: 9/20/99

Shipping Instructions: Jerry Castiglione 716/284-0431

Sales Order: 8231

Project# 503519

No. Line	Roll #	QTY Shipped	UM	Kind of Package, Description of Articles, Special Marks, and Exceptions	Weight
1	104102681	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,926.78
2	103102287	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,638.38
3	104102694	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5'	2,940.73
4	104102695	14625	SF	HDE040A000 40 mil Avg GSE HD Blk, HD, Smooth, 22.5	1,043.85
5	103102288	15750	SF	HDT040A000 40 mil Avg GSE HD Texture Blk, HD, 2 Side Tex, 22.5	3,727.37

TERMS: Prepaid / Collect

Customer P.O. #: NOA

Section 7

Load Verification

Signed

X

Pick Up # 4741

Seal #

Truckers P.O. #

Total Quantity 75,375 FW: 9-23 Total Weight 14,275.125

Driver Requirements:

1) Driver must pre call 24 hrs prior to delivery and on Friday for Monday delivery.
2) Driver must call (800) 230-5725, when unloaded.
3) Driver must call and advise any delay in transit.
4) A copy of this B/L must accompany Freight Invoice.

CARRIER NAME: Eldridge

CARRIER SIGNATURE

DATE:

Sign Here for Shipper

Shipper:

Address: GSE Lining Technology Inc.
19103 Gundle Rd
Houston, Tx. 77073-3593

Sign Here for Agent of Shipper

Agent for Shipper:

(GSE LINING TECHNOLOGY, INC
APPROVED AGENT FOR SHIPPER)

Agent must sign, retain and retain a copy of this Shipping Order

ORIGINAL

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102286

ROLL IDENTIFICATION

Roll Number	103102286	
Product Name	HDT040A000	
Production Date	9/20/99	
Length ≈(+/- 1%)	700	feet
	213	meters
Width (Nominal)	22.5	feet
	6.9	meters
Sheet Area	15,750	sq. feet
	1,463	sq. meters
Weight	3,639	pounds
	1,651	kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	42	(1.1)
Minimum		every roll	36	(0.9)	37	(0.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	105	(183)
- MD		every roll	84	(147)	105	(183)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	148	(259)
- MD		every roll	60	(105)	143	(251)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		550	
- MD	(51 mm)	every roll	100		540	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	23	(125)	41	(182)
- MD		every roll	28	(125)	37	(165)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.2	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/24/99	1/resin lot	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	60	(267)	114	(507)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

APPROVED
S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102285

ROLL IDENTIFICATION

Roll Number	103102285
Product Name	HDT040A000
Production Date	9/20/99

Length ≈(+/- 1%)	700 213	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	15,750 1,463	sq. feet sq. meters
Weight	3,699 1,678	pounds kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	42	(1.1)
Minimum		every roll	36	(0.9)	37	(0.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	109	(190)
- MD		every roll	84	(147)	107	(188)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	156	(273)
- MD		every roll	60	(105)	143	(251)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		520	
- MD	(51 mm)	every roll	100		570	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	43	(191)
- MD		every roll	28	(125)	37	(165)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.2	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/24/99	1/resin lot	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	60	(267)	122	(543)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102284

ROLL IDENTIFICATION

Roll Number	103102284
Product Name	HDT040A000
Production Date	9/19/99

Length ≈(+/- 1%)	700 213	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	15,750 1,463	sq. feet sq. meters
Weight	3,675 1,667	pounds kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	42	(1.1)
Minimum		every roll	36	(0.9)	38	(1.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	104	(182)
- MD		every roll	84	(147)	108	(189)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	134	(234)
- MD		every roll	60	(105)	152	(266)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		550	
- MD	(51 mm)	every roll	100		520	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	41	(182)
- MD		every roll	28	(125)	35	(156)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.2	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.2	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/24/99	1/resin lot	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	60	(267)	121	(538)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

APPROVED
S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102283

ROLL IDENTIFICATION

Roll Number	103102283
Product Name	HDT040A000
Production Date	9/19/99

Length ≈(+/- 1%)	700 213	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	15,750 1,463	sq. feet sq. meters
Weight	3,674 1,667	pounds kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	43	(1.1)
Minimum		every roll	36	(0.9)	37	(0.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	109	(190)
- MD		every roll	84	(147)	106	(186)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	153	(267)
- MD		every roll	60	(105)	147	(258)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		560	
- MD	(51 mm)	every roll	100		550	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	42	(187)
- MD		every roll	28	(125)	36	(160)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.2	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.0	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/24/99	1/resin lot	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	60	(267)	110	(489)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102683

ROLL IDENTIFICATION

Roll Number	104102683	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,930 1,329	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	41	(1.03)
Minimum		every roll	36	(0.90)	40	(1.02)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	115	(202)
- MD		every roll	84	(147)	116	(203)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	220	(385)
- MD		every roll	152	(266)	212	(371)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		797	
- MD	(51 mm)	every roll	700		877	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	34	(150)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	72	(320)	109	(485)

Order No. 8231
Customer Name IWS&ALP PROPERTIES
Location NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102685

ROLL IDENTIFICATION

Roll Number	104102685
Product Name	HDE040A000
Production Date	9/6/99

Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,906 1,318	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	39	(0.98)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	117	(204)
- MD		every roll	84	(147)	117	(204)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	217	(379)
- MD		every roll	152	(266)	218	(381)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		807	
- MD	(51 mm)	every roll	700		807	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	34	(150)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	72	(320)	105	(467)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102686

ROLL IDENTIFICATION

ll Number	104102686
Product Name	HDE040A000
Production Date	9/6/99

Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,909 1,320	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	39	(0.98)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	117	(204)
- MD		every roll	84	(147)	115	(202)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	210	(368)
- MD		every roll	152	(266)	213	(372)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		787	
- MD	(51 mm)	every roll	700		777	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	33	(148)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	72	(320)	107	(476)

er No. 8231
Customer Name IWS&ALP PROPERTIES
Location NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 10410268?

ROLL IDENTIFICATION

oll Number	104102687	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,910 1,320	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	*Test Method*	*Results*
Density, g/cc	*ASTM D 1505*	0.938
Melt index, g/10 min.	*ASTM D 1238 (190/2.16)*	0.08

Physical Property	*Test Method*	*Test Frequency*	*Customer Minimum* English	Metric	*Test Results* English	Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	38	(0.97)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	117	(204)
- MD		every roll	84	(147)	113	(197)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	206	(360)
- MD		every roll	152	(266)	207	(363)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		770	
- MD	(51 mm)	every roll	700		770	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	33	(147)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	104	(463)

der No. 8231
Customer Name IWS&ALP PROPERTIES
Location NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102688

ROLL IDENTIFICATION

oll Number	104102688	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,906 1,318	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	39	(0.99)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	114	(199)
- MD		every roll	84	(147)	109	(190)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	203	(356)
- MD		every roll	152	(266)	198	(346)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		750	
- MD	(51 mm)	every roll	700		780	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	33	(146)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	106	(472)

der No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102689

ROLL IDENTIFICATION

Roll Number	104102689	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,930 1,329	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	41	(1.03)
Minimum		every roll	36	(0.90)	39	(0.98)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	112	(196)
- MD		every roll	84	(147)	103	(181)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	198	(346)
- MD		every roll	152	(266)	191	(335)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		730	
- MD	(51 mm)	every roll	700		799	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	33	(147)
- MD		every roll	28	(125)	38	(168)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	108	(481)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102690

ROLL IDENTIFICATION

Roll Number	104102690	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,958 1,342	pounds kilograms

RESIN INFORMATION

Lot Number	7191265
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	38	(0.97)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	112	(196)
- MD		every roll	84	(147)	102	(179)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	200	(350)
- MD		every roll	152	(266)	195	(342)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		19	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		740	
- MD	(51 mm)	every roll	700		809	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	32	(141)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	72	(320)	108	(481)

Order No. 8231
Customer Name IWS&ALP PROPERTIES
Location NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102692

ROLL IDENTIFICATION

Roll Number	104102692
Product Name	HDE040A000
Production Date	9/6/99

Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,952 1,339	pounds kilograms

RESIN INFORMATION

Lot Number	7191265
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	40	(1.02)
Minimum		every roll	36	(0.90)	38	(0.97)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	106	(185)
- MD		every roll	84	(147)	101	(176)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	207	(361)
- MD		every roll	152	(266)	193	(337)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		760	
- MD	(51 mm)	every roll	700		869	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	32	(143)
- MD		every roll	28	(125)	37	(163)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505					
		every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603					
		every 5th	2.0		2.4	
Carbon Black Dispersion	ASTM D 3015					
		every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B					
	Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833					
		every roll	72	(320)	104	(463)

Order No. 8231
Customer Name IWS&ALP PROPERTIES
Location NIAGRA FALLS, NY

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Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102694

ROLL IDENTIFICATION

Roll Number	104102694	
Product Name	HDE040A000	
Production Date	9/6/99	
Length ≈(+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,944 1,335	pounds kilograms

RESIN INFORMATION

Lot Number	7191265
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt Index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	41	(1.04)
Minimum		every roll	36	(0.90)	39	(0.99)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	103	(181)
- MD		every roll	84	(147)	103	(181)
Break Strength, ppi (N/cm) - TD		every roll	163	(286)	214	(375)
- MD		every roll	152	(266)	207	(363)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		17	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		840	
- MD	(51 mm)	every roll	700		850	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	26	(125)	33	(146)
- MD		every roll	28	(125)	37	(163)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR (F)	ASTM D 1693 Cond. B Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	105	(467)

Order No. 8201
Customer Name INVISTA P ROPERTIES
Location NIAGRA FALLS, NY

APPROVED
S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102695

ROLL IDENTIFICATION

Roll Number	104102695
Product Name	HDE040A300
Production Date	9/8/99

Length ≈(+/- 1%)	660 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,910 1,320	pounds kilograms

RESIN INFORMATION

Lot Number	7191265
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.936
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.09

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	41	(1.04)
Minimum		every roll	36	(0.90)	40	(1.00)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	100	(175)
- MD		every roll	84	(147)	101	(175)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	214	(375)
- MD		every roll	152	(266)	206	(361)
Yield Elongation, % - TD	Gauge length = 1.3"	every roll	12		16	
- MD	(33 mm)	every roll	12		16	
Break Elongation, % - TD	Gauge length = 2.0"	every roll	700		860	
- MD	(51 mm)	every roll	700		900	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	34	(150)
- MD		every roll	28	(125)	36	(162)
Dimensional Stability, %	ASTM D 1204 (100°C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.3	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. C Start Date = 9/10/99	every roll	1600		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	104	(463)

Order No.	6231
Customer Name	IWS&A.P PROPERTIES
Location	NIAGRA FALLS, NY

APPROVED
S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102287

ROLL IDENTIFICATION

Roll Number	103102287	
Product Name	HDT040AC00	
Production Date	9/20/99	
Length ≈(+/- 1%)	700 213	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	15,750 1,463	sq. feet sq. meters
Weight	3,636 1 649	pounds kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	42	(1.1)
Minimum		every roll	36	(0.9)	37	(0.9)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	110	(193)
- MD		every roll	84	(147)	104	(182)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	166	(290)
- MD		every roll	60	(105)	138	(241)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		17	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		510	
- MD	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	44	(196)
- MD		every roll	28	(125)	39	(174)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll		-2.0		-0.2
Density, g/cc	ASTM D 1505	every 5th		0.940		0.940
Carbon Black Content, %	ASTM D 1603	every 5th		2.0		2.7
Carbon Black Dispersion	ASTM D 3015	every 5th		A2		A2
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/24/99	1/resin lot		1500		Pending
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	30	(267)	1.6	(516)

Order No. 8231
Customer Name IWS&LP PROPERTIES
Location NIAGRA FALLS NY

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S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 103102298

ROLL IDENTIFICATION

Roll Number	103102298
Product Name	HDT040ACCO
Production Date	9/20/99

Length ≈(+/- 1%)	700 213	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	15,750 1,463	sq. feet sq. meters
Weight	3,727 1,691	pounds kilograms

RESIN INFORMATION

Lot Number	7191290
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.939
Melt Index, g/10 min.	ASTM D 1238 (190/2.16)	0.07

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5994					
Average		every roll	40	(1.0)	42	(1.1)
Minimum		every roll	36	(0.9)	38	(1.0)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	103	(180)
- MD		every roll	84	(147)	116	(203)
Break Strength, ppi (N/cm) - TD		every roll	60	(105)	158	(276)
- MD		every roll	60	(105)	166	(291)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		19	
- MD	(33 mm)	every roll	12		18	
Break Elongation, % - TD	gauge length = 2.0"	every roll	100		536	
- MD	(51 mm)	every roll	100		500	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	42	(187)
- MD		every roll	28	(125)	36	(160)
Dimensional Stability, %	ASTM D 1204 (100C, 15 min)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.3	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.946	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/24/99	1/resin lot	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	60	(267)	110	(489)

Order No	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

APPROVED
S.P.
9/20/99
QA

Roll Test Data Report

GSE Lining Technology, Inc.

Roll No. 104102681

ROLL IDENTIFICATION

Roll Number	104102681	
Product Name	HDE040A000	
Production Date	9/6/99	
Length (+/- 1%)	650 198	feet meters
Width (Nominal)	22.5 6.9	feet meters
Sheet Area	14,625 1,359	sq. feet sq. meters
Weight	2,930 1,329	pounds kilograms

RESIN INFORMATION

Lot Number	7191261
Type	TR400GS
Supplier	Phillips

GSE RESIN TEST DATA

Property	Test Method	Results
Density, g/cc	ASTM D 1505	0.938
Melt index, g/10 min.	ASTM D 1238 (190/2.16)	0.08

Physical Property	Test Method	Test Frequency	Customer Minimum English	Customer Minimum Metric	Test Results English	Test Results Metric
Thickness, mil (mm)	ASTM D 1593/D 751/D 5199					
Average		every roll	40	(1.00)	41	(1.04)
Minimum		every roll	36	(0.90)	40	(1.02)
Tensile Properties:	ASTM D 638, Type IV					
Yield Strength, ppi (N/cm) - TD		every roll	84	(147)	111	(195)
- MD		every roll	84	(147)	113	(197)
Break Strength, ppi (N/cm) - TD		every roll	152	(266)	217	(379)
- MD		every roll	152	(266)	205	(358)
Yield Elongation, % - TD	gauge length = 1.3"	every roll	12		15	
- MD	(33 mm)	every roll	12		15	
Break Elongation, % - TD	gauge length = 2.0"	every roll	700		780	
- MD	(51 mm)	every roll	700		800	
Tear Resistance, lb. (N)	ASTM D 1004					
- TD		every roll	28	(125)	34	(150)
- MD		every roll	28	(125)	37	(166)
Dimensional Stability, %	ASTM D 1204 (100C, 1hr)					
- TD		every roll	-2.0		-0.3	
- MD		every roll	-2.0		-0.2	
Density, g/cc	ASTM D 1505	every 5th	0.940		0.945	
Carbon Black Content, %	ASTM D 1603	every 5th	2.0		2.7	
Carbon Black Dispersion	ASTM D 3015	every 5th	A2		A2	
ESCR, (hr)	ASTM D 1693 Cond. B Start Date = 9/10/99	every roll	1500		Pending	
Puncture Resistance, lb. (N)	ASTM D 4833	every roll	72	(320)	101	(449)

Order No.	8231
Customer Name	IWS&ALP PROPERTIES
Location	NIAGRA FALLS, NY

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GLYNN GEOTECHNICAL ENGINEERING

Liner Inventory Log

Project: Industrial Welding Site
GGE No.: 99-1076-B
Client: Law Engineering and Environmental Services, Inc.

Lot No.	Roll No.	Description	Delivered	Weight	Area	Condition	Manufacturer	Sample
7191290	103102286	GSE HDT040A000	9.23.99	3,693 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	
7191290	103102285	GSE HDT040A000	9.23.99	3,693 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	
7191290	103102284	GSE HDT040A000	9.23.99	3,695 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	
7191290	103102283	GSE HDT040A000	9.23.99	3,674 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	
7191290	103102287	GSE HDT040A000	9.23.99	3,636 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	
7191290	103102288	GSE HDT040A000	9.23.99	3,727 lb.	15,750 s.f.	GOOD	GSE Lining Technology Inc.	X
7191261	104102683	GSE HDE040A000	9.23.99	2,930 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191261	104102685	GSE HDE040A000	9.23.99	2,906 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191261	104102686	GSE HDE040A000	9.23.99	2,909 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191261	104102687	GSE HDE040A000	9.23.99	2,910 lb.	14,625 s.f.	FELL OFF TRUCK	GSE Lining Technology Inc.	
7191261	104102688	GSE HDE040A000	9.23.99	2,906 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191261	104102689	GSE HDE040A000	9.23.99	2,930 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191261	104102681	GSE HDE040A000	9.23.99	2,930 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	X
7191265	104102690	GSE HDE040A000	9.23.99	2,958 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191265	104102692	GSE HDE040A000	9.23.99	2,952 lb.	14,625 s.f.	FELL OFF TRUCK	GSE Lining Technology Inc.	X
7191265	104102694	GSE HDE040A000	9.23.99	2,944 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	
7191265	104102695	GSE HDE040A000	9.23.99	2,910 lb.	14,625 s.f.	GOOD	GSE Lining Technology Inc.	

* Rolls unloaded with SES WA450 loader and slings. Rolls placed on prepared concrete pad at south end of site.

415 South Transit Street, Lockport, New York 14094
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• VISIT OUR WEB SITE AT www.glynngroup.com / E-MAIL: gge@glynngroup.com •

GSE

R E S U M E

NAME : Johnny Hashaw

POSITION : Supervisor II

EXPERIENCE : Has been employed by GSE Lining Technology since 01/01/88 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
CORTEZ GOLD MINES POND	BEOWAWE	NV	291,630
LYONS FALLS PAPER LAGOON	LYONS FALLS	NY	249,164
RAVENBROOK PH. I, II, III CLO.	CARVER	MA	48,864
BRUSH WELLMAN FLOW LAGOONS	ELMORE	OH	700,000
CARTER VALLEY LF PH 1 SEC 2	CHURCHILL	TN	280,000
LAIDLAW VALLEY VIEW LANDFILL	SULFUR	KY	335,000
MURPHY/PRENCHES CREEK	ELIZABETHTOWN	NC	349,269
POLK CO. N.CENTRAL LF CELL 2	BARTOW	FL	3,916,993
SAVANNAH RIVER LF CLOSURE	AIKEN	SC	9,110,810
N.COUNTY RESOURCE RECOVERY FAC	WEST PALM BEACH	FL	5,855,042
BALDWIN MAGNOLIA L/F, AL	SUMMERDALE	AL	45,116
BEC/ALLWASTE/JEFFERSON CO LF 2	PINSON	AL	7,076
NOVA RD. LF CLOSURE	ORMOND BEACH	FL	1,200,000
ENOREE LANDFILL CELL #3	GREENVILLE	SC	638,103
BAKER PLACE ROAD LANDFILL	GROVETOWN	GA	805,533
KERR MCGEE POND 6/INSTALL/CLOS	HAMILTON	MS	65,000
BFI-OX MOUNTAIN LANDFILL	HALF MOON BAY	CA	544,500
PUENTE HILLS LF	WHITTIER	CA	1,290,804
PANOCHE	BENICIAZ	CA	252,649
USA WASTE/VALLEY CELL	IRWIN	PA	2,820
SLT/LAIDLAW CHEROKEE RUN	BELLEFONTAINE	OH	210,000
SLT/LAIDLAW ADRIAN CO. CELL	ADRIAN	MI	896,148
SLT/LAIDLAW ADRIAN CO. CAP		MI	700,000
SLT/TRI-COUNTY LANDFILL		GA	433,100
SLT/CONSUMER POWER	WEST OLIVE	MI	3,500,100
	Total Sq Ft		31,727,711

GSE®

R E S U M E

NAME : Debra Carroll20532

POSITION : QA Technician

EXPERIENCE : Has been employed by GSE Lining Technology since 03/17/97 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
ENOREE LANDFILL CELL #3	GREENVILLE	SC	57,671
PST/WALBACH FINISHER #1 LAGOON	COLUMBUS	NE	23,642
MANOR ROBERTS/G/F'S	WOODWARD	OK	37,713
MANOR ROBERTS/LAGOON #22	WOODWARD	OK	74,332
MANOR ROBERTS/LAGOON #23	WOODWARD	OK	59,340
IMC AGRICO WEST POND DITCH	ST JAMES	LA	254,602
EAGLE MTN. SEWAGE LAGOONS	CEDAR VALLEY	UT	17,961
BHP FLORENCE IMPOUNDMENT POND	FLORENCE	AZ	165,370
U.S. BORAX/EVAPORATION PONDS	BORON	CA	487,867
REPUBLIC/LAUGHLIN LANDFILL	LAUGHLIN	NV	31,576
RUBY HILL MINE	EUREKA	NV	623,506
GREEN HILLS MEMORIAL PARK CAP	RANCHO PALOS VE	CA	155,267
BFI AREA 90 CLOSURE	AVON DALE	LA	149,062
BFI/GULF PINES CAP	BILOXI	MS	25,064
USA WASTE/WEBSTER PARISH LF	MINDEN	LA	262,199
USA WASTE/WEBSTER PARISH CELL2	MINDEN	LA	286,751
ALLIED/ELLIS SCOTT LANDFILL	CLINTON	MO	6,818
WASTE MGMT/SECURITY LF CELL 8	CLEVELAND	TX	34,001
ALLIED/ TAYLOR CO LF	MAUK	GA	865,959
WMI BJ LF CAP	NORCROSS	GA	373,713
WMI/ BUTTON GWINETTE LF CAP	LAWRENCEVILLE	GA	786,477
ENTERPRISE BRINE PIT RELINE/IN	MT BELVIEU	TX	87,356
	Total Sq Ft		4,866,257

R E S U M E

NAME : Raul Rivera20397

POSITION : Weld Technician

EXPERIENCE : Has been employed by GSE Lining Technology since 09/15/97 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
MURPHY/FRENCHES CREEK	ELIZABETHTOWN	NC	238,804
ENOREE LANDFILL CELL #3	GREENVILLE	SC	370,896
USA WASTE/GRAND CENTRAL	PEN ARGYL	PA	491,930
USA WASTE/MEADOWFILL CELLS/CAP	BRIDGEPORT	WV	152,461
	Total Sq Ft		1,254,091

GSE®

R E S U M E

NAME : Saul Hernandez20574

POSITION : Weld Technician

EXPERIENCE : Has been employed by GSE Lining Technology since 08/05/97 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
MURPHY/FRENCHES CREEK	ELIZABETHTOWN	NC	38,804
POLK CO. N.CENTRAL LF CELL 2	BARTOW	FL	108,668
NOVA RD. LF CLOSURE	ORMOND BEACH	FL	1,200,000
SNOREE LANDFILL CELL #3	GREENVILLE	SC	70,896
NEWTON POWER CELL & CLOSURE	NEWTON	IL	40,944
SEABOARD/PERKINS LINER REPAIR	ELKHART	KS	41,361
MOUNT PLEASANT (CITY OF) LF	MT. PLEASANT	TX	28,388
USA WASTE/R & B LANDFILL CELL	HOMER	GA	57,466
Total Sq Ft			1,586,527

R E S U M E

NAME : Jose ARodriguez22302

POSITION : Other

EXPERIENCE : Has been employed by GSE Lining Technology since 10/21/98 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
WMI BJ LF CAP	NORCROSS	GA	381,039
WMI/ BUTTON GWINETTE LF CAP	LAWRENCEVILLE	GA	547,634
ENTERPRISE BRINE PIT RELINE/IN	MT BELVIEU	TX	1,323,828
	Total Sq Ft		2,252,501

R E S U M E

NAME : Bounloth Lounnarath20589

POSITION : Weld Technician

EXPERIENCE : Has been employed by GSE Lining Technology since 06/18/96 and has worked on the following projects :

PROJECT	LOCATION		SQ FT
BROWN STATION RD. LANDFILL	UPPER MARLBORO	MD	212,763
CHRIN LANDFILL STAGE 3B	WILLIAMS TOWNSH	PA	42,402
BFI NORTH SHELBY LANDFILL	MILLINGTON	TN	21,551
BIRCHWOOD LANDFILL PHASE I-II	CHATTANOOGA	TN	47,756
TOM FARMS LAGOON	NEWTON GROVE	NC	83,781
BFI/HICKORY RIDGE PH 11 C IV	CONLEY	GA	66,270
BALDWIN MAGNOLIA L/F, AL	SUMMERDALE	AL	70,057
BEC/ALLWASTE/JEFFERSON CO LF 2	PINSON	AL	11,153
CITY OF DALLAS MCCOMAS L.F.	DALLAS	TX	330,480
KENNECOTT BARNEYS CANYON BC-5	BINGHAM CANYON	UT	1,715,824
BFI MIDDLEPOINT L.F. SECTION 9	MURFREESBORO	TN	277,003
BFI/NORTH BATON ROUGE LANDFILL	ZACHARY	LA	10,782
BFI/CONESTOGA CELLS 7 & 8	MORGANTOWN	PA	53,302
REPUBLIC/OAK GROVE PH.3	WINDER	GA	73,476
BFI/LORAIN COUNTY	OBERLIN	OH	39,119
ALLIED/ANDERSON COUNTY CELL	BELTON	SC	21,622
ALLIED/ TAYLOR CO LF	MAUK	GA	845,503
Total Sq Ft			3,922,844

APPENDIX E-3

GEOMEMBRANE:

Conformance Test Results

Geotechnics

..... GEOTECHNICAL, GEOENVIRONMENTAL, AND GEOSYNTHETIC LABORATORIES

LABORATORY TEST REPORT

October 6, 1999

Mr. Alan R. Hopkins
Glynn Geotechnical Engineering
415 South Transit Street
Lockport, NY 14094

Project No.: L99222-01, 02

RE: CONFORMANCE TEST RESULTS
GSE 40-MIL GEOMEMBRANES
IWS-OLIN CHEMICAL LANDFILL CAP
GGE PROJECT NO. 99-1076

Transmitted herein are the results of the conformance tests performed for Glynn Geotechnical Engineering as directed by Mr. Hopkins on the samples submitted as follows.

Date Submitted	Project No.	Material	No. Samples
9-28-99	L99222-01	40 mil Smooth HDPE	2
10-4-99	L99222-02	40 mil Textured HDPE	1

We are pleased to be of service and trust that our efforts have contributed to the success of your project. Should you have any questions or if we may be of any further assistance, please do not hesitate to call.

Respectfully submitted,

Richard S. Lacey, P.E.
Laboratory Director

attachments: 3 Data Pages

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Geotechnics

CAVEAT

The tests were performed in general accordance with the procedures referenced on the data tables as well as industry practice on test specimens believed to be representative of the samples submitted. The test results are indicative only of the specimens that were actually evaluated. The conformance sample remnants will be retained for ninety days then discarded unless otherwise directed beforehand by the Client.

Geotechnics has no direct knowledge of the origin of the samples submitted, implies no position with regard to the disposition of the test results, i.e. pass/fail, and makes no claims as to the suitability of the material for its intended end use.

The test data and all associated project information provided shall be held in confidence and disclosed to other parties only with the authorization of the Client and Geotechnics.

The test data transmitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics.

CONFORMANCE TEST RESULTS

CLIENT: GLYNN GROTECHNICAL ENGINEERING
CLIENT PROJECT: IWS - OLIN CHEMICAL LANDFILL CAP
CLIENT PROJ. NO.: 99-1076
PROJECT NO.: L99222-01
LAB ID NO.: L99222-01-01
MATERIAL: GSE 40 MIL SMOOTH HDPE
SAMPLE I.D. Not Provided
ROLL NO: 104102681

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5199-95	mils	41	41	42	42	43		
			41	42	42	43	42	**41.8**	0.71
PUNCTURE RESISTANCE	D 4833	lbs	117.1	117.0	115.3	114.1	114.4		
			118.6	114.2	114.0	114.1	116.5		
			111.0	112.5	109.6	108.9	110.4	**113.8**	2.89
TEAR RESISTANCE	D 1004-94	MD-lbs	34.3	34.9	33.7	33.5	33.9		
			34.3	33.8	32.6	33.3	33.3	**33.8**	0.64
		CD-lbs	30.3	30.4	31.0	31.1	35.3		
			32.2	34.1	35.5	32.1	33.5	**32.6**	1.95
TENSILE PROPERTIES	D 638-95 &NSF 1993								
STRENGTH AT YIELD		MD-ppi	104	102	100	104	100	**102**	1.93
		CD-ppi	108	110	107	108	108	**108**	1.19
STRENGTH AT BREAK		MD-ppi	206	162	200	160	178	**181**	20.90
		CD-ppi	221	205	200	178	208	**202**	15.87
ELONGATION AT YIELD Lo = 1.3" (NSF 54,1993)		MD%	20	20	18	19	19	**19.3**	0.74
		CD%	16	17	17	17	17	**16.6**	0.32
ELONGATION AT BREAK Lo = 2.5" (NSF 54,1993)		MD%	642	522	645	507	558	**575**	65.25
		CD%	719	670	648	597	679	**663**	44.90
ELONGATION AT BREAK Lo = 2.0"		MD%	802	652	806	634	698	**718**	81.56
		CD%	899	838	811	746	849	**828**	56.13

CHECKED BY: JW DATE: 9-30-99

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Geotechnics

CONFORMANCE TEST RESULTS

CLIENT: GLYNN GROTECHNICAL ENGINEERING
CLIENT PROJECT: IWS - OLIN CHEMICAL LANDFILL CAP
CLIENT PROJ. NO.: 99-1076
PROJECT NO.: L99222-01
LAB ID NO.: L99222-01-02
MATERIAL: GSE 40 MIL SMOOTH HDPE
SAMPLE I.D. Not Provided
ROLL NO: 104102692

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5199-95	mils	42	43	42	43	42		
			42	42	41	43	41	**42.1**	0.73
PUNCTURE RESISTANCE	D 4833	lbs	112.7	111.9	110.9	109.8	109.6		
			112.2	96.7	111.2	110.5	109.3		
			112.9	106.9	109.7	108.1	107.9	**109.4**	3.92
TEAR RESISTANCE	D 1004-94	MD-lbs	34.5	34.7	34.0	35.0	35.1		
			32.6	33.6	33.6	34.9	34.7	**34.3**	0.80
		CD-lbs	29.7	33.5	32.0	32.6	34.4		
			35.8	32.7	31.2	33.1	31.1	**32.6**	1.75
TENSILE PROPERTIES	D 638-95 &NSF 1993								
STRENGTH AT YIELD		MD-ppi	103	101	100	102	102	**102**	1.31
		CD-ppi	110	112	110	113	114	**112**	1.66
STRENGTH AT BREAK		MD-ppi	212	176	188	194	181	**190**	13.89
		CD-ppi	171	196	216	192	204	**196**	16.87
ELONGATION AT YIELD		MD%	20	19	19	19	18	**19.1**	0.44
Lo = 1.3" (NSF 54,1993)		CD%	17	17	17	17	17	**17.0**	0.32
ELONGATION AT BREAK		MD%	668	544	596	609	643	**612**	47.58
Lo = 2.5" (NSF 54,1993)		CD%	601	646	706	631	655	**648**	38.35
ELONGATION AT BREAK		MD%	835	680	745	761	804	**765**	59.47
Lo = 2.0"		CD%	751	808	882	789	819	**810**	47.93

CHECKED BY: _____ DATE: 9-30-99

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Geotechnics

CONFORMANCE TEST RESULTS

CLIENT: GLYNN GROTECHNICAL ENGINEERING
CLIENT PROJECT: IWS - OLIN CHEMICAL LANDFILL CAP
CLIENT PROJ. NO.: 99-1076
PROJECT NO.: L99222-02
LAB ID NO.: L99222-02-01
MATERIAL: GSE 40 MIL textured HDPE
SAMPLE I.D. Not Provided
ROLL NO: 1E+08

TEST	ASTM METHOD	UNITS	SPECIMEN NO. 1	2	3	4	5	AVE	STD
THICKNESS	D 5994-96	mils	39	40	39	40	41		
			40	34	41	40	38	**39.1**	2.02
ASPERITY HEIGHT	GRI-GM12	mils	33	29	34	37	22		
			34	33	27	25	33	**30.7**	4.74
PUNCTURE RESISTANCE	D 4833	lbs	115.6	120.2	111.3	114.7	115.2		
			118.0	114.9	110.7	117.6	110.6		
			115.0	123.0	114.2	116.5	103.7	**114.7**	4.54
TEAR RESISTANCE	D 1004-94	MD-lbs	38.2	35.0	35.9	40.0	42.2		
			37.9	38.4	40.5	38.3	39.2	**38.6**	2.11
		CD-lbs	37.4	33.5	34.3	35.7	40.5		
			35.2	35.2	40.1	33.9	35.7	**36.2**	2.45
TENSILE PROPERTIES	D 638-95 &NSF 1993								
STRENGTH AT YIELD		MD-ppi	111	111	111	110	110	**111**	0.46
		CD-ppi	116	123	106	109	114	**114**	6.32
STRENGTH AT BREAK		MD-ppi	112	148	144	148	134	**137**	14.99
		CD-ppi	108	110	117	88	126	**110**	14.08
ELONGATION AT YIELD Lo = 1.3" (NSF 54,1993)		MD%	16	17	17	17	18	**17.0**	0.74
		CD%	14	13	14	15	14	**14.2**	0.42
ELONGATION AT BREAK Lo = 2.5" (NSF 54,1993)		MD%	280	444	411	439	393	**394**	66.85
		CD%	205	216	385	95	406	**262**	131.56
ELONGATION AT BREAK Lo = 2.0"		MD%	350	556	514	549	491	**492**	83.56
		CD%	257	270	482	119	508	**327**	164.45

CHECKED BY: RM DATE: 10-6-99

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APPENDIX E-4

GEOMEMBRANE:

Installer's Subgrade Surface Acceptance Reports

Subgrade Surface Acceptance

Project Name: OLIN CLOSURE. INDUSTRIAL WELDING SITE

Project Number: 503519

Location: NIAGRA FALLS NY

Customer:

Date: 10-6-99

Partial: X Final:

This document only applies to the acceptability of surface conditions for installation of geosynthetic products. GSE does not accept responsibility for compaction, elevation or moisture content, nor for the surface condition maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the Owner or Earthwork Contractor.

PANELS 1 - 14 AT NORTH END OF SITE TO SOUTH. PANELS 1, 2, + 14 TEXTURED.

TOTAL TEXTURED 40MIL 17270 sf

TOTAL SMOOTH 40MIL 65098

For GSE Lining Technology, Inc.:

JOHNNY HASHAW

For Contractor/Owner:

J.E.S. (JESSE GROSSMAN, PROJ. MGR. GGE, SITE QC)

Jay CASTIGLIONE SF- AREA PENDING L.S. RECORD SURVEY

Acceptance Number: 1

Area Accepted: 73368 /SF

Total Area accepted to date: 73368

GSE REPRESENTATIVE

Subgrade Surface Acceptance

Project Name: OLIN CLOSURE INDUSTRIAL WELDING SITE

Project Number: 503519

Location: NIAGRA FALLS NY

Customer: _____

Date: 10-7-99

Partial: _____ Final: X

This document only applies to the acceptability of surface conditions for installation of geosynthetic products. GSE does not accept responsibility for compaction, elevation or moisture content, nor for the surface condition maintenance during deployment. Structural integrity of the subgrade and maintenance of these conditions are the responsibility of the Owner or Earthwork Contractor.

PANELS 15-44 FROM MIDDLE OF SITE TO SOUTH. PAVELS 15, 33, 34, 35, 36, 37, 38, 39 40, 41, 42, 43, & 44 BEING TEXTURED.

TOTAL TEXTURED 22572 ; FINAL TOTAL 39,842

TOTAL SMOOTH 68783 FINAL TOTAL 133881

For GSE Lining Technology, Inc.: _____

JOHNNY HASHAW

For Contractor/Owner: _____

J.E.S. (JESSE GROSSMAN, PROJ. MGR GLE, SITE QC

Jerry Castiglion

SF-Area - Pending L.S. Record Survey

Acceptance Number: 2

Area Accepted: 91355 /SF

Total Area accepted to date: 173723

GSE REPRESENTATIVE

APPENDIX E-5

GEOMEMBRANE:

HDPE Deployment Log

GLYNN GEOTECHNICAL ENGINEERING

SMOOTH/TEXTURED
HDPE DEPLOYMENT

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

DATE	PANEL NO.	LOT NO. - ROLL NO.	PANEL LENGTH	THICKNESS (MIL)	LOCATION & COMMENTS
10/6/99	1	7191290-103102287	179	40	TEXTURED, EAST SLOPE
10/6/99	2	7191290-103102287	415	"	TEXTURED, NORTH SLOPE
10/6/99	3	7191261-104102689	411	"	SMOOTH
10/6/99	4	7191261-104102689	219	"	SMOOTH
10/6/99	5	7191265-104102295	183	"	SMOOTH
10/6/99	6	7191265-104102295	394	"	SMOOTH
10/6/99	7	7191261-104102688	242	"	SMOOTH
10/6/99	8	7191261-104102688	221	"	SMOOTH
10/6/99	9	7191261-104102685	130	"	SMOOTH
10/6/99	10	7191261-104102685	364	"	SMOOTH
10/6/99	11	7191261-104102685	124	"	SMOOTH
10/6/99	12	7191265-104102694	228	"	SMOOTH
10/6/99	13	7191265-104102694	341	"	SMOOTH
10/6/99	14	7191290-103102285	198	"	TEXTURED, WEST SLOPE
10/7/99	15	7191290-103102285	365	"	TEXTURED, EAST SLOPE
10/7/99	16	7191261-104102686	330	"	SMOOTH
10/7/99	17	7191261-104102686	294	"	SMOOTH
10/7/99	18	7191265-104102694	38	"	SMOOTH
10/7/99	20	7191261-104102683	298	"	SMOOTH
10/7/99	21	7191290-103102287	56	"	SMOOTH
10/7/99	22	7191290-103102287	318	"	SMOOTH
10/7/99	23	7191261-104102687	245	"	SMOOTH
10/7/99	24	7191265-104102690	66	"	SMOOTH
10/7/99	25	7191265-104102690	306	"	SMOOTH
10/7/99	26	7191265-104102690	260	"	SMOOTH
10/7/99	27	7191261-104102681	31	"	SMOOTH
10/7/99	28	7191261-104102681	257	"	SMOOTH
10/7/99	29	7191261-104102681	233	"	SMOOTH
10/7/99	30	7191261-104102681	100	"	SMOOTH
10/7/99	31	7191265-104102692	108	"	SMOOTH
10/7/99	32	7191265-104102694	N/A	"	SMOOTH
10/7/99	33	7191290-103102288	93	"	TEXTURED
10/7/99	34	7191290-103102288	44	"	TEXTURED
10/7/99	35	7191290-103102288	35	"	TEXTURED
10/7/99	36	7191290-103102288	118	"	TEXTURED
10/7/99	37	7191290-103102288	40	"	TEXTURED
10/7/99	38	7191290-103102288	44	"	TEXTURED
10/7/99	39	7191290-103102288	47	"	TEXTURED
10/7/99	40	7191290-103102288	50	"	TEXTURED
10/7/99	41	7191290-103102288	52	"	TEXTURED
10/7/99	42	7191290-103102284	54	"	TEXTURED
10/7/99	43	7191290-103102284	56	"	TEXTURED
10/7/99	44	7191290-103102284	58	"	TEXTURED

APPENDIX E-6

GEOMEMBRANE:

Pre-Weld/Trial Seam Data Summary

GLYNN GEOTECHNICAL ENGINEERING

PREWELD TESTING
SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

TME TESTED	DATE TESTED	WEATHER	TECH. NO.	MACH NO.	MACH. TEMP (F)	SPEED PRE/ HEAT	TYPE OF WELD	PEEL O (ppi)	PEEL O (ppi)	PEEL O (ppi)	PEEL I (ppi)	PEEL I (ppi)	PEEL I (ppi)	SHEAR	COMMENTS
8:53 AM	10/6/99	OVERCAST, 45°	RR	34	660	5 fpm	DF	121	123	121	122	113	125	142	TEXTURED - TEXTURED
9:28 AM	10/6/99	"	RR	34	660	5 fpm	DF	118	101	108	97	98	111	131	SMOOTH - TEXTURED
9:42 AM	10/6/99	"	RR	34	660	5 fpm	DF	97	100	112	109	114	107	126	SMOOTH - SMOOTH
9:47 AM	10/6/99	"	SH	35	660	5 fpm	DF	102	101	95	120	115	119	133	SMOOTH - TEXTURED
10:00 AM	10/6/99	"	SH	35	660	5 fpm	DF	98	101	100	100	105	106	123	SMOOTH - SMOOTH
1:00 PM	10/6/99	SUNNY, 50°	RR	34	660	5 fpm	DF	107	90	91	108	97	100	117	SMOOTH - SMOOTH
2:00 PM	10/6/99	"	RR	34	660	5 fpm	DF	124	111	118	107	112	110	137	TEXTURED - TEXTURED
2:05 PM	10/6/99	"	SH	35	660	5 fpm	DF	93	102	102	91	97	99	116	SMOOTH - SMOOTH
8:05 AM	10/7/99	SUNNY, 35°	RR	34	660	5 fpm	DF	118	102	102	100	98	99	123	SMOOTH - SMOOTH
8:18 AM	10/7/99	"	SH	35	660	5 fpm	DF	110	104	112	112	124	127	133	SMOOTH - SMOOTH
8:24 AM	10/7/99	"	RR	34	660	5 fpm	DF	89	100	112	116	113	108	137	SMOOTH - TEXTURED
12:00 PM	10/7/99	"	RR	34	660	5 fpm	DF	54	60	64	65	59	56	82	TEXTURED - TEXTURED
1:50 PM	10/7/99	SUNNY, 50°	BL	278	230-250		EXT	74	81	89	95	101	76	102	SMOOTH - SMOOTH
1:30 PM	10/7/99	"	SH	35	660	5 fpm	DF	85	112	106	87	107	100	111	SMOOTH - SMOOTH
1:45 PM	10/7/99	"	RR	34	660	5 fpm	DF	87	96	89	100	92	89	110	SMOOTH - SMOOTH
8:51 AM	10/8/99	"	BL	278	230-250		EXT	61	89	88				125	SMOOTH - SMOOTH
9:05 AM	10/8/99	"	SH	98	230-250		EXT	105	107	98				114	SMOOTH - SMOOTH
1:23 PM	10/8/99	"	RR	98	120-200		EXT	80	81	97				117	SMOOTH - SMOOTH
1:30 PM	10/8/99	"	BL	278	230-250		EXT	83	78	91				111	SMOOTH - SMOOTH
8:31 AM	10/9/99	SUNNY, 53°	BL	278	230-250		EXT	86	101	100				103	SMOOTH - SMOOTH
8:45 AM	10/9/99	"	SH	98	150-235		EXT	91	90	95				114	SMOOTH - TEXTURED

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APPENDIX E-7

GEOMEMBRANE:

Destructive Seam Test Results

GLYNN GEOTECHNICAL ENGINEERING

FIELD DESTRUCTIVE SEAM TESTING SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

DESTRUCTIVE SAMPLE ID.						FIELD TEST INFORMATION										
SAMPLE NO.	SEAM NO.	DATE WELDED	WELD. TECH.	MACHINE NO.	WELD TYPE	FIELD TEST DATE	PEEL (ppi) O/I	PEEL (ppi) O/I	PEEL (ppi) O/I	PEEL (ppi) O/I	PEEL (ppi) O/I	SHEAR (ppi)	FIELD PASS/ FAIL	LAB PASS\ FAIL	LOCATION	COMMENTS
DS-1	2/3	10/6/99	RR	W - 34	DF	10/6/99	93/98	90/109	91/109	90/114	86/105	134	P	P	408' FROM WEST END P1	SMOOTH/TEXTURED
DS-2	3/4	10/6/99	SH	W - 35	DF	10/7/99	109/113	107/112	108/115	116/11	111/11	136	P	P	405' FROM WEST END P3	SMOOTH/SMOOTH
DS-3	6/7	10/6/99	SH	W - 35	DF	10/7/99	108/111	109/114	104/105	112/10	104/10	135	P	P	95' FROM WEST END P6	SMOOTH/SMOOTH
DS-4	7/8	10/6/99	RR	W - 34	DF	10/7/99	56/70	58/61	56/67	57/60	57/65	83	P	P	190' FROM WEST END P7	SMOOTH/SMOOTH
DS-5	8/10	10/6/99	SH	W - 35	DF	10/7/99	65/69	70/70	71/72	62/66	60/66	86	P	P	305' FROM WEST END P8	SMOOTH/SMOOTH
DS-6	12/13	10/6/99	SH	W - 35	DF	10/7/99	64/67	67/67	74/72	70/62	74/61	89	P	P	68' FROM WEST END P12	SMOOTH/SMOOTH
DS-7	1/2	10/6/99	RR	W - 34	DF	10/7/99	78/77	78/68	77/74	79/67	87/73	93	P	P	20' FROM NORTH END P1	TEXTURED/TEXTURED
DS-8	16/13	10/7/99	SH	W - 35	DF	10/8/99	99/86	96/95	84/96	88/82	79/96	120	P	P	40' FROM EAST END P13	SMOOTH/SMOOTH
DS-9	16/17	10/7/99	RR	W - 34	DF	10/9/99	89/87	81/91	86/90	82/83	84/84	116	P	P	125' FROM EAST END P16	SMOOTH/SMOOTH
DS-10	20/21	10/7/99	SH	W - 35	DF	10/9/99	78/83	81/85	81/81	82/79	79/78	80	P	P	@ P21/P22 CROSS SEAM	SMOOTH/SMOOTH
DS-11	22/20	10/7/99	RR	W - 34	DF	10/9/99	85/77	85/53	87/81	87/74	85/83	112	P	P	163' FROM WEST END P22	SMOOTH/SMOOTH
DS-12	23/25	10/7/99	SH	W - 35	DF	10/9/99	93/92	92/83	97/92	97/99	99/97	108	P	P	8' FROM EAST END P23	SMOOTH/SMOOTH
DS-13	25/26	10/7/99	SH	W - 35	DF	10/9/99	83/85	93/93	87/87	90/94	92/93	111	P	P	96' FROM EAST END P25	SMOOTH/SMOOTH
DS-14	28/29	10/7/99	RR	W - 34	DF	10/9/99	79/91	81/87	80/86	81/89	81/94	109	P	P	92' FROM EAST END P28	SMOOTH/SMOOTH
DS-15	35/36	10/7/99	SH	W - 35	DF	10/9/99	83/88	90/90	88/88	90/91	90/89	95	P	P	@ P35/P36 CROSS SEAM	TEXTURED/TEXTURED
DS-16	15/22	10/7/99	RR	W - 34	DF	10/9/99	85/94	77/86	83/90	86/90	79/94	101	P	P	@ P22/P15 TIE IN	SMOOTH/TEXTURED
DS-17	42/43	10/7/99	RR	W - 34	DF	10/9/99	82/87	82/86	84/86	85/85	89/52	68	P	P	TOP SOUTH SLOPE @ P42/P43	TEXTURED/TEXTURED

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 7, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 1
DATE RECEIVED:	OCTOBER 6, 1999	DATE TESTED:	OCTOBER 7, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 1		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO TEXTURED		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	18	HOURS	(24 HOURS)
TEMPERATURE:	68	"F	(70" - 77" F)
RELATIVE HUMIDITY	55	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	93.67	lbs.	SE - 1	FTB
2	40	mil	104.45	lbs.	SE - 1	FTB
3	40	mil	98.99	lbs.	SE - 1	FTB
4	40	mil	95.77	lbs.	SE - 1	FTB
5	40	mil	104.63	lbs.	SE - 1	FTB
AVERAGE			99.5	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	115.09	lbs.	SE - 1	FTB
2	40	mil	118.17	lbs.	SE - 1	FTB
3	40	mil	114.25	lbs.	SE - 1	FTB
4	40	mil	102.63	lbs.	SE - 1	FTB
5	40	mil	116.49	lbs.	SE - 1	FTB
AVERAGE			113.3	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: ALAN R. HOPKINS

REVIEWED BY: A.R.H. / MARK W. GLYNN P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D-4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 7, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 2
DATE RECEIVED:	OCTOBER 6, 1999	DATE TESTED:	OCTOBER 7, 1999

SAMPLE DATA			
SAMPLE ID:	DS - 2		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6" LONG STRIP		
MIN. CONDITIONING PERIOD	18	HOURS	(24 HOURS)
TEMPERATURE:	68	°F	(70° - 77" F)
RELATIVE HUMIDITY:	55	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE:	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION:	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION:	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	102.07	lbs.	SE - 1	FTB
2	40	mil	99.83	lbs.	SE - 1	FTB
3	40	mil	99.55	lbs.	SE - 1	FTB
4	40	mil	101.23	lbs.	SE - 1	FTB
5	40	mil	95.91	lbs.	SE - 1	FTB
AVERAGE			99.7	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	112.99	lbs.	SE - 1	FTB
2	40	mil	115.23	lbs.	SE - 1	FTB
3	40	mil	114.11	lbs.	SE - 1	FTB
4	40	mil	114.39	lbs.	SE - 1	FTB
5	40	mil	110.33	lbs.	SE - 1	FTB
AVERAGE			113.4	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.A. // MARK W. GLYNN, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED	OCTOBER 7, 1999
LOCATION	NIAGARA FALLS, NEW YORK	PROJECT NO	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.	DS - 3
DATE RECEIVED:	OCTOBER 6, 1999	DATE TESTED:	OCTOBER 7, 1999

SAMPLE DATA			
SAMPLE ID:	DS - 3		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	18	HOURS	(24 HOURS)
TEMPERATURE:	68	°F	(70° - 77° F)
RELATIVE HUMIDITY:	55	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE:	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION:	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION:	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	90.73	lbs.	SE - 1	FTB
2	40	mil	88.77	lbs.	SE - 1	FTB
3	40	mil	94.23	lbs.	SE - 1	FTB
4	40	mil	98.43	lbs.	SE - 1	FTB
5	40	mil	97.17	lbs.	SE - 1	FTB
AVERAGE			93.9	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	105.43	lbs.	SE - 1	FTB
2	40	mil	103.89	lbs.	SE - 1	FTB
3	40	mil	105.29	lbs.	SE - 1	FTB
4	40	mil	107.25	lbs.	SE - 1	FTB
5	40	mil	106.83	lbs.	SE - 1	FTB
AVERAGE			105.7	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 8, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO:	DS - 4
DATE RECEIVED:	OCTOBER 7, 1999	DATE TESTED:	OCTOBER 8, 1999

SAMPLE DATA			
SAMPLE ID:	DS - 4		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	14 HOURS	(24 HOURS)	
TEMPERATURE:	68 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	50 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE:	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION:	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION:	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	85.67 lbs.	SE - 1	FTB
2	40 mil	85.25 lbs.	SE - 1	FTB
3	40 mil	83.57 lbs.	SE - 1	FTB
4	40 mil	92.39 lbs.	SE - 1	FTB
5	40 mil	89.87 lbs.	SE - 1	FTB
AVERAGE		87.4 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	109.33 lbs.	SE - 1	FTB
2	40 mil	110.87 lbs.	SE - 1	FTB
3	40 mil	113.39 lbs.	SE - 1	FTB
4	40 mil	114.51 lbs.	SE - 1	FTB
5	40 mil	112.13 lbs.	SE - 1	FTB
AVERAGE		112.0 lbs.		

REMARKS
The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 8, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 5
DATE RECEIVED:	OCTOBER 7, 1999	DATE TESTED:	OCTOBER 8, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 5		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	14 HOURS	(24 HOURS)	
TEMPERATURE.	69 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	51 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	102.05 lbs.	SE - 1	FTB
2	40 mil	100.51 lbs.	SE - 1	FTB
3	40 mil	103.17 lbs.	SE - 1	FTB
4	40 mil	101.21 lbs.	SE - 1	FTB
5	40 mil	98.41 lbs.	SE - 1	FTB
AVERAGE		101.1 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	108.21 lbs.	SE - 1	FTB
2	40 mil	107.37 lbs.	SE - 1	FTB
3	40 mil	106.95 lbs.	SE - 1	FTB
4	40 mil	109.05 lbs.	SE - 1	FTB
5	40 mil	108.77 lbs.	SE - 1	FTB
AVERAGE		108.1 lbs.		

REMARKS

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 8, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 6
DATE RECEIVED:	OCTOBER 7, 1999	DATE TESTED:	OCTOBER 8, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 6		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE.	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15	HOURS	(24 HOURS)
TEMPERATURE:	69	"F	(70" - 77" F)
RELATIVE HUMIDITY:	51	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER.	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	96.59	lbs.	SE - 1	FTB
2	40	mil	99.25	lbs.	SE - 1	FTB
3	40	mil	99.25	lbs.	SE - 1	FTB
4	40	mil	97.15	lbs.	SE - 1	FTB
5	40	mil	100.23	lbs.	SE - 1	FTB
AVERAGE			98.5	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	115.91	lbs.	SE - 1	FTB
2	40	mil	112.69	lbs.	SE - 1	FTB
3	40	mil	111.15	lbs.	SE - 1	FTB
4	40	mil	112.41	lbs.	SE - 1	FTB
5	40	mil	114.65	lbs.	SE - 1	FTB
AVERAGE			113.4	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

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GLYNN GEOTECHNICAL ENGINEERING

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ASTM D - 4437 / NSF 54

PROJECT	INDUSTRIAL WELDING SITE	DATE REPORTED	OCTOBER 8, 1999
LOCATION	NIAGARA FALLS, NEW YORK	PROJECT NO.	99 - 1076 -B
CLIENT.	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 7
DATE RECEIVED	OCTOBER 7, 1999	DATE TESTED	OCTOBER 8, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 7		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	TEXTURED WELDED TO TEXTURED		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15 HOURS	(24 HOURS)	
TEMPERATURE:	70 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	51 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	94.91	lbs.	SE - 1	FTB
2	40	mil	91.55	lbs.	SE - 1	FTB
3	40	mil	109.61	lbs.	SE - 1	FTB
4	40	mil	102.47	lbs.	SE - 1	FTB
5	40	mil	99.95	lbs.	SE - 1	FTB
AVERAGE			99.7	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	117.31	lbs.	SE - 1	FTB
2	40	mil	120.39	lbs.	SE - 1	FTB
3	40	mil	121.93	lbs.	SE - 1	FTB
4	40	mil	118.29	lbs.	SE - 1	FTB
5	40	mil	123.05	lbs.	SE - 1	FTB
AVERAGE			120.2	lbs.		

REMARKS

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REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 8
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 8		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	14 HOURS	(24 HOURS)	
TEMPERATURE:	71 "F	(70° - 77" F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	90.79 lbs.	SE - 1	FTB
2	40 mil	91.63 lbs.	SE - 1	FTB
3	40 mil	88.13 lbs.	SE - 1	FTB
4	40 mil	84.35 lbs.	SE - 1	FTB
5	40 mil	89.67 lbs.	SE - 1	FTB
AVERAGE		88.9 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	115.41 lbs.	SE - 1	FTB
2	40 mil	110.93 lbs.	SE - 1	FTB
3	40 mil	112.89 lbs.	SE - 1	FTB
4	40 mil	113.73 lbs.	SE - 1	FTB
5	40 mil	112.19 lbs.	SE - 1	FTB
AVERAGE		113.0 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

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ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 9
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID	DS - 9		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	14 HOURS	(24 HOURS)	
TEMPERATURE:	71 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	89.39 lbs.	SE - 1	FTB
2	40 mil	95.69 lbs.	SE - 1	FTB
3	40 mil	92.33 lbs.	SE - 1	FTB
4	40 mil	91.49 lbs.	SE - 1	FTB
5	40 mil	89.39 lbs.	SE - 1	FTB
AVERAGE		91.7 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	112.05 lbs.	SE - 1	FTB
2	40 mil	110.51 lbs.	SE - 1	FTB
3	40 mil	108.98 lbs.	SE - 1	FTB
4	40 mil	108.98 lbs.	SE - 1	FTB
5	40 mil	112.33 lbs.	SE - 1	FTB
AVERAGE		110.6 lbs.		

REMARKS

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REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

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ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT	LAW ENVIRONMENTAL	SAMPLE NO.:	DS -10
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID:	DS - 10		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15 HOURS	(24 HOURS)	
TEMPERATURE:	71 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE:	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION:	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION:	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	97.08 lbs.	SE - 1	FTB
2	40 mil	102.54 lbs.	SE - 1	FTB
3	40 mil	101.42 lbs.	SE - 1	FTB
4	40 mil	100.72 lbs.	SE - 1	FTB
5	40 mil	94.43 lbs.	SE - 1	FTB
AVERAGE		99.2 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	101.00 lbs.	SE - 1	FTB
2	40 mil	102.81 lbs.	SE - 1	FTB
3	40 mil	101.56 lbs.	SE - 1	FTB
4	40 mil	101.14 lbs.	SE - 1	FTB
5	40 mil	101.42 lbs.	SE - 1	FTB
AVERAGE		101.6 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

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ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS -11
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID:	DS - 11		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15 HOURS	(24 HOURS)	
TEMPERATURE:	71 "F	(70" - 77" F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE:	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	86.87 lbs.	SE - 1	FTB
2	40 mil	81.56 lbs.	SE - 1	FTB
3	40 mil	81.70 lbs.	SE - 1	FTB
4	40 mil	83.10 lbs.	SE - 1	FTB
5	40 mil	82.82 lbs.	SE - 1	FTB
AVERAGE		83.2 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	108.84 lbs.	SE - 1	FTB
2	40 mil	107.58 lbs.	SE - 1	FTB
3	40 mil	108.28 lbs.	SE - 1	FTB
4	40 mil	107.44 lbs.	SE - 1	FTB
5	40 mil	108.70 lbs.	SE - 1	FTB
AVERAGE		108.2 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H / MARK W. GLYNN, P.E.

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ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS -12
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID	DS - 12		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15 HOURS		(24 HOURS)
TEMPERATURE:	71 °F		(70° - 77° F)
RELATIVE HUMIDITY:	54 %		(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	98.06 lbs.	SE - 1	FTB
2	40 mil	101.14 lbs.	SE - 1	FTB
3	40 mil	99.04 lbs.	SE - 1	FTB
4	40 mil	104.78 lbs.	SE - 1	FTB
5	40 mil	102.40 lbs.	SE - 1	FTB
AVERAGE		101.1 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	114.00 lbs.	SE - 1	FTB
2	40 mil	110.23 lbs.	SE - 1	FTB
3	40 mil	107.58 lbs.	SE - 1	FTB
4	40 mil	112.89 lbs.	SE - 1	FTB
5	40 mil	111.07 lbs.	SE - 1	FTB
AVERAGE		111.2 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

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DOCFILE PG4XL

GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 11, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 13
DATE RECEIVED:	OCTOBER 9, 1999	DATE TESTED:	OCTOBER 11, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 13		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE.	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	41 HOURS	(24 HOURS)	
TEMPERATURE:	70 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	57 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED	2.0 INCHES / MINUTE
GRIP TYPE	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	97.31 lbs.	SE - 1	FTB
2	40 mil	96.75 lbs.	SE - 1	FTB
3	40 mil	91.15 lbs.	SE - 1	FTB
4	40 mil	93.39 lbs.	SE - 1	FTB
5	40 mil	90.31 lbs.	SE - 1	FTB
AVERAGE		93.8 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	113.27 lbs.	SE - 1	FTB
2	40 mil	117.89 lbs.	SE - 1	FTB
3	40 mil	112.85 lbs.	SE - 1	FTB
4	40 mil	111.45 lbs.	SE - 1	FTB
5	40 mil	113.41 lbs.	SE - 1	FTB
AVERAGE		113.8 lbs.		

REMARKS
The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 11, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 14
DATE RECEIVED:	OCTOBER 9, 1999	DATE TESTED:	OCTOBER 11, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 14		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO SMOOTH		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	42	HOURS	(24 HOURS)
TEMPERATURE:	72	°F	(70° - 77° F)
RELATIVE HUMIDITY:	56	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	95.49	lbs.	SE - 1	FTB
2	40	mil	90.17	lbs.	SE - 1	FTB
3	40	mil	100.25	lbs.	SE - 1	FTB
4	40	mil	95.49	lbs.	SE - 1	FTB
5	40	mil	92.55	lbs.	SE - 1	FTB
AVERAGE			94.8	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	112.15	lbs.	SE - 1	FTB
2	40	mil	112.15	lbs.	SE - 1	FTB
3	40	mil	115.65	lbs.	SE - 1	FTB
4	40	mil	112.01	lbs.	SE - 1	FTB
5	40	mil	115.65	lbs.	SE - 1	FTB
AVERAGE			113.5	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS -15
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 15		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	TEXTURED WELDED TO TEXTURED		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	16 HOURS	(24 HOURS)	
TEMPERATURE:	71 °F	(70° - 77° F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	123.94 lbs.	SE - 1	FTB
2	40 mil	117.51 lbs.	SE - 1	FTB
3	40 mil	120.45 lbs.	SE - 1	FTB
4	40 mil	124.78 lbs.	SE - 1	FTB
5	40 mil	133.88 lbs.	SE - 1	FTB
AVERAGE		124.1 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	111.07 lbs.	BRK	FTB
2	40 mil	114.57 lbs.	SE - 1	FTB
3	40 mil	118.63 lbs.	SE - 1	FTB
4	40 mil	109.67 lbs.	SE - 1	FTB
5	40 mil	116.11 lbs.	SE - 1	FTB
AVERAGE		114.0 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

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REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 9, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS -16
DATE RECEIVED:	OCTOBER 8, 1999	DATE TESTED:	OCTOBER 9, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 16		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	SMOOTH WELDED TO TEXTURED		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	15 HOURS	(24 HOURS)	
TEMPERATURE:	71 °F	(70" - 77" F)	
RELATIVE HUMIDITY:	54 %	(45 % - 55 %)	

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	96.94 lbs.	SE - 1	FTB
2	40 mil	96.94 lbs.	SE - 1	FTB
3	40 mil	97.08 lbs.	SE - 1	FTB
4	40 mil	96.52 lbs.	SE - 1	FTB
5	40 mil	96.25 lbs.	SE - 1	FTB
AVERAGE		96.7 lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS	PEAK LOAD (lbs.)	TYPE OF FAILURE	
1	40 mil	109.81 lbs.	SE - 1	FTB
2	40 mil	102.82 lbs.	SE - 1	FTB
3	40 mil	104.36 lbs.	SE - 1	FTB
4	40 mil	99.74 lbs.	SE - 1	FTB
5	40 mil	106.18 lbs.	SE - 1	FTB
AVERAGE		104.6 lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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GLYNN GEOTECHNICAL ENGINEERING

H.D.P.E. PEEL & SHEAR

ASTM D - 4437 / NSF 54

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 11, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 -B
CLIENT:	LAW ENVIRONMENTAL	SAMPLE NO.:	DS - 17
DATE RECEIVED:	OCTOBER 9, 1999	DATE TESTED:	OCTOBER 11, 1999

SAMPLE DATA			
SAMPLE ID :	DS - 17		
TYPE OF WELD:	DOUBLE FUSION		
SPECIMEN TYPE:	TEXTURED WELDED TO TEXTURED		
SPECIMEN SIZE:	1" WIDE x 6 " LONG STRIP		
MIN. CONDITIONING PERIOD	42	HOURS	(24 HOURS)
TEMPERATURE:	72	°F	(70° - 77° F)
RELATIVE HUMIDITY:	56	%	(45 % - 55 %)

TEST DATA	
TEST MACHINE:	MTS - SINTECH
MODEL:	QTEST MODEL I
SERIAL NUMBER:	QTI - 393 - 0111
TEST SPEED:	2.0 INCHES / MINUTE
GRIP TYPE :	SELF ADJUSTING PNEUMATIC
GRIP SEPARATION :	PEEL : 1/2 " FROM SEAM EDGE
GRIP SEPARATION :	SHEAR : 3 "

PEEL ADHESION TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	100.25	lbs.	SE - 1	FTB
2	40	mil	104.59	lbs.	SE - 1	FTB
3	40	mil	89.61	lbs.	SE - 1	FTB
4	40	mil	98.29	lbs.	SE - 1	FTB
5	40	mil	100.25	lbs.	SE - 1	FTB
AVERAGE			98.6	lbs.		

SHEAR STRENGTH TEST

REPLICATE NO.	SHEET THICKNESS		PEAK LOAD (lbs.)		TYPE OF FAILURE	
1	40	mil	112.71	lbs.	SE - 1	FTB
2	40	mil	125.03	lbs.	SE - 1	FTB
3	40	mil	123.49	lbs.	SE - 1	FTB
4	40	mil	120.41	lbs.	SE - 1	FTB
5	40	mil	121.67	lbs.	SE - 1	FTB
AVERAGE			120.7	lbs.		

REMARKS

The 24 hour conditioning period has been waived at the request of the client.

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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APPENDIX E-8

GEOMEMBRANE:

Fusion Weld Seam Data Summary

GLYNN GEOTECHNICAL ENGINEERING

FUSION WELD SEAM DATA SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD SEAMING INFORMATION							SEAM TESTING INFORMATION							
SEAM NO.	DATE WELDED	AMB. TEMP.	WELD TECH.	MACH. NO.	WELD START TIME	WELD LENGTH	PRESSURE TEST DATE	START TIME	END TIME	START/ END PRESS	PASS/ FAIL	TEST TECH.	DEST TEST NO.	COMMENTS
2/3	10/6/99	50	RR	34	11:49	413	10/6/99	1:37	1:42	30/29	P	D.C.	DS-1	
4/5	10/6/99	50	RR	34	1:48	22	10/6/99	2:47	2:52	30/28	P	D.C.		
4-5/6	10/6/99	50	RR	34	2:05	405	10/6/99	3:11	3:16	29/28	P	D.C.		
							10/6/99	3:17	3:22	30/30	P	D.C.		
3/4-5	10/6/99	50	SH	35	2:00	410	10/6/99	2:47	2:52	30/28	P	D.C.	DS-2	
							10/6/99	2:52	2:57	31/30	P	D.C.		
6/7	10/6/99	50	SH	35	2:48	380	10/6/99	3:51	3:56	30/28	P	D.C.	DS-3	
							10/6/99	3:51	3:56	30/29	P	D.C.		
8/9	10/6/99	50	RR	34	3:20	22	10/6/99	7:51	7:56	30/29	P	D.C.		
7/8-9	10/6/99	50	RR	34	3:26	374	10/6/99	7:51	7:56	32/29	P	D.C.	DS-4	
							10/6/99	7:51	7:56	32/31	P	D.C.		
							10/6/99	9:40	9:45	31/30	P	D.C.		
8-9/10	10/6/99	50	SH	35	3:45	364	10/6/99	9:10	9:15	30/29	P	D.C.	DS-5	
							10/6/99	2:33	2:38	30/28	P	D.C.		
							10/6/99	2:40	2:45	30/27	P	D.C.		
11/12	10/6/99	50	RR	34	4:20	22	10/6/99	11:15	11:20	28/26	P	D.C.		
10/11-12	10/6/99	50	RR	34	4:32	350	10/6/99	11:15	11:20	30/29	P	D.C.		
							10/6/99	11:15	11:20	30/30	P	D.C.		
							10/6/99	11:15	11:20	30/30	P	D.C.		
11-12/13	10/6/99	45	SH	35	5:00	340	10/6/9[illegible]	3:26	3:31	32/31	P	D.C.	DS-6	
14/13	10/6/99	45	SH	35	5:35	22	10/6/99	10:55	11:00	30/28	P	D.C.		TOP OF WEST SLOPE
14/12	10/6/99	45	SH	35	"	22	10/6/99	10:48	10:53	30/30	P	D.C.		TOP OF WEST SLOPE
14/10	10/6/99	45	SH	35	"	22	10/6/99	10:47	10:52	30/28	P	D.C.		TOP OF WEST SLOPE
14/9	10/6/99	45	SH	35		22	10/6/99	10:46	10:51	31/29	P	D.C.		TOP OF WEST SLOPE
14/7	10/6/99	45	SH	35	"	22	10/6/99	10:45	10:50	29/26	P	D.C.		TOP OF WEST SLOPE
14/6	10/6/99	45	SH	35	"	22	10/6/99	10:42	10:47	30/28	P	D.C.		TOP OF WEST SLOPE
14/5	10/6/99	45	SH	35	"	22	10/6/99	10:35	10:40	30/30	P	D.C.		TOP OF WEST SLOPE
14/3	10/6/99	45	SH	35	"	22	10/6/99	10:34	10:39	29/27	P	D.C.		TOP OF WEST SLOPE
14/2	10/6/99	45	SH	35	"	22	10/6/99	10:32	10:37	27/26	P	D.C.		TOP OF WEST SLOPE

GLYNN GEOTECHNICAL ENGINEERING

FUSION WELD SEAM DATA SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD SEAMING INFORMATION							SEAM TESTING INFORMATION							
SEAM NO.	DATE WELDED	AMB. TEMP.	WELD TECH.	MACH. NO.	WELD START TIME	WELD LENGTH	PRESSURE TEST DATE	START TIME	END TIME	START/ END PRESS	PASS/ FAIL	TEST TECH.	DEST TEST NO.	COMMENTS
1/2	10/6/99	45	RR	34	6:05	22	10/7/99	11:30	11:35	32/29	P	DC	DS-7	TOP OF EAST SLOPE
1/3	10/6/99	45	RR	34	"	22	10/7/99	11:30	11:35	28/27	P	DC		TOP OF EAST SLOPE
1/4	10/6/99	45	RR	34	"	22	10/7/99	11:40	11:45	28/28	P	DC		TOP OF EAST SLOPE
1/6	10/6/99	45	RR	34	"	22	10/7/99	11:40	11:45	29/28	P	DC		TOP OF EAST SLOPE
1/7	10/6/99	45	RR	34	"	22	10/7/99	2:50	2:55	30/30	P	DC		TOP OF EAST SLOPE
1/8	10/6/99	45	RR	34	"	22	10/7/99	2:15	2:20	30/29	P	DC		TOP OF EAST SLOPE
1/10	10/6/99	45	RR	34	"	22	10/7/99	2:04	2:09	30/30	P	DC		TOP OF EAST SLOPE
1/11	10/6/99	45	RR	34	"	22	10/7/99	3:20	3:25	30/28	P	DC		TOP OF EAST SLOPE
13/16	10/7/99	45	SH	35	8:50	324	10/8/99	8:11	8:16	27/27	P	DC	DS-8	
17/16	10/7/99	45	RR	34	8:45	298	10/8/99	8:36	8:41	30/28	P	DC	DS-9	
							10/8/99	11:12	11:18	31/30	P	DC		
17/18	10/7/99	45	RR	34	9:30	22	10/8/99	11:15	11:20	30/28	P	DC		
17/19	10/7/99	45	RR	34	9:35	280	10/8/99	8:28	8:33	30/29	P	DC		
							10/8/99	11:50	11:55	31/29	P	DC		
18/16	10/7/99	45	RR	34	9:37	36	10/8/99	11:15	11:20	29/28	P	DC		
18/19	10/7/99	45	RR	34	9:37	38	10/8/99	11:35	11:40	31/28	P	DC		
19/20	10/7/99	45	RR	34	10:10	285	10/8/99	8:52	8:57	29/27	P	JH		
20/21	10/7/99	50	SH	35	10:30	22	10/8/99	1:38	1:43	31/29	P	JH	DS-10	
20-21/22	10/7/99	50	RR	34	10:40	318	10/8/99	1:41	1:46	31/28	P	JH		
							10/8/99	8:58	9:03	30/29	P	JH	DS-11	
20-21/19	10/7/99	50	SH	35	10:40	354	10/8/99	8:52	8:57	29/27	P	JH		
							10/8/99	10:31	10:36	31/31	P	JH		
							10/8/99	1:32	1:37	30/27	P	JH		
23/24	10/7/99	55	RR	34	12:00	22	10/8/99	2:07	2:12	31/31	P	JH		
22/23-24	10/7/99	55	RR	34	12:13	310	10/8/99	2:05	2:10	30/27	P	JH		
							10/8/99	9:06	9:11	30/28	P	JH		
25/23-24	10/7/99	60	SH	35	11:32	307	10/8/99	2:07	.2:12	30/28	P	JH		
							10/8/99	3:23	3:28	30/29	P	JH	DS-12	
							10/8/99	2:54	2:59	27/27	P	JH		

GLYNN GEOTECHNICAL ENGINEERING

FUSION WELD SEAM DATA SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD SEAMING INFORMATION							SEAM TESTING INFORMATION							
SEAM NO.	DATE WELDED	AMB. TEMP.	WELD TECH.	MACH. NO.	WELD START TIME	WELD LENGTH	PRESSURE TEST DATE.	START TIME	END TIME	START/ END PRESS	PASS/ FAIL	TEST TECH.	DEST TEST NO.	COMMENTS
26/27	10/7/99	60	RR	34	1:20	22	10/8/99	9:39	9:44	30/27	P	DC		
							10/8/99	2:54	2:59	31/30	P	DC		
28/26-27	10/7/99	60	RR	34	1:27	256	10/8/99	3:44	3:49	30/30	P	DC		
							10/8/99	10:11	10:16	30/29	P	JH		
25/26-27	10/7/99	60	SH	35	1:32	290	10/8/99	2:54	2:59	27/27	P	DC		
							10/8/99	10:01	10:06	31/30	P	DC	DS-13	
28/29	10/7/99	60	RR	34	2:18	233	10/8/99	4:07	4:12	32/30	P	DC	DS-14	
30/31	10/7/99	60	SH	35	2:25	22	10/8/99	8:08	8:13	30/30	P	DC		
31/29	10/7/99	60	RR	34	2:35	104	10/8/99	4:30	4:35	30/29	P	DC		
29/30	10/7/99	60	SH	35	2:30	100	10/8/99	9:00	9:05	30/30	P	JH		
32/18	10/7/99	60	SH	35	3:06	18	10/8/99	12:55	1:00	28/26	P	DC		
32/19	10/7/99	60	SH	35	3:13	12	10/8/99	1:20	1:25	30/30	P	DC		
33/14	10/7/99	60	SH	35	3:30	22	10/8/99	11:05	11:10	31/30	P	DC		
34/33	10/7/99	60	SH	35	3:38	22	10/8/99	2:17	2:22	33/32	P	DC		
34/35	10/7/99	60	SH	35	3:45	22	10/8/99	2:30	2:35	29/27	P	DC		
35/36	10/7/99	60	SH	35	3:48	22	10/8/99	2:51	2:56	30/29	P	DC		
15/13	10/7/99	60	RR	34	4:03	22	10/8/99	7:38	7:43	30/29	P	DC		
15/16	10/7/99	60	RR	34	"	22	10/8/99	8:12	8:17	29/27	P	DC		
							10/8/99	8:12	8:17	29/27	P	DC		
15/17	10/7/99	60	RR	34	"	22	10/8/99	8:17	8:17	30/30	P	DC		
15/19	10/7/99	60	RR	34	"	22	10/8/99	8:30	8:35	30/29	P	DC		
15/20	10/7/99	60	RR	34	"	22	10/8/99	8:56	9:01	30/27	P	DC		
15/22	10/7/99	60	RR	34	"	22	10/8/99	9:04	9:09	29/26	P	DC	DS-16	
15/23	10/7/99	60	RR	34	"	22	10/8/99	9:11	9:16	30/27	P	DC		
15/25	10/7/99	60	RR	34	"	22	10/8/99	9:15	9:20	29/27	P	DC		
15/26	10/7/99	60	RR	34	"	22	10/8/99	9:44	9:51	31/29	P	DC		
15/28	10/7/99	60	RR	34	"	22	10/8/99	10:18	10:23	33/32	P	DC		
15/29	10/7/99	60	RR	34	"	22	10/8/99	8:57	9:02	20/28	P	JH		
							10/8/99	8:58	9:03	29/27	P	JH		
15/30	10/7/99	60	RR	34	"	22	10/8/99	8:59	9:04	32/30	P	JH		

GLYNN GEOTECHNICAL ENGINEERING

FUSION WELD SEAM DATA SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD SEAMING INFORMATION							SEAM TESTING INFORMATION							
SEAM NO.	DATE WELDED	AMB. TEMP.	WELD TECH.	MACH. NO.	WELD START TIME	WELD LENGTH	PRESSURE TEST DATE	START TIME	END TIME	START/ END PRESS	PASS/ FAIL	TEST TECH.	DEST TEST NO.	COMMENTS
25/36	10/7/99	60	SH	35	4:15	22	10/8/99	2:51	2:56	28/27	P	DC		
27/36	10/7/99	60	SH	35	"	22	10/8/99	3:20	3:25	30/28	P	DC		
28/36	10/7/99	60	SH	35	"	22	10/8/99	3:44	3:49	30/32	P	DC		
29/36	10/7/99	60	SH	35	"	22	10/8/99	4:07	4:12	29/27	P	DC		
31/36	10/7/99	60	SH	35	"	22	10/8/99	4:29	4:34	32/30	P	DC		
34/R#49	10/7/99	60	SH	35	4:20	24	10/8/99	1:51	1:56	29/26	P	JH		
R#49/24	10/7/99	60	SH	35	4:22	5	10/8/99	2:04	2:09	30/30	P	JH		
R#49/22	10/7/99	60	SH	35	4:27	22	10/8/99	1:50	1:55	27/24	P	JH		
35/25-24	10/7/99	60	SH	35	4:17	40	10/8/99	2:36	2:41	33/31	P	DC		
							10/8/99	2:36	2:41	34/34	P	DC		
34/21	10/7/99	60	SH	35	4:35	10	10/8/99	1:48	1:53	30/27	P	JH		
33/18	10/7/99	60	SH	35	4:40	22	10/8/99	12:55	1:00	30/28	P	DC		
33/32	10/7/99	60	SH	35	"	22	10/8/99	1:10	1:15	28/27	P	DC		
							10/8/99	1:16	1:21	29/29	P	JH		
33/19	10/7/99	60	SH	35	"	22	10/8/99	1:28	1:33	30/27	P	JH		
33/21	10/7/99	60	SH	35	"	22	10/8/99	1:34	1:39	27/27	P	JH		
36/37	10/7/99	60	SH	35	5:02	22	10/8/99	5:00	5:05	32/30	P	DC		
37/38	10/7/99	60	SH	35	5:08	40	10/8/99	5:06	5:11	29/28	P	DC		
40/41	10/7/99	60	RR	34	5:10	50	10/9/99	8:05	8:10	31/30	P	DC		
38/39	10/7/99	55	SH	35	5:20	44	10/8/99	5:10	5:15	30/30	P	DC		
39/40	10/7/99	55	RR	34	5:30	47	10/9/99	7:47	7:53	30/29	P	DC		
41/42	10/7/99	50	SH	35	5:30	52	10/9/99	8:14	8:19	32/30	P	JH		
42/43	10/7/99	50	RR	34	5:38	52	10/9/99	8:18	8:23	30/29	P	JH	DS-17	
43/44	10/7/99	50	SH	35	5:36	56	10/9/99	8:23	8:28	31/29	P	JH		
31/39	10/7/99	45	RR	34	5:54	22	10/9/99	8:00	8:05	30/29	P	JH		
31/40	10/7/99	45	RR	34	"	22	10/9/99	8:00	8:05	30/30	P	JH		
31/40	10/7/99	45	RR	34	"	22	10/9/99	8:00	8:05	32/32	P	JH		
31/41	10/7/99	45	RR	34	"	22	10/9/99	8:17	8:22	28/28	P	JH		

GLYNN GEOTECHNICAL ENGINEERING

FUSION WELD SEAM
DATA SUMMARY

PROJECT: INDUSTRIAL WELDING SITE
GGE PROJECT NO.: 99-1076-B
CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD SEAMING INFORMATION							SEAM TESTING INFORMATION							
SEAM NO.	DATE WELDED	AMB. TEMP.	WELD TECH.	MACH. NO.	WELD START TIME	WELD LENGTH	PRESSURE TEST DATE	START TIME	END TIME	START/ END PRESS	PASS/ FAIL	TEST TECH.	DEST TEST NO.	COMMENTS
41/30	10/7/99	45	RR	34	5:54	22	EXTRUSION WELDED - VACUUM TESTED 10/9/99							
42/30	10/7/99	45	RR	34	"	22	10/9/99	8:13	8:18	30/28	P	JH		
43/30	10/7/99	45	RR	34	"	22	10/9/99	8:19	8:24	30/28	P	JH		
44/30	10/7/99	45	RR	34	"	22	10/9/99	8:21	8:26	28/27	P	JH		
44/15-R#60	10/7/99	45	SH	35	5:50	38	10/9/99	8:31	8:36	33/30	P	JH		
							10/9/99	9:20	9:25	31/31	P	JH		
15/R#60	10/7/99	45	SH	35	5:45	15	10/9/99	8:35	8:40	30/29	P	JH		
44/R#61	10/7/99	45	SH	35	6:05	6	10/9/99	8:27	8:32	30/30	P	JH		
15/R#61	10/7/99	45	SH	35	6:08	8	10/9/99	8:30	8:35	30/30	P	JH		
30/R#61	10/7/99	45	SH	35	6:10	3	EXTRUSION WELDED - VACUUM TESTED 10/9/99							

APPENDIX E-9

GEOMEMBRANE:

Repair Summary (Extrusion Welds)

GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
1	P2/P3	DS-1	08' FROM WEST END P	10/7/99	1:15	PATCH	BL	278	3 X 2	10/7/99	P	JR	WELDER TEMP
2	P3/P4/P5	SEAM INTSX.	NORTH END	10/8/99	9:47	PATCH	RR	98	2 X 1	10/8/99	P	JR	230 - 250
3	P3/P4	DS-2	05' FROM WEST END P	10/7/99	1:45	PATCH	BL	278	2 X 2	10/7/99	P	JR	
4	P3	RISER PEN.	TOP OF EAST SLOPE	10/7/99	5:00	PATCH	BL	278	1 X 1	10/8/99	P	JR	
5	P5	HOLE	EAST END OF PANEL	10/8/99	8:40	PATCH	BL	278	2 X 5	10/8/99	P	JR	
6	P4/P5/P6	SEAM INTSX.	NORTH END	10/8/99	10:00	PATCH	BL	278	7 X 2	10/8/99	P	JR	
7	P1/P2	DS-7	NORTHEAST CORNER	10/7/99	4:50	PATCH	BL	278	2 X 2	10/7/99	P	JR	
8	P6/P7	DS-3	MIDDLE	10/8/99	10:00	PATCH	RR	98	5 X 5	10/8/99	P	JR	
9	P6/P7	RISER PEN.	EAST END	10/7/99	1:13	PATCH	BL	278	2 X 1	10/8/99	P	JR	
10	P6/P7/P1	SEAM INTSX.	EAST END	10/7/99	3:15	PATCH	BL	278	2 X 1	10/7/99	P	JR	
11	P7/P8/P1	SEAM INTSX.	EAST END	10/7/99	2:15	PATCH	BL	278	2 X 2	10/7/99	P	JR	
12	P7/P8	SEAM INTSX.	EAST END	10/8/99	10:05	PATCH	RR	98	2 X 2	10/8/99	P	JR	
13	P7/P9/P8	SEAM INTSX.	EAST END	10/8/99	9:45	PATCH	RR	98	1 X 1	10/8/99	P	JR	
14	P8/P9/P10	SEAM INTSX.	EAST END	10/8/99	9:52	PATCH	RR	98	3 X 4	10/8/99	P	JR	
15	P8/P10/P1	SEAM INTSX.	EAST END	10/8/99	11:15	PATCH	BL	278	1 X 2	10/8/99	P	JR	
16	P10/P11/P1	SEAM INTSX.	EAST END	10/8/99	11:20	PATCH	BL	278	1 X 1	10/8/99	P	JR	
17	P10/P11	HOLE	EAST END	10/8/99	11:25	PATCH	BL	278	3 X 4	10/8/99	P	JR	
18	P12	HOLE	20' FROM WEST END	10/8/99	11:30	PATCH	BL	278	1 X 2	10/8/99	P	JR	
19	P19	HOLE	EAST END	10/8/99	8:05	PATCH	BL	278	1 X 1	10/8/99	P	JR	
20	P19	HOLE	EAST END	10/8/99	9:10	PATCH	BL	278	1 X 1	10/8/99	P	JR	
21	P11/P12/P10	SEAM INTSX.	EAST END	10/8/99	11:45	PATCH	BL	278	1 X 1	10/8/99	P	JR	

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GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
22	P9/P10/P14	SEAM INTSX.	WEST END	10/8/99	11:13	PATCH	RR	98	4 X 2	10/8/99	P	JR	WELDER TEMP
23	P10/P12/P14	SEAM INTSX.	WEST END	10/8/99	11:18	PATCH	RR	98	4 X 2	10/8/99	P	JR	230-250
24	P12/P13/P14	SEAM INTSX.	WEST END	10/8/99	11:20	PATCH	RR	98	4 X 2	10/8/99	P	JR	
25	P13/P16/P14	HOLE	WEST END	10/8/99	11:45	PATCH	RR	98	4 X 2	10/8/99	P	JR	
26	P8/P10	DS-5	05' FROM WEST END P	10/7/99	3:25	PATCH	BL	278	4 X 2	10/8/99	P	JR	
27	P12/P13	DS-6	8' FROM WEST END P1	10/8/99	11:45	PATCH	RR	98	2 X 2	10/8/99	P	JR	
28	P11/P12/P13	SEAM INTSX.	EAST END	10/8/99	11:50	PATCH	BL	278	2 X 1	10/8/99	P	JR	
29	P16/P17	RISER PEN.	MIDDLE	10/8/99	11:55	PATCH	BL	278	2 X 2	10/8/99	P	JR	
30	P17	RISER PEN.	MIDDLE	10/8/99	12:00	PATCH	BL	278	5 X 3	10/8/99	P	JR	
31	P19	HOLE	WEST END	10/8/99	10:00	PATCH	BL	278	1 X 1	10/8/99	P	JR	
32	P20	HOLE	WEST END	10/8/99	10:23	PATCH	BL	278	2 X 2	10/8/99	P	JR	
33	P21	HOLE	WEST END	10/8/99	10:30	PATCH	BL	278	3 X 2	10/8/99	P	JR	
34	P19	HOLE	WEST END	10/8/99	8:13	PATCH	RR	98	2 X 2	10/8/99	P	JR	
35	P19	HOLE	WEST END	10/8/99	1:15	PATCH	RR	98	3 X 5	10/8/99	P	JR	
36	P23/P25	HOLE	WEST END	10/8/99	1:30	PATCH	RR	98	3 X 5	10/8/99	P	JR	
37	P7	HOLE	EAST END	10/7/99	2:05	PATCH	BL	278	3 X 5	10/8/99	P	JR	
38	P7/P8	DS-4	90' FROM WEST END P	10/8/99	10:10	PATCH	RR	98	5 X 2	10/8/99	P	JR	
39	P8/P10	HOLE	MIDDLE	10/8/99	8:15	PATCH	RR	98	1 X 1	10/8/99	P	JR	
40	P17/P18	HOLE	WEST END	10/8/99	10:15	PATCH	BL	278	1 X 1	10/8/99	P	JR	
41	P29/P31	SEAM INTSX.	MIDDLE	10/8/99	3:00	PATCH	BL	278	2 X 2	10/8/99	P	JR	
42	P26	HOLE	MIDDLE	10/8/99	3:05	PATCH	RR	98	2 X 2	10/8/99	P	JR	

GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

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GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
43	P28	RISER PEN.	MIDDLE	10/8/99	3:50	PATCH	BL	278	6 X 4	10/8/99	P	JR	WELDER TEMP
44	P25	BURN THROUGH	WEST END	10/8/99	3:55	PATCH	BL	278	2 X 4	10/8/99	P	JR	230-250
45	P20/P21/P22	DS-10	@ P21/P22 CROSS SEAM	10/8/99	3:33	PATCH	RR	98	6 X 2	10/8/99	P	JR	
46	P20	HOLE	WEST END	10/8/99	2:30	PATCH	RR	98	1 X 1	10/8/99	P	JR	
47	P20/P22	DS-11	163' FROM W END P22	10/8/99	3:38	PATCH	RR	98	2 X 4	10/8/99	P	JR	
48	P16/P17	DS-9	125' FROM E END P16	10/8/99	3:30	PATCH	RR	98	2 X 4	10/8/99	P	JR	
49	P22/P34/P24	PATCH	WEST END	10/8/99	3:25	PATCH	RR	98	3 X 20	10/8/99	P	JR	
50	P18/P19	HOLE	WEST END	10/8/99	10:30	PATCH	BL	278	2 X 1	10/8/99	P	JR	
51	P23/P25	DS-12	8' FROM E END P23	10/8/99	4:15	PATCH	RR	98	2 X 4	10/8/99	P	JR	
52	P26/P25	DS-13	96' FROM E END P25	10/8/99	4:30	PATCH	RR	98	2 X 4	10/8/99	P	JR	
53	P35/P36	DS-15	@ P35/P36 CROSS SEAM	10/8/99	4:05	PATCH	BL	278	2 X 4	10/8/99	P	JR	
54	P28/P29	DS-14	92' FROM E END P28	10/9/99	10:00	PATCH	BL	278	2 X 4	10/9/99	P	JR	
55	P29	BURN THROUGH	EAST END	10/8/99	4:15	PATCH	BL	278	2 X 4	10/8/99	P	JR	
56	P26/P28	BURN THROUGH	EAST END	10/8/99	4:45	PATCH	RR	98	3 X 1	10/8/99	P	JR	
57	P22/P23/P15	DS-16	EAST END	10/8/99	10:44	PATCH	RR	98	5 X 2	10/8/99	P	JR	
58	P30/P15/R#6	BURN THROUGH	EAST END	10/9/99	9:20	PATCH	RR	98	1 X 2	10/9/99	P	JR	
59	P31/P36	SEAM INTSX.	WEST END	10/9/99	9:25	PATCH	RR	98	2 X 2	10/9/99	P	JR	
60	P44/P15	PATCH	SOUTHEAST CORNER	10/9/99	9:15	PATCH	BL	278	16 X 14	10/9/99	P	JR	
61	P15/P44/P30	PATCH	SOUTHEAST CORNER	10/9/99	8:50	PATCH	BL	278	1 X 3	10/9/99	P	JR	
62	P3/P5	SEAM INTSX.	WEST END	10/8/99	11:40	PATCH	RR	98	2 X 2	10/9/99	P	JR	
63	P5/P6	SEAM INTSX.	WEST END	10/9/99	10:30	PATCH	RR	98	3 X 4	10/9/99	P	JR	

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GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
64	P30/P15	SEAM INTSX.	EAST END	10/7/99	8:15	PATCH	RR	98	1' DIA.	10/9/99	P	JR	WELDER TEMP
65	P30	BURN THROUGH	WEST END	10/9/99	9:10	PATCH	RR	98	2 X 3	10/9/99	P	JR	230-250
66	P31/P36/P37	SEAM INTSX.	EAST END	10/9/99	8:55	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
67	P29/P31	SEAM INTSX.	EAST END	10/9/99	9:20	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
68	P29/P28	SEAM INTSX.	EAST END	10/9/99	8:45	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
69	P35	HOLE	EAST END	10/9/99	9:00	PATCH	RR	98	2 X 3	10/9/99	P	JR	
70	P22	BURN THROUGH	EAST END	10/8/99	11:20	PATCH	RR	98	4 X 4	10/8/99	P	JR	
71	P24	SEAM INTSX.	WEST END	10/8/99	10:15	PATCH	RR	98	1' DIA.	10/8/99	P	JR	
72	P21/P22/P34	SEAM INTSX.	WEST END	10/8/99	10:07	PATCH	RR	98	1' DIA.	10/8/99	P	JR	
73	P21/P20/P22	SEAM INTSX.	WEST END	10/9/99	9:20	PATCH	RR	98	2 X 4	10/9/99	P	JR	
74	P20/P19	SEAM INTSX.	WEST END	10/8/99	10:14	PATCH	BL	278	1 X 2	10/8/99	P	JR	
75	P18/P17/P19	SEAM INTSX.	WEST END	10/8/99	10:22	PATCH	BL	278	1 X 2	10/8/99	P	JR	
76	P17/P16/P18	SEAM INTSX.	WEST END	10/8/99	10:33	PATCH	BL	278	1 X 3	10/8/99	P	JR	
77	P13	SEAM INTSX.	EAST END	10/8/99	10:41	PATCH	BL	278	1 X 2	10/8/99	P	JR	
78	P17	SEAM INTSX.	MIDDLE	10/8/99	10:52	PATCH	BL	278	1 X 2	10/8/99	P	JR	
79	P28	SEAM INTSX.	MIDDLE	10/9/99	9:38	PATCH	BL	278	1 X 3	10/9/99	P	JR	
80	P29	RISER PEN.	MIDDLE	10/9/99	8:07	PATCH	BL	278	5 X 6	10/9/99	P	JR	
81	P2	SEAM INTSX.	WEST SLOPE	10/8/99	2:32	PATCH	SH	98	5 X 3	10/8/99	P	JR	
82	P24/P35	SEAM INTSX.	WEST SLOPE	10/8/99	3:40	PATCH	RR	98	5 X 2	10/8/99	P	JR	
83	P42/P43	DS-17	TOP S SLOPE @ P42/P43	10/9/99	10:45	PATCH	RR	98	3 X 2	10/9/99	P	JR	
84	P28/P29/P36	SEAM INTSX.	TOP OF WEST SLOPE	10/8/99	4:50	PATCH	RR	98	1 X 2	10/8/99	P	JR	

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GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
85	P29/P36	SEAM INTSX.	TOP WEST SLOPE	10/8/99	5:05	PATCH	SH	98	1 X 2	10/9/99	P	JR	WELDER TEMP
86	P39/P31	SEAM INTSX.	TOP OF SOUTH SLOPE	10/9/99	9:45	PATCH	BL	278	1 X 2	10/9/99	P	JR	230-250
87	P20/P15	SEAM INTSX.	EAST END	10/8/99	10:05	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
88	P18/P32/P33	SEAM INTSX.	WEST END	10/8/99	10:20	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
89	P32/P33	HOLE	WEST END	10/8/99	11:30	PATCH	RR	98	2 X 2	10/9/99	P	JR	
90	P19/P32/P33	SEAM INTSX.	WEST END	10/8/99	11:40	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
91	P21/P34/P33	SEAM INTSX.	WEST END	10/8/99	10:50	PATCH	RR	98	2' DIA.	10/9/99	P	JR	
92	P24/P35/P34	SEAM INTSX.	WEST END	10/8/99	11:15	PATCH	RR	98	1 X 2	10/9/99	P	JR	
93	P24/P34/R#4	SEAM INTSX.	WEST END	10/8/99	10:35	PATCH	RR	98	1 X 2	10/9/99	P	JR	
94	P24/P22/P#4	SEAM INTSX.	WEST END	10/8/99	11:55	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
95	P20/P21/P19	SEAM INTSX.	WEST END	10/8/99	12:10	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
96	P24/P23/P22	SEAM INTSX.	WEST END	10/8/99	12:10	PATCH	BL	278	1 X 2	10/9/99	P	JR	
97	P23/P24/P25	SEAM INTSX.	WEST END	10/8/99	12:30	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
98	P25/P24/P35	SEAM INTSX.	WEST END	10/8/99	12:45	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
99	P36/P35/P25	SEAM INTSX.	WEST END	10/8/99	12:15	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
100	P27/P36	SEAM INTSX.	WEST END	10/8/99	1:00	PATCH	BL	278	1 X 2	10/9/99	P	JR	
101	P26/P27/P25	SEAM INTSX.	WEST END	10/8/99	1:00	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
102	P26/P27/P28	SEAM INTSX.	WEST END	10/8/99	1:20	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
103	P27/P28/P36	SEAM INTSX.	WEST END	10/8/99	1:15	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
104	P29/P31/P36	SEAM INTSX.	WEST END	10/8/99	1:25	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
105	P38/P37/P31	SEAM INTSX.	WEST CORNER	10/8/99	1:40	PATCH	BL	278	3 X 4	10/9/99	P	JR	

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GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
106	P39/P31/P38	SEAM INTSX.	SOUTH END	10/9/99	9:00	PATCH	RR	98	1' DIA.	10/9/99	P	JR	WELDER TEMP
107	P40/P39/P31	SEAM INTSX.	SOUTH END	10/9/99	9:05	PATCH	BL	278	1' DIA.	10/9/99	P	JR	230-250
108	P31/P40	HOLE	SOUTH END	10/9/99	9:15	PATCH	BL	278	2 X 2	10/9/99	P	JR	
109	P31/P39	SEAM INTSX.	SOUTH END	10/9/99	9:30	PATCH	BL	278	1 X 2	10/9/99	P	JR	
110	P31/P40/P41	SEAM INTSX.	SOUTH END	10/9/99	9:40	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
111	P30/P31/P41	SEAM INTSX.	SOUTH END	10/9/99	9:15	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
112	P30/P41	HOLE	SOUTH END	10/9/99	9:20	PATCH	RR	98	1 X 2	10/9/99	P	JR	
113	P30/P41/P42	SEAM INTSX.	SOUTH END	10/9/99	9:35	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
114	P30/P43/P42	SEAM INTSX.	SOUTH END	10/9/99	9:55	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
115	P30/P44/P43	SEAM INTSX.	SOUTHEAST CORNER	10/9/99	9:50	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
116	P15/R#60/P4	SEAM INTSX.	SOUTHEAST CORNER	10/9/99	10:10	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
117	P15/P44/R#6	SEAM INTSX.	SOUTHEAST CORNER	10/9/99	10:20	PATCH	BL	278	2 X 3	10/9/99	P	JR	
118	R#61/P44/P1	SEAM INTSX.	SOUTHEAST CORNER	10/9/99	10:10	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
119	P30/P44/R#6	SEAM INTSX.	SOUTHEAST CORNER	10/9/99	10:35	PATCH	BL	278	1' DIA.	10/9/99	P	JR	
120	P29/P28/P15	SEAM INTSX.	EAST END	10/9/99	10:25	PATCH	RR	98	1' DIA.	10/9/99	P	JR	
121	P23/P15P/25	SEAM INTSX.	EAST END	10/9/99	10:40	PATCH	RR	98	1 X 2	10/9/99	P	JR	
122	P25/P15/P26	SEAM INTSX.	EAST END	10/9/99	10:50	PATCH	RR	98	278	10/9/99	P	JR	
123	P1/P2	SEAM INTSX.	EAST END	10/8/99	11:15	PATCH	RR	98	1 X 1	10/9/99	P	JR	
124	P28/P29/P15	SEAM INTSX.	EAST END	10/9/99	10:45	PATCH	BL	278	278	10/9/99	P	JR	
125	P26/P28/P15	SEAM INTSX.	EAST END	10/9/99	10:55	PATCH	BL	278	278	10/9/99	P	JR	
126	P44/P60	HOLE	SOUTHEAST CORNER	10/9/99	11:05	PATCH	BL	278	278	10/9/99	P	JR	

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GLYNN GEOTECHNICAL ENGINEERING

REPAIR SUMMARY

PROJECT: INDUSTRIAL WELDING SITE

GGE PROJECT NO.: 99-1076-B

CLIENT: LAW ENGINEERING & ENVIRONMENTAL SERVICES, INC.

FIELD REPAIR INFORMATION										VACUUM TESTING INFORMATION			
PATCH/ REPAIR NO.	SEAM/ PANEL NO.	DEFECT TYPE	LOCATION	DATE OF REPAIR	TIME OF REPAIR	REPAIR TYPE	WELD. TECH.	MACH. NO.	REPAIR SIZE (FT X FT)	VACUUM TEST DATE	PASS/ FAIL	TEST TECH.	COMMENTS
127	P22/P23/P15	SEAM INTSX.	EAST END	10/8/99	11:10	PATCH	RR	98	1' DIA.	10/8/99	P	JR	WELDER TEMP
128	P17/P19/P15	SEAM INTSX.	EAST END	10/8/99	9:55	PATCH	BL	278	1' DIA.	10/8/99	P	JR	230 - 250
129	P16/P17/P15	SEAM INTSX.	EAST END	10/8/99	10:05	PATCH	BL	278	1' DIA.	10/8/99	P	JR	
130	P11/P13/P15	SEAM INTSX.	EAST END	10/8/99	9:30	PATCH	BL	278	1' DIA.	10/8/99	P	JR	
131	P11/P15/P1	SEAM INTSX.	EAST END	10/8/99	9:45	PATCH	BL	278	1' DIA.	10/8/99	P	JR	
132	P4/P6/P1	SEAM INTSX.	EAST END	10/7/99	1:30	PATCH	BL	278	1' DIA.	10/7/99	P	JR	
133	P3/P4/P1	SEAM INTSX.	EAST END	10/7/99	2:30	PATCH	BL	278	1' DIA.	10/7/99	P	JR	
134	P6/P7/P14	SEAM INTSX.	WEST END	10/8/99	10:20	PATCH	RR	98	1' DIA.	10/8/99	P	JR	
135	P7/P9/P14	SEAM INTSX.	WEST END	10/8/99	10:55	PATCH	RR	98	1' DIA.	10/8/99	P	JR	
136	P13/P16	SEAM INTSX.	EAST END	10/8/99	11:05	PATCH	RR	98	2' X 4'	10/8/99	P	JR	

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APPENDIX F

QUALITY ASSURANCE TEST RESULTS-
BORROW SOURCES, SOIL, STONE, ASPHALT

APPENDIX F-1

LCRS TRENCH STONE

Gradation

Date: August 27, 1999

Attn: Jerry Castiglione

Re: **Sieve Analysis for #2 Crushed Stone, item 703-02**
Project: I.W.S.- Olin Project

SIEVE	WEIGHT(gms.)	% RETAINING	% PASSING	SPECS.
1-1/2"	0	0	100	100
1"	310	2.8	97.2	90-100
3/4"	4321	39.1	58.1	
1/2"	5661	51.3	6.8	0-15
1/4"	652	5.9	0.9	
#200	57	0.5	0.4	0-1.0
PAN	41	0.4		
TOTAL	11,042	100		

I hereby certify that the above information is correct to the best of my knowledge.

For Redland/ LaFarge Corp.
Niagara Division

Robert J. Knerr
Quality Control

APPENDIX F-2

CLAY BARRIER TRENCH BACKFILL AND BUFFER LAYER MATERIAL

Analytical Report – Chemical Analyses

Quanterra Incorporated
450 William Pitt Way
Pittsburgh, Pennsylvania 15238

412 820-8380 Telephone
412 820-2080 Fax

Quanterra
Environmental Services

ANALYTICAL REPORT

PROJECT NO. Olin Chemical

Industrial Welding/Gill Creek

Lot #'s: C8G250109 / C8G250111

Matt Ligon

Law Environmental Inc

QUANTERRA INCORPORATED

Veronica Bortot

Veronica Bortot
Project Manager

August 16, 1998

Quanterra
Environmental Services

CASE NARRATIVE

OLIN CHEMICAL CORPORATION
PROJECT: GILL CREEK

QUANTERRA LOT NO: C8G250109/C8G250111

SHIPMENT:
Samples were received at Quanterra, Pittsburgh PA on July 24 and 25, 1998 in good condition. In the shipment received on July 24; the cooler temperature was 20°C. The organic samples were recollected and received at the laboratory on July 25, 1998 at proper temperature.

NOTE:
Except where noted, no problems were observed during the analyses.

PESTICIDES / PCB'S:
For the PCB calibration curve analyzed on 7/22/98 on HP58901A, the RSD of Aroclor 1016-2, -3 exceeded the 20% criteria. By following the guidelines set in method 8082, the average of the RSD's for TCX, 1016, 1260 and DCB was less than 20%, therefore the average RF was used for all. The average of the RSD's was 14.9%.

The percent difference of 4,4-DDD, 4,4-DDT and methoxychlor exceeded the ± 15 %D criteria in the individual A standard analyzed on 7/30/98 on 58902A. The percent difference of 4,4-DDT and methoxychlor exceeded the ± 15 %D criteria in the individual A standard analyzed on 7/30/98 on 58902B. As stated in SW846, if the ± 15 % criteria is exceeded but the average of all compounds is less than 15% and no compounds are detected, the data is acceptable.

METALS:
Due to poor percent recovery of antimony in the laboratory control sample, the sample required a redigestion for antimony. All recoveries were within QC limits in the LCS for the redigestion.

Results contained in the enclosed standard laboratory report, which was faxed to Matt Ligon on July 31, 1998, may differ slightly from those reported in the enclosed Ward data package. This difference may be due to rounding and/or different reporting limits (i.e. Ward processes results down to the IDL. Due to the quick turnaround time requested, data was entered into the laboratory data system and a standard report was faxed.)

SAMPLE SUMMARY

Quanterra

C8G250109

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
CK3GD	001	MAWHINNIE BORROW	07/23/98	14:3

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

SAMPLE SUMMARY

Quanterra

C8G250111

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
CK3GN	001	MAWHINNIE BORROW PIT	07/24/98	13:3

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

METHODS SUMMARY

Quanterra

C8G250111

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Organochlorine Pesticides	SW846 8081A	SW846 3550
PCBs	SW846 8082	SW846 3550
Semivolatile Organic Compounds by GC/MS	SW846 8270C	SW846 3550B
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Volatile Organics by GC/MS	SW846 8260B	SW846 5030

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

METHODS SUMMARY

Quanterra

C8G250109

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B
Mercury in Solid Waste (Manual Cold-Vapor)	SW846 7471A	SW846 7471A
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW

TOTAL Metals

Lot-Sample #...: C8G250109-001 Matrix.....: SOLID
Date Sampled...: 07/23/98 Date Received..: 07/24/98
% Moisture.....: 13

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 8208149						
Mercury	0.031 B	0.12	mg/kg	SW846 7471A	07/27/98	CK3GD10F
		Dilution Factor: 1		MS Run #.....: 8208025		
Prep Batch #...: 8210155						
Arsenic	4.7	1.2	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD102
		Dilution Factor: 1		MS Run #.....: 8210034		
Lead	7.3	0.35	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD103
		Dilution Factor: 1		MS Run #.....: 8210034		
Selenium	ND	0.58	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD105
		Dilution Factor: 1		MS Run #.....: 8210034		
Thallium	0.92 B	1.2	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD106
		Dilution Factor: 1		MS Run #.....: 8210034		
ilver	ND	1.2	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD107
		Dilution Factor: 1		MS Run #.....: 8210034		
Beryllium	1.0	0.58	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD10L
		Dilution Factor: 1		MS Run #.....: 8210034		
Cadmium	ND	0.58	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD109
		Dilution Factor: 1		MS Run #.....: 8210034		
Chromium	19.3	1.2	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD10A
		Dilution Factor: 1		MS Run #.....: 8210034		
Copper	19.4	2.9	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD10C
		Dilution Factor: 1		MS Run #.....: 8210034		
Nickel	21.1	4.6	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD10D
		Dilution Factor: 1		MS Run #.....: 8210034		
Zinc	57.7	2.3	mg/kg	SW846 6010B	07/29-07/30/98	CK3GD10E
		Dilution Factor: 1		MS Run #.....: 8210034		
Prep Batch #...: 8216173						
Antimony	ND	1.2	mg/kg	SW846 6010B	08/04-08/05/98	CK3GD104
		Dilution Factor: 1		MS Run #.....: 8210034		

(Continued on next page)

OLIN CHEMICAL CORPORATION

Client Sample ID: MAWHINNIE BORROW

TOTAL Metals

Lot-Sample #...: C8G250109-001 Matrix.....: SOLID

NOTE(S):

B Estimated result. Result is less than RL.

Results and reporting limits have been adjusted for dry weight.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW PIT

GC/MS Volatiles

Lot-Sample #...: C8G250111-001	**Work Order #...:** CK3GN102	**Matrix.....:** SOLID
Date Sampled...: 07/24/98	**Date Received..:** 07/25/98	**MS Run #.....:** 8209022
Prep Date.....: 07/28/98	**Analysis Date..:** 07/28/98	
Prep Batch #...: 8209133		
Dilution Factor: 1		
% Moisture.....: 18	**Method.....:** SW846 8260B	

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acetone	ND	24	ug/kg
Benzene	ND	6.1	ug/kg
Bromodichloromethane	ND	6.1	ug/kg
Bromoform	ND	6.1	ug/kg
Bromomethane	ND	12	ug/kg
2-Butanone	ND	24	ug/kg
Carbon disulfide	ND	6.1	ug/kg
Carbon tetrachloride	ND	6.1	ug/kg
Chlorobenzene	ND	6.1	ug/kg
Dibromochloromethane	ND	6.1	ug/kg
Chloroethane	ND	12	ug/kg
Chloroform	ND	6.1	ug/kg
Chloromethane	ND	12	ug/kg
1,1-Dichloroethane	ND	6.1	ug/kg
1,2-Dichloroethane	ND	6.1	ug/kg
1,1-Dichloroethene	ND	6.1	ug/kg
1,2-Dichloroethene (total)	ND	6.1	ug/kg
1,2-Dichloropropane	ND	6.1	ug/kg
cis-1,3-Dichloropropene	ND	6.1	ug/kg
trans-1,3-Dichloropropene	ND	6.1	ug/kg
Ethylbenzene	ND	6.1	ug/kg
2-Hexanone	ND	24	ug/kg
Methylene chloride	ND	6.1	ug/kg
4-Methyl-2-pentanone	ND	24	ug/kg
Styrene	ND	6.1	ug/kg
1,1,2,2-Tetrachloroethane	ND	6.1	ug/kg
Tetrachloroethene	ND	6.1	ug/kg
Toluene	ND	6.1	ug/kg
1,1,1-Trichloroethane	ND	6.1	ug/kg
1,1,2-Trichloroethane	ND	6.1	ug/kg
Trichloroethene	ND	6.1	ug/kg
Vinyl chloride	ND	12	ug/kg
Xylenes (total)	ND	6.1	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	106	(57 - 124)
Toluene-d8	99	(49 - 145)
4-Bromofluorobenzene	97	(35 - 136)
Dibromofluoromethane	95	(56 - 137)

(Continued on next page)

OLIN CHEMICAL CORPORATION

Client Sample ID: MAWHINNIE BORROW PIT

GC/MS Volatiles

Lot-Sample #...: C8G250111-001 Work Order #...: CK3GN102 Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW PIT

GC/MS Semivolatiles

Lot-Sample #...: C8G250111-001	**Work Order #...:** CK3GN103	**Matrix.....:** SOLID
Date Sampled...: 07/24/98	**Date Received..:** 07/25/98	**MS Run #.....:**
Prep Date.....: 07/28/98	**Analysis Date..:** 07/29/98	
Prep Batch #...: 8210103		
Dilution Factor: 1		
% Moisture.....: 18	**Method.....:** SW846 8270C	

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Acenaphthene	ND	400	ug/kg
Acenaphthylene	ND	400	ug/kg
Anthracene	ND	400	ug/kg
Benzo(a)anthracene	ND	400	ug/kg
Benzo(a)pyrene	ND	400	ug/kg
Benzo(b)fluoranthene	ND	400	ug/kg
Benzo(k)fluoranthene	ND	400	ug/kg
Benzo(ghi)perylene	ND	400	ug/kg
bis(2-Chloroethoxy) methane	ND	400	ug/kg
bis(2-Chloroethyl) ether	ND	400	ug/kg
bis(2-Ethylhexyl) phthalate	ND	400	ug/kg
4-Bromophenyl phenyl ether	ND	400	ug/kg
Butyl benzyl phthalate	ND	400	ug/kg
Carbazole	ND	400	ug/kg
4-Chloroaniline	ND	400	ug/kg
4-Chloro-3-methylphenol	ND	400	ug/kg
2-Chloronaphthalene	ND	400	ug/kg
2-Chlorophenol	ND	400	ug/kg
4-Chlorophenyl phenyl ether	ND	400	ug/kg
Chrysene	ND	400	ug/kg
Dibenz(a,h)anthracene	ND	400	ug/kg
Dibenzofuran	ND	400	ug/kg
1,2-Dichlorobenzene	ND	400	ug/kg
1,3-Dichlorobenzene	ND	400	ug/kg
1,4-Dichlorobenzene	ND	400	ug/kg
3,3'-Dichlorobenzidine	ND	1900	ug/kg
2,4-Dichlorophenol	ND	400	ug/kg
Diethyl phthalate	ND	400	ug/kg
2,4-Dimethylphenol	ND	400	ug/kg
Dimethyl phthalate	ND	400	ug/kg
Di-n-butyl phthalate	ND	400	ug/kg
Di-n-octyl phthalate	ND	400	ug/kg
2,4-Dinitrophenol	ND	1900	ug/kg
4,6-Dinitro-2-methylphenol	ND	1900	ug/kg

(Continued on next page)

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW PIT

GC/MS Semivolatiles

Lot-Sample #...: C8G250111-001 Work Order #...: CK3GN103 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS
2,4-Dinitrotoluene	ND	400	ug/kg
2,6-Dinitrotoluene	ND	400	ug/kg
Fluoranthene	ND	400	ug/kg
Fluorene	ND	400	ug/kg
Hexachlorobenzene	ND	400	ug/kg
Hexachlorobutadiene	ND	400	ug/kg
Hexachlorocyclopentadiene	ND	1900	ug/kg
Hexachloroethane	ND	400	ug/kg
Indeno(1,2,3-cd)pyrene	ND	400	ug/kg
Isophorone	ND	400	ug/kg
2-Methylnaphthalene	ND	400	ug/kg
2-Methylphenol	ND	400	ug/kg
4-Methylphenol	ND	400	ug/kg
Naphthalene	ND	400	ug/kg
2-Nitroaniline	ND	1900	ug/kg
3-Nitroaniline	ND	1900	ug/kg
4-Nitroaniline	ND	1900	ug/kg
Nitrobenzene	ND	400	ug/kg
2-Nitrophenol	ND	400	ug/kg
4-Nitrophenol	ND	1900	ug/kg
N-Nitrosodi-n-propylamine	ND	400	ug/kg
N-Nitrosodiphenylamine	ND	400	ug/kg
Pentachlorophenol	ND	1900	ug/kg
Phenanthrene	ND	400	ug/kg
Phenol	ND	400	ug/kg
Pyrene	ND	400	ug/kg
1,2,4-Trichlorobenzene	ND	400	ug/kg
2,4,5-Trichlorophenol	ND	400	ug/kg
2,4,6-Trichlorophenol	ND	400	ug/kg
2,2'-oxybis(1-Chloropropane)	ND	400	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	71	(23 - 120)
Terphenyl-d14	83	(18 - 137)
2-Fluorophenol	62	(25 - 121)
2-Fluorobiphenyl	75	(30 - 115)
Phenol-d5	77	(24 - 113)
2,4,6-Tribromophenol	103	(19 - 122)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIK BORROW PIT

GC Semivolatiles

Lot-Sample #...: C8G250111-001	**Work Order #...:** CK3GN104	**Matrix.....:** SOLID
Date Sampled...: 07/24/98	**Date Received..:** 07/25/98	**MS Run #.....:**
Prep Date.....: 07/28/98	**Analysis Date..:** 07/30/98	
Prep Batch #...: 8210101		
Dilution Factor: 1		
% Moisture.....: 18	**Method.....:** SW846 8081A	

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aldrin	ND	2.1	ug/kg
alpha-BHC	ND	2.1	ug/kg
beta-BHC	ND	2.1	ug/kg
delta-BHC	ND	2.1	ug/kg
gamma-BHC (Lindane)	ND	2.1	ug/kg
alpha-Chlordane	ND	2.1	ug/kg
gamma-Chlordane	ND	2.1	ug/kg
4,4'-DDD	ND	2.1	ug/kg
4,4'-DDE	ND	2.1	ug/kg
4,4'-DDT	ND	2.1	ug/kg
Dieldrin	ND	2.1	ug/kg
Endosulfan I	ND	2.1	ug/kg
Endosulfan II	ND	2.1	ug/kg
Endrin ketone	ND	2.1	ug/kg
Endosulfan sulfate	ND	2.1	ug/kg
Endrin	ND	2.1	ug/kg
Endrin aldehyde	ND	2.1	ug/kg
Heptachlor	ND	2.1	ug/kg
Heptachlor epoxide	ND	2.1	ug/kg
Toxaphene	ND	81	ug/kg
Methoxychlor	ND	21	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	72	(30 - 150)
Decachlorobiphenyl	81	(30 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW PIT

GC Semivolatiles

Lot-Sample #...:	C8G250111-001	**Work Order #...:**	CK3GN105	**Matrix.....:**	SOLID
Date Sampled...:	07/24/98	**Date Received..:**	07/25/98	**MS Run #.....:**	
Prep Date.....:	07/28/98	**Analysis Date..:**	07/29/98		
Prep Batch #...:	8210102				
Dilution Factor:	1				
% Moisture.....:	18	**Method.....:**	SW846 8082		

PARAMETER	RESULT	REPORTING LIMIT	UNITS
Aroclor 1016	ND	40	ug/kg
Aroclor 1221	ND	40	ug/kg
Aroclor 1232	ND	40	ug/kg
Aroclor 1242	ND	40	ug/kg
Aroclor 1248	ND	40	ug/kg
Aroclor 1254	ND	40	ug/kg
Aroclor 1260	ND	40	ug/kg

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	84	(30 - 150)
Decachlorobiphenyl	87	(30 - 150)

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW

General Chemistry

Lot-Sample #...: C8G250109-001 Work Order #...: CK3GD Matrix.....: SOLID
Date Sampled...: 07/23/98 Date Received..: 07/24/98
% Moisture.....: 13

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	86.7		%	MCAWW 160.3 MOD	07/27-07/28/98	8208214

Dilution Factor: 1 MS Run #.....: 8208064

OLIN CHEMICAL CORPORATION

Quanterra

Client Sample ID: MAWHINNIE BORROW PIT

General Chemistry

Lot-Sample #...: C8G250111-001 Work Order #...: CK3GN Matrix.....: SOLID
Date Sampled...: 07/24/98 Date Received..: 07/25/98
% Moisture.....: 18

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	82.4		%	MCAWW 160.3 MOD	07/27-07/28/98	8208214

Dilution Factor: 1 MS Run #.....: 8208064

METHOD BLANK REPORT

Quanterra

TOTAL Metals

Client Lot #...: C8G250109 Matrix.....: SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MB Lot-Sample #: C8H040000-173 Prep Batch #...: 8216173						
Antimony	ND	1.0	mg/kg	SW846 6010B	08/04-08/05/98	CKA5310
		Dilution Factor: 1				
MB Lot-Sample #: C8G270000-149 Prep Batch #...: 8208149						
Mercury	**0.0013 B**	**0.10**	**mg/kg**	**SW846 7471A**	**07/27/98**	**CK4FN101**
		Dilution Factor: 1				
MB Lot-Sample #: C8G290000-155 Prep Batch #...: 8210155						
Arsenic	ND	1.0	mg/kg	SW846 6010B	07/29-07/30/98	CK62710L
		Dilution Factor: 1				
Lead	**0.14 B**	**0.30**	**mg/kg**	**SW846 6010B**	**07/29-07/30/98**	**CK62710M**
		Dilution Factor: 1				
Selenium	**0.21 B**	**0.50**	**mg/kg**	**SW846 6010B**	**07/29-07/30/98**	**CK62710P**
		Dilution Factor: 1				
Thallium	ND	1.0	mg/kg	SW846 6010B	07/29-07/30/98	CK627101
		Dilution Factor: 1				
Beryllium	**0.13 B**	**0.50**	**mg/kg**	**SW846 6010B**	**07/29-07/30/98**	**CK627107**
		Dilution Factor: 1				
Cadmium	ND	0.50	mg/kg	SW846 6010B	07/29-07/30/98	CK62711N
		Dilution Factor: 1				
Chromium	**0.058 B**	**1.0**	**mg/kg**	**SW846 6010B**	**07/29-07/30/98**	**CK62711L**
		Dilution Factor: 1				
Copper	ND	2.5	mg/kg	SW846 6010B	07/29-07/30/98	CK62710A
		Dilution Factor: 1				
Nickel	ND	4.0	mg/kg	SW846 6010B	07/29-07/30/98	CK62710H
		Dilution Factor: 1				
Silver	ND	1.0	mg/kg	SW846 6010B	07/29-07/30/98	CK62711M
		Dilution Factor: 1				
Zinc	**1.3 B**	**2.0**	**mg/kg**	**SW846 6010B**	**07/29-07/30/98**	**CK62710K**
		Dilution Factor: 1				

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METHOD BLANK REPORT

Quanterra

TOTAL Metals

Client Lot #...: C8G250109

Matrix.....: SOLID

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

B Estimated result. Result is less than RL.

Quanterra
Environmental Services

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C8G250111 **Work Order #...:** CK531101 **Matrix.....:** SOLID
MB Lot-Sample #: C8G280000-133

Prep Date.....: 07/28/98
Analysis Date..: 07/28/98 **Prep Batch #...:** 8209133
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acetone	ND	20	ug/kg	SW846 8260B
Benzene	ND	5.0	ug/kg	SW846 8260B
Bromodichloromethane	ND	5.0	ug/kg	SW846 8260B
Bromoform	ND	5.0	ug/kg	SW846 8260B
Bromomethane	ND	10	ug/kg	SW846 8260B
2-Butanone	ND	20	ug/kg	SW846 8260B
Carbon disulfide	ND	5.0	ug/kg	SW846 8260B
Carbon tetrachloride	ND	5.0	ug/kg	SW846 8260B
Chlorobenzene	ND	5.0	ug/kg	SW846 8260B
Dibromochloromethane	ND	5.0	ug/kg	SW846 8260B
Chloroethane	ND	10	ug/kg	SW846 8260B
Chloroform	ND	5.0	ug/kg	SW846 8260B
Chloromethane	ND	10	ug/kg	SW846 8260B
1,1-Dichloroethane	ND	5.0	ug/kg	SW846 8260B
1,2-Dichloroethane	ND	5.0	ug/kg	SW846 8260B
1,1-Dichloroethene	ND	5.0	ug/kg	SW846 8260B
,2-Dichloroethene (total)	ND	5.0	ug/kg	SW846 8260B
1,2-Dichloropropane	ND	5.0	ug/kg	SW846 8260B
cis-1,3-Dichloropropene	ND	5.0	ug/kg	SW846 8260B
trans-1,3-Dichloropropene	ND	5.0	ug/kg	SW846 8260B
Ethylbenzene	ND	5.0	ug/kg	SW846 8260B
2-Hexanone	ND	20	ug/kg	SW846 8260B
Methylene chloride	ND	5.0	ug/kg	SW846 8260B
4-Methyl-2-pentanone	ND	20	ug/kg	SW846 8260B
Styrene	ND	5.0	ug/kg	SW846 8260B
1,1,2,2-Tetrachloroethane	ND	5.0	ug/kg	SW846 8260B
Tetrachloroethene	ND	5.0	ug/kg	SW846 8260B
Toluene	ND	5.0	ug/kg	SW846 8260B
1,1,1-Trichloroethane	ND	5.0	ug/kg	SW846 8260B
1,1,2-Trichloroethane	ND	5.0	ug/kg	SW846 8260B
Trichloroethene	ND	5.0	ug/kg	SW846 8260B
Vinyl chloride	ND	10	ug/kg	SW846 8260B
Xylenes (total)	ND	5.0	ug/kg	SW846 8260B

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	100	(57 - 124)
Toluene-d8	97	(49 - 145)
4-Bromofluorobenzene	95	(35 - 136)
Dibromofluoromethane	97	(56 - 137)

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Environmental Services

METHOD BLANK REPORT

GC/MS Volatiles

Client Lot #...: C8G250111 **Work Order #...:** CK531101 **Matrix.....:** SOLID

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

Quanterra
Environmental Services

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XM101 **Matrix.....:** SOLID
MB Lot-Sample #: C8G290000-103

Prep Date.....: 07/28/98
Analysis Date..: 07/29/98 **Prep Batch #...:** 8210103
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Acenaphthene	ND	330	ug/kg	SW846 8270C
Acenaphthylene	ND	330	ug/kg	SW846 8270C
Anthracene	ND	330	ug/kg	SW846 8270C
Benzo(a)anthracene	ND	330	ug/kg	SW846 8270C
Benzo(a)pyrene	ND	330	ug/kg	SW846 8270C
Benzo(b)fluoranthene	ND	330	ug/kg	SW846 8270C
Benzo(k)fluoranthene	ND	330	ug/kg	SW846 8270C
Benzo(ghi)perylene	ND	330	ug/kg	SW846 8270C
bis(2-Chloroethoxy) methane	ND	330	ug/kg	SW846 8270C
bis(2-Chloroethyl) ether	ND	330	ug/kg	SW846 8270C
bis(2-Ethylhexyl) phthalate	ND	330	ug/kg	SW846 8270C
4-Bromophenyl phenyl ether	ND	330	ug/kg	SW846 8270C
Butyl benzyl phthalate	ND	330	ug/kg	SW846 8270C
Carbazole	ND	330	ug/kg	SW846 8270C
4-Chloroaniline	ND	330	ug/kg	SW846 8270C
4-Chloro-3-methylphenol	ND	330	ug/kg	SW846 8270C
2-Chloronaphthalene	ND	330	ug/kg	SW846 8270C
2-Chlorophenol	ND	330	ug/kg	SW846 8270C
4-Chlorophenyl phenyl ether	ND	330	ug/kg	SW846 8270C
Chrysene	ND	330	ug/kg	SW846 8270C
Dibenz(a,h)anthracene	ND	330	ug/kg	SW846 8270C
Dibenzofuran	ND	330	ug/kg	SW846 8270C
1,2-Dichlorobenzene	ND	330	ug/kg	SW846 8270C
1,3-Dichlorobenzene	ND	330	ug/kg	SW846 8270C
1,4-Dichlorobenzene	ND	330	ug/kg	SW846 8270C
3,3'-Dichlorobenzidine	ND	1600	ug/kg	SW846 8270C
2,4-Dichlorophenol	ND	330	ug/kg	SW846 8270C
Diethyl phthalate	ND	330	ug/kg	SW846 8270C
2,4-Dimethylphenol	ND	330	ug/kg	SW846 8270C
Dimethyl phthalate	ND	330	ug/kg	SW846 8270C
Di-n-butyl phthalate	ND	330	ug/kg	SW846 8270C
Di-n-octyl phthalate	ND	330	ug/kg	SW846 8270C
2,4-Dinitrophenol	ND	1600	ug/kg	SW846 8270C
4,6-Dinitro-2-methylphenol	ND	1600	ug/kg	SW846 8270C
2,4-Dinitrotoluene	ND	330	ug/kg	SW846 8270C
2,6-Dinitrotoluene	ND	330	ug/kg	SW846 8270C

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Quanterra
Environmental Services

METHOD BLANK REPORT

GC/MS Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XM101 **Matrix.....:** SOLID

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Fluoranthene	ND	330	ug/kg	SW846 8270C
Fluorene	ND	330	ug/kg	SW846 8270C
Hexachlorobenzene	ND	330	ug/kg	SW846 8270C
Hexachlorobutadiene	ND	330	ug/kg	SW846 8270C
Hexachlorocyclopentadiene	ND	1600	ug/kg	SW846 8270C
Hexachloroethane	ND	330	ug/kg	SW846 8270C
Indeno(1,2,3-cd)pyrene	ND	330	ug/kg	SW846 8270C
Isophorone	ND	330	ug/kg	SW846 8270C
2-Methylnaphthalene	ND	330	ug/kg	SW846 8270C
2-Methylphenol	ND	330	ug/kg	SW846 8270C
4-Methylphenol	ND	330	ug/kg	SW846 8270C
Naphthalene	ND	330	ug/kg	SW846 8270C
2-Nitroaniline	ND	1600	ug/kg	SW846 8270C
3-Nitroaniline	ND	1600	ug/kg	SW846 8270C
4-Nitroaniline	ND	1600	ug/kg	SW846 8270C
Nitrobenzene	ND	330	ug/kg	SW846 8270C
2-Nitrophenol	ND	330	ug/kg	SW846 8270C
4-Nitrophenol	ND	1600	ug/kg	SW846 8270C
N-Nitrosodi-n-propylamine	ND	330	ug/kg	SW846 8270C
N-Nitrosodiphenylamine	ND	330	ug/kg	SW846 8270C
Pentachlorophenol	ND	1600	ug/kg	SW846 8270C
Phenanthrene	ND	330	ug/kg	SW846 8270C
Phenol	ND	330	ug/kg	SW846 8270C
Pyrene	ND	330	ug/kg	SW846 8270C
1,2,4-Trichlorobenzene	ND	330	ug/kg	SW846 8270C
2,4,5-Trichlorophenol	ND	330	ug/kg	SW846 8270C
2,4,6-Trichlorophenol	ND	330	ug/kg	SW846 8270C
2,2'-oxybis(1-Chloropropa	ND	330	ug/kg	SW846 8270C

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	84	(23 - 120)
Terphenyl-d14	91	(18 - 137)
2-Fluorophenol	72	(25 - 121)
2-Fluorobiphenyl	82	(30 - 115)
Phenol-d5	82	(24 - 113)
2,4,6-Tribromophenol	107	(19 - 122)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Quanterra
Environmental Services

METHOD BLANK REPORT

GC Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XK101 **Matrix.....:** SOLID
MB Lot-Sample #: C8G290000-101

Prep Date.....: 07/28/98
Analysis Date..: 07/30/98 **Prep Batch #...:** 8210101
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Aldrin	ND	1.7	ug/kg	SW846 8081A
alpha-BHC	ND	1.7	ug/kg	SW846 8081A
beta-BHC	ND	1.7	ug/kg	SW846 8081A
delta-BHC	ND	1.7	ug/kg	SW846 8081A
gamma-BHC (Lindane)	ND	1.7	ug/kg	SW846 8081A
alpha-Chlordane	ND	1.7	ug/kg	SW846 8081A
gamma-Chlordane	ND	1.7	ug/kg	SW846 8081A
4,4'-DDD	ND	1.7	ug/kg	SW846 8081A
4,4'-DDE	ND	1.7	ug/kg	SW846 8081A
4,4'-DDT	ND	1.7	ug/kg	SW846 8081A
Dieldrin	ND	1.7	ug/kg	SW846 8081A
Endosulfan I	ND	1.7	ug/kg	SW846 8081A
Endosulfan II	ND	1.7	ug/kg	SW846 8081A
Endrin ketone	ND	1.7	ug/kg	SW846 8081A
Endosulfan sulfate	ND	1.7	ug/kg	SW846 8081A
Endrin	ND	1.7	ug/kg	SW846 8081A
Endrin aldehyde	ND	1.7	ug/kg	SW846 8081A
Heptachlor	ND	1.7	ug/kg	SW846 8081A
Heptachlor epoxide	ND	1.7	ug/kg	SW846 8081A
Toxaphene	ND	67	ug/kg	SW846 8081A
Methoxychlor	ND	17	ug/kg	SW846 8081A

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	83	(30 - 150)
Decachlorobiphenyl	83	(30 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

Quanterra
Environmental Services

METHOD BLANK REPORT

GC Semivolatiles

Client Lot #...: C8G250111
MB Lot-Sample #: C8G290000-102

Work Order #...: CK5XL101

Matrix.....: SOLID

Prep Date.....: 07/28/98
Prep Batch #...: 8210102

Analysis Date..: 07/29/98
Dilution Factor: 1

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD
Aroclor 1016	ND	33	ug/kg	SW846 8082
Aroclor 1221	ND	33	ug/kg	SW846 8082
Aroclor 1232	ND	33	ug/kg	SW846 8082
Aroclor 1242	ND	33	ug/kg	SW846 8082
Aroclor 1248	ND	33	ug/kg	SW846 8082
Aroclor 1254	ND	33	ug/kg	SW846 8082
Aroclor 1260	ND	33	ug/kg	SW846 8082

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	100	(30 - 150)
Decachlorobiphenyl	89	(30 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

Quanterra

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C8G250109 **Matrix.....:** SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
LCS Lot-Sample#: C8G270000-149 **Prep Batch #...:** 8208149					
Mercury	103	(80 - 120)	SW846 7471A	07/27/98	CK4FN102
		Dilution Factor: 1			
LCS Lot-Sample#: C8G290000-155 **Prep Batch #...:** 8210155					
Thallium	104	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62710Q
		Dilution Factor: 1			
Beryllium	98	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62710X
		Dilution Factor: 1			
Zinc	112	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711A
		Dilution Factor: 1			
Arsenic	99	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711C
		Dilution Factor: 1			
Lead	99	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711D
		Dilution Factor: 1			
Selenium	102	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711F
		Dilution Factor: 1			
Chromium	101	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711U
		Dilution Factor: 1			
Silver	98	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711V
		Dilution Factor: 1			
Cadmium	100	(80 - 120)	SW846 6010B	07/29-07/30/98	CK62711W
		Dilution Factor: 1			
Copper	93	(80 - 120)	SW846 6010B	07/29-07/30/98	CK627112
		Dilution Factor: 1			
Nickel	99	(80 - 120)	SW846 6010B	07/29-07/30/98	CK627118
		Dilution Factor: 1			
LCS Lot-Sample#: C8H040000-173 **Prep Batch #...:** 8216173					
Antimony	96	(80 - 120)	SW846 6010B	08/04-08/05/98	CKA53102
		Dilution Factor: 1			

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Quanterra

LABORATORY CONTROL SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C8G250109 **Matrix.....:** SOLID

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

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Environmental Services

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...: C8G250111 **Work Order #...:** CK531102 **Matrix.....:** SOLID
LCS Lot-Sample#: C8G280000-133
Prep Date.....: 07/28/98 **Analysis Date..:** 07/28/98
Prep Batch #...: 8209133
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	METHOD
1,1-Dichloroethene	**132**	**(59 - 172)**	**SW846 8260B**
Trichloroethene	**119**	**(62 - 137)**	**SW846 8260B**
Benzene	**125**	**(66 - 142)**	**SW846 8260B**
Toluene	**130**	**(59 - 139)**	**SW846 8260B**
Chlorobenzene	**122**	**(60 - 133)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	93	(80 - 120)
Toluene-d8	99	(81 - 117)
4-Bromofluorobenzene	93	(74 - 121)
Dibromofluoromethane	87	(70 - 130)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Quanterra Environmental Services

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC/MS Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XM102-LCS **Matrix.....:** SOLID
LCS Lot-Sample#: C8G290000-103 CK5XM103-LCSD
Prep Date.....: 07/28/98 **Analysis Date..:** 07/29/98
Prep Batch #...: 8210103
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Phenol	**73**	**(10 - 107)**			**SW846 8270C**
	71	**(10 - 107)**	**2.4**	**(0-47)**	**SW846 8270C**
2-Chlorophenol	**81**	**(23 - 134)**			**SW846 8270C**
	76	**(23 - 134)**	**5.5**	**(0-53)**	**SW846 8270C**
1,4-Dichlorobenzene	**91**	**(20 - 124)**			**SW846 8270C**
	90	**(20 - 124)**	**1.3**	**(0-41)**	**SW846 8270C**
N-Nitrosodi-n-propylamine	**122**	**(13 - 186)**			**SW846 8270C**
	120	**(13 - 186)**	**1.9**	**(0-45)**	**SW846 8270C**
1,2,4-Trichlorobenzene	**96**	**(38 - 107)**			**SW846 8270C**
	95	**(38 - 107)**	**0.60**	**(0-37)**	**SW846 8270C**
4-Chloro-3-methylphenol	**84**	**(22 - 124)**			**SW846 8270C**
	80	**(22 - 124)**	**4.6**	**(0-55)**	**SW846 8270C**
Acenaphthene	**97**	**(31 - 137)**			**SW846 8270C**
	95	**(31 - 137)**	**2.1**	**(0-34)**	**SW846 8270C**
4-Nitrophenol	**76**	**(1.0- 132)**			**SW846 8270C**
	72	**(1.0- 132)**	**5.1**	**(0-50)**	**SW846 8270C**
2,4-Dinitrotoluene	**106**	**(28 - 125)**			**SW846 8270C**
	102	**(28 - 125)**	**4.5**	**(0-60)**	**SW846 8270C**
Pentachlorophenol	**116**	**(14 - 124)**			**SW846 8270C**
	106	**(14 - 124)**	**9.3**	**(0-35)**	**SW846 8270C**
Pyrene	**107**	**(52 - 115)**			**SW846 8270C**
	105	**(52 - 115)**	**1.9**	**(0-33)**	**SW846 8270C**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Nitrobenzene-d5	90	(23 - 120)
	88	(23 - 120)
Terphenyl-d14	92	(18 - 137)
	90	(18 - 137)
2-Fluorobiphenyl	84	(30 - 115)
	82	(30 - 115)
2-Fluorophenol	86	(25 - 121)
	84	(25 - 121)
Phenol-d5	69	(24 - 113)
	65	(24 - 113)
2,4,6-Tribromophenol	108	(19 - 122)
	110	(19 - 122)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XK102-LCS **Matrix.....:** SOLID
LCS Lot-Sample#: C8G290000-101 CK5XK103-LCSD
Prep Date.....: 07/28/98 **Analysis Date..:** 07/30/98
Prep Batch #...: 8210101
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
gamma-BHC (Lindane)	**72**	**(32 - 127)**			**SW846 8081A**
	72	**(32 - 127)**	**1.2**	**(0-20)**	**SW846 8081A**
Heptachlor	**85**	**(34 - 111)**			**SW846 8081A**
	84	**(34 - 111)**	**0.42**	**(0-15)**	**SW846 8081A**
Aldrin	**104**	**(42 - 122)**			**SW846 8081A**
	103	**(42 - 122)**	**0.81**	**(0-16)**	**SW846 8081A**
Dieldrin	**81**	**(36 - 146)**			**SW846 8081A**
	81	**(36 - 146)**	**0.0**	**(0-23)**	**SW846 8081A**
Endrin	**78**	**(30 - 147)**			**SW846 8081A**
	78	**(30 - 147)**	**0.0**	**(0-24)**	**SW846 8081A**
4,4'-DDT	**83**	**(25 - 160)**			**SW846 8081A**
	81	**(25 - 160)**	**2.2**	**(0-26)**	**SW846 8081A**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	85	(30 - 150)
	84	(30 - 150)
Decachlorobiphenyl	85	(30 - 150)
	85	(30 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

Quanterra
Environmental Services

LABORATORY CONTROL SAMPLE EVALUATION REPORT

GC Semivolatiles

Client Lot #...: C8G250111 **Work Order #...:** CK5XL102-LCS **Matrix.....:** SOLID
LCS Lot-Sample#: C8G290000-102 CK5XL103-LCSD
Prep Date.....: 07/28/98 **Analysis Date..:** 07/29/98
Prep Batch #...: 8210102
Dilution Factor: 1

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Aroclor 1016	**87**	**(30 - 150)**			**SW846 8082**
	86	**(30 - 150)**	**1.7**	**(0-20)**	**SW846 8082**
Aroclor 1260	**96**	**(30 - 150)**			**SW846 8082**
	95	**(30 - 150)**	**0.31**	**(0-20)**	**SW846 8082**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
Tetrachloro-m-xylene	106	(30 - 150)
	103	(30 - 150)
Decachlorobiphenyl	94	(30 - 150)
	96	(30 - 150)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

MATRIX SPIKE SAMPLE EVALUATION REPORT

Quanterra

TOTAL Metals

Client Lot #...: C8G250109 **Matrix.....:** SOLID
Date Sampled...: 07/23/98 **Date Received..:** 07/23/98

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C8G240108-003 **Prep Batch #...:** 8210155							
Arsenic	94	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H712A
	94	(75 - 125)	0.08	(0-20)	SW846 6010B	07/29-07/30/98	CK2H712C
		Dilution Factor: 1					
		MS Run #.....: 8210034					
Beryllium	99	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H711H
	102	(75 - 125)	2.3	(0-20)	SW846 6010B	07/29-07/30/98	CK2H711J
		Dilution Factor: 1					
		MS Run #.....: 8210034					
Cadmium	80	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7137
	86	(75 - 125)	4.7	(0-20)	SW846 6010B	07/29-07/30/98	CK2H7138
		Dilution Factor: 2					
		MS Run #.....: 8210034					
Chromium	NC	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7131
	NC	(75 - 125)		(0-20)	SW846 6010B	07/29-07/30/98	CK2H7132
		Dilution Factor: 1					
		MS Run #.....: 8210034					
Copper	NC	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H711P
	NC	(75 - 125)		(0-20)	SW846 6010B	07/29-07/30/98	CK2H711Q
		Dilution Factor: 1					
		MS Run #.....: 8210034					
Lead	NC	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H712D
	NC	(75 - 125)		(0-20)	SW846 6010B	07/29-07/30/98	CK2H712E
		Dilution Factor: 2					
		MS Run #.....: 8210034					
Nickel	100	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7124
	92	(75 - 125)	3.9	(0-20)	SW846 6010B	07/29-07/30/98	CK2H7125
		Dilution Factor: 1					
		MS Run #.....: 8210034					
Selenium	95	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H712H
	96	(75 - 125)	1.4	(0-20)	SW846 6010B	07/29-07/30/98	CK2H712J
		Dilution Factor: 2					
		MS Run #.....: 8210034					
Silver	76	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7134
	85	(75 - 125)	7.8	(0-20)	SW846 6010B	07/29-07/30/98	CK2H7135
		Dilution Factor: 1					
		MS Run #.....: 8210034					

(Continued on next page)

MATRIX SPIKE SAMPLE EVALUATION REPORT

Quanterra

TOTAL Metals

Client Lot #...: C8G250109 **Matrix.....:** SOLID
Date Sampled...: 07/23/98 **Date Received..:** 07/23/98

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Thallium	97	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7114
	98	(75 - 125)	1.4	(0-20)	SW846 6010B	07/29-07/30/98	CK2H7115
		Dilution Factor: 2					
		MS Run #.....: 8210034					
Zinc	NC	(75 - 125)			SW846 6010B	07/29-07/30/98	CK2H7128
	NC	(75 - 125)		(0-20)	SW846 6010B	07/29-07/30/98	CK2H7129
		Dilution Factor: 2					
		MS Run #.....: 8210034					

MS Lot-Sample #: C8G240108-003 **Prep Batch #...:** 8216173

Antimony	52 N	(75 - 125)			SW846 6010B	08/04-08/05/98	CK2H712F
	34 N,*	(75 - 125)	40	(0-20)	SW846 6010B	08/04-08/05/98	CK2H712G
		Dilution Factor: 5					
		MS Run #.....: 8210034					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Results and reporting limits have been adjusted for dry weight.

NC The recovery and/or RPD were not calculated.

N Spiked analyte recovery is outside stated control limits.

* Relative percent difference (RPD) is outside stated control limits.

MATRIX SPIKE SAMPLE EVALUATION REPORT

TOTAL Metals

Client Lot #...: C8G250109 **Matrix.....:** SOLID
Date Sampled...: 07/21/98 **Date Received..:** 07/21/98

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
MS Lot-Sample #: C8G220117-001 **Prep Batch #...:** 8208149							
Mercury	48 N	(75 - 125)			SW846 7471A	07/27/98	CK0D312H
	76	(75 - 125)	12	(0-20)	SW846 7471A	07/27/98	CK0D312J
		Dilution Factor: 1					
		MS Run #.....: 8208025					

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

N Spiked analyte recovery is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

Quanterra
Environmental Services

MATRIX SPIKE SAMPLE EVALUATION REPORT

GC/MS Volatiles

Client Lot #...:	C8G250111	**Work Order #...:**	CK3GN106-MS	**Matrix.....:**	SOLID
MS Lot-Sample #:	C8G250111-001		CK3GN107-MSD		
Date Sampled...:	07/24/98	**Date Received..:**	07/25/98	**MS Run #.....:**	8209022
Prep Date.....:	07/28/98	**Analysis Date..:**	07/28/98		
Prep Batch #...:	8209133				
Dilution Factor:	1	**% Moisture.....:**	18		

PARAMETER	PERCENT RECOVERY	RECOVERY LIMITS	RPD	RPD LIMITS	METHOD
Benzene	**127**	**(70 - 130)**			**SW846 8260B**
	131 a	**(70 - 130)**	**3.0**	**(0-20)**	**SW846 8260B**
Chlorobenzene	**123**	**(70 - 130)**			**SW846 8260B**
	129	**(70 - 130)**	**5.1**	**(0-17)**	**SW846 8260B**
1,1-Dichloroethene	**132 a**	**(70 - 130)**			**SW846 8260B**
	139 a	**(70 - 130)**	**4.9**	**(0-19)**	**SW846 8260B**
Toluene	**136 a**	**(70 - 130)**			**SW846 8260B**
	137 a	**(70 - 130)**	**0.57**	**(0-24)**	**SW846 8260B**
Trichloroethene	**119**	**(70 - 130)**			**SW846 8260B**
	123	**(70 - 130)**	**3.3**	**(0-20)**	**SW846 8260B**

SURROGATE	PERCENT RECOVERY	RECOVERY LIMITS
1,2-Dichloroethane-d4	91	(57 - 124)
	100	(57 - 124)
Toluene-d8	98	(49 - 145)
	100	(49 - 145)
4-Bromofluorobenzene	88	(35 - 136)
	95	(35 - 136)
Dibromofluoromethane	88	(56 - 137)
	91	(56 - 137)

NOTE(S):

Calculations are performed before rounding to avoid round-off errors in calculated results.

Bold print denotes control parameters

a Spiked analyte recovery is outside stated control limits.

Results and reporting limits have been adjusted for dry weight.

SAMPLE DUPLICATE EVALUATION REPORT

General Chemistry

Quanterra Environmental Services

Client Lot #...: C8G250111 **Work Order #...:** CK1DG-SMP, CK1DG-DUP **Matrix.....:** SOLID

Date Sampled...: 07/21/98 **Date Received..:** 07/23/98

% Moisture.....: 25

PARAM	RESULT	DUPLICATE RESULT	UNITS	RPD	RPD LIMIT	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids						SD Lot-Sample #: C8G230117-001		
	75.1	74.8	%	0.46	(0-20)	MCAWW 160.3 MOD	07/27-07/28/98	8208214

Dilution Factor: 1

Prep Date.....: 8208064 Analysis Date..: Prep Batch #...:

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

Client: Olin Chemical Project: _____ Quote: _____

ler Rec'd & Opened for Temp. Check on: 7/24/98

Coolers Opened and Unpacked on: 7/25/98 By: AKA (Signature)

Quanterra Lot Number: C86250109

		Yes	No
1.	Were custody seals on the outside of the cooler?		✓
	If YES, how many and where? Quantity __ Location		
	Were signatures and date correct?		✓
2.	Were custody papers included inside the cooler?	✓	
3.	Were custody papers properly filled out (ink, signed, match labels)?	✓	
4.	Did you sign the custody papers in the appropriate place?	✓	
5.	Was shippers packing slip attached to this form?	✓	
6.	Were packing materials used?		✓
	If YES, what type?		
.	Were the samples chilled? (Record temperatures on reverse side.)		✓
8.	Were the samples appropriately preserved?	✓	
9.	Were all bottles sealed in separate plastic bags?	✓	
10.	Did all bottles arrive in good condition (unbroken)?		✓
11.	Were all bottle labels complete (sample ID, preservatives, etc.)?	✓	
12.	Did all bottle labels and/or tags agree with custody papers?	✓	
13.	Were correct bottles used for tests indicated?	✓	
14.	Were all VOA vials checked for the presence of air bubbles?	✓	
15.	Was a sufficient amount of sample sent in each bottle?	✓	

16. Samples received by: FEDEX (UPS) CLIENT DROP-OFF OTHER AIRBORNE

Explain any discrepancies: _____

el 2 Review _____

Was contacted on _____ by _____ to resolve discrepancies.

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

P: Preserved
UP: Unpreserved

Sample ID	TMET PH<2	DMET PH<2	HG PH<2	NUT(1) PH<2	CN PH ≥12	OG TPHC PH<2	PHEN PH<2	SULF PH ≥12	TOC PH<2	TOX PH<2	VOA P/UP	hrdnss PH<2		
Vials Preserved														

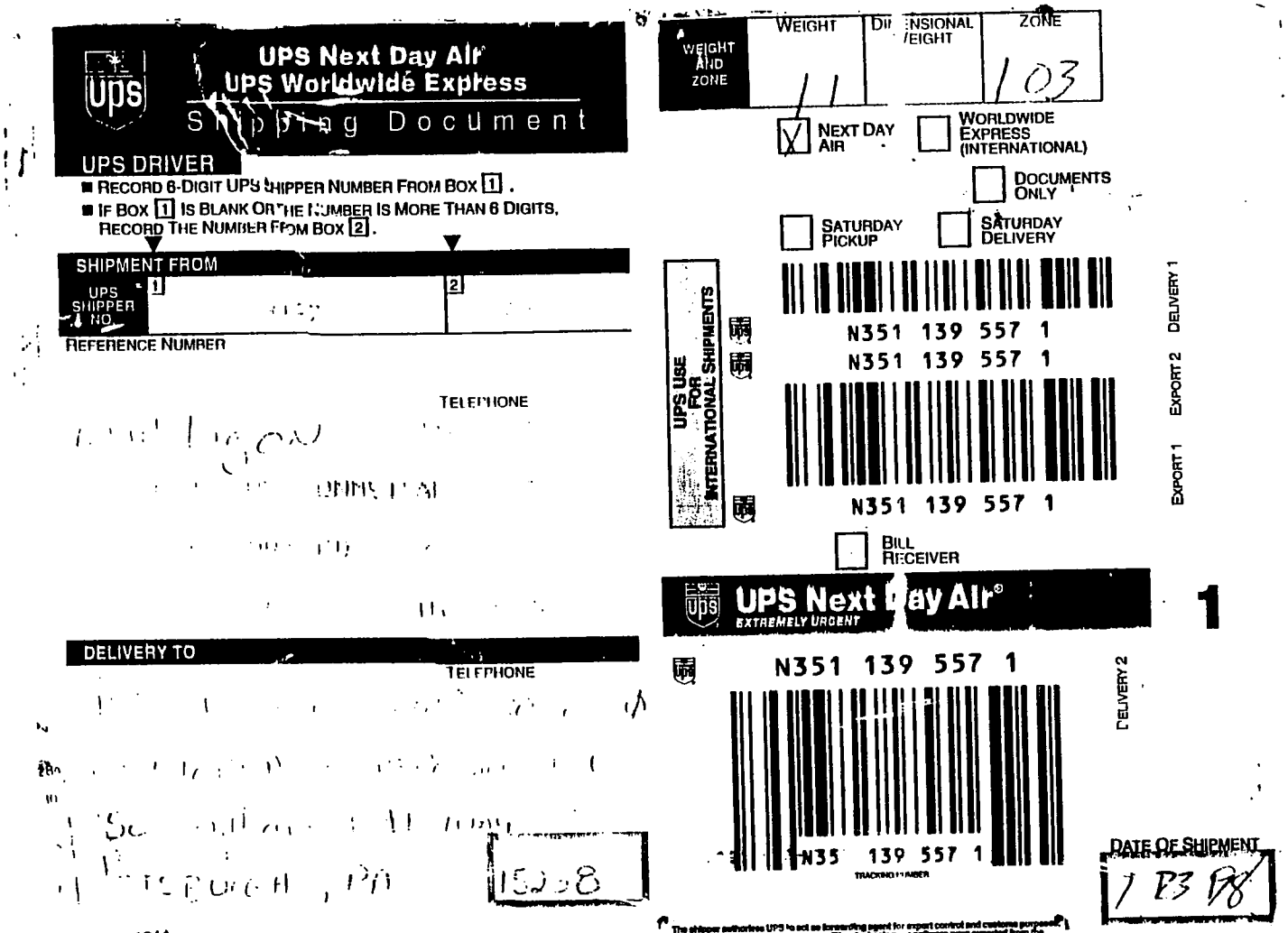
(1) "NUT" could include sample bottles for ammonia, chemical oxygen demand, nitrate/nitrite, TKN, or total phosphorus

Comments:

Cooler Number	Temperature
	20°

Bottle Type	Lot Number*
8 oz	*
40 ml W	*

* Please use an asterisk if bottle lot number was covered by the label.



UPS Next Day Air
UPS Worldwide Express
Shipping Document

UPS DRIVER
- RECORD 6-DIGIT UPS SHIPPER NUMBER FROM BOX [1].
- IF BOX [1] IS BLANK OR THE NUMBER IS MORE THAN 6 DIGITS, RECORD THE NUMBER FROM BOX [2].

SHIPMENT FROM
UPS SHIPPER NO. [1] [2]
REFERENCE NUMBER
TELEPHONE

DELIVERY TO
TELEPHONE

0101911
'97 W
United Parcel Service, Louisville, KY

WEIGHT AND ZONE
WEIGHT 11
DIMENSIONAL WEIGHT
ZONE 103

[X] NEXT DAY AIR
[ ] WORLDWIDE EXPRESS (INTERNATIONAL)
[ ] DOCUMENTS ONLY
[ ] SATURDAY PICKUP
[ ] SATURDAY DELIVERY

UPS USE FOR INTERNATIONAL SHIPMENTS

N351 139 557 1
N351 139 557 1
N351 139 557 1

EXPORT 1 EXPORT 2 DELIVERY 1

[ ] BILL RECEIVER

UPS Next Day Air®
EXTREMELY URGENT
1

N351 139 557 1
N35 139 557 1
TRACKING NUMBER

DELIVERY 2

DATE OF SHIPMENT
1 P3 98

The shipper authorizes UPS to act as forwarding agent for export control and customs purposes. The shipper certifies that these commodities, technology or software were exported from the United States in accordance with the Export Administration Regulations. Diversion contrary to U.S. law is prohibited.

[redacted]

Chain of Custody Record

Quanter...

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
Olin Chemical Corp	Dave Wheeless	23 July 98	04771
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
2400 Buffalo Ave	(770) 421-3510 / (770) 421-3486		
City / **State** / **Zip Code**	**Site Contact**	**Lab Contact**	
Niagara Falls / NY / 14302	Dave Wheeless	VB	
Project Name	**Carrier/Waybill Number**		
Olin Gill Creek	UPS N351 1395571		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H_2SO_4	HNO_3	HCl	NaOH	ZnAc/NaOH	#	Analysis: TCL VOA	TCL SOM	TCL Pest/PCB	PP METALS	% Moisture
Mawhinnie Borrow	23 July	14:30			X	X						3					
TRIP BLANK			X						X				X				

Special Instructions/ Conditions of Receipt

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☒ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☒ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Date	Time		Date	Time
1. Relinquished By	23 July 98	15:30	1. Received By Patrick L Faust	7/24/98	11:00
2. Relinquished By			2. ~~Received By~~		
3. Relinquished By			3. Received By		

Comments: Accelerated Turn Verbal Results / FAX DQO IV

DISTRIBUTION: WHITE - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

Client: Olin Chemical Project: _____ Quote: _____

Cooler Rec'd & Opened for Temp. Check on: 7/25/98

Coolers Opened and Unpacked on: 7/25/98 By: PKL

(Signature)

Quanterra Lot Number: C8G250111

		Yes	No
1.	Were custody seals on the outside of the cooler?		✓
	If YES, how many and where? Quantity __ Location		
	Were signatures and date correct?		✓
2.	Were custody papers included inside the cooler?	✓	
3.	Were custody papers properly filled out (ink, signed, match labels)?	✓	
4.	Did you sign the custody papers in the appropriate place?	✓	
5.	Was shippers packing slip attached to this form?	✓	
6.	Were packing materials used?	✓	
	If YES, what type? Bubble wrap, Styrofoam Peanuts		
7.	Were the samples chilled? (Record temperatures on reverse side.)	✓	
8.	Were the samples appropriately preserved?	N/A	
9.	Were all bottles sealed in separate plastic bags?		✓
10.	Did all bottles arrive in good condition (unbroken)?	✓	
11.	Were all bottle labels complete (sample ID, preservatives, etc.)?	✓	
12.	Did all bottle labels and/or tags agree with custody papers?	✓	
13.	Were correct bottles used for tests indicated?		
14.	Were all VOA vials checked for the presence of air bubbles?	N/A	
15.	Was a sufficient amount of sample ~~sent~~ in each bottle?	✓	

16. Samples received by: FEDEX (UPS) CLIENT DROP-OFF OTHER AIRBORNE

Explain any discrepancies: _____

Level 2 Review _____

Was contacted on _____ by _____ to resolve discrepancies.

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

P: Preserved

UP: Unpreserved

Sample ID	TMET PH<2	DMET PH<2	HG PH<2	NUT(1) PH<2	CN PH ≥12	OG TPHC PH<2	PHEN PH<2	SULF PH ≥12	TOC PH<2	TOX PH<2	VOA P/UP	hrdnss PH<2			

(1) "NUT" could include sample bottles for ammonia, chemical oxygen demand, nitrate/nitrite, TKN, or total phosphorus

Comments: _____

Cooler Number	Temperature
	5°

Bottle Type	Lot Number*
40z	*
8 oz	*

* Please use an asterisk if bottle lot number was covered by the label.

Saturday DELIVERY

011189

PLACE DIRECTLY BELOW ADDRESS LABEL

UPS Worldwide Express Shipping Document

WEIGHT AND ZONE

UPS DRIVER

- RECORD 6-DIGIT UPS SHIPPER NUMBER FROM BOX [1].
- IF BOX [1] IS BLANK OR THE NUMBER IS MORE THAN 6 DIGITS, RECORD THE NUMBER FROM BOX [2].

SHIPMENT FROM

UPS SHIPPER NO. [1] [2]

REFERENCE NUMBER

TELEPHONE

DELIVERY TO

TELEPHONE

UPS USE FOR INTERNATIONAL SHIPMENTS

- [X] NEXT DAY AIR
- [ ] WORLDWIDE EXPRESS (INTERNATIONAL)
- [ ] DOCUMENTS ONLY
- [ ] SATURDAY PICKUP
- [X] SATURDAY DELIVERY
- [ ] BILL RECEIVER

N351 139 558 0

N351 139 558 0

N351 139 558 0

EXPORT 1 EXPORT 2 DELIVERY 1

UPS Next Day Air® EXTREMELY URGENT

1

N351 139 558 0

N351 139 558 0

TRACKING NUMBER

DELIVERY 2

DATE OF SHIPMENT

010191120 12/97

Saturday DELIVERY

011189

PLACE DIRECTLY BELOW ADDRESS LABEL

COMMENTS:

Chain of Custody Record

Quanterra

QUA-4124 0797

Client	Project Manager	Date	Chain of Custody Number
Olin Corp	Dave Wheeless	24 July 98	04772
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
2400 Buffalo Ave	(770) 421-3510/(770) 421-3486		
City / State / Zip Code	**Site Contact**	**Lab Contact**	
Niagara Falls / NY / 14302			
Project Name	**Carrier/Waybill Number**		
Olin Gill Creek	N351 139 558 0		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Aqueous	Sed.	Soil		Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH		Analysis (Attach list if more space is needed): TCL														Special Instructions/ Conditions of Receipt
Mawhinnie Borrow Pit	24 July 98	13:30			X		3							X													

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☒ Return To Client ☐ Disposal by Lab ☐ Archive For _____ Months (A fee may be assessed if samples are retained longer than 3 months)

Turn Around Time Required
☐ 24 Hours ☐ 48 Hours ☒ 7 Days ☐ 14 Days ☐ 21 Days ☐ Other _____

QC Requirements (Specify)

	Relinquished By	Date	Time	Received By	Date	Time
1.		24 July 98	14:30	Patrick R. Faust	7/25/98	10:45
2.						
3.						

Comments: TARGET Compound List DQO's

DISTRIBUTION: White - Stays with the Sample; CANARY - Returned to Client with Report; PINK - Field Copy

APPENDIX F-3

CLAY BARRIER TRENCH BACKFILL AND BUFFER LAYER MATERIAL

Geotechnical Test Data

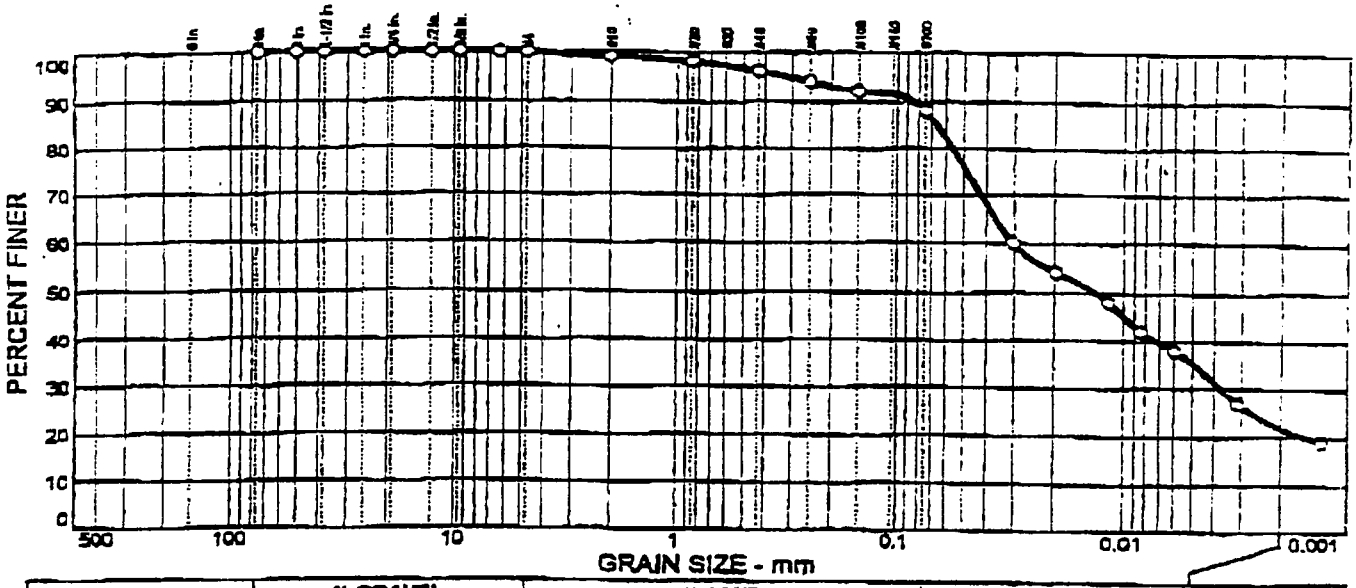
GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-01 **Source of Sample:** **Date:** 6/4/99
Location: Brown CLAY - Albright Road **Elev./Depth:** 1.5 - 4'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	0	1	3	8	66	22

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	100		
#4	100		
#10	99		
#20	98		
#40	96		
#60	94		
#100	92		
#200	88		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 18 LL= 36 PI= 18

Coefficients

D_{85}= 0.0660 D_{60}= 0.0303 D_{50}= 0.0132
D_{30}= 0.0037 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

As Recieved Moisture = 15.8 %

Reported By: Laura K Baxter

Reviewed By: ARH / Mark W. Glynn, P.E.

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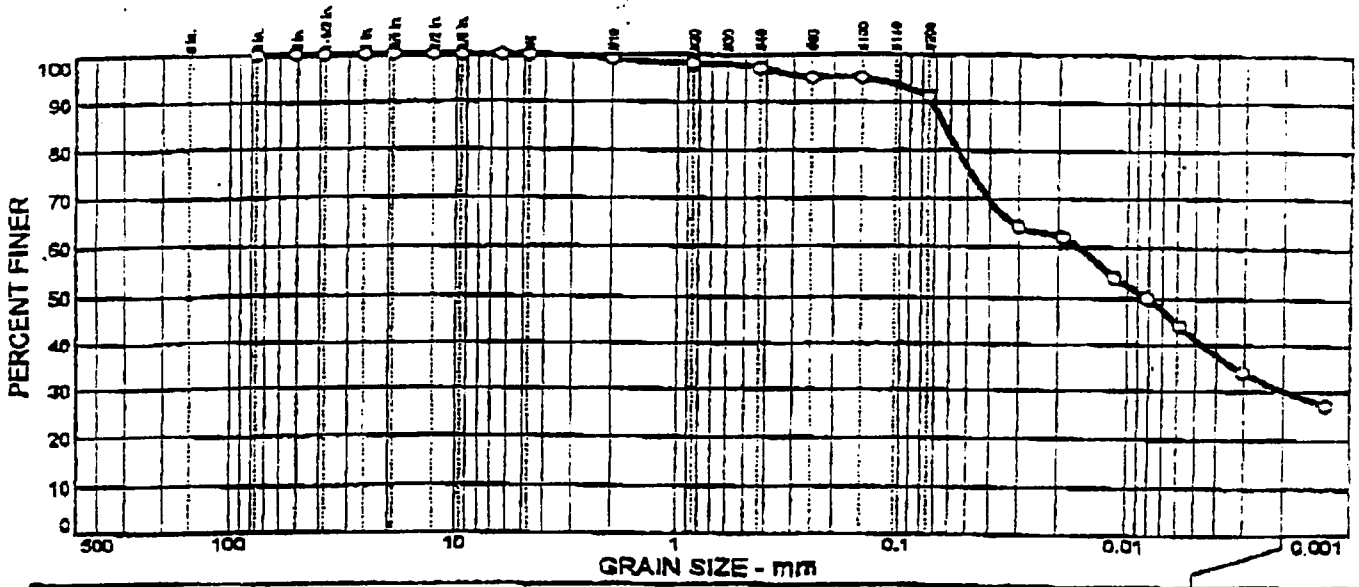
GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

Project: Materials Testing **Project No.:** 99-106

Client: Sevenson Environmental Services

Sample No: 99-02 **Source of Sample:** **Date:** 6/4/99
Location: Brown CLAY - Albright Road **Elev./Depth:** 1.5 - 4'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	0	1	2	6	61	30

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	100		
#4	100		
#10	99		
#20	98		
#40	97		
#60	95		
#100	95		
#200	91		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 20 LL= 42 PI= 22

Coefficients

D_{85}= 0.0638 D_{60}= 0.0162 D_{50}= 0.0081
D_{30}= 0.0020 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

As Recieved Moisture = 16.9 %

Reported By: Laura K Barton

Reviewed By: ARH / Mark W. Glynn, P.E.

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GGE GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

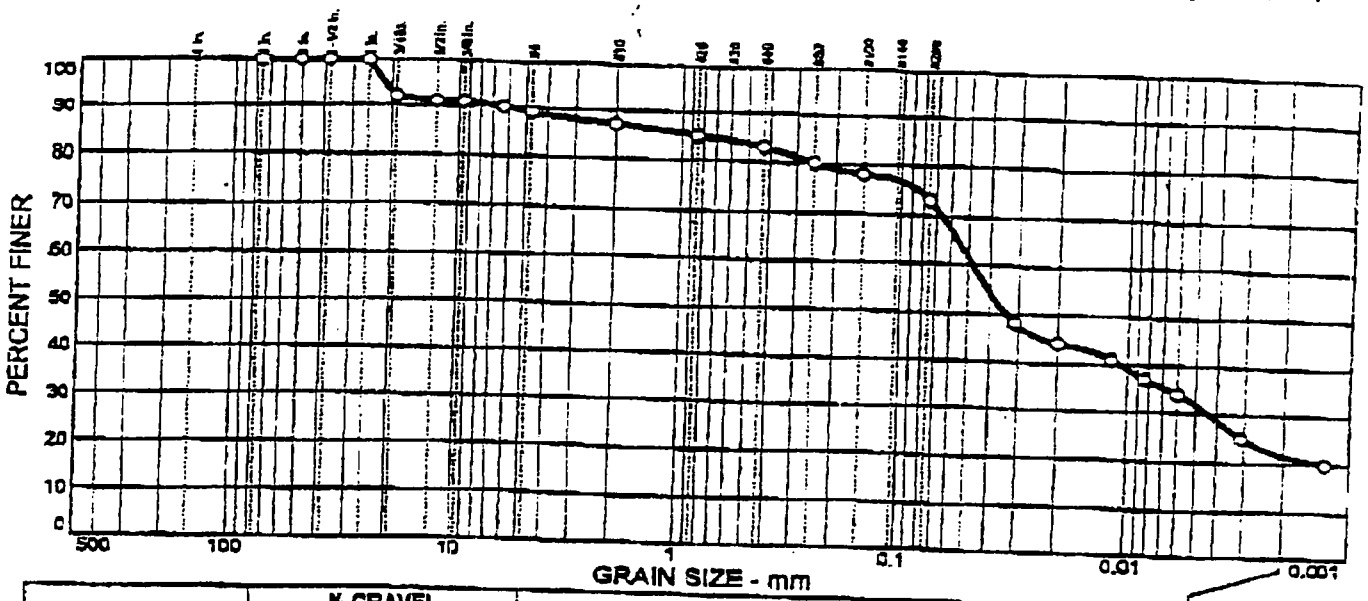
Project: Materials Testing

Project No.: 99-1061

Client: Sevenson Environmental Services

Sample No: 99-03 **Source of Sample:**
Location: Brown CLAY - Albright Road

Date: 6/4/99
Elev./Depth: 1.5 - 4'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	8	3	2	4	10	52	21

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2	100		
1.5	100		
1	100		
3/4	92		
1/2	91		
3/8	91		
1/4	90		
#4	89		
#10	87		
#20	85		
#40	83		
#60	80		
#100	78		
#200	73		

* (no specification provided)

Soil Description
Lean clay with sand

Atterberg Limits
PL= 17 LL= 34 PI= 17

Coefficients
D_{85}= 0.850 D_{60}= 0.0478 D_{50}= 0.0341
D_{30}= 0.0044 D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= CL AASHTO=

Remarks
As Received Moisture = 14.5 %
One 1 1/2" piece of Gravel removed from sample.

Reported By: Laura K Barton

Reviewed By: ARH

ARH / Mark W. Glynn, P.E.
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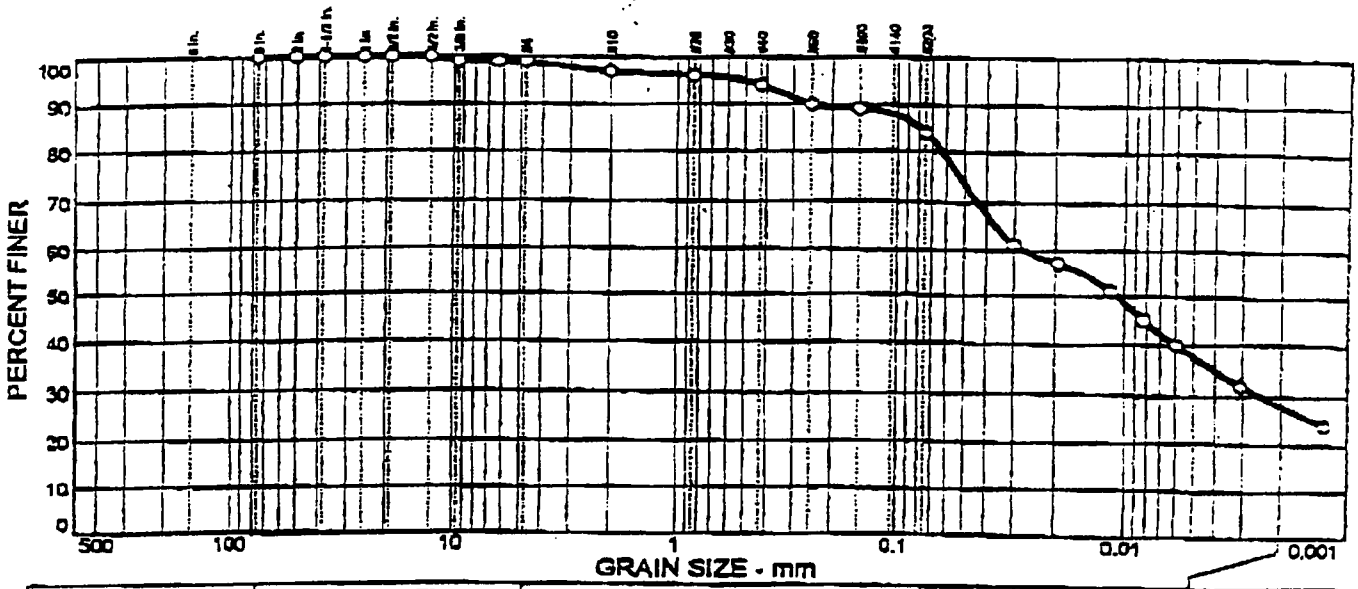
GGE GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-04 **Source of Sample:** **Date:** 6/4/99
Location: Brown CLAY - Albright Road **Elev./Depth:** 1.5 - 4'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	1	2	3	10	56	28

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	99		
1/4 in.	99		
#4	99		
#10	97		
#20	96		
#40	94		
#60	90		
#100	89		
#200	84		

Soil Description
Lean clay with sand

Atterberg Limits
PL= 17 LL= 31 PI= 14

Coefficients
D_{85}= 0.0794 D_{60}= 0.0281 D_{50}= 0.0108
D_{30}= 0.0025 D_{15}= D_{10}=
C_u= C_c=

Classification
USCS= CL AASHTO=

Remarks
As Received Moisture = 14.4 %

* (no specification provided)

Reported By: Laura K Barton

Reviewed By: ARH

ARH / Mark W. Glynn, P.E.

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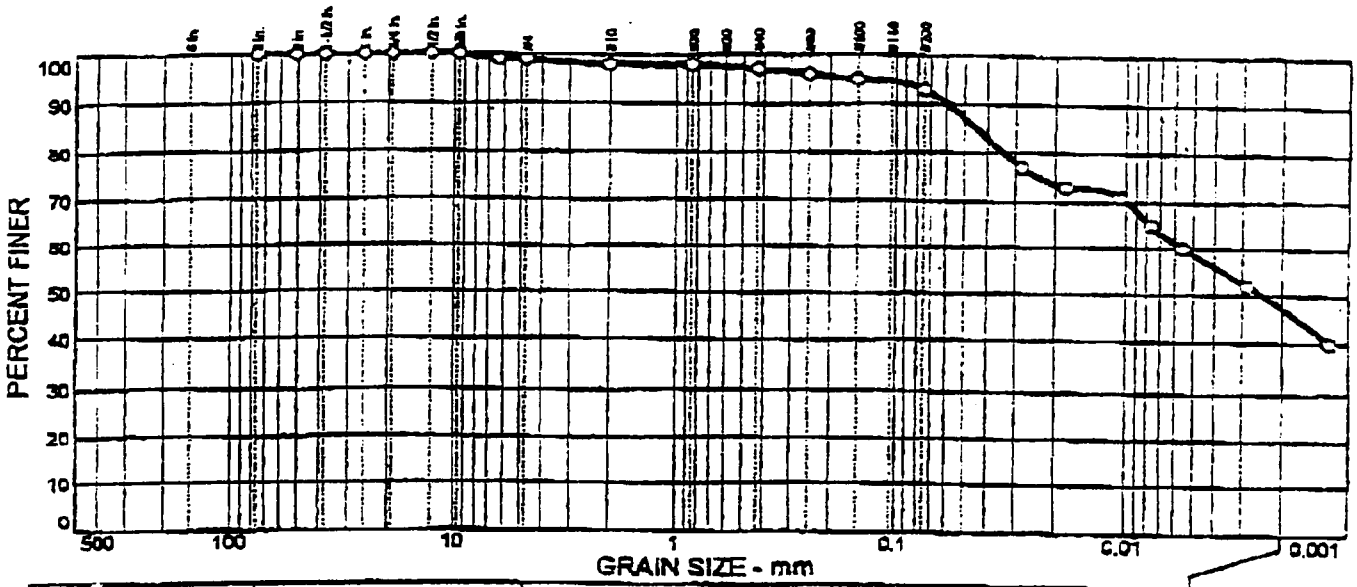
GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-05 **Source of Sample:** **Date:** 6/4/99
Location: Light brown CLAY - Albright Road **Elev./Depth:** 7 - 10'



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	1	1	1	4	46	47

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	99		
#4	99		
#10	98		
#20	98		
#40	97		
#60	96		
#100	95		
#200	93		

* (no specification provided)

Soil Description

Lean clay

Atterberg Limits

PL= 20 LL= 40 PI= 20

Coefficients

D_{85}= 0.0444 D_{60}= 0.0055 D_{50}= 0.0024
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= CL AASHTO=

Remarks

As Received Moisture = 15.3 %.

Reported By: Laura K Barton

Reviewed By: ARH / Mark W. Glynn, P.E.

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GGC GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

COMPACTION TEST DATA

ASTM D - 698 - 78 / ASTM D - 1557 - 78

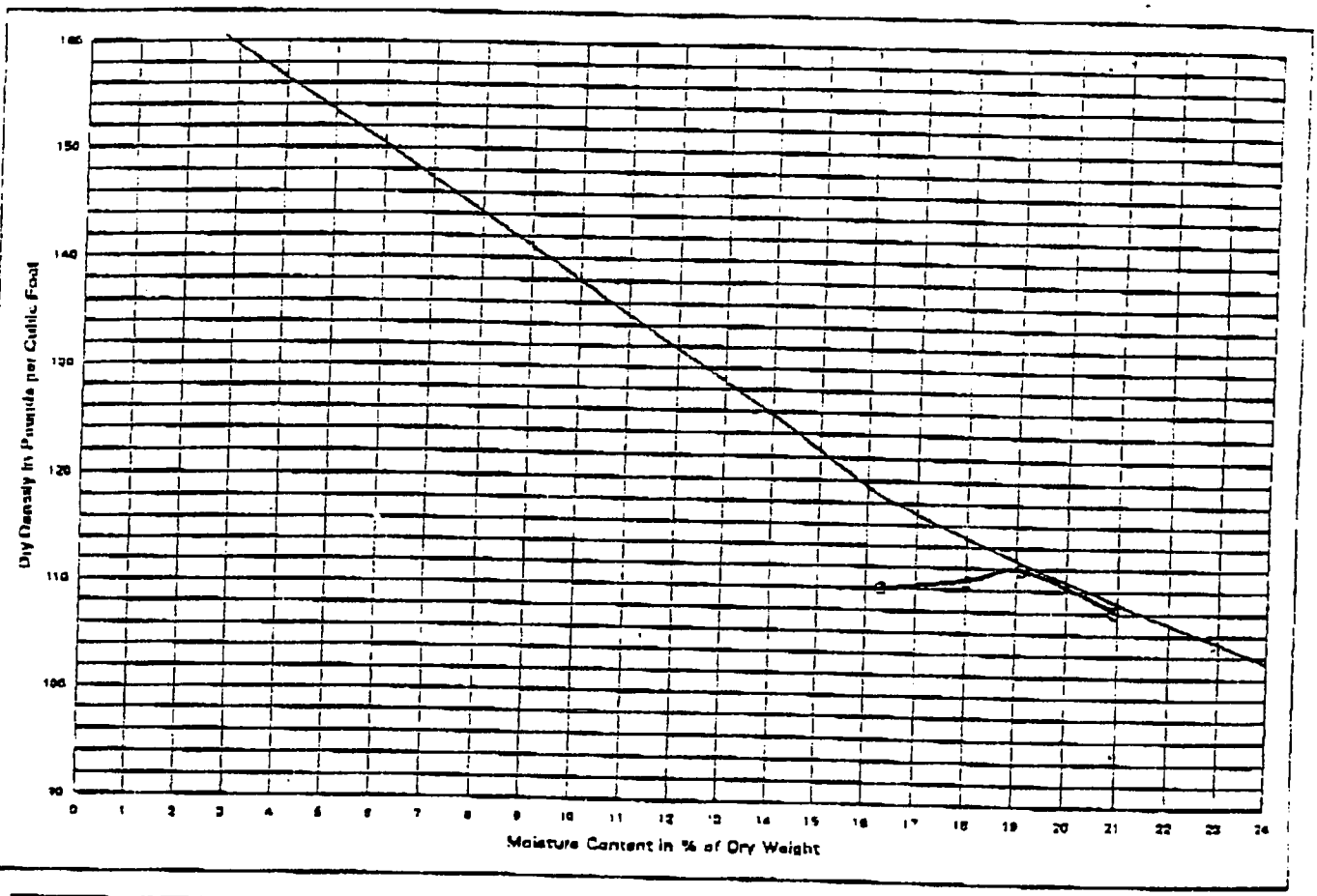
PROJECT:	MATERIALS TESTING	DATE REPORTED:	JUNE 2, 1999
LOCATION:	LEWISTON, NEW YORK	PROJECT NO.:	99 - 1061
CLIENT:	SEVENSON ENVIRONMENTAL SERVICES	SAMPLE NO.:	99 - 01,02,03,04 COMPOSITE
DATE RECEIVED:	MAY 28, 1999	DEPTH:	1.5 - 4'

SAMPLE DESCRIPTION: BROWN CLAY - ALBRIGHT ROAD PIT - COMPOSITE OF 01,02,03&04

SAMPLE CLASSIFICATION: Silt with sand - ML (Visual)

STANDARD A.S.T.M. D - 698 - 78 X MODIFIED A.S.T.M. D - 1557 - 78 ____ CORRECTION METHOD ____

HAMMER USED: AUTOMATIC X MANUAL ____ PREPARATION METHOD: DRY ____ MOIST X



MAXIMUM DRY DENSITY 112.0 p.c.f. OPTIMUM MOISTURE 18.9 %

ZERO AIR VOIDS CURVE AT 2.75 SPECIFIC GRAVITY

REPORTED BY: Laura K. Barton
LAURA BARTON

REVIEWED BY: A.G.H. / MARK W. GLYNN, P.E.

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DOCFILE W1061.XL

REV 5/97

GLYNN GEOTECHNICAL ENGINEERING

GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

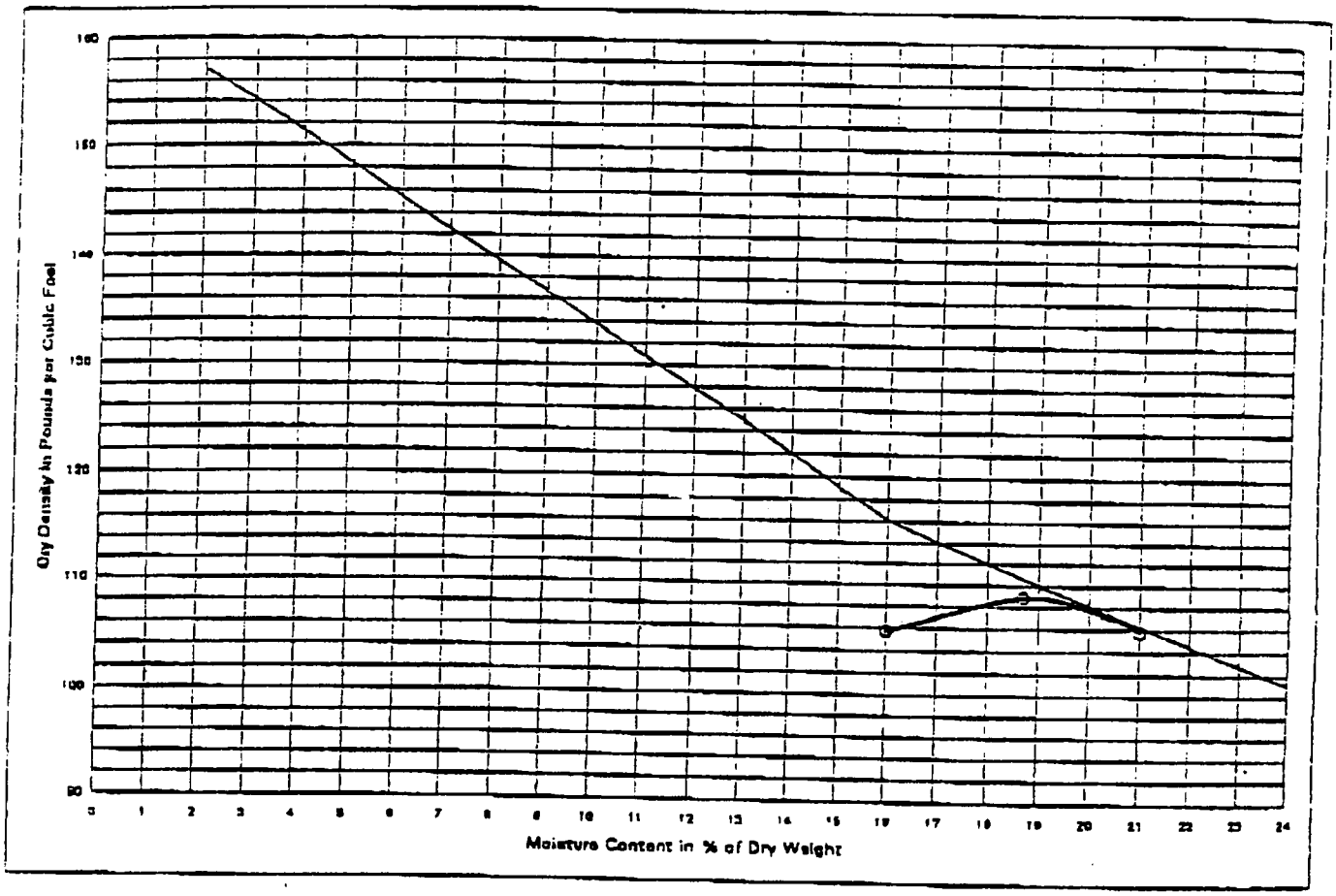
COMPACTION TEST DATA

ASTM D - 698 - 78 / ASTM D - 1557 - 78

PROJECT:	MATERIALS TESTING	DATE REPORTED:	JUNE 2, 1999
LOCATION:	LEWISTON, NEW YORK	PROJECT NO.:	99 - 1061
CLIENT:	SEVENSON ENVIRONMENTAL SERVICES	SAMPLE NO.:	99 - 05
DATE RECEIVED:	MAY 28, 1999	DEPTH:	7 - 10'
SAMPLE DESCRIPTION:	LIGHT BROWN CLAY - ALBRIGHT ROAD PIT		
SAMPLE CLASSIFICATION:	Silty Clay - CL - ML (Visual)		

STANDARD A.S.T.M. D - 698 - 78 X MODIFIED A.S.T.M. D - 1557 - 78 ____ CORRECTION METHOD 3

HAMMER USED: AUTOMATIC X MANUAL ____ PREPARATION METHOD: DRY ____ MOIST X



MAXIMUM DRY DENSITY	109.1 p.c.f.	OPTIMUM MOISTURE	18.9 %
ZERO AIR VOIDS CURVE AT	2.65	SPECIFIC GRAVITY	

REPORTED BY: Laura K. Barton
LAURA BARTON

REVIEWED BY: ARH / Mark W. Glynn
ARH / MARK W. GLYNN, P.E.

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DOCFILE ##1061-05\XL

REV 1/97

GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

TRIAXIAL PERMEABILITY
ASTM D - 5084

PROJECT: MATERIALS TESTING
LOCATION: LEWISTON, NEW YORK
CLIENT: SEVENSON ENVIRONMENTAL
DATE RECEIVED: MAY 28, 1999

DATE REPORTED: JUNE 8, 1999
PROJECT NO.: 99 - 1061
SAMPLE NO.: 99 - 05
DEPTH: 7 - 10'

SAMPLE DESCRIPTION: LIGHT BROWN CLAY - ALBRIGHT ROAD PIT 90 % STANDARD PROCTOR AT 1% OVER OPTIMUM
SAMPLE CLASSIFICATION: SILTY CLAY - CL-ML (VISUAL)

INITIAL DATA		
Initial Height	5.2	cm
Initial Diameter	7.1	cm
Moisture Content	19.9	%
Wet Density	117.4	pcf
% Proctor	90.0	%

FINAL DATA		
Final Height	5.3	cm
Final Diameter	7.0	cm
Moisture Content	24.5	%
Wet Density	123.6	pcf
Minimum Saturation	97	%

TEST DATA		
Confining Pressure	67	psi
Head Water Pressure	62	psi
Tail Water Pressure	60	psi
Average Gradient, i	30	

NOTES

MATERIAL WAS COMPACTED VIA MANUAL METHODS.
DEAIRED WATER WAS UTILIZED AS THE PERMEANT LIQUID.
SATURATION CALCULATED USING THE "B" PARAMETER.
SAMPLE CONSOLIDATED TO 91% PROCTOR DURING TESTING.

RESULTS

AVERAGE PERMEABILITY, K = 3.1×10^{-8} *(cm/sec) at 20° c*

REPORTED BY: ALAN R. HOPKINS

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

DOCFILE:TRIAXRPT

REV-6/92

APPENDIX F-4

PROTECTIVE/DRAINAGE LAYER – SAND

Geotechnical Test Data

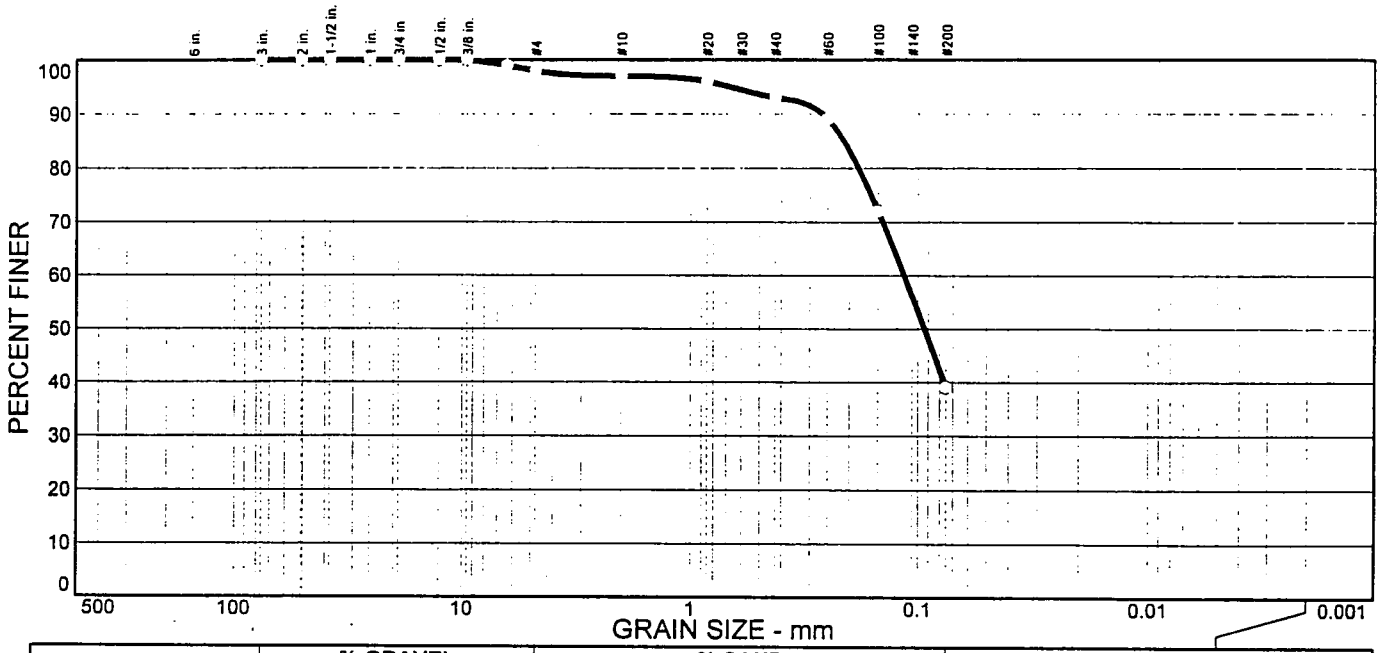
GLYNN GEOTECHNICAL ENGINEERING

GRAIN SIZE ANALYSIS
ASTM D-422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-17 **Source of Sample:** **Date:** 9/01/99
Location: Baseball Sand - Pine Hill **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	2	1	4	54	39	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	99		
#4	98		
#10	97		
#20	96		
#40	93		
#60	89		
#100	72		
#200	39		

Soil Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.213 D_{60}= 0.115 D_{50}= 0.0936
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Reported by: Reviewed by:

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

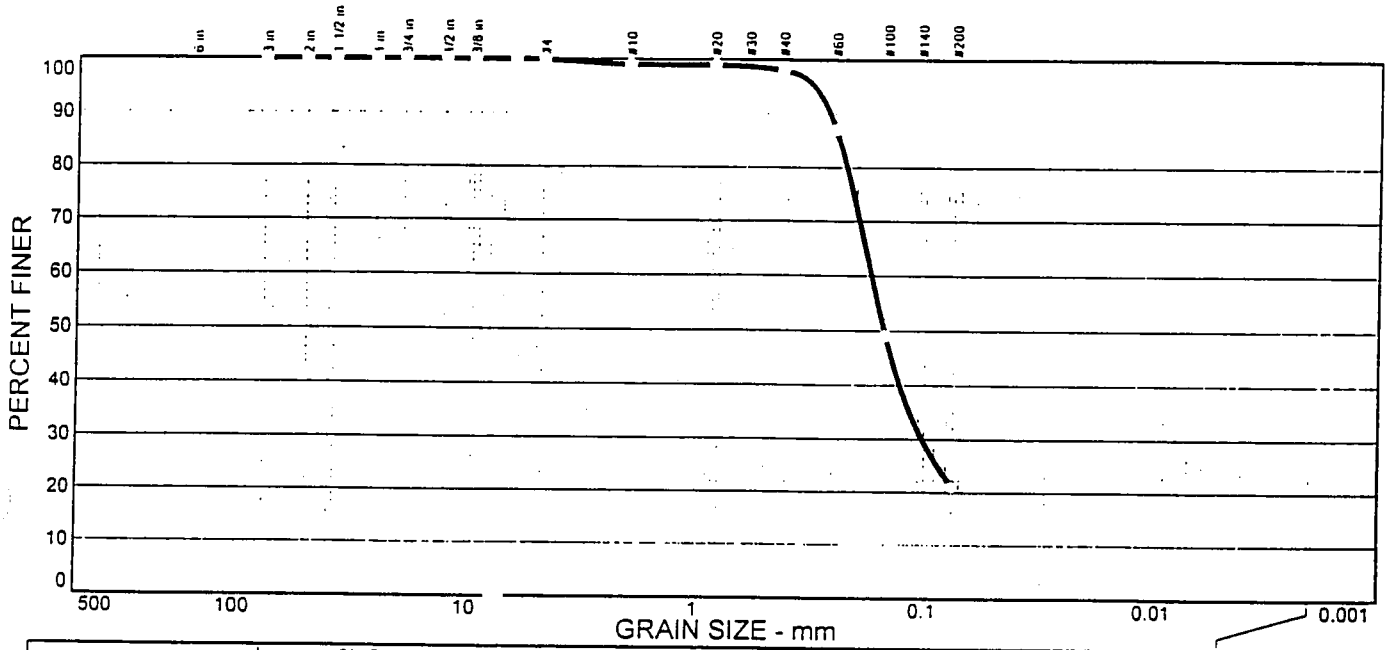
GLYNN GEOTECHNICAL ENGINEERING

GRAIN SIZE ANALYSIS
ASTM D-422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-25 **Source of Sample:** **Date:** 10/12/99
Location: North IWS Cover Area-Barrier Sand - 1st 5000 cuyds **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	0	1	1	77	21	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	100		
#4	100		
#10	99		
#20	99		
#40	98		
#60	87		
#100	49		
#200	21		

Soil Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.241 D_{60}= 0.173 D_{50}= 0.152
D_{30}= 0.102 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Reported by: Reviewed by: AR #

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voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

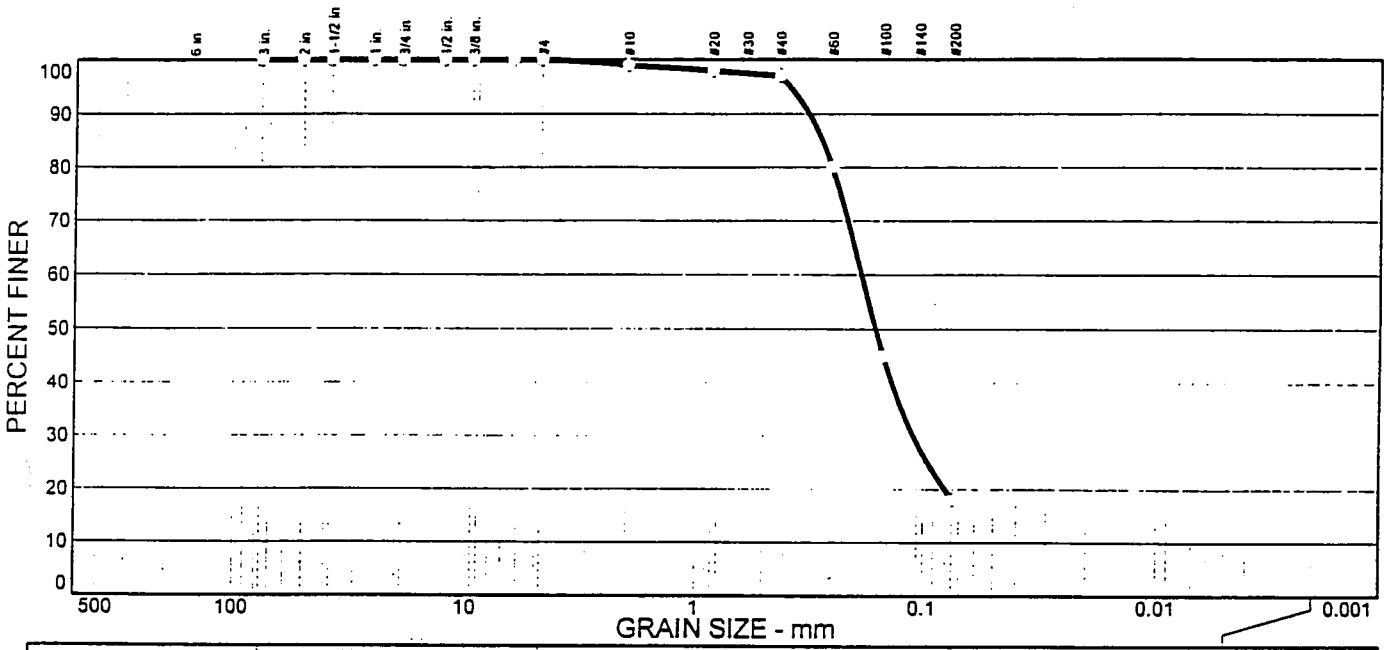
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-26 **Source of Sample:** **Date:** 10/13/99

Location: North IWS Cover Area-Barrier Sand - 2nd 5000 Cuyds **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	0	1	2	79	18	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	100		
#4	100		
#10	99		
#20	98		
#40	97		
#60	80		
#100	45		
#200	18		

Soil Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.277 D_{60}= 0.186 D_{50}= 0.162

D_{30}= 0.111 D_{15}= D_{10}=

C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Reported by: Reviewed by: ARH

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GLYNN GEOTECHNICAL ENGINEERING

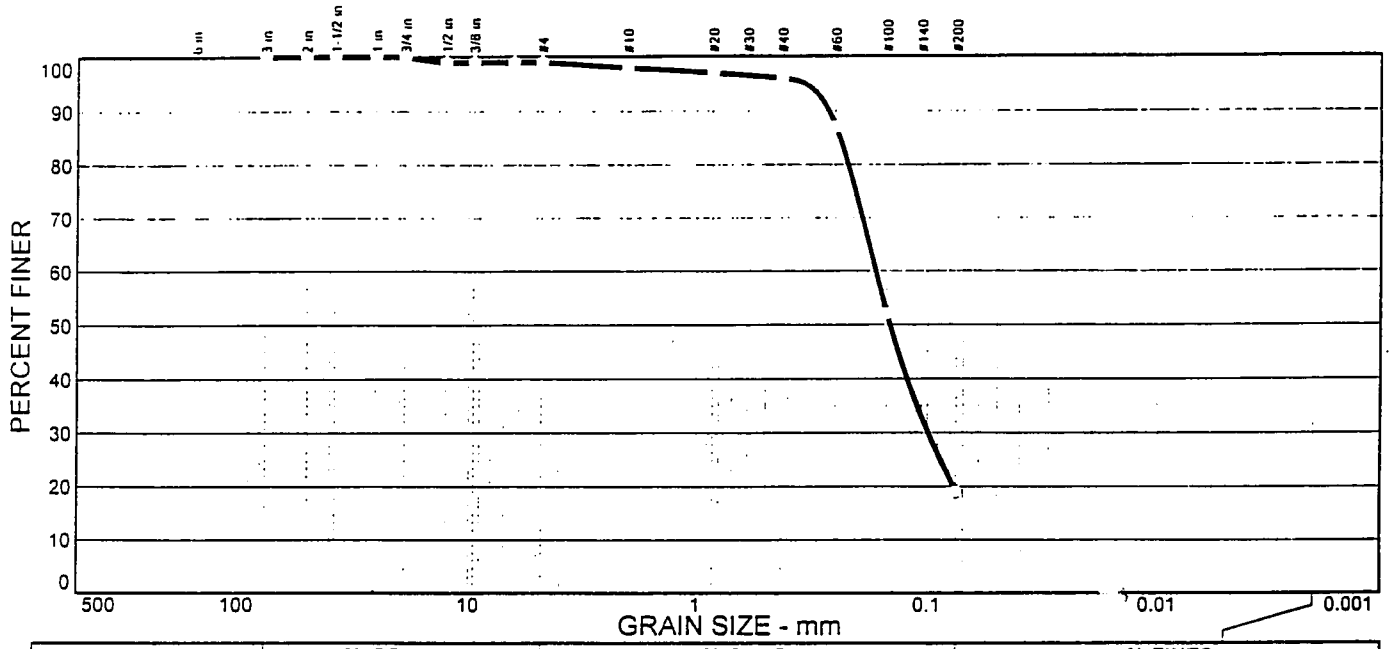
GRAIN SIZE ANALYSIS
ASTM D-422

Project: Materials Testing **Project No.:** 99-1061

Client: Sevenson Environmental Services

Sample No: 99-27 **Source of Sample:** **Date:** 10/13/99

Location: North IWS Cover Area-Barrier Sand - 3rd 5000 Cuyds **Elev./Depth:**



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	1	1	2	77	19	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100		
1.5 in.	100		
1 in.	100		
3/4 in.	100		
1/2 in.	99		
3/8 in.	99		
1/4 in.	99		
#4	99		
#10	98		
#20	97		
#40	96		
#60	87		
#100	52		
#200	19		

Soil Description

Silty sand

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= 0.240 D_{60}= 0.168 D_{50}= 0.146
D_{30}= 0.0994 D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= SM AASHTO=

Remarks

* (no specification provided)

Reported by: Reviewed by: ARH

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

COMPACTION TEST DATA

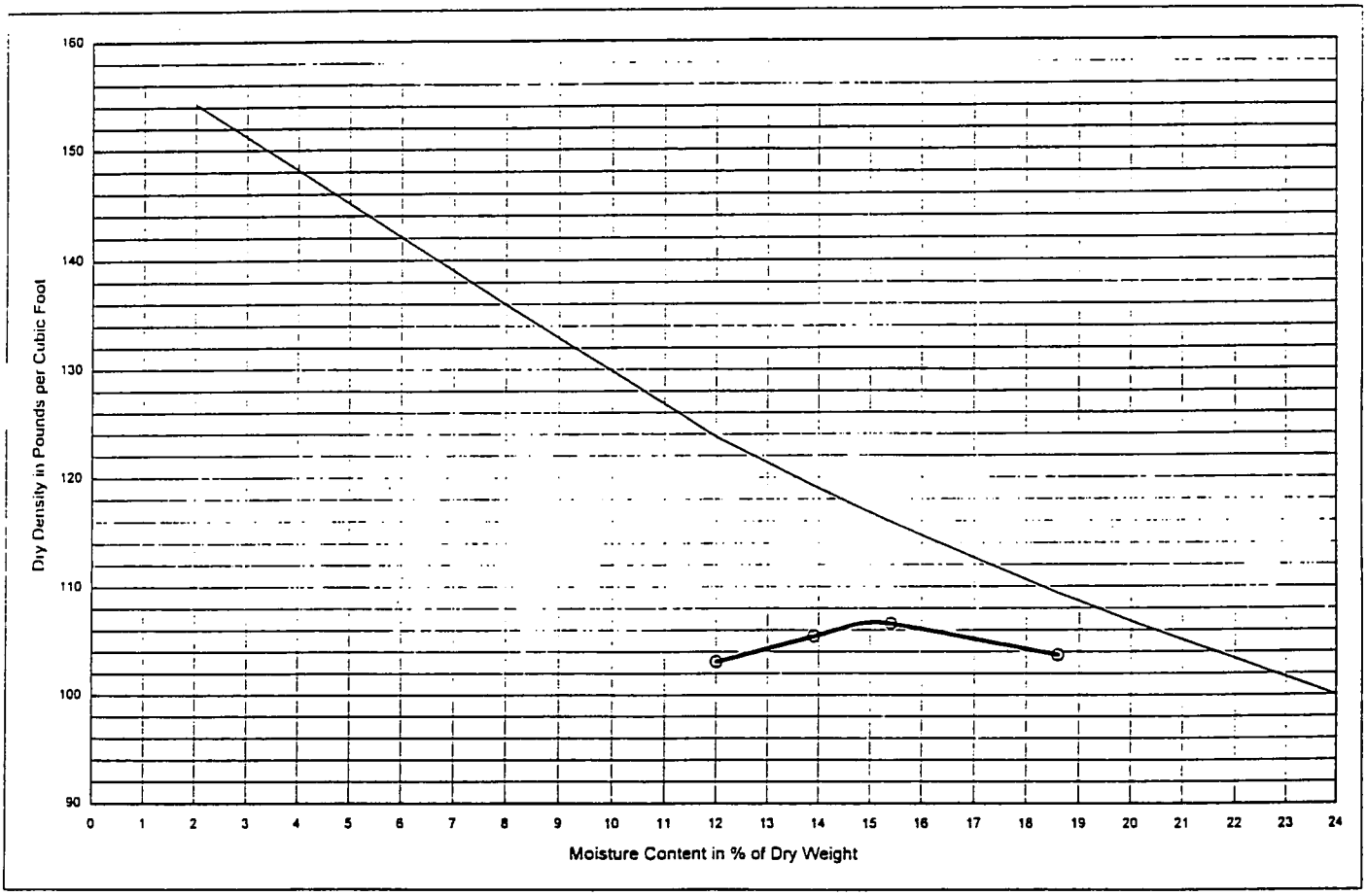
ASTM D - 698 - 78 : ASTM D - 1557 - 78

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 12, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1061
CLIENT:	SEVENSON ENVIRONMENTAL SERVICES	SAMPLE NO.:	99 - 25
DATE RECEIVED:	OCTOBER 11, 1999	DEPTH:	ON SITE

SAMPLE DESCRIPTION: NORTH IWS COVER AREA - BARRIER SAND - 1st 5000 Cubic Yards

SAMPLE CLASSIFICATION: silty SAND - SM

STANDARD A.S.T.M. D - 698 - 78	X	MODIFIED A.S.T.M. D - 1557 - 78		CORRECTION METHOD			A
HAMMER USED: AUTOMATIC	X	MANUAL		PREPARATION METHOD	DRY		MOIST X



MAXIMUM DRY DENSITY	106.8	p.c.f.	OPTIMUM MOISTURE	15.2	%
ZERO AIR VOIDS CURVE AT	2.60		SPECIFIC GRAVITY		

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H / MARK W. GLYNN, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

COMPACTION TEST DATA

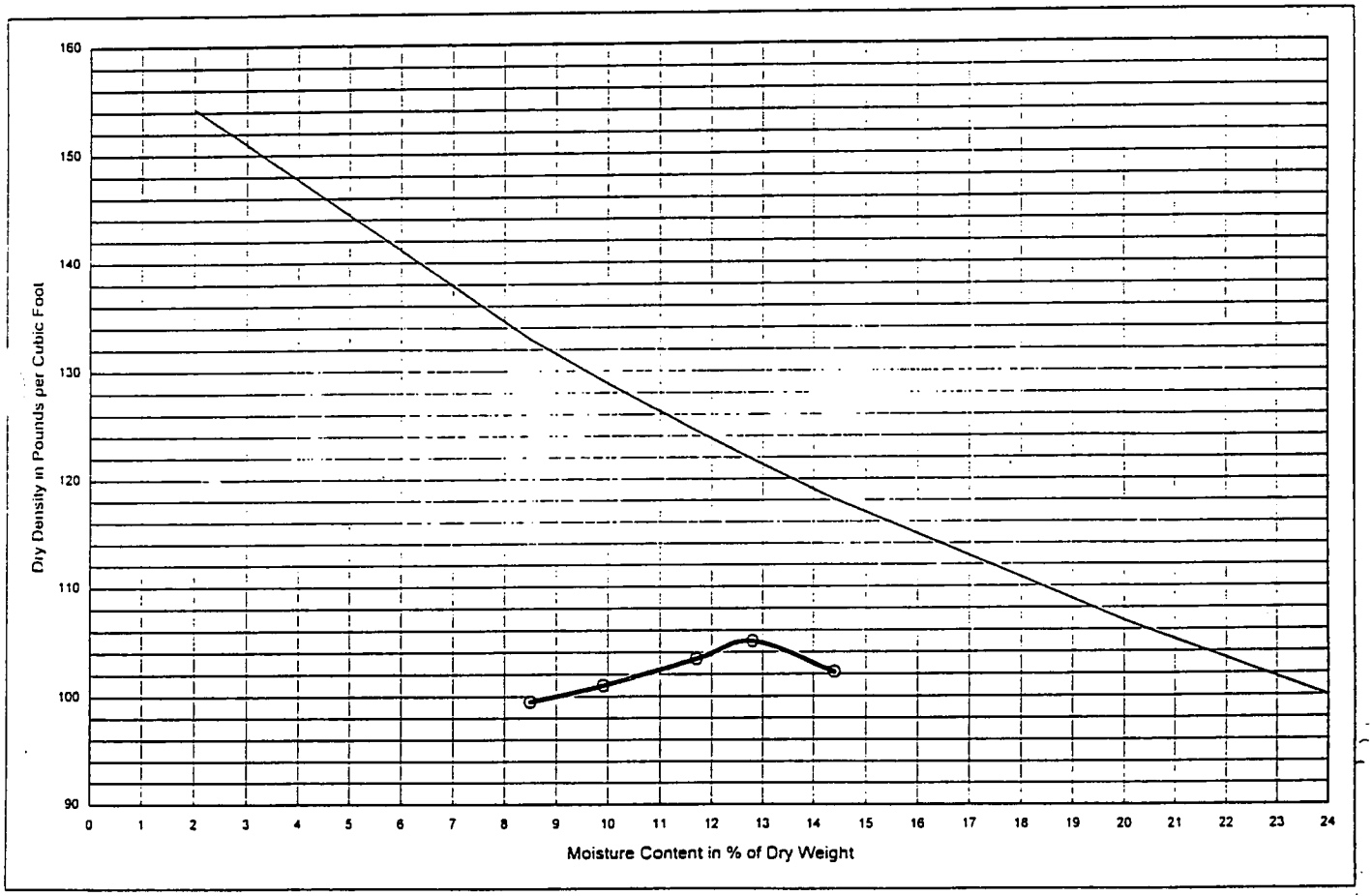
ASTM D - 698 - 78 : ASTM D - 1557 - 78

PROJECT: INDUSTRIAL WELDING SITE
LOCATION: NIAGARA FALLS, NEW YORK
CLIENT: SEVENSON ENVIRONMENTAL SERVICES
DATE RECEIVED: OCTOBER 12, 1999

DATE REPORTED: OCTOBER 13, 1999
PROJECT NO.: 99 - 1061
SAMPLE NO.: 99 - 26
DEPTH: ON SITE

SAMPLE DESCRIPTION: NORTH IWS COVER AREA - BARRIER SAND - 2nd 5000 CUBIC YARDS
SAMPLE CLASSIFICATION: silty SAND - SM

STANDARD A.S.T.M. D - 698 - 78 [X] MODIFIED A.S.T.M. D - 1557 - 78 [ ] CORRECTION METHOD [A]
HAMMER USED: AUTOMATIC [X] MANUAL [ ] PREPARATION METHOD: DRY [ ] MOIST [X]



MAXIMUM DRY DENSITY	105.2 p.c.f.	OPTIMUM MOISTURE	12.7 %
ZERO AIR VOIDS CURVE AT	2.60	SPECIFIC GRAVITY	

REPORTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

GLYNN GEOTECHNICAL ENGINEERING

COMPACTION TEST DATA

ASTM D - 698 - 78 / ASTM D - 1557 - 78

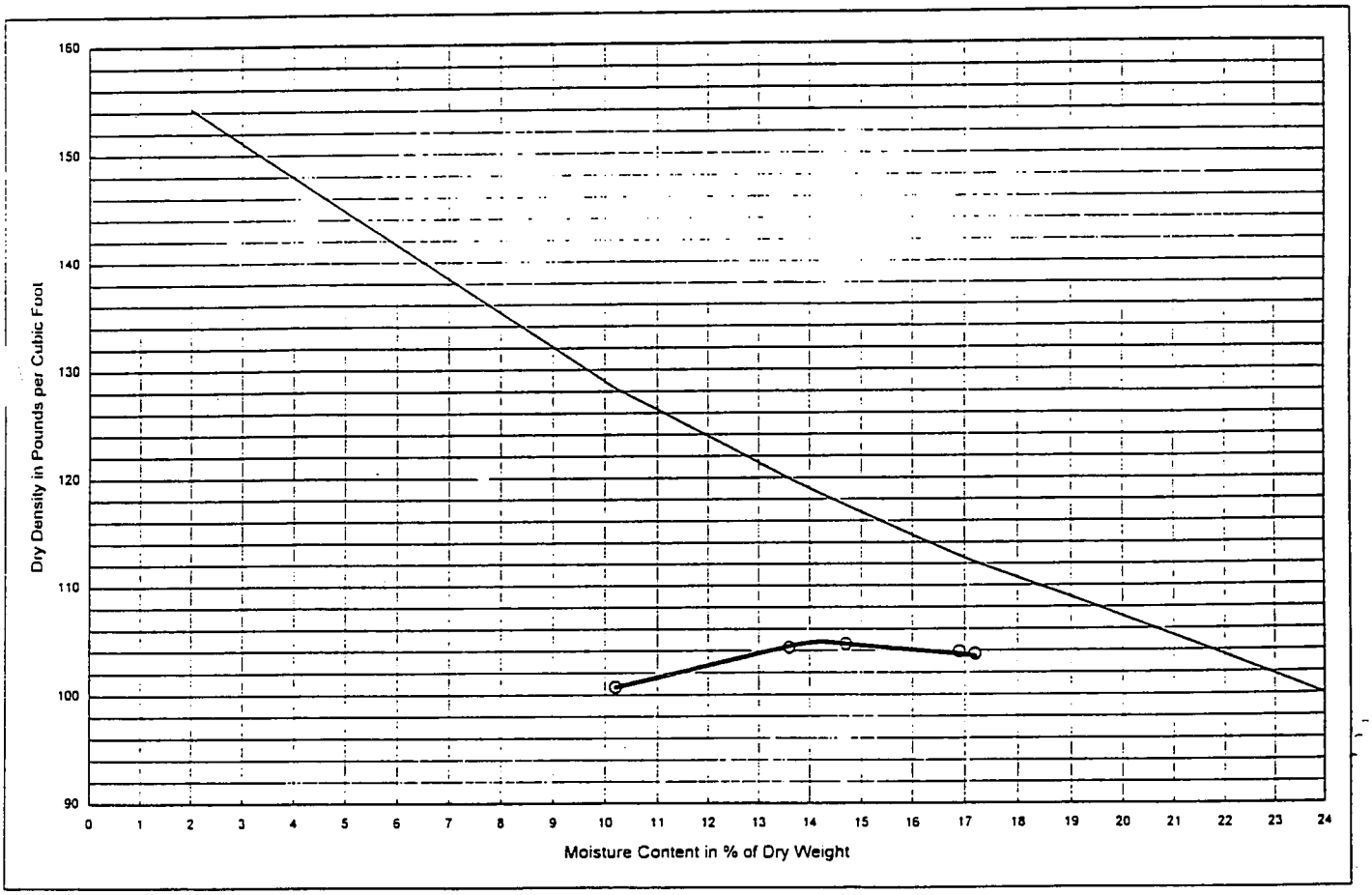
PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 13, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1061
CLIENT:	SEVENSON ENVIRONMENTAL SERVICES	SAMPLE NO.:	99 - 27
DATE RECEIVED:	OCTOBER 12, 1999	DEPTH:	ON SITE

SAMPLE DESCRIPTION: NORTH IWS COVER AREA - BARRIER SAND - 3rd 5000 CUBIC YARDS

SAMPLE CLASSIFICATION: silty SAND - SM

STANDARD A.S.T.M. D - 698 - 78 [X] MODIFIED A.S.T.M. D - 1557 - 78 [ ] CORRECTION METHOD [A]

HAMMER USED: AUTOMATIC [X] MANUAL [ ] PREPARATION METHOD: DRY [ ] MOIST [X]



MAXIMUM DRY DENSITY	104.8 p.c.f.	OPTIMUM MOISTURE	14.2 %
ZERO AIR VOIDS CURVE AT	2.60	SPECIFIC GRAVITY	

REPORTED BY: Edward Lover
EDWARD LOVER

REVIEWED BY: A.R.H. / Mark W. Glynn
A.R.H. / MARK W. GLYNN, P.E.

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

APPENDIX F-5

PROTECTIVE/DRAINAGE LAYER – SAND

Analytical Report – Chemical Analyses

Quanterra
450 William Pitt Way
Pittsburgh, Pennsylvania 15238-1330

412 820-8380 Telephone
412 820-2080 Fax

ANALYTICAL REPORT

Olin Industrial Welding Site

Lot #: C9I240134

Katy Allen

Law Environmental Inc

QUANTERRA INCORPORATED

Veronica Bortot

Veronica Bortot
Project Manager

October 8, 1999

Quanterra

CASE NARRATIVE

CLIENT: LAW ENVIRONMENTAL INC.

SITE: INDUSTRIAL WELDING SITE

QUANTERRA LOT NO. C9I240134

SHIPMENT:
Samples were received at Quanterra Pittsburgh, PA on September 24, 1999 in good condition. The cooler temperature was 10 degrees Celsius.

NOTE:
Except where noted, no problems were observed during the analyses.

GC/MS SEMIVOLATILES:
Spike compounds N-nitrosodi-n-propylamine and 1,4-Dichlorobenzene were recovered above the QC limits in the lab control sample. The compounds were not detected in the sample; therefore data is reported. A slight positive bias is believed to have no impact on the data quality.

PESTICIDES:
The RSD of Methoxychlor exceeded the +/-15% D criteria for the continuing calibration standards analyzed on 9/27/99 at 20:15 and 20:49. The average of all compounds in the continuing calibration mixes was 3.4. Since there was no detection of any of the compounds that exceeded the +/-15%D criteria, analysis continued and the results for the samples were reported.

METHODS SUMMARY

C9I240134

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B
Mercury in Solid Waste (Manual Cold-Vapor)	SW846 7471A	SW846 7471A
Organochlorine Pesticides	SW846 8081A	SW846 3550
PCBs by SW-846 8082	SW846 8082	SW846 3550
Semivolatile Organic Compounds by GC/MS	SW846 8270C	SW846 3550B
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B
Volatile Organics by GC/MS	SW846 8260B	SW846 5030

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

Quanterra

SAMPLE SUMMARY

C9I240134

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
D2V0L	001	SP#1	09/23/99	13:00
D2V0T	002	SP#2	09/23/99	13:00

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Chain of Custody Record

Quanterra, Inc. - Pittsburgh PA Lab
450 William Pitt Way
Pittsburgh PA 15238

Quanterra

OUA-4124

Client: LAW ENGINEERING	Project Manager: CHRISTA CRUIKSHANK	Date: 9/23/99	Chain Of Custody Number: 63960
Address: 117 TOWNPARK DR	Telephone Number (Area Code)/Fax Number: (716) 285-0765/285-0582	Lab Number:	Page ____ of ____
City: KENNESAW / State: GA / Zip Code: 30144	Site Contact: CHRISTA		
Project Name: IWS- OLIN	Carrier/Waybill Number:		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: VOA	SVOA	TEST(BNC)	PP METALS
SP #1	9/23/99	1300	SOIL						2	1		1
SP #2	9/23/99	1300	SOIL						2	1		1

Special Instructions: LOW LEVEL ONLY ON VOA'S

Possible Hazard Identification: [X] Non-Hazard [ ] Flammable [ ] Skin Irritant [ ] Poison B [ ] Unknown

Sample Disposal: [ ] Return To Client [ ] Disposal By Lab [ ] Archive For ____ Months

Turn Around Time Required: [ ] Normal [X] Rush 48 hr TAT

QC Level: [ ] I. [ ] II. [ ] III.

Project Specific (Specify): PER CONTRACT

1. Relinquished By	Date: 9/23/99	Time: 1338	1. Received By	Date: 9/24/99	Time: 0930
2. Relinquished By	Date:	Time:	2. Received By	Date:	Time:
3. Relinquished By	Date:	Time:	3. Received By	Date:	Time:

Comments: Please FAX OR CALL WITH RESULTS ASAP

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

Client: Lang Engr. Project: _____ Quote: _____

Cooler Rec'd & Opened for Temp. Check on: 9/24/99

Coolers Opened and Unpacked on: 9/24/99 By: _____ (Signature)

Quanterra Lot Number: 09t240134

	Yes	No
1. Were custody seals on the outside of the cooler?	✓	
If YES, how many and where? Quantity __ Location front back		
Were signatures and date correct?	✓	
2. Were custody papers included inside the cooler?	✓	
3. Were custody papers properly filled out (ink, signed, match labels)?	✓	
4. Did you sign the custody papers in the appropriate place?	✓	
5. Was shippers packing slip attached to this form?	✓	
6. Were packing materials used?	✓	
If YES, what type? Bubble Pack		
7. Were the samples chilled? (Record temperatures on reverse side.) Ice	✓	
8. Were the samples appropriately preserved?	na	
9. Were all bottles sealed in separate plastic bags?		✓
10. Did all bottles arrive in good condition (unbroken)?	✓	
11. Were all bottle labels complete (sample ID, preservatives, etc.)?	✓	
12. Did all bottle labels and/or tags agree with custody papers?	✓	
13. Were correct bottles used for tests indicated?	✓	
14. Were all VOA vials checked for the presence of air bubbles?	✓	
15. Was a sufficient amount of sample sent in each bottle?	✓	

16. Samples received by: FEDEX UPS CLIENT DROP-OFF OTHER AIRBORNE

Explain any discrepancies: _____

Level 2 Review _____

Was contacted on _____ by _____ to resolve discrepancies.

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

P: Preserved

UP: Unpreserved

Sample ID	TMET pH<2	DMET pH<2	HG pH<2	NUT(1) pH<2	CN pH ≥12	OG TPHC pH<2	PHEN pH<2	SULF pH ≥12	TOC pH<2	TOX pH<2	VOA PUP	Indoor pH<2			

(1) "NUT" could include sample bottles for ammonia, chemical oxygen demand, nitrate/nitrite, TKN, or total phosphorus

Comments: _____

Cooler Number	Temperature
	10°

Bottle Type	Lot Number*

* Please use an asterisk if bottle lot number was covered by the label.

SPH13

FedEx. USA Airbill FedEx Tracking Number 809790669820 10 Form I.D. No. 0210 **Recipient's Copy**

1 From

Date 11/21/11

Sender's Name _____ Phone (716) 284-0431

Company SEVENSON ENVIRONMENTAL SRVCS

Address 2749 LOCKPORT RD Dept/Floor/Suite/Room

City NIAGARA FALLS State NY ZIP 14305

2 Your Internal Billing Reference Information

3 To

Recipient's Name RECEIVING Phone (412) 820-2148

Company QUANTERRA, INC

Address 450 WILLIAM PITT WAY Dept/Floor/Suite/Room ☐ Check here if residence (Extra charge applies for FedEx Express Saver)

(To "HOLD" at FedEx location, print FedEx address here)

City PITTSBURGH State PA ZIP 15238

For HOLD at FedEx Location check here

☐ Hold Weekday (Not available with FedEx First Overnight)

☐ Hold Saturday (Not available at all locations) (Available for FedEx Priority Overnight and FedEx 2Day only)

For WEEKEND Delivery check here (Extra Charge. Not available at all locations)

☐ Saturday Delivery (Available for FedEx Priority Overnight and FedEx 2Day only)

☐ NEW Sunday Delivery (Available for FedEx Priority Overnight only)

8 0 9 7 9 0 6 6 9 8 2 0

4a Express Package Service Packages under 150 lbs. Delivery commitment may be later in some areas

☒ FedEx Priority Overnight (Next business morning)

☐ FedEx Standard Overnight (Next business afternoon)

☐ FedEx First Overnight (Earliest next business morning delivery to select locations) (Higher rates apply)

☐ FedEx 2Day (Second business day)

☐ FedEx Express Saver (Third business day)

FedEx Letter Rate not available. Minimum charge: One-pound rate.

4b Express Freight Service Packages over 150 lbs. Delivery commitment may be later in some areas

☐ FedEx Overnight Freight (Next business day)

☐ FedEx 2Day Freight (Second business day)

☐ FedEx Express Saver Freight (Up to 3 business days)

(Call for delivery schedule. See back for detailed descriptions of freight services.)

5 Packaging ☐ FedEx Letter ☐ FedEx Pak ☐ FedEx Box ☐ FedEx Tube ☒ Other Pkg.

Declared value limit $500

6 Special Handling (Box must be checked)

Does this shipment contain dangerous goods? ☐ No ☐ Yes Shipper's Declaration not required ☐ Yes Shipper's Declaration required

☐ Dry Ice Dry Ice, 9, UN 1845 _____ x _____ kg

☐ Cargo Aircraft Only

*Dangerous Goods cannot be shipped in FedEx packaging

7 Payment ☐ Obtain Recipient FedEx Account No.

Bill to: ☐ Sender (Account No. in Section 1 will be billed) ☐ Recipient ☐ Third Party ☐ Credit Card ☐ Cash/Check

(Enter FedEx Account No. or Credit Card No. below)

Total Packages	Total Weight	Total Declared Value*	Total Charges
1	5	$ .00	$

*When declaring a value higher than $100 per shipment, you pay an additional charge. See SERVICE DESCRIPTIONS, DECLARED VALUE, AND LIMIT OF LIABILITY section for further information.

Credit Card Auth.

8 Release Signature

Your signature authorizes Federal Express to deliver this shipment without obtaining a signature and agrees to indemnify and hold harmless Federal Express from any resulting claims.

321

Questions? Call 1-800-Go-FedEx® (800)463-3339

0078287695

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GC/MS VOLATILES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID

Lab Sample ID:C9I240134 001

Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Sample WT/Vol: 2.4 / g

Date Received: 09/24/99

Work Order: D2V0L101

Date Extracted:09/28/99

Dilution factor: 1

Date Analyzed: 09/28/99

Moisture %:8.2

QC Batch: 9272112

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
67-64-1	Acetone	49	B
71-43-2	Benzene	11	U
75-27-4	Bromodichloromethane	11	U
75-25-2	Bromoform	11	U
74-83-9	Bromomethane	23	U
78-93-3	2-Butanone	45	U
75-15-0	Carbon disulfide	11	U
56-23-5	Carbon tetrachloride	11	U
108-90-7	Chlorobenzene	11	U
124-48-1	Dibromochloromethane	11	U
75-00-3	Chloroethane	23	U
67-66-3	Chloroform	11	U
74-87-3	Chloromethane	23	U
75-34-3	1,1-Dichloroethane	11	U
107-06-2	1,2-Dichloroethane	22	
75-35-4	1,1-Dichloroethene	11	U
540-59-0	1,2-Dichloroethene (total)	11	U
78-87-5	1,2-Dichloropropane	11	U
10061-01-5	cis-1,3-Dichloropropene	11	U
10061-02-6	trans-1,3-Dichloropropene	11	U
100-41-4	Ethylbenzene	11	U
591-78-6	2-Hexanone	45	U
75-09-2	Methylene chloride	2.4	J
108-10-1	4-Methyl-2-pentanone	45	U
100-42-5	Styrene	11	U
79-34-5	1,1,2,2-Tetrachloroethane	11	U
127-18-4	Tetrachloroethene	11	U
108-88-3	Toluene	9.2	J

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 2.4 / g
Work Order: D2V0L101
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/28/99
Date Analyzed: 09/28/99

QC Batch: 9272112

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
71-55-6	1,1,1-Trichloroethane	11	U
79-00-5	1,1,2-Trichloroethane	11	U
79-01-6	Trichloroethene	11	U
75-01-4	Vinyl chloride	20	J
1330-20-7	Xylenes (total)	7.9	J

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 2.92 / g
Work Order: D2V0T101
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/28/99
Date Analyzed: 09/28/99

QC Batch: 9272112

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
67-64-1	Acetone	36	J B
71-43-2	Benzene	9.4	U
75-27-4	Bromodichloromethane	9.4	U
75-25-2	Bromoform	9.4	U
74-83-9	Bromomethane	19	U
78-93-3	2-Butanone	38	U
75-15-0	Carbon disulfide	9.4	U
56-23-5	Carbon tetrachloride	9.4	U
108-90-7	Chlorobenzene	9.4	U
124-48-1	Dibromochloromethane	9.4	U
75-00-3	Chloroethane	19	U
67-66-3	Chloroform	9.4	U
74-87-3	Chloromethane	19	U
75-34-3	1,1-Dichloroethane	9.4	U
107-06-2	1,2-Dichloroethane	16	
75-35-4	1,1-Dichloroethene	9.4	U
540-59-0	1,2-Dichloroethene (total)	9.4	U
78-87-5	1,2-Dichloropropane	9.4	U
10061-01-5	cis-1,3-Dichloropropene	9.4	U
10061-02-6	trans-1,3-Dichloropropene	9.4	U
100-41-4	Ethylbenzene	9.4	U
591-78-6	2-Hexanone	38	U
75-09-2	Methylene chloride	5.4	J
108-10-1	4-Methyl-2-pentanone	38	U
100-42-5	Styrene	9.4	U
79-34-5	1,1,2,2-Tetrachloroethane	9.4	U
127-18-4	Tetrachloroethene	9.4	U
108-88-3	Toluene	8.9	J

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 2.92 / g
Work Order: D2V0T101
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/28/99
Date Analyzed: 09/28/99

QC Batch: 9272112

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
71-55-6	1,1,1-Trichloroethane	9.4	U
79-00-5	1,1,2-Trichloroethane	9.4	U
79-01-6	Trichloroethene	9.4	U
75-01-4	Vinyl chloride	20	
1330-20-7	Xylenes (total)	11	

GC/MS SEMIVOLATILES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 30 / g
Work Order: D2V0L102
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
83-32-9	Acenaphthene	360	U
208-96-8	Acenaphthylene	360	U
120-12-7	Anthracene	360	U
56-55-3	Benzo(a)anthracene	360	U
50-32-8	Benzo(a)pyrene	360	U
205-99-2	Benzo(b)fluoranthene	360	U
207-08-9	Benzo(k)fluoranthene	360	U
191-24-2	Benzo(ghi)perylene	360	U
111-91-1	bis(2-Chloroethoxy)methane	360	U
111-44-4	bis(2-Chloroethyl) ether	360	U
117-81-7	bis(2-Ethylhexyl) phthalate	190	J
101-55-3	4-Bromophenyl phenyl ether	360	U
85-68-7	Butyl benzyl phthalate	360	U
86-74-8	Carbazole	360	U
106-47-8	4-Chloroaniline	360	U
59-50-7	4-Chloro-3-methylphenol	360	U
91-58-7	2-Chloronaphthalene	360	U
95-57-8	2-Chlorophenol	360	U
7005-72-3	4-Chlorophenyl phenyl ether	360	U
218-01-9	Chrysene	360	U
53-70-3	Dibenz(a,h)anthracene	360	U
132-64-9	Dibenzofuran	360	U
95-50-1	1,2-Dichlorobenzene	360	U
541-73-1	1,3-Dichlorobenzene	360	U
106-46-7	1,4-Dichlorobenzene	360	U
91-94-1	3,3'-Dichlorobenzidine	1700	U
120-83-2	2,4-Dichlorophenol	360	U
84-66-2	Diethyl phthalate	360	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 30 / g
Work Order: D2V0L102
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
105-67-9	2,4-Dimethylphenol	360	U
131-11-3	Dimethyl phthalate	360	U
84-74-2	Di-n-butyl phthalate	360	U
117-84-0	Di-n-octyl phthalate	360	U
51-28-5	2,4-Dinitrophenol	1700	U
534-52-1	4,6-Dinitro-2-methylphenol	1700	U
106-44-5	4-Methylphenol	360	U
121-14-2	2,4-Dinitrotoluene	360	U
606-20-2	2,6-Dinitrotoluene	360	U
206-44-0	Fluoranthene	360	U
86-73-7	Fluorene	360	U
118-74-1	Hexachlorobenzene	360	U
87-68-3	Hexachlorobutadiene	360	U
77-47-4	Hexachlorocyclopentadiene	1700	U
67-72-1	Hexachloroethane	360	U
193-39-5	Indeno(1,2,3-cd)pyrene	360	U
78-59-1	Isophorone	360	U
91-57-6	2-Methylnaphthalene	360	U
95-48-7	2-Methylphenol	360	U
65794-96-9	3-Methylphenol & 4-Methylphe	360	U
91-20-3	Naphthalene	360	U
88-74-4	2-Nitroaniline	1700	U
99-09-2	3-Nitroaniline	1700	U
100-01-6	4-Nitroaniline	1700	U
98-95-3	Nitrobenzene	360	U
88-75-5	2-Nitrophenol	360	U
100-02-7	4-Nitrophenol	1700	U
621-64-7	N-Nitrosodi-n-propylamine	360	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 30 / g
Work Order: D2V0L102
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
86-30-6	N-Nitrosodiphenylamine	360	U
108-60-1	2,2'-oxybis(1-Chloropropane)	360	U
87-86-5	Pentachlorophenol	1700	U
85-01-8	Phenanthrene	360	U
108-95-2	Phenol	360	U
129-00-0	Pyrene	360	U
120-82-1	1,2,4-Trichlorobenzene	360	U
95-95-4	2,4,5-Trichlorophenol	360	U
88-06-2	2,4,6-Trichlorophenol	360	U
62-75-9	N-Nitrosodimethylamine	360	U
110-86-1	Pyridine	720	U
62-53-3	Aniline	360	U
100-51-6	Benzyl alcohol	360	U
65-85-0	Benzoic acid	1700	U
935-95-5	2,3,5,6-Tetrachlorophenol	360	U
58-90-2	2,3,4,6-Tetrachlorophenol	360	U
122-66-7	1,2-Diphenylhydrazine (as Az	360	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 30 / g
Work Order: D2V0T102
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
83-32-9	Acenaphthene	360	U
208-96-8	Acenaphthylene	360	U
120-12-7	Anthracene	360	U
56-55-3	Benzo(a)anthracene	360	U
50-32-8	Benzo(a)pyrene	360	U
205-99-2	Benzo(b)fluoranthene	360	U
207-08-9	Benzo(k)fluoranthene	360	U
191-24-2	Benzo(ghi)perylene	360	U
111-91-1	bis(2-Chloroethoxy)methane	360	U
111-44-4	bis(2-Chloroethyl) ether	360	U
117-81-7	bis(2-Ethylhexyl) phthalate	170	J
101-55-3	4-Bromophenyl phenyl ether	360	U
85-68-7	Butyl benzyl phthalate	360	U
86-74-8	Carbazole	360	U
106-47-8	4-Chloroaniline	360	U
59-50-7	4-Chloro-3-methylphenol	360	U
91-58-7	2-Chloronaphthalene	360	U
95-57-8	2-Chlorophenol	360	U
7005-72-3	4-Chlorophenyl phenyl ether	360	U
218-01-9	Chrysene	360	U
53-70-3	Dibenz(a,h)anthracene	360	U
132-64-9	Dibenzofuran	360	U
95-50-1	1,2-Dichlorobenzene	360	U
541-73-1	1,3-Dichlorobenzene	360	U
106-46-7	1,4-Dichlorobenzene	360	U
91-94-1	3,3'-Dichlorobenzidine	1800	U
120-83-2	2,4-Dichlorophenol	360	U
84-66-2	Diethyl phthalate	360	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 30 / g
Work Order: D2V0T102
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
105-67-9	2,4-Dimethylphenol	360	U
131-11-3	Dimethyl phthalate	360	U
84-74-2	Di-n-butyl phthalate	360	U
117-84-0	Di-n-octyl phthalate	360	U
51-28-5	2,4-Dinitrophenol	1800	U
534-52-1	4,6-Dinitro-2-methylphenol	1800	U
121-14-2	2,4-Dinitrotoluene	360	U
606-20-2	2,6-Dinitrotoluene	360	U
206-44-0	Fluoranthene	360	U
86-73-7	Fluorene	360	U
118-74-1	Hexachlorobenzene	360	U
87-68-3	Hexachlorobutadiene	360	U
77-47-4	Hexachlorocyclopentadiene	1800	U
67-72-1	Hexachloroethane	360	U
193-39-5	Indeno(1,2,3-cd)pyrene	360	U
78-59-1	Isophorone	360	U
91-57-6	2-Methylnaphthalene	360	U
95-48-7	2-Methylphenol	360	U
65794-96-9	3-Methylphenol & 4-Methylphe	360	U
91-20-3	Naphthalene	360	U
88-74-4	2-Nitroaniline	1800	U
99-09-2	3-Nitroaniline	1800	U
100-01-6	4-Nitroaniline	1800	U
98-95-3	Nitrobenzene	360	U
88-75-5	2-Nitrophenol	360	U
100-02-7	4-Nitrophenol	1800	U
621-64-7	N-Nitrosodi-n-propylamine	360	U
86-30-6	N-Nitrosodiphenylamine	360	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 30 / g
Work Order: D2V0T102
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/29/99

QC Batch: 9270192

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
108-60-1	2,2'-oxybis(1-Chloropropane)	360	U
87-86-5	Pentachlorophenol	1800	U
85-01-8	Phenanthrene	360	U
108-95-2	Phenol	360	U
129-00-0	Pyrene	360	U
120-82-1	1,2,4-Trichlorobenzene	360	U
95-95-4	2,4,5-Trichlorophenol	360	U
88-06-2	2,4,6-Trichlorophenol	360	U

PESTICIDES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8081A
Pesticides (8081A)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 30 / g
Work Order: D2V0L103
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/27/99

QC Batch: 9270187

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC (Lindane)	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	1.9	U
72-55-9	4,4'-DDE	1.9	U
72-20-8	Endrin	1.9	U
53494-70-5	Endrin ketone	1.9	U
7421-93-4	Endrin aldehyde	1.9	U
33213-65-9	Endosulfan II	1.9	U
72-54-8	4,4'-DDD	1.9	U
1031-07-8	Endosulfan sulfate	1.9	U
50-29-3	4,4'-DDT	1.9	U
72-43-5	Methoxychlor	19	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	73	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8081A
Pesticides (8081A)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 30 / g
Work Order: D2V0T103
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/27/99

QC Batch: 9270187

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	1.9	U
319-85-7	beta-BHC	1.9	U
319-86-8	delta-BHC	1.9	U
58-89-9	gamma-BHC (Lindane)	1.9	U
76-44-8	Heptachlor	1.9	U
309-00-2	Aldrin	1.9	U
1024-57-3	Heptachlor epoxide	1.9	U
959-98-8	Endosulfan I	1.9	U
60-57-1	Dieldrin	1.9	U
72-55-9	4,4'-DDE	1.9	U
72-20-8	Endrin	1.9	U
53494-70-5	Endrin ketone	1.9	U
7421-93-4	Endrin aldehyde	1.9	U
33213-65-9	Endosulfan II	1.9	U
72-54-8	4,4'-DDD	1.9	U
1031-07-8	Endosulfan sulfate	1.9	U
50-29-3	4,4'-DDT	1.9	U
72-43-5	Methoxychlor	19	U
5103-71-9	alpha-Chlordane	1.9	U
5103-74-2	gamma-Chlordane	1.9	U
8001-35-2	Toxaphene	74	U

METALS

LAW ENVIRONMENTAL INC

Client Sample ID: SP#1

TOTAL Metals

Lot-Sample #...: C9I240134-001
Date Sampled...: 09/23/99 Date Received..: 09/24/99 Matrix.....: SOLID
% Moisture.....: 8.2

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9268106						
Antimony	ND	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L106
		Dilution Factor: 1		MS Run #.....: 9268007		
Arsenic	1.1	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L107
		Dilution Factor: 1		MS Run #.....: 9268007		
Cadmium	0.061 B	0.22	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L108
		Dilution Factor: 1		MS Run #.....: 9268007		
Chromium	3.5	0.54	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L109
		Dilution Factor: 1		MS Run #.....: 9268007		
Lead	4.3	0.33	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10A
		Dilution Factor: 1		MS Run #.....: 9268007		
Selenium	ND	0.54	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10C
		Dilution Factor: 1		MS Run #.....: 9268007		
Silver	ND	0.54	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10D
		Dilution Factor: 1		MS Run #.....: 9268007		
Thallium	0.49 B	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10E
		Dilution Factor: 1		MS Run #.....: 9268007		
Beryllium	0.34 B	0.54	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10F
		Dilution Factor: 1		MS Run #.....: 9268007		
Copper	5.4	2.7	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10G
		Dilution Factor: 1		MS Run #.....: 9268007		
Nickel	3.6 B	4.4	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10H
		Dilution Factor: 1		MS Run #.....: 9268007		
Zinc	40.9	2.2	mg/kg	SW846 6010B	09/25-09/27/99	D2V0L10J
		Dilution Factor: 1		MS Run #.....: 9268007		
Prep Batch #...: 9270111						
Mercury	ND	0.11	mg/kg	SW846 7471A	09/27/99	D2V0L10K
		Dilution Factor: 1		MS Run #.....: 9270010		

(Continued on next page)

LAW ENVIRONMENTAL INC

Client Sample ID: SP#1

TOTAL Metals

Lot-Sample #...: C9I240134-001 Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

LAW ENVIRONMENTAL INC

Client Sample ID: SP#2

TOTAL Metals

Lot-Sample #...: C9I240134-002 Matrix.....: SOLID
Date Sampled...: 09/23/99 Date Received..: 09/24/99
% Moisture.....: 9.2

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9268106						
Antimony	ND	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T106
		Dilution Factor: 1		MS Run #.....: 9268007		
Arsenic	1.3	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T107
		Dilution Factor: 1		MS Run #.....: 9268007		
Cadmium	0.11 B	0.22	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T108
		Dilution Factor: 1		MS Run #.....: 9268007		
Chromium	3.8	0.55	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T109
		Dilution Factor: 1		MS Run #.....: 9268007		
Lead	4.0	0.33	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10A
		Dilution Factor: 1		MS Run #.....: 9268007		
Selenium	ND	0.55	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10C
		Dilution Factor: 1		MS Run #.....: 9268007		
Silver	ND	0.55	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10D
		Dilution Factor: 1		MS Run #.....: 9268007		
Thallium	0.81 B	1.1	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10E
		Dilution Factor: 1		MS Run #.....: 9268007		
Beryllium	0.33 B	0.55	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10F
		Dilution Factor: 1		MS Run #.....: 9268007		
Copper	6.0	2.8	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10G
		Dilution Factor: 1		MS Run #.....: 9268007		
Nickel	3.7 B	4.4	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10H
		Dilution Factor: 1		MS Run #.....: 9268007		
Zinc	47.0	2.2	mg/kg	SW846 6010B	09/25-09/27/99	D2V0T10J
		Dilution Factor: 1		MS Run #.....: 9268007		
Prep Batch #...: 9270111						
Mercury	0.015 B	0.11	mg/kg	SW846 7471A	09/27/99	D2V0T10K
		Dilution Factor: 1		MS Run #.....: 9270010		

(Continued on next page)

LAW ENVIRONMENTAL INC

Client Sample ID: SP#2

TOTAL Metals

Lot-Sample #...: C9I240134-002 Matrix.....: SOLID

NOTE(S):

Results and reporting limits have been adjusted for dry weight.

B Estimated result. Result is less than RL.

PCB'S

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8082
PCBs (8082)

Lab Sample ID:C9I240134 001

Sample WT/Vol: 30 / g
Work Order: D2V0L104
Dilution factor: 1
Moisture %:8.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/27/99

QC Batch: 9270188

Client Sample Id: SP#1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
12674-11-2	Aroclor 1016	36	U
11104-28-2	Aroclor 1221	36	U
11141-16-5	Aroclor 1232	36	U
53469-21-9	Aroclor 1242	36	U
12672-29-6	Aroclor 1248	36	U
11097-69-1	Aroclor 1254	36	U
11096-82-5	Aroclor 1260	36	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8082
PCBs (8082)

Lab Sample ID:C9I240134 002

Sample WT/Vol: 30 / g
Work Order: D2V0T104
Dilution factor: 1
Moisture %:9.2

Date Received: 09/24/99
Date Extracted:09/27/99
Date Analyzed: 09/27/99

QC Batch: 9270188

Client Sample Id: SP#2

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg		Q
12674-11-2	Aroclor 1016		36	U
11104-28-2	Aroclor 1221		36	U
11141-16-5	Aroclor 1232		36	U
53469-21-9	Aroclor 1242		36	U
12672-29-6	Aroclor 1248		36	U
11097-69-1	Aroclor 1254		36	U
11096-82-5	Aroclor 1260		36	U

WET CHEMISTRY

LAW ENVIRONMENTAL INC

Client Sample ID: SP#1

General Chemistry

Lot-Sample #...: C9I240134-001 **Work Order #...:** D2V0L **Matrix.....:** SOLID
Date Sampled...: 09/23/99 **Date Received..:** 09/24/99
% Moisture.....: 8.2

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	91.8		%	MCAWW 160.3 MOD	09/27-09/28/99	9270183

Dilution Factor: 1 MS Run #.....: 9270067

LAW ENVIRONMENTAL INC

Client Sample ID: SP#2

General Chemistry

Lot-Sample #...: C9I240134-002 **Work Order #...: D2V0T** **Matrix.....: SOLID**
Date Sampled...: 09/23/99 **Date Received..: 09/24/99**
% Moisture.....: 9.2

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	90.8		%	MCAWW 160.3 MOD	09/27-09/28/99	9270183

Dilution Factor: 1 MS Run #.....: 9270067

APPENDIX E-4
VEGETATIVE LAYER MATERIAL - TOPSOIL

Geotechnical Test Data

Analytical Report – Chemical Analyses

GLYNN GEOTECHNICAL ENGINEERING
GEOTECHNICAL AND CIVIL ENGINEERING SERVICES

Grain Size Analysis
ASTM D - 422

Project: Materials Testing

Project No.: 99-1061

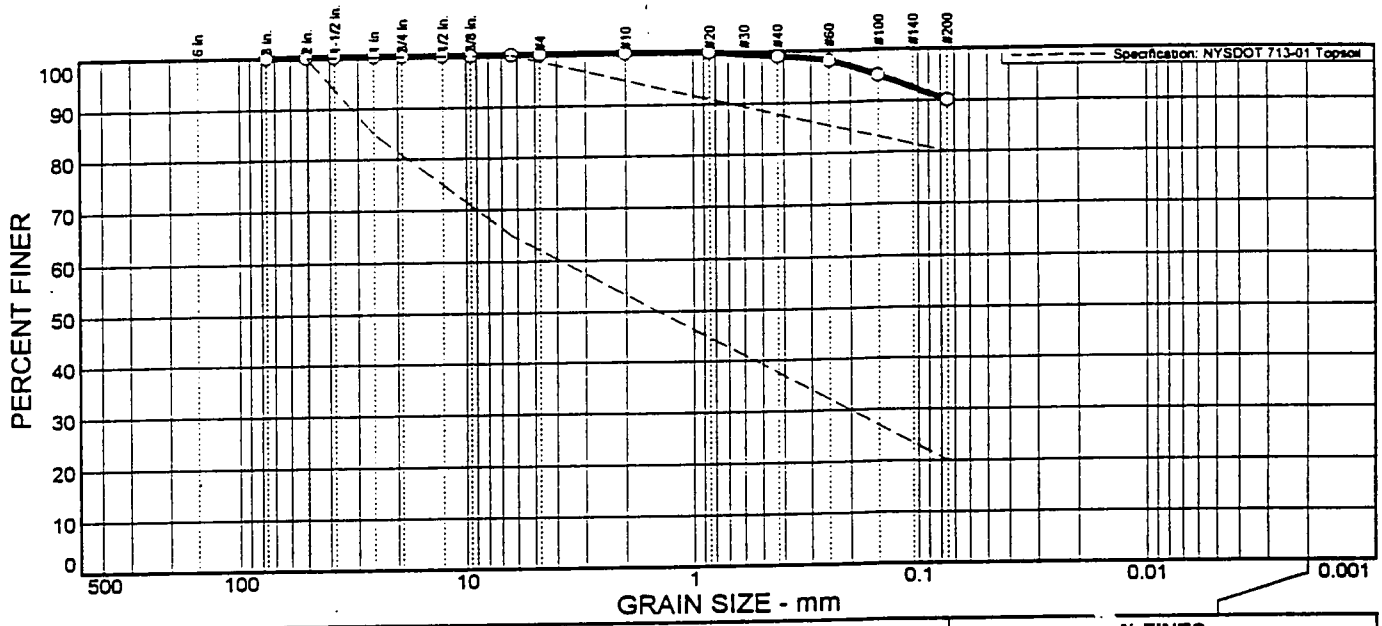
Client: Sevenson Environmental Services

Sample No: 99-10 **Source of Sample:**

Location: Composite of 99-10, 11, 12, 13

Date: 7/2/99

Elev./Depth:



% COBBLES	% GRAVEL		% SAND			% FINES	
	CRS.	FINE	CRS.	MEDIUM	FINE	SILT	CLAY
0	0	0	0	1	9	90	

SIEVE SIZE	PERCENT FINER	SPEC.* PERCENT	PASS? (X=NO)
3 in.	100		
2 in.	100	100 - 100	
1.5 in.	100		
1 in.	100	85 - 100	
3/4 in.	100		
1/2 in.	100		
3/8 in.	100		
1/4 in.	100	65 - 100	
#4	100		
#10	100		
#20	100		
#40	99		
#60	98		
#100	95		
#200	90	20 - 80	X

Soil Description

Silt

Atterberg Limits

PL= LL= PI=

Coefficients

D_{85}= D_{60}= D_{50}=
D_{30}= D_{15}= D_{10}=
C_u= C_c=

Classification

USCS= ML AASHTO=

Remarks

pH=(5.5-7.6) 99-10=5.3, 99-11=5.1, 99-12=5.2, 99-13=5.5
% Organics=(2-20%) 99-10=3.2%, 99-11=3.5%,
99-12=4.4%, 99-13= 4.9%

* NYSDOT 713-01 Topsoil

Reported By: Laura K Barton

Reviewed By: ARH / Mark W. Glynn, P.E.

6503 Campbell Blvd., Lockport, New York 14094 (716) 625-6933 / fax (716) 625-6983

Quanterra
450 William Pitt Way
Pittsburgh, Pennsylvania 15238-1330

412 820-8380 Telephone
412 820-2080 Fax

ANALYTICAL REPORT

Olin Industrial Welding Site

Lot #: C9I220146

Katy Allen

Law Environmental Inc

QUANTERRA INCORPORATED

Veronica Bortot

Veronica Bortot
Project Manager

October 8, 1999

Quanterra

CASE NARRATIVE

CLIENT: LAW ENVIRONMENTAL INC.

SITE: INDUSTRIAL WELDING SITE

QUANTERRA LOT NO. C9I220146

SHIPMENT:
Samples were received at Quanterra Pittsburgh, PA on September 22, 1999 in good condition. The cooler temperature was 20 degrees Celsius.

NOTE:
Except where noted, no problems were observed during the analyses.

METALS:
The matrix spike and matrix spike duplicate were below the 75-125% control limits for antimony.

Quanterra

METHODS SUMMARY

C9I220146

PARAMETER	ANALYTICAL METHOD	PREPARATION METHOD
Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B
Mercury in Solid Waste (Manual Cold-Vapor)	SW846 7471A	SW846 7471A
Organochlorine Pesticides	SW846 8081A	SW846 3550
PCBs by SW-846 8082	SW846 8082	SW846 3550
Semivolatile Organic Compounds by GC/MS	SW846 8270C	SW846 3550B
Total Residue as Percent Solids	MCAWW 160.3 MOD	MCAWW 160.3 MOD
Trace Inductively Coupled Plasma (ICP) Metals	SW846 6010B	SW846 3050B
Volatile Organics by GC/MS	SW846 8260B	SW846 5030

References:

MCAWW "Methods for Chemical Analysis of Water and Wastes", EPA-600/4-79-020, March 1983 and subsequent revisions.

SW846 "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 and its updates.

Quanterra

SAMPLE SUMMARY

C9I220146

WO #	SAMPLE#	CLIENT SAMPLE ID	DATE	TIME
D2PTD	001	IWSTS1	09/21/99	

NOTE(S):

- The analytical results of the samples listed above are presented on the following pages.
- All calculations are performed before rounding to avoid round-off errors in calculated results.
- Results noted as "ND" were not detected at or above the stated limit.
- This report must not be reproduced, except in full, without the written approval of the laboratory.
- Results for the following parameters are never reported on a dry weight basis: color, corrosivity, density, flashpoint, ignitability, layers, odor, paint filter test, pH, porosity pressure, reactivity, redox potential, specific gravity, spot tests, solids, solubility, temperature, viscosity, and weight.

Chain of Custody Record

Quanterra, Inc. - Pittsburgh PA Lab
450 William Pitt Way
Pittsburgh PA 15238

Quanterra

QUA-4124

Client	Project Manager	Date	Chain Of Custody Number
LAW ENGINEERING	KATY ALLEN / DAVE WHEELESS	9.21.99	63782
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
112 TOWNPARK DRIVE	(770) 421-3510		
City / State / Zip Code	**Site Contact**		
KENNESAW / GA / 30144	CHRISTA CRUICKSHANK		
Project Name	**Carrier/Waybill Number**		
INDUSTRIAL WELDING SITE	(716) 285-0765		
Contract/Purchase Order/Quote No.			

Sample I.D. No. and Description	Date	Time	Sample Type	Total Volume	Containers Type	Containers No.	Preservative	Condition on Receipt	Analysis: VOCs TCL	SVOCs TCL	TCL PEST / PCB	TP METALS
TOPSOIL * IWS TS 1	9.21.99				ENCORE	2						
					4 oz.	2						
					8 oz.	1						

Special Instructions

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal
☐ Return To Client ☐ Disposal By Lab ☐ Archive For _____ Months

Turn Around Time Required
☐ Normal ☒ Rush ONE WEEK

QC Level
☐ I. ☐ II. ☐ III.

Project Specific (Specify)

	Date	Time		Date	Time
1. Relinquished By	9/21/99	3:00	1. Received By		
2. Relinquished By			2. Received By	9/22/99	0910
3. Relinquished By			3. Received By		

Comments

DISTRIBUTION: WHITE - Stays with Sample; CANARY - Returned to Client with Report; PINK - Field Copy

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

Client: Law Enviro. Project: _____ Quote: _____

Cooler Rec'd & Opened for Temp. Check on: 9/22/99

Coolers Opened and Unpacked on: 9/22/99 By: _____ (Signature)

Quanterra Lot Number: 99T220146

		Yes	No
1.	Were custody seals on the outside of the cooler?	✓	
	If YES, how many and where? Quantity __ Location front		
	Were signatures and date correct?	✓	
2.	Were custody papers included inside the cooler?	✓	
3.	Were custody papers properly filled out (ink, signed, match labels)?	✓	
4.	Did you sign the custody papers in the appropriate place?	✓	
5.	Was shippers packing slip attached to this form?	✓	
6.	Were packing materials used?	✓	
	If YES, what type? bubble wrap		
7.	Were the samples chilled? (Record temperatures on reverse side.)	✓	
8.	Were the samples appropriately preserved?	NO	WE 9/22/99
9.	Were all bottles sealed in separate plastic bags?		✓
10.	Did all bottles arrive in good condition (unbroken)?	✓	
11.	Were all bottle labels complete (sample ID, preservatives, etc.)?	✓	
12.	Did all bottle labels and/or tags agree with custody papers?	✓	
13.	Were correct bottles used for tests indicated?	✓	
14.	Were all VOA vials checked for the presence of air bubbles?	✓	
15.	Was a sufficient amount of sample sent in each bottle?	✓	

16. Samples received by: FEDEX UPS CLIENT DROP-OFF OTHER AIRBORNE

Explain any discrepancies: _____

Level 2 Review _____

Was contacted on _____ by _____ to resolve discrepancies.

Cooler Receipt Form

Quanterra Environmental Services Pittsburgh

P: Preserved

UP: Unpreserved

Sample ID	TMET PH<2	DMET PH<2	HG PH<2	NUT(1) PH<2	CN PH ≥12	OG TPHC PH<2	PHEN PH<2	SULF PH ≥12	TOC PH<2	TOX PH<2	VOA PUP	Indium PH<2			

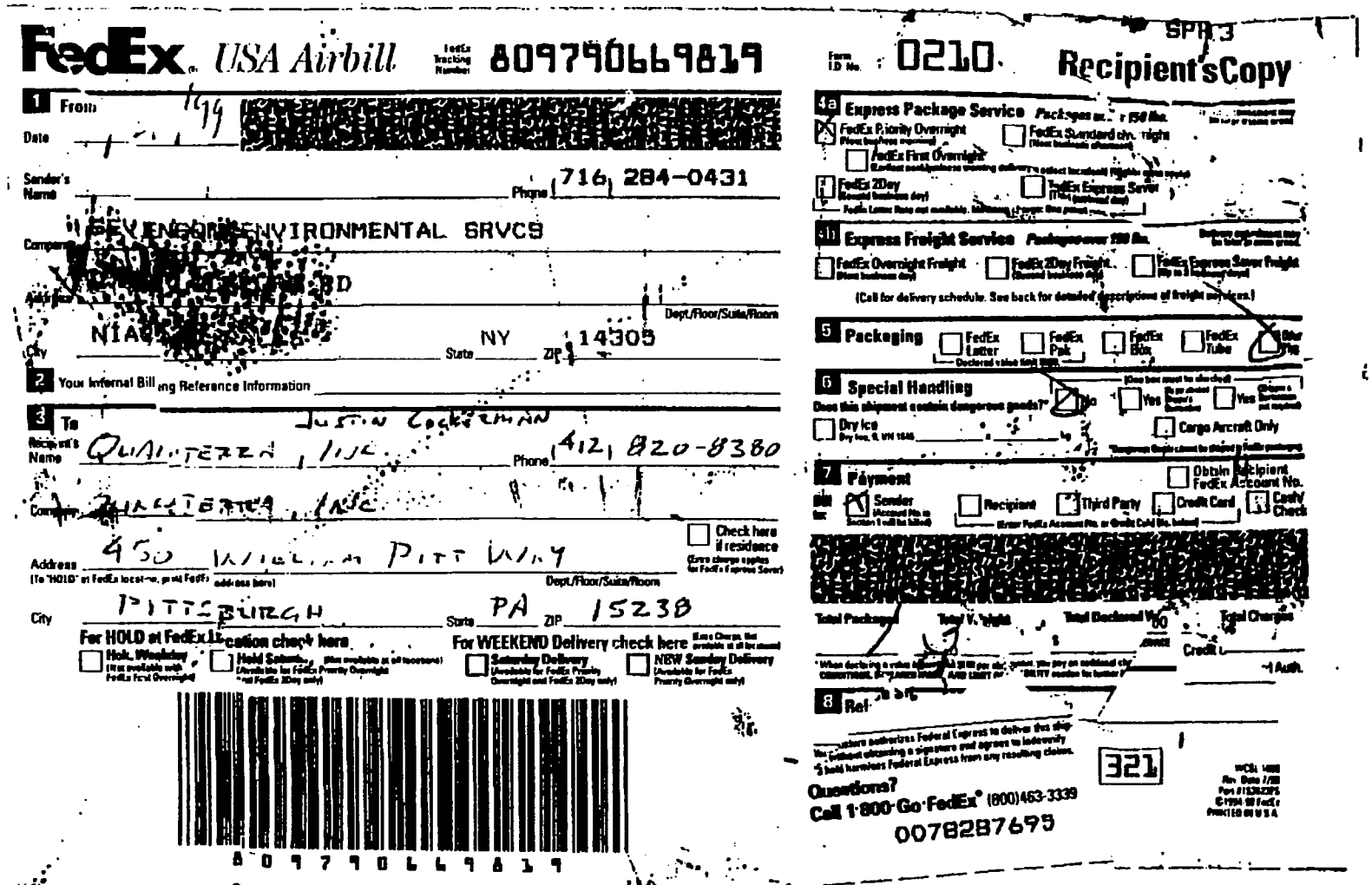
(1) "NUT" could include sample bottles for ammonia, chemical oxygen demand, nitrate/nitrite, TKN, or total phosphorus

Comments: _____

Cooler Number	Temperature
	20°

Bottle Type	Lot Number*

* Please use an asterisk if bottle lot number was covered by the label.



FedEx. USA Airbill FedEx Tracking Number 809790669819 Form ID No. 0210 SPR 3 Recipient's Copy

1 From Date 4/14/94

Sender's Name [redacted] Phone (716) 284-0431

Company SEVERN ENGINEERING ENVIRONMENTAL SRVCS

Address [redacted] 3D Dept/Floor/Suite/Room

City NIAGARA FALLS State NY ZIP 14305

2 Your Internal Billing Reference Information

3 To Recipient's Name QUANTERRA, INC. Attn: JUSTIN COCKERHAM Phone (412) 820-8380

Company QUANTERRA, INC.

Address 450 WILLIAM PITT WAY Dept/Floor/Suite/Room

Check here if residence

City PITTSBURGH State PA ZIP 15238

For HOLD at FedEx Location check here

Hold Weekday

Hold Saturday

For WEEKEND Delivery check here

Saturday Delivery

NEW Sunday Delivery (Available for FedEx Priority Overnight only)

809790669819

4a Express Package Service

FedEx Priority Overnight

FedEx Standard Overnight

FedEx First Overnight

FedEx 2Day

FedEx Express Saver

4b Express Freight Service

FedEx Overnight Freight

FedEx 2Day Freight

FedEx Express Saver Freight

(Call for delivery schedule. See back for detailed descriptions of freight services.)

5 Packaging FedEx Letter FedEx Pak FedEx Box FedEx Tube Other

6 Special Handling

Does this shipment contain dangerous goods? No Yes

Dry Ice

Cargo Aircraft Only

7 Payment

Sender

Recipient

Third Party

Credit Card

Cash/Check

Obtain Recipient FedEx Account No.

Total Packages Total Weight Total Declared Value $ .00 Total Charges

Credit Card Auth.

8 Rel

321

Questions? Call 1-800-Go-FedEx® (800)463-3339

0078287695

GC/MS VOLATILES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 4.79 / g
Work Order: D2PTD101
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/28/99
Date Analyzed: 09/28/99

QC Batch: 9272112

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
67-64-1	Acetone	82	B
71-43-2	Benzene	6.7	U
75-27-4	Bromodichloromethane	6.7	U
75-25-2	Bromoform	6.7	U
74-83-9	Bromomethane	13	U
78-93-3	2-Butanone	5.4	J
75-15-0	Carbon disulfide	6.7	U
56-23-5	Carbon tetrachloride	6.7	U
108-90-7	Chlorobenzene	6.7	U
124-48-1	Dibromochloromethane	6.7	U
75-00-3	Chloroethane	13	U
67-66-3	Chloroform	6.7	U
74-87-3	Chloromethane	13	U
75-34-3	1,1-Dichloroethane	6.7	U
107-06-2	1,2-Dichloroethane	6.7	U
75-35-4	1,1-Dichloroethene	6.7	U
540-59-0	1,2-Dichloroethene (total)	6.7	U
78-87-5	1,2-Dichloropropane	6.7	U
10061-01-5	cis-1,3-Dichloropropene	6.7	U
10061-02-6	trans-1,3-Dichloropropene	6.7	U
100-41-4	Ethylbenzene	6.7	U
591-78-6	2-Hexanone	27	U
75-09-2	Methylene chloride	6.7	U
108-10-1	4-Methyl-2-pentanone	27	U
100-42-5	Styrene	6.7	U
79-34-5	1,1,2,2-Tetrachloroethane	6.7	U
127-18-4	Tetrachloroethene	6.7	U
108-88-3	Toluene	6.7	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8260B
Volatile Organics, GC/MS (8260B)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 4.79 / g
Work Order: D2PTD101
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/28/99
Date Analyzed: 09/28/99

QC Batch: 9272112

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
71-55-6	1,1,1-Trichloroethane	6.7	U
79-00-5	1,1,2-Trichloroethane	6.7	U
79-01-6	Trichloroethene	6.7	U
75-01-4	Vinyl chloride	5.6	J
1330-20-7	Xylenes (total)	6.7	U

GC/MS SEMIVOLATILES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 30 / g
Work Order: D2PTD102
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/22/99
Date Analyzed: 09/23/99

QC Batch: 9265479

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
83-32-9	Acenaphthene	420	U
208-96-8	Acenaphthylene	420	U
120-12-7	Anthracene	420	U
56-55-3	Benzo(a)anthracene	420	U
50-32-8	Benzo(a)pyrene	420	U
205-99-2	Benzo(b)fluoranthene	420	U
207-08-9	Benzo(k)fluoranthene	420	U
191-24-2	Benzo(ghi)perylene	420	U
111-91-1	bis(2-Chloroethoxy)methane	420	U
111-44-4	bis(2-Chloroethyl) ether	420	U
117-81-7	bis(2-Ethylhexyl) phthalate	420	U
101-55-3	4-Bromophenyl phenyl ether	420	U
85-68-7	Butyl benzyl phthalate	420	U
86-74-8	Carbazole	420	U
106-47-8	4-Chloroaniline	420	U
59-50-7	4-Chloro-3-methylphenol	420	U
91-58-7	2-Chloronaphthalene	420	U
95-57-8	2-Chlorophenol	420	U
7005-72-3	4-Chlorophenyl phenyl ether	420	U
218-01-9	Chrysene	420	U
53-70-3	Dibenz(a,h)anthracene	420	U
132-64-9	Dibenzofuran	420	U
95-50-1	1,2-Dichlorobenzene	420	U
541-73-1	1,3-Dichlorobenzene	420	U
106-46-7	1,4-Dichlorobenzene	420	U
91-94-1	3,3'-Dichlorobenzidine	2000	U
120-83-2	2,4-Dichlorophenol	420	U
84-66-2	Diethyl phthalate	420	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 30 / g
Work Order: D2PTD102
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/22/99
Date Analyzed: 09/23/99

QC Batch: 9265479

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
105-67-9	2,4-Dimethylphenol	420	U
131-11-3	Dimethyl phthalate	420	U
84-74-2	Di-n-butyl phthalate	420	U
117-84-0	Di-n-octyl phthalate	420	U
51-28-5	2,4-Dinitrophenol	2000	U
534-52-1	4,6-Dinitro-2-methylphenol	2000	U
121-14-2	2,4-Dinitrotoluene	420	U
606-20-2	2,6-Dinitrotoluene	420	U
206-44-0	Fluoranthene	420	U
86-73-7	Fluorene	420	U
118-74-1	Hexachlorobenzene	420	U
87-68-3	Hexachlorobutadiene	420	U
77-47-4	Hexachlorocyclopentadiene	2000	U
67-72-1	Hexachloroethane	420	U
193-39-5	Indeno(1,2,3-cd)pyrene	420	U
78-59-1	Isophorone	420	U
91-57-6	2-Methylnaphthalene	420	U
95-48-7	2-Methylphenol	420	U
65794-96-9	3-Methylphenol & 4-Methylphe	420	U
91-20-3	Naphthalene	420	U
88-74-4	2-Nitroaniline	2000	U
99-09-2	3-Nitroaniline	2000	U
100-01-6	4-Nitroaniline	2000	U
98-95-3	Nitrobenzene	420	U
88-75-5	2-Nitrophenol	420	U
100-02-7	4-Nitrophenol	2000	U
621-64-7	N-Nitrosodi-n-propylamine	420	U
86-30-6	N-Nitrosodiphenylamine	420	U

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8270C
Base/Neutrals and Acids (8270C)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 30 / g
Work Order: D2PTD102
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/22/99
Date Analyzed: 09/23/99

QC Batch: 9265479

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
108-60-1	2,2'-oxybis(1-Chloropropane)	420	U
87-86-5	Pentachlorophenol	2000	U
85-01-8	Phenanthrene	420	U
108-95-2	Phenol	420	U
129-00-0	Pyrene	420	U
120-82-1	1,2,4-Trichlorobenzene	420	U
95-95-4	2,4,5-Trichlorophenol	420	U
88-06-2	2,4,6-Trichlorophenol	420	U

PESTICIDES

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8081A
Pesticides (8081A)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 30 / g
Work Order: D2PTD103
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/22/99
Date Analyzed: 09/24/99

QC Batch: 9265480

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
319-84-6	alpha-BHC	2.2	U
319-85-7	beta-BHC	2.2	U
319-86-8	delta-BHC	2.2	U
58-89-9	gamma-BHC (Lindane)	2.2	U
76-44-8	Heptachlor	2.2	U
309-00-2	Aldrin	2.2	U
1024-57-3	Heptachlor epoxide	2.2	U
959-98-8	Endosulfan I	2.2	U
60-57-1	Dieldrin	2.2	U
72-55-9	4,4'-DDE	2.2	U
72-20-8	Endrin	2.2	U
53494-70-5	Endrin ketone	2.2	U
7421-93-4	Endrin aldehyde	2.2	U
33213-65-9	Endosulfan II	2.2	U
72-54-8	4,4'-DDD	2.2	U
1031-07-8	Endosulfan sulfate	2.2	U
50-29-3	4,4'-DDT	2.2	U
72-43-5	Methoxychlor	22	U
5103-71-9	alpha-Chlordane	2.2	U
5103-74-2	gamma-Chlordane	2.2	U
8001-35-2	Toxaphene	86	U

PCB'S

LAW ENVIRONMENTAL INC

Lab Name:QUANTERRA

SDG Number:

Matrix: (soil/water) SOLID
Method: SW846 8082
PCBs (8082)

Lab Sample ID:C9I220146 001

Sample WT/Vol: 30 / g
Work Order: D2PTD104
Dilution factor: 1
Moisture %:22

Date Received: 09/22/99
Date Extracted:09/22/99
Date Analyzed: 09/23/99

QC Batch: 9265483

Client Sample Id: IWSTS1

CAS NO.	COMPOUND	CONCENTRATION UNITS: (ug/L or ug/kg) ug/kg	Q
12674-11-2	Aroclor 1016	42	U
11104-28-2	Aroclor 1221	42	U
11141-16-5	Aroclor 1232	42	U
53469-21-9	Aroclor 1242	42	U
12672-29-6	Aroclor 1248	42	U
11097-69-1	Aroclor 1254	42	U
11096-82-5	Aroclor 1260	42	U

METALS

LAW ENVIRONMENTAL INC

Client Sample ID: IWSTS1

TOTAL Metals

Lot-Sample #...: C9I220146-001 Matrix.....: SOLID
Date Sampled...: 09/21/99 Date Received..: 09/22/99
% Moisture.....: 22

PARAMETER	RESULT	REPORTING LIMIT	UNITS	METHOD	PREPARATION-ANALYSIS DATE	WORK ORDER #
Prep Batch #...: 9266101						
Mercury	0.033 B	0.13	mg/kg	SW846 7471A	09/23/99	D2PTD10K
		Dilution Factor: 1		MS Run #.....: 9266002		
Prep Batch #...: 9268106						
Antimony	ND	1.3	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD106
		Dilution Factor: 1		MS Run #.....: 9268007		
Arsenic	4.0	1.3	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD107
		Dilution Factor: 1		MS Run #.....: 9268007		
Cadmium	0.052 B	0.26	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD108
		Dilution Factor: 1		MS Run #.....: 9268007		
Chromium	26.1	0.64	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD109
		Dilution Factor: 1		MS Run #.....: 9268007		
Lead	15.6	0.38	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10A
		Dilution Factor: 1		MS Run #.....: 9268007		
Selenium	0.40 B	0.64	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10C
		Dilution Factor: 1		MS Run #.....: 9268007		
Silver	ND	0.64	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10D
		Dilution Factor: 1		MS Run #.....: 9268007		
Thallium	1.8	1.3	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10E
		Dilution Factor: 1		MS Run #.....: 9268007		
Beryllium	1.5	0.64	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10F
		Dilution Factor: 1		MS Run #.....: 9268007		
Copper	16.3	3.2	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10G
		Dilution Factor: 1		MS Run #.....: 9268007		
Nickel	28.2	5.1	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10H
		Dilution Factor: 1		MS Run #.....: 9268007		
Zinc	86.4	2.6	mg/kg	SW846 6010B	09/25-09/27/99	D2PTD10J
		Dilution Factor: 1		MS Run #.....: 9268007		

(Continued on next page)

LAW ENVIRONMENTAL INC

Client Sample ID: IWSTS1

TOTAL Metals

Lot-Sample #...: C9I220146-001 Matrix.....: SOLID

NOTE(S):

B Estimated result. Result is less than RL.

Results and reporting limits have been adjusted for dry weight.

WET CHEMISTRY

LAW ENVIRONMENTAL INC

Client Sample ID: IWSTS1

General Chemistry

Lot-Sample #...: C9I220146-001 Work Order #...: D2PTD Matrix.....: SOLID
Date Sampled...: 09/21/99 Date Received..: 09/22/99
% Moisture.....: 22

PARAMETER	RESULT	RL	UNITS	METHOD	PREPARATION-ANALYSIS DATE	PREP BATCH #
Percent Solids	78.3		%	MCAWW 160.3 MOD	09/24-09/25/99	9267197

Dilution Factor: 1 MS Run #.....: 9267072

APPENDIX F-6

AGGREGATE BASE COURSE

Geotechnical Test Data

SJB SERVICES, INC.

Contract Drilling and Testing

1951-1 Hamburg Turnpike
Buffalo, NY 14218
Phone: (716) 821-5911
Fax: (716) 821-0163

55 Oliver Street
Cohoes, New York 12047
Phone: (518) 238-1145
Fax: (518) 238-1249

P.O. Box 416 • 208 Le Fevre Road
Stockertown, PA 18083
Phone: (610) 746-2670
Fax: (610) 746-2669

TOLL FREE: 1-800-821-5911

Laboratory Test Report

PROJECT : MATERIAL TESTING : LAFARGE NIAGARA

CLIENT : LAFARGE NIAGARA

DATE : APRIL 13, 1999

PROJECT NO.: SJB-T1175
REPORT NO.: LTR-1

SAMPLE INFORMATION :
Sample No. 99-146 was collected from a source stockpile by SJB Services, Inc. on April 1, 1999. Sample is described as a 2" ROC Stone from the LaFarge Niagara, Niagara Quarry in Niagara Falls, N.Y.

ASTM D-422 : Particle Size Analysis of Soils

Sieve Size	Percent Passing
2"	100.0
1 1/2"	97.3
1"	83.5
3/4"	72.2
1/2"	58.2
1/4"	39.0
#4	33.2
#10	20.0
#30	13.8
#40	11.4
#100	9.2
#200	7.2
0.02mm	0.8

PERCENT COMPONENTS

GRAVEL	SAND	SILT	CLAY
66.8%	26.0%	5.8%	1.4%

ASTM D-4318 : Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Sample is NON PLASTIC - NP

GGE GLYNN GEOTECHNICAL ENGINEERING

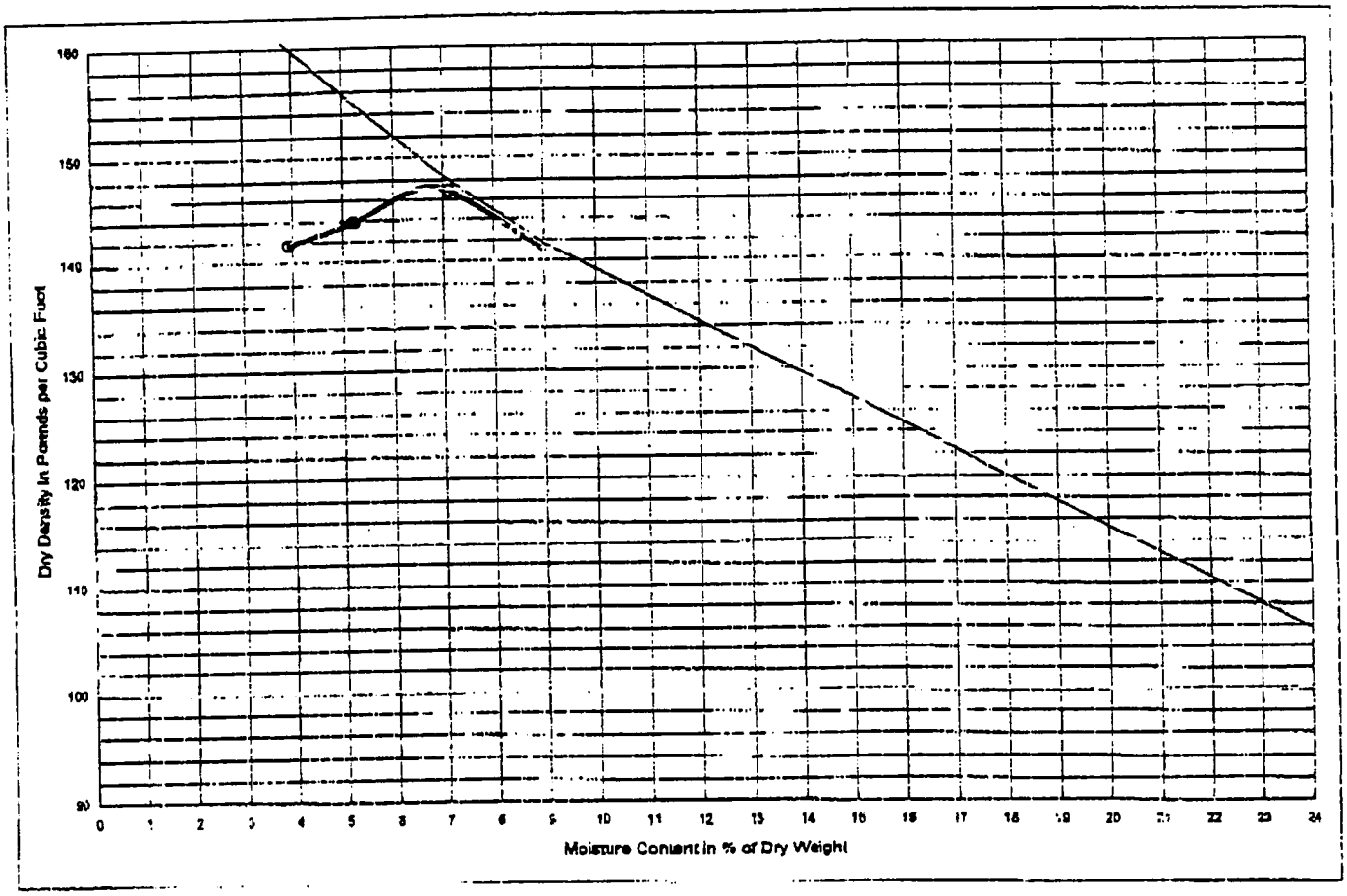
COMPACTION TEST DATA

ASTM D - 698 - 78 / ASTM D - 1557 - 78

PROJECT: IWS SITE
LOCATION: NIAGARA FALLS, NEW YORK
CLIENT: SEVENSON ENVIRONMENTAL SERVICES
DATE RECEIVED: SEPTEMBER 22, 1999
SAMPLE DESCRIPTION: CRUSHED STONE - AGGREGATE BASE COURSE MATERIAL
SAMPLE CLASSIFICATION: N/A

DATE REPORTED: SEPTEMBER 24, 1999
PROJECT NO.: 99 - 1061
SAMPLE NO.: 99 - 23
DEPTH: ON SITE

STANDARD A: [illegible] 78 ___ MODIFIED A.S.T.M. D 1557-78 X CORRECTION METHOD C
HAMMER USE A X [illegible] ___ PREPARATION METHOD: DRY ___ MOIST X



MAXIMUM DRY DENSITY 147.0 p.c.f. OPTIMUM MOISTURE 6.6 %
ZERO AIR VOIDS CURVE AT 2.85 SPECIFIC GRAVITY

REPORTED BY: MARK C. NIVER for

REVIEWED BY: ARHF [illegible]

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

APPENDIX F-7

PIPE BEDDING MATERIAL

Geotechnical Test Data

LAFARGE

Date: August 27, 1999

Sevenson Environmental
2749 Lockport Road
Niagara Falls, New York 14305
Attn: Jerry Castiglione

Re: **Sieve analysis for 1 inch run of crusher**
Project: I.W.S. – Olin Project

SIEVE	WEIGHT	% RETAINING	% PASSING	SPECS.
1-1/2"	0	0	100	100
1"	0	0	100	100
3/4"	1204	8.6	91.4	
1/2"	2883	20.7	70.7	
1/4"	3728	26.7	44.0	30-65
1/8"	2113	15.1	28.9	
#20	2008	14.4	14.5	
#40	464	3.3	11.1	5-40
#200	856	6.1	5.0	5-10
PAN	696	5.0		
TOTALS	13,952			

If you should need samples of this item for your own testing purposes, please feel free to contact me at 297-3031 ext.# 234.

I hereby certify that the above information is correct to the best of my knowledge.

For Redland/LaFarge,
Niagara Division

Robert J. Knerr
Quality Control Technician

REDLAND QUARRIES NY INC., a subsidiary of Lafarge Corporation
400 Hinman Road, Lockport, New York 14094
Office: (716) 439-1300 Fax: (716) 434-9447

APPENDIX F-8

ASPHALT PAVEMENT

Supplier's Certification

Job Mix Formula

Mix Design Calculations

LAFARGE

Date: September 15, 1999

Sevenson Environmental
2749 Lockport Road
Niagara Falls, N.Y. 14305

Attn: Jerry Castiglione

Re: Material Certification
Project: Olin Project.

Dear Sirs;

I am pleased to certify that the following Bituminous Materials required for the above captioned project will meet the standard specifications of the New York State Department of Transportation under section 403- Hot Mix Asphalt Concrete Pavement. Please find attached our approved Job Mix Formula's) for the Bituminous item(s) as per your request.

The Asphalt Cement Content will be increased to 7.6% to the 7F Top Course For this particular project to decrease the air void content, and make less permeable.

Due to the unusual high A.C. content, Redland/Lafarge Corp. will assume no liability for any pavement failure, or any other damages caused by this increase.

Job Mix Formulas are subject to change in the future.

I hereby certify that the above information is true to the best of my knowledge.

For Redland/LaFarge Corp.,
Niagara Division

Robert J. Knerr
Quality Control

REDLAND QUARRIES NY INC., a subsidiary of Lafarge Corporation
400 Hinman Road, Lockport, New York 14094
Office: (716) 439-1300 Fax. (716) 434-9447

FD 174 M (6)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

JOB MIX FORMULA
MARSHALL MIX DESIGN

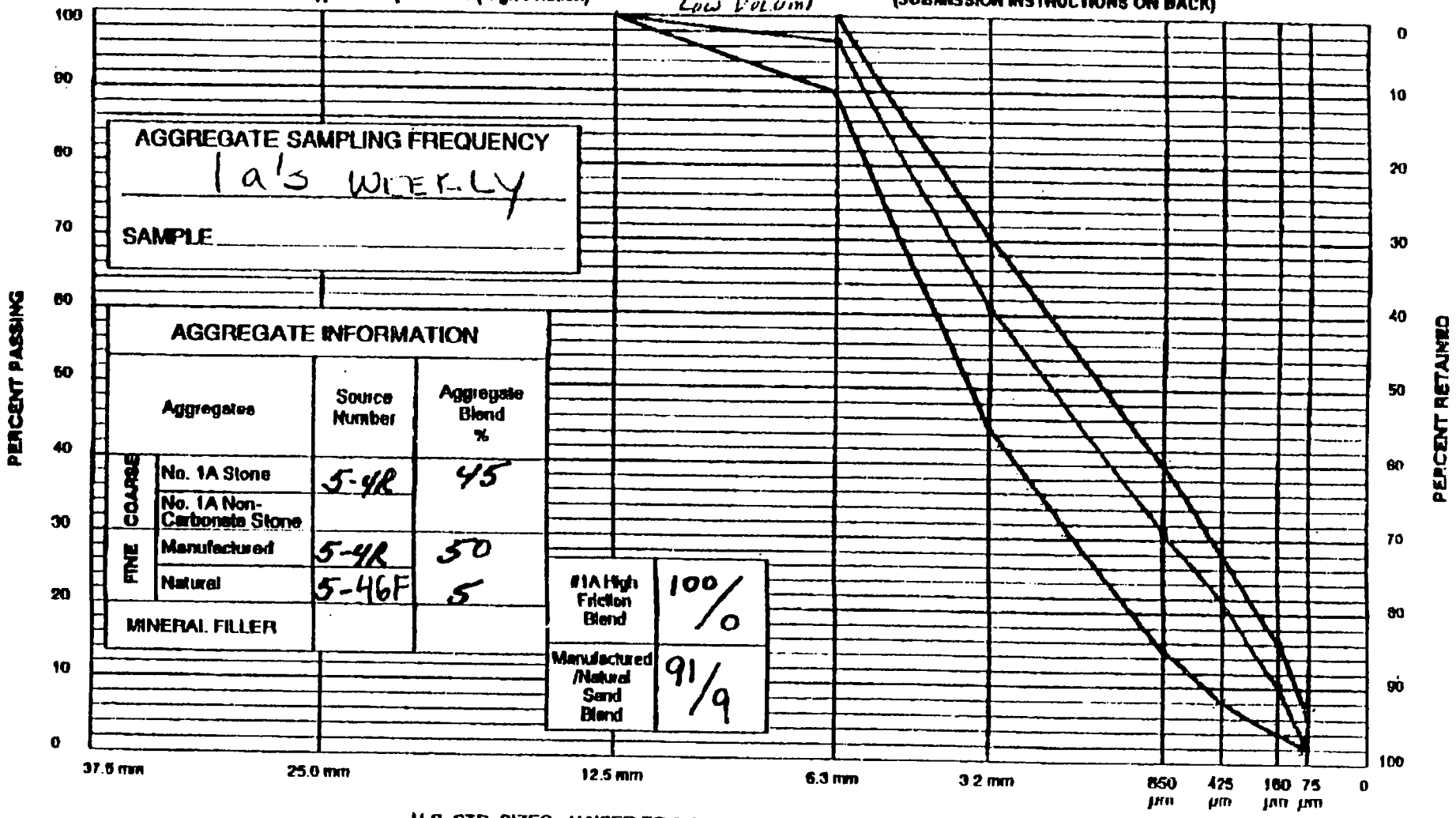
171-18

Type 7F Top Course ~~(High Friction)~~

Facility No. 10118 Formula No. 7 18
Plant REDLAND QUARRIES NY INC Region 5
Plant Location 8875 QUARRY ROAD NIAGARA FALLS, NY
Submitted By Robert J. Bruno Date May 17, 97

(SUBMISSION INSTRUCTIONS ON BACK)

Low Volume



AGGREGATE SAMPLING FREQUENCY

1 a's WEEKLY

SAMPLE

AGGREGATE INFORMATION

	Aggregates	Source Number	Aggregate Blend %
COARSE	No. 1A Stone	5-48	45
COARSE	No. 1A Non-Carbonate Stone		
FINE	Manufactured	5-48	50
FINE	Natural	5-46F	5
	MINERAL FILLER		

#1A High Friction Blend	100/0
Manufactured /Natural Sand Blend	91/9

U.S. STD. SIZES - RAISED TO 0.45 POWER

Sieve Size		37.5 mm	25.0 mm	12.5 mm	6.3 mm	3.2 mm	850 µm	425 µm	160 µm	75 µm	Asphalt Content (Percent)
% Passing	1. General Limits			100	90-100	45-70	15-40	8-27	4-16	2-6	6.0-8.0
	2. JMF Range			100	90-100	55-67	27-38	15-27	7-15	1-5	6.2-7.0
	3. Target Value			100	97	61	31	22	11	3	6.6

Asphalt Grade	
AC	15

P.G. 64-22

Approved by Regional Director Timothy J. Haynes Date 6/17/97

Remarks:

BR 1748 (2/89)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

JOB MIX FORMULA
MARSHALL MIX DESIGN

12-81A

Type 7F Top Course (High Friction) (Low Volume)

Facility No. 10281 Formula No. 12-81
nt REILAND NIAGARA INC Ac 15
Plant Location 8825 QUARRY ROAD NIAGARA FALLS N
Submitted By Richard D. Bauer Date Jan 19 1998
(Submission Instructions on Back)

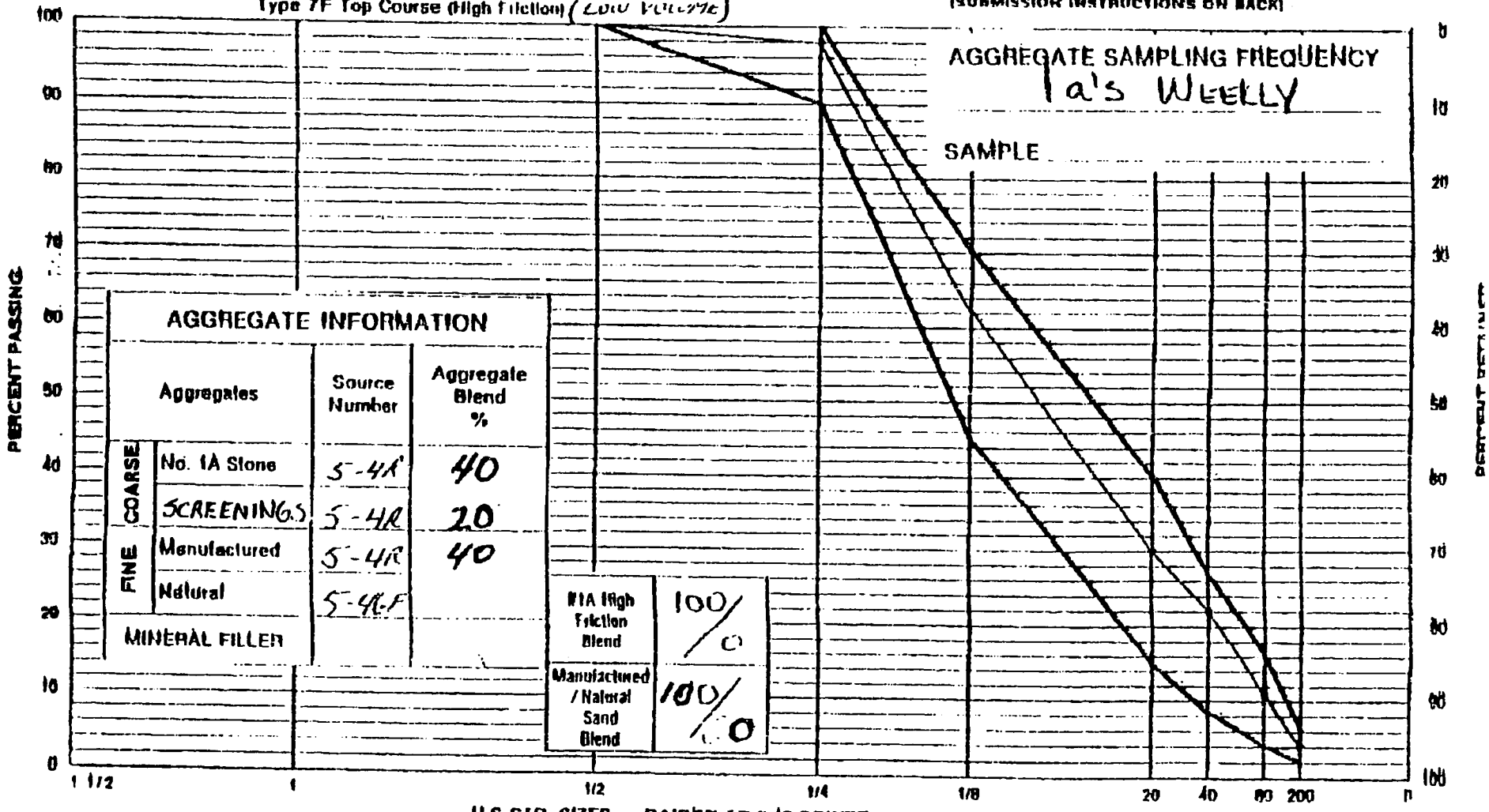
AGGREGATE SAMPLING FREQUENCY
1a's WEEKLY

SAMPLE

AGGREGATE INFORMATION

	Aggregates	Source Number	Aggregate Blend %
COARSE	No. 1A Stone	5-4R	40
FINE	SCREENINGS	5-4R	20
FINE	Manufactured	5-4R	40
FINE	Natural	5-4R-F	
	MINERAL FILLER		

#1A High Friction Blend	100/0
Manufactured / Natural Sand Blend	100/0



Sieve Size		2"	1 1/2"	1"	1/2"	1/4"	1/8"	No. 20	No. 40	No. 80	No. 200	Asphalt Content (Percent)	Asphalt Grade
% Passing	1. General Limits				100	90-100	45-70	15-40	8-27	4-18	2-8	5.0-8.0	AC 15
	2. JMF Range				100	90-100	50-62	16-30	8-23	5-13	2-6	6.2-7.0	
	3. Target Value				100	96	56	23	16	9	4	6.6	

Recommended for Approval by Regional Director Timothy Hogan Date 2/12/98

Approved by Director, Materials Bureau _____ Date _____

Remarks: 50 Blow, 1 1/2", Low Volume only

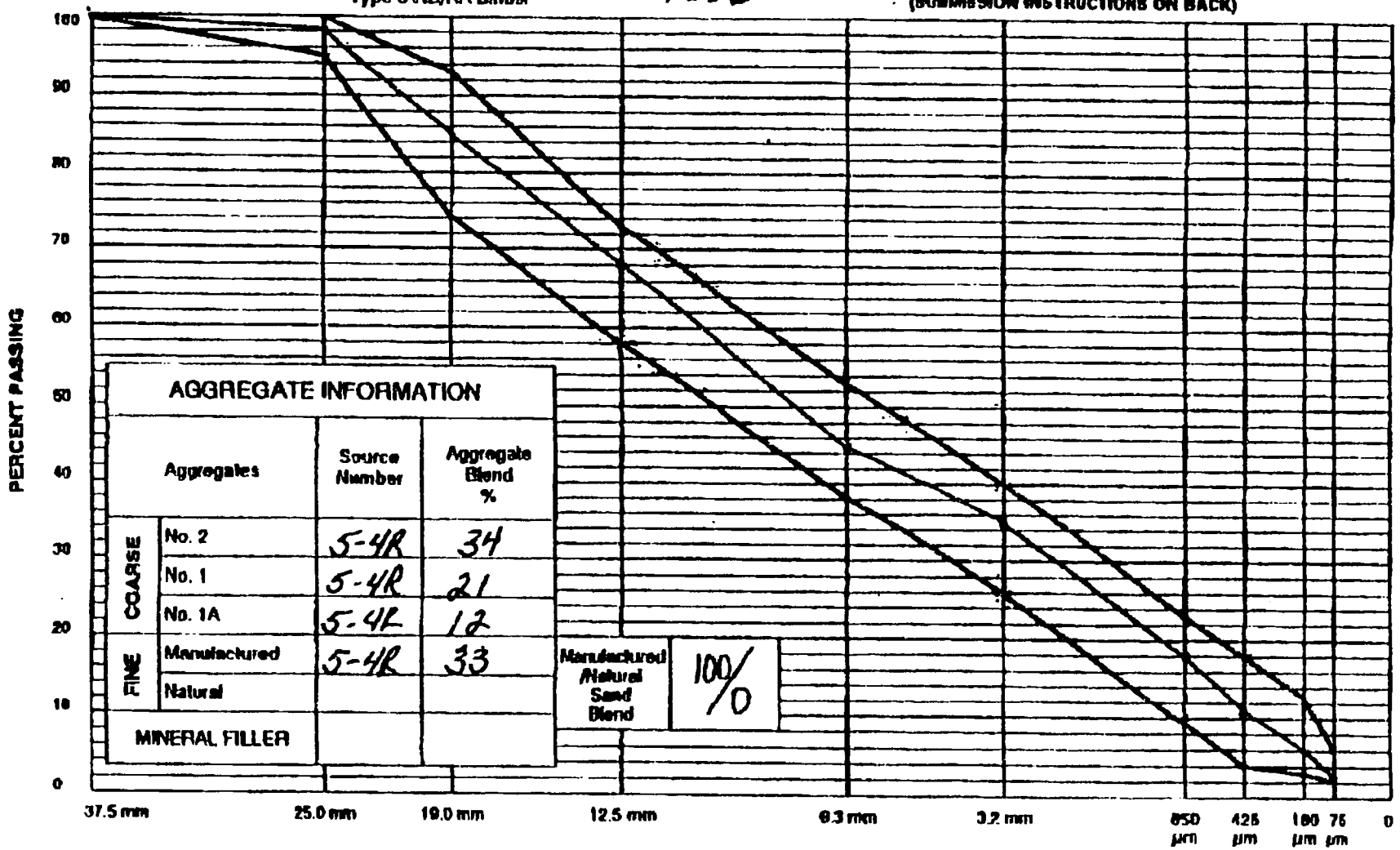
5 M (6/85)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
JOB MIX FORMULA
HEAVY DUTY/RUT AVOIDANCE MIX
Type 3 HD/RA Binder

1626

Facility No. 10118 Formula No. 97115 1626
Plant REDLAND NIAGARA INC. Region #5
Plant Location 8275 QUARRY ROAD NIAGARA FALLS, N.Y.
Submitted By Robert J. Zaun Date March 24 1997

(SUBMISSION INSTRUCTIONS ON BACK)



AGGREGATE INFORMATION

	Aggregates	Source Number	Aggregate Blend %
COARSE	No. 2	5-4R	34
COARSE	No. 1	5-4R	21
COARSE	No. 1A	5-4R	12
FINE	Manufactured	5-4R	33
FINE	Natural		
MINERAL FILLER			

Manufactured/Natural Sand Blend: 100/0

U.S. STD. SIZES - RAISED TO 0.45 POWER

Sieve Size		37.5 mm	25.0 mm	19.0 mm	12.5 mm	9.5 mm	4.75 mm	2.36 mm	850 µm	425 µm	180 µm	75 µm	Asphalt Content (Percent)
% Passing	1. General Limits	100	95-100	74-93	58-78	38-63	28-40	9-23	4-16	3-13	2-6	4.0-6.0	
	2. JMF Range	100	95-100	80-90	63-73	40-50	31-39	14-22	7-15	3-9	0.1-4.1	—	
	3. Target Value	100	98	86	68	45	35	18	11	6	2.1	4.6	

Asphalt Grade: AC 15

Approved by Regional Director Thomas J. Hayes Date 4/4/97

Remarks

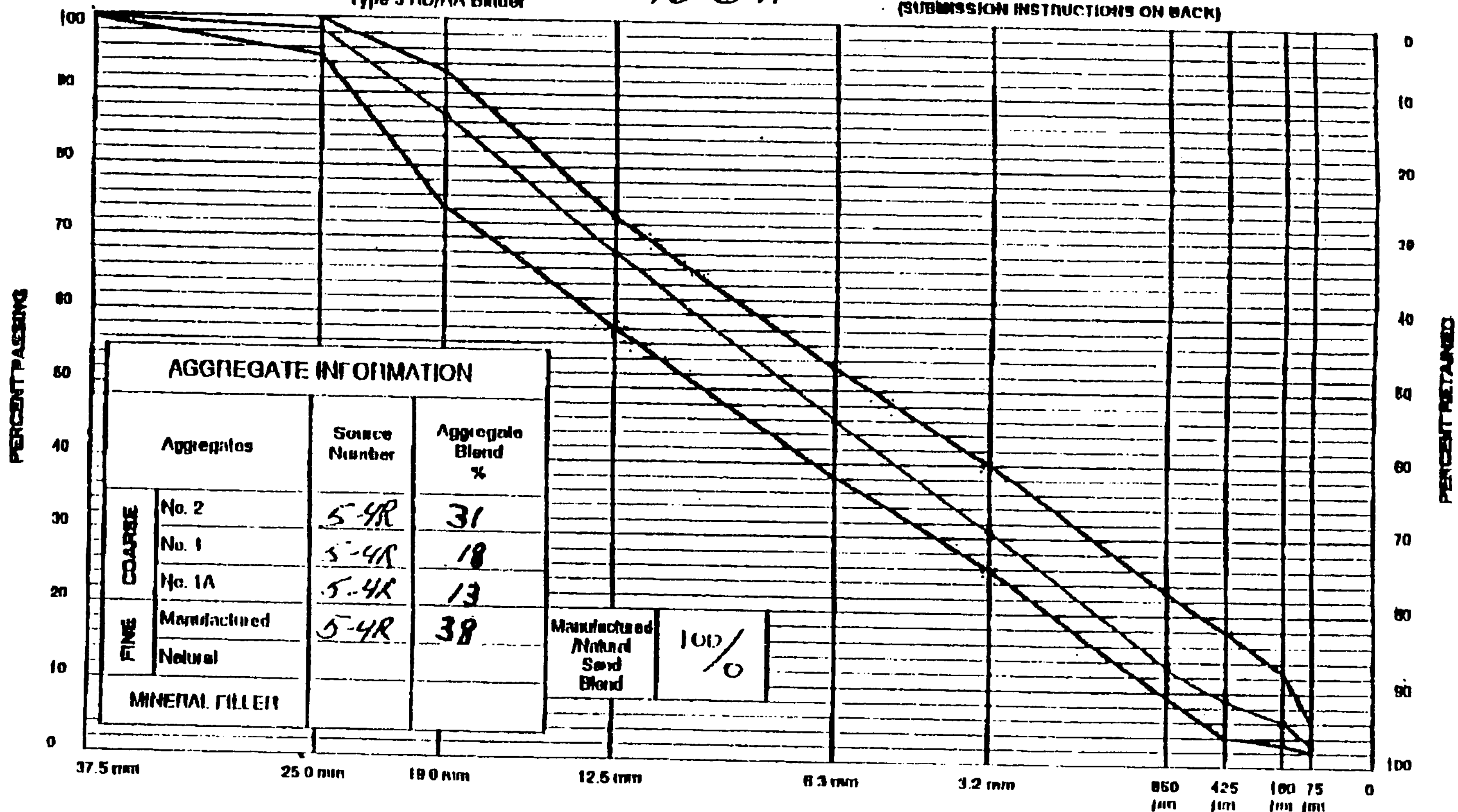
M (87)

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU
JOB MIX FORMULA
HEAVY DUTY/RUT AVOIDANCE MIX
Type 3 HD/RA Binder

1606 A

Facility No. 10281 Formula No. 97 - 1606 A
Plant Redland Quarries Inc Region #5
Plant Location RT 25 Quarry Rd Niagara Falls, NY
Submitted By Robert J. Burr Date Feb. 21, 1997

(SUBMISSION INSTRUCTIONS ON BACK)



AGGREGATE INFORMATION			
Aggregates		Source Number	Aggregate Blend %
COARSE	No. 2	5-4R	31
	No. 1	5-4R	18
	No. 1A	5-4R	13
FINE	Manufactured	5-4R	38
	Natural		
MINERAL FILLER			

Manufactured /Natural Sand Blend	100/0

U.S. STD. SIZES - RAISED TO 0.45 POWER

Sieve Size		37.5 mm	25.0 mm	19.0 mm	12.5 mm	6.3 mm	3.2 mm	850 µm	425 µm	180 µm	75 µm	Asphalt Content (Percent)
% Passing	1. General Limits	100	95-100	74-93	60-73	38-53	26-40	9-23	4-18	3-13	2-6	4.0-6.0
	2. JMF Range	100	95-100	84-94	66-76	47-57	33-41	10-18	5-13	3-9	1-5	—
	3. Target Value	100	99	89	71	52	37	14	9	6	3	4.7

Asphalt Grade
AC 15
PG 64-22

Approved by Regional Director Timothy Haynes Date 4/4/97

Remarks:

BR 77a

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

REGION: #5

ITEM: 403.1901

MIX TYPE: 7F Top Olin Project
< 2% Voids

LOCATION: NIAGARA FALLS, N.Y.

WORKSHEET FOR ANALYSIS OF COMPACTED PAVING MIXTURE

PRODUCER: LAFARGE NIAGARA

(Analysis by weight of total mixture)
COMPOSITION OF PAVING MIXTURE

COMPACTION: 35 BLOWS PER SIDE

	CONSTITUENT MATERIAL	NYSDOT Source Number	Specific Gravity, G APPARENT	Specific Gravity, G BULK		Mix Composition, % by weight of Total Mix, P Region Verification	Mix or Trial Number 1	2	3	4	5
COARSE AGGREGATE					P 1						
					P 2						
					P 3						
	NO. 1A	5-4R	2.797	2.706	P 4	5			32.20		
	SCR'S	5-4R	2.804	2.723	P 5	5			24.84		
FINE AGG.	Manufactured	5-4R	2.804	2.723	P 6	5			24.84		
	Natural	5-46F	2.76	2.695	P 7	5			10.12		
MINERAL FILLER					P 8						
TOTAL AGGREGATE					P S				92.00		
ASPHALT CEMENT @ 77 F (25C)				1.026	P B				8.0		
Gmm	MAX. SP. GR. of Paving Mix (ASTM D2041)				→				2.424		
Gmb	BULK SP. GR. of Compacted Mix (ASTM D2726)				→				2.412		
Gsb	BULK SP. GR. of Total Aggregate*				→				2.714		
Gse	EFFECTIVE SP. GR. of Total Aggregate*				→				2.749		
Gsa	APPARENT SP. GR. of Total Aggregate*				→				2.799		
VMA	VMA = 100 - {Gmb X Ps} / Gsb				→				18.24		
Ps	AIR VOIDS = 100 X {Gmm-Gmb} / {Gmm}				→				0.50		
Pvma	% VMA FILLED w/ A.C.= 100 X {VMA-Ps} / {VMA}				↘				97.3		
Pbe	EFFECTIVE Asphalt Content = {Gb(VMA - PA)} / {Gmb}				↘				7.56		
	STABILITY (CORRECTED)				↘						
	FLOW				→						
	MARSHALL QUOTIENT= Stability (cor.) / Flow				→						
	UNIT WEIGHT				↘				150.5		

*EQUATIONS FROM CHAPTER V, SECTION E, NY MATERIALS METHOD 5.13

PREPARED BY: ROBERT J. KNERR
DATE: 10/04/99

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM # : 403.1901

MIX TYPE: 7F Low Vol.
< 2% Voids
Olin Project

PRODUCER: LAFARGE NIAGARA

LOCATION: NIAGARA FALLS, N.Y.

REGION: #6

MAXIMUM SPECIFIC GRAVITY OF BITUMINOUS PAVING MIXTURES
ASTM D - 2041 (RICE METHOD)

Maximum Specific Gravity of Bituminous Paving Mixture = Gmm
A = Weight of dry sample in air (grams)
D = Weight of flask filled with airless water at 77 (F) (25 C)
E = Weight of flask filled with water and sample at 77 (F) (25C)

Gmm = A/(A+D-E)

ASPHALT CONTENT					8.0 %					
TEST NO.					1	2				
A=					1196.3	1196.9				
D=					8055.4	8038.6				
E=					8758.0	8742.0				
A + D - E =					493.7	493.5				
G mm=					2.423	2.425				
AVERAGE Gmm=						2.424				

PREPARED BY: ROBERT J. KNERR DATE: 10/04/99

BR 79
COMPUTATION OF MARSHALL MIX PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

REGION: 5
ITEM: 403.1901
MIX TYPE: 7F Top Low Vol < 2% Voids (Olin Project)
LOCATION: NIAGARA FALLS, N.Y.

PRODUCER: LAFARGE NIAGARA

SPECIMEN	ASPHALT CONTENT	WEIGHT - GRAMS IN AIR	WEIGHT - GRAMS IN WATER	WEIGHT - GRAMS S.S.D.	VOLUME C.C.	SPECIFIC GRAVITY BULK Gmb	SPECIFIC GRAVITY THEOR. Gmm	VOIDS TOTAL MIX	UNIT WEIGHT Lbs/Cu.Ft.	STABILITY MEAS.	LBS. COR	FLOW 0.01 In.
a	b	c	d	e	f	g	h	i	j	k	l	m
					e - d	c / f		{(h-g) / h} 100	(g x 62.4)			
A												
B												
C												
AVG.												
A												
B												
C												
AVG.												
A	8.0	1189.6	696.7	1189.8	493.1	2.412	2.423	0.5	150.54			
B	8.0	1193.3	698.0	1193.5	495.5	2.408	2.425	0.6	150.28			
C*	8.0	1189.5	697.2	1189.7	492.5	2.415		0.4	150.71			
AVG.	8.0					2.412	2.424	0.5	150.61			
A												
B												
C												
AVG.												
A												
B												
C												
AVG.												

A & B = 35 Blows
C = 50 Blows

PREPARED BY: ROBERT J. KNERR

DATE: 10/04/99

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

REGION: 5

ITEM: 403 1901

MIX TYPE: 7F Top Low Vol.
< 2% Voids (Olin Project)
PRODUCER: LAFARGE NIAGARA

LOCATION: NIAGARA FALLS N.Y.

MARSHALL GRADATION ANALYSIS WORKSHEET

AGGREGATE INFORMATION				
	AGGREGATE COLD FEED BINS	SOURCE NUMBER	TEST NUMBER	COLD FEED BLEND %
COARSE				
	NO. 1A	5-4R	97AR9	15
	NO. SCR'S	5-4R	97AR8	17
FINE	NO. 1B	5--4R	97AR9	35
	SAND	5-45F	97AF29	0

SIEVE SIZES	BIN NO. H.F. 1	BIN NO. 1	BIN NO. 1A	BIN NO. SCR'S	BIN NO. 1B	SAND
	PERCENT PASSING SIEVE					
1/2"			100	100	100	
1/4"			92	99	100	
1/8"			9	69	96	100
20			1	36	36	99
45			1	29	22	92
80			1	23	12	25
200			1	14	4	1
PAN			0	0	0	0

COMBINED **AVERAGE** **GRADATION**

BIN NO.	PER. % BATCHED	PERCENT % PASSING SIEVE										
						12.6mm	6.3mm	3.2mm	850um	425um	180um	75um
HF	0.00%					0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.00%					0.0	0.0	0.0	0.0	0.0	0.0	0.0
1A	35.00%					35.0	32.2	3.2	0.4	0.4	0.4	0.4
SCR'S	27.00%					27.0	26.7	18.6	9.7	7.8	6.2	3.8
1B	27.00%					27.0	27.0	25.9	9.7	5.9	3.2	1.1
SAND	11.00%					11.0	11.0	11.0	10.9	10.1	2.8	0.1
TOTAL	100.00%					100.0	96.9	58.7	30.7	24.2	12.6	5.3
SPEC.	LIMITS					100 100	90 100	45 70	15 40	8 27	4 16	2 6

PREPARED BY: ROBERT J. KNERR

DATE: 10/04/99

SR 88

COMBINED MARSHALL GRADATION
AT THE % ASPHALT CEMENT INDICATED

WEIGHT RETAINED (GRAMS)

AGG. BIN	BATCH PER %	GRAMS BATCH	1/2"	1/4"	1/8"	20	40	80	200	PAN	TOTAL
1A	35%	386.4	0.0	15.5	336.2	30.9	0.0	0.0	0.0	3.9	386.4
SCR'S	27%	298.1	0.0	6.9	96.4	96.4	20.9	17.9	23.8	32.8	298.1
1B	27%	298.1	0.0	0.0	8.9	179.6	41.7	29.8	26.8	11.9	298.1
SAND	11%	121.4	0.0	0.0	0.0	1.2	8.5	61.4	29.1	1.2	121.4
TOTAL	100%	1104.0									1104.0

1200 gr. x 8.0% A.C.= 96.0 gr. A.C.
1200 gr. - 96.0 1104.0 gr. aggregate

		1-1/2"	1"	3/4"	1/2"	1/4"	1/8"	20	40	80	200	PAN	TOT
Average Percent Retained Per Stone Item	1 H.F.	0%	0%	0%	0%	90%	9%	0%	0%	0%	0%	1.0%	100%
	1'S	0%	0%	0%	5%	85%	9%	0%	0%	0%	0%	1.0%	100%
	1A'S	0%	0%	0%	0%	4%	87%	8%	0%	0%	0%	1.0%	100%
	SCR'S	0%	0%	0%	0%	3%	32%	33%	7%	8%	8%	11.0%	100%
	1B'S	0%	0%	0%	0%	0%	3%	60%	14%	10%	9%	4.0%	100%

APPENDIX F-9

ASPHALT PAVEMENT

Core Density Test Data

BR 179
COMPUTATION OF
MARSHALL PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM# : 403.13 REGION: #5

MIX TYPE: 3 Binder
LOCATION: Niagara Falls
DATE: 10/13/89

PRODUCE: Lafarge Niagara
J.M.F. #

LOT # 1 SUBLOT: A
FACILITY: 10281

SPECIMEN	ASPHALT CONTENT	WEIGHT IN GRAMS			VOLUME	SPECIFIC GRAVITY		VOIDS	STABILITY-LB			FLOW	QUOTIENT
		IN AIR	IN WATER	S.S.D.	CC	BULK	THEOR	TOTAL MIX	UNIT WT.	MEASURED	CORRECTED		
						Gmb	Gmm		Lb/Cu.Ft				
a	b	c	d	e	f	g	h	i	j	k	l	m	n
					e-d	c/f		100(h g)/h	(G*62.4)				l/m
1	5.1	1275.5	758.1	1279.0	520.9	2.449	2.528	3.28	152.82				
2	5.1	1253.8	743.2	1256.1	512.9	2.445	2.535	3.44	152.57				
1&2avg	5.1	1264.6	750.6	1267.5	516.9	2.447		3.36	152.69				
QCT AVG.						2.447	2.532	3.36	152.69				
3	5.1	1244.6	746.7	1246.4	499.7	2.491	2.528	1.62	155.44				
4	5.1	1238.8	744.2	1240.2	496.0	2.498	2.535	1.34	155.88				

EXTRA RICE TESTS

ASPHALT CONTENT	5.1% QCT		5.1% QCA		Q.C.T.		Q.C.A.	
TEST #	1	2	1	2	1	2	1	2
A	2066.1	2065.6	2066.1	2065.6				
D	8055.4	8038.6	8055.4	8038.6				
E	9304.1	9289.3	9304.1	9289.3				
A+D-E	817.4	814.9	817.4	814.9				
Gmm	2.528	2.535	2.528	2.535				
AVG.Gmm	2.532		2.532		#VALUE!		0.000	

Quality Control By: Rob Knerr

Quality Assurance By:

REMARKS: [illegible]
[illegible]
[illegible]
Puck # 4 = 75 blows

BR 179
COMPUTATION OF
MARSHALL PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM# : 403.1901 **REGION:** #5

PRODUCT: Lafarge Niagara
J.M.F. #

LOT # 1 **SUBLOT:** A
FACILITY: 10281

MIX TYPE: 7F Top - Olin Project
LOCATION: Niagara Falls
DATE: 10/14/98

SPECIMEN	ASPHALT CONTENT	WEIGHT IN GRAMS			VOLUME	SPECIFIC GRAVITY		VOIDS	STABILITY-LB			FLOW	QUOTIENT
		IN AIR	IN WATER	S.S.D.	CC	BULK Gmb	THEOR. Gmm	TOTAL MIX	UNIT WT. Lb/Cu.Ft	MEASURED	CORRECTED		
a	b	c	d	e	f	g	h	i	j	k	l	m	n
					e-d	c/f		100(h-g)/h	(G*62.4)				l/m
1	8.0	1225.3	716.1	1226.0	509.9	2.403	2.433	1.40	149.95				
2	8.0	1241.8	726.7	1242.5	515.8	2.408	2.441	1.19	150.26				
3	8.0	1255.5	733.9	1256.1	522.2	2.404		1.35	150.01				
QCT AVG.						2.405	2.437	1.31	150.07				

EXTRA RICE TESTS

ASPHALT CONTENT	8.0% QCT				Q.C.T.		Q.C.A.	
TEST #	1	2			1	2	1	2
A	1219.0	1214.6						
D	8055.4	8038.6						
E	8773.3	8755.6						
A+D-E	501.1	497.6						
Gmm	2.433	2.441						
AVG.Gmm	2.437				#VALUE!		0.000	

Quality Control By: Rob Knerr

Quality Assurance By:

EMARKS: 35 Blows
Sampled from chute @ 40 tons for fast results on job.

GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 15, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 - B
CLIENT:	LAW ENVIRONMENTAL	DATE RECEIVED:	OCTOBER 15, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE (35 BLOW)	% MARSHALL (35 BLOW)	DATE PLACED
1- TOP	99 - 09	2.31	143.9	5.2	150.1	95.9	10/14/1999
2- TOP	99 - 10	2.32	145.0	4.8	150.1	96.6	10/14/1999
3 - BINDER	99 - 11	2.41	150.1	4.8	152.7	98.3	10/13/1999
4 - BINDER	99 - 12	2.39	148.8	5.6	152.7	97.4	10/13/1999

NOTES:

Core samples collected from 10/13/99 & 10/14/99 placement areas.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

DOCFILE:LABSUMSXL

415 South Transit Street, Lockport, New York 14094
voice: 716.625.6933 / fax: 716.625.6983

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GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 16, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO	99 - 1076 - B
CLIENT:	LAW ENVIRONMENTAL	DATE RECEIVED	OCTOBER 16, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE (35 BLOW)	% MARSHALL (35 BLOW)	
1B - TOP	99 - 13	2.41	150.0	1.1	150.1	99.9	Retest of sample "1-TOP"
2B - TOP	99 - 14	2.37	147.5	2.7	150.1	98.3	Retest of sample "2-TOP"

NOTES:

Core samples collected from 10/14/99 placement area.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

DOCFILE.LABSUMSXL

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BR 179
COMPUTATION OF
MARSHALL PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM# : 403.13 REGION: #5

MIX TYPE: 3 Binder Olin prjt.
LOCATION: Niagara Falls
DATE: 10/19/99

PRODUCER: Lafarge Niagara
J.M.F. #

LOT #
FACILITY: 10261

SUBLOT:

SPECIMEN	ASPHALT CONTENT	WEIGHT IN GRAMS			VOLUME	SPECIFIC GRAVITY		VOIDS	STABILITY-LB			FLOW	QUOTIENT
		IN AIR	IN WATER	S.S.D.	CC	BULK Gmb	THEOR. Gmm	TOTAL MIX	UNIT WT. Lb/Cu Ft	MEASURED	CORRECTED		
a	b	c	d	e	f	g	h	i	j	k	l	m	n
					e-d	c/f		100(h-g)/h	(G*62.4)				l/m
1	5.1	1246.7	741.8	1249.4	507.6	2.456	2.533	3.00	153.25				
2	5.1	1289.5	766.8	1292.2	525.4	2.454	2.531	3.08	153.13				
3	5.1	1242.3	737.9	1245.7	505.8	2.451		3.20	152.94				
OCT AVG.						2.454	2.532	3.08	153.13				

EXTRA RICE TESTS

ASPHALT CONTENT	5.1% OCT				Q.C.T.		Q.C.A.	
TEST #	1	2			1	2	1	2
A	2027.2	2043.8						
D	8055.4	8038.6						
E	9282.2	9275.0						
A+D-E	800.4	807.4						
Gmm	2.533	2.531						
AVG.Gmm	2.532				#VALUE!		0.000	

Quality Control By: Rob Knerr

Quality Assurance By.

EMARKS: 35 Blows

GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 19, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO	99 - 1076 - B
CLIENT	LAW ENVIRONMENTAL	DATE RECEIVED	OCTOBER 19, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE * (35 BLOW)	% MARSHALL (35 BLOW)
B10 - BINDER	99 - 15	2.48	154.4	2.1	153.13	100.8
B11 - BINDER	99 - 16	2.47	153.7	2.4	153.13	100.4
B12 - BINDER	99 - 17	2.46	153.4	2.8	153.13	100.2

* Marshall value from 10/19/99 am batch. No Marshall test data provided for 10/18/99 supplied material.

NOTES:

Core samples collected from 10/18/99 placement area.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.M. / MARK W. GLYNN, P.E.

DOCFILE:LABSUMSXL

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GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT:	INDUSTRIAL WELDING SITE	DATE REPORTED:	OCTOBER 20, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 - B
CLIENT:	LAW ENVIRONMENTAL	DATE RECEIVED:	OCTOBER 20, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE * (35 BLOW)	% MARSHALL
B13 - BINDER	99 - 18	2.48	154.7	2.1	153.13	101.0
B14 - BINDER	99 - 19	2.41	149.9	4.8	153.13	97.9
B15 - BINDER	99 - 20	2.40	149.6	5.2	153.13	97.7
B16 - BINDER	99 - 21	2.50	155.9	1.3	153.13	101.8
B17 - BINDER	99 - 22	2.44	152.0	3.6	153.13	99.3

NOTES:

Core samples collected from 10/19/99 placement area.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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10/25/1999 09:42 2973336

BR 179
COMPUTATION OF
MARSHALL PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM# : 403.1901 REGION: #5

MIX TYPE: 7F Top Olin Project
LOCATION: Niagara Falls
DATE: 10/25/99

PRODUCE: Lafarge Niagara
J.M.F. #

LOT #
FACILITY: 10281

SUBLOT:

SPECIMEN	ASPHALT CONTENT	WEIGHT IN GRAMS			VOLUME	SPECIFIC GRAVITY		VOIDS	STABILITY-LB			FLOW	QUOTIENT
		IN AIR	IN WATER	S.S.D	CC	BULK	THEOR.	TOTAL MIX	UNIT WT.	MEASURED	CORRECTED		
						Gmb	Gmm		Lb/Cu.Ft				
a	b	c	d	e	f	g	h	i	j	k	l	m	n
					e-d	c/f		100(h-g)/h	(G*62.4)				l/m
1	8.0	1227.7	718.8	1228.6	509.8	2.408	2.424	0.74	150.26				
2	8.0	1253.0	732.0	1254.1	522.1	2.400	2.427	1.07	149.76				
3	8.0	1242.0	725.5	1242.9	517.4	2.400		1.07	149.76				
QCT AVG.						2.403	2.426	0.95	149.93				

EXTRA RICE TESTS

ASPHALT CONTENT	8.0% QCT				Q.C.T.		Q.C.A.	
TEST #	1	2			1	2	1	2
A	1246.5	1280.4						
D	8055.4	8038.6						
E	8787.6	8791.5						
A+D-E	514.3	527.5						
Gmm	2.424	2.427						
AVG.Gmm	2.426				#VALUE!		0.000	

Quality Control By: Rob Knerr

Quality Assurance By:

EMARKS: 35 Blows

GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT: INDUSTRIAL WELDING SITE
LOCATION: NIAGARA FALLS, NEW YORK
CLIENT: LAW ENVIRONMENTAL

DATE REPORTED: OCTOBER 26, 1999
PROJECT NO.: 99 - 1076 - B
DATE RECEIVED: OCTOBER 26, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE * (35 BLOW)	% MARSHALL (35 BLOW)
T10 - TOP	99 - 23	2.40	149.7	0.8	149.95	99.8
T11 - TOP	99 - 24	2.37	147.5	2.3	149.95	98.3
T12 - TOP	99 - 25	2.37	147.8	2.1	149.95	98.6
T13 - TOP	99 - 26	2.37	147.6	2.3	149.95	98.4

NOTES:

Core samples collected from 10/25/99 placement area.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

DOCFILE:LABSUMSXL

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BR 179
COMPUTATION OF
MARSHALL PROPERTIES

NEW YORK STATE
DEPARTMENT OF TRANSPORTATION
MATERIALS BUREAU

ITEM# : 403.1901 REGION: #5

MIX TYPE: 7F Top Olin Project
PRODUCE Lafarge Niagara LOT # SUBLOT: LOCATION: Niagara Falls
J.M.F. # FACILITY: 10281 DATE: 10/26/99

SPECIMEN	ASPHALT CONTENT	WEIGHT IN GRAMS			VOLUME	SPECIFIC GRAVITY		VOIDS	STABILITY-LB			FLOW	QUOTIENT
		IN AIR	IN WATER	S.S.D.	CC	BULK	THEOR.	TOTAL MIX	UNIT WT.	MEASURED	CORRECTED		
a	b	c	d	e	f	g	h	i	j	k	l	m	n
					e-d	c/f		100(h-g)/h	(G*62.4)				l/m
1	8.0	1238.3	724.0	1238.9	514.9	2.405	2.425	0.91	150.07				
2	8.0	1229.8	720.2	1230.5	510.3	2.410	2.429	0.70	150.38				
3	8.0	1233.5	722.3	1234.1	511.8	2.410		0.70	150.38				
OCT AVG.						2.408	2.427	0.78	150.26				

EXTRA RICE TESTS

ASPHALT CONTENT	8.0% OCT				Q.C.T.		Q.C.A.	
TEST #	1	2			1	2	1	2
A	1237.4	1229.1						
D	8055.4	8038.6						
E	8782.6	8761.6						
A+D-E	510.2	506.1						
Gmm	2.425	2.429						
AVG.Gmm	2.427				#VALUE!		0.000	

Quality Control By: Rob Knerr

Quality Assurance By:

EMARKS: 35 Blows

GLYNN GEOTECHNICAL ENGINEERING

LABORATORY SUMMARY SHEET

PROJECT	INDUSTRIAL WELDING SITE	DATE REPORTED	OCTOBER 27, 1999
LOCATION:	NIAGARA FALLS, NEW YORK	PROJECT NO.:	99 - 1076 - B
CLIENT	LAW ENVIRONMENTAL	DATE RECEIVED:	OCTOBER 27, 1999

SAMPLE I.D.	GGE SAMPLE NO.	SPECIFIC GRAVITY	DENSITY (PCF)	% AIR VOIDS	MARSHALL VALUE * (35 BLOW)	% MARSHALL (35 BLOW)
T14 - TOP	99 - 27	2.40	149.1	1.3	150.26	99.2
T15 - TOP	99 - 28	2.39	148.3	1.8	150.26	98.7
T16 - TOP	99 - 29	2.38	148.1	1.9	150.26	98.6
T17 - TOP	99 - 30	2.37	147.7	2.2	150.26	98.3

NOTES:

Core samples collected from 10/26/99 placement area.

The specified method - AASHTO T-166 refers to AASTHO T-275 for samples with open voids.

ASTM D-1188 is an acceptable alternative method to AASTHO T-275.

These cores were tested in accordance with ASTM D-1188 and air voids were determined in accordance with ASTM D-3203.

SUBMITTED BY: EDWARD LOVER

REVIEWED BY: A.R.H. / MARK W. GLYNN, P.E.

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APPENDIX G

FIELD CHANGE APPROVALS

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-001	9/28/99

Identification of Area and Item:

Storm Water Runoff Collection and Discharge

Description of Change:

The 90% design package previously submitted to NYSDEC called for all of the site's surface drainage to be directed to existing combined sewer, the storm sewer and Gill Creek via existing catch basins in the vicinity of the IWS and ALP properties. The City of Niagara Falls cited a City Ordinance requiring parcels within 100 feet of a stream to discharge storm water runoff to that stream. The IWS and ALP properties are within 100 feet of Gill Creek.

The 100% design package now has the site plans draining all storm water runoff to a series of newly constructed catch basins and discharging the water into the creek via three pipes. The three pipes cross under Veteran's Drive and terminate at Gill Creek. This work is covered under the Nationwide permit (No.13) provided by the USACOE.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Terry Castiglione	Date: 11-11-99
Christa Cruikshank, Law CQC/CQA	[signature]	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	[signature]	Date: 11.12.99
John Burns, Olin Project Manager	[signature]	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	[signature]	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-002	9/28/99

Identification of Area and Item:

Leachate Collection Recovery System – Recovery Well

Description of Change:

The original material specification, 02682 @ section 2.01, was 12-inch diameter well screen and solid wall Schedule 80 PVC pipe as manufactured by Atlantic Screen & Manufacturing, Inc., or approved equal. The method of attaching the specified SDR 17 HDPE collection pipe to the sump was not specified.

The 12" PVC pipe was changed to 12" SDR 11 HDPE with a shop-welded HDPE inlet stub to allow butt fusing of the incoming HDPE collection pipe. The slot size and interval were unchanged from the original specification.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.G.	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn J Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-003	9/28/99

Identification of Area and Item:

American Legion Building Rubble – The IWS 90% Design package allowed for use of the ALP rubble as fill material under the IWS cap.

Description of Change:

The specifications called for Type 2 ROC for aggregate base courses at the ALP. 2" ROC was also specified as the fill material needed to bring the ALP to pavement subgrade. The ALP building rubble was originally designated to be placed in the IWS waste cover area.

ALP demolition plans were revised to eliminate intrusive activities before commencement of work. The ALP rubble from the above grade demolition will be placed in ALP pavement areas where more than six inches of fill is needed. This change reduces the volume of imported fill needed for the ALP paving by approximately 200 to 300 cubic yards.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.E.S.	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	GN Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
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Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-004	9/28/99

Identification of Area and Item:

The 90% design package called for keying the 40-mil HDPE liner into native clay

Description of Change:

In the 90% design package, the 40-mil HDPE liner was shown to extend into the native/re-compacted clay to a depth of three feet to form the perimeter key trench. Keying the liner into native clay would be difficult to construct due to the varying depths to the clay layer around the perimeter of the IWS.

The 100% design was revised to show a minimum 1' deep by 3' wide compacted clay key into native clay and a minimum 1' deep geomembrane key into native/re-compacted clay.

Authorization/Acknowledgement Signatures:			
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date:	11/11/99
Christa Cruikshank, Law CQC/CQA	[signature]	Date:	11/9/99
Jesse Grossman, GGE Construction Manager	[signature]	Date:	11.12.99
John Burns, Olin Project Manager	John Burns	Date:	11/29/99
Glenn Coffman, Law Certifying Engineer	[signature]	Date:	11/22/99

NYSDEC Comments:

Approved:		Date:
	NYSDEC Site Representative	

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FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-005	9/28/99

Identification of Area and Item:

City of Niagara Falls ordinance requires parcels within 100 feet of a stream to discharge storm water runoff to that stream (see FCA-001). The grading plan had to be re-engineered to comply with this ordinance.

Description of Change:

The 90% design plans called for grading plans to facilitate drainage to the City of Niagara Falls' existing sewers and catch basins.

The new drainage plan in the 100% design package calls for the drainage between the IWS and the ALP to be separate. The IWS is now graded to direct all runoff to the east using a V-channel that is sloped to two catch basins. The ALP is filled and graded to slope primarily from the north to south so that virtually all of the runoff goes south to three catch basins that are linked with 24" SDR 17 HDPE pipe. All surface runoff from the site enters Gill Creek. These plans have been accepted and a construction permit issued by the City Engineer, Kevin O'Brien. The Nationwide permit No. 13 issued by the USACOEcovers this site for construction work performed in Gill Creek.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager		Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:
	NYSDEC Site Representative	

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-006	9/30/99

Identification of Area and Item:

Vegetative layer (topsoil)

Description of Change:

Specification 02314 states that the topsoil used for the vegetative layer should comply with section 713.01 of the NYSDOT specifications. The percent passing of a #200 mesh sieve should be 20 to 80. The pH of the samples should be between 5.5 and 7.6.

The soil sampled had 90% passing the #200 sieve and a pH of 5.1. The particle size distribution of the topsoil was approved by Law. Sevenson and its seeding contractor will adjust for the soil pH in the hydroseeding process by adding lime to the mixure.

Authorization/Acknowledgement Signatures:			
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date:	11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date:	11/9/99
Jesse Grossman, GGE Construction Manager	J.G.	Date:	11.12.99
John Burns, Olin Project Manager	John Burns	Date:	11/29/99
Glenn Coffman, Law Certifying Engineer	GJ Coffman	Date:	11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-007	9/28/99

Identification of Area and Item:

Asphalt compaction specifications (Section 02743 Paragraph 3.04 Items B, C, and J)

Description of Change:

Item B reads "Binder course shall be placed over aggregate base in one lift to achieve a thickness of 2 inches when compacted". It should read "Binder course shall be placed over aggregate base in one lift to achieve the thickness shown on the Drawings"

Item C reads "Surface course shall be placed over binder course in one lift to achieve a thickness of 1 ½ inches when compacted". It should read "Surface course shall be placed over binder course in one lift to achieve the thickness shown on the Drawings"

Item J reads "...average minimum density of 98 percent of maximum theoretical density..." The actual compaction should be 98 percent of a 35 blow Marshall Test density. The specification is based on "Lining of Waste Containment and Other Impoundment Facilities" published by the EPA in 1988 Table 4.38 on page 4-166. According to a footnote, all of the values in this table are based on a 35 blow Marshall Test = 100%.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.E.	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-008	9/28/99

Identification of Area and Item:

Revisions requested to the Site Specific Health and Safety Plan, Section 4.0 Community Air Monitoring, in the 90% design package

Description of Change:

Air samples will be collected during any intrusive activities or activities that involve contaminated or de-watered sediments. The air samples will be archived for 30 days from the sampling date unless analysis is requested by NYSDOH.

A particulate pre-filter will be used for the mercury documentation air monitoring. The particulate pre-filter and vapor phase filter will be analyzed for mercury.

Two windsocks will be installed to aid in taking wind direction measurements. Periodically throughout the day, weather data will be collected from the Olin's meteorological station located south of the Site.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Dustin Steiner, CRA HSO	Dustin R. Steiner	Date: 11/11/99
Jesse Grossman, GGE Construction Manager		Date: 11-12-99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:
	NYSDEC Site Representative	

Distribution:
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Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-009	11/03/99

Identification of Area and Item:

Additional soil was placed beneath the IWS capping system to allow reduction of the cap size. The westernmost portion of the IWS cover limits (a.k.a. the dog leg) was eliminated.

Description of Change:

The 100% design called for the IWS capping system to cover the portion of the IWS property bounded on the north by the fence across the southern boundary of the Cerebral Palsy Association property, on the west by the utility easement and on the south by the APL property.

It was determined that the "dog leg" area should be eliminated from the cap footprint since the volume of material for consolidation was reduced. NYSDEC approval for this change was based on review of previous site data that identified four areas for excavation on a 50-foot grid. It was agreed that two feet of soil would be removed from three of identified areas and that four feet of soil would be removed from the fourth area. Approximately 1,000 cubic yards of soil was removed during the excavations and placed within the IWS cap limits.

Additional soil samples were taken in the area southwest of the "dog leg". Based upon the 25-foot grid sampling plan approved by NYSDEC, 20 locations were sampled on 10/1/99. Six of the twenty soil samples were split with NYSDEC. Fourteen grid area locations were excavated to a depth of two feet. Approximately 700 cubic yards of soil was removed during the excavation and placed within the IWS cap limits.

Sampling procedures for this field change are included as FCA 1222-009a.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/10/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.E.S.	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-009a	11/03/99

Identification of Area and Item:

Sampling of the southwestern most area of the designed IWS cover limits.

Description of Change:

The NYSDEC requested characterization of the southwest area of the dog leg where soils data was not available (see FCA 1222-009). The direct push method was used to obtain soil samples laid out on a 25-foot grid in the area designated by NYSDEC. The soil samples were collected in macro core open samplers fitted with clear acetate liners.

Each soil sample was removed from the liner, placed in a pre-cleaned stainless steel bowl and mixed to homogenize. The soil sample was then placed in a laboratory clean glass jar and the jars put on ice for transport. Samples were split with the NYSDEC field representative upon request. The samples were sent to a New York State certified laboratory under chain of custody for expedited analysis.

A second round of confirmatory samples was collected from the excavated areas using driven split-spoon samplers. Approximately 700 cubic yards of soil was excavated and placed within the limits of the IWS cap.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson's Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.E.S	Date: 11.12.99
John Burns, Olin Project Manager	J. John Burns	Date: 11/29/99
Glen Coffman, Law Certifying Engineer	G Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-010	11/03/99

Identification of Area and Item:

IWS south drainage ditch.

Description of Change:

The excavation of soils from the southwestern most area of the original IWS cover limits resulted in the relocation of that soil within the modified limits of the IWS cap (see FCA 1222-009). The relocation of this soil occurred after 75% of the clay buffer material had been placed. To keep the project on schedule, the contractor placed the approximately 1700 additional cubic yards on the extreme southern end of the IWS. The change in volume altered the drainage ditch position west and south of the IWS, resulting in a deeper ditch on the south side. The extra height resulted in side slopes of greater than 3H: 1V and created the potential for slope failure or ongoing erosion maintenance on the south side of the ditch.

To shore the side slope and still maintain proper drainage, 180 linear feet of 15" diameter ADS drain pipe was placed on the original ditch invert. The ditch was then backfilled with common fill to cover the pipe and to create side slopes of 3H: 1V or less. Cover over the pipe was graded to drain east toward the existing catch basin or back toward the "daylight" or west end of the pipe.

A two-foot extension was also added to the original catch basin design to allow for proper drainage of the area.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA		Date: 11/9/99
Jesse Grossman, GGE Construction Manager		Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer		Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-011	11/03/99

Identification of Area and Item:

Placement of approximately 520 linear feet of fence on the south boundary of the ALP property.

Description of Change:

The 100% design called for galvanized chain link fence to be installed along the south boundary of the ALP. This feature was eliminated because Olin now owns the property on both sides of the proposed fence. The ALP and IWS properties are contained by a perimeter fence that extends around Olin's property west of Veterans Drive and north of Buffalo Avenue.

The proposed gates that allowed access to the IWS from Veterans Drive were eliminated due to the steep slopes and swale along the east boundary of the Site. A double gate was installed in the southeast corner of the ALP property.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11-11-99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	Jesse Grossman	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-012	11/03/99

Identification of Area and Item:

Access to IWS capped area

Description of Change:

Two 20 foot long culvert pipes were added to the swales around the IWS cap to provide vehicle access for maintenance and monitoring activities. Access from the south is across a section of 15" diameter ADS pipe covered with crushed stone. Access from the west is across a section of 24" HDPE covered by soil fill.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson Representative	Jerry Castiglione	Date: 11/11/99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	J.S.	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glenn Coffman, Law Certifying Engineer	Glenn Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:
	NYSDEC Site Representative	

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-014	11/04/99

Identification of Area and Item:

Residential parking area south of the alley

Description of Change:

The parking area between the north side of the IWS and south side of the alley was a concern to the near-neighbors. The area was asphalt paved as a good will gesture to the neighbors. This offer resulted in 11,000 S.F. of base stone, binder and top course being installed. In addition, curb bumpers were installed to control parking and to protect the IWS fencing bordering the area.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson's Representative	Jerry Castiglione	Date: 11-11-99
Christa Cruikshank, Law CQC/CQA		Date: 11/9/99
Jesse Grossman, GGE Construction Manager		Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glen Coffman, Law Certifying Engineer		Date: 11/22/99

NYSDEC Comments:

Approved:		Date:

NYSDEC Site Representative

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

FIELD CHANGE APPROVAL (FCA)

Project Name:	Project Number:	FCA Number:	Date:
Industrial Welding Site	R.Z25.1011	1222-015	11/04/99

Identification of Area and Item:

The side slopes of the ALP paving area.

Description of Change:

The slopes of the ALP paving area are generally 3H: 1V along the edges of the west, north, and east ends of the ALP paving limits. All paving on these slopes has to be done by hand and rolled using narrow rollers. The increased asphalt cement in the top course mix made the material too "fat" to roll on the steep slopes. The mix had to be modified to a lower asphalt cement content to allow application on the slopes.

Authorization/Acknowledgement Signatures:		
Jerry Castiglione, Sevenson's Representative	Jerry Castiglione	Date: 11-11-99
Christa Cruikshank, Law CQC/CQA	Christa L Cruikshank	Date: 11/9/99
Jesse Grossman, GGE Construction Manager	[illegible]	Date: 11.12.99
John Burns, Olin Project Manager	John Burns	Date: 11/29/99
Glen Coffman, Law Certifying Engineer	GW Coffman	Date: 11/22/99

NYSDEC Comments:

Approved:		Date:
	NYSDEC Site Representative	

Distribution:
NYSDEC
Olin Project Coordinator
Signatories
Field Project File

APPENDIX H

"DOG-LEG" AREA SAMPLING AND ANALYSIS REPORT

CRA

Conestoga-Rovers & Associates
2055 Niagara Falls Blvd., Suite Three
Niagara Falls, NY 14304

(716) 297-6150 Office (716) 297-2265 Fax

January 24, 2000
Revised: February 2, 2000

Reference No. 14934

Ms. Lorraine Miller
Sr. Assoc. Environmental Specialist
OLIN CORPORATION
1186 Lower River Road, NW
Charleston, TN 37310

Dear Ms. Miller:

Re: Soil Sampling Program
Industrial Welding Site
Niagara Falls, New York

Conestoga-Rovers & Associates (CRA) initiated soil sampling activities at the Industrial Welding Site (Site) in Niagara Falls, New York on October 1, 1999, in accordance with your request on September 30, 1999. The soil sampling activities included:

i) advancement of 20 soil borings with an ATV-mounted Geoprobe unit;

ii) advancement of two additional soil borings; and

iii) the collection and analysis of soil samples to evaluate the soil for mercury content from historic operations on Site soil.

This letter provides a description of the soil sampling activities and presents CRA's findings and resulting analytical data.

WORK PERFORMED

The area of the Site which was to be sampled had not been previously investigated in either the Remedial Investigation or the Pre-Design. An ATV-mounted Geoprobe unit was utilized to perform the subsurface soil sampling. The hydraulically driven Geoprobe recovered soil using macro core open samplers fitted with a removable cutting shoe and clear acetate liner. These samplers are open tube design and measure 44 inches in length and approximately 2 inches in outside diameter. Samples were collected from the top 2 feet of the soil cover. Soil samples were removed from the acetate liner and placed directly in laboratory cleaned sample bottles after being homogenized in a precleaned stainless steel bow. The samples were immediately placed on ice in insulated sample coolers. A total of 21 soil samples were collected from 20 sample locations shown on the attached Figure 1. The samples were collected and analyzed for mercury, Method SW-846, 7471. One duplicate sample was collected and submitted to the laboratory as a blind sample to check the laboratory's precision. A New York State Department

of Environmental Conservation (NYSDEC) representative was present during field activities. The NYSDEC collected split samples from six locations (F11, F12, F14, F17, F19, and F20). The NYSDEC collected the soil samples for mercury and pesticide analysis. Samples were shipped via laboratory courier to the analytical laboratory using proper Chain of Custody procedures.

ADDITIONAL WORK PERFORMED

On October 6, 1999, CRA collected two additional soil samples at locations F1 and F2 (see Figure 1). Steel split spoons were pushed into the ground using a bulldozer. Split spoons were decontaminated with soap and water before and after use. Samples were collected from the top 2 feet of soil cover. Soil samples were removed from the split spoons and placed directly into laboratory-cleaned sample bottles after being homogenized in a precleaned stainless steel bowl. The samples were immediately placed on ice in insulated sample coolers. A NYSDEC representative was present during field activities. The NYSDEC collected split samples at both locations. Samples were shipped via laboratory courier to the analytical laboratory using proper Chain of Custody procedures.

The samples were collected and analyzed for mercury, Method SW-846, 7471. A sample collection and results summary is presented in Table 1. Laboratory analytical soil data are presented in Attachment A.

Should you have any questions regarding this information, please do not hesitate to contact us.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Dustin R. Steiner

DRS/js/1
Encl.
c.c.: Kelly McIntosh
Andrew Kisiel

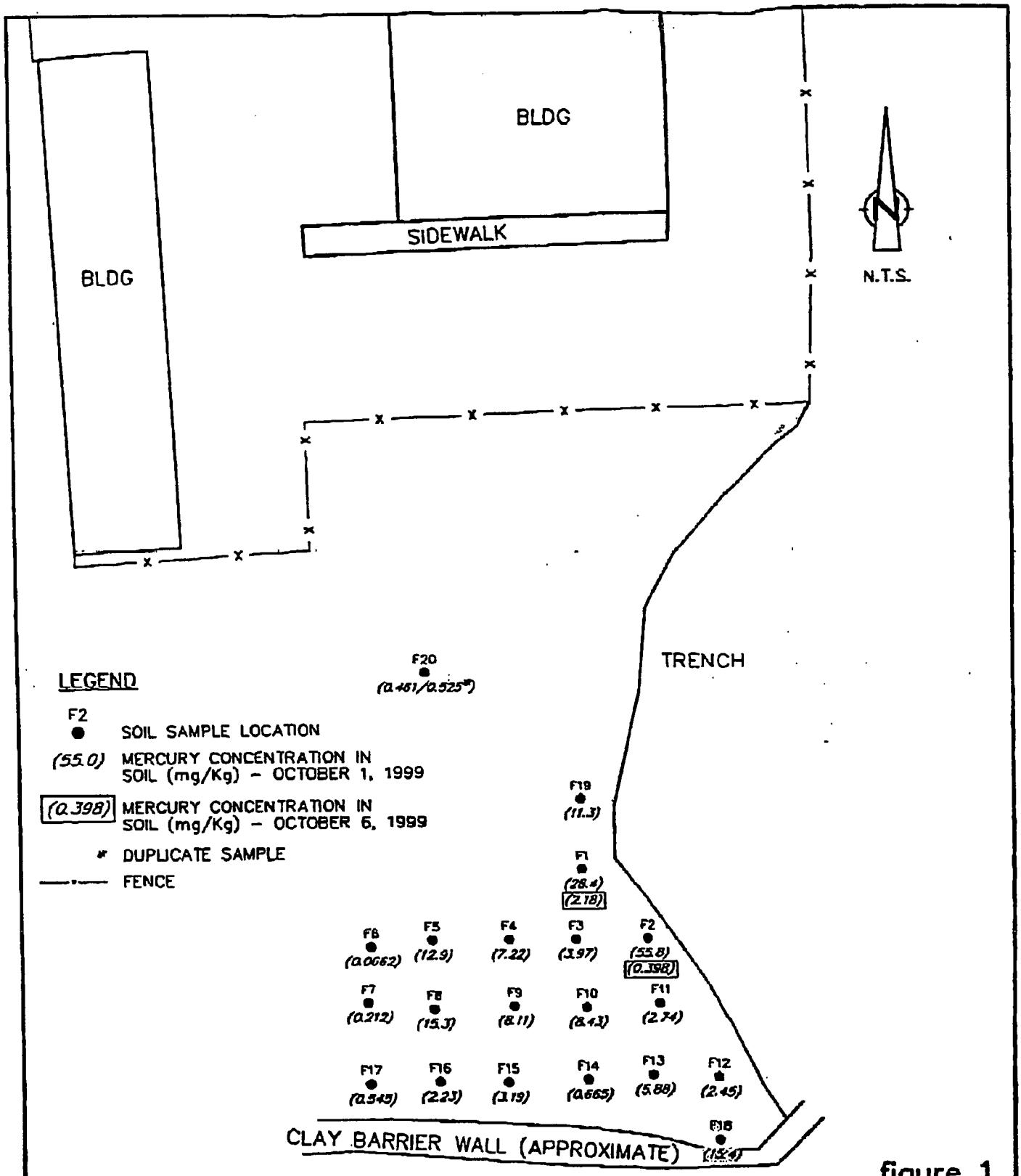

figure 1

SOIL SAMPLING LOCATIONS
AND MERCURY CONCENTRATIONS
OLIN CORPORATION INDUSTRIAL WELDING SITE
Niagara Falls, New York

CRA

14934-00(MILL002)GN-NF001 NOV 15/1999

TABLE 1

SAMPLE COLLECTION AND RESULTS SUMMARY
INDUSTRIAL WELDING SITE
NIAGARA FALLS, NEW YORK
OCTOBER 1999

Sample I.D.	*Location*	*Depth (Ft.)*	*Date*	*Time*	*Matrix*	*Analysis*	*Volume*	*Conc. (mg/kg)*
S-14934-100199-DRS-F01	F1	0 to 2	10/01/99	0855	Soil	Mercury	1 x 4 oz.	26.4
S-14934-100199-DRS-F02	F2	0 to 2	10/01/99	0905	Soil	Mercury	1 x 4 oz.	55.8
S-14934-100199-DRS-F03	F3	0 to 2	10/01/99	0915	Soil	Mercury	1 x 4 oz.	3.97
S-14934-100199-DRS-F04	F4	0 to 2	10/01/99	0925	Soil	Mercury	1 x 4 oz.	7.22
S-14934-100199-DRS-F05	F5	0 to 2	10/01/99	0933	Soil	Mercury	1 x 4 oz.	12.9
S-14934-100199-DRS-F06	F6	0 to 2	10/01/99	0937	Soil	Mercury	1 x 4 oz.	0.0662
S-14934-100199-DRS-F07	F7	0 to 2	10/01/99	0950	Soil	Mercury	1 x 4 oz.	0.212
S-14934-100199-DRS-F08	F8	0 to 2	10/01/99	1005	Soil	Mercury	1 x 4 oz.	15.3
S-14934-100199-DRS-F09	F9	0 to 2	10/01/99	1018	Soil	Mercury	1 x 4 oz.	8.11
S-14934-100199-DRS-F10	F10	0 to 2	10/01/99	1030	Soil	Mercury	1 x 4 oz.	8.43
S-14934-100199-DRS-F11	F11	0 to 2	10/01/99	1140	Soil	Mercury	1 x 4 oz.	2.74
S-14934-100199-DRS-F12	F12	0 to 2	10/01/99	1155	Soil	Mercury	1 x 4 oz.	2.45
S-14934-100199-DRS-F13	F13	0 to 2	10/01/99	1240	Soil	Mercury	1 x 4 oz.	5.88
S-14934-100199-DRS-F14	F14	0 to 2	10/01/99	1200	Soil	Mercury	1 x 4 oz.	0.665
S-14934-100199-DRS-F15	F15	0 to 2	10/01/99	1247	Soil	Mercury	1 x 4 oz.	3.19
S-14934-100199-DRS-F16	F16	0 to 2	10/01/99	1255	Soil	Mercury	1 x 4 oz.	2.23
S-14934-100199-DRS-F17	F17	0 to 2	10/01/99	1210	Soil	Mercury	1 x 4 oz.	0.545
S-14934-100199-DRS-F18	F18	0 to 2	10/01/99	1310	Soil	Mercury	1 x 4 oz.	15.4
S-14934-100199-DRS-F19	F19	0 to 2	10/01/99	1220	Soil	Mercury	1 x 4 oz.	11.3
S-14934-100199-DRS-F20	F20	0 to 2	10/01/99	1230	Soil	Mercury	1 x 4 oz.	0.461
S-14934-100199-DRS-F30	F30	0 to 2	10/01/99	1240			(1)	0.525
S-14934-100699-DRS-F01	F1	2 to 4	10/06/99	1045	Soil	Mercury	1 x 4 oz.	2.18
S-14934-100699-DRS-F02	F2	4 to 6	10/06/99	1000	Soil	Mercury	1 x 4 oz.	0.398

Notes:

* NYSDEC split samples for mercury and pesticides.

(1) Field duplicate sample of S-14934-100199-DRS-F20

ATTACHMENT A

ANALYTICAL RESULTS

Columbia Analytical Services inc.

A FULL SERVICE ENVIRONMENTAL LABORATORY

October 6, 1999

Mr. Paul McMahon
Conestoga Rovers & Associates
2055 Niagara Falls Blvd.
Suite Three
Niagara Falls, NY 14304

RECEIVED
OCT - 8 1999
CRA Services

PROJECT:14934 OLIN/IWS
Submission #:9910000019

Dear Mr. McMahon:

Enclosed are the analytical results of the analyses requested. The analytical data was provided to you on 10/04/99 per a Facsimile transmittal. All data has been reviewed prior to report submission.

Should you have any questions please contact me at (716) 288-5380.

Thank you for letting us provide this service.

Sincerely,

COLUMBIA ANALYTICAL SERVICES

Karen Bunker
Project Manager

Enc.

This package has been reviewed by Columbia Analytical Services' QA Department/Laboratory Director prior to report submittal.

1 Mustard St. • Suite 250 • Rochester, NY 14608 • Tele:(716)288-5380 • Fax:(716)288-8475

CASE NARRATIVE

COMPANY: Conestoga Rovers & Associates
14934 Olin/IWS
SUBMISSION #: 9910000019

CRA soil samples were collected on 10/01/99 and received at CAS on 10/01/99 in good condition.

INORGANIC ANALYSIS

Soil samples were analyzed for Mercury by EPA Method 7471A from SW-846.

All initial and continuing calibrations were compliant.

All blank spike recoveries and matrix spike recoveries were within QC limits, except for the recovery for F01 which could not be calculated as it was spiked too low and flagged "D".

No analytical or QC problems were encountered with these analyses.

Columbia Analytical Services Inc.

Effective 04/01/96

CAS LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. For further explanation see case narrative / cover letter.

B - This flag is used when the analyte is found in the associated blank as well as in the sample.

E - This flag identifies compounds whose concentrations exceed the calibration range.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits.
(Flag the entire batch - Inorganic analysis only)

* - Duplicate analysis not within control limits.
(Flag the entire batch - Inorganic analysis only)

- Also used to qualify Organics QC data outside limits.

D - Spike diluted out.

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

CAS Lab ID # for State Certifications

NY ID # in Rochester:	10145	NJ ID # in Rochester:	73004
CT ID # in Rochester:	PH0556	RI ID # in Rochester:	158
MA ID # in Rochester:	M-NY032	NH ID # in Rochester:	294198-A
OH EPA # in Rochester:	VAP	AIHA # in Rochester:	7889

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F01

Date Sampled : 10/01/99 Order #: 328949 Sample Matrix: SOIL/SEDIMENT
Date Received: 10/01/99 Submission #:9910000019

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	26.4	MG/KG	10/04/99	20.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.8	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F02

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328950
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	55.8	MG/KG	10/04/99	50.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.3	%	10/01/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F03

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328951
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	3.97	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	89.4	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F04

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328952
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	7.22	MG/KG	10/04/99	10.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	85.2	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F05

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328953
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	12.9	MG/KG	10/04/99	20.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	83.5	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F06

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328954
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.0662	MG/KG	10/04/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.0	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F07

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328955
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS MERCURY	0.0500	0.212	MG/KG	10/04/99	1.0
WET CHEMISTRY PERCENT SOLIDS	1.0	90.0	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F08

Date Sampled : 10/01/99 Order #: 328956 Sample Matrix: SOIL/SEDIMENT
Date Received: 10/01/99 Submission #:9910000019

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	15.3	MG/KG	10/04/99	20.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	86.0	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F09

Date Sampled : 10/01/99 Order #: 328957 Sample Matrix: SOIL/SEDIMENT
Date Received: 10/01/99 Submission #:9910000019

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	8.11	MG/KG	10/04/99	10.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.3	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F10

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328958
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	8.43	MG/KG	10/04/99	10.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	80.1	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F11

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328960
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	2.74	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.7	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F12

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328962
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	2.45	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.9	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F13

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328964
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	5.88	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	86.4	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F14

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328966
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.665	MG/KG	10/04/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	82.4	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F15

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328967
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	3.19	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	81.7	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F16

Date Sampled : 10/01/99 Order #: 328968 Sample Matrix: SOIL/SEDIMENT
Date Received: 10/01/99 Submission #:9910000019

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	2.23	MG/KG	10/04/99	5.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	88.7	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F17

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328969
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.545	MG/KG	10/04/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	84.8	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F18

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328970
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	15.4	MG/KG	10/04/99	20.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	86.2	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F19

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328971
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	11.3	MG/KG	10/04/99	10.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	85.2	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F20

Date Sampled : 10/01/99
Date Received: 10/01/99
Order #: 328972
Submission #:9910000019
Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.461	MG/KG	10/04/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	90.6	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/06/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100199-DRS-F30

Date Sampled : 10/01/99
Date Received: 10/01/99

Order #: 328973
Submission #:9910000019

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.525	MG/KG	10/04/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	90.9	%	10/04/99	1.0

COLUMBIA ANALYTICAL SERVICES

INORGANIC QUALITY CONTROL SUMMARY

Report Date : 10/05/99
CAS Order # : 328949 - S-14934-100199-DRS-F01
Client : Conestoga Rovers & Associates
OCCIDENTAL, NIAGARA FALLS
Reported Units: MG/KG
Run # : 43189
Percent Solid : 84.8

	PRECISION			ACCURACY			
	ORIGINAL	DUPLICATE	RPD	FOUND	ADDED	% REC.	LIMITS
MERCURY	26.4	25.7	2	20.8	0.179	D	75 - 125

COLUMBIA ANALYTICAL SERVICES

INORGANIC QUALITY CONTROL SUMMARY

Report Date : 10/05/99
CAS Order # : 328973 - S-14934-100199-DRS-F30
Client : Conestoga Rovers & Associates
OCCIDENTAL, NIAGARA FALLS
Reported Units: MG/KG
Run # : 43194
Percent Solid : 90.9

	PRECISION			ACCURACY			
	ORIGINAL	DUPLICATE	RPD	FOUND	ADDED	% REC.	LIMITS
MERCURY	0.525	0.497	5	0.678	0.175	87	75 - 125

COLUMBIA ANALYTICAL SERVICES

INORGANIC BLANK SPIKE SUMMARY

CAS Submission #: 9910000019
Client: Conestoga Rovers & Associates
OCCIDENTAL, NIAGARA FALLS

BLANK SPIKES

	BLANK	FOUND	ADDED	% REC	LIMITS	RUN	UNITS
MERCURY	0.0500 U	1.21	1.29	94	68 - 132	43189	MG/KG
MERCURY	0.0500 U	1.18	1.29	91	68 - 132	43192	MG/KG
MERCURY	0.0500 U	1.16	1.29	90	68 - 132	43193	MG/KG
MERCURY	0.0500 U	1.21	1.29	94	68 - 132	43194	MG/KG

COLUMBIA ANALYTICAL SERVICES

INORGANIC QUALITY CONTROL SUMMARY

Report Date : 10/05/99
CAS Order # : 328971 - S-14934-100199-DRS-F19
Client : Conestoga Rovers & Associates
OCCIDENTAL, NIAGARA FALLS
Reported Units: %
Run # : 43158

	PRECISION		
	ORIGINAL	DUPLICATE	RPD
PERCENT SOLIDS	85.2	86.6	2

CHAIN OF CUSTODY RECORD

CRA
CONESTOGA-ROVERS & ASSOCIATES
2055 Niagara Falls Blvd. Suite Three
Niagara Falls, NY 14304 (716)297-6150

SHIPPED TO (Laboratory Name): C.A.S. Columbia Analytical Services Rochester, N.Y.

REFERENCE NUMBER: #14934 OCIN/LWS

SAMPLER'S SIGNATURE: Dustin R. Steiner PRINTED NAME: Dustin Steiner

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS H9	REMARKS
	10/1/99	0855	S-14934-100199-DRS-F01	Soil	1	✓	1x40z. glass
		0905	S-14934-100199-DRS-F02		1	✓	
		0915	-F03		1	✓	
		0925	-F04		1	✓	24 hr.
		0933	-F05		1	✓	
		0937	-F06		1	✓	
		0950	-F07		1	✓	Turnaround
		1005	-F08		1	✓	
		1018	-F09		1	✓	
		1030	-F10		1	✓	ASAP!
		1140	-F11		1	✓	
		1155	-F12		1	✓	
		1240	-F13		1	✓	
		1200	-F14		1	✓	
		1247	-F15		1	✓	
		1255	-F16		1	✓	
		1210	-F17		1	✓	

TOTAL NUMBER OF CONTAINERS

HEALTH/CHEMICAL HAZARDS —

RELINQUISHED BY: ① Dustin R. Steiner	DATE: 10/1/99 TIME: 1330	RECEIVED BY: ② J. Britt CAS	DATE: 10/1/99 TIME: 2:45p
RELINQUISHED BY: ② J. Britt CAS	DATE: 10/1/99 TIME: 5:18p	RECEIVED BY: ③	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ④	DATE: TIME:

METHOD OF SHIPMENT: Lab's Courier WAY BILL No. —

White –Fully Executed Copy
Yellow –Receiving Laboratory Copy
Pink –Shipper Copy
Goldenrod –Sampler Copy

SAMPLE TEAM: DUSTIN STEINER, ANDREW P. KISIEL

RECEIVED FOR LABORATORY BY: CAS
DATE: 10-1-99 TIME: 1715

Nº NF- [illegible]

1001 (D) OCT 31/94(NF) REV.1 (F-05)

CHAIN OF CUSTODY RECORD

CRA
CONESTOGA-ROVERS & ASSOCIATES
2055 Niagara Falls Blvd. Suite Three
Niagara Falls, NY 14304 (716)297-6150

SHIPPED TO (Laboratory Name): C.A.S.

REFERENCE NUMBER: 14934 OLIN/FWS

SAMPLER'S SIGNATURE: Dustin R. Steiner PRINTED NAME: Dustin Steiner

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS: Hg	REMARKS
	6/1/99	1310	S-14934-100199-DRS-F18	Soil	1	✓	1X 4oz. glass
	↓	1220	S-14934-100199-DRS-F19	↓	1	✓	
		1230	S-14934-100199-DRS-F20		1	✓	
	↓	1240	S-14934-100199-DRS-F30	↓	1	✓	24 hr. Turnaround ASAP!

DRS

TOTAL NUMBER OF CONTAINERS: 21 HEALTH/CHEMICAL HAZARDS —

RELINQUISHED BY: ① Dustin R. Steiner	DATE: 10/1/99 TIME: 1330	RECEIVED BY: ② J. [illegible] CAS	DATE: 10/1/99 TIME: 245P
RELINQUISHED BY: ② J. [illegible] CAS	DATE: 10/1/99 TIME: 515P	RECEIVED BY: ③	DATE: TIME:
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ④	DATE: TIME:

METHOD OF SHIPMENT: Courier WAY BILL No. —

White -Fully Executed Copy
Yellow -Receiving Laboratory Copy
Pink -Shipper Copy
Goldenrod -Sampler Copy

SAMPLE TEAM: Dustin R. Steiner, Andrew P. Kisiel

RECEIVED FOR LABORATORY BY: [illegible] CAS
DATE: 10-1-99 TIME: 1715

№ NF- [illegible]

Columbia Analytical Services Inc.

Cooler Receipt And Preservation Check Form

Project/Client _____ Submission Number _____

Cooler received on 10-1-99 and opened on 10-1-99 by _____

1. Were custody seals on outside of cooler? Tape CRA — YES NO NA
   If yes, how many and where? _____
2. Were signature & date correct? YES NO
3. Were custody papers properly filled out (ink, signed, etc)? YES NO
4. Did all bottles arrive in good condition (unbroken)? YES NO
5. Were all bottle labels complete (*i.e.* analysis, preservation, etc)? YES NO
6. Did all bottle labels and tags agree with custody papers? YES NO
7. Were correct bottles used for the tests indicated? YES NO
8. Were VOA vials checked for absence of air bubbles, and noted if so? YES NO
9. Where did the bottles originate? CAS/A CAS/K CAS/S CAS/L CAS/X CAS/J CAS/R
10. Temperature of cooler(s) upon receipt: 15.2 _____ _____ _____ _____

Is the temperature within 4 ± 2° C?:	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐
If No, Explain Below	No ☒ NA	No ☐	No ☐	No ☐	No ☐

Date/Time Temperatures Taken: 10-1-99 1720

Thermometer ID: 101 Circle One: Temp Blank Sample Bottle (Cooler Temp.)

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added
pH	Reagent					
12	NaOH					
2	HNO_3					
2	H_2SO_4					
5-9*	P/PCBs (608 only)					

YES = All samples OK
NO = Samples were preserved at lab as listed
*If pH adjustment is required, use NaOH and/or H_2SO_4

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2				

CLIENT NOTIFICATION: _____

Columbia Analytical Services, Inc.

A FULL SERVICE ENVIRONMENTAL LABORATORY

October 19, 1999

RECEIVED
OCT 25 1999
CRA Services

Mr. Paul McMahon
Conestoga Rovers & Associates
2055 Niagara Falls Blvd.
Suite Three
Niagara Falls, NY 14304

PROJECT:14934 OLIN/IWS
Submission #:9910000086

Dear Mr. McMahon:

Enclosed are the analytical results of the analyses requested. The analytical data was provided to you on 10/19/99 per a Facsimile transmittal. All data has been reviewed prior to report submission.

Should you have any questions please contact me at (716) 288-5380.

Thank you for letting us provide this service.

Sincerely,

COLUMBIA ANALYTICAL SERVICES

Karen Bunker

Karen Bunker
Project Manager

Enc.

This package has been reviewed by Columbia Analytical Services' QA Department/Laboratory Director prior to report submittal.

1 Mustard St. • Suite 250 • Rochester, NY 14608 • Tele:(716)288-5380 • Fax:(716)288-8475

Columbia Analytical Services Inc.

Effective 04/01/96

CAS LIST OF QUALIFIERS

(The basis of this proposal are the EPA-CLP Qualifiers)

U - Indicates compound was analyzed for but was not detected. The sample quantitation limit must be corrected for dilution and for percent moisture.

J - Indicates an estimated value. For further explanation see case narrative / cover letter.

B - This flag is used when the analyte is found in the associated blank as well as in the sample.

E - This flag identifies compounds whose concentrations exceed the calibration range.

A - This flag indicates that a TIC is a suspected aldol-condensation product.

N - Spiked sample recovery not within control limits.
(Flag the entire batch - Inorganic analysis only)

* - Duplicate analysis not within control limits.
(Flag the entire batch - Inorganic analysis only)

- Also used to qualify Organics QC data outside limits.

D - Spike diluted out.

S - Reported value determined by Method of Standard Additions. (MSA)

X - As specified in the case narrative.

CAS Lab ID # for State Certifications

NY ID # in Rochester:	10145	NJ ID # in Rochester:	73004
CT ID # in Rochester:	PH0556	RI ID # in Rochester:	158
MA ID # in Rochester:	M-NY032	NH ID # in Rochester:	294198-A
OH EPA # in Rochester:	VAP	AIHA # in Rochester:	7889

COLUMBIA ANALYTICAL SERVICES

Reported: 10/19/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100699-DRS-F01

Date Sampled : 10/06/99
Date Received: 10/06/99

Order #: 330359
Submission #:9910000086

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	2.18	MG/KG	10/13/99	2.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	82.7	%	10/08/99	1.0

COLUMBIA ANALYTICAL SERVICES

Reported: 10/19/99

Conestoga Rovers & Associates
Project Reference: 14934 OLIN/IWS
Client Sample ID : S-14934-100699-DRS-F02

Date Sampled : 10/06/99
Date Received: 10/06/99

Order #: 330360
Submission #:9910000086

Sample Matrix: SOIL/SEDIMENT

ANALYTE	PQL	RESULT	DRY WEIGHT UNITS	DATE ANALYZED	ANALYTICAL DILUTION
METALS					
MERCURY	0.0500	0.398	MG/KG	10/13/99	1.0
WET CHEMISTRY					
PERCENT SOLIDS	1.0	83.9	%	10/08/99	1.0

COLUMBIA ANALYTICAL SERVICES

INORGANIC BLANK SPIKE SUMMARY

CAS Submission #: 9910000086
Client: Conestoga Rovers & Associates
14934 OLIN/IWS

BLANK SPIKES

	BLANK	FOUND	ADDED	% REC	LIMITS	RUN	UNITS
MERCURY	0.0500 U	1.25	1.29	97	68 - 132	43623	MG/KG

CHAIN OF CUSTODY RECORD

99-10-86

CRA
CONESTOGA-ROVERS & ASSOCIATES
2055 Niagara Falls Blvd. Suite Three
Niagara Falls, NY 14304 (716)297-6150

SHIPPED TO (Laboratory Name): C.A.S.

REFERENCE NUMBER: 14934 OLIN/IWS

SAMPLER'S SIGNATURE: Dustin R. Steiner PRINTED NAME: Dustin Steiner

SEQ. No.	DATE	TIME	SAMPLE No.	SAMPLE TYPE	No. OF CONTAINERS	PARAMETERS: Mercury (Hg)	PARAMETERS: Order#	REMARKS
	10/6/99	1015	S-14934-100699-DES-F01	Soil	1	✓	33 03 59	1x4oz. glass
	10/6/99	1100	S-14934-100699-DES-F02	Soil	1	✓	3 60	
								2 WEEK Turnaround!

DES

TOTAL NUMBER OF CONTAINERS: 2 HEALTH/CHEMICAL HAZARDS: —

RELINQUISHED BY: ① Dustin R. Steiner	DATE: 10/6/99 TIME: 1130	RECEIVED BY: ② J. Butt J.Butt CAS	DATE: 10/6/99 TIME: 2:00 P
RELINQUISHED BY: ② J. Butt J.Butt CAS	DATE: 10/6/99 TIME: 4:40 P	RECEIVED BY: ③ Maria O'Brien CAS	DATE: 10-6-99 TIME: 16:00
RELINQUISHED BY: ③	DATE: TIME:	RECEIVED BY: ④	DATE: TIME:

METHOD OF SHIPMENT: Courier WAY BILL No. —

White —Fully Executed Copy
Yellow —Receiving Laboratory Copy
Pink —Shipper Copy
Goldenrod —Sampler Copy

SAMPLE TEAM: DES

RECEIVED FOR LABORATORY BY: Maria O'Brien CAS
DATE: 10-6-99 TIME: 16:00

Nº NF- 42

1001 (D) OCT 31/94(NF) REV.1 (F-D5)

Shipped CAS Temp 1.3

Cooler Receipt And Preservation Check Form

Project/Client CRA Submission Number 10-86

Cooler received on 10-6-99 and opened on 10-6-99 by [signature]

1.	Were custody seals on outside of cooler?	YES (NO)					
	If yes, how many and where?						
2.	Were signature & date correct?	YES NO					
3.	Were custody papers properly filled out (ink, signed, etc)?	(YES) NO					
4.	Did all bottles arrive in good condition (unbroken)?	(YES) NO					
5.	Were all bottle labels complete (*i.e.* analysis, preservation, etc)?	(YES) NO					
6.	Did all bottle labels and tags agree with custody papers?	(YES) NO					
7.	Were correct bottles used for the tests indicated?	(YES) NO					
8.	Were VOA vials checked for absence of air bubbles, and noted if so?	YES NO					
9.	Where did the bottles originate?	CAS/A	CAS/K	CAS/S	CAS/L	CAS/X	CAS/J (CAS/R)
10.	Temperature of cooler(s) upon receipt:	1.3					
	Is the temperature within 4 ± 2° C?:	Yes ☐	Yes ☐	Yes ☐	Yes ☐	Yes ☐	
	If No, Explain Below	No ☒	No ☐	No ☐	No ☐	No ☐	

Date/Time Temperatures Taken: 10-6-99 16:05

Thermometer ID: 161 **Circle One:** Temp Blank Sample Bottle (Cooler Temp.)

Explain any discrepancies: _____

		YES	NO	Sample I.D.	Reagent	Vol. Added
pH	Reagent					
12	NaOH					
2	HNO_3					
2	H_2SO_4					
5-9*	P/PCBs (608 only)					

YES = All samples OK
NO = Samples were preserved at lab as listed
*If pH adjustment is required, use NaOH and/or H_2SO_4

VOC Vial pH Verification (Tested after Analysis) Following Samples Exhibited pH > 2				

CLIENT NOTIFICATION: _____