Final Remedial Design Report
Industrial Welding Site-Operable Unit 3
(Packard Road Site)

Niagara Falls, New York

Prepared for:

Olin Corporation
Environmental Remediation Group
Charleston, Tennessee

Prepared by:

MACTEC Engineering and Consulting, P.C.

In Association With
MACTEC Engineering and Consulting, Inc.
Kennesaw, Georgia

March 9, 2007

MACTEC

engineering and constructing a better tomorrow

March 9, 2007

Mr. Mike Bellotti
Olin Corporation
1186 Lower River Rd.
Charleston, TN 37310

Subject: LETTER OF TRANSMITTAL
Remedial Design Report
Industrial Welding Site- Operable Unit 3 (Packard Road Site)
MACTEC Project: 6100-07-0005

Dear Mr. Bellotti:

MACTEC Engineering and Consulting, P.C., in association with MACTEC Engineering and Consulting, Inc., is pleased to provide you with a copy of the Remedial Design Report for the Industrial Welding Site- Operable Unit 3 (Packard Road Site).

MACTEC appreciates the opportunity to be of service to Olin Corporation. If you have any questions or comments about this project please do not hesitate to call us at (770) 421-3400.

Sincerely,

MACTEC ENGINEERING AND CONSULTING, INC.

Glenn N. Coffman, P.E.
Vice President

Frederick K. Marotte
Project Manager
MACTEC Engineering and Consulting, Inc.

Enclosures: Final Draft Remedial Design Report
Industrial Welding Site- Operable Unit 3 (Packard Road Parcel)

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LIST OF ACRONYMS AND ABBREVIATIONS

ALP	American Legion Post
AASHTO	American Association of State Highway and Transportation Officials
ASTM	American Society for Testing and Materials
BHC	Benzene hexachlorides (hexachlorocyclohexanes)
bgs	below ground surface
CAER	Construction Activity Evaluation Report
CAP	Community Advisory Panel
cc/min	cubic centimeters per minute
cfs	cubic feet per second
CPANC	Cerebral Palsy Association of Niagara County
CQA	Construction Quality Assurance
CQAP	Construction Quality Assurance Plan
CQAR	Construction Quality Assurance Report
CQC	Construction Quality Control
DIR	Deficiency Identification Report
DSR	Daily Summary Report
EPA	Environmental Protection Agency
ESD	Explanation of Significant Differences
FCA	Field Change Approval
FS	Feasibility Study
FSP	Field Sampling Plan
IWS	Industrial Welding TOC
HASP	Health and Safety Plan
HDPE	high-density polyethylene
HEF	High Energy Fuels
HSO	Health and Safety Officer
LAW	Law Engineering and Environmental Services, P.C. and Law Engineering and Environmental Services, Inc.
LCRS	leachate control and recovery system
mg/kg	milligrams per kilogram

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

NYSDOT	New York State Department of Transportation
NYSDEC	New York State Department of Environmental Conservation
NYSELAP	New York State Environmental Laboratory Approval Program
Olin	Olin Corporation
O&M	Operations and Maintenance
OSHA	Occupational Health and Safety Administration
PAH	polycyclic aromatic hydrocarbons
P.E.	Professional Engineer
PM	Project Manager
PPL	Priority Pollutant List
PSVP	Performance Standards Verification Plan
ppb	parts per billion
ppm	parts per million
RA	Remedial Action
RAWP	Remedial Action Work Plan
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
Rust	Rust Environment & Infrastructure, Inc.
SCG	Standards, Criteria and Guidance
sec	second(s)
Site	Packard Road Site
SPDES	State Pollutant Discharge Elimination System
TCL	Target Compound List
µg/L	micrograms per liter
USACOE	United States Army Corps of Engineers
USGS	United States Geological Survey

INTRODUCTION

This document presents the Remedial Design for the Packard Road Site, Operable Unit 3 (OU 3) of the Industrial Welding Inactive Hazardous Waste Site located in Niagara Falls, New York. The Packard Road Site will be referred to herein as the "Site". The Design represents an implementation of the Conceptual Engineering Design that was deemed acceptable by the New York State Department of Environmental Conservation (NYSDEC) in a letter dated June 24, 2005. The purpose of the document is to provide a fully considered and planned design to remediate the Site. This document has been prepared to voluntarily remediate the Site which is contiguous to the Industrial Welding Site (IWS) which was remediated to fulfill a portion of the requirements set forth in an Order on Consent executed March 3, 1997 between NYSDEC and Olin Corporation (Olin).

The following information is provided in the Remedial Design as the basis for the design and guidelines for construction:

- Design criteria used in the development of the design
- Remedial Design Drawings and Specifications
- Remedial Action Work Plan, including a planned construction schedule
- Implementation plans to verify that the Remedial Action is performed in conformance with the remedial design and health and safety requirements, including a Construction Quality Assurance Plan and an Engineer's Health and Safety Plan. (A Construction Management Plan and Contractor's Health and Safety Plan will be provided by the remedial action contractor upon award of the contract).

The Remedial Design Report for the Site addresses the technical requirements to implement each component of the Remedial Action.

1.0 BACKGROUND INFORMATION

This document presents the Remedial Design (RD) for the Packard Road Site, Operable Unit 3 (OU3) of the Industrial Welding Inactive Hazardous Waste Site located in the City of Niagara Falls, New York. The Packard Road Site will be referred to herein as the "Site". The RD fulfills a requirement of Olin's Order that is consistent to the implementation of the RD Work Plan (September 1997) approved by the New York State Department of Environmental Conservation (NYSDEC) for IWS. The technical requirements to implement this Remedial Action (RA) of the Site are addressed in this document.

1.1 SITE LOCATION

The Site is bounded by parking lots adjacent to Buffalo Avenue to the South, Veterans Drive (Packard Road) and Gill Creek to the east in the City of Niagara Falls, New York. The Site is immediately south of the IWS and the former American Legion Post (ALP) property which were the sites of remedial action completed in 2000. Figure 1.1 depicts the location of the Site.

1.2 PROJECT AREA

The project area is shown on Figure 1.2. The project area comprises approximately 4.3 acres and is relatively flat, with elevations generally ranging from 572 to 575 feet above mean sea level (msl). There are two soil mounds at the northwest corner of the property. The soil profile consists of permeable soil and fill soil overlying a denser silty clay. Contaminant levels of concern lie in the uppermost eight feet with the highest concentrations generally in the upper four feet. Fencing and a locked gate control access to the Site.

1.3 PROPERTY HISTORY

This Site has been historically owned by Olin. Past practices at the Site have resulted in soil and water impacts from chlorinated cyclohexanes (BHC), polynucleararomatic hydrocarbons (PAHs), and mercury that were associated with the original Industrial Welding site. The Site was not used for waste disposal and does not contain any historical waste disposal site or landfills. The impacts found on the Site are believed to be associated with activities at the original Industrial Welding site. The Site is contiguous with IWS and impacts are similar on the two properties.

1.4 PREVIOUS INVESTIGATIONS

In 2001, Olin Corporation voluntarily agreed to conduct a site soil and ground water investigation of this Site. The results of this study were reported to NYSDEC in reports dated January 18, 2002 and

July 31, 2002. Although the affected media are generally subsurface, there are two soil mounds located on the Site that were sampled and analyzed during the soil investigation. The analytical results for theses samples indicated that the soil mounds were similar to the surrounding on-site soil both in the types of chemical impacts and concentrations.

1.5 SELECTED REMEDY

An asphalt cover will be constructed over an area of approximately 4.3 acres comprising the entirety of the impacted Site property. Any soils excavated from the Site property will be consolidated under the Site's final cover system. Construction of the subgrade for the asphalt cover will be accomplished using on-site materials and imported clean fill. Storm drainage structures and piping will be constructed for control of surface stormwater flows from the asphalt cover. Stormwater will be discharged directly into Gill Creek.

Land use restrictions will be applied to the Site property. Land use restrictions preclude future activities at the Site that could materially threaten, compromise, or damage the remedies. The Site property is and will continue to be fenced.

2.0 REPORT OBJECTIVES

The objective of this document is to provide a fully considered and planned design to remediate the Site property by implementing the Conceptual Engineering Design that was deemed acceptable by NYSDEC in a letter dated June 24, 2005. A copy of the letter is included in Appendix F.

The sections of this report are organized as follows:

Section 3.0	Design Criteria
Section 4.0	Remedial Design Drawings and Specifications
Section 5.0	Satisfaction of Applicable Requirements
Section 6.0	Performance Standards Verification Plan
Section 7.0	Community Relations
Section 8.0	Construction Schedule
Section 9.0	Bibliography

The report sections presented above have been developed and presented to the detail appropriate for the Remedial Design submittal for review by NYSDEC.

3.0 DESIGN CRITERIA

This section of the Remedial Design Report presents the design criteria used for this project. The design includes the following specific elements:

- Initial and intermediate (Phase 1) erosion and sediment control;
- Demolition and removal of structural materials;
- Protection, abandonment, adjustment or removal of utilities and monitoring wells as indicated;
- Subgrade preparation;
- Asphalt cover;
- Stormwater drainage system;
- Chain link fencing;
- Site access construction; and
- Final (Phase 2) erosion and sediment control.

3.1.1 Initial and Intermediate (Phase 1) Erosion and Sediment Control

Required initial and intermediate erosion and sediment control measures are indicated on the Design Drawings (referenced in Section 4.0). Construction entrance, silt fencing, storm drain inlet protection, and other measures must be installed prior to any land-disturbing activity. All erosion and sediment control measures must be constructed and maintained in accordance with the applicable standards of the "New York Standards and Specifications for Erosion and Sediment Control" published by the New York State Department of Environmental Conservation (NYSDEC), and the requirements of the City of Niagara Falls. Standard details for erosion and sediment control measures are included on the Design Drawings. The City approved the proposed Erosion and Sediment Control Plans included with the Design Drawings by letter, dated February 20, 2007.

3.1.2 Demolition and Removal of Structural Materials

Limited portions of concrete slabs will be removed to provide the required grades for the asphalt cover and for installation of the storm drainage system. Requirements for concrete demolition and removal of debris are discussed in the Specifications and on the Design Drawings. Designated sections of existing chain link fencing inside the Site will be removed for construction of the asphalt cover. Miscellaneous metal and other structural debris located on the Site will also be removed. Concrete demolition debris, miscellaneous metal and other structural debris will be transported and disposed off-site after being cleaned of impacted soils.

3.1.3 Existing Utilities and Monitoring Wells

Information is shown on the Design Drawings regarding existing utilities based on available information. This information is not necessarily complete and accurate. The Contractor will be responsible for contacting the New York State Underground Facility Protection Organization to determine the location of existing utilities prior to commencing the construction work. Based on a telephone conversation with the City of Niagara Falls engineer, Robert Buzzelli, on February 28, 2007, the City and the Niagara Falls Water Board have approved the abandonment of the on-site water and sewer utilities The Remedial Action Contractor will contact the City at least ten working days prior to initiating abandonment activities to discuss specific City requirements for this effort. All utilities not indicated to be abandoned or removed will be protected from damage or disturbance. Removal, abandonment, or adjustment of other utilities will be required as indicated on the Design Drawings and in accordance with the Specifications.

The three existing monitoring wells within the limits of construction must be protected from damage or disturbance during the construction work. The top of each monitoring well will be reconstructed as indicated on the Design Drawings.

3.1.4 Subgrade Preparation

Grading of the asphalt cover subgrade will involve limited disturbance of existing surface soils within the limits of the asphalt cover, with the exception of excavations required for construction of the storm drainage system, grading of existing soil mounds, abandonment of utilities, and repair of designated areas. All excavated surface soils will be used as part of the subgrade fill. The Specifications (referenced in Section 4.0) state that soils within the limits of the asphalt cover shall not be removed from the Site. Proof-rolling and compaction of the subgrade, including existing surface materials, will be required in order to provide the proper base for asphalt cover construction. The following criteria have been used for the development of the grading design for the asphalt cover subgrade:

- Limit undercutting and disturbance of existing surface soils;
- Grade to the required limits for the asphalt cover;
- Provide subgrade finish slopes of at least 1.5 percent to allow positive drainage of stormwater to drop inlets;
- Provide asphalt cover edge slopes not exceeding 3 horizontal to 1 vertical (3H:1V); and
- Provide a stable base for asphalt cover construction.

Subgrade material will consist of soil obtained from on-site grading operations and from approved off-site borrow source(s). Off-site borrow material must conform to the following specifications:

- Fine gravel, sands with fines (SM, SC), silt (ML), low to medium plasticity clay (CL), or blends of these materials, as defined by the Unified Soil Classification System (USCS); and
- Free of stones larger than approximately three inches in greatest dimension, and substantially free of roots, trash and other material which may be compressible or which cannot be compacted properly.

3.1.5 Asphalt Cover

The design criteria for the Site final cover system are to reduce the infiltration of precipitation into the site soils and prevent exposures to site soils. The cover will divert and contain runoff, allowing the runoff to be managed and discharged directly into Gill Creek by way of a new discharge point. The Site final cover system is an asphalt concrete cover designed to be equivalent to the existing adjacent IWS asphalt cover system and the requirements of NYCRR Part 360-2.13(r).

Any soils excavated in constructing the Site final cover system will be consolidated, proofrolled, compacted and graded under the Site's final cover system. After preparation of the subgrade soils are approved, construction will begin on installation of the Site final cover system. The Site final cover system will include a six-inch layer of aggregate base course, compacted in accordance with the Specifications. Following compaction of the aggregate, areas to be paved will be covered with a minimum of 3½ inches of asphalt concrete, consisting of a 2½-inch binder course and a 1-inch surface course. A seal-coat will be applied to the surface of the asphalt concrete. The mix design and construction procedures for the top 1-inch surface course of asphalt concrete have been established to minimize hydraulic conductivity. The mix for the surface course will have a higher asphalt binder content than a standard NYSDOT asphalt mixture in accordance with the Specifications (included in Appendix B). The surface course will be compacted as specified. Asphalt concrete with higher asphalt binder content that is properly placed and compacted is projected by the U.S. Environmental Protection Agency (USEPA) to have hydraulic conductivities less than 1×10^{-7} cm/sec (USEPA, 1988).

Grading plans for the final cover system were developed for the Site using existing topographic information.

3.1.6 Stormwater Drainage System

The asphalt cover is graded to drain to five drop inlets within the Site. Reinforced concrete pipes will transport stormwater from the drop inlets through a junction manhole and then to Gill Creek. The drop inlets and manhole will be constructed of precast concrete and will conform to the applicable standards of the New York State Department of Transportation (NYSDOT) and the City. Reinforced concrete piping

for the discharge pipe under the Site will conform to the City's standards. Pipe sizes and slopes are designed to handle the design storm runoff. The City has approved the proposed design for work within the Veterans Drive right-of-way.

The following criteria have been used for control and discharge of stormwater drainage:

- Construct the asphalt cover at grades that will direct stormwater runoff to drop inlets within the limits of the asphalt cover. The minimum surface slope will be 1.5 percent to limit the potential for creating areas of standing water in the surface;
- Install drop inlets at required spacing and with properly sized grates to handle stormwater runoff from the 25-year design storm at a minimum;
- Install stormwater drainage pipes of sufficient size and slope to handle stormwater runoff from the 25-year design storm at a minimum;
- Install stormwater discharge pipe to Gill Creek in conformance with the requirements of the City of Niagara Falls, including criteria for road crossing, pipe material, and installation clearance distance from existing utilities;
- Discharge stormwater runoff to Gill Creek at the same invert elevation as the previously constructed and adjacent stormwater discharge pipes; and
- Construct headwall and place riprap on the creek bank at the stormwater discharge point in conformance with the applicable requirements of the Buffalo District of the U.S. Army Corps of Engineers (refer also to Section 5.1).

3.1.7 Chain Link Fencing

Existing fencing on the west and portions of the south and east edges of the asphalt cover will remain in place as indicated on the Design Drawings. The asphalt cover will be constructed as close as practical to the fence. The remediation contractor may temporarily remove existing fence fabric from posts as needed to provide access for construction of the asphalt cover. The removed fence materials will be re-installed at completion of asphalt cover construction. Sections of fencing within the limits of the asphalt cover will be permanently removed for construction of the asphalt cover as indicated on the Design Drawings. New fencing will be installed along the east and south edges of the asphalt cover to provide security fencing around the full limits of the asphalt cover. A gate will be provided for access to the Site. Materials and installation requirements for new fencing are included in the Design Drawings and Specifications.

3.1.8 Site Access Construction

An asphalt-paved vehicle pull-off lane and ramp will be constructed for access to the Site as shown on the Design Drawings. The design for the vehicle pull-off will conform to the requirements of the City of Niagara Falls. The City has approved the site access design as shown on the Design Drawings.

3.1.9 Final (Phase 2) Erosion and Sediment Control

Erosion and sediment control measures to be installed at completion of the asphalt cover construction include permanent seeding and rip rap as indicated on the Design Drawings. Erosion and sediment control measures will be constructed and maintained in accordance with the standards and regulations referenced in Section 3.1.1. Permanent seeding conforming to the "New York Standards and Specifications for Erosion and Sediment Control" will be provided as indicated on the Design Drawings to establish a vegetative cover on all unpaved areas disturbed by construction.

3.2 INSTITUTIONAL CONTROLS

Fencing and a lockable gate will be installed to limit access to the property after remedial action construction is completed. The Site property deed will be amended to restrict the land use to preclude future activities at the Site that could materially threaten, compromise, or damage the selected remedy. The Site deed will be amended to restrict land use.

3.3 LONG-TERM MONITORING REQUIREMENTS

The long-term monitoring requirements for the Site will focus on annual inspections of the Site. Annual inspections will include the final cover system, storm drainage system, and perimeter fencing. Inspections will be performed to check the integrity of the asphalt cover and to verify that the storm drainage system is functioning properly. Repairs to fencing will be made as needed to keep unauthorized personnel from entering the area. Inspection and maintenance logs and forms for these activities will be presented in the Operations and Maintenance (O&M) Plan to be prepared at the completion of construction.

4.0 REMEDIAL DESIGN DRAWINGS AND SPECIFICATIONS

Drawings and Specifications have been prepared to present the design and provide the construction contractor sufficient direction to execute the remediation work. The following sections list these documents.

4.1 DRAWINGS

The following table provides a listing of Design Drawings that are included in the Remedial Design Report. The Drawings are included in Appendix A.

Drawing No.	Drawing Title
---	Cover Sheet
GR-001	Pre-Construction Topographic Survey
GR-002	Overall Site Plan
CL-101	Clearing and Demolition Plan
CL-002	Grading and Drainage Plan
CL-003	Phase 1 Erosion and Sediment Control Plan
CL-004	Phase 2 Erosion and Sediment Control Plan
CL-101	Storm Drainage Pipe Profiles
CL-102	Cover System Details and Sections
CL-103	Cover System Details and Sections
CL-104	Chain Link Fencing Details
CL-105	Erosion and Sediment Control Details (1 of 2)
CL-106	Erosion and Sediment Control Details (2 of 2)

4.2 SPECIFICATIONS

The following table provides a listing of Specifications that are included in this Remedial Design Report. The Specifications are included as Appendix B.

Section Number	Title
01110	Summary of Work
01310	Project Management and Coordination
01330	Submittal Procedures
01350	Special Procedures
01450	Quality Control
01500	Temporary Facilities and Controls
01575	Temporary Soil Erosion and Sediment Control
01722	Construction Surveying
02220	Site Demolition
02230	Site Clearing
02240	Temporary Dewatering
Section Number	**Title**

02284	Abandonment and Reconstruction of Facilities
02310	Grading
02316	Excavating and Backfilling for Utility Structures
02317	Trenching and Backfilling
02373	Erosion Control Matting
02374	Riprap
02632	Storm Drainage Piping and Structures
02722	Aggregate Base Course
02744	Asphalt Concrete Pavement
02772	Concrete Curbs and Gutters
02821	Chain Link Fences and Gates
02926	Seeding and Mulching

5.0 SATISFACTION OF APPLICABLE REQUIREMENTS

Applicable requirements such as local construction permits (including discharge permits that may be required prior to construction) are addressed in the following paragraphs. The estimated time required to process such permit applications have been incorporated into the construction schedule.

During construction, the need may arise for various construction-related permits or approvals such as temporary utility connections and approvals for off-site discharge/disposal of water generated from construction operations. All such permits/approvals will be obtained by the contractor as the need arises to comply with applicable City of Niagara Falls ordinances and regulations.

5.1 STORM WATER DISCHARGE PERMITTING

The Remedial Action design includes discharge of storm water to Gill Creek, which will involve the construction of a headwall and the installation of rip rap adjacent to the headwall in order to stabilize the creek bank. NYSDEC has indicated to Olin that stormwater discharge to Gill Creek does not require a State Pollutant Discharge Elimination System (SPDES) Permit if the discharge is constructed at or above the ordinary high water (OHW) mark of Gill Creek. Construction of the storm water discharge in such a manner with the proper creek bank stabilization measures qualifies the activities for a United States Army Corps of Engineers (USACE) Nationwide Permit (NWP) 13 (Bank Stabilization). A Pre-Construction Notification (PCN) under NWP 13 for the porposed work impacting Gill Creek was submitted to USACE on July 25, 2006. The USACE issued a letter dated October 5, 2006 which affirms compliance with NWP 13. The State of New York Department of State has issued a "General Concurrence" letter dated September 20, 2006 for the proposed work. Copies of the above referenced letters are included in Appendix F.

5.2 TRAFFIC PLAN

It will become necessary to temporarily close Veterans Drive during the installation of the storm drainage discharge pipe under the road. Appropriate approvals from City of Niagara Falls will be obtained by the contractor.

5.3 ACCESS AGREEMENTS

Access to areas off-site will be required for Remedial Action activities. Appropriate approvals will be obtained from the City of Niagara Falls by the contractor for work within the right-of-way. Approvals will also be obtained from adjacent property owners as necessary.

6.0 PERFORMANCE STANDARDS VERIFICATION PLAN

The Performance Standards Verification Plan (PSVP) is a combination of several documents discussing how performance standards and quality control objectives will be achieved to meet the objectives of the remedial action. Performance standards applicable to the remedial tasks are presented in the design drawings and specifications. Sections 6.1 through 6.5 describe the documents comprising the Performance Standards Verification Plan.

6.1 REMEDIAL ACTION WORK PLAN

The Remedial Action Work Plan (RAWP) describes the activities to be undertaken during the RA to comply with the conceptual design. The purpose of the RAWP is to demonstrate that the design is consistent with the previously approved approach. The RAWP is provided as Appendix C.

6.2 CONSTRUCTION QUALITY ASSURANCE PLAN

The Construction Quality Assurance Plan (CQAP) will be used by the Engineer's Construction Quality Assurance (CQA) representative(s) during the RA. Construction Quality Control (CQC) as described in the Specifications will be the responsibility of the Remedial Action Contractor. Review of RA activities to assure that proper quality control measures are being performed is the responsibility of the Engineer's CQA representative(s). Quality assurance procedures for RA are described in the CQAP provided in Appendix D.

6.3 HEALTH AND SAFETY PLAN

Olin's Site Health and Safety Plan (HASP) is presented in Appendix E. The Remedial Action Contractor, the Engineer, and all contractors on-site must comply with the requirements presented in the Site HASP. Each contractor on-site will be responsible for the health and safety of their personnel.

6.4 OPERATION AND MAINTENANCE PLAN

A site Operation and Maintenance (O&M) Plan (which will be an addendum to the existing IWS O&M Plan) will be prepared to describe O&M activities required during the post-closure period. The O&M Plan addendum will be prepared at the completion of construction and will describe O&M requirements for the Site cover system, storm drainage system, perimeter fencing and signs. This document will be developed to be consistent with the O&M Plan for the original Industrial Welding Site, and will be specific to the Site as appropriate.

6.5 CONSTRUCTION CERTIFICATION REPORT

A Construction Certification Report will be prepared by the Engineer of Record at the completion of construction. The Construction Certification Report will document that the Site construction activities were performed in accordance with the approved RD.

7.0 COMMUNITY RELATIONS

Purpose:

Olin will maintain a flow of information with the community throughout the remedial construction phase and beyond. A framework for NYSDEC and Olin to inform the community and proactively respond to community questions will be developed.

Goals:

- To provide the public, both the near neighbor community and key local officials, with information in a timely manner
- To be sure that the work proceeds smoothly and meets the needs of the public and the agreed upon commitments of Olin and NYSDEC.
- To assess and respond to any concerns raised by the neighbors and/or local officials.

Objectives:

- To protect human health and the environment
- To perform the work in a safe manner
- To address and fully understand community concerns

Activities:

- Community interaction was initiated at the March 3, 2006, public meeting hosted by the New York State Department of Environmental Conservation at the Public Library in Niagara Falls, NY. The agency discussed the site and the planned remedy with the attendees. After reviewing and addressing all written and oral comments NYSDEC issued a Record of Decision for the site on March 24, 2006, allowing Olin to proceed with implementation of the approved remedy.
- Olin will conduct mailings to nearby community members, including fact sheets and project updates. This will be done at the start and completion of the remedial construction, with additional mailings as necessary.
- A document repository will be maintained at the Niagara Falls public Library.
- Signage will be posted at the site with emergency telephone numbers.
- Names and contact information of Olin and NYSDEC representatives will be listed in public reports, for any site related inquiries.
- Olin will continue to update its local Community Advisory Panel with site progress and information. That panel meets quarterly at the Olin Buffalo Avenue plant.

8.0 CONSTRUCTION SCHEDULE

An estimated schedule of the Remedial Action construction activities is provided in the RAWP (Appendix C). Construction will take place in 2007.

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Rust Environment & Infrastructure, 1997, "Remedial Design Work Plan, Industrial Welding Site, Inactive Hazardous Waste Site, City of Niagara Falls, Niagara County," prepared for Olin Corporation.

Rust Environment & Infrastructure, 1998. "Pre-Design Data Summary Report, Industrial Welding Site, Inactive Hazardous Waste Site, City of Niagara Falls, Niagara County," prepared for Olin Corporation.

Source: USGS 7.5 Minute Topographic Quadrangle Map, Niagara Falls, New York Contour Interval = 5 feet (US), Updated 2001.

OLIN CORPORATION

NIAGARA FALLS, NEW YORK

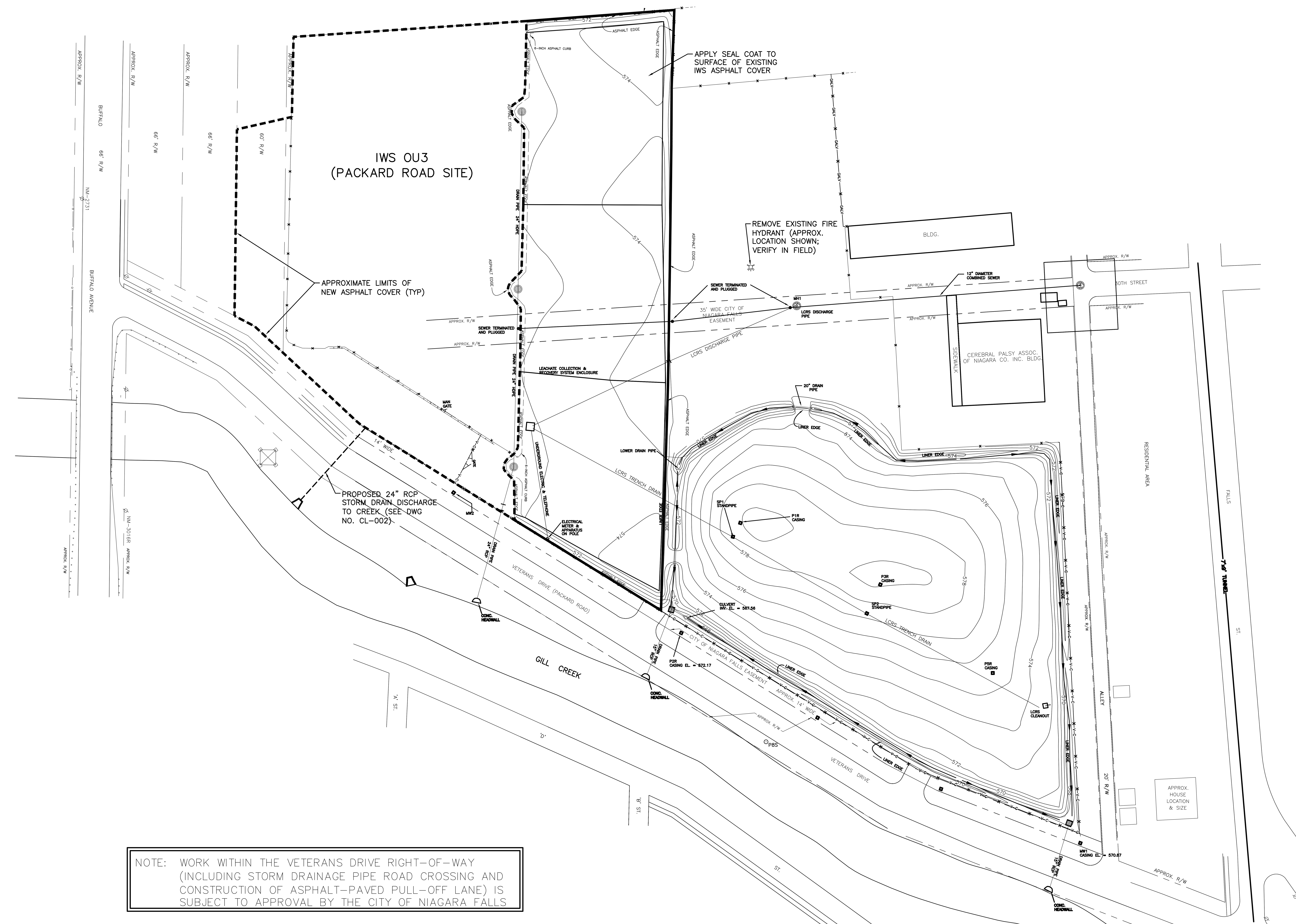
Remedial Design Report: Industrial Welding Site - Operable Unit 3 (Packard Road Site)

SITE LOCATION MAP

MACTEC ENGINEERING AND CONSULTING, INC.

MACTEC Project Number: 6300060001

FIGURE 1.1



NOTE: WORK WITHIN THE VETERANS DRIVE RIGHT-OF-WAY (INCLUDING STORM DRAINAGE PIPE ROAD CROSSING AND CONSTRUCTION OF ASPHALT-PAVED PULL-OFF LANE) IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

LEGEND

Symbol	Meaning
—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—	OTHER EXISTING CHAINLINK FENCE
—— ► ——	DITCH WITH FLOW DIRECTION
P3R OR MW1	PIEZOMETER IDENTIFICATION OR MONITORING WELL IDENTIFICATION
STANDPIPE	STANDPIPE FOR LEACHATE COLLECTION & RECOVERY SYSTEM
R/W	RIGHT-OF-WAY
- - - - (heavy dashed)	LIMIT OF NEW ASPHALT COVER
——— (heavy solid)	LIMIT OF SEAL COATING

NOTES:

1. SOURCE OF SITE PLAN BASE MAP: RECORD DRAWINGS OF IWS WORK, SEPT. 2000.
2. EXISTING WATER AND SEWER UTILITIES WILL BE ABANDONED WITHIN THE LIMITS OF THE ASSUMED CITY OF NIAGARA FALLS EASEMENT AND AT OTHER LOCATIONS ON THE PACKARD ROAD SITE. REFER TO DRAWING CL-001.
3. REFER TO OTHER DRAWINGS FOR EXISTING TOPOGRAPHIC INFORMATION AND PROPOSED CONSTRUCTION WORK WITHIN THE LIMITS OF THE PACKARD ROAD SITE.
4. CONSTRUCTION WORK SHALL INCLUDE APPLICATION OF A SEAL COAT TO SURFACE OF EXISTING IWS ASPHALT COVER WHERE INDICATED IN ACCORDANCE WITH THE SPECIFICATIONS.

SCALE IN FEET: 0 60 120

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED: N/A
DRAWN: C. BUDSOCK
CHECKED: G. COFFMAN
IN CHARGE: R. MAROTTE
DATE: 09 MARCH 07

STATE OF NEW YORK — GLENN N. COFFMAN — 062440-1 — PROFESSIONAL ENGINEER

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC
MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

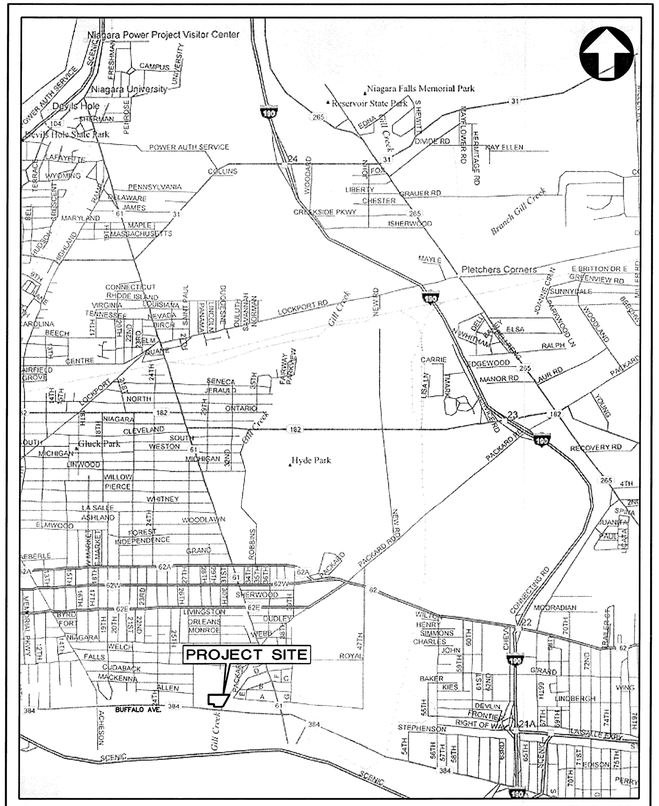
OVERALL SITE PLAN

SCALE: NONE
CONTRACT: 6300-06-0001
DWG. NO.: FIG 1.2 | REV: 0 | PAGE NO:

APPENDIX A

DESIGN DRAWINGS

DESIGN DRAWINGS FOR
ASPHALT COVER CONSTRUCTION
INDUSTRIAL WELDING SITE-OPERABLE UNIT 3
(PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK



SITE LOCATION MAP

LIST OF DRAWINGS	
DRAWING NUMBER	TITLE
–	COVER SHEET
GR–001	PRE–CONSTRUCTION TOPOGRAPHIC SURVEY
GR–002	OVERALL SITE PLAN
CL–001	CLEARING AND DEMOLITION PLAN
CL–002	GRADING AND DRAINAGE PLAN
CL–003	PHASE 1 EROSION AND SEDIMENT CONTROL PLAN
CL–004	PHASE 2 EROSION AND SEDIMENT CONTROL PLAN
CL–101	STORM DRAINAGE PIPE PROFILES
CL–102	COVER SYSTEM DETAILS AND SECTIONS
CL–103	COVER SYSTEM DETAILS AND SECTIONS
CL–104	CHAIN LINK FENCING DETAILS
CL–105	EROSION AND SEDIMENT CONTROL DETAILS (1 OF 2)
CL–106	EROSION AND SEDIMENT CONTROL DETAILS (2 OF 2)

PREPARED FOR:

OLIN CORPORATION
ENVIRONMENTAL REMEDIATION GROUP
CHARLESTON, TENNESSEE

PREPARED BY:

MACTEC Engineering and Consulting, P.C.

IN ASSOCIATION WITH:

MACTEC

MACTEC Engineering and Consulting, Inc.
3200 TOWN POINT DRIVE
KENNESAW, GEORGIA 30144 (770) 421–3400

STATE OF NEW YORK
JOHN N. COPPOLA
062440
ENGINEER PROFESSIONAL
3/9/07

REVISED MARCH 9, 2007

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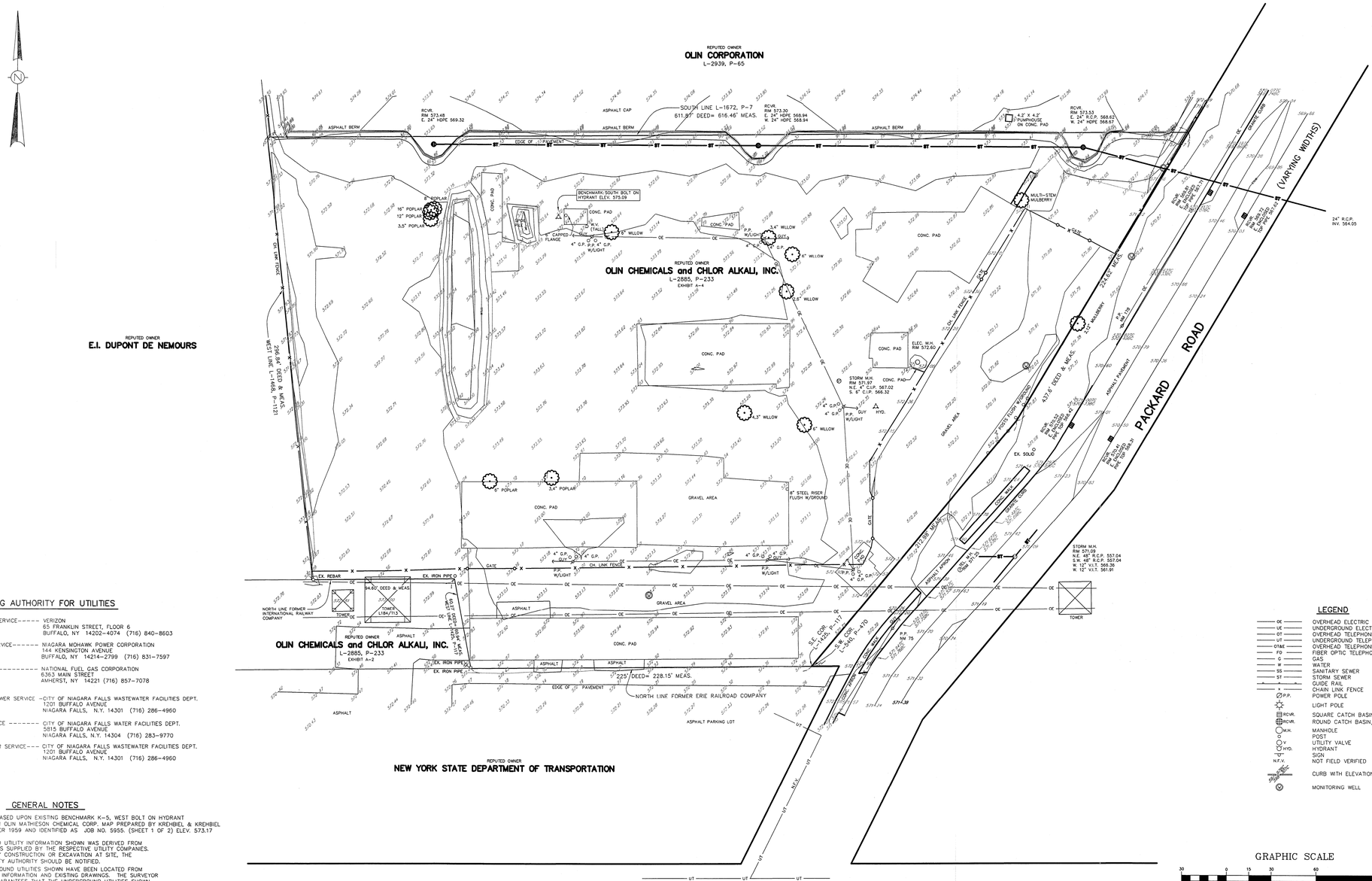

OPERATING AUTHORITY FOR UTILITIES

(1) TELEPHONE SERVICE------ VERIZON
65 FRANKLIN STREET, FLOOR 6
BUFFALO, NY 14202-4074 (716) 840-8603

(2) ELECTRIC SERVICE------ NIAGARA MOHAWK POWER CORPORATION
144 KENSINGTON AVENUE
BUFFALO, NY 14214-2799 (716) 831-7597

(3) GAS SERVICE--------- NATIONAL FUEL GAS CORPORATION
6363 MAIN STREET
AMHERST, NY 14221 (716) 857-7078

(4) SANITARY SEWER SERVICE -CITY OF NIAGARA FALLS WASTEWATER FACILITIES DEPT.
1201 BUFFALO AVENUE
NIAGARA FALLS, N.Y. 14301 (716) 286-4960

(5) WATER SERVICE ------- CITY OF NIAGARA FALLS WATER FACILITIES DEPT.
5815 BUFFALO AVENUE
NIAGARA FALLS, N.Y. 14304 (716) 283-9770

(6) STORM SEWER SERVICE--- CITY OF NIAGARA FALLS WASTEWATER FACILITIES DEPT.
1201 BUFFALO AVENUE
NIAGARA FALLS, N.Y. 14301 (716) 286-4960

GENERAL NOTES

(1) ELEVATIONS BASED UPON EXISTING BENCHMARK K-5, WEST BOLT ON HYDRANT AS SHOWN ON OLIN MATHIESON CHEMICAL CORP. MAP PREPARED BY KREHBIEL & KREHBIEL DATED OCTOBER 1959 AND IDENTIFIED AS JOB NO. 5955. (SHEET 1 OF 2) ELEV. 573.17

(2) UNDERGROUND UTILITY INFORMATION SHOWN WAS DERIVED FROM RECORD PLANS SUPPLIED BY THE RESPECTIVE UTILITY COMPANIES. PRIOR TO ANY CONSTRUCTION OR EXCAVATION AT SITE, THE PROPER UTILITY AUTHORITY SHOULD BE NOTIFIED.
THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING DRAWINGS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED ALTHOUGH HE DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

(3) SEE CITY OF NIAGARA FALLS TAX MAP NO. 159.12-1-7.

(4) PROPERTY LINES SHOWN ARE BASED UPON LIMITED DEED AND FIELD MEASUREMENTS AND ARE SUBJECT TO VARIATION BASED UPON FURTHER TITLE DOCUMENTATION AND ADDITIONAL FIELD MEASUREMENTS AS DICTATED BY A STANDARD BOUNDARY SURVEY.

LEGEND

- OE — OVERHEAD ELECTRIC
- UE — UNDERGROUND ELECTRIC
- OT — OVERHEAD TELEPHONE
- UT — UNDERGROUND TELEPHONE
- OT&E — OVERHEAD TELEPHONE & ELECTRIC
- FO — FIBER OPTIC TELEPHONE CABLE
- G — GAS
- W — WATER
- SS — SANITARY SEWER
- ST — STORM SEWER
- GUIDE RAIL
- CHAIN LINK FENCE
- P.P. — POWER POLE
- LIGHT POLE
- RCVR. — SQUARE CATCH BASIN/RECEIVER
- RCVR. — ROUND CATCH BASIN/RECEIVER
- M.H. — MANHOLE
- POST
- V. — UTILITY VALVE
- HYD. — HYDRANT
- SIGN
- N.F.V. — NOT FIELD VERIFIED
- CURB WITH ELEVATIONS
- MONITORING WELL

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

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

REVISION			

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

TOPOGRAPHICAL MAP OF PART OF LOT-4 OF THE STEDMAN FARM

LOCATION **CITY OF NIAGARA FALLS, NIAGARA COUNTY, NEW YORK**

DRAWN: JEM III
COMP.:
CAD FILE: 53776.DWG
CHECKED:

JOB No. **5377** | SCALE: **1"= 30'** | DATE: **JUNE 14, 2005**

NOTES:

1. TOPOGRAPHIC SURVEY BY MCINTOSH & MCINTOSH, P.C.
2. NIAGARA MOHAWK IS NOW REFERRED TO AS NATIONAL GRID.
3. NIAGARA FALLS WATER AND WASTEWATER FACILITIES IS NOW REFERRED TO AS NIAGARA FALLS WATER BOARD.

REV	DATE	BY	SUB	APP	DESCRIPTION

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED N/A
DRAWN N/A
CHECKED N/A
IN CHARGE N/A
DATE 09 MARCH 07

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

PRE-CONSTRUCTION TOPOGRAPHIC SURVEY

SCALE: NONE
CONTRACT: 6300-06-0001
DWG. NO.: GR-001 | REV: 0 | PAGE NO: 1

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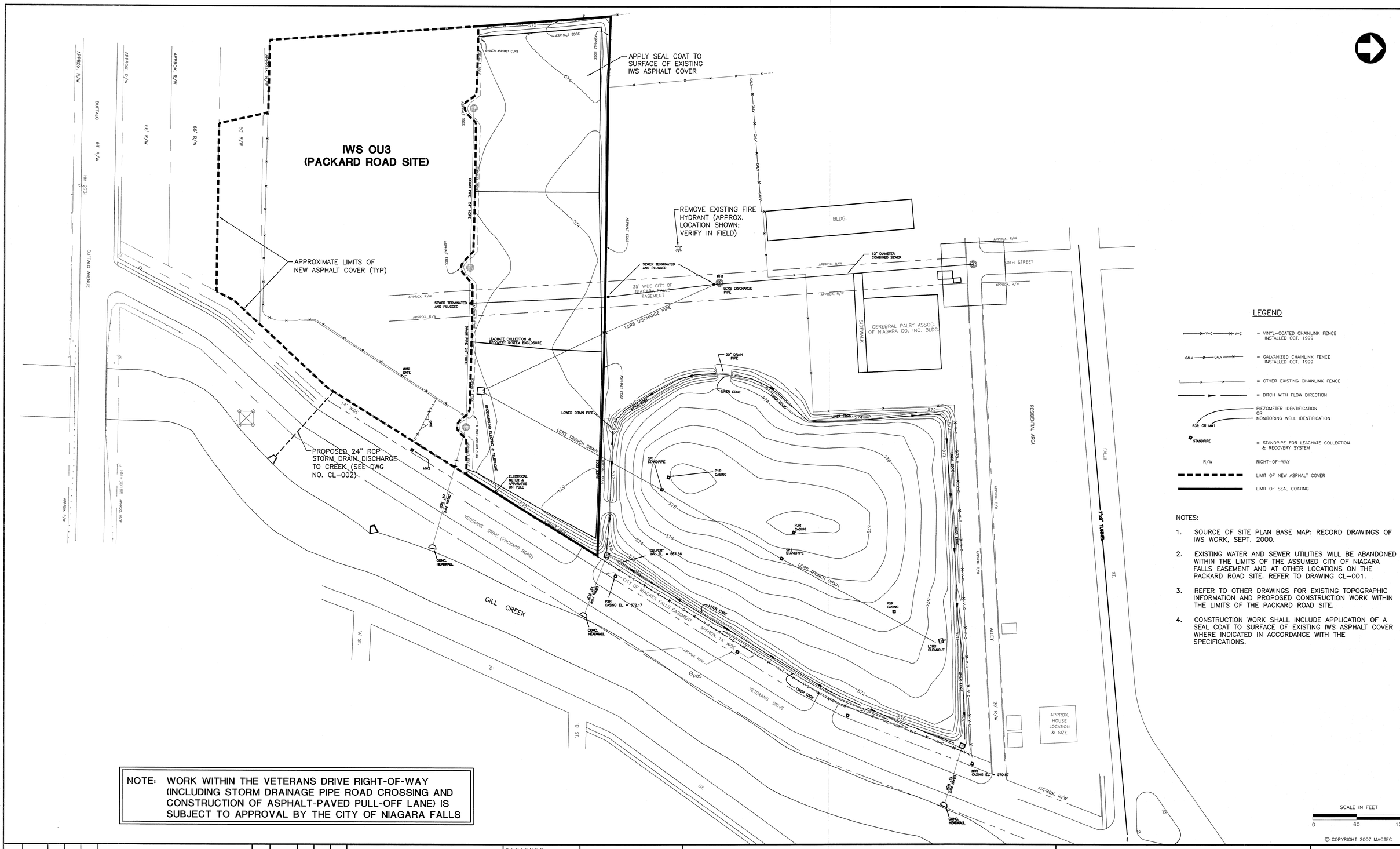

LEGEND

- V-C — V-C = VINYL-COATED CHAINLINK FENCE INSTALLED OCT. 1999
- GALV — GALV = GALVANIZED CHAINLINK FENCE INSTALLED OCT. 1999
- = OTHER EXISTING CHAINLINK FENCE
- = DITCH WITH FLOW DIRECTION
- P3R OR MW1 = PIEZOMETER IDENTIFICATION OR MONITORING WELL IDENTIFICATION
- STANDPIPE = STANDPIPE FOR LEACHATE COLLECTION & RECOVERY SYSTEM
- R/W = RIGHT-OF-WAY
- = LIMIT OF NEW ASPHALT COVER
- = LIMIT OF SEAL COATING

NOTES:

1. SOURCE OF SITE PLAN BASE MAP: RECORD DRAWINGS OF IWS WORK, SEPT. 2000.
2. EXISTING WATER AND SEWER UTILITIES WILL BE ABANDONED WITHIN THE LIMITS OF THE ASSUMED CITY OF NIAGARA FALLS EASEMENT AND AT OTHER LOCATIONS ON THE PACKARD ROAD SITE. REFER TO DRAWING CL-001.
3. REFER TO OTHER DRAWINGS FOR EXISTING TOPOGRAPHIC INFORMATION AND PROPOSED CONSTRUCTION WORK WITHIN THE LIMITS OF THE PACKARD ROAD SITE.
4. CONSTRUCTION WORK SHALL INCLUDE APPLICATION OF A SEAL COAT TO SURFACE OF EXISTING IWS ASPHALT COVER WHERE INDICATED IN ACCORDANCE WITH THE SPECIFICATIONS.

NOTE: WORK WITHIN THE VETERANS DRIVE RIGHT-OF-WAY (INCLUDING STORM DRAINAGE PIPE ROAD CROSSING AND CONSTRUCTION OF ASPHALT-PAVED PULL-OFF LANE) IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

SCALE IN FEET
0 60 120

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED N/A
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN N. COFFMAN — 072401 — ENGINEER — PROFESSIONAL — 3/9/07

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC
MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

OVERALL SITE PLAN

SCALE: NONE
CONTRACT: 6300-06-0001
DWG. NO.: GR-002 | REV: 0 | PAGE NO: 2

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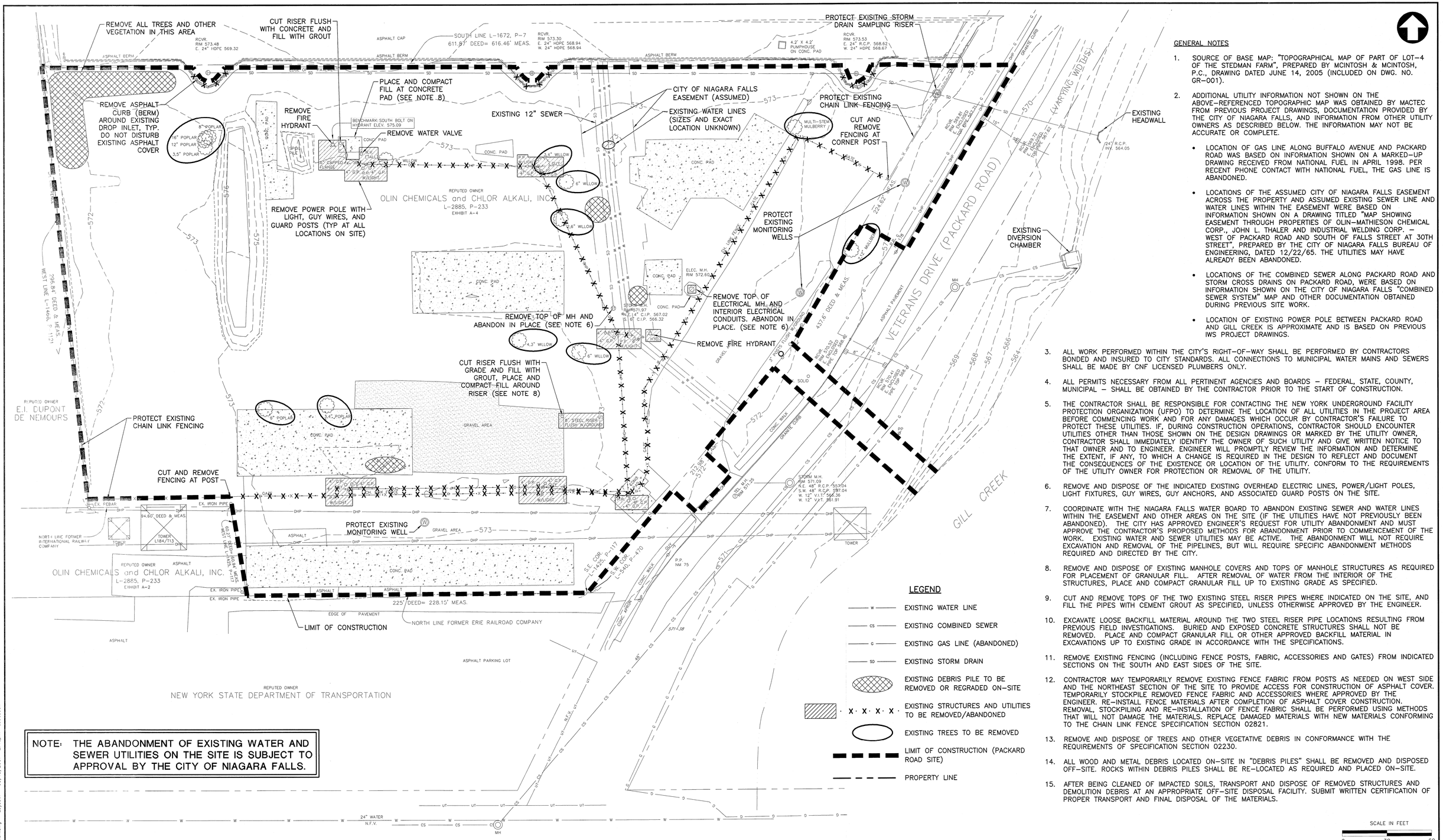

GENERAL NOTES

1. SOURCE OF BASE MAP: "TOPOGRAPHICAL MAP OF PART OF LOT-4 OF THE STEDMAN FARM", PREPARED BY MCINTOSH & MCINTOSH, P.C., DRAWING DATED JUNE 14, 2005 (INCLUDED ON DWG. NO. GR-001).

2. ADDITIONAL UTILITY INFORMATION NOT SHOWN ON THE ABOVE-REFERENCED TOPOGRAPHIC MAP WAS OBTAINED BY MACTEC FROM PREVIOUS PROJECT DRAWINGS, DOCUMENTATION PROVIDED BY THE CITY OF NIAGARA FALLS, AND INFORMATION FROM OTHER UTILITY OWNERS AS DESCRIBED BELOW. THE INFORMATION MAY NOT BE ACCURATE OR COMPLETE.

   - LOCATION OF GAS LINE ALONG BUFFALO AVENUE AND PACKARD ROAD WAS BASED ON INFORMATION SHOWN ON A MARKED-UP DRAWING RECEIVED FROM NATIONAL FUEL IN APRIL 1998. PER RECENT PHONE CONTACT WITH NATIONAL FUEL, THE GAS LINE IS ABANDONED.
   - LOCATIONS OF THE ASSUMED CITY OF NIAGARA FALLS EASEMENT ACROSS THE PROPERTY AND ASSUMED EXISTING SEWER LINE AND WATER LINES WITHIN THE EASEMENT WERE BASED ON INFORMATION SHOWN ON A DRAWING TITLED "MAP SHOWING EASEMENT THROUGH PROPERTIES OF OLIN-MATHIESON CHEMICAL CORP., JOHN L. THALER AND INDUSTRIAL WELDING CORP. - WEST OF PACKARD ROAD AND SOUTH OF FALLS STREET AT 30TH STREET", PREPARED BY THE CITY OF NIAGARA FALLS BUREAU OF ENGINEERING, DATED 12/22/65. THE UTILITIES MAY HAVE ALREADY BEEN ABANDONED.
   - LOCATIONS OF THE COMBINED SEWER ALONG PACKARD ROAD AND STORM CROSS DRAINS ON PACKARD ROAD, WERE BASED ON INFORMATION SHOWN ON THE CITY OF NIAGARA FALLS "COMBINED SEWER SYSTEM" MAP AND OTHER DOCUMENTATION OBTAINED DURING PREVIOUS SITE WORK.
   - LOCATION OF EXISTING POWER POLE BETWEEN PACKARD ROAD AND GILL CREEK IS APPROXIMATE AND IS BASED ON PREVIOUS IWS PROJECT DRAWINGS.

3. ALL WORK PERFORMED WITHIN THE CITY'S RIGHT-OF-WAY SHALL BE PERFORMED BY CONTRACTORS BONDED AND INSURED TO CITY STANDARDS. ALL CONNECTIONS TO MUNICIPAL WATER MAINS AND SEWERS SHALL BE MADE BY CNF LICENSED PLUMBERS ONLY.

4. ALL PERMITS NECESSARY FROM ALL PERTINENT AGENCIES AND BOARDS - FEDERAL, STATE, COUNTY, MUNICIPAL - SHALL BE OBTAINED BY THE CONTRACTOR PRIOR TO THE START OF CONSTRUCTION.

5. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING THE NEW YORK UNDERGROUND FACILITY PROTECTION ORGANIZATION (UFPO) TO DETERMINE THE LOCATION OF ALL UTILITIES IN THE PROJECT AREA BEFORE COMMENCING WORK AND FOR ANY DAMAGES WHICH OCCUR BY CONTRACTOR'S FAILURE TO PROTECT THESE UTILITIES. IF, DURING CONSTRUCTION OPERATIONS, CONTRACTOR SHOULD ENCOUNTER UTILITIES OTHER THAN THOSE SHOWN ON THE DESIGN DRAWINGS OR MARKED BY THE UTILITY OWNER, CONTRACTOR SHALL IMMEDIATELY IDENTIFY THE OWNER OF SUCH UTILITY AND GIVE WRITTEN NOTICE TO THAT OWNER AND TO ENGINEER. ENGINEER WILL PROMPTLY REVIEW THE INFORMATION AND DETERMINE THE EXTENT, IF ANY, TO WHICH A CHANGE IS REQUIRED IN THE DESIGN TO REFLECT AND DOCUMENT THE CONSEQUENCES OF THE EXISTENCE OR LOCATION OF THE UTILITY. CONFORM TO THE REQUIREMENTS OF THE UTILITY OWNER FOR PROTECTION OR REMOVAL OF THE UTILITY.

6. REMOVE AND DISPOSE OF THE INDICATED EXISTING OVERHEAD ELECTRIC LINES, POWER/LIGHT POLES, LIGHT FIXTURES, GUY WIRES, GUY ANCHORS, AND ASSOCIATED GUARD POSTS ON THE SITE.

7. COORDINATE WITH THE NIAGARA FALLS WATER BOARD TO ABANDON EXISTING SEWER AND WATER LINES WITHIN THE EASEMENT AND OTHER AREAS ON THE SITE (IF THE UTILITIES HAVE NOT PREVIOUSLY BEEN ABANDONED). THE CITY HAS APPROVED ENGINEER'S REQUEST FOR UTILITY ABANDONMENT AND MUST APPROVE THE CONTRACTOR'S PROPOSED METHODS FOR ABANDONMENT PRIOR TO COMMENCEMENT OF THE WORK. EXISTING WATER AND SEWER UTILITIES MAY BE ACTIVE. THE ABANDONMENT WILL NOT REQUIRE EXCAVATION AND REMOVAL OF THE PIPELINES, BUT WILL REQUIRE SPECIFIC ABANDONMENT METHODS REQUIRED AND DIRECTED BY THE CITY.

8. REMOVE AND DISPOSE OF EXISTING MANHOLE COVERS AND TOPS OF MANHOLE STRUCTURES AS REQUIRED FOR PLACEMENT OF GRANULAR FILL. AFTER REMOVAL OF WATER FROM THE INTERIOR OF THE STRUCTURES, PLACE AND COMPACT GRANULAR FILL UP TO EXISTING GRADE AS SPECIFIED.

9. CUT AND REMOVE TOPS OF THE TWO EXISTING STEEL RISER PIPES WHERE INDICATED ON THE SITE, AND FILL THE PIPES WITH CEMENT GROUT AS SPECIFIED, UNLESS OTHERWISE APPROVED BY THE ENGINEER.

10. EXCAVATE LOOSE BACKFILL MATERIAL AROUND THE TWO STEEL RISER PIPE LOCATIONS RESULTING FROM PREVIOUS FIELD INVESTIGATIONS. BURIED AND EXPOSED CONCRETE STRUCTURES SHALL NOT BE REMOVED. PLACE AND COMPACT GRANULAR FILL OR OTHER APPROVED BACKFILL MATERIAL IN EXCAVATIONS UP TO EXISTING GRADE IN ACCORDANCE WITH THE SPECIFICATIONS.

11. REMOVE EXISTING FENCING (INCLUDING FENCE POSTS, FABRIC, ACCESSORIES AND GATES) FROM INDICATED SECTIONS ON THE SOUTH AND EAST SIDES OF THE SITE.

12. CONTRACTOR MAY TEMPORARILY REMOVE EXISTING FENCE FABRIC FROM POSTS AS NEEDED ON WEST SIDE AND THE NORTHEAST SECTION OF THE SITE TO PROVIDE ACCESS FOR CONSTRUCTION OF ASPHALT COVER. TEMPORARILY STOCKPILE REMOVED FENCE FABRIC AND ACCESSORIES WHERE APPROVED BY THE ENGINEER. RE-INSTALL FENCE MATERIALS AFTER COMPLETION OF ASPHALT COVER CONSTRUCTION. REMOVAL, STOCKPILING AND RE-INSTALLATION OF FENCE FABRIC SHALL BE PERFORMED USING METHODS THAT WILL NOT DAMAGE THE MATERIALS. REPLACE DAMAGED MATERIALS WITH NEW MATERIALS CONFORMING TO THE CHAIN LINK FENCE SPECIFICATION SECTION 02821.

13. REMOVE AND DISPOSE OF TREES AND OTHER VEGETATIVE DEBRIS IN CONFORMANCE WITH THE REQUIREMENTS OF SPECIFICATION SECTION 02230.

14. ALL WOOD AND METAL DEBRIS LOCATED ON-SITE IN "DEBRIS PILES" SHALL BE REMOVED AND DISPOSED OFF-SITE. ROCKS WITHIN DEBRIS PILES SHALL BE RE-LOCATED AS REQUIRED AND PLACED ON-SITE.

15. AFTER BEING CLEANED OF IMPACTED SOILS, TRANSPORT AND DISPOSE OF REMOVED STRUCTURES AND DEMOLITION DEBRIS AT AN APPROPRIATE OFF-SITE DISPOSAL FACILITY. SUBMIT WRITTEN CERTIFICATION OF PROPER TRANSPORT AND FINAL DISPOSAL OF THE MATERIALS.

SCALE IN FEET
0 30 60

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN N. COFFMAN — 082440-1 — ENGINEER — PROFESSIONAL — 3/9/07

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC
MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

CLEARING AND DEMOLITION PLAN

SCALE AS SHOWN
CONTRACT 6300-06-0001
DWG. NO. CL-001 | REV 0 | PAGE NO 3

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PROTECT EXISTING STORM DRAIN SAMPLING RISER

CITY OF NIAGARA FALLS EASEMENT (ASSUMED)

CONNECT NEW FENCE TO EXISTING FENCE

12' WIDE DOUBLE SWING GATE

ASPHALT-PAVED PULL-OFF LANE WITH MOUNTABLE CURBING PER CITY STANDARDS

CUT EDGE OF EXISTING PAVEMENT AND REMOVE EXISTING GRANITE CURBING (SALVAGE FOR RE-USE ON-SITE WHERE INDICATED)

NEW STORM DRAIN SAMPLING RISER

CONNECT NEW FENCE TO EXISTING FENCE

INSTALL NEW GALVANIZED CHAIN LINK FENCE. DESIGNATION CODE CL-6PO (SEE DWG CL-104)

REPLACE EXISTING GRANITE CURB

INSTALL NEW VINYL-COATED CHAIN LINK FENCE AT EAST EDGE OF SITE ALONG PACKARD ROAD. DESIGNATION CODE VCL-6PO (SEE DWG CL-105)

INV. EL. 564.20

OLIN CHEMICALS and CHLOR ALKALI, INC. L-2885, P-233 EXHIBIT A-2

REPUTED OWNER NEW YORK STATE DEPARTMENT OF TRANSPORTATION

NORTH LINE FORMER ERIE RAILROAD COMPANY

NORTH LINE FORMER INTERNATIONAL RAILWAY COMPANY

EDGE OF PAVEMENT

ASPHALT PARKING LOT

VETERANS DRIVE (PACKARD RD.)

BUFFALO AVENUE (66.0' WIDE)

GILL CREEK

LEGEND (NEW CONSTRUCTION)

- 575 — FINISH GRADE
- × 575.11 — SPOT ELEVATION (FINISH GRADE)
- ASPHALT PAVEMENT (OUTSIDE LIMITS OF COVER SYSTEM)
- STORM DRAIN PIPE
- MANHOLE
- DROP INLET
- LIMIT OF CONSTRUCTION
- xx — NEW GALVANIZED CHAIN LINK FENCE
- x — NEW VINYL-COATED CHAIN LINK FENCE

NOTE: WORK WITHIN THE VETERANS DRIVE RIGHT-OF-WAY (INCLUDING STORM DRAINAGE PIPE ROAD CROSSING AND CONSTRUCTION OF ASPHALT-PAVED PULL-OFF LANE) IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

SCALE IN FEET
0 30 60

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REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN P. NICHOLSON
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — ANDREW N. COFFMAN — LICENSED PROFESSIONAL ENGINEER — 3/9/07

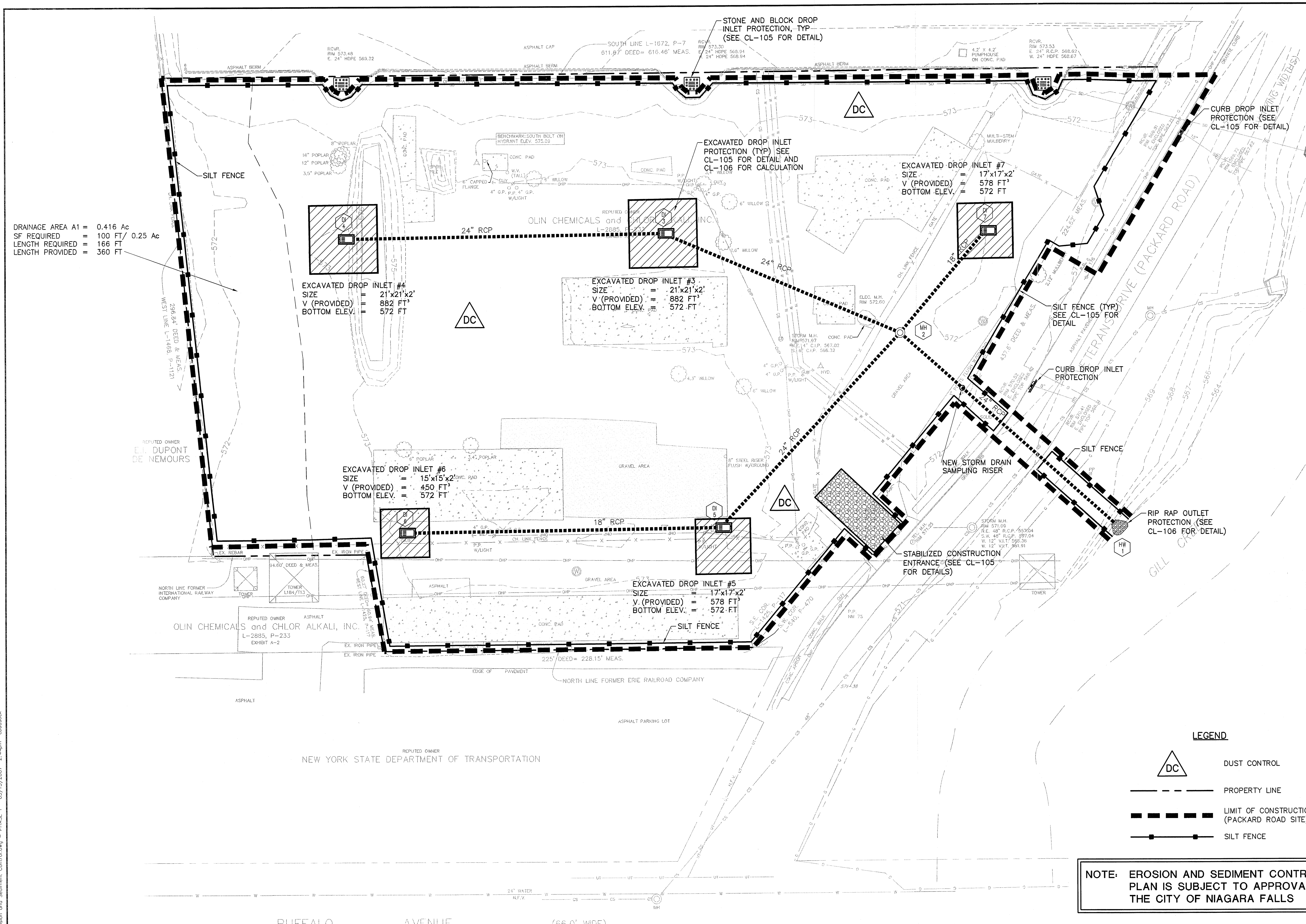
OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC
MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

GRADING AND DRAINAGE PLAN

SCALE AS SHOWN
CONTRACT 6300-06-0001
DWG. NO. CL-002 | REV 0 | PAGE NO 4



LEGEND

DC	DUST CONTROL
— — —	PROPERTY LINE
▬ ▬ ▬	LIMIT OF CONSTRUCTION (PACKARD ROAD SITE)
—■—■—	SILT FENCE

NOTE: EROSION AND SEDIMENT CONTROL PLAN IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

EROSION AND SEDIMENT CONTROL NOTES

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL", NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC), AUGUST 2005.
2. THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO OR CONCURRENT WITH LAND DISTURBING ACTIVITIES.
3. STABILIZED CONSTRUCTION ENTRANCE, SILT FENCE, DROP INLET PROTECTION AT EXISTING STORM DRAIN INLETS, AND OTHER REQUIRED MEASURES SHALL BE CONSTRUCTED AND SHALL BE MADE FUNCTIONAL PRIOR TO COMMENCEMENT OF LAND DISTURBING ACTIVITIES. CONSTRUCT WHERE INDICATED AND IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS.
4. CONSTRUCT EXCAVATED DROP INLET PROTECTION AT NEW STORMWATER DROP INLET LOCATIONS DURING THE PROGRESS OF THE WORK AS INDICATED.
5. ALL DISTURBED AREAS SHALL DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES UNTIL FINAL STABILIZATION IS ACHIEVED.
6. PERIODIC INSPECTION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PERFORMED AS REQUIRED DURING THE PROGRESS OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING OF DRAIN INLETS AND PIPES THAT BECOME CLOGGED AS A RESULT OF CONSTRUCTION ACTIVITIES.
7. MATERIAL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. APPLY DUST CONTROL MEASURES, TEMPORARY SEEDING AND MULCHING AS REQUIRED DURING THE PROGRESS OF THE WORK.
8. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES. ADDITIONAL MEASURES BEYOND THE APPROVED PLAN SHALL BE IMPLEMENTED AS NECESSARY.
9. INSTALL RIPRAP OUTLET PROTECTION, EROSION CONTROL MATTING, PERMANENT SEEDING, AND MULCHING AS INDICATED ON THE DRAWINGS AND IN CONFORMANCE WITH THE PROJECT SPECIFICATIONS.
10. MAINTAIN SEDIMENT CONTROL MEASURES UNTIL THE WORK IS COMPLETED AND ALL DISTURBED AREAS ARE STABILIZED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REMOVE ALL TEMPORARY SEDIMENT CONTROL MEASURES AND RESTORE THOSE AREAS TO THE ORIGINAL OR DESIGNED CONDITIONS.

SCALE IN FEET 0 30 60

DESIGNED	M. ILIC
DRAWN	P. NICHOLSON
CHECKED	G. COFFMAN
IN CHARGE	R. MAROTTE
DATE	09 MARCH 07

REV	DATE	BY	SUB	APP	DESCRIPTION

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC

MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421-3400

3/9/07

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

PHASE 1 EROSION AND SEDIMENT CONTROL PLAN

SCALE	CONTRACT	DWG. NO.	REV	PAGE NO
AS SHOWN	6300-06-0001	CL-003	0	5

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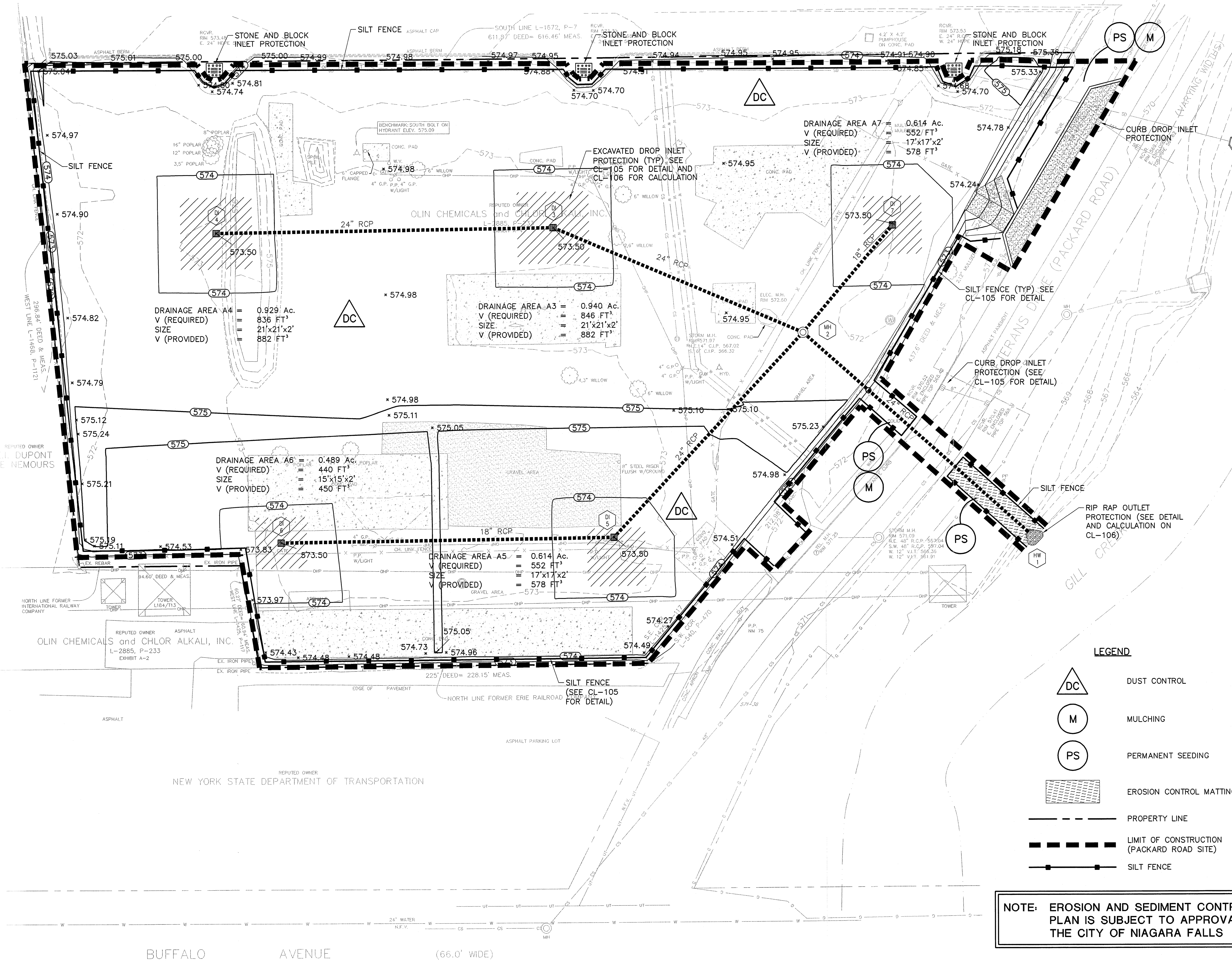

LEGEND

- DC — DUST CONTROL
- M — MULCHING
- PS — PERMANENT SEEDING
- EROSION CONTROL MATTING
- PROPERTY LINE
- LIMIT OF CONSTRUCTION (PACKARD ROAD SITE)
- SILT FENCE

EROSION AND SEDIMENT CONTROL NOTES

1. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED AND MAINTAINED IN ACCORDANCE WITH THE APPLICABLE REQUIREMENTS OF THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL", NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION (NYSDEC), AUGUST 2005.
2. THE ESCAPE OF SEDIMENT FROM THE SITE SHALL BE PREVENTED BY THE INSTALLATION OF EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO OR CONCURRENT WITH LAND DISTURBING ACTIVITIES.
3. STABILIZED CONSTRUCTION ENTRANCE, SILT FENCE, DROP INLET PROTECTION AT EXISTING STORM DRAIN INLETS, AND OTHER REQUIRED MEASURES SHALL BE CONSTRUCTED AND SHALL BE MADE FUNCTIONAL PRIOR TO COMMENCEMENT OF LAND DISTURBING ACTIVITIES. CONSTRUCT WHERE INDICATED AND IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS.
4. CONSTRUCT EXCAVATED DROP INLET PROTECTION AT NEW STORMWATER DROP INLET LOCATIONS DURING THE PROGRESS OF THE WORK AS INDICATED.
5. ALL DISTURBED AREAS SHALL DRAIN TO APPROVED SEDIMENT CONTROL MEASURES AT ALL TIMES DURING LAND DISTURBING ACTIVITIES UNTIL FINAL STABILIZATION IS ACHIEVED.
6. PERIODIC INSPECTION AND MAINTENANCE OF EROSION AND SEDIMENT CONTROL MEASURES SHALL BE PERFORMED AS REQUIRED DURING THE PROGRESS OF THE WORK. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANING OF DRAIN INLETS AND PIPES THAT BECOME CLOGGED AS A RESULT OF CONSTRUCTION ACTIVITIES.
7. MATERIAL STOCKPILES SHALL BE STABILIZED OR PROTECTED WITH SEDIMENT TRAPPING MEASURES. APPLY DUST CONTROL MEASURES, TEMPORARY SEEDING AND MULCHING AS REQUIRED DURING THE PROGRESS OF THE WORK.
8. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE MAINTAINED AT ALL TIMES. ADDITIONAL MEASURES BEYOND THE APPROVED PLAN SHALL BE IMPLEMENTED AS NECESSARY.
9. INSTALL RIPRAP OUTLET PROTECTION, EROSION CONTROL MATTING, PERMANENT SEEDING, AND MULCHING AS INDICATED ON THE DRAWINGS AND IN CONFORMANCE WITH THE PROJECT SPECIFICATIONS.
10. MAINTAIN SEDIMENT CONTROL MEASURES UNTIL THE WORK IS COMPLETED AND ALL DISTURBED AREAS ARE STABILIZED. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO REMOVE ALL TEMPORARY SEDIMENT CONTROL MEASURES AND RESTORE THOSE AREAS TO THE ORIGINAL OR DESIGNED CONDITIONS.

NOTE: EROSION AND SEDIMENT CONTROL PLAN IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

SCALE IN FEET: 0 30 60

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED M. ILIC
DRAWN P. NICHOLSON
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN N. COFFMAN — LICENSED PROFESSIONAL ENGINEER — 3/9/07

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IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

PHASE 2 EROSION AND SEDIMENT CONTROL PLAN

SCALE	CONTRACT	DWG. NO.	REV	PAGE NO
AS SHOWN	6300-06-0001	CL-004	0	6

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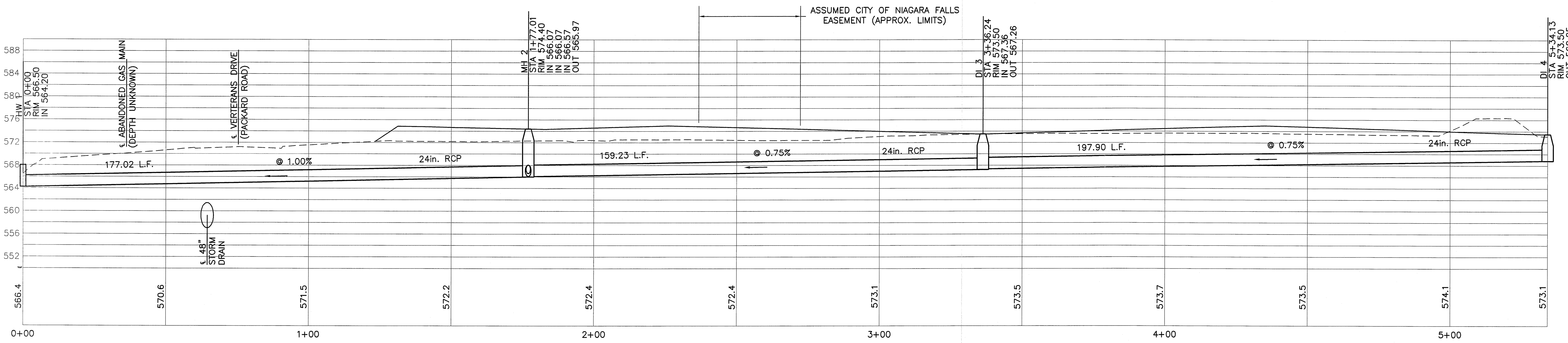
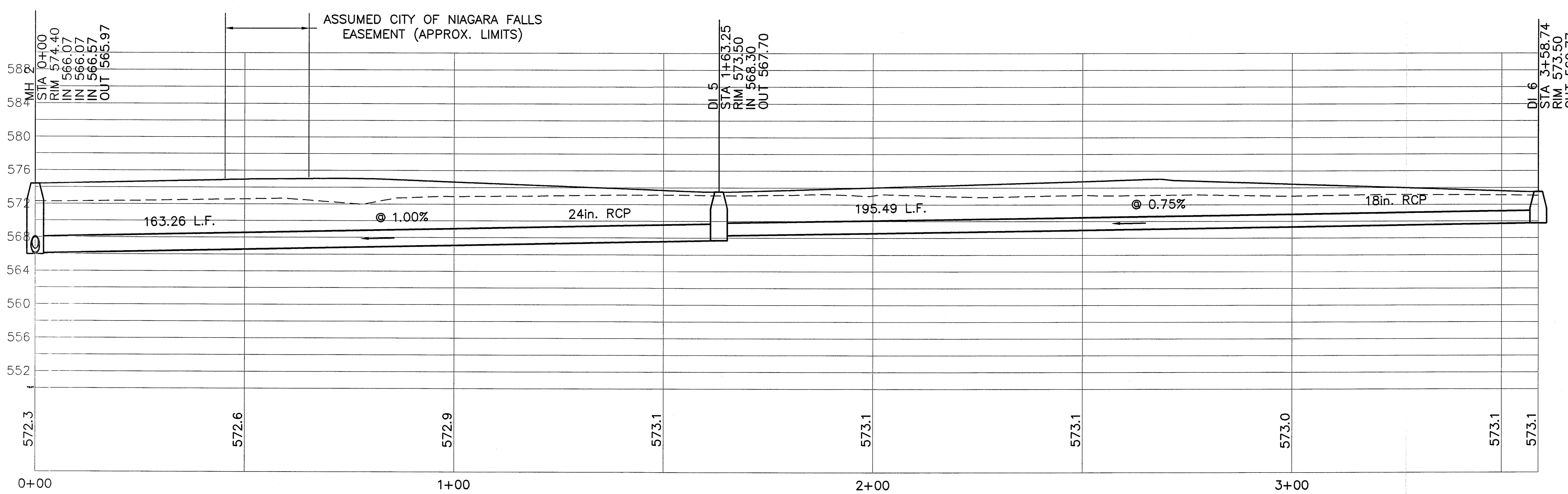


HW 1 – DI 4

SCALE: 1"=20'–0" HORIZ.
1"=10'–0" VERT.



MH 2 – DI6

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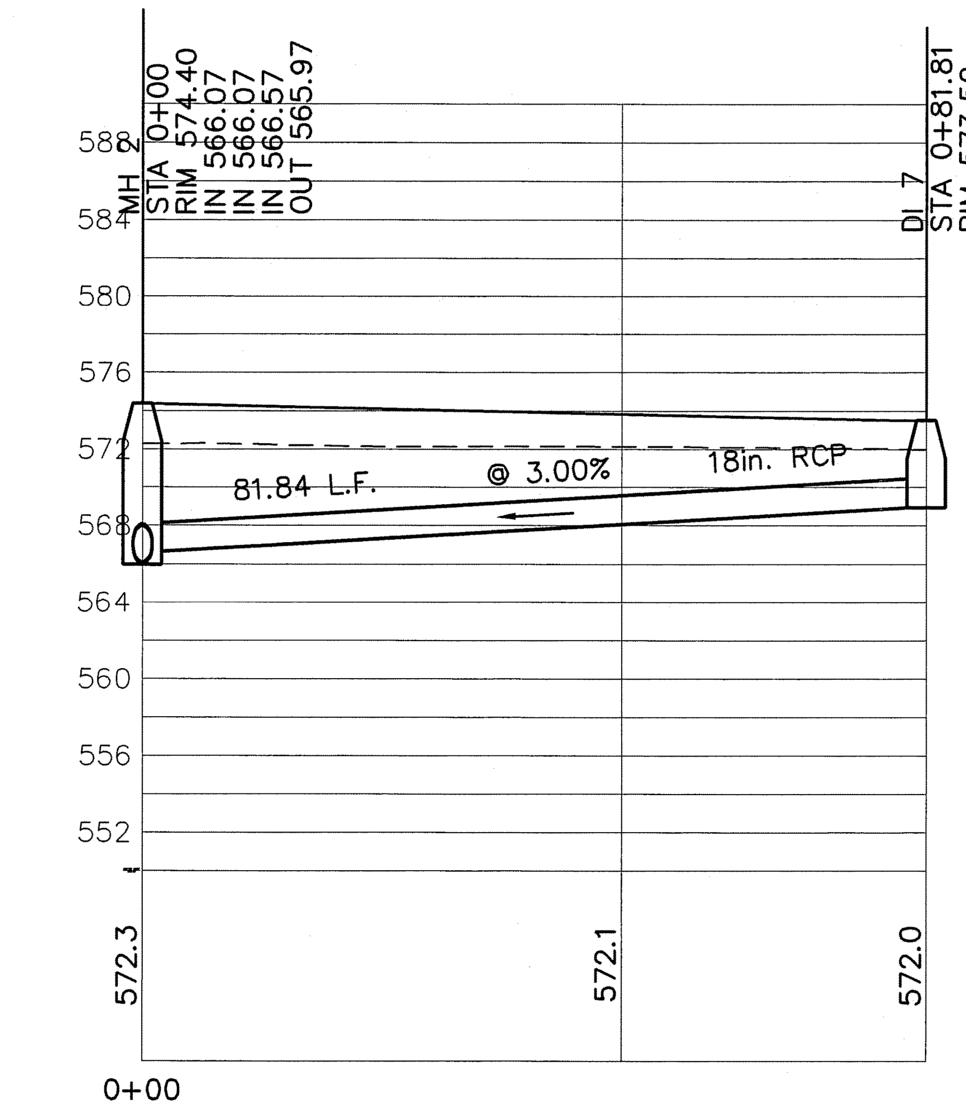

MH 2 – DI 7

SCALE: 1"=20'–0" HORIZ.
1"=10'–0" VERT.

NOTE: WORK WITHIN THE VETERANS DRIVE RIGHT-OF-WAY (INCLUDING STORM DRAINAGE PIPE ROAD CROSSING AND CONSTRUCTION OF ASPHALT-PAVED PULL-OFF LANE) IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

REV	DATE	BY	SUB	APP	DESCRIPTION	REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN P. NICHOLSON
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 90 MARCH 07

STATE OF NEW YORK · GLENN R. COFFMAN · PROFESSIONAL ENGINEER
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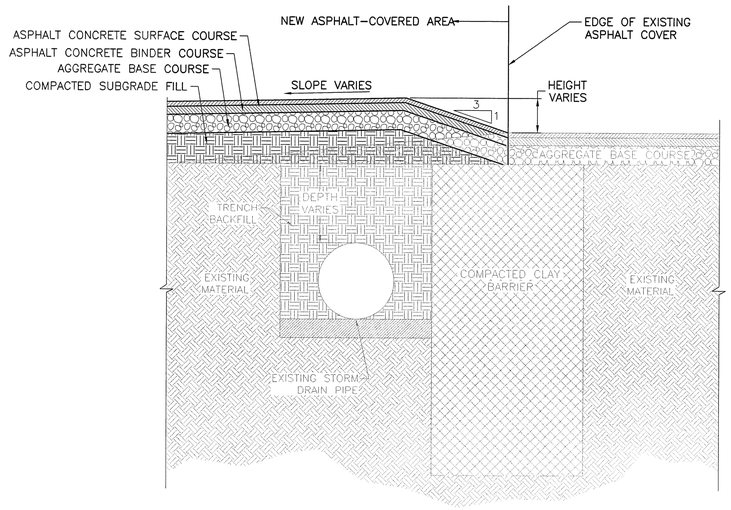
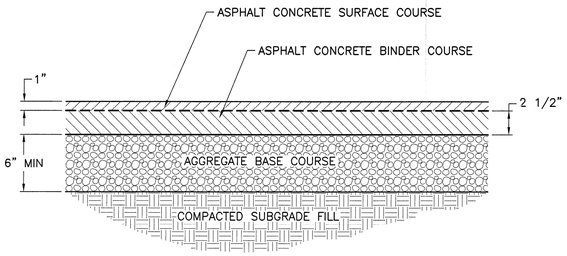
STORM DRAINAGE PIPE PROFILES

SCALE: AS SHOWN
CONTRACT: 6300–06–0001
DWG. NO.: CL–101 | REV: 0 | PAGE NO: 7

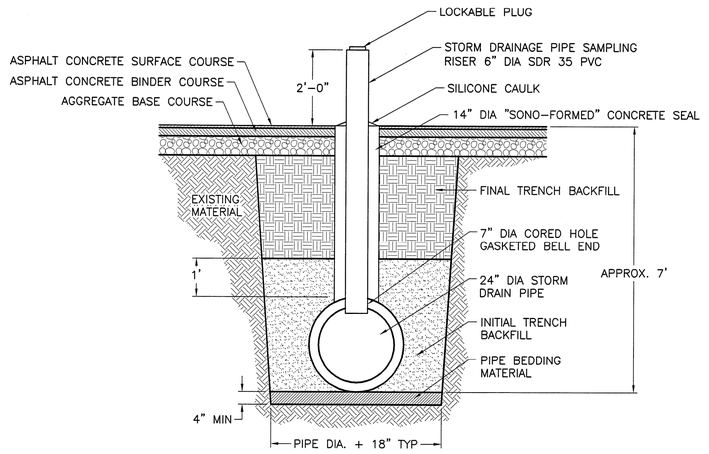


SECTION C
SCALE: N.T.S.
CL-102 CL-002



TYPICAL ASPHALT CONCRETE COVER SECTION

SECTION A
SCALE: 1 1/2"=1'-0"
CL-102 CL-002

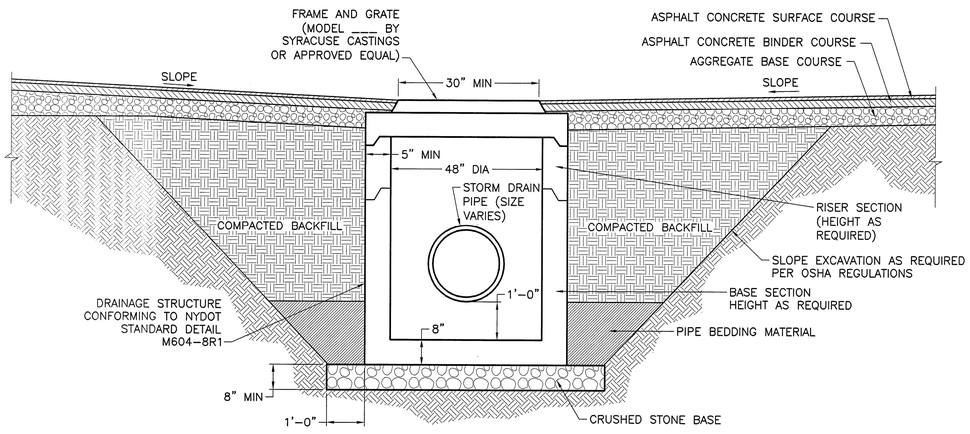


NOTE:

1. SLOPE SODES OF EXCAVATION OR PROVIDE TRENCH SHORING AS REQUIRED TO COMPLY WITH OSHA REGULATIONS.

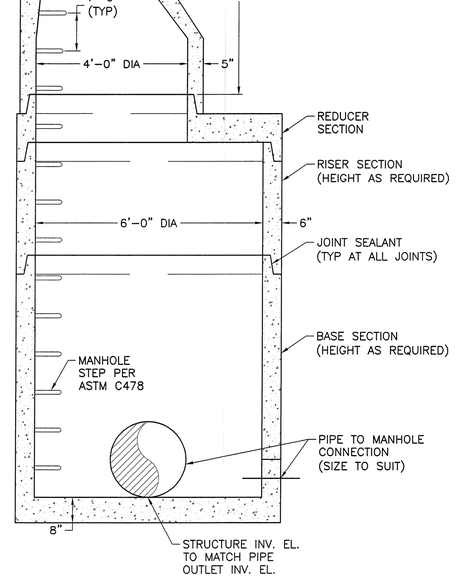
STORM DRAIN SAMPLING RISER

SECTION D
SCALE: N.T.S.
CL-102 CL-002



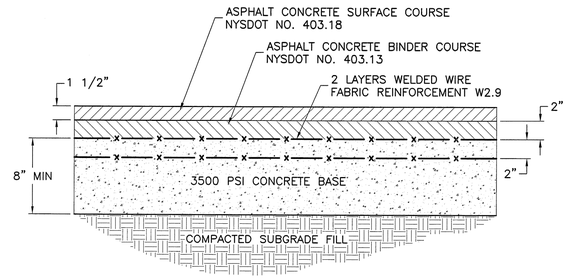
DROP INLET

SECTION F
SCALE: N.T.S.
CL-102 CL-002



STORM MANHOLE

SECTION K
SCALE: 1/2"=1'-0"
CL-102 CL-002



NOTE: CITY REQUIRES THAT PAVEMENT FOR PULL-OFF LANE (LOCATED IN CITY RIGHT-OF-WAY) BE SIMILAR TO THAT WHICH EXISTS IN ADJACENT ROADWAY. THE ABOVE DETAIL IS TYPICAL OF CITY TRUCK ROUTE ROAD PAVEMENTS; HOWEVER, REGARDLESS OF THE ABOVE, THE CONTRACTOR MUST MATCH THE EXISTING PAVEMENT SECTION.

TYPICAL PAVEMENT SECTION

SECTION J
SCALE: 1 1/2"=1'-0"
CL-102 CL-002

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN N. COFFMAN — 062447 — ENGINEER — PROFESSIONAL — 3/9/07

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IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

COVER SYSTEM
DETAILS AND SECTIONS

SCALE: AS SHOWN
CONTRACT: 6300-06-0001
DWG. NO.: CL-102 | REV: 0 | PAGE NO: 8

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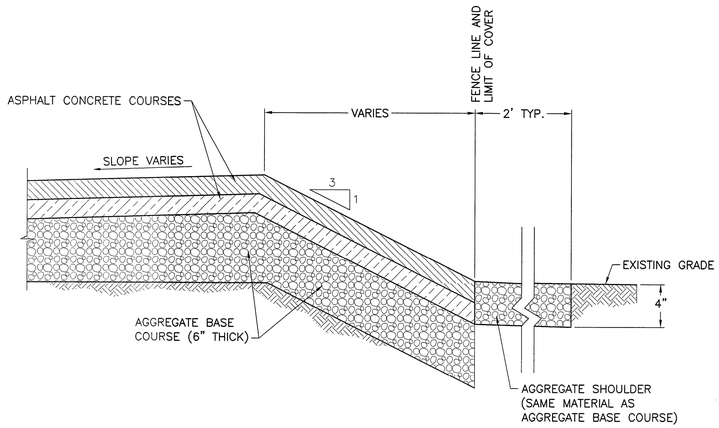
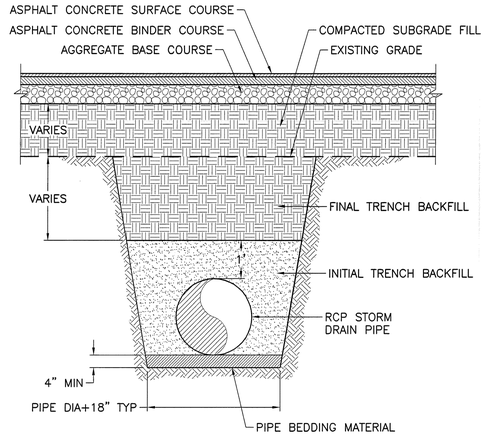


NOTES:

1. CONSTRUCT AGGREGATE SHOULDER ALONG EAST SIDE OF PERIMETER OF ASPHALT COVER AS SHOWN.
2. DETAIL IS TYPICAL FOR ALL EDGES WITH THE EXCEPTION OF THE NORTH SIDE.

ASPHALT COVER EDGE CONSTRUCTION

SECTION B — SCALE: N.T.S. — CL-103 — CL-002

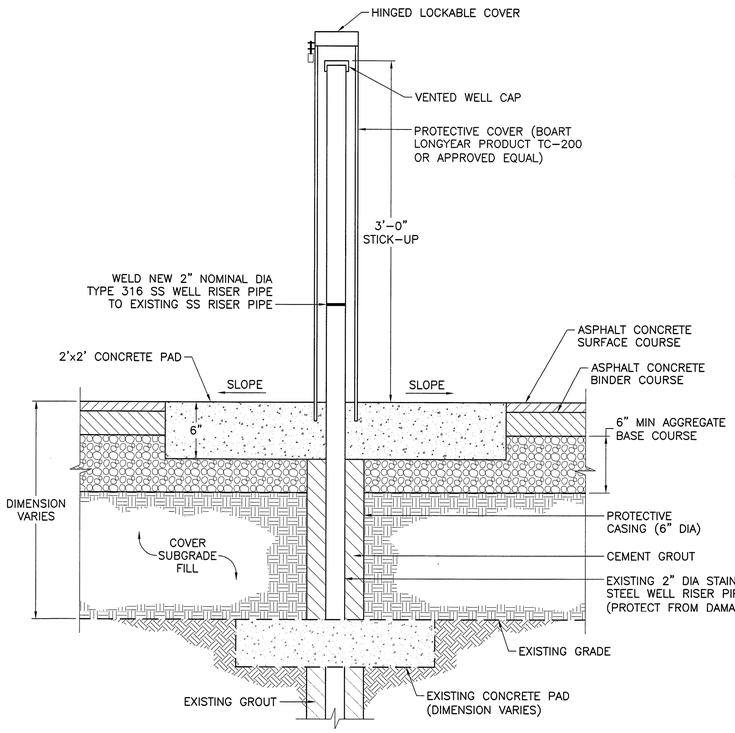


NOTE:

1. SLOPE SIDES OF EXCAVATION OR PROVIDE TRENCH SHORING AS REQUIRED TO COMPLY WITH APPLICABLE OSHA REGULATIONS.

TYPICAL STORM DRAIN PIPE INSTALLATION UNDER ASPHALT COVER

SECTION E — SCALE: 1/4"=1'-0" — CL-103 — CL-002

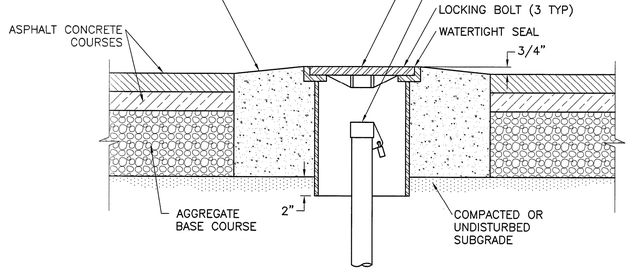


NOTE:

1. CONTRACTOR SHALL NOT DISTURB OR DAMAGE EXISTING MONITORING WELLS, INCLUDING RISER PIPE, CONCRETE PAD, SURFACE SEAL, AND SUBSURFACE WELL COMPONENTS.
2. PRIOR TO WELDING NEW RISER PIPE EXTENSION, INSTALL A TEMPORARY NON-COMBUSTIBLE PLUG IN THE CASING TO PREVENT WELDING DEBRIS OR OTHER FOREIGN PARTICLES FROM ENTERING THE WELL.

MONITORING WELL TOP RECONSTRUCTION

DETAIL 1 — SCALE: 1-1/2"=1'-0" — CL-103 — CL-002

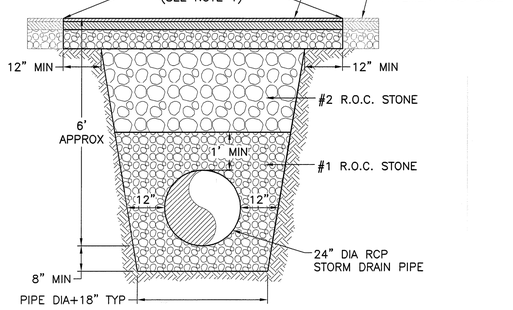


NOTES:

1. REMOVE EXISTING PROTECTIVE COVER. CUT AND REMOVE TOP OF RISER AT ELEVATION BELOW FINISH GRADE AS SHOWN.
2. WELL PAD SHALL EXTEND TO BOTTOM OF AGGREGATE BASE.
3. REFER TO SPECIFICATIONS FOR ADDITIONAL WELL TOP RECONSTRUCTION REQUIREMENTS.

MONITORING WELL TOP RECONSTRUCTION

DETAIL 2 — SCALE: NOT TO SCALE — CL-103 — CL-002



NOTES:

1. CUT EXISTING PAVEMENT IN A UNIFORM STRAIGHT ALIGNMENT ON EACH SIDE OF TRENCH EXCAVATION AT INDICATED DISTANCE OUTSIDE TOP OF EXCAVATION. MAINTAIN PAVEMENTS CUTS IN GOOD CONDITION UNTIL PIPE INSTALLATION, BACKFILL AND PAVEMENT RESTORATION ARE COMPLETED.
2. SLOPE SIDES OF EXCAVATION OR PROVIDE TRENCH SHORING AS REQUIRED TO COMPLY WITH APPLICABLE OSHA REGULATIONS.
3. CONFORM TO CITY OF NIAGARA FALLS REQUIREMENTS.

TYPICAL PIPE INSTALLATION ACROSS ROAD

SECTION G — SCALE: 1/4"=1'-0" — CL-103 — CL-002

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN N. GOFFMAN — 082440-1 — ENGINEER — PROFESSIONAL — 3/9/07

OLIN CORPORATION
CHARLESTON, TENNESSEE

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IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

COVER SYSTEM
DETAILS AND SECTIONS

SCALE: AS SHOWN
CONTRACT: 6300-06-0001
DWG. NO.: CL-103 | REV: 0 | PAGE NO: 9

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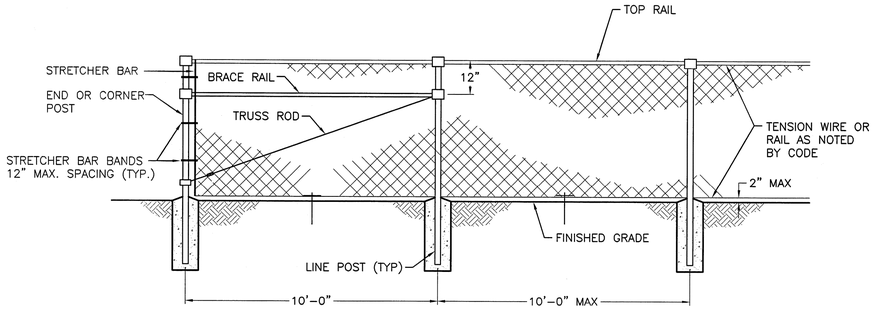
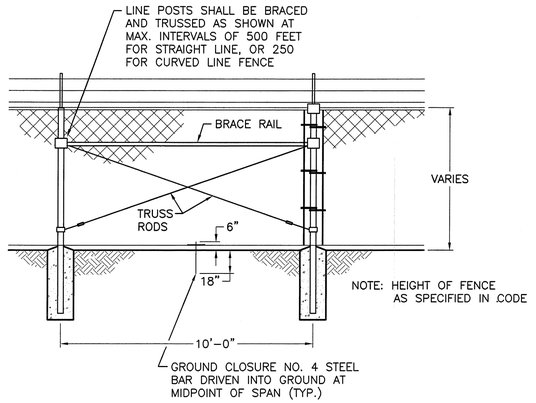
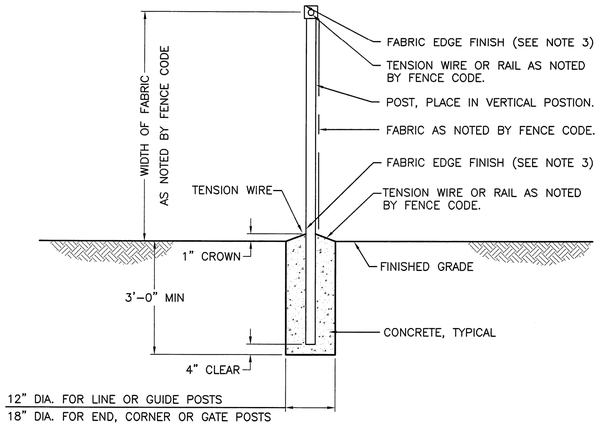


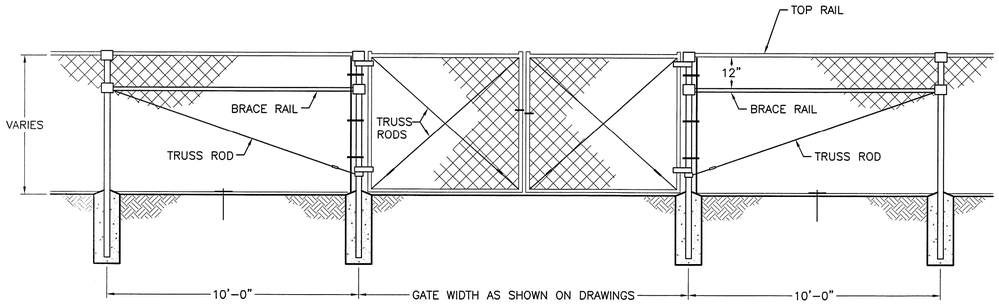
ELEVATION AT CORNER OR END



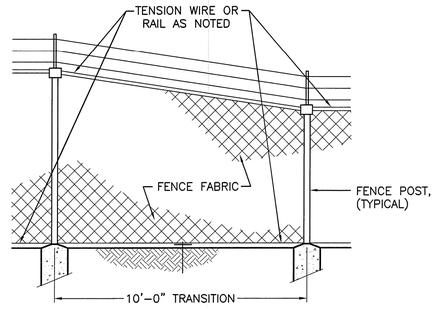
ELEVATION AT BRACED POSTS



FENCE SECTION



DOUBLE-LEAF
SWINGING GATE ELEVATION



TRANSITION IN FENCE HEIGHT

① ② ③ ④
CL-6 W T

FENCE DESIGNATION CODE:

① TYPE OF CHAIN LINK FABRIC:
CL = GALVANIZED STEEL.
VCL = VINYL - CLAD GALVANIZED STEEL.

② WIDTH OF FABRIC IN FEET / HEIGHT ERECTED.

③ TYPE OF TOP / BOTTOM SUPPORTS:
W = TENSION WIRE.
P = PIPE RAIL.

④ INCLINATION OF EXTENSION ARMS:
T = TOWARD PROTECTED FACILITY.
V = VERTICAL.
A = AWAY FROM PROTECTED FACILITY.
O = NO BARBED WIRE OR EXTENSION ARMS USED.

NOTES:

1. LOCATION OF FENCING, LOCATION OF GATES, GATE WIDTH AND ANY SPECIAL FEATURES NECESSARY TO CONSTRUCT FENCING AND GATES SHALL BE AS SHOWN ON DRAWINGS. ALL DIMENSIONS EXCEPT GATE WIDTH SHALL BE TO CENTERS OF POSTS.
2. CHAIN LINK FENCE FEATURES SHALL BE AS NOTED ON THE DRAWINGS AND SHALL BE FENCE DESIGNATION CODE CL-6 P A.
3. UNLESS OTHERWISE NOTED, TOP AND BOTTOM EDGES OF FABRIC SHALL BE BARBED AND TWISTED WHEN BARBED WIRE IS USED AND KNUCKLED WHEN NO BARBED WIRE IS USED.
4. SEE SPECIFICATIONS FOR FABRICATION AND INSTALLATION REQUIREMENTS FOR FENCING.
5. GROUND CLOSURE SHALL BE PROVIDED AT LOCAL GROUND DEPRESSIONS WHERE TENSION WIRE OR RAIL IS MORE THAN 2 INCHES ABOVE GROUND SURFACE AS INDICATED OR DIRECTED.

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED S. LIND
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — GLENN W. COFFMAN — 062476 — LICENSED PROFESSIONAL ENGINEER — 3/9/07

OLIN CORPORATION
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IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

CHAIN LINK FENCING
DETAILS

SCALE AS SHOWN
CONTRACT 6300-06-0001
DWG. NO. CL-104 | REV 0 | PAGE NO 10

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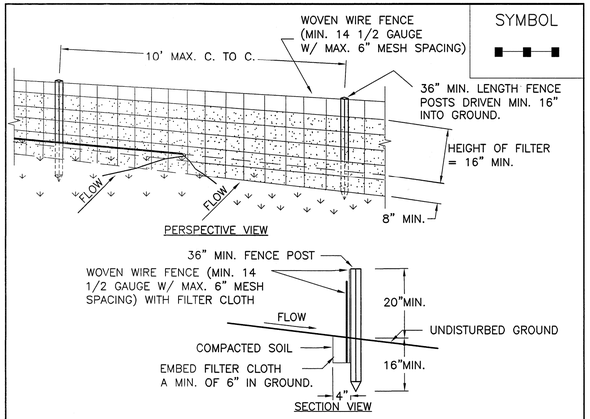
SYMBOL



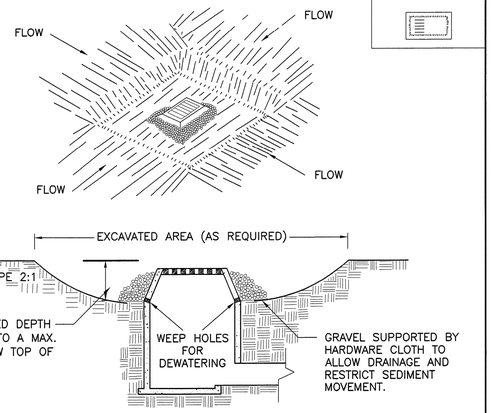
CONSTRUCTION SPECIFICATIONS

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

SILT FENCE

SYMBOL



CONSTRUCTION SPECIFICATIONS

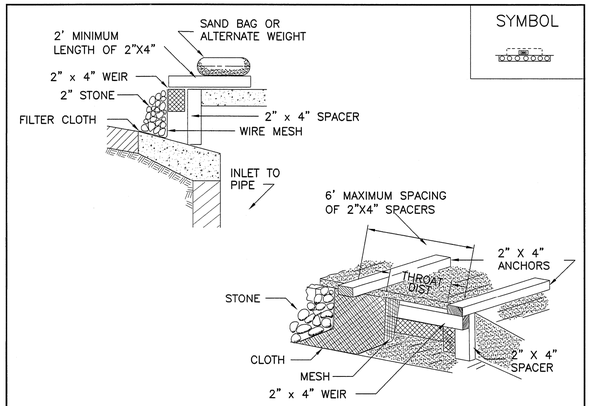
1. CLEAR THE AREA OF ALL DEBRIS THAT WILL HINDER EXCAVATION.
2. GRADE APPROACH TO THE INLET UNIFORMLY AROUND THE BASIN.
3. WEEP HOLES SHALL BE PROTECTED BY GRAVEL.
4. UPON STABILIZATION OF CONTRIBUTING DRAINAGE AREA, SEAL WEEP HOLES, FILL BASIN WITH STABLE SOIL TO FINAL GRADE, COMPACT IT PROPERLY AND STABILIZE WITH PERMANENT SEEDING.

MAXIMUM DRAINAGE AREA 1 ACRE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

EXCAVATED DROP INLET PROTECTION

SYMBOL



CONSTRUCTION SPECIFICATIONS

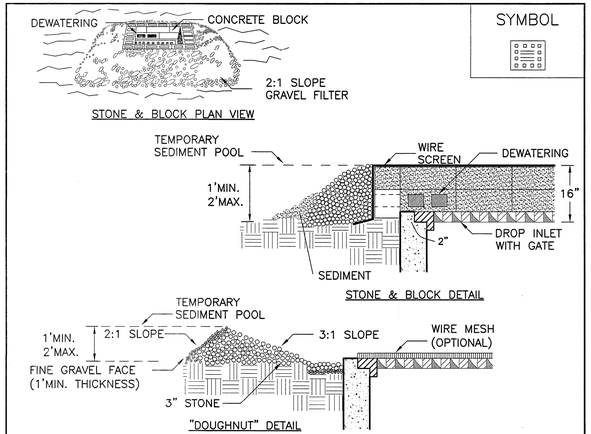
1. FILTER FABRIC SHALL HAVE AN EOS OF 40–85.
2. WOODEN FRAME SHALL BE CONSTRUCTED OF 2" x 4" CONSTRUCTION GRADE LUMBER.
3. WIRE MESH ACROSS THROAT SHALL BE A CONTINUOUS PIECE 30 INCH MINIMUM WIDTH WITH A LENGTH 4 FEET LONGER THAN THE THROAT. IT SHALL BE SHAPED AND SECURELY NAILED TO A 2" x 4" WEIR.
4. THE WEIR SHALL BE SECURELY NAILED TO 2" x 4" SPACERS 9 INCHES LONG SPACED NO MORE THAN 6 FEET APART.
5. THE ASSEMBLY SHALL BE PLACED AGAINST THE INLET AND SECURED BY 2" x 4" ANCHORS 2 FEET LONG EXTENDING ACROSS THE TOP OF THE INLET AND HELD IN PLACE BY SANDBAGS OR ALTERNATE WEIGHTS.

MAXIMUM DRAINAGE AREA 1 ACRE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

CURB DROP INLET PROTECTION

SYMBOL



CONSTRUCTION SPECIFICATIONS

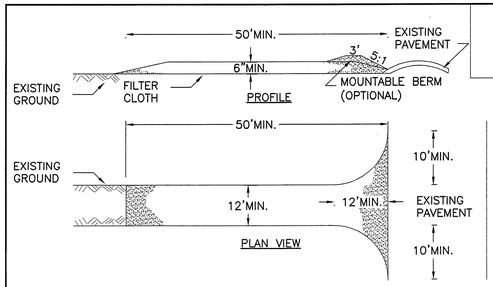
1. LAY ONE BLOCK ON EACH SIDE OF THE STRUCTURE ON ITS SIDE FOR DEWATERING. FOUNDATION SHALL BE 2 INCHES MINIMUM BELOW REST OF INLET AND BLOCKS SHALL BE PLACED AGAINST INLET FOR SUPPORT.
2. HARDWARE CLOTH OR 1/2" WIRE MESH SHALL BE PLACED OVER BLOCK OPENINGS TO SUPPORT STONE.
3. USE CLEAN STONE OR GRAVEL 1/2–3/4 INCH IN DIAMETER PLACED 2 INCHES BELOW TOP OF THE BLOCK ON A 2:1 SLOPE OR FLATTER.
4. FOR STONE STRUCTURES ONLY, A 1 FOOT THICK LAYER OF THE FILTER STONE WILL BE PLACED AGAINST THE 3 INCH STONE AS SHOWN ON THE DRAWINGS.

MAXIMUM DRAINAGE AREA 1 ACRE

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STONE & BLOCK DROP INLET PROTECTION

SYMBOL



CONSTRUCTION SPECIFICATIONS

1. STONE SIZE – USE 2" STONE, OR RECLAIMED OR RECYCLED CONCRETE EQUIVALENT.
2. LENGTH – NOT LESS THAN 50 FEET (EXCEPT ON A SINGLE RESIDENCE LOT WHERE A 30 FOOT MINIMUM LENGTH WOULD APPLY).
3. THICKNESS – NOT LESS THAN SIX (6) INCHES.
4. WIDTH – TWELVE (12) FOOT MINIMUM, BUT NOT LESS THAN THE FULL WIDTH AT POINTS WHERE INGRESS OR EGRESS OCCURS. TWENTY–FOUR (24) FOOT IF SINGLE ENTRANCE TO SITE.
5. FILTER CLOTH – WILL BE PLACED OVER THE ENTIRE AREA PRIOR TO PLACING OF STONE.
6. SURFACE WATER – ALL SURFACE WATER FLOWING OR DIVERTED TOWARD CONSTRUCTION ENTRANCES SHALL BE PIPED ACROSS THE ENTRANCE. IF PIPING IS IMPRACTICAL, A MOUNTABLE BERM WITH 5:1 SLOPES WILL BE PERMITTED.
7. MAINTENANCE – THE ENTRANCE SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOWING OF SEDIMENT ONTO PUBLIC RIGHTS–OF–WAY. ALL SEDIMENT SPILLED, DROPPED, WASHED OR TRACTED ONTO PUBLIC RIGHTS–OF–WAY MUST BE REMOVED IMMEDIATELY.
8. WHEN WASHING IS REQUIRED, IT SHALL BE DONE ON A AREA STABILIZED WITH STONE AND WHICH DRAINS INTO AN APPROVED SEDIMENT TRAPPING DEVICE.
9. PERIODIC INSPECTION AND NEEDED MAINTENANCE SHALL BE PROVIDED AFTER EACH RAIN.

U.S. DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
NEW YORK STATE SOIL & WATER CONSERVATION COMMITTEE

STABILIZED CONSTRUCTION ENTRANCE

NOTE: EROSION AND SEDIMENT CONTROL PLAN IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED M. ILIC
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
IN CHARGE R. MAROTTE
DATE 09 MARCH 07

STATE OF NEW YORK — JOHN W. COFFMAN — 082461 — LICENSED PROFESSIONAL ENGINEER — 3/9/07

OLIN CORPORATION
CHARLESTON, TENNESSEE

MACTEC Engineering and Consulting, P.C.
3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421–3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

EROSION AND SEDIMENT CONTROL DETAILS (1 OF 2)

SCALE: AS SHOWN
CONTRACT: 6300–06–0001
DWG. NO.: CL–105 | REV: 0 | PAGE NO: 11

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Excavated Sediment Trap Calculations

1 **Structure Number** **A3**
2 **Drainage Area** **0.94 Ac.**
3 **Required Sediment Storage** 33.33 Cy/Ac. X Disturbed Area
33.33 Cy/Ac. x 0.94 Ac = 31.3 Cy = **845.9 Cf**

4 Assume excavation depth (minimum of 1.0 ft.) = 2 ft.
5 Assume slope of sides (shall not be steeper than 2:1) = 2 : 1
6 Determine required surface area
SA (min) = Required sediment storage / excavation depth
SA (min) = 845.9 Cf / 2 ft
SA (min) = 423 Sf
7 Assume shape of excavation and determine dimensions.
Shape: Square
Dimensions (ft) : **L = 21.0 W = 21.0**

Excavated Sediment Trap Calculations

1 **Structure Number** **A4**
2 **Drainage Area** **0.929 Ac.**
3 **Required Sediment Storage** 33.33 Cy/Ac. X Disturbed Area
33.33 Cy/Ac. x 0.929 Ac = 31.0 Cy = **836.0 Cf**

4 Assume excavation depth (minimum of 1.0 ft.) = 2 ft.
5 Assume slope of sides (shall not be steeper than 2:1) = 2 : 1
6 Determine required surface area
SA (min) = Required sediment storage / excavation depth
SA (min) = 836 Cf / 2 ft
SA (min) = 418 Sf
7 Assume shape of excavation and determine dimensions.
Shape: Square
Dimensions (ft) : **L = 21.0 W = 21.0**

Excavated Sediment Trap Calculations

1 **Structure Number** **A5**
2 **Drainage Area** **0.614 Ac.**
3 **Required Sediment Storage** 33.33 Cy/Ac. X Disturbed Area
33.33 Cy/Ac. x 0.614 Ac = 20.5 Cy = **552.5 Cf**

4 Assume excavation depth (minimum of 1.0 ft.) = 2 ft.
5 Assume slope of sides (shall not be steeper than 2:1) = 2 : 1
6 Determine required surface area
SA (min) = Required sediment storage / excavation depth
SA (min) = 552.5 Cf / 2 ft
SA (min) = 276.3 Sf
7 Assume shape of excavation and determine dimensions.
Shape: Square
Dimensions (ft) : **L = 17.0 W = 17.0**

Excavated Sediment Trap Calculations

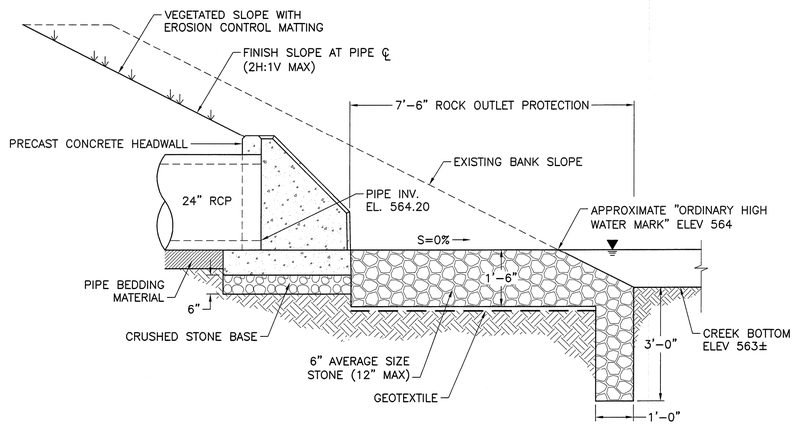
1 **Structure Number** **A6**
2 **Drainage Area** **0.489 Ac.**
3 **Required Sediment Storage** 33.33 Cy/Ac. X Disturbed Area
33.33 Cy/Ac. x 0.489 Ac = 16.3 Cy = **440.1 Cf**

4 Assume excavation depth (minimum of 1.0 ft.) = 2 ft.
5 Assume slope of sides (shall not be steeper than 2:1) = 2 : 1
6 Determine required surface area
SA (min) = Required sediment storage / excavation depth
SA (min) = 440.1 Cf / 2 ft
SA (min) = 220 Sf
7 Assume shape of excavation and determine dimensions.
Shape: Square
Dimensions (ft) : **L = 15.0 W = 15.0**

Excavated Sediment Trap Calculations

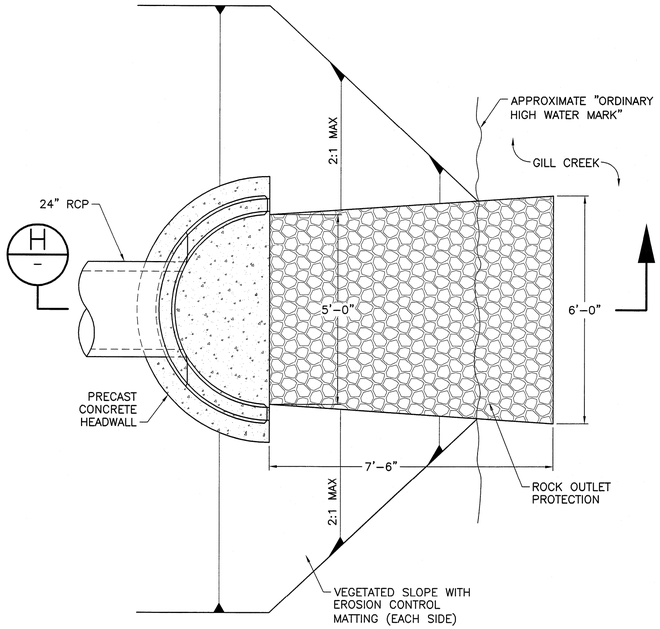
1 **Structure Number** **A7**
2 **Drainage Area** **0.614 Ac.**
3 **Required Sediment Storage** 33.33 Cy/Ac. X Disturbed Area
33.33 Cy/Ac. x 0.614 Ac = 20.5 Cy = **552.5 Cf**

4 Assume excavation depth (minimum of 1.0 ft.) = 2 ft.
5 Assume slope of sides (shall not be steeper than 2:1) = 2 : 1
6 Determine required surface area
SA (min) = Required sediment storage / excavation depth
SA (min) = 552.5 Cf / 2 ft
SA (min) = 276.3 Sf
7 Assume shape of excavation and determine dimensions.
Shape: Square
Dimensions (ft) : **L = 17.0 W = 17.0**



STORMWATER DISCHARGE

SECTION H – SCALE: 1/2"=1'–0"



DETAIL 3 – SCALE: 1/2"=1'–0" – CL–106

CALCULATION OF ROCK OUTLET PROTECTION
(IN ACCORDANCE WITH APPLICABLE REQUIREMENTS OF THE "NEW YORK STANDARDS AND SPECIFICATIONS FOR EROSION AND SEDIMENT CONTROL", AUG. 2005, NEW YORK STATE DEPT. OF ENVIRONMENTAL CONSERVATION)

d	=	24 INCHES
La	=	10 FT
w	=	d + 0.4 La
w	=	2 + 0.4 X 10
w	=	6 FT

NOTE: EROSION AND SEDIMENT CONTROL PLAN IS SUBJECT TO APPROVAL BY THE CITY OF NIAGARA FALLS

REV	DATE	BY	SUB	APP	DESCRIPTION

DESIGNED M. ILIC
DRAWN C. BUDSOCK
CHECKED G. COFFMAN
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STATE OF NEW YORK – LEWIS N. COFFMAN – 060401 – REGISTERED PROFESSIONAL ENGINEER – 3/9/07

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3200 TOWN POINT DRIVE, SUITE 100
KENNESAW, GEORGIA 30144 (770) 421–3400

IWS OU3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

EROSION AND SEDIMENT CONTROL DETAILS (2 OF 2)

SCALE AS SHOWN
CONTRACT 6300–06–0001
DWG. NO. CL–106 | REV 0 | PAGE NO 12

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APPENDIX B

SPECIFICATIONS

SPECIFICATIONS

ASPHALT COVER CONSTRUCTION
INDUSTRIAL WELDING SITE – OPERABLE UNIT 3
(PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

Prepared for:

Olin Corporation
Environmental Remediation Group
Charleston, Tennessee

Prepared by:

MACTEC Engineering and Consulting, P.C.

In Association With

MACTEC Engineering and Consulting, Inc.

Kennesaw, Georgia

March 9, 2007
MACTEC Project No. 6100-07-0005

TABLE OF CONTENTS

SPECIFICATIONS

ASPHALT COVER CONSTRUCTION
INDUSTRIAL WELDING SITE - OPERABLE UNIT 3 (PACKARD ROAD SITE)
NIAGARA FALLS, NEW YORK

DIVISION 1 - GENERAL REQUIREMENTS

01110	Summary of Work
01310	Project Management and Coordination
01330	Submittal Procedures
01350	Special Procedures
01450	Quality Control
01500	Temporary Facilities and Controls
01575	Temporary Soil Erosion and Sediment Control
01722	Construction Surveying

DIVISION 2 - SITE CONSTRUCTION

02220	Site Demolition
02230	Site Clearing
02240	Temporary Dewatering
02284	Abandonment and Reconstruction of Facilities
02310	Grading
02316	Excavating and Backfilling for Utility Structures
02317	Trenching and Backfilling
02373	Erosion Control Matting
02374	Riprap
02632	Storm Drainage Piping and Structures
02722	Aggregate Base Course
02743	Asphalt Concrete Pavement
02772	Concrete Curbs and Gutters
02821	Chain Link Fences and Gates
02926	Seeding and Mulching

SECTION 01110
SUMMARY OF WORK

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Work covered by Project Documents

2. Work by others

4. Work sequence

5. Contractor's use of premises

1.02 WORK COVERED BY PROJECT DOCUMENTS

A. The Work consists of, in general, construction of an asphalt cover and related construction at the Industrial Welding Site Operable Unit 3 (Packard Road Site) in Niagara Falls, New York.

B. The Work includes, but is not necessarily limited to, the following items:

1. Compliance with all applicable federal, state and local laws and regulations.

2. Obtaining required permits and authorizations from governing jurisdictions.

3. Mobilization of supplies, equipment and personnel required for project execution.

4. Preparation and submittal of shop drawings and other required submittals as specified.

5. Implementation of health and safety procedures in compliance with Owner's requirements and all applicable regulations of authorities having jurisdiction.

6. Installation and maintenance of temporary soil erosion and sediment control measures, including silt fencing.

7. Locating and protection of all existing utilities (buried and above grade), structures, and other facilities within the limits of construction that are not indicated to be removed.

8. Construction and maintenance of temporary construction facilities (including temporary utilities, support facilities, and security and protection facilities), and removal of the facilities at project completion.

9. Clearing and removal of trees and other vegetation within the limits of construction.

10. Construction layout, surveying and staking necessary for the Work.

11. Control of surface and ground water as required for construction.

12. Site demolition, including removal of designated chain link fencing, concrete slabs, and above-grade utilities (such as light poles, overhead power lines, fire hydrants, water valves and riser pipes), and miscellaneous debris.

13. Abandonment of existing water and sewer utilities.

14. Off-site disposal or salvaging of removed chain link fencing, above-grade utilities, and miscellaneous demolition debris.

15. Relocation of existing rocks and rubble and placement of the materials on the Site.

16. Grading of soil mounds and placement of the materials on the Site.

17. Storm drainage system, including reinforced concrete pipes, drop inlets, junction manhole, and headwall.

18. Installation of storm drainage pipe under Packard Road and restoration of pavement.

19. Proof-rolling and stabilization of existing subgrade as required

20. Grading, placement and compaction of existing site materials and imported fill materials for construction of aggregate base subgrade.

21. Aggregate base course and asphalt concrete pavement courses.

22. New chain link fences and gates.

23. Site access construction, including asphalt-paved pull-off lane and ramp.

24. Seal coating of previously completed IWS asphalt cover.

25. Final erosion control measures, including riprap, erosion control matting, and seeding and mulching.

26. Site cleanup and demobilization.

1.03 WORK BY OTHERS

A. Related work by others under separate contracts with the Owner consists of:

1. Construction Quality Assurance and Construction Quality Control

1.04 WORK SEQUENCE

A. Detailed sequencing of the Work shall be the responsibility of the Contractor as long as the requirements of these specifications are met and the Contractor's progress is according to the schedule approved by the Owner.

1.05 CONTRACTOR'S USE OF PREMISES

A. All of the Contractor's operations on the Owner's premises, including the storage of materials, shall be confined to the "Site". The "Site" consists of the area within the "Limit of Construction" shown on the Drawings.

B. Contractor's personnel shall abide by the Owner's regulations concerning site entry and exit.

C. The Owner and Engineer will not assume responsibility for damages to facilities on the Site due to negligence or carelessness on the part of the Contractor. The Owner and Engineer will not be liable for loss or damage of Contractor's tools, equipment, or materials due to theft, vandalism or any other cause whatsoever.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310
PROJECT MANAGEMENT AND COORDINATION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes general requirements for management, scheduling, and coordination of the Work, and project meetings.

1.02 CONSTRUCTION MANAGEMENT PLAN

A. Submit a Construction Management Plan within the time limit specified in subsection 1.02 of Section 01330.

B. The Construction Management Plan shall indicate how the construction activities are to be implemented and coordinated, and shall include the following at a minimum:

1. Identification of key project personnel and lines of authority, and descriptions of the duties of the key personnel, and an organizational chart.

2. Procedures for project communication and coordination.

3. Contractor quality control procedures.

4. Confirmation of proposed work days and hours presented in Contractor's Bid.

5. Lists of major equipment, systems and materials to be used for the Work.

6. Staging of operations, including sequencing of the Work, impact of Work on streets and properties, required timing and location of street closures if any, and routing of haul vehicles and construction equipment.

7. Identification of areas for parking of equipment and personal vehicles and storage of materials.

1.03 CONSTRUCTION PROGRESS SCHEDULE

A. Submit initial Construction Progress Schedule within the time limit specified in subsection 1.02 of Section 01330.

B. Prepare the Construction Progress Schedule in the form of a horizontal bar chart. The Schedule is to be used as the baseline/target schedule.

C. Show complete sequence of construction by activity, identifying Work of separate stages and other logically grouped activities. Indicate the early and late start, early and late finish, float dates, and duration. Identify all Critical Path elements.

D. The Construction Progress Schedule shall be in accordance with the required work sequence and completion dates specified in the Agreement.

E. The Construction Progress Schedule shall be revised as required to indicate anticipated and actual durations and sequence of activities. Copies of revised Schedules shall be provided to the Engineer and Owner at the time of Progress Meetings for review and comment.

F. Indicate estimated percentage of completion for each item of Work at each submission. Schedule updates shall present baseline/target bars for individual construction activities directly beneath current timeline bars for comparison purposes.

G. The Contract Time will be adjusted by the Owner only as defined in the Contract Documents. If the Owner finds that the Contractor is entitled to any extension of the Contract Time under the provisions of this Contract, the Owner's determination as to the total number of days extensions will be based upon the currently approved Construction Progress Schedule and on all data relevant to the request for extension.

1.04 PRECONSTRUCTION CONFERENCE

A. The Owner or Engineer will schedule and administer a preconstruction conference. The location of the preconstruction conference will be at a site convenient for all parties, as designated by the Owner or Engineer.

B. Parties responsible for attending the preconstruction conference are representatives of the Owner, Contractor, Engineer, and other parties as appropriate.

C. Agenda:

1. Review of Construction Documents (Drawings and Specifications)

2. Designation of Engineer’s personnel and personnel representing the parties in Contract

3. Review and clarification of the responsibilities of project personnel

4. Review and clarification of the lines of communication

5. Review of: Contractor's Construction Management Plan; Construction Progress Schedule; Schedule of Submittals

6. Procedures for submission and processing of submittals and project administration documents

7. Procedures for measurement and payment, including the Schedule of Values, applications for payment, and contract modifications

8. Procedures for Contractor’s submittal of requests for information (RFIs), and Engineer’s issuance of Field Orders, interpretations and clarifications

9. Discussion of construction quality assurance and quality control testing procedures and responsibilities

10. Use of premises, including work areas, storage areas, temporary facilities, and housekeeping procedures

11. Site security and work hours

12. Scheduling for progress meetings

13. Other items as appropriate

1.05 PROGRESS MEETINGS

A. The Engineer will schedule and administer regular progress meetings. The progress meetings will be held weekly or as otherwise determined by the Engineer.

B. The location of the progress meetings will be at a site convenient for all parties, as designated by the Engineer.

C. Attendance: Representatives of the Engineer, Contractor, Owner, and other parties as appropriate.

D. Agenda (to be revised as appropriate):

1. Minutes of Previous Meeting:
   a. Review and approve
   b. Objections, exceptions and amendments to minutes
   c. Status of action items

2. Health and safety issues

3. Quality assurance and quality control procedures

4. Construction Progress:
   a. Progress since last meeting
   b. Review of Construction Progress Schedule
   c. Deviations from Schedule
   d. Corrective measures to regain Schedule
   e. Planned activities for next period
   f. Off-site fabrication and delivery schedules
   g. Submittal schedules
   h. Revisions to Construction Progress Schedule

5. Materials and Products:
   a. Status of submittal reviews
   b. Substitutions
   c. Ordering of materials and products, and delivery issues
   d. Storage and protection of materials and products

6. Deficiencies:
   a. Identification of deficiencies
   b. Status of correction
   c. Field observations, problems, and conflicts

7. Requests for Information:
   a. Status of Engineer's clarifications

8. Action Items:
   a. Identification of items
   b. Assignment of tasks
   c. Critical dates for completion

9. Other business

1.06 PROJECT COORDINATION AND SCHEDULING

A. Coordinate scheduling, submittals, and Work of the various sections of the Specifications to assure efficient and orderly sequence of installation of interdependent construction elements.

B. Contractor shall initiate the Work in accordance with the Project Schedule, and shall thereafter proceed and complete performance of the Work promptly, diligently and in such a manner and sequence with the work of other contractors in order to permit completion of the Project within the required schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01330
SUBMITTAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes submittal procedures and types of submittals required prior to the beginning of certain phases of the Work, prior to the incorporation of products in the Work, and during the progress of the Work.

1.02 INITIAL SUBMITTALS

A. Submit the following to the Engineer for review not more than seven days after issuance of the Notice to Proceed:

1. Construction Management Plan (refer to Section 01310)

2. Spill Prevention, Control and Countermeasures Plan (refer to Section 01500)

3. Health and Safety Plan (refer to Section 01350)

4. Initial Construction Progress Schedule (refer to Section 01310)

5. Schedule of Submittals (refer to this Section)

1.03 PROGRESS SUBMITTALS

A. Submit the following to the Engineer for review during the progress of the Work and at project completion:

1. Product data (refer to this Section for administrative requirements)

2. Surveying information (refer to Section 01722)

3. All other submittals not mentioned above but specified in individual Specification Sections

1.04 SCHEDULE OF SUBMITTALS AND SUBMITTAL LOG

A. The Schedule of Submittals shall be based on the Submittal Register prepared by the Engineer and shall include the following:

1. The planned dates for Contractor's submittals

2. The dates approved submittals will be required from the Engineer

3. The planned dates of manufacture, delivery and installation of products

B. Maintain an accurate dated Submittal Log and bring this log to each scheduled Progress Meeting. The Submittal Log shall include all required information listed for the Schedule of Submittals, and the following items:

1. Submittal description and file number assigned as each submittal is made

2. Date sent to Engineer

3. Date returned to Contractor from Engineer

4. Status of submittal

5. Date of resubmittal and return (if applicable)

7. Projected date of delivery to Site (if applicable)

1.05 PRODUCT DATA

A. Product data as specified in individual Specification Sections, include, but are not necessarily limited to, standard prepared data for manufactured products (sometimes referred to as catalog data) such as the manufacturer's product specification and installation instructions, availability of colors and patterns, manufacturer's printed statements of compliance and applicability, catalog cuts, product photographs, production or quality control inspection and test reports and certifications, mill reports, and printed product warranties, as applicable to the Work.

1.06 GENERAL PROCEDURES FOR SUBMITTALS

A. Provide all required submittals with reasonable promptness and in such sequence as shown on the Schedule of Submittals so as to cause no delay in the Project Work.

B. Provide no less than 14 days for review from the time the Engineer receives them, unless otherwise agreed with the Engineer, or as otherwise stated in individual sections of the Specifications.

C. Submit the number of copies of submittal packages that Contractor requires, plus three copies which will be retained by the Engineer and Owner.

D. Submittals shall clearly indicate any deviations or variations from the requirements of the Project Documents.

E. All submittals shall be furnished with the following information:

1. Number and title of the submittal

2. Date of submittal

3. Name of Contractor, subcontractor, and manufacturer, as applicable

4. Clear identification of contents and location of the work item

5. Contractor's certification statement as defined in subsection 1.07.F below

6. Specification Section reference

7. Drawing number reference, if applicable

F. Contractor shall not begin any work affected by a submittal which has been returned with the notations "Revise and Resubmit" or "Not Acceptable" until a revision or correction of the submittal has been resubmitted and returned with the notations "Approved" or "Approved as Noted". Corrections noted on the submittals shall be followed without exception.

G. The Engineer's review and approval are to determine conformance with information given in the Project Documents and compatibility with the design concept of the completed project as a functioning whole as indicated in the Project Documents. The Engineer's review and approval shall not relieve the Contractor from compliance with the Project Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01350
SPECIAL PROCEDURES

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Work hours

2. Health and safety

1.02 WORK HOURS

A. Normal Work hours shall be in accordance with applicable ordinances, laws and regulations of authorities having jurisdiction.

1.03 HEALTH AND SAFETY

A. The Contractor's work will involve excavating and grading impacted materials. The Contractor may potentially contact substances harmful to the health and safety of workers on the Site.

B. All Work shall be performed in accordance with applicable safety and health regulations, codes and standards set forth by the proper authorities, including but not necessarily limited to the following:

1. All persons performing excavation and handling of existing materials on the Site shall meet the training and medical monitoring requirements of 29 CFR 1910.120 (OSHA).

2. Comply with the OSHA regulations regarding trench excavation (29 CFR 1926.650 through 1926.653).

3. Comply with the OSHA regulations regarding confined space entry (29 CFR 1910.146).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01450
QUALITY CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Regulatory requirements

2. References

3. Source quality control testing

4. Quality control of installation

5. Manufacturers' field services and reports

6. Quality control testing services

7. Qualifications and duties of QC firms

8. Quality control submittals

9. Coordination

1.02 REGULATORY REQUIREMENTS

A. Comply with all applicable local, state and federal regulations.

1.03 REFERENCES

A. Conform to latest edition of reference standards as of date of the Project Documents or date otherwise specified in specification sections.

B. If specified reference standards conflict with the Project Documents, request clarification from the Engineer before proceeding.

C. The contractual relationship of the parties to the Contract shall not be altered from the Project Documents by mention or inference otherwise in any reference document.

1.04 SOURCE QUALITY CONTROL TESTING

A. Materials and equipment forming the Work under this Project are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Project Documents.

B. Provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the

specifications and reference standards for quality and workmanship indicated in the Project Documents.

1.05 QUALITY CONTROL OF INSTALLATION

A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce Work of specified quality.

B. Comply fully with manufacturers' instructions, including each step in sequence.

C. If manufacturers' instructions conflict with the Project Documents, request clarification from the Engineer before proceeding.

D. Comply with specified standards as a minimum quality for the Work except when more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.

E. Work shall be performed by persons qualified to produce workmanship of specified quality.

1.06 MANUFACTURERS' FIELD SERVICES AND REPORTS

A. When specified in individual specification sections, material or product suppliers or manufacturers shall provide qualified staff personnel (representatives) to observe and document site conditions, conditions of surfaces and installation, quality of workmanship, start-up of equipment, testing and adjusting of equipment as applicable, and initiation of instructions when necessary.

B. The suppliers' or manufacturers' representatives shall report observations and site decisions or instructions given to applicators or installers that are supplemental or contrary to manufacturers' written instructions.

1.07 QUALITY CONTROL TESTING SERVICES

A. Contractor shall employ and pay for the services of approved independent QC firms and laboratories to perform specified inspection and testing of the construction.

B. Contractor shall allow sufficient time in the Construction Progress Schedule for quality control testing, evaluation, and reporting of test results. Contractor shall give particular attention to this in areas where results/approvals will be required prior to continuing with the Work.

1.07 QUALIFICATIONS AND DUTIES OF QC FIRMS

A. Each QC firm shall be an approved testing, inspection, and quality control organization, independent from the Contractor and Owner. The QC firm's offices delivering such services shall have a minimum of three years experience with quality control services for construction of similar scope.

1.08 QUALITY CONTROL SUBMITTALS

A. QC firms shall submit test reports to Contractor. Contractor shall submit test reports to Engineer for review and approval within five working days after obtaining results of each inspection and test.

B. Reports shall include, as applicable: date issued; Project name; name of inspector; date and time of sampling or inspection; identification of product or material; location in the project; type of inspection or test; date sample received in laboratory, and name of person receiving sample; date of test; results of tests; and signature of appropriate specialist on laboratory report certifying accuracy of data

1.09 COORDINATION

A. Contractor shall furnish incidental labor and facilities:

1. To provide access to work to be tested;

2. To obtain and handle samples at the project site or at the source of products to be tested;

3. To facilitate inspections and tests; and

4. For storage and curing of test samples if applicable.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01500
TEMPORARY FACILITIES AND CONTROLS

PART 1 GENERAL

1.01 SUMMARY

A. Section Includes:

1. Temporary utilities (electricity, water, and sanitary facilities)

2. Barriers and enclosures

3. Protection of existing utilities and surface facilities

4. Protection of installed Work

5. Site security

6. Public traffic control

7. Construction cleaning

8. Noise control

9. Surface water and dust control

10. Spill prevention and control

11. Storage of materials

1.02 TEMPORARY ELECTRICAL SERVICE

A. Furnish and install temporary electrical service as required for performance of the Work. Temporary electrical utilities shall be installed by a licensed electrician. All electrical connections shall meet appropriate NEMA ratings consistent with the intended service. Coordinate with local electric utility and obtain any necessary permits.

B. Provide and maintain adequate lighting for construction operations and field offices.

C. Pay costs of energy used for power service, temporary lighting, heating, cooling and ventilation by all temporary facilities.

1.03 TEMPORARY WATER SERVICE

A. Provide, maintain, and pay for suitable quantity and quality of water required for the Work.

B. Provide water conveyance to any locations on the Site where water is used for the Work.

C. Provide, maintain, and pay for potable drinking water.

1.04 TEMPORARY SANITARY FACILITIES

A. Provide and maintain temporary portable chemical toilet facilities. The facilities shall be provided at time of Project mobilization and shall be maintained in clean and sanitary condition until Substantial Completion. Provide a sufficient number of portable toilets for Contractor's work crews, representatives of the Engineer, Owner and other authorized visitors, in accordance with applicable health and safety regulations.

B. Provide and maintain water hand washing facilities in clean, good working order. Provide and maintain other personal decontamination facilities to comply with applicable health and safety regulations.

1.05 BARRIERS AND ENCLOSURES

A. Install temporary chain link fencing to prevent unauthorized entry to construction areas, and to protect existing facilities and adjacent properties from damage from construction operations as shown on the Drawings. Maintain fencing and screening on a daily basis and replace or repair damaged materials.

B. Provide barricades and other temporary construction required by governing authorities for public rights-of-way. All temporary construction shall be in accordance with applicable federal, state and local laws and building codes.

C. Furnish and post signs warning the general public to prevent unauthorized access, to identify hard hat areas, and that the Site contains physical and chemical hazards. Furnish and post a sign, minimum size four square feet, at each entrance or gate with the following text:

> "All Personnel and Visitors Beyond This Point Must Wear Hard Hat, Safety Glasses, High-Visibility Vest and Steel Toe Boots"

D. Provide high density polyethylene safety fencing around excavations. Maintain and replace damaged fencing.

1.06 PROTECTION OF EXISTING UTILITIES

A. The Drawings indicate utilities or obstructions that are known to exist according to the best information available to the Engineer and Owner.

B. Contact and cooperate with all utility owners, agencies or departments that own and/or operate utilities in the vicinity of the Site to locate all utilities and other facilities in compliance with all applicable laws and regulations.

C. Comply with the requirements of 16 NYCRR Part 753 for protection of underground utilities, including the requirement to provide notice to the one-call notification systems by contacting the New York Underground Facility Protection Organization (phone number 800-962-7962).

D. Comply with the requirements of the utility owner, the New York State Department of Labor Code Rule 57, High Voltage Proximity, and all other applicable laws and regulations of authorities having jurisdiction for all work in the vicinity of overhead high-voltage lines.

E. All utilities shall be protected from damage during construction, unless otherwise indicated to be removed or abandoned. If damaged, the utilities shall be repaired as required by the utility owner at the Contractor's expense.

1.07 PROTECTION OF EXISTING SURFACE FACILITIES

A. Protect existing buildings, fencing, pavement, curbs and gutters, and other surface facilities from damage, unless such facilities are designated on the Drawings for removal.

B. Repair or replace any existing buildings, fencing, pavement, curbs and gutters, and other surface facilities that are cracked, broken or otherwise damaged by Contractor, to original condition, or better, in accordance with local requirements at no additional cost to the Project.

1.08 PROTECTION OF INSTALLED WORK

A. Protect installed Work and provide special protection where required in individual specification sections.

B. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.

1.09 SITE SECURITY

A. Provide security and facilities to protect Work from unauthorized entry, vandalism or theft. Initiate security program at job mobilization and maintain the security throughout the duration of the Work. Coordinate with Owner's security program.

B. Vehicular access to the site shall be restricted to authorized vehicles only. Allow entrance only to authorized persons with proper identification. Maintain a log of security incidents. Require all visitors having access to the site to sign in and sign out on a log. Visitors shall include on the log their social security number and the time of entry and departure from the site.

C. All approved visitors to the site shall be briefed on safety and security and provided with temporary identification and safety equipment by the Contractor's SHSO, and escorted by the Contractor throughout their visit.

1.10 PUBLIC TRAFFIC CONTROL

A. Coordinate with the City of Niagara Falls and comply with applicable requirements for maintaining and protecting traffic on all affected public roads during the Work. If required, a traffic control plan shall be developed and submitted to the City for review and approval.

B. Protect and divert traffic in compliance with the requirements of the City. Provide properly trained and equipped flagmen and install traffic control devices (including barricades and signs). The traveling public shall be protected from damage to persons and vehicles. Pay for and obtain all required road/lane closure permits, haul route permits, or other traffic control permits required for execution of the Work.

C. Traffic control devices shall comply with the "Manual on Uniform Traffic Control Devices" (MUTCD), published by U.S. Department of Transportation, latest edition.

1.11 CONSTRUCTION CLEANING

A. Maintain areas free of trash and rubbish. Maintain Site in a clean and orderly condition.

B. Supply all containers required for storage and removal of trash, rubbish, and debris resulting from the Work.

C. Remove trash and rubbish from Site at least once each week and dispose off-site at an approved waste disposal facility.

D. Contractor shall provide adequate means of removing soil residue and other debris from the body, undercarriage and tires of trucks and equipment prior to vehicles leaving the site. Any soil residue or other debris that is tracked or falls onto adjacent road surfaces shall be removed from the road surfaces and placed back on the site. Removal of debris in roads that has resulted from Contractor's negligence shall be removed at no additional cost to the Project. Remove debris from the roads using a street sweeper, shovels or hand sweepers and place on-site prior to construction of aggregate base for the asphalt cover.

1.12 NOISE CONTROL

A. Contractor's vehicles and equipment shall have appropriate noise reduction and protection devices that will minimize noise levels to the greatest degree practicable. Noise levels shall conform to the latest OSHA standards (including 29 CFR 1926.52), and other applicable state, county and local ordinance requirements.

B. Outfit all vehicles and equipment with mufflers and other sound attenuating equipment so that sound levels do not exceed 90 dBA when measured at a distance of 20 feet from any vehicle or equipment.

C. Noise shall also be controlled by compliance with required work hour restrictions, and other limitations imposed by authorities having jurisdiction.

1.13 SURFACE WATER CONTROL

A. Provide methods to control surface water to prevent damage to the Work, the Site, and adjoining properties in conformance with the requirements indicated on the Drawings.

B. Divert water away from excavations and other construction areas, and direct drainage to proper runoff courses as required to prevent any erosion, damage or nuisance to adjacent areas. Contractor shall be responsible for damages caused by water disposal operations.

C. Provide, operate and maintain equipment and facilities of adequate size to control water.

1.14 SPILL PREVENTION AND CONTROL

A. Prepare, implement and maintain a Spill Prevention, Control and Countermeasures (SPCC) Plan for all on-site fueling operations (including gasoline, diesel, and lubricants) and other regulated operations. The SPCC Plan shall include the requirements in the following paragraphs, at a minimum.

B. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations, including the following:

1. Provide relatively impervious secondary containment and spill protection devices at all onsite vehicle maintenance facilities.

2. Collect all oil and other fluids discharged during vehicle maintenance operations in drums and dispose of properly. Waste containers remaining on site for any length of time when Contractor is not present shall be left in secure areas, properly labeled and covered.

C. Provide equipment and personnel to perform emergency measures required to contain significant spillages on-site, as determined necessary by the Engineer and Owner. In the event of a release or threatened release of hazardous substances outside excavation areas, regardless of whether less than a reportable quantity is involved, Contractor shall immediately inform the Engineer.

D. All Contractor's equipment used during construction shall conform to all current federal, state and local laws and regulations.

1.15 DUST CONTROL

A. Contractor shall control fugitive dust at all times, including weekends, holidays and hours when work is not in progress.

B. Maintain excavations, stockpiles, and other areas within the Work area free from particulates which would cause the air pollution standards to be exceeded or cause a hazard or nuisance.

C. Provide all labor, materials and equipment, including water trucks and dust suppressant, needed to limit visible dust generation during the Work.

D. Provide dust control measures required by all applicable regulatory requirements including the following:

1. Wetting agents shall be used on a scheduled basis

2. Trucks carrying soil shall be covered

3. Soil stockpiles shall be located away from pedestrian areas

4. Periodic street and sidewalk cleaning shall be provided

1.16 STORAGE OF MATERIALS

A. Furnished products to be incorporated in the Work shall be stored within suitable structures and areas where approved by the Owner.

B. Size of storage structure(s) and storage areas shall be determined by Contractor and shall be adequate for proper storage of products specified in individual Specification sections. Allow for access and orderly provision for maintenance and for inspection of products.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01575
TEMPORARY SOIL EROSION AND SEDIMENT CONTROL

PART 1 GENERAL

1.01 SUMMARY

A. Section includes construction of temporary measures to control soil erosion and sediment transport within the construction limits. Temporary control measures shall be those that are needed prior to installation of permanent control features; or that are needed temporarily to control erosion that develops during normal construction activities.

1.02 REFERENCES

A. "New York State Standards and Specifications for Erosion and Sediment Control", New York State Department of Environmental Conservation (NYSDEC), August 2005

1.03 QUALITY ASSURANCE

A. Comply with the requirements of pollution control laws, rules and regulations of governmental authorities having jurisdiction and applicable permit conditions as presented on the Drawings.

1.04 SEQUENCING REQUIREMENTS

A. The use of temporary control measures shall be coordinated with the permanent erosion control features specified elsewhere in the Specifications to the extent practical, to assure effective and continuous erosion and sediment control.

PART 2 PRODUCTS

2.01 SILT FENCING

A. Silt fencing shall conform to the applicable requirements of the referenced NYSDEC publication as indicated on the Drawings.

2.02 CONSTRUCTION ENTRANCE

A. Aggregate and geotextile for construction entrance shall be as indicated on the Drawings.

2.03 OTHER TEMPORARY CONTROLS

A. Furnish materials for storm drain inlet protection, sediment traps, and other required temporary controls as indicated on the Drawings.

PART 3 EXECUTION

3.01 GENERAL

A. Install temporary erosion and sediment control measures prior to any land disturbance and in accordance with the requirements stated on the Drawings

B. All Work shall be performed in such a manner that objectionable sediment shall not be created on land surfaces and in storm drains and watercourses through or adjacent to the Site.

C. The Engineer shall have the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, fill and grading operations.

D. The Engineer shall also have the authority to direct the Contractor to:

1. Alter the location, type and number of erosion and sediment control devices from that shown on the Drawings due to changes in drainage patterns created during construction; and

2. Provide immediate, temporary or permanent erosion and sediment control measures to minimize adverse impact on land surfaces and in storm drains and watercourses on or adjacent to the Site.

E. Incorporate all permanent erosion control measures (including seeding) into the Project at the earliest practical time.

F. Erosion control measures shown on the Drawings are minimal requirements. It is the responsibility of the Contractor to install additional measures as needed to control sediment, whether or not directed to add such measures by the Engineer.

G. Temporary erosion and sediment control measures shall conform to the requirements of this Section and as indicated on the Drawings.

3.02 INSTALLATION OF SILT FENCING

A. Prior to any land disturbance, install silt fencing in accordance with the standard procedures presented in the referenced NYSDEC publication as indicated on the Drawings.

B. Temporary silt fencing shall be installed at all locations indicated on the Drawings or as otherwise approved by the Engineer.

C. At the time of installation, the fabric will be rejected if it has defects, deterioration or damage incurred during manufacture, transportation, storage or installation.

3.03 CONSTRUCTION ENTRANCE

A. Construction entrance shall be constructed in accordance with the details and requirements indicated on the Drawings.

B. Any materials or mud spilled, dropped, washed, or tracked from vehicles from the site onto roadways or into storm drain drop inlets shall be removed as indicated on the Drawings.

3.04 CONSTRUCTION OF OTHER TEMPORARY CONTROLS

A. Install and construct other required temporary erosion and sediment controls as indicated on the Drawings.

3.05 INSPECTION AND MAINTENANCE

A. Inspect silt fencing at a minimum frequency of once every week and after each significant rain event unless otherwise approved by the Engineer. Make required repairs immediately. Replace silt fence fabric when it has deteriorated, is torn, loose or no longer effectively performs.

B. Inspect and maintain all other temporary erosion and sediment control measures as required. Replace or reconstruct when the measures no longer effectively perform

C. Remove sediment deposits when deposits reach approximately one-half the height of storm drain inlet protection, sediment traps and silt fencing. Sediment shall be spread over the ground surface within the limits of the asphalt cover prior to placement of aggregate base material.

D. Maintain silt fencing, construction entrance, and other temporary erosion and sediment control measures until completion of the Work.

3.06 REMOVAL OF TEMPORARY CONTROL MEASURES

A. Temporary erosion and sediment control measures shall not be removed until approved by the Engineer. The upgradient areas shall be sufficiently stabilized with permanent erosion control measures as specified prior to removal.

END OF SECTION

SECTION 01722
CONSTRUCTION SURVEYING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: field surveying for control and documentation of the lines, grades and elevations of the Work.

1.02 QUALITY CONTROL

A. Record surveys which are required for review and approval of the Work shall be performed by a Registered Land Surveyor (RLS) licensed and registered in the State of New York, retained by the Contractor, and acceptable to the Engineer.

B. Day to day surveying for Contractor's control purposes may be performed by Contractor's own surveyors.

1.03 SUBMITTALS

A. Submit record survey drawings (specified in subsection 3.02 of this Section), certified by the RLS, along with computer files on diskette in AutoCad 2004 or later format. Redline mark-ups of the Project Drawings are not acceptable. A digitized tracing of a manually drawn record survey drawing, derived from non-digital surveying techniques, is also not acceptable.

1.04 SURVEY REFERENCE POINTS

A. Benchmarks have been established for horizontal and vertical control for the Work. Control datum for survey is that indicated on the Drawings.

B. Verify locations of survey reference points prior to starting the Work. Promptly notify Engineer and Owner of any discrepancies discovered.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 GENERAL SURVEY REQUIREMENTS

A. Utilize recognized engineering survey practices appropriate for obtaining the information specified.

B. Protect and preserve permanent reference points during construction.

C. Promptly report to Engineer and Owner the loss or destruction of any reference point or relocation required because of changes in grades or other reasons. Replace dislocated reference points based on original survey control. Make no changes without prior written notice to Engineer and Owner.

D. The Work shall be executed in conformance with the lines and grades shown on the Drawings, unless otherwise approved by the Engineer and Owner.

E. Establish elevations, lines and levels required for all items of the Work.

3.02 DOCUMENTATION OF THE WORK

A. Maintain a complete and accurate log of control and survey work as it progresses.

B. Record survey drawings shall be prepared to fully document the Work as specified in individual specification sections.

C. Promptly submit record survey drawings (with computer files) to Engineer for review at critical stages of construction as identified in the Construction Progress Schedule.

D. Contractor's RLS shall prepare and certify the record survey drawings.

END OF SECTION

SECTION 02220
SITE DEMOLITION

PART 1 GENERAL

1.01 SUMMARY

A. Section includes demolition and removal of pavement and structures indicated on the Drawings, including the following:

1. Asphalt and concrete pavement and slabs

2. Chain link fencing

3. Above-grade electrical utilities

1.02 SUBMITTALS

A. Prepare and submit a Demolition Work Plan prior to commencement of demolition. The Work Plan shall include procedures to be used for removal, handling, characterization, loading, off-site hauling and disposal of demolition materials. The Work Plan shall also include information on proposed waste haulers, proposed disposal facility, and other necessary site-specific elements in conformance with the requirements of the Owner and all other applicable federal, state and local regulations.

B. Submit written certification of proper transport and final disposal of demolition materials to a permitted disposal facility.

1.03 QUALITY ASSURANCE

A. Conform to applicable local, state, and federal regulations (including 29 CFR 1926, Part T – Demolition) related to operation of equipment and tools, protection of persons and property, and environmental controls.

1.04 PROJECT CONDITIONS

A. During demolition and removal, use all procedures necessary to assure that no portion of the structures, either that to be removed or to remain, become a hazard to persons by instability or other condition.

B. Notify affected utility companies before starting work and comply with their requirements.

C. Notify all local, state, and federal agencies having jurisdiction and complete all necessary forms required for demolition work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 PREPARATION FOR DEMOLITION

A. By careful study of the Drawings and these Specifications, determine the location and extent of demolition to be performed.

B. If not indicated to be removed, shut off, cap, and otherwise protect existing public utility lines in the area of demolition in accordance with the requirements of the Owner or public agency having jurisdiction.

3.02 REMOVAL OF CURBS

A. Cut and remove existing granite curb where indicated on the Drawings.

B. Remove curb at joint nearest the indicated removal limits or saw cut between joints as approved by the Engineer.

C. Temporarily stockpile removed curbing for installation along the edge of the road at existing curb cut as indicated on the Drawings. Excess curbing shall be removed from the Site.

D. Maintain saw cuts in good order until construction is completed.

3.03 REMOVAL OF ASPHALT AND CONCRETE

A. Designated areas of existing asphalt and concrete shall be cut as specified herein, and as shown on the Drawings, for installation of new storm drainage pipes and structures and for site grading. Conform to the additional requirements in Section 02317.

B. Use an adequately powered, water-cooled, mechanical saw with a diamond-edge blade or abrasive wheel, unless otherwise approved by the Engineer.

C. Cut pavement and slabs in uniform line around perimeter of each excavation and along the road pavement edge at Site access turn-out. Limit the area to be removed to the smallest practical area to accomplish the work in accordance with the project requirements.

D. Break up and remove asphalt and concrete using suitable equipment.

E. Maintain cuts in good order until construction is completed adjacent to removed asphalt and concrete.

3.04 REMOVAL OF CHAIN LINK FENCING

A. Remove existing fencing (including fabric, posts and accessories) at locations indicated on the Drawings.

B. Remove fence posts and concrete footings to full depth.

3.05 REMOVAL OF LIGHT/POWER POLES

A. Coordinate with electrical utility owner for de-energizing of power lines on poles to be removed within the limits of construction as indicated on the Drawings.

B. Remove designated existing overhead power lines, light fixtures, guy wires, guy anchors, poles, and all other accessories attached to the poles.

C. Excavate and remove power poles to full depth. Soil excavated for removal of poles shall be used as backfill. Place and compact backfill as specified in Section 02316.

3.06 DISPOSAL OF REMOVED MATERIALS

A. Disposal of removed materials shall comply with all applicable local, state and federal regulations.

END OF SECTION

SECTION 02230
SITE CLEARING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes clearing, grubbing and disposal of vegetation.

1.02 PROJECT CONDITIONS

A. Implement temporary erosion and sediment control measures prior to clearing of vegetation as specified in Section 01575.

B. Site clearing shall be performed in a manner that does not damage existing pavement, structures or other facilities not indicated to be removed.

C. Conform to applicable local codes for disposal of cleared and grubbed vegetation.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING AND GRUBBING

A. Cut and remove trees, brush, grass and other vegetation down to the existing ground surface within the limits of construction.

B. Remove tree limbs, branches and other vegetative debris from debris piles.

C. Grind tree stumps and roots to a minimum depth of 12 inches below existing grade.

3.02 DISPOSAL OF VEGETATION

A. Cleared vegetation that is removed above the ground surface shall be chipped and placed on-site or transported off-site and disposed as specified in the following paragraphs.

B. Limbs, branches, foliage, and brush shall be chipped and placed on-site as approved by the Engineer. Chipping and placement shall include reducing woody materials to chips by the use of an appropriate chipping machine and placement in place by broadcasting or other acceptable methods. Chipped vegetation shall be spread over the ground surface and shall not exceed six inches total thickness.

C. Logs and timber consisting of tree sections cut at the ground surface and excluding any roots, stumps, or logs retrieved from excavations shall be disposed off-site.

D. All soil adhering to plant material shall be removed prior to off-site disposal.

E. Conform to all applicable local, state and federal regulations for transport and disposal of vegetation.

F. Burning of cleared vegetation will not be allowed.

END OF SECTION

SECTION 02240
TEMPORARY DEWATERING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes temporary dewatering requirements for excavations and in-place abandonment of below-grade structures.

1.02 DESIGN REQUIREMENTS

A. Contractor shall be responsible for the design of all temporary dewatering systems if required for excavations below groundwater.

B. Dewatering systems shall be designed to provide a working area free of standing water until construction is completed in each excavation. Water shall be pumped, drained by gravity or removed by other means, and discharged as specified in this Section.

C. The extent of control of water includes, but is not limited to:

1. Furnishing, installing and operating all necessary pumps, piping and accessories.

2. Removing such temporary works and equipment after they have served their purpose.

1.03 SUBMITTALS

A. Submit a plan for control of water to the Engineer for review. The plan shall indicate: method of dewatering to be used; location of sumps or pumps as applicable; and how water will be discharged.

1.04 QUALITY ASSURANCE

A. The Contractor shall have demonstrated experience in dewatering operations of the type required in the proposed work.

1.05 PROJECT CONDITIONS

A. Some subsurface information has been obtained and is available for review by the Contractor. The Contractor is responsible for determining the character of materials, extent of groundwater or other conditions to be encountered. No warranty, either expressed or implied, is made as to the accuracy of the subsurface information presented.

1.06 COORDINATION

A. Dewatering work shall be coordinated with other phases of the Work to comply with the approved schedule, to provide required conditions for stability of excavations, control of groundwater during excavation activities, and proper discharge of removed groundwater as specified.

PART 2 PRODUCTS

2.01 EQUIPMENT

A. Provide and maintain at all times proper and approved pumping machinery of sufficient capacity to meet the maximum requirements for the removal of groundwater from excavations as specified.

B. Keep on hand, or have immediate access to, additional pumps of sufficient capacity to provide reasonably for any breakdown or to dewater the work in case of flooding.

C. Sufficient suction and discharge hose or piping shall be available for adequate discharge of pumped liquids without causing erosion, sedimentation or other adverse consequences.

PART 3 EXCAVATION

3.01 DEWATERING

A. If encountered during excavations, the groundwater surface shall be lowered to a depth of at least two feet below the required bottom of excavation.

B. Dewatering shall be accomplished by pumping directly from excavation bottom unless otherwise approved by the Engineer.

C. Maintain and operate the dewatering equipment until excavation of materials, and placement and compaction of backfill or fill material is complete up to at least two feet above the natural ground-water level and as approved by the Engineer.

D. Removal of liquids shall not interfere with other work.

E. Provide erosion and sediment control necessitated by the liquids removal operations.

3.02 HANDLING AND DISCHARGE OF LIQUIDS

A. All water removed during dewatering operations shall be discharged on-site where directed by the Engineer using approved equipment and methods.

3.03 REMOVAL OF DEWATERING SYSTEMS

A. Deactivate and remove dewatering systems prior to completion of the Work.

END OF SECTION

SECTION 02284
ABANDONMENT AND RECONSTRUCTION OF FACILITIES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes: abandonment of utilities; and reconstruction of the tops of monitoring wells.

1.02 REFERENCES

A. ASTM International:

1. ASTM A 778, Standard Specification for Welded, Unannealed Austenitic Stainless Steel Tubular Products

2. ASTM C 33, Standard Specification for Concrete Aggregates

3. ASTM C 150, Standard Specification for Portland Cement

1.03 PROJECT CONDITIONS

A. Monitoring wells to be reconstructed are indicated on the Drawings.

B. Contractor is responsible for notifying, and coordinating with, the City of Niagara Falls for abandonment of utilities. Comply with the applicable requirements of the City regarding the locations and methods of utility abandonment.

C. Work shall be performed in a manner that does not disturb existing adjacent utilities and other facilities that are not indicated to be removed.

PART 2 PRODUCTS

2.01 GROUT

A. Grout shall be a pumpable mixture of Portland cement, sand and potable water. Grout shall have a minimum 28-day compressive strength of 2,000 psi.

B. Cement shall be Type I or II Portland cement complying with ASTM C 150.

2.02 CONCRETE FOR WELL RECONSTRUCTION

A. Concrete for well pads shall consist of Type I or II Portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and clean water. Concrete shall have a minimum 28-day compressive strength of 3000 psi.

2.03 MONITORING WELL RISERS AND FITTINGS

A. Monitoring well riser pipe extensions shall be fabricated of Grade TP 316L stainless steel and conform to ASTM A 778. Pipe diameter shall be as indicated on the Drawings.

B. Furnish vented slip cap for top of each riser.

2.04 CEMENT-BENTONITE GROUT

A. Portland cement-bentonite grout shall be a mixture of Type II or IV Portland cement (complying with ASTM C 150) and clean water in the proportion of 5 to 6 gallons of water per 94-pound bag of cement. The mix shall also contain approximately two to six percent sodium bentonite by weight.

2.05 PROTECTIVE COVERS

A. Protective covers shall be lockable stand-up galvanized well covers manufactured by Boart Longyear, Part Number TC-200, or approved equal.

2.06 WELL MANHOLE

A. Well manhole shall be leak-resistant cast iron manholes, eight-inch minimum inside diameter, with 12-inch length sheet metal or HDPE skirt. Well manhole shall meet AASHTO H-20 traffic rating. Lid shall be painted white with a black monitoring well triangle and labeled “Monitoring Well”.

PART 3 EXECUTION

3.01 GROUTING EQUIPMENT

A. The grout plant shall be equipment designed for this type of work. Mixers shall be capable of complete uniform mixing of the materials and shall be of sufficient capacity to continuously feed each pumping unit at its normal pumping rate. Pumps shall be capable of developing the required pressure based on the Contractor’s calculations to achieve the specified results.

B. Positive displacement meters, marked holding tanks, or other suitable devices shall be used to correctly measure both the mix and the quantity of grout pumped.

C. Pressure injection hoses, fittings, valves, pressure gauges, and other appropriate materials and equipment shall be provided to achieve a continuous supply of grout and accurate pressure control.

3.02 PREPARATION FOR ABANDONMENT

A. Protect existing structures, utilities, monitoring wells, fences and all other facilities that are not designated to be removed.

B. A site review attended by appropriate City of Niagara Falls personnel shall be performed prior to abandonment of existing utilities. The review shall include, but is not to be limited to, the following:

1. Review "as built" construction drawings if available;

2. Locate utilities to be abandoned; and

3. Locate nearby underground utility pipelines and conduits.

C. Personnel shall wear proper personal protective equipment during the working period. Explosimeters or combustible gas indicators and oxygen meters shall be readily available and shall be used as appropriate.

D. No person shall enter any manhole or any other underground facility unless proper OSHA Confined Space Entry Procedures are followed.

3.03 REMOVAL OF LIQUIDS AND DEBRIS

A. Remove liquids and residues from the manholes and riser pipes using explosion-proof or air-driven pumps, hand pumps or other appropriate equipment and methods.

B. All removed liquids and residues shall be containerized, characterized and disposed off-site in accordance with all applicable local, state and federal regulations unless otherwise approved by the Engineer.

C. Continue dewatering operations if required to handle inflow until completion of placement of grout or granular fill materials as applicable.

3.04 REMOVAL OF STRUCTURE TOPS AND PIPING

A. Cut and remove tops of riser pipes. Remove manhole frames, covers of designated existing manholes to be abandoned. Remove tops of the manhole structures as required for placement and compaction of granular fill.

B. Disconnect and remove exposed piping, electrical conduits, and accessories from the interior of the structures if required for in-place abandonment.

C. Dispose of all removed materials off-site as specified in Section 02220.

3.05 GROUTING OF BELOW-GRADE STRUCTURES

A. Riser pipes and associated below-grade structures shall be grouted in-place as specified in the following paragraphs unless otherwise approved by the Engineer. Existing manholes shall be filled with granular material instead of grout as specified in subsection 3.06.

B. Use suitable methods and equipment to control flow of grout so that complete filling without voids is achieved.

C. The volume of grout to be injected shall be determined by the Contractor based on field measurements of the structure and pipe dimensions. Provide additional volume of grout as required to achieve the specified results.

D. Install relief vents if required for the injection of grout.

E. Grout shall be pumped using suitable equipment and methods to achieve complete filling of the structures and pipes.

F. Grouting shall not be considered complete until the grout exiting the air vents is consistent with the grout which is being pumped in, based on test results.

G. Allow a minimum of 24 hours for grout to harden prior to initiation of subsequent construction activities in the vicinity of the structures.

3.06 FILLING OF MANHOLE STRUCTURES

A. Place granular fill material in manholes using equipment and methods that will provide proper compaction of the fill as specified.

B. Place granular fill material in layers of approximately 12-inch thickness and compact using a backhoe bucket or other suitable equipment to provide a suitably stabilized fill as approved by the Engineer.

C. Continue placement and compaction of granular fill material up to existing grade.

3.07 RECONSTRUCTION OF MONITORING WELL TOPS

A. Protect existing monitoring wells from damage during the Work. Damage shall be defined as disturbance to the well, which causes it to be no longer plumb or damages the surface seal. Repair or replace damaged wells as directed by the Engineer.

B. Monitoring well reconstruction shall be performed using methods that will not contaminate the existing wells. Protect open risers (casings) to prevent entrance of foreign debris. Prior to cutting casing, install a temporary plug in the casing to prevent pipe cuttings or other debris from entering the casing.

C. The tops of monitoring wells within the limits of construction affected by changes in grade shall be reconstructed as indicated on the Drawings and specified in the following paragraphs.

D. Adjust top of riser as required to achieve final elevation shown on the Drawings. Depending on the location, install additional riser pipe with approved couplers or cut top of riser pipe as applicable.

E. The well reconstruction shall include continuous cement-bentonite concrete grout from the existing to finish grade.

F. Install well manhole or protective cover at the top of monitoring wells as shown on the Drawings.

G. Construct concrete well pad around the well to the dimensions indicated on the Drawings. The finished surface of the concrete well pad shall slope away from the protective cover or well manhole to the outside edge.

H. Dispose of removed materials as specified in Section 02220.

END OF SECTION

SECTION 02310
GRADING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes excavation, fill placement and grading required for subgrade construction and other site grading as part of the asphalt cover construction.

1.02 REFERENCES

A. ASTM International:

1. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

2. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

3. ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

4. ASTM D 2487, Standard Classification of Soils for Engineering Purposes (Unified Soil Classification System)

5. ASTM D 2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

6. ASTM D 3017, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Documentation of analytical laboratory qualifications as specified in subsection 1.04.B.

2. Results of chemical testing of proposed fill materials.

3. Certifications by material supplier for proposed borrow materials (if used) showing conformance with the Specifications.

B. Submit written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.

C. Submit record survey drawing of completed subgrade as specified in this Section.

1.04 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent Quality Control firm to determine conformance of earthwork materials and constructed work with the Specifications.

B. Contractor shall retain the services of an independent chemical testing laboratory to perform specified chemical analyses of proposed imported materials. The laboratory shall have a valid US Army Corps of Engineers certification and/or National Environmental Laboratory Accreditation Program (NELAP) certification for the specified test methods and matrix.

C. Record surveys shall be performed by the Contractor's Registered Land Surveyor as specified.

1.05 PROJECT CONDITIONS

A. Work shall be performed in a manner that does not disturb existing monitoring wells, utilities, fencing, pavement, structures, or other facilities not indicated to be removed. Damage caused by the Contractor to facilities not indicated to be removed shall be repaired or replaced.

B. Contractor shall not remove disturbed soils within the limits of the asphalt cover from the Site. However, excavation, grading and compaction of surface materials will be necessary for subgrade preparation.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction.

B. Prior to use of soils from off-site borrow source(s), chemical analyses of proposed borrow material shall be performed by an approved chemical testing laboratory retained by the Contractor.

1. Contractor shall identify the proposed borrow source for imported materials, perform sampling, submit the samples to an analytical laboratory for testing, and review the analytical test results.

2. A minimum of one composite sample per proposed borrow source shall be obtained and analyzed. The following laboratory analyses shall be performed:

a. Target Compound List (TCL) organics

b. Priority Pollutant List (PPL) metals analysis

3. The analytical laboratory shall provide test results as a Level III Data Package.

C. Chemical analysis is not required for processed aggregates.

2.02 SOIL FILL

A. Soil Fill to be used for construction of the asphalt cover subgrade shall be obtained from on-site grading operations and from approved off-site borrow sources.

B. Soil Fill obtained from off-site borrow sources shall conform to the following specifications:

1. Fine gravel, sands with fines (SM, SC), silt (ML), inorganic clay (CL), or blends of these materials, as defined by the Unified Soil Classification System (USCS).

2. Free of stones larger than approximately three inches in greatest dimension, and substantially free of roots, trash and other material which may be compressible or which cannot be compacted properly.

C. Physical Testing of Soil Fill:

1. Soil Classification (ASTM D 2487): Minimum of one test for each change in material.

2. Moisture-Density Curve (ASTM D 698): Minimum of one test for each change in material.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. The following tests shall be performed during placement of Soil Fill:

1. In-Place Density (using ASTM D 2922, ASTM D 1556, or other appropriate test methods): Minimum of one test per lift per 1,000 square yards (or fraction thereof) of material placed, and at every change in material.

2. Moisture Content (using ASTM D 3017, ASTM D 2216, or other appropriate test method): Minimum of one test per lift per 1,000 square yards (or fraction thereof) of material placed, and at every change in material.

3. In-place density and moisture content testing performed using nuclear instruments shall be checked by comparison to test results using laboratory methods.

C. A record survey drawing of the completed subgrade shall be prepared and submitted to the Engineer for review before proceeding with subsequent placement of aggregate base course. At a minimum, survey finished surface elevations of the subgrade on a grid pattern with a maximum spacing of 25 feet.

3.02 SITE PREPARATION

A. The Contractor's surveyor shall lay out the limits and elevations for site grading.

B. Abandon existing utilities and remove structures as indicated on the Drawings and specified in individual specification sections.

C. Remove vegetation as indicated on the Drawings and specified in Section 02230.

D. Metal and other miscellaneous debris located in existing debris piles and fill areas on the Site shall be removed from the Site and disposed in accordance with all applicable local, state and federal regulations.

E. Existing rock in debris piles shall be relocated on-site as follows:

1. Relocate to areas of the Site that will require a minimum of 18 inches of subgrade fill.

2. Place the rock in one layer to a maximum height of approximately six inches. The top of the relocated rock shall be no higher than 12 inches below the subgrade elevation for the aggregate base course.

3. Place Soil Fill, stones and aggregate over the rock to fill voids between rocks and compact and consolidate the materials to the extent practical.

3.03 PROOF-ROLLING

A. After initial grading as specified in paragraph 3.04.A, the existing surface within the limits of the asphalt cover shall be proof-rolled.

B. Proofrolling shall be performed during a suitable period of dry weather. A heavily loaded dump truck or similar approved construction equipment shall be used for proofrolling. The equipment shall make at least four passes over the full extent of subgrade soils. The vehicle shall have a minimum weight of 30,000 pounds for a 4-wheel vehicle or equivalent.

C. Soft, organic, highly plastic, or excessively wet soils which pump, rut or wave during proofrolling shall be stabilized as required to provide a suitable subgrade for asphalt cover construction.

3.04 GRADING AND PLACEMENT OF FILL

A. Grade existing surface materials and place on-site in areas requiring fill. Placement and compaction of the material shall conform to the specifications for Soil Fill in the following paragraphs.

B. Place Soil Fill (including existing surface materials) in uniform lifts not exceeding eight inches loose lift thickness. Compact each lift to a minimum of 98 percent of the material's maximum dry density as determined by ASTM D 698.

C. Maintain the moisture content of Soil Fill to within plus or minus three percentage points of the soil’s optimum moisture content.

D. Uniformly grade the surface so that no obstruction to drainage from other sections of the Site is created at any time. The finished surface shall be free from irregular surface changes.

E. The surface shall be graded to achieve the required subgrade elevations for aggregate base course construction. Grade to within a tolerance of plus or minus one inch.

F. Compacted Soil Fill that does not meet the specified density requirement shall be scarified, the moisture content adjusted, and the area recompacted and retested.

G. Based on the results of surveying of the finished surface of aggregate base subgrade, areas that are not constructed to the required elevations, within specified tolerance, shall be adjusted.

3.06 MAINTENANCE AND PROTECTION

A. Protect graded areas from traffic and erosion, and keep free from trash.

B. Damage to any compacted lift at any time during the course of construction, such as rutting under the loads imposed by earth-moving or hauling equipment or damage due to erosion from rainfall events shall be fully repaired prior to placement of any overlying materials.

C. Repair of damaged areas shall include scarifying the surface, reshaping, and compacting to the required density.

END OF SECTION

SECTION 02316
EXCAVATING AND BACKFILLING FOR UTILITY STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes excavation, backfill and compaction for the installation of manholes, drop inlets and headwalls. Section does not include trench excavation and backfilling for installation of piping.

1.02 REFERENCES

A. ASTM International:

1. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

2. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

3. ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

4. ASTM D 2937, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method

5. ASTM D 3017, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

B. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Certifications by material suppliers for proposed borrow materials showing conformance with the Specifications as applicable.

B. Submit written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.

1.04 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent Quality Control firm to determine conformance of earthwork materials and constructed work with the Specifications.

1.05 PROJECT CONDITIONS

A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with applicable OSHA regulations.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. If borrow fill is required, proposed materials and source shall be approved for suitability by the Engineer as specified prior to delivery and use in the construction.

B. The Engineer will also determine:

1. The suitability of on-site excavated materials for use as backfill material.

2. The suitability of excavated bottom for structure foundation.

2.02 CRUSHED STONE BASE FOR STRUCTURES

A. Crushed stone base material shall consist of coarse aggregate conforming to the applicable material requirements in subsection 703-02 of the NYSDOT Specifications. Gradation shall be as specified in Table 703-4 of the NYSDOT Specifications for size number 1 coarse aggregate as summarized in the following table:

Sieve Size	**Percent Passing, by Weight**
1 inch	100
1/2 inch	90 - 100
1/4 inch	0 - 15

2.03 BACKFILL MATERIAL

A. Soil used for backfill around utility structures shall consist of on-site material obtained during excavation and grading, provided that it is substantially free of rocks larger than approximately three inches in greatest dimension, roots, trash and other material which may be compressible or which cannot be compacted properly.

B. Testing of Backfill Material:

1. Moisture-Density Curve (ASTM D 698): Minimum of one test for each visible change in material.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Testing of Backfill:

1. In-Place Density (using ASTM D 1556 or ASTM D 2937): Minimum of one test

for every three lifts of backfill placed at each structure.

2. Moisture Content (using ASTM D3017, ASTM D2216, or other appropriate test method): Minimum of one test for every three lifts of backfill placed at each structure.

3.02 PREPARATION

A. Establish required limits and elevations for excavations.

B. Implement, operate and maintain a dewatering system as required to control groundwater for excavation, installation of structures, and backfill in conformance with the requirements of Section 02240.

3.03 EXCAVATING AND PREPARATION OF SUBGRADE

A. Excavate to the dimensions and elevations required for installation of structures. Slope sides of excavations and provide shoring and bracing as required to conform to applicable OSHA regulations.

B. Excavate in a manner and sequence that will provide proper drainage at all times.

C. Do not disturb materials below the required bottom of excavations unless otherwise required and approved by the Engineer.

D. Place and compact Crushed Stone Base material under structures to the depth indicated on the Drawings. Accurately grade the Crushed Stone Base to the required for elevation to provide a firm and uniform bearing for the structure.

E. Maintain side slopes of excavations in a safe condition until completion of excavation, structure installation and backfilling.

3.04 BACKFILLING AROUND STRUCTURES

A. Place and compact backfill as promptly as progress of the Work permits, but not until completion of the following:

1. Acceptance by the Engineer of construction below finish grade.

2. Removing concrete formwork, if applicable.

3. Removing shoring and bracing as the excavation is backfilled, if applicable.

4. Removing trash and debris.

B. Placing Backfill

1. Place backfill in lifts not more than eight inches loose thickness.

2. Do not place backfill on surfaces that are muddy or frozen.

3. Place backfill evenly adjacent to structures, to required finish grade.

4. Take care to prevent unbalanced forces against structures by carrying the material uniformly around the structure to approximately the same elevation in each lift.

C. Compacting of Backfill

1. Except as required in the following paragraph 2, compact each layer of backfill material to a minimum of 95 percent of the material's maximum dry density as determined by ASTM D 698.

2. Backfill placed within 24 inches of the aggregate base course subgrade for asphalt cover shall be compacted to a minimum of 98 percent of the material's maximum dry density as determined by ASTM D 698.

D. Place backfill up to existing grade or aggregate base course subgrade as applicable.

END OF SECTION

SECTION 02317
TRENCHING AND BACKFILLING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes excavation, backfill and compaction for the installation of underground pipelines.

1.02 REFERENCES

A. ASTM International:

1. ASTM D 448, Standard Classification for Sizes of Aggregate for Road and Bridge Construction

2. ASTM D 698, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

3. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

4. ASTM D 2216, Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

5. ASTM D 2937, Standard Test Method for Density of Soil in Place by the Drive-Cylinder Method

6. ASTM D 3017, Standard Test Method for Water Content of Soil and Rock in Place by Nuclear Methods (Shallow Depth)

B. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Certifications by material suppliers for proposed borrow materials showing conformance with the Specifications as applicable.

B. Submit written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.

1.04 QUALITY ASSURANCE

A. Contractor shall retain the services of an approved independent Quality Control firm to determine conformance of earthwork materials and constructed work with the Specifications.

1.05 PROJECT CONDITIONS

A. The Contractor is solely responsible for excavation slope stability. Excavation work shall be in compliance with all applicable OSHA regulations.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. If borrow fill is required, proposed materials and source shall be approved for suitability by the Engineer as specified prior to delivery and use in the construction.

B. The Engineer will also determine:

1. The suitability of on-site excavated materials for use as Pipe Bedding and Initial Trench Backfill.

2. The suitability of excavated trench bottom for pipe foundation.

2.02 STABILIZATION MATERIAL

A. Stabilization Material shall consist of coarse aggregate with gradation conforming to size number 57 aggregate as defined in ASTM D 448.

2.03 PIPE BEDDING AND INITIAL TRENCH BACKFILL MATERIAL

A. Pipe bedding material and initial trench backfill material shall consist of coarse aggregate conforming to the applicable material requirements in subsection 703-02 of the NYSDOT Specifications. Gradation shall be as specified in Table 703-4 of the NYSDOT Specifications for size number 1 coarse aggregate as summarized in the following table:

Sieve Size	**Percent Passing, by Weight**
1 inch	100
1/2 inch	90 - 100
1/4 inch	0 - 15

2.04 FINAL TRENCH BACKFILL

A. Final Trench Backfill for pipe installed under asphalt cover shall consist of materials obtained from trench excavation, provided that it is substantially free of material which may be compressible or which cannot be compacted properly.

B. Testing of Trench Backfill Material ((under asphalt cover):

1. Moisture-Density Curve (ASTM D 698): Minimum of one test for each visible change in material.

C. Final Trench Backfill for pipe installed across road shall be as indicated on the Drawings.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Testing of Final Trench Backfill (under asphalt cover):

1. In-Place Density (using ASTM D 1556 or ASTM D 2937): Minimum of one test for every three lifts of backfill placed and for every 200 linear feet of trench, including at the road crossing.

2. Moisture Content (using ASTM D3017, ASTM D2216, or other appropriate test method): Minimum of one test for every three lifts of backfill placed and for every 200 linear feet of trench, including at the road crossing.

3.02 PREPARATION

A. Establish required alignment and elevations for trench excavation.

B. Implement, operate and maintain a dewatering system as required to control groundwater for trench excavation, pipe installation and backfill in conformance with the requirements of Section 02240.

3.03 TRENCH EXCAVATION AND PIPE BEDDING

A. Excavate trenches for pipe installation where indicated on the Drawings and as specified in the following paragraphs.

B. Excavation and preparation of pipe bedding shall conform to the details shown on the Drawings.

C. The depth of trench excavation shall be as required to provide the required invert elevations and pipe bedding for the pipe. Excavate trenches to the width necessary for proper installation of the piping as indicated on the Drawings, and in compliance with OSHA regulations regarding trench excavation.

D. The maximum length of open trench shall be no more than 200 linear feet unless otherwise approved by the Engineer.

E. Sloping, sheeting or bracing shall be used as necessary to prevent failure of the trench banks. All trench protection shall conform to OSHA safety standards.

F. If existing material below the trench bottom grade is unsuitable for properly laying pipe (such as excessively soft soil), excavate and remove the unsuitable material to a minimum depth of six inches below the base of the pipe or as otherwise determined by the Engineer. Replace the removed unsuitable material with Stabilization Material. Stabilization Material shall be placed in horizontal loose lifts no greater than six inches and lightly" compacted. "Light" compaction for purposes of trench stabilization is defined as spreading and tamping with a backhoe bucket to ensure reasonable uniformity of stabilized trench bottom.

G. Place and compact Pipe Bedding Material to the depth indicated on the Drawings. Accurately grade the Pipe Bedding Material to the required invert elevation and to provide a firm and uniform bearing for piping.

3.04 PIPE INSTALLATION

A. The Engineer must approve pipe bedding prior to placement of piping.

B. Install piping as shown on the Drawings and as specified in Section 02632.

3.05 BACKFILLING AND COMPACTING

A. Initial Trench Backfill shall be placed on both sides of the pipe at the same time and to approximately the same elevation. Correct any pipe displacements before proceeding.

B. Continue placement and compaction of Initial Trench Backfill over the pipe. Place in six-inch lifts up to approximately 12 inches above the top of the pipe.

C. Each lift of Initial Trench Backfill shall be thoroughly compacted using manually-guided compaction equipment.

D. Do not place Final Trench Backfill until the piping system as installed conforms to the specifications as determined by the Engineer.

E. Place and compact Final Trench Backfill as follows:

1. Place backfill in lifts not greater than six inches loose thickness.

2. For pipes installed under asphalt cover, compact Final Trench Backfill to at least 95 percent of the material's maximum dry density as determined by ASTM D 698.

F. Place Final Trench Backfill up to elevations indicated on the Drawings.

G. Placement and compaction of backfill shall be performed in a manner that does not damage the pipe. Pipe that is damaged shall be replaced at no additional cost to the Owner.

H. Construction traffic shall not be allowed to cross installed pipelines prior to placement and compaction of the full depth of backfill.

END OF SECTION

SECTION 02373
EROSION CONTROL MATTING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes furnishing and installing erosion control blankets (ECB) to provide surface stabilization of slopes where indicated on the Drawings.

1.02 SUBMITTALS

A. Submit the following for review and approval prior to shipment of products to the Site:

1. Manufacturer's descriptive documentation for specified products

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction.

2.02 EROSION CONTROL BLANKET

A. ECB shall be Curlex® III, manufactured by American Excelsior Company, or approved equal. ECB shall consist of biodegradable wood excelsior or straw fibers with a minimum weight of 0.73 pounds per square yard, and covered on the top and bottom with UV stabilized polypropylene netting.

B. Furnish manufacturer's recommended steel wire staples or other approved anchoring devices. Staples shall be 11 gauge minimum, and have a minimum length of six inches.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Redirect runoff away from the areas on which erosion control matting is to be installed.

B. Grade surface of installation area, shaping and smoothing the soil. Remove soil clods, rocks, roots, trash, and other obstructions so that material will have direct contact with soil surface.

C. Distribute and incorporate soil amendments into the prepared soil as specified in Section 02926.

D. Distribute seed over prepared soil surface as specified in Section 02926 prior to placement of ECB material.

3.02 INSTALLATION OF EROSION CONTROL BLANKET

A. Install ECB in conformance with the manufacturer's recommendations.

B. Roll specified ECB over the prepared and seeded ground surface. Install the material so that it lays flush with the soil surface and the material is not stretched.

C. Installation on Slopes:

1. ECB shall be installed vertically down slopes. However, installation perpendicular to the gradient will be acceptable for short slope lengths if approved by the Engineer.

2. The edges of adjacent rolls of ECB shall be abutted together. Overlapping is not required. Secure the ECB edges with a common row of staples or biodegradable stakes as recommended by the manufacturer.

3. ECB shall be trenched at the upgradient edge if the material cannot be extended three feet over the slope crest or if overland flow is anticipated from upslope areas.

4. At locations where a splice occurs on the slope, the upper section of the ECB shall be lapped over the lower section a minimum of six inches, and the upper edge of the lower section shall be anchored in a trench.

D. Secure ECB to soil surface with staples using pattern and spacing as recommended by the manufacturer for the site conditions. Staple installation shall include top and bottom edges of rolls and in a staggered pattern between roll edges.

3.03 MAINTENANCE AND PROTECTION

A. Protect installed from damage.

B. No earthwork equipment or trucks shall be allowed on the installed products.

END OF SECTION

SECTION 02374
RIPRAP

PART 1 GENERAL

1.01 SUMMARY

A. Section includes placement of riprap at storm drain outlets and at other locations as shown on the Drawings.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M 288, Geotextile Specification for Highway Applications

B. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit certifications from suppliers indicating that riprap complies with the Specifications.

B. Submit manufacturer's documentation (including material properties sheet and quality control certifications) on geotextile indicating compliance with the product specifications in this Section.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction.

B. Riprap material shall meet specified gradation prior to placement. All processing shall be completed at the source.

2.02 GEOTEXTILE

A. Furnish nonwoven geotextile for placement beneath all riprap. The geotextile shall conform to the specifications for Survivability Class 1 geotextile as defined in AASHTO M288.

2.03 RIPRAP

A. Riprap shall consist of hard, angular shaped stone complying with the applicable requirements of Section 620-2 of the NYSDOT Specifications for "Dry RipRap". Mass and size of stone shall be as follows: at least 50 percent by weight of stones shall weigh in excess of 330 pounds, and the remainder of stones shall weigh from 110 to 330 pounds.

PART 3 EXECUTION

3.01 PREPARATION OF SUBGRADE

A. Excavate, grade and compact the subgrade to the lines and elevations required for placement of riprap to the thickness indicated on the Drawings so that the top surface of riprap will be at the required finish grade.

3.02 GEOTEXTILE INSTALLATION

A. Subgrade shall be smooth and free of litter, sharp protrusions, and large stones prior to geotextile placement.

B. The geotextile shall be placed loosely upon the slope so that placement of the overlying materials does not stretch or tear the fabric. Bury the upper edges of the geotextile a minimum of six inches below grade at tops of slopes.

C. Overlap adjacent sections or rolls of geotextile in the direction of slopes. Anchor geotextile at overlaps using approved pins or staples. Overlaps shall be a minimum of one foot.

3.03 PLACEMENT OF RIPRAP

A. Riprap shall be placed into a well-graded mass of stone with a minimum of voids. Place in conformance with the dimensions and thicknesses shown on the Drawings.

B. Placement of riprap by dumping into chutes or similar methods which are likely to cause segregation of the riprap or damage of the geotextile will not be permitted.

C. Place riprap to its full thickness in one operation. Riprap shall not be placed in layers.

D. Rock shall be tamped into place until the surface conforms approximately to the required grade and cross section.

END OF SECTION

SECTION 02632
STORM DRAINAGE PIPING AND STRUCTURES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes furnishing and installation of storm drain piping, manholes, drop inlets, and headwalls.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO M 170, Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

B. ASTM International:

1. ASTM C 76, Standard Specification for Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

2. ASTM C 443 Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets

3. ASTM C 923, Standard Specification for Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes and Laterals

C. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Manufacturer's documentation, including product data sheets, certified test reports and shop drawings, showing conformance with this Section for all specified products.

B. At project completion, submit Record ("As-Built") Drawings, signed and sealed by the Contractor's Registered Land Surveyor (RLS) and electronic files in AutoCad 2004 format (specified in subsection 3.07).

1.04 QUALITY ASSURANCE

A. Manufacturers shall have manufacturing and quality control facilities capable of producing and assuring the quality of piping and drainage structures.

1.05 DELIVERY, STORAGE AND HANDLING

A. During loading, transporting and unloading, exercise care to prevent damage to products.

B. Pipe shall be marked with manufacturer's identification symbol, size, date of manufacture, class of pipe and applicable product specification identification number.

C. All materials shall be inspected upon delivery to the Site. Damaged or defective materials shall be rejected and shall be replaced with new materials at no additional cost to the Owner.

PART 2 PRODUCTS

2.01 REINFORCED CONCRETE PIPE

A. Reinforced concrete pipe (RCP) shall be round pipe conforming to ASTM C 76 or AASHTO M 170, Class III unless otherwise indicated on the Drawings. Joints shall be tongue and groove compression gasket joints complying with ASTM C 443.

2.02 MANHOLE

A. Manhole shall be constructed of precast reinforced concrete units conforming to subsection 706-04 of the NYSDOT Specifications. Manhole type and dimensions shall be as indicated on the Drawings.

B. Precast manhole base shall have an integral base and riser section. Precast risers shall be barrel sections of the required diameter, constructed to provide the indicated total manhole height with the fewest joints. Furnish precast eccentric cone, concentric cone or flat slab top for manhole as indicated on the Drawings.

C. Openings for pipe connections to manhole shall be provided at the locations and to the sizes required, and shall not be closer than one foot to the nearest joint. Furnish flexible, watertight gasket conforming to ASTM C 923, cast integrally with riser sections.

D. Manhole section joints shall be tongue and groove with preformed gaskets conforming to ASTM C 443. In addition, furnish non-shrink grout or suitable plastic plugs to fill all lift holes.

E. Steps for access into manhole shall be embedded in the concrete, accurately positioned both vertically and horizontally as shown on the Drawings, and shall conform to ASTM C 478. Manhole steps shall be polypropylene molded around steel rods.

F. Manhole frame and cover shall be as indicated on the Drawings.

2.03 DROP INLETS

A. Drop inlets shall be precast concrete structures conforming to subsection 706-04 of the NYSDOT Specifications and the details shown on the Drawings.

B. Openings for pipe connections shall be provided at the locations and to the sizes required.

C. Cast iron drainage gratings and frames for drainage structures shall be as indicated on the Drawings.

2.04 HEADWALL

A. Headwall shall be Precast Concrete Pipe End Section, Code PES-24, manufactured by Kistner Concrete Products, Inc., or approved equal.

B. Scour protection at pipe outlet shall be riprap as specified in Section 02374.

2.05 BEDDING AND BACKFILL MATERIALS

A. Bedding and backfill materials for pipe and structures shall be as specified in Sections 02316 and 02317.

PART 3 EXECUTION

3.01 PROTECTION OF EXISTING UTILITIES

A. Comply with the requirements specified in Section 01500 for location and protection of existing utilities.

3.02 EXCAVATION AND BEDDING

A. Excavation and preparation of subgrade for drainage structures shall be completed as specified in Section 02316.

B. Excavation of trenches and preparation of pipe bedding shall be completed as specified in Section 02317.

3.03 INSTALLATION OF PIPE

A. Installation of all pipe shall be subject to the review of the Engineer. Pipe installation, including pipe laying and jointing, shall conform to the pipe manufacturers' recommendations and as specified in the following paragraphs.

B. Inspect pipe for defects before lowering into trench. Do not install damaged or defective pipe.

C. Field cutting of piping, where required, shall be made with a machine specially designed for cutting piping and in accordance with the manufacturer's instructions. Cuts shall be carefully done, without damage to piping, so as to leave a smooth end at right angles to the axis of the piping. Piping damaged by improper or careless methods of cutting shall be replaced or repaired.

D. Interior of all piping and mating surfaces shall be inspected and all debris shall be removed from the interior and mating surfaces before installation.

E. Install piping accurately to line and grade shown. Slope piping uniformly between elevations shown on the Drawings. Accurate means of determining and checking the alignment and grade shall be used, which shall be subject to the approval of the Engineer. Remove and relay piping that is incorrectly installed at no additional cost to the Owner.

F. Do not lay piping in water or on saturated material. Maintain a dry trench as much as practicable until pipe bedding, installation and placement and compaction of initial trench backfill are complete.

G. Start laying piping at lowest point and proceed toward the higher elevations. Pipe shall be laid with the bell and groove end upgrade. Piping shall be installed so that the barrel of the piping receives the bearing pressure from the pipe bedding. Excavate bell holes as necessary for uniform support of pipe barrel on bedding material.

H. All lifting holes in RCP pipe shall be completely filled with non-shrink grout (or plastic plugs specially manufactured for this purpose) after pipe is placed in the trench and prior to placement of any backfill material over the pipe. If plugs are used, submit documentation for the proposed plugs prior to installation.

I. No piping shall be brought into position until the preceding pipe length or fitting has been installed and secured in place. As soon as possible after each joint is made, sufficient backfill material shall be placed along the pipe to prevent pipe movement off line or grade. Joints shall not be covered until pipe inspection has been completed and all defective piping has been repaired.

J. Whenever pipe laying is not actively in progress, the open ends of the piping shall be closed by a temporary plug or cap to prevent soil, water and other foreign matter from entering the piping.

3.04 INSTALLATION OF DRAINAGE STRUCTURES

A. Construct drainage structures at the locations indicated on the Drawings and as specified in the following paragraphs.

B. Set each precast concrete structure on prepared subgrade at the proper elevation, carefully leveled and aligned as indicated on the Drawings. Joints in precast concrete drainage structures shall be assembled with approved sealing materials and shall be constructed in accordance with manufacturer's recommendations.

C. Lifting holes shall not penetrate completely through structure walls. All lifting holes shall be completely filled with non-shrink grout or suitable plastic plugs after installation of the structure.

D. Install drainage grates, covers, and frames in accordance with the manufacturers' recommendations and as shown on the Drawings. Elevations for top of drainage grates shall be as required to provide unobstructed stormwater flow into drop inlets.

3.05 PIPE CONNECTIONS

A. Pipe connections to drainage structures shall be installed true to line and grade as shown on the Drawings.

B. Pipe connections shall be made using resilient connectors conforming to ASTM C 923, or other approved materials, in accordance with the manufacturer's recommendations. All pipe connections shall be watertight.

3.06 INSTALLATION OF PIPE UNDER ROAD

A. Pipe installation under Veterans Drive shall be performed by the open cut and cover method.

B. Trenching and backfilling shall conform to the requirements of Section 02317 and with the applicable requirements of the City of Niagara Falls for pipe installation across city streets. Trenching through asphalt pavement shall conform to the following requirements:

1. Cut pavement in a uniform straight alignment on each side of excavation at a distance of approximately 12 inches outside top of excavation.

2. Break up and remove asphalt using suitable equipment. Removed asphalt shall be properly disposed off-site or placed on-site in areas approved by the Engineer.

3. Maintain pavement cuts in good condition until pipe installation, backfill and pavement reconstruction operations are completed.

3.06 BACKFILLING

A. Place and compact backfill over pipes and around structures as specified in Sections 02316 and 02317.

3.07 RECORD DRAWINGS

A. During the progress of the storm drain system installation, record installed locations, elevations, and all changes and deviations from the original design.

B. Provide “as-built” (record) drawings and electronic files of the installed system at completion. Drawings shall be signed and sealed by the Contractor’s RLS and shall include the following information:

1. Size and type of all installed pipe and structures

2. Surveyed locations and invert elevations of all installed pipe and structures

END OF SECTION

SECTION 02722
AGGREGATE BASE COURSE

PART 1 GENERAL

1.01 SUMMARY

A. Section includes construction of aggregate base course for asphalt cover and for asphalt pavement at Veterans Drive and pull-off as applicable.

1.02 REFERENCES

A. ASTM International:

1. ASTM D 1556, Standard Test Method for Density and Unit Weight of Soil in Place by the Sand-Cone Method

2. ASTM D 1557, Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

3. ASTM D 2167, Standard Test Method for Density and Unit Weight of Soil in Place by the Rubber Balloon Method

4. ASTM D 2922, Standard Test Methods for Density of Soil and Soil-Aggregate in Place by Nuclear Methods (Shallow Depth)

B. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit written documentation (including gradation test results), signed by the material producer, indicating that the materials meet or exceed the specified requirements. Submit information for review and approval, no later than 14 calendar days prior to scheduled delivery of specified materials to the Site.

B. Submit written reports of all specified tests showing conformance of the materials and constructed work with the Specifications.

C. Submit record survey drawing of completed aggregate base course as specified in this Section.

1.04 QUALITY ASSURANCE

A. Record surveys shall be performed by the Contractor's Registered Land Surveyor as specified.

1.05 PROJECT CONDITIONS

A. Work shall be performed in a manner that does not disturb existing monitoring wells, utilities, fencing, pavement, structures, or other facilities not indicated to be removed.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction.

2.02 AGGREGATE BASE COURSE MATERIAL

A. Aggregate base course material shall conform to the material requirements in Section 304 of the NYSDOT Specifications for Subbase Course, Type 2. Gradation shall be as summarized below:

Sieve Size	**Percent Passing, by Weight**
2 inch	100
1/4 inch	25 – 60
No. 40	5– 40
No. 200	0 - 10

B. Aggregate shall meet specified gradation prior to placement. All processing shall be completed at the source.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Tests specified below shall be performed during placement and compaction of aggregate base course:

1. Moisture-Density relationship (using ASTM D 1557): Minimum of one test per lift for every 1,000 tons of aggregate delivered to the Site, and at every change in material.

2. In-Place Density (using ASTM D 1556, D 2167, or D 2922, or other appropriate test method): Minimum of one test per lift for every 1,000 square yards of material placed, or fraction thereof. If the material is too coarse (more than about 20 percent retained on the 3/4-inch sieve) to use the above methods, proper compaction will be considered to have been reached when the surface is tightly bound and shows no detectable rutting or movement under operation of compaction equipment.

B. For asphalt cover, surveying shall be performed by the Contractor's surveyor to monitor the aggregate base course thickness, surface elevations of the completed top of aggregate base course, and uniformity of surface.

C. A record survey drawing of the completed aggregate base course under the asphalt cover shall be prepared and submitted to the Engineer for review before proceeding with subsequent placement of asphalt concrete. At a minimum, survey finished surface elevations of the aggregate base course on a grid pattern with a maximum spacing of 25 feet.

3.02 PREPARATION

A. Installation of storm drainage piping and structures shall be completed as specified in Section 02632.

B. Placement, compaction and grading of the subgrade shall be completed as specified in Section 02310.

C. For reconstruction of asphalt pavement across Veterans Drive pipe crossing and construction of the pull-off lane, construct pavement subgrade and base as indicated on the Drawings.

D. Verify that subgrade gradients and elevations are correct, and that subgrade is ready for placement of aggregate base course material.

E. Aggregate base course shall not be placed on soft, muddy or frozen subgrade. Correct unsuitable subgrade conditions by using methods approved by the Engineer.

3.03 PLACING AND COMPACTING

A. Place, spread, shape, and compact the aggregate base course as continuously as practicable during each day's operations. Place the material in a manner to avoid segregation. Uncontrolled spreading shall not be permitted.

B. Construct aggregate base course in one uniform lift unless otherwise approved by the Engineer. Lift thickness shall conform to the following requirements:

1. In areas not occupied by existing concrete slabs, the maximum compacted thickness of each lift shall be nine inches and the minimum compacted thickness of each lift shall be six inches.

2. Over the existing concrete slabs, the maximum compacted thickness of each lift shall be nine inches and the minimum compacted lift thickness of each lift shall be three inches.

C. Level and contour aggregate base course to achieve the final asphalt cover grades indicated on the Drawings within the tolerance specified in subsection 3.05.

D. Compaction shall follow the spreading operation closely to prevent loss of contained moisture and displacement of material.

E. At the time aggregate base course material is placed, it shall have a moisture content sufficient to obtain the required compaction. If necessary, uniformly apply water over the

base material during compaction in sufficient quantity for proper compaction. Prevent free water from appearing on the surface during, or subsequent to, compaction operations.

F. The depth of aggregate base course shall be carefully controlled, with periodic measurements of the loose and compacted depth.

G. For aggregate base course under asphalt cover, each layer shall be compacted to a density of at least 95 percent of the material's maximum dry density as determined by ASTM D 1557. Conform to the requirements of the City of Niagara Falls for aggregate base course under asphalt pavement as applicable.

H. Areas of aggregate base course that do not meet the specified density requirement shall be scarified, recompacted and retested.

3.05 THICKNESS AND SURFACE TOLERANCES

A. Unless otherwise approved by the Engineer, the following tolerances shall apply:

1. Depth of aggregate base course shall be plus or minus 1/2 inch based on the average of at least four tests, with no test result exceeding plus or minus one inch.

2. Finished surface of aggregate base course shall not vary more than one inch above or below the required elevations.

B. Based on the results of surveying and other measurements, areas of the aggregate base course that are not constructed to the required depth and surface elevations, within the allowed tolerances, shall be adjusted to the proper thickness and elevations using methods approved by the Engineer. The limits of reworking will be determined by the Engineer.

3.06 MAINTENANCE AND PROTECTION

A. The completed aggregate base course shall be maintained smooth and uniform until covered by the subsequent stage of construction.

B. Damaged areas shall be repaired using methods approved by the Engineer.

C. Place asphalt concrete as soon as possible after completion of the aggregate base course to prevent damage due to weather and mechanical disturbances.

END OF SECTION

SECTION 02743
ASPHALT CONCRETE PAVEMENT

PART 1 GENERAL

1.01 SUMMARY

A. Section includes construction of asphalt concrete and application of seal coat where indicated on the Drawings.

1.02 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO):

1. AASHTO T 27, Sieve Analysis of Fine and Coarse Aggregates

2. AASHTO T 164, Quantitative Extraction of Bitumen from Bituminous Paving Mixtures

3. AASHTO T 166, Bulk Specific Gravity of Compacted Bituminous Mixtures Using Saturated Surface-Dry Specimens

4. AASHTO T 168, Sampling Bituminous Paving Mixtures

5. AASHTO T 209, Maximum Specific Gravity of Bituminous Paving Mixtures

B. ASTM International:

1. ASTM C 136, Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

2. ASTM D 979, Standard Practice for Sampling Bituminous Paving Mixtures

3. ASTM D 2041, Standard Test Method for Theoretical Maximum Specific Gravity and Density of Bituminous Paving Mixtures

4. ASTM D 2172, Standard Test Methods for Quantitative Extraction of Bitumen From Bituminous Paving Mixtures

5. ASTM D 2726, Standard Test Method for Bulk Specific Gravity and Density of Non-Absorptive Compacted Bituminous Mixtures

6. ASTM D 2950, Standard Test Method for Density of Bituminous Concrete in Place by Nuclear Methods

7. ASTM D 5361, Standard Practice for Sampling Compacted Bituminous Mixtures for Laboratory Testing

C. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following information for review and approval no later than 14 calendar days prior to scheduled delivery of specified materials to the Site:

1. Job-mix formulas for asphalt concrete courses.

2. Written documentation, signed by material producers, indicating that asphalt concrete materials furnished for this project meet or exceed the specified requirements.

3. Manufacturer's documentation for crack filler and seal coating materials.

B. Submit copy of truck ticket for every load of asphalt concrete delivered to the Site.

C. Progress Submittals:

1. Submit no later than one calendar day after placement, results of verification testing specified in subsection 2.01 of this Section.

2. Submit, within two calendar days after the date of placement, results of field quality control testing specified in subsection 3.01.

D. Submit record survey drawing of completed asphalt concrete construction as specified in this Section.

1.04 QUALITY ASSURANCE

A. Record surveys shall be performed by the Contractor's Registered Land Surveyor as specified.

1.05 PROJECT CONDITIONS

A. Work shall be performed in a manner that does not disturb existing monitoring wells, utilities, fencing, pavement, structures, or other facilities not indicated to be removed.

B. Asphalt concrete and bituminous materials shall be placed only during periods of acceptable weather conditions in accordance with the applicable requirements of subsection 402-3.01 of the NYSDOT Specifications.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction

2.02 BITUMINOUS TACK COAT

A. Tack coat shall comply with the material requirements of subsection 407-2 of the NYSDOT Specifications.

2.03 ASPHALT CONCRETE MIXTURES

A. Asphalt Concrete Within Limits of Asphalt Cover:

1. Materials and mixtures for asphalt concrete shall conform to the requirements of Section 403 of the NYSDOT Specifications as modified in the following paragraphs.

2. Asphalt concrete binder course shall be Type 3 Binder.

3. Asphalt concrete surface course shall be Type 7, 7F2 or 7F3 Top, except that asphalt binder (PGB) content shall be 8.0 percent ±0.4 percent.

B. Asphalt Concrete for Road Pavement Reconstruction and Pull-Off Lane:

1. Materials and mixtures for asphalt concrete shall conform to the requirements of Section 403 of the NYSDOT Specifications as indicated on the Drawings.

C. Verification Testing of Asphalt Concrete Mixtures (after approval of Job Mix Formulas):

1. The Contractor may be required to obtain loose samples of asphalt concrete mixtures produced for the project as delivered in trucks for acceptance testing by the QC Firm.

2. Samples shall be obtained in accordance with AASHTO T 168 or ASTM D 979 at the rate of one sample per 500 tons for each asphalt concrete mix, or fraction thereof, and a minimum of one sample per lot (one day's production).

3. QC Firm will test each sample to determine (if required): maximum specific gravity of the mix (using AASHTO T 209 or ASTM D 2041); asphalt binder content (using AASHTO T 164 or ASTM D 2172); and aggregate gradation (using AASHTO T 27 or ASTM C 136).

4. Variances in test results from the approved Job Mix Formulas are subject to rejection or payment reduction as determined by the Engineer and Owner.

2.04 CRACK SEALER

A. Crack sealer shall be "hot fiberized crackfill" or asphalt filler material designation 702-0700 conforming to the requirements of Section 702 of the NYSDOT Specifications for miscellaneous asphalt cements.

2.05 BITUMINOUS SEAL COAT

A. Bituminous seal coat shall consist of a mixture of a coal tar emulsion, sand, and additives conforming to the applicable provisions of the NYSDOT Specifications.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. Tests specified in the following paragraphs shall be performed during construction of the asphalt concrete pavement.

B. Density Testing (during the Compaction Process): Acceptance of each day's placement of asphalt concrete shall be determined by using a nuclear densitometer in accordance with the procedures described in ASTM D 2950. A minimum of five tests shall be conducted for every 3,000 square yards of material placed, and a minimum of five tests per lot.

C. Density Verification:

1. Density of asphalt concrete shall be verified by testing of drilled cores obtained in accordance with ASTM D 5361 (or other appropriate test method) at locations selected by the QC Firm.

2. Contractor shall obtain cores under the observation of the QC Firm. A minimum of two cores shall be obtained for each 3,000 square yards of asphalt concrete placed for each lift.

3. The QC Firm shall immediately transport the cores, with appropriate identification, to an approved laboratory facility for testing. The cores shall be tested for bulk specific gravity in accordance with AASHTO T 166 or ASTM D 2726.

4. Core holes shall be repaired by applying a tack coat to the interior core hole walls and filling with asphalt concrete the same day cored. Thoroughly compact the asphalt concrete mixture and leave flush with the top of the asphalt concrete course.

D. Surface Tolerance: Contractor shall test the finished surface of asphalt concrete pavement with a 10-foot straightedge at locations directed by the QC Firm. The deviation of the finished surface from the testing edge of the straightedge shall not exceed 1/4 inch, except at changes in grade. Deviations greater than the specified tolerance shall be corrected as approved by the Engineer.

E. Tests for Thickness: The thickness of asphalt concrete shall be carefully controlled by the Contractor. Periodic measurements of the loose and compacted thickness shall be taken under the observation of the QC Firm.

F. Completed areas of asphalt concrete pavement where test results are unacceptable are subject to payment reductions as determined by the Engineer and Owner.

G. Record survey of the completed asphalt concrete cover shall be performed. Surveying shall be performed by, or under the direction of, a Registered Land Surveyor retained by the Contractor.

3.02 PREPARATION

A. Aggregate base course shall be completed as specified in Section 02722. The Contractor is responsible for maintaining the completed aggregate base course at the required density and grade prior to and during asphalt cover construction. If rutting or any other damage occurs as a result of hauling operations, the Contractor shall immediately repair the aggregate base course. Repairs shall include removal and replacement if necessary using methods approved by the Engineer.

B. Correct unsatisfactory conditions. Remove and dispose of debris and other unsuitable material from the surface of the aggregate base course.

3.03 TACK COAT

A. Apply tack coat over the finished surface of the aggregate base course immediately prior to placement of asphalt concrete in accordance with Section 407 of the NYSDOT Specifications.

B. Apply tack coat to surfaces of drainage structures and other structures that will contact the asphalt concrete.

C. When the surface course is not placed within 10 days after completion of the binder course, or when the surface of the binder course has become soiled, thoroughly clean the surface and apply a tack coat in accordance with Section 407 of the NYSDOT Specifications. Do not apply more tack coat than will be covered by new asphalt concrete the same day.

3.04 ASPHALT CONCRETE CONSTRUCTION

A. Construct asphalt concrete courses over prepared aggregate base course (or concrete base if applicable) to the limits shown on the Drawings.

B. Each course shall be constructed in one uniform lift to the required total compacted lift thickness indicated on the Drawings.

C. Construction of the asphalt concrete courses shall conform to the applicable requirements of Section 403 of the NYSDOT Specifications as modified in the following paragraphs. Paragraphs D, E and H do not necessarily apply to asphalt concrete construction at Veterans Drive.

D. Place asphalt concrete using spreaders equipped with hoppers and strike-off plates or screeds, capable of producing courses ten to 15 feet wide, free of grooves, depressions and holes.

E. Ironing screeds used with strike-offs and screeds on the spreader shall be heated to at least 250 degrees before starting operations to prevent sticking or tearing of the surface.

F. Placing the mixture shall be a continuous operation. If any irregularities occur, they shall be corrected before final compaction of the mixture.

G. The asphalt concrete mix shall be compacted immediately after placing. Initial rolling with a steel-wheeled vibratory roller shall follow the paver as closely as possible. Final rolling shall eliminate marks from the previous rolling. In areas too small for the roller, a vibrating plate compactor or hand tamper shall be used to achieve thorough compaction.

H. Placement shall be planed to minimize the number of cold joints. The edges of spreads shall be smooth and sloped six to 12 inches to provide a bonding surface with the adjacent spread. Cold surfaces shall be heated with an infrared heater just before forming joints. Apply tack coat to all joints. All joints shall be staggered in the overlying course to ensure strength and low permeability for the asphalt concrete cover.

I. Edges of the asphalt cover shall be compacted using hand tampers or hand-held vibratory compactors to provide a hard finished surface. Such compaction shall proceed around the entire edge of the cover and adjacent to structures.

J. Unless otherwise approved by the Engineer, the average in-place density of each asphalt concrete course placed within any lot shall be not less than 98 percent of the maximum theoretical density (determined in accordance with AASHTO T 209 or ASTM D 2041). No individual density test shall be less than 95 percent of the maximum theoretical density.

K. Final surface shall be constructed to the elevations indicated on the Drawings, unless otherwise approved by the Engineer. All asphalt surfaces of the cover shall drain with no puddles or areas of standing water. Surfaces not draining shall be removed and reconstructed or overlaid.

L. The finished surface at junction with existing adjacent asphalt shall provide a smooth transition with no cracks and acceptable to the Engineer.

3.05 SEAL COAT

A. The final surface of the asphalt cover and the previously completed IWS asphalt cap shall be sealed with a bituminous seal coat conforming to the requirements of subsection 2.05.

B. Prior to sealing of the previously completed asphalt cap, the following shall be accomplished:

1. Remove vegetation growing through cracks and treat roots using an appropriate herbicide approved by the Owner and Engineer. The herbicide shall be licensed for use in the State and shall conform to all other applicable requirements for post-emergent herbicides.

2. Clean asphalt pavement surface of all debris in accordance with the requirements of Section 633 of the NYSDOT Specifications.

3. Treat all oil spills and an appropriate oil sealer conforming to the applicable provisions of the NYSDOT Specifications.

4. Fill all visible cracks with a crack sealer conforming to the requirements of subsection 2.04.

C. Prior to sealing of the asphalt cap of the Packard Road parcel, clean the surface of debris in accordance with the requirements of Section 633 of the NYSDOT Specifications.

D. Preparation of the asphalt surfaces and procedures for application of bituminous material shall conform to the applicable provisions of the NYSDOT Specifications and standard local practice.

E. Apply two coats of seal coat at a rate approved by the Engineer.

F. The surface shall be allowed to properly cure in accordance with standard NYSDOT and local procedures.

3.07 MAINTENANCE AND PROTECTION

A. The completed asphalt pavement surfaces shall be protected from damage until acceptance of the construction work.

B. Damaged areas shall be repaired using methods approved by the Engineer.

END OF SECTION

SECTION 02772
CONCRETE CURBS AND GUTTERS

PART 1 GENERAL

1.01 SUMMARY

A. Section includes construction of Portland cement concrete curbs and gutters.

1.02 REFERENCES

A. Local Standards and Regulations:

1. City of Niagara Falls standards

B. "Standard Specifications", 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Concrete mix design

2. Manufacturer's product data sheets for expansion joint filler and other furnished materials

1.04 PROJECT CONDITIONS

A. Conform to the applicable requirements of the NYSDOT Specifications and the City for required weather conditions and other restrictions for concrete placement, curing and protection.

B. Coordinate work with aggregate base course and pavement construction.

PART 2 PRODUCTS

2.01 SOURCE QUALITY CONTROL

A. Proposed materials shall be approved by the Engineer as specified prior to delivery and use in the construction.

2.02 CONCRETE MATERIALS AND MIX DESIGN

A. Concrete materials and mix design shall conform to the applicable requirements of Section 609 of the NYSDOT Specifications.

2.03 EXPANSION JOINT FILLER

A. Expansion joint filler shall conform to the applicable requirements of Section 609 of the NYSDOT Specifications.

PART 3 EXECUTION

3.01 FIELD QUALITY CONTROL

A. No concrete for a specific pour shall be ordered for delivery to the Site until pertinent concrete mix design and specified materials are approved by the Engineer.

3.02 PREPARATION

A. Verify that aggregate base course has been constructed to the correct lines, grade and cross-sections, and that it has been compacted as specified in Section 02722.

B. Maintain subgrade in a smooth, compacted condition until curb and gutter construction is complete.

C. Subgrade shall be in a moist condition when concrete is placed.

3.03 CONCRETE PLACEMENT AND FINISHING

A. Conform to the applicable requirements of Section 609 of the NYSDOT Specifications, and as specified in the following paragraphs.

B. Concrete curbs and gutters shall be constructed on prepared subgrade at the locations, elevations and alignments indicated on the Drawings.

C. Construct curbs and gutters prior to construction of asphalt pavement.

D. After concrete has been consolidated and forms have been removed, the surface shall be finished to a uniform texture. All edges shall be rounded with a 1/4-inch edger. The finished surface shall conform to the lines and grades indicated on the Drawings. The gutters shall be sloped as indicated and shall not have depressions which trap water.

E. Expansion and contraction (crack control) joints shall be provided as specified below (unless otherwise indicated on the Drawings):

1. Expansion joints shall be formed at maximum intervals of 250 feet, and at structures and radius points. Expansion joint width shall be 3/4-inch. Joint filler shall extend for the full depth of the joint. Install joint filler in accordance with the manufacturer's recommendations.

2. Crack control joints shall be provided at maximum spacing of 10 feet. Dimension of each formed or saw cut contraction joint shall be 1 1/2 inch deep by 1/8 to 1/4 inch wide.

3.04 CURING AND PROTECTION

A. Immediately following finishing operations, cure and protect concrete in conformance with the applicable requirements of Section 609 of the NYSDOT Specifications.

3.06 CORRECTION OF DEFECTIVE WORK

A. Concrete work that does not conform to the specified requirements, including strength, tolerances, and finishes, shall be corrected at the Contractor's expense, as determined by the Engineer.

END OF SECTION

SECTION 02821
CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

A. Section includes installation of new chain link fencing and gates, including installation of warning signs.

1.02 REFERENCES

A. ASTM International:

1. ASTM A 392, Standard Specification for Zinc-Coated Steel Chain-Link Fence Fabric

2. ASTM C 33, Standard Specification for Concrete Aggregates

3. ASTM C 150, Standard Specification for Portland Cement

4. ASTM F 567, Standard Practice for Installation of Chain-Link Fence

5. ASTM F 626, Standard Specifications for Fence Fittings

6. ASTM F 668, Standard Specification for Polyvinyl Chloride (PVC) and Other Organic Polymer-Coated Steel Chain-Link Fence Fabric

7. ASTM F 900, Standard Specification for Industrial and Commercial Swing Gates

8. ASTM F 1043, Standard Specification for Strength and Protective Coatings on Metal Industrial Chain Link Fence Framework

1.03 SUBMITTALS

A. Submit the following for review prior to commencement of the work of this Section:

1. Product data and shop drawings showing materials, finishes and dimensions for fencing and gates.

2. Shop drawings showing fabrication of signage and materials and methods for attachment to chain link fence.

PART 2 PRODUCTS

2.01 FENCE FABRIC

A. Height of fence fabric shall be as indicated on the Drawings.

B. Fabric for fencing to be installed on the east side of the Site (as designated on the Drawings) shall be fabricated of polyvinyl chloride (PVC)-coated or other organic polymer-coated steel wire conforming to the following specifications:

1. Core wire diameter shall be 0.120 inch minimum (11 gauge). Size of mesh shall be two inches.

2. Wire coating shall be Class 2a or Class 2b, conforming to ASTM F 668. Color shall match existing vinyl-coated chain link fence.

C. Fabric for fencing to be installed at all other locations shall be fabricated of number 9 gage (0.148 inch)] (coated wire size) galvanized steel wires, two-inch mesh. Fabric shall be galvanized after weaving with a minimum of 1.2 ounces of zinc per square foot of surface area and conform to ASTM A 392, Class 1.

D. Fabric shall be knuckled at one selvage and twisted at the other selvage.

2.02 FENCE POSTS

A. Fence posts (including gate posts) shall conform to one of the following specifications:

1. Round hot-dipped galvanized steel pipe conforming to ASTM F 1043, Group 1A (Schedule 40). External and internal coatings shall be Type A. All coatings shall be applied after welding.

2. Triple coated high strength steel pipe conforming to ASTM F 1043, Group 1C. External coating shall be Type B and internal coating shall be Type D. All coatings shall be applied after welding.

B. Line posts shall have a minimum nominal outside diameter (O.D.) of 1-7/8 inches for fabric heights six feet or less, and 2-3/8 inches for fabric heights over six feet.

C. End, Corner, and Pull Posts shall have a minimum nominal O.D. of 2-3/8 inches for fabric heights six feet or less, and 2-7/8 inches for fabric heights over six feet.

D. Gate post sizes shall be as follows for one single gate leaf or one leaf of double gate installations on fence heights of six feet or less:

1. For four-foot maximum gate leaf width - round posts shall be not less than 2-3/8 inches nominal O.D.

2. For gate leaf width over four feet to 10 feet - round posts shall be not less than 2-7/8 inches nominal O.D.

2.03 TOP RAILS AND BRACE RAILS

A. Rails shall conform to the same material requirements for fence posts in subsection 2.02.A. Minimum nominal O.D. shall be 1-5/8 inches.

B. Furnish rails in manufacturer's longest lengths, with expansion type couplings approximately six inches long for each joint. Provide means for attaching the top rail securely to each gate, corner, pull, and end post.

2.04 FENCE FITTINGS

A. Fence fittings shall conform to ASTM F 626.

2.05 GATES

A. Gates shall have the same type of fabric as for fence, unless otherwise indicated. Gates shall be swing as shown on the Drawings and as specified in the following paragraphs. Gate widths shall be as indicated on the Drawings.

B. Swing gates shall conform to ASTM F 900, and shall be complete with latches, stops, keepers, hinges, and other standard hardware as specified in subsection 2.05.C.

C. Gate Hardware: Furnish galvanized steel or malleable iron hardware and accessories for each gate, consisting of hinges, latches, stops and keepers as specified in paragraphs 1 through 4 below, and as applicable.

1. Hinges (for swing gates): Shall be of adequate strength for gate, and with large bearing surfaces for clamping in position. The hinges shall not twist or turn under the action of the gate. The gates shall be capable of being opened and closed easily by one person.

2. Latches: Shall have a plunger-bar arranged to engage the center stop for double swing gates as approved by the Engineer. A forked latch may be provided for single swing gates of openings less than 10 feet wide. Latch shall permit operation from either side of gate. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking each gate.

3. Center Stops: For double swing gates, provide a center stop consisting of a device arranged to be set in concrete and to engage a plunger bar of the latch. No stop is required on single swing gates.

4. Hold-Open Keepers: Shall consist of a mechanical device for securing the free end of each swing gate leaf when in the full open position.

2.06 CONCRETE FOR POST FOOTINGS

A. Concrete shall consist of Type I Portland cement complying with ASTM C 150, one-inch maximum size aggregates complying with ASTM C 33, and clean water. Concrete mix shall be proportioned such that the 28-day compressive strength of moist-cured laboratory samples achieves not less than 3,000 pounds per square inch (psi).

2.07 SIGNS

A. Provide warning signs with required accessories for attachment to chain-link fencing.

B. Provide the number of signs required to install at the spacing and locations specified in subsection 3.04 of this Section.

C. Warning signs shall be 24 inches by 30 inches, made of 10-gage galvanized sheet metal or 8-gage aluminum, painted or coated yellow with black letters as follows:

4" letters	**WARNING! KEEP OUT!**
3" letters	HAZARDOUS MATERIALS
3" letters	*FOR INFORMATION CALL (xxx) xxx-xxxx*

PART 3 EXECUTION

3.01 PREPARATION

A. The ground surface along the alignment of the fencing shall be graded as specified in Section 02310. Grade to produce a relatively even surface for proper fence construction.

B. Establish required locations for fencing and gates as indicated on the Drawings.

C. Do not begin fence installation and erection before grading, paving and other construction is completed at the fence location.

3.02 FENCE INSTALLATION

A. Construct fencing in accordance with ASTM F 567, as recommended by the fence manufacturer and as indicated on the Drawings. Provide all necessary hardware for a complete installation.

B. Connect new fencing to existing fencing at the locations indicated on the Drawings, adjusted as necessary to connect to the nearest existing fence post. Make connections in accordance with reference standards and acceptable industry practice to provide a secure and structurally stable fencing.

C. Fence posts shall have concrete encasement as specified in the following paragraphs:

1. Excavate holes to the dimensions indicated on the Drawings.

2. Center and align posts in holes three inches above bottom of excavation. Place concrete around posts in a continuous pour to two inches above finish grade. Vibrate or tamp concrete for consolidation. Check each post for vertical and top alignment, and hold in position during concrete placement and finishing operations.

3. Do not install fence fabric until concrete has cured for a minimum of two days.

D. If solid rock or concrete is encountered, set posts into the solid rock or concrete to a depth three times the largest cross-section of the posts. The diameter of the hole shall be ½ inch greater than the largest cross-section of the post.

E. Alternate materials and methods of post anchorage may be used if approved by the Engineer.

3.03 GATE INSTALLATION

A. Install gates as indicated on the Drawings in conformance with gate manufacturer's recommendations and acceptable industry practice.

B. Install gates plumb, level, and secure for full opening without interference. Install ground-set items in concrete for anchorage as recommended by the fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

3.04 INSTALLATION OF WARNING SIGNS

A. Attach signs securely to chain-link fence using materials and methods that will minimize the potential for theft.

B. Signs shall be installed on the exterior face of the chain-link fence at approximately 200 foot intervals, and adjacent to or on each gate. The center of each sign shall be at a distance of five feet above the final grade at the fence line.

END OF SECTION

SECTION 02926
SEEDING AND MULCHING

PART 1 GENERAL

1.01 SUMMARY

A. Section includes establishing temporary and permanent grass where indicated on the Drawings.

1.02 REFERENCES

A. “Standard Specifications”, 2002, New York State Department of Transportation (NYSDOT Specifications)

1.03 SUBMITTALS

A. Submit the following for review and approval prior to commencement of the work of this Section:

1. Soil sample analysis results and recommendations for soil amendments.

B. Submit the following for review and approval at time of shipment of materials to the Site:

1. Certification of grass seed from seed vendor for each grass seed mixture stating the botanical and common name and percentage by weight of each species and variety, and percentage of purity, germination and weed seed.

2. Manufacturer's certification for lime and fertilizer showing compliance with the Specifications.

3. Bag tags, receipts, truck weight tickets, and other information necessary to confirm application rates and types for all seed, lime and fertilizer.

1.04 QUALITY ASSURANCE

A. Seeding shall be accomplished according to standard local practice and in compliance with requirements of applicable state and federal regulations.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer.

B. Protect materials from deterioration during delivery, and while stored at the site.

1.06 PROJECT CONDITIONS

A. Perform seedbed preparation and seeding as soon as possible after completion of grading.

B. Seeding shall be sown only during the appropriate growing season for the particular seed mix.

PART 2 PRODUCTS

2.01 FERTILIZER

A. Fertilizer shall be a standard commercial fertilizer, in dry or liquid form, meeting the requirements of subsection 713-03 of the NYSDOT Specifications.

B. The grade of fertilizer shall be based on soil test results and approved by the Engineer. For bidding purposes, assume the following:

Nitrogen	18 percent
Phosphoric Acid	24 percent
Soluble Potash	6 percent

2.02 LIME

A. Lime shall be ground limestone designated for agricultural use, meeting the requirements of subsection 713-02 of the NYSDOT Specifications.

2.03 SEED

A. Seed shall be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, complying with the requirements of subsection 713-04 of the NYSDOT Specifications.

B. Seed mixtures for permanent vegetation shall be as indicated on the Drawings and as summarized below:

1. For seeding during spring (Feb. 1 to April 15) or fall (Aug. 20 to Oct. 25) seasons:

Seed Type	Rate per Acre
Tall fescue	100 lbs
Kobe lespedeza	10 lbs
Behiagrass	25 lbs
Rye grain	40 lbs

2. For seeding during summer season (April 15 to August 20):

Seed Type	Rate per Acre
Tall fescue	100 lbs
Kobe lespedeza	10 lbs
Bermudagrass	15 lbs
German millet	10 lbs

C. Proposed changes to the seed mix shall be submitted to the Engineer for approval prior to use.

D. Seed that has become wet, moldy or otherwise damaged will not be acceptable.

2.04 MULCH

A. Provide mulch adequate to protect the seed during its germination and growing period. Mulch shall be clean long-fibered hay or straw (consisting of stalks of oats, wheat, barley, rye, or excelsior wood fibers), reasonably free of noxious weed seeds, and meeting the requirements of subsections 713-18 and 713-19 of the NYSDOT Specifications.

PART 3 EXECUTION

3.01 SOIL SAMPLING

A. An independent testing firm retained by the Contractor shall obtain at least one sample (minimum 10-ounce sample) per acre of soil to be seeded, analyze the samples to determine amounts of nitrogen, phosphorus, potassium, and pH value in the soil, and provide recommendations on fertilizer and lime to be used.

3.02 PREPARATION

A. Site grading shall be completed as specified in Section 02310. Surfaces shall be reasonably smooth and free of litter, large roots, sharp protrusions, and large stones.

B. Loosen subgrade of areas to receive grass seed to a minimum depth of three inches. Remove stones and sticks, roots, rubbish and other extraneous matter.

3.03 APPLICATION OF SOIL AMENDMENTS

A. Uniformly apply fertilizer for permanent vegetation at the rate determined based on soil test results and as approved by the Engineer. For bidding purposes, assume a rate of 800 pounds per acre of the grade of fertilizer specified in subsection 2.01.

B. Uniformly apply lime at the rate determined based on soil test results and as approved by the Engineer. For bidding purposes, assume three tons per acre.

3.04 APPLICATION OF PERMANENT SEEDING AND MULCH

A. Uniformly apply seed where indicated on the Drawings and in accordance with the applicable requirements of subsection 610-3.02 of the NYSDOT Specifications.

B. Seed may be sown with a gravity, rotary, or cultipacker seeder, or as otherwise approved by the Engineer.

C. Immediately after seeding, protect seeded areas with mulch or erosion control matting. Install erosion control matting where indicated on the Drawings and as specified in Section 02373. Spread mulch uniformly over all other seeded areas not requiring erosion control matting at a rate of approximately two tons per acre.

D. If seed and mulch are applied in one application, such as while using a hydraulic seeder with mulch, the seed application rates shall be increased by a minimum of 30 percent.

3.07 ESTABLISHMENT OF GRASS

A. Begin maintenance of seeded areas immediately after seed placement. Water, repair washed or eroded areas, and otherwise protect and maintain the seeded areas for a minimum of one month after seed placement has been completed.

B. Final acceptance of grassed areas will not be made by the Engineer until a satisfactory stand of grass is obtained in all areas seeded. A satisfactory stand of grass is defined as a cover of living plants, after true leaves are formed, of the seed species applied, in which gaps larger than one square foot do not occur. Bare spots shall be scattered, and the total bare areas shall not comprise more than ten percent of the total seeded area.

C. During the establishment period, re-seed bare and eroded areas as determined necessary by the Engineer. Repair of washed or eroded areas and re-seeding of bare areas shall be performed at no additional cost to the Owner.

END OF SECTION

APPENDIX C

REMEDIAL ACTION WORK PLAN

(including Planned Schedule)

Final
Remedial Action Work Plan
Industrial Welding Sit – Operable Unit 3
(Packard Road Site)

Niagara Falls, New York

Prepared for:

Olin Corporation

Environmental Remediation Group

Charleston, Tennessee

Prepared by:

MACTEC Engineering and Consulting, P.C.

In Association With:

MACTEC Engineering and Consulting, Inc.

Kennesaw, Georgia

March 9, 2007

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1.0 CONSTRUCTION SEQUENCE

The Remedial Action Work Plan describes the anticipated construction sequence for the Packard Road Parcel (Site) of the Industrial Welding Site (IWS). Details of the construction sequence may be changed by the Contractor to take advantage of site conditions and weather.

1.1 PROJECT AREA PREPARATION

Project area preparation will be performed by the Contractor. Preparation activities will consist of:

- Establishing Work limits
- Installation and maintenance of temporary erosion and sediment control measures, including silt fencing and construction entrance
- Establishing areas for temporary storage of materials, parking of vehicles and other temporary facilities
- Securing the Site
- Locating existing utilities (buried and above-grade) that will be impacted by the Work
- Establishing the limits of the asphalt cover and site access, and alignment of storm drainage system
- Survey of construction areas to determine existing grades and establish vertical and horizontal control for grading activities and other Work on the Site

The Contractor will be responsible for maintaining safe vehicular and pedestrian traffic along roadways adjacent to construction activities.

1.2 MATERIAL DISTRIBUTION

Soils excavated from trenches required for the storm drainage piping will be spread on the ground surface under the cover. The area under the cover will be graded so that the design subgrades will be met.

1.3 SUBGRADE PREPARATION

Prior to placement of subgrade fill materials, the entire area within the limits of the cover will be proof-rolled to detect unsuitable subgrade materials and materials will be stabilized as required. Existing surface materials and imported soil fill will be placed and compacted to the required elevations for the asphalt cover subgrade. Imported soil fill will be obtained from an approved off-site borrow source. Subgrade materials will be excavated, spread, graded, and compacted in accordance with the Specifications.

1.4 BORROW SOIL QUALITY CONTROL

Imported soil fill incorporated into the subgrade will be sampled by the Construction QA/QC representative. Each sample will be analyzed by a NYSELAP laboratory for Target Compound List organic analytes and Priority Pollutant List metals. Laboratory detection limits for each analyte shall be less than the regulatory levels identified. Laboratory data will be submitted to Olin immediately upon receipt and prior to use of the material on-site.

1.5 SURFACE DRAINAGE SYSTEM CONSTRUCTION

The cover will be graded to control surface water run-off and direct surface water runoff into drop inlets located within the limits of the asphalt cover. Storm drainage pipes will transport storm water from the drop inlets through a junction manhole and then to Gill Creek. Discharge to the creek will require crossing Veterans Drive. The pipe crossing must conform to all applicable requirements of the City of Niagara Falls. The storm water drainage system will not connect to the existing storm drains that discharge to Gill Creek.

1.6 ASPHALT COVER

An asphalt cover (consisting of an aggregate base course, asphalt concrete binder course, and asphalt concrete surface course) will be constructed in accordance with the Drawings and Specifications. The asphalt concrete surface course will be a modified NYSDOT surface mix with a high asphalt binder content as specified. A bituminous seal coat will be applied to the completed asphalt concrete surface course on the Packard Road Site and the previously completed adjacent asphalt cover.

1.7 PROJECT CLOSEOUT

The project site will be returned to a neat and satisfactory condition.

2.0 CONSTRUCTION SCHEDULE

The cover construction work is planned for 2007. This construction period assumes construction will be performed at least five days per week, eight hours per day. The following planned schedule is provided.

APPENDIX D

CONSTRUCTION QUALITY ASSURANCE PLAN

Final
Construction Quality Assurance Plan
Industrial Welding Site – Operable Unit 3
(Packard Road Site)

Niagara Falls, New York

Prepared for:
Olin Corporation
Environmental Remediation Group
Charleston, Tennessee

Prepared by:
MACTEC Engineering and Consulting, P.C.

In Association With
MACTEC Engineering and Consulting, Inc.

Kennesaw, Georgia

October 13, 2006

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1.1 Organization Chart

1.0 INTRODUCTION

This section addresses the responsibilities with respect to Construction Quality Assurance (CQA) and Construction Quality Control (CQC). This section also includes definitions of the terminology used in addressing matters concerning CQA/CQC.

1.1 CQA AND CQC

CQA is the responsibility of the Engineer. CQC is the respsonsibility of approved independent quality control testing firms retained by the Remedial Action Contractor. It is the responsibility of CQC personnel to check the work and materials of the Contractor for conformance with the Remedial Design.

1.2 ORGANIZATION CHART

An organization chart indicating key project members and lines of communication is presented in Figure 1.1.

1.3 RESPONSIBILITIES OF ENGINEER

MACTEC Engineering and Consulting, P.C., in association with MACTEC Engineering and Consulting, Inc. will serve as the Engineer.

1.3.1 Engineer's Project Manager

The Engineer's Project Manager (PM) for this project is Mr. Rick Marotte. His responsibilities will include:

- Subcontracting, and coordinating CQA services, surveying and analytical activities during remedial action
- Periodic review of CQA reports

1.3.2 Engineer's Certifying Engineer

The Engineer's Certifying Engineer for this project is Glenn N. Coffman, P.E., whose responsibilities include:

- Approval and Certification of Remedial Action
- Documentation of changes to the Remedial Action Design Drawings and Specifications that occur during construction

- Approval of corrective measures in cases where deviation from the specified design or failure to meet design specifications is detected by the CQA personnel
- Certification of construction in general accordance with the Remedial Action Design Drawings and Specifications
- Review of As-Built (Record) Drawings
- Approval and Certification of Final Engineering Report

1.3.3 CQA Personnel

The duties of the CQA personnel include:

- Verification of compliance of materials and workmanship with the standards established in the Remedial Action Design Drawings and Specifications
- On-site observation of work in progress to assess compliance by the Contractor with the Remedial Design Drawings and Specifications to:
  - Confirm that the test data are accurately recorded and maintained
  - Verify that the raw data are properly summarized and interpreted
- Reporting results of all observations to the Contractor, including work and materials that are not of acceptable quality or that fail to meet the specified design. The report will be made using the Deficiency Identification Report (DIR) defined herein.
- Providing the Engineer with periodic reports on inspection results including:
  - Reviews and interpretations of observation records and test results
  - Identification of work that the CQA requires being accepted, rejected, uncovered for observation or work that may require special testing, inspection, or approval
  - Reports of rejected work and materials

1.3.4 Remedial Action Contractor

It is the responsibility of the Remedial Action Contractor to provide personnel, materials, and direction for the construction of the work in accordance with the Design Drawings and Specifications using appropriate construction procedures and techniques.

CQC is also the responsibility of the Remedial Action Contractor. The duties of the CQC personnel are:

- On-Site and laboratory testing that is required, as described in the project specifications.

- Scheduling of quality control testing to assure that the testing program is coordinated with field activities and that the CQA personnel are aware of planned CQC activities.

1.4 REMEDY PROCEDURE

Corrective measures will be implemented by the Contractor when observations or tests indicate that the Contractor's work does not meet the standards established by the Remedial Design.

1.5 MATERIALS AND WORK SUBJECT TO OBSERVATION AND TESTING

All materials and work procedures are subject to observation and testing as stated in the Specifications. Work or materials rejected on the basis of observation and testing will be corrected in the following manner, except where specified by the Engineer.

The CQA personnel will report material or work deficiency to the Engineer and the Contractor. The Contractor will suggest or propose a plan to correct deficient work or materials to the CQA personnel. The suggested corrective action will be attached to the DIR. After coordinating with the Engineer and approval by Olin, the CQA personnel will specify the corrective action to be implemented and document the action in the DIR. The Contractor will implement the corrective action.

2.0 DOCUMENTATION

CQA documentation will occur in the form of a series of reports. The CQA personnel will be responsible for maintaining all CQA records.

2.1 METHOD OF REPORTING

2.1.1 Daily Summary Reports

CQA personnel will prepare Daily Summary Reports (DSRs). At a minimum, the DSR will include the following:

- Unique identifying report number for cross referencing and document control
- Date, project name, project number, task number, location, and other pertinent information
- Data on weather conditions
- Report on meetings that pertain to CQA
- Minutes recorded from all meetings
- Brief description of construction activities – location, description of activity, and construction progress
- Description of independent laboratory testing that will include the name of testing company, type of testing, number of samples, description of split sampling (where appropriate), location of sampling, and other pertinent observations
- Description of CQA activities
- Description of off-site materials received, including quality verification documentation
- Calibration, or recalibration, of test equipment, including action taken as a result of recalibration
- Decisions made regarding approval of work or materials and corrective action recommended for substandard work or materials
- Reference to supporting documentation will include a unique identifying number for document control
- Signatures of the CQA personnel and Contractor's representative

2.1.2 Field Change Approval

A Field Change Approval (FCA) form will be completed for all changes occurring during construction that differ from the Remedial Design. An FCA form is presented in Appendix A of this document.

2.1.3 Deficiency Identification Report

A deficiency is defined as material or workmanship that does not meet the standards established in the Remedial Design. At a minimum, the DIR should include the following information:

- Unique identifying report number for cross referencing and document control
- Date, project name, project number, task number, and other pertinent information
- Detailed description of the deficiency
- Location of deficiency
- How and where deficiency was located, including reference to other CQA documentation that may be used for cross-referencing
- Estimation of how long deficiency has existed
- Suggested corrective action proposed by the Contractor
- Decision of Engineer on request for corrective action
- Description of approved corrective action
- Documentation of corrective action taken
- Reference to additional CQA activity reports for corrective action, where applicable
- Final results
- Suggested methods to prevent similar deficiencies
- Appeals made by Contractor, if any
- Engineer's decision on appeals
- Signature for the appropriate CQA personnel

2.1.4 Construction Quality Assurance Report

At the completion of the project, the CQA personnel will submit a final Construction Quality Assurance Report (CQAR) to the Engineer's PM for review. This report will include all of the DSRs, DIRs, deviations from the Remedial Design documents (with justifying documentation) and As-Built drawings.

2.2 RECORDKEEPING

2.2.1 Document Control

All CQA documentation will be maintained by the Engineer under a document control procedure organizing and indexing the information for easy cross-referencing. Each page of the CQA documentation will receive an identifier at the top right-hand corner of the page. The identifier will consist of:

- DSR – Daily Summary Report
- DIR – Deficiency Identification Report
- FCA – Field Change Approval

2.2.2 Storage of Records

The Engineer will be responsible for all CQA documents during the construction phases of the project.

2.3 LINES OF COMMUNICATION

Lines of communication will be maintained according to the previously presented organization chart. The following information further describes lines of communication between key project members.

2.3.1 CQA/ Personnel

All reports, certifications, and data sheets will be reviewed by CQA personnel for accuracy and completeness. CQA personnel will review the testing method to determine its validity. Reports generated by CQA personnel will be submitted to the Engineer for review. CQA personnel will submit notice of materials or Contractor workmanship deficiency to the Engineer.

CQA personnel will report directly to the Engineer's PM. CQA personnel will act as a liaison between the Contractor and the Engineer's PM. It will be the responsibility of the CQA personnel to verify that the Contractor installs the work in accordance with the Remedial Design.

2.3.2 Engineer

The Engineer will review the DIR and will decide, in concert with the Olin Project Engineer, if action by the Contractor is required. The Engineer will review the Contractor's proposals for correcting deficient work or materials. If a corrective action procedure suggested by the Contractor is approved, then it will be noted on the DIR and submitted to the CQA personnel for action by the Contractor. If the suggested

corrective action is not approved, the disapproval will be noted on the DIR and returned to the Contractor for modification and resubmittal. The Engineer will review all Contractor appeals and requests for equipment, materials, or procedural modifications in the same manner as if it was a newly submitted DIR.

2.3.3 Contractor

The Contractor will submit requests for equipment, materials, or procedural modifications to the Engineer. The Contractor will be required to propose a method for corrective action on deficient work or materials when requested by the Engineer.

2.4 CONTRACTOR'S SUBMITTALS

The CQA personnel will maintain a log of all Contractor submittals. These submittals may include:

- Manufacturer's material quality verification sheets and reports
- Test results from approved independent laboratories
- Contractor's proposal for corrective action of deficient workmanship or materials

2.5 TESTING LABORATORIES

The testing laboratories will submit test results directly to the Engineer as well as the Contractor.

3.0 PROCEDURES

3.1 LAYOUT OF WORK AND GRADE CONTROL

This work will include establishing full documentation of construction survey control.

3.1.1 Standards

- Horizontal and vertical control have been established as shown on the "Topographical Map of Part of Lot-4 of the Stedman Farm, City of Niagara Falls, Niagara County, New York", prepared by McIntosh & McIntosh, P.C., dated June 14, 2005 (included with the Design Drawings.)
- Temporary benchmarks and other survey control points will be established as required by the Contractor during remedial action.

3.1.2 Certification

- Temporary benchmarks, and other survey control points will be established by a Registered Land Surveyor (RLS) licensed in the State of New York who will certify their accuracy.
- The RLS will submit copies of his notes with the certified drawings illustrating surveyed points, lines, and grades.
- CQA personnel will maintain a log of certified survey drawings, and notes.
- CQA personnel will maintain a log of all surveying activities.

3.1.3 Execution

- The CQA personnel will observe and document surveying activities.
- The CQA personnel will not allow work to proceed until lines and grades have been established and certified by the approved surveyor unless appropriate approvals have been obtained.

3.2 REMOVAL OF VEGETATION AND STRUCTURES DEMOLITION

This work includes the procedures necessary to remove vegetation, demolition debris, and any miscellaneous debris within the Site, and either haul off-site or consolidate the wastes under the cover as identified in the Remedial Design Report.

3.2.1 Standards

- Cleaning, grubbing and disposal of vegetation will be performed in accordance with the Specifications. Burning of vegetation will not be allowed

- Demolition, removal and disposal of designated structures will be performed in accordance with the Specifications.
- Local, state, and federal regulations regarding hauling and disposal of vegetation and debris will apply.

3.2.2 Documentation

The CQA personnel will maintain a daily log of all removal and consolidation activities.

3.2.3 Execution

The CQA personnel will make visual observations for quality assurance.

3.2.4 Storage

Removed vegetation and demolition debris may be stockpiled temporarily in locations approved by the CQA personnel.

3.3 DEWATERING

This work includes dewatering of excavations as required for installation of storm drainage structures and piping.

3.3.1 Standards

- Local, state, and federal regulations regarding work in and around trench excavations will apply.

3.3.2 Documentation

- The CQA personnel will retain a copy of the Contractor's plan for disposal/disposition of water generated during construction.
- The CQA personnel will verify that water to be discharged to the City of Niagara Falls sewer is sampled, analyzed, and results are submitted to the City of Niagara Falls.
- The CQA personnel will verify that water to be discharged to the city sewer meets or exceeds the City's criteria for discharge.
- The CQA personnel will maintain a written log of all dewatering, collection, turbidity monitoring, chemical analyses, and disposal activities.

3.3.3 Execution

- The CQA personnel will make visual observations for quality assurance.

- The Contractor will be responsible for the design and equipment necessary to collect, store, monitor, analyze, and handle water from dewatering activities.

3.3.4 Storage

- All liquids from dewatering activities may be stored temporarily on site in aboveground storage tanks in locations approved by Olin.

3.4 LIMITS OF COVER CONSTRUCTION

This work includes verification that cover construction extends to the limits and thickness established in the Remedial Design through observation and surveying.

3.4.1 Standards

Limits of the cover shown on the Construction Drawings will be marked in the field by the Contractor's RLS.

3.4.2 Certification

- Temporary bench marks and other survey control will be established as required by the Contractor during remedial action
- The RLS will submit copies of his notes with the certified drawings illustrating surveyed points, lines, and grades.

3.4.3 Documentation

- The CQA personnel will maintain a log of all survey documents certificates, and drawings as well as a description of activities.
- The CQA personnel will maintain a copy of the following:
  - Record survey drawings of completed storm drainage system
  - Intermediate Topographic Surveys (record drawings) of constructed top of subgrade, and top of aggregate base course
  - Final Topographic Survey (record drawing) of finish grades at completion of Remedial Action
- The CQA personnel will notify the Contractor promptly of survey results that deviate from the limits and grades indicated as acceptable in the Remedial Design Drawings and Specifications.
- The CQA personnel will record the actual dimensions of the cover limits and area on the appropriate Construction Drawing(s).

3.4.4 Execution

- The CQA personnel will observe the construction, record construction dimensions, and document observations.
- The CQA personnel will not allow cover construction beyond established limits unless approved by Olin.
- The CQA personnel will not allow work to continue unless the Contractor has adequately prevented runoff with erosion control measures established in the Remedial Design.

3.5 MATERIAL HANDLING AND GRADING

This work includes the necessary grading of soils within the project limits.

3.5.1 Standards

- Local, state, and federal regulations regarding safety, hauling, and storage will apply.
- Dust will be controlled.
- The Contractor will conduct the work in a safe manner.
- Burning will not be allowed.
- Material handling within the project limits will include soil excavation for asphalt cover subgrade construction and, storm drainage system construction. These excavated soils will be hauled, deposited, and compacted within the cover limits as designated in the Remedial Design.
- Laboratory testing and in-place density testing will be performed in accordance with the Specifications.

3.5.2 Documentation

- The CQA personnel will maintain a written log of all material handling activities.
- QC Tests specified in the Remedial Design will be observed by CQA personnel and performed by an independent testing firm.
- The CQA personnel will verify and document that QC testing was performed in accordance with the Remedial Design.

3.5.3 Execution

- The CQA personnel will observe and document all material handling activities.
- Newly excavated soils will be deposited under the limits of the cover as soon as practical after removal from the original location.

- Newly excavated soils will be hauled along the shortest haul routes practical, with precautions implemented to avoid strewing or scattering soils along the routes.

3.5.4 Placement

- Excavated materials may be placed only in locations approved by the Engineer.
- The CQA personnel will verify that the placed materials are protected from erosion and secured within an area not accessible to the public.

4.0 MATERIALS

4.1 IMPORTED BACKFILL MATERIALS

This work includes supplying and grading all imported fill material to be used for cover components (subgrade layer, protective/drainage soil layer, vegetative soil layer), asphalt concrete aggregate base course, and general backfill activities associated with the perched groundwater collection system and new stormwater drainage facilities. The work will include verifying backfill materials through testing and observation to ensure that they meet the standards established in the Specifications.

4.1.1 Standards

- Applicable industry standards of the latest revision of test methods published by ASTM International, and other reference standards as stated in the Specifications.
- Local, state DOT and federal regulations as stated in the Specifications will apply.

4.1.2 Certification

- The CQA personnel will obtain analytical laboratory reports, certified by the laboratory subcontracted to the Remedial Action Contractor, for the test procedures as established in the Specifications.
- The CQA personnel will obtain physical laboratory reports, certified by the independent laboratory subcontracted to the Remedial Action Contractor, for the test procedures as established in the Specifications.

4.1.3 Documentation

- The CQA personnel will maintain a log of all sampling and testing activities on backfill materials, including chemical analyses.
- The CQA personnel will maintain a log of all test reports on the backfill material.
- The CQA personnel will maintain a log of all backfill material from approved off-site borrow sources. The log will include location of borrow source, date, weight of material where required, load number designation, description of material and reference to laboratory reports where applicable.

4.1.4 Execution

- The CQA personnel will visually monitor each material delivery to the site.
- The CQA personnel will reject any delivery not meeting the standards established in the Specifications. Notification of rejection will be given to the Engineer and the Contractor.

- Dust will be controlled during grading activities.

4.1.5 Storage

- Backfill material will be stockpiled in a manner described in the Specifications and in a location approved by Olin.
- Backfill material will be segregated from all other materials.

4.2 STORM DRAINAGE PIPING AND STRUCTURES

This section presents quality assurance procedures related to the construction of storm drainage piping, drop inlets, junction manhole, and headwall. Work will include verifying proper installation by observation to ensure that construction of piping and structures meets the standards established in the Specifications.

4.2.1 Standards

- Applicable industry standards stated in the Specifications.
- Manufacturers test reports showing conformance with the Specifications.

4.2.2 Certification

- Manufacturers' certification that the product to be furnished will comply with all product requirements in the Specifications.

4.2.3 Documentation

- The CQA personnel will maintain a log of all piping and structures received on the Site. The log will include manufacturer's name, product identification, date of manufacture, size, and class of pipe and structures.

4.2.4 Execution

- The CQA personnel will examine piping and structures before installation for obviously defective materials and proper size.
- The CQA personnel will reject any construction material not meeting the standards established in the Specifications. Notification of rejection will be given to the Engineer and the Contractor.
- CQA personnel will observe the Contractor's installation to verify conformance with the Specifications.

4.3 ASPHALT CONCRETE PAVING

This work includes installing asphalt concrete pavement as shown on the Drawings.

4.3.1 Standards

- Applicable standards of the New York State Department of Transportation "Standard Specifications" 2002 edition.

4.3.2 Documentation

- CQA personnel will maintain a log of all sampling and testing activities for aggregate base course and asphalt concrete materials as established in the Specifications.
- The CQA personnel will maintain a log of all test reports on aggregate base course and asphalt concrete materials.

4.3.3 Execution

- A qualified representative of the independent laboratory will determine conformance of the materials and constructed work as required by the Specifications.

4.4 OTHER SITE WORK

Includes verification through observation and manufacturer certification that the standards established in the Specifications for all other items of work are adequately met.

4.4.1 Standards

- Remedial Design Drawings and Specifications
- Manufacturer's instructions and recommendations

4.4.2 Documentation

- CQA personnel will maintain a log of all project associated material deliveries. The log will include: delivery date, material description, manufacturer, transporter, truck/trailer number, material weight, weight ticket number, bill of lading number and a load number designation.
- CQA personnel will maintain a log of all Contractor provided shop drawings and product data for all project work.
- CQA personnel will maintain a log of all Contractors provided product information and test results for project materials.

4.4.3 Execution

- CQA personnel will not allow work to continue if the construction standards are not in accordance with the standards established in the Remedial Design unless appropriate approvals have been obtained.

- CQA personnel will verify through observation and manufacturer's certification that the project materials and storage conditions meet the standards established in the Remedial Design.

- CQA personnel will observe delivery and storage of all materials and document their observations daily.

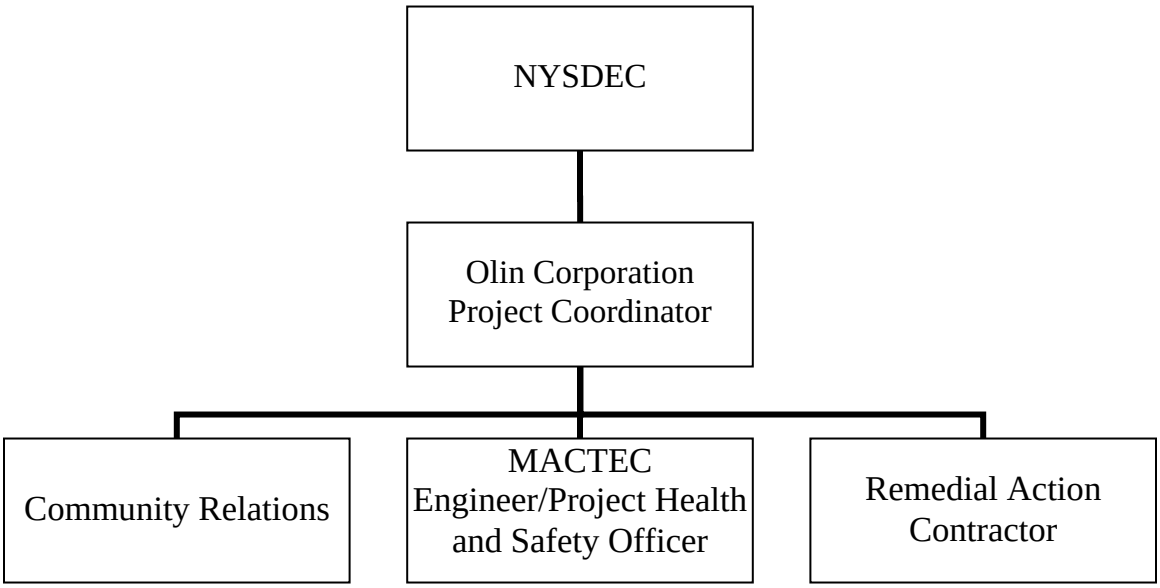
4.4.4 Storage

- Verify materials to be installed are stored in a manner that is recommended by the manufacturer and in a location approved by the CQA personnel.

- Verify the areas accessible by the public, such as Veterans Drive, be kept cleared of construction equipment, debris, mud, and dirt when work is not in progress.

FIGURES

Figure 1.1- Organizational Chart



APPENDIX E

HEALTH AND SAFETY PLAN

Final
Health and Safety Plan
Industrial Welding Sit – Operable Unit 3
(Packard Road Site)

Niagara Falls, New York

Prepared for:

Olin Corporation

Environmental Remediation Group

Charleston, Tennessee

Prepared by:

MACTEC Engineering and Consulting, P.C.

In Association With:

MACTEC Engineering and Consulting, Inc.

Kennesaw, Georgia

March 9, 2007

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1.0 INTRODUCTION

This Health and Safety Plan (HASP) presents Olin's health and safety requirements for the asphalt cover construction activities occurring at Operable Unit 3 (OU 3) of the Industrial Welding Site (IWS) property. OU 3 will hereafter be referred to as "the Site."

The Site is bounded by parking lots adjacent to Buffalo Avenue to the South, Veterans Drive (Packard Road) and Gill Creek to the East and the Industrial Welding Site (IWS) to the North in the city of Niagara Falls, New York. The project area is shown on Figure 1.1.

The project area comprises approximately 4.3 acres and is relatively flat, with elevations ranging from 572 to 575 feet above mean sea level (msl). Fencing and locked gates presently control access to the Site.

This Site has been historically owned by Olin. Past practices at the Site have resulted in soil and water impacts from chlorinated cyclohexanes (BHC), polynuclear aromatic hydrocarbons (PAHs), and mercury that were associated with IWS. The Site was not used for waste disposal and does not contain any historical waste disposal site or landfills. The impacts found on the Site are believed to be associated with activities at IWS. The Site is contiguous with IWS and impacts are similar on the two properties.

The construction/remediation activities planned at the Site are summarized below.

- Investigation of suspected underground vaults.
- Excavation and consolidation of contaminated soils under the final cover system.
- Installation of a multilayer cover system to prevent any direct contact exposure and to reduce precipitation infiltration. The final cover system will be keyed into the underlying clay strata, to act as a barrier to perched groundwater flow.
- Long term operation, maintenance and monitoring of the selected remedy.
- Land use restrictions.

An asphalt concrete cover will be constructed over an area of approximately 4.3 acres comprising the entirety of the Site property. Any soils excavated from the Site property will be consolidated under the final cover system. Surface drainage from the final cover system will be directed under Veterans Drive to Gill Creek. The final cover system will eliminate erosion, minimize the migration of rainfall into Site soils, and prevent direct human exposure to Site soils.

<u>Nature of Proposed Activities</u>
Direct contact with soil and/or perched water may occur during the following activities:

- Trenching and excavation
- Construction water sampling
- Use of heavy equipment for grading and trenching
- Construction of cover systems (before buffer layer completion)
- Decontamination

<u>Nature of Potential Exposure for this Project</u>

Based on previous environmental investigations, soil and placed sediments may contain:

- Mercury (up to 1,850 micrograms per kilogram [mg/kg]) ,
- Hexachlorocyclohexanes (commonly known as benzene hexachloride [BHCs]) (up to 5.0 mg/kg alpha BHC, 5.3 mg/kg for beta BHC, 1 mg/kg for delta BHC, 1 mg/kg for gamma BHC)), and
- Polycyclic aromatic hydrocarbons (PAHs) (up to 1,820 mg/kg).

Based on previous environmental investigations, perched ground water potentially contains:

- Mercury (1.3 µg/L), and
- Gamma BHC (0.058 µg/L).
- Beta BHC (0.086 µg/L).

The expected start for construction is September 1, 2006, with construction completion expected in approximately 8 weeks.

2.0 KEY PROJECT PERSONNEL AND RESPONSIBILITIES

This section addresses the responsibilities of the project members with respect to the HASP.

All contractors are responsible for the Health and Safety of their employees. All contractors onsite will prepare their own HASPs that, at a minimum, meet the requirements presented in this HASP. Contractors shall train their personnel in Site-specific Health and Safety procedures and supply appropriate personal protective equipment (PPE).

Figure 2.1 summarizes the organizational structure for this project. Refer to Section 6.0 and 7.0 of this plan for specific program information. As a representative for the Owner, the Project Health and Safety Officer (HSO) has overall responsibility that the requirements of this HASP are met.

Owner

Mike Bellotti will serve as Project Coordinator for Olin Corporation.

Engineer and Contractor Representatives

MACTEC is the Engineer for the project. Sevenson Environmental Services, Inc. (Sevenson) is the Remedial Action Contractor (Contractor).

Remedial Action Contractor Safety Coordinator

The Remedial Action Contractor Safety Coordinator (RACSC) is responsible for the Health and Safety of Sevenson employees and Sevenson's subcontractors and will ensure that activities performed by the Contractor and their subcontractors are in compliance with this HASP
.

Project Health and Safety Officer

The following tasks are the responsibility of the Project HSO:

- Compliance with this HASP for all personnel and activities on the site.
- Observation of the work performed by the Remedial Action Contractor and its subcontractors, including the execution of health and safety procedures.
- Stop the work of the Contractor if a violation of the health and safety procedures is observed.
- Documentation of log-in/log-out procedures, pre-entry briefings for site visitors.
- Coordination of emergency response actions including stop work orders, site evacuation, notification of community agencies such as fire and police departments, notification of governmental agencies, and communications with the Owner, Engineer, and contractor.
- Coordinate the Community Air Monitoring Program as specified by Section 4.0. The Project HSO will ensure that monitoring is conducted as specified in the HASP and that monitoring instruments are have been calibrated. The Project HSO will determine field sampling locations for air samples, and collect air samples per Section 4.2

3.0 GENERAL REQUIREMENTS

The Project HSO will oversee the implementation of this HASP. The excavation and construction activities at the Site property may present chemical and physical hazards. The Project HSO and the Remedial Action Contractor Safety Coordinator are responsible for making an independent hazard assessment and anticipating potential hazards. However, the Project HSO will have overall authority for compliance with this HASP.

This HASP, which must be kept on site, addresses the health and safety hazards of the tasks performed by project personnel, including the requirements and procedures for worker protection (per 29 CFR 1910.120). As additional relevant information becomes available, the Project HSO can change or amend this document with agreement from the Owner. The Project HSO must initial any change made to the HASP at the relevant section, document the amendment date, make available copies of these changes to all site personnel, and obtain signature of site personnel verifying that they have read and will be governed by these changes.
The facilities, equipment, monitoring instruments, materials, and personnel will be provided as necessary to protect on-site personnel and off-site human receptors from physical injury and potential adverse health effects that could result from exposure to chemical hazards which may be present on-site. Personnel entering the job site will comply with the requirements of this HASP.

3.1 WORKER TRAINING

Table 3.1 documents that workers have received the appropriate training requirements as per 29 CFR 1910.120(e), 29 CFR 1910.38, and 29 CFR 1910.1200. Contractors and Subcontractors are responsible for the requirements and implementation of this plan and ensuring that their personnel on-site are properly trained in Health and Safety procedures.

3.2 MEDICAL SURVEILLANCE

Table 3.1 indicates personnel who participate in a Medical Surveillance Program [29 CFR 1910.120(f)]. All workers who could be exposed to concentrations of chemicals above the OSHA Permissible Exposure Limits (PELs) for 30 days per year or more must be included in the Medical Surveillance Program.

3.3 SAFE WORK PRACTICES

General safety guidelines are provided below.

- Minimize contact with excavated or contaminated materials. Do not sit or kneel on potentially contaminated surfaces.
- Smoking, eating, or drinking after entering the work zone and before decontamination will not be allowed. Use of illegal drugs and alcohol are prohibited.
- Practice good housekeeping. Keep everything orderly and out of potentially harmful situations.
- Use of contact lenses on site will not be allowed.
- In an unknown situation, always assume the worst conditions.
- Be observant of your immediate surroundings and the surroundings of others. It is a team effort to notice and warn of impending dangerous situations. Withdrawal from a hazardous situation to reassess procedures is the preferred course of action.

- Conflicting situations may arise concerning safety requirements and working conditions and must be addressed and resolved rapidly by the Project HSO and RACSC to relieve any motivations or pressures to circumvent established safety policies.
- Unauthorized breaches of specified safety protocol will not be allowed. Workers unwilling or unable to comply with the established procedures will be discharged.

4.0 COMMUNITY AIR MONITORING

This section specifies the requirements for the site-specific community air monitoring for the construction at the Site property. Air monitoring strategies have been designed to address sampling/monitoring for mercury, BHCs, PAH's and total particulate emissions. Monitoring will be performed by direct reading instruments and collection of samples for off-site analysis using sorbent tubes and filter cassettes.

4.1 AIR Monitoring USING DIRECT READ INSTRUMENTS

Air monitoring equipment will be maintained and operated in accordance with manufacturer's instructions, and calibrated daily. Necessary calibration/audit equipment and supplies will be maintained.

Prior to the commencement of intrusive activities, two baseline (background) air samples will be collected by the Project HSO for laboratory analysis for mercury, total particulates and BHCs. This sampling will occur along the perimeter of the work site. Prior to the commencement of construction activities, baseline (background) air quality conditions will also be monitored in the work zone and at the perimeter by the Remedial Action Contractor Safety Coordinator using direct reading instruments for total organic vapor, respirable particulates, and mercury vapor. After the establishment of the baseline, direct-read monitoring will continue at the active work area. Monitoring will occur on an hourly basis during excavation and soil handling involving impacted soils. The monitoring frequency may be reduced, based on emissions trends, during less invasive activities such as construction of the multi-layer cover.

Measured concentrations will be compared to action levels as specified in Tables 4.1 and 4.2. Collection of samples at the site perimeter for off-site analysis will be triggered by these action levels. Actions will be taken to either eliminate or reduce concentrations to acceptable limits, as required. Monitoring data will be recorded and a report with the sampling location, wind direction at the time of sampling, time, and results will be generated daily. Air-monitoring logs and daily summaries will be included in the project files.

4.2 Perimeter Monitoring using Sorbent Tubes/FILTER CASSETTES

Air samples will be collected at the perimeter of the work area by the Project HSO and analyzed for mercury, BHCs, PAH's and total particulates using NIOSH methods. Four locations will be sampled each day for two 8-hour days during the initial part of intrusive activities such as trenching. Four additional samples will be collected for one 8-hour day approximately mid-way through construction. The four sample locations will be the approximate midpoint of the perimeter fence on the four sides of the work area.

Air samples will be collected using calibrated Gillian or equivalent low-flow pumps. The pumps will be calibrated each morning prior to use. Laboratory-prepared sorbent tubes and filter cassettes will be mounted on the sampling pump. The pumps will be operated for approximately 8 hours each day. The wind direction will be monitored and recorded at selected intervals. Pumps will be periodically checked to verify operation and flow rate. The start and stop time, wind direction, weather conditions, and observed flow rate will logged for each pump. After completion of the sampling period, the tubes

will be removed and packaged for shipping to a New York State Environmental Laboratory Approval Program (NYSELAP) laboratory for analyses. Analytes will be analyzed by NIOSH methods:

Mercury	NIOSH Method 6009
BHCs	NIOSH Method 5502
PAHs	NIOSH Method 5519 (or equivalent)
Total Particulates	NIOSH Method 0500 (or equivalent)

The Field Sampling Plan (Appendix E) presents the procedures for sampling and analysis. Samples will be labeled in a clear and consistent fashion. Each sample will have a corresponding entry on a chain-of-custody record that will include site name, sample identification number, sample type, date of collection, parameters for which analyses are requested, sample volume, and signatures of sampler, and other personnel involved in the chain of custody for the sample. Analytical results will be included in the project files.

5.0 SITE CONTROL

Site control procedures, as required by 29 CFR 1910.120(d), will be implemented before the start of site tasks.

5.1 Work Zones

THREE WORK ZONES WILL BE ESTABLISHED FOR THIS SITE. THE EXCLUSION ZONE IS DEFINED AS THE AREA WHERE CONTAMINATION IS SUSPECTED AND THE REMEDIAL ACTION TASKS ARE TO BE PERFORMED WHICH WILL INCLUDE ALL OF THE AREA TO BE COVERED WITH ASPHALT. THE CONTAMINATION REDUCTION ZONE IS DEFINED AS THE AREA WHERE EQUIPMENT AND WORKERS ARE TO BE DECONTAMINATED. THE SUPPORT ZONE IS DEFINED AS THE COMMAND AREA AND SERVES AS A STORAGE AREA FOR SUPPLIES. THE BOUNDARIES OF THE EXCLUSION ZONE, CONTAMINATION REDUCTION ZONE, AND SUPPORT ZONE WILL BE MARKED USING WARNING TAPE AND OR TEMPORARY FENCING.

5.2 Buddy System

When required by contract, or when conditions exist that could be dangerous to life and health, a buddy system shall be implemented.

5.3 Site Access

Access to the site will be controlled using sign in/sign out log for site workers. Sign in/sign out log and identification badges will be used for visitors.

5.4 Communications

On-site communications will be verbal. Off-site communications will be conducted through field office telephones.

6.0 HAZARDOUS MATERIALS

The following report was consulted for complete information on the results of previous site investigations:

- Voluntary Environmental Characterization – Packard Road Parcel, Olin Corporation, January 18, 2002

This document provides analytical data for the areas that will be included in the current project.

6.1 Chemical Hazards

Based on previous studies, the chemical hazards of potential concern detected in the soil/sediment are mercury, BHCs, and polycyclic aromatic hydrocarbons (PAHs). Project personnel may be exposed by inhalation of chemical vapors, by dermal contact, and by incidental ingestion of soils potentially contaminated with organic compounds and mercury or by dermal contact with perched water. Contaminants may also be present in respirable dust and air-borne emissions.

6.2 PROPERTIES OF CHEMICAL HAZARDS

Appendix A contains Chemical Fact Sheets for the compounds of concern (mercury, BHCs, and PAHS). In addition to the compounds of concern, other potentially hazardous materials may be brought onto the site as part of the construction activities. These materials will be addressed as part of the hazard communication program that is discussed in Section 7.2.

6.3 HAZARDOUS MATERIALS WORK PRACTICES

A hazard analysis has been conducted for each task associated with this project per 29 CFR 1910.120(c). Health hazards shall be evaluated by perimeter air monitoring and by direct-read air monitoring in the work area. Health hazards will be controlled by safe work practices. If safe working conditions can not be engineered, site workers will be protected by implementing personal protective equipment (Section 6.3.2). Fire, reactive, physical, and biological hazards shall be controlled by utilizing safe work practices (Section 7.0).

6.3.1 Air Monitoring

Based upon the types of chemicals previously detected at the site, visual dust monitoring is required during site work. Dust control measures will be instituted if dusty conditions are noted during work in contaminated areas. The Project HSO will also communicate regularly with the Remedial Action Contractor Safety Coordinator.

<u>Real Time Monitoring</u>

The Contractor will furnish and maintain real-time air monitoring equipment which, at a minimum, will include: an explosimeter, (photo ionization detector), a respirable dust monitor, mercury vapor analyzer, and necessary calibration/audit equipment and supplies. Other equipment required to complete real-time air monitoring will be provided by the Contractor as necessary. All equipment will be maintained and operated in accordance with manufacturer's instructions. Real-time monitoring will

be conducted at the active work area in the Exclusion Zone. This monitoring will take place when intrusive work i.e., work such as excavation which may cause the generation of airborne contaminants to take place. Measurement of the concentrations of mercury vapor, and respirable particulate will be compared to the prescribed action levels. In this way it can be determined immediately whether any contaminants are being generated into the air as the result of the work, and the proper actions can be taken to either eliminate or reduce these concentrations to acceptable limits. Monitoring data will be recorded and a report of the sampling location, time, and results will be generated daily and placed in the project files.

Action Levels

The wearing of the various types of personal protective equipment will depend upon the potential for exposure (inhalation, ingestion, and dermal contact), type and amount of contamination present, operation being performed, and other factors such as weather and instituted engineering controls. The information provided in Table 4.1 and 4.2 along with the judgement of the Project HSO and Remedial Action Contractor Safety Coordinator will be used in determining the appropriate PPE and institution of specific controls.

A data sheet will be developed and implemented by the Remedial Action Contractor Safety Coordinator upon which the following real-time monitoring data will be recorded:

- Date and time of monitoring
- Air monitoring location
- Instrument, model number, serial number
- Calibration/background levels
- Results of monitoring
- Safety and Health Specialist/Industrial Hygienist Technician Signature
- Interpretation of the data and any further recommendations by the Project HSO or the Remedial Action Contractor Construction Safety Coordinator

In addition, as part of the community air monitoring program, air samples will be collected at the perimeter of the active work area by the Project HSO and analyzed by NIOSH methods for mercury, BHCs, and total particulates. These data will be used to evaluate dust and vapor emissions that may travel off-site.

6.3.2 Personal Protective Equipment

Descriptions of levels B, C, and D protection are provided in Section 7.8. Required personal protective equipment (PPE) and types of protective clothing materials for workers are listed, as well as an indication of the initial level of protection. The level of protection may be upgraded or downgraded according to the monitoring data of the Project HSO. PPE levels shall be indicated in the Field Logbook. When using PPE, workers must adhere to their employer's Personal Protective Equipment Program [29 CFR 1910.120(g) and 29 CFR 1910 Subpart I]. Conditions requiring Level B PPE are not anticipated at this site. If action levels indicate Level B is required, the contractor will evacuate the work area and contact the Olin representative. Work will not resume until a determination of the appropriate action has been conducted, implemented, and evaluated.

If respirators are worn, workers must adhere to their employer's Respiratory Protection Program (29 CFR 1910.134) or the requirements of this plan whichever is the most protective of the worker. Table 2.1 provides a record of the site workers' last annual fit test. Facial hair interfering with the respirator seal (e.g., beards) is not allowed when respirators are worn.

Exposure to ground water is expected during excavation and trenching. Precautions must be taken when working in conditions where potentially-contaminated ground-water may be contacted. Employees should

wear protective gloves when dermal contact with ground-water is likely and minimize the magnitude and duration of contact as much as possible. If signs and symptoms of exposure to chemical hazards occur, then work activities should be re-evaluated by the Project HSO.

6.3.3 Safe Work Practices

Workers shall follow the Safe Work Practices (Section 7.0) that have been developed for tasks associated with construction and with intrusive work in a contaminated area.

6.4 PHYSICAL HAZARDS

Physical hazards which may be associated with paving, cover construction, excavation, and local transport of soils and other materials are presented below:

- General Construction and Vehicle Safety: General construction and vehicle safety must be maintained. The RA Contractor and subcontractors will, at the minimum, comply with U.S. Department of Labor 29 CFR 1926.
- Temperature Extremes: Heat stress, particularly in the summer months, can present significant worker stress. Metabolic heat loading is increased by the use of heat-generating equipment (i.e., welding), protective clothing, and to a lesser extent, respirators. Workers operating heavy equipment are less affected, due to a lower level of physical activity. Guidance on heat and cold stress is provided in ACGIH's 1998 Threshold Limit Values for Physical Agents.
- Excavation Hazards: Trenching and excavating present a significant risk of slope instability and cave-ins. The Contractor will comply with 29 CFR 1926 Subpart P.
- Noise: Noise exposures will be controlled to comply with community noise regulations and acceptable OSHA worker exposure levels. The Contractor will minimally comply with 29 CFR 1926.52.
- Explosion Hazard: As required under the OSHA Permit-Required Confined Space Entry Standard and Standards for Excavations (29 CFR 1910.146 and 29 CFR 1926.650-.652, respectively), confined spaces and excavations must be tested, prior to entry, for oxygen-deficiency, combustible gases, and toxic gases.

7.0 SAFE WORK PRACTICES

These safe work practices are designed to protect site workers and visitors.

7.1 EMERGENCY RESPONSE

The following emergency response information is provided as per 29 CFR 1910.120(j).

A. Hospital Route Map

A hospital route map that includes the site location is included as Figure 7.1. Prior to commencement of field activities, the Project HSO will determine the general wind direction, evacuation routes, and standby locations (typically at least 100 feet upwind).

B. Emergency Contacts

A list of contacts and telephone numbers for the applicable local off-site emergency responders is provided in Table 7.1. This list must be posted in the on-site project office and in the vicinity of telephones that may be used in an emergency, as appropriate. The nature of the site work and contaminants of concern should be reviewed with the off-site responders before work begins on this project.

C. Emergency Response Equipment

The following emergency response equipment is required for this project and shall be readily available.

- X Field First Aid Kit
- X Fire Extinguisher
- X Eyewash (Note: 15 minutes of free-flowing fresh water)
- ___ Shower
- ____ Other:

D. Communication

The emergency response communication system for the site is:

X Verbal
X Two-way radio
X Cellular telephone
X Hand signals:
Hand gripping throat.....Out of air, can't breathe
Grip partner's wrist or
both hands around waist…… Leave area immediately
Hands on top of head……Need assistance
Thumbs up…… OK, I am all right, I understand
Thumbs down……No, negative
__ Horn
__ Siren
__ Other:

E. Emergency Response Procedures

In the event that an on-site emergency develops, the procedures delineated in Table 7.2 are to be followed immediately. The types of emergencies that could occur on the project site include fire, medical, and cave in emergencies.

The following steps are taken in the event of fire to reduce the possibility of the spread of contamination and to assure that individuals are not exposed above acceptable limits:

- If a fire occurs, trained Contractor employees equipped with the proper respiratory protection gear will attempt to suppress it using hand-held fire extinguishers.
- The Project HSO and the Remedial Action Contractor Safety Coordinator will be notified at once.
- The local fire department is notified by the Project HSO if the fire cannot be handled safely by contractor employees.
- If necessary, the site will be evacuated using the preplanned routes as defined by the Project HSO and Remedial Action Contractor Safety Coordinator.

The procedures listed below are to be followed in case of worker injury. When the medical situation allows, precautions to prevent the spread of contamination are taken.

These may include:

- Removing the injured individual's contaminated clothing and protective equipment within the Exclusion Zone
- Wrapping the injured individual in sheets to contain contamination
- The use of plastic sheeting to protect ambulance interiors and hospital facilities from becoming contaminated
- The use of protective clothing and contamination control techniques by rescue and medical facility

Note: Medical actions will always take priority.

A map with directions to the emergency medical facility will be posted at each telephone (see Figure 7.1). Before the start of hazardous work, communication will be conducted with the emergency responders, local medical facility, and hazardous material response team located in the vicinity of the site. Items to be discussed include types of responses, hazards at site, control programs, notification procedures, and lines of authority.

In addition to the incident report form, a critique of the response will be prepared. This critique will describe the emergency, the responders, actions taken, and recommendations for improvement. The

critique will also be discussed with the affected personnel for use as a training tool and to provide them with an opportunity for their input. The report and critique will be prepared by the Project HSO and the Remedial Action Contractor Safety Coordinator.
The basic outline of the fire alarm program is as follows:

- The alarm system, three short blasts of an air horn, will be activated when any on-site personnel notices the presence of a fire.
- As soon as the initial alarm to on-site personnel is completed and evacuation is under way, outside assistance will be immediately requested if deemed necessary by the Project HSO.
- Personnel not involved in on-site emergency response procedures will evacuate to an area upwind of the fire. If the fire can be treated with a fire extinguisher, personnel closest to the fire will obtain a fire extinguisher and attempt to extinguish the fire. This will be attempted only if there is minimum risk to the personnel involved. Site personnel will have received training in the use of fire extinguishers.

Within 48 hours after an emergency response, the Incident Report Form provided in Appendix B shall be completed and returned to the Project HSO, who will forward a copy to Olin.

7.2 HAZARD COMMUNICATION

The following procedures shall be followed for all chemicals brought on site:

- Chemical containers (primary and secondary) shall be correctly and clearly labeled with the name of the chemical and the hazard(s) associated with that chemical (e.g. flammable, corrosive).
- Workers will be trained on the hazards of these chemicals.

A Material Safety Data Sheet (MSDS) for each chemical brought on the site will be readily available in a master file for the project at the site office. Contractors are responsible for supplying MSDSs to the Project HSO in advance for materials that will be brought onto the site. The Project HSO is responsible for reviewing the MSDSs for the proposed materials, making an approval decision, and maintaining the MSDS master file. When chemicals are used on site, workers must adhere to their company's Hazard Communication Program (29 CFR 1910.1200) and the requirements of this Plan. The following chemicals may be used during this project.

- Alconox (low phosphate detergent)
- Acetone
- Hydrocloric Acid (10 – 33 percent)
- Methanol
- Nitric Acid (50 – 70 percent)
- Sulfuric Acid (57 percent)
- Hexane
- Sodium thiosulfate
- Diesel fuel
- Gasoline
- Petroleum lubricating grease
- Petroleum lubricating oil
- Concrete
- Asphaltic concrete

Material Safety Data Sheets (MSDS's) for these chemicals are provided in Appendix C.

7.3 ACCIDENT PREVENTION Program

During all active site work, the Project HSO will implement and maintain an Accident Prevention Program to ensure safe, accident-free completion of the site work. The Remedial Action Contractor Safety Coordinator will be directly responsible for enforcing the Accident Prevention Program for the Contractor and subcontractor personnel and will report directly to the Project HSO any unsafe site activities as they occur.

A comprehensive Accident Prevention Program has been developed by Sevenson which follows the requirements listed in 29 CFR 1926. Some of the more important features of the program are:

- Statement of policy
- Delegation of responsibility
- Self-inspection guide
- Safety meetings
- Outline of topics suitable for safety meetings
- Fire prevention program
- Posting requirements
- Assured equipment grounding conductor program
- Policy for violation of safety rules
- Accident investigation
- General safety rules for workers
- Lock out/tag out procedure

The hazards that are expected to be encountered by site personnel, other than worker exposure to the contaminants, and heat stress due to the wearing of protective equipment, are common to construction work. Some of these hazards and their applicable OSHA regulations are:

Electrical - (1926.400)

Motorized equipment - (1926.600-604)

Fire protection and prevention - (1926.150-152)

Excavations - (1926.650-652) 1910.178(h)

The Project HSO will be responsible for the administration of the Accident Prevention Program. The Project HSO will be responsible for the implementation and overview of the Program and will manage the Program on a daily basis. The Remedial Action Contractor Safety Coordinator will determine whether safety rules are being violated by their employees or subcontractors, advise the employee on the proper procedures(s), initiate any disciplinary action which may be required, conduct the daily safety inspections, investigate all accidents, and make recommendations that will correct all unsafe conditions. It is anticipated that all phases of the project will have essentially the same types of hazards present, and there will be no change in the emphasis of the Accident Prevention Program.

All contractors and subcontractors will be required to follow the Accident Prevention Program. Personnel will be trained by the Project HSO in the content and procedures associated with the program. The Remedial Action Contractor Safety Coordinator will be responsible to determine its subcontractor compliance with this Program. The Project HSO will also be responsible to determine the Construction QA/QC Contractor's compliance with this program.

Weekly Monday morning safety meetings will be conducted by the Project HSO. The topics will be developed in conjunction with the Remedial Action Contractor Safety Coordinator and Contractor's CIH. All on-site personnel will be required to attend the safety meetings. A log will be kept of the attendees and subjects covered.

Basic fire prevention measures will be followed. A fire alarm plan is included in Section 7.1. The site will be kept in a neat and orderly fashion. Non-contaminated refuse will be disposed of on a regular basis. The disposal of contaminated material is discussed in Section 7.5.

Equipment will be inspected daily by the operator prior to operation. Motorized equipment will be checked to see that brake and steering mechanisms are in working order as well that all alarm systems and safety guards are operational. Electrical equipment will be checked to determine whether it is properly grounded and there are no frayed cords or other obvious defects.

There will be one person on-site at all times trained and certified in First Aid and Cardiopulmonary Resuscitation (CPR). There will also be a First Aid kit located in the site office. Injuries and/or illnesses will be reported to the Remedial Action Contractor Safety Coordinator or Project HSO who will then decide on the proper course of treatment i.e., routine first aid or emergency medical treatment. The emergency medical treatment facility and the route to be followed to get there is discussed in another section of this plan.

Accidents will be reported to the Project HSO who will then investigate the accident and make recommendations to prevent its reoccurrence. All reports will be filed using the Incident Report Form (Appendix B). The Project HSO and Remedial Action Contractor Safety Coordinator will make a daily safety inspection of the site. All safety hazards identified will be immediately corrected.

Cutting and welding operations, if required, will require a permit signed by the Remedial Action Contractor Safety Coordinator. The permit will require the following information:

- Percent oxygen level
- Percent of lower flammable limit
- Vapor concentration
- Availability of fire extinguisher
- Location of nearest combustibles
- Welding/burning operations in compliance with OSHA regulation 1910.252

The testing of the atmosphere will be the Contractor's responsibility. A copy of the permit will be maintained in the Project HSO's project files.

7.4 CONFINED SPACES

A confined space entry program will be required when workers enter into tanks, excavations, sewers, and buildings with limited access, or any place with limited ventilation. Prior to entry into a confined space, the Contractor will review with the affected personnel all potential hazards, proper work procedures, required safety equipment, and emergency procedures.

As part of the Contractor's program and planning, the following actions will be completed prior to entry:

- Determine whether the confined space is a permit or non-permit space.
- Pre-plan all operations with those both directly and indirectly involved, including rescue teams.
- Notify the Project HSO and other proper authorities of the jurisdiction of the planned entry and actions to be taken.
- Review emergency signals with all involved in the confined space entry.
- Have a completely filled out list of emergency telephone numbers for police, fire, hospital, and emergency rescue units. Have clear directions and map of route to nearest hospital and emergency treatment facility.
- A minimum of three workers are required for confined space operations. Personnel must be trained to work safely in and around the permit space and the requirements of the OSHA standard.
- Have safety equipment listed above readily available.
- Mechanical equipment will be thoroughly checked and in proper working order prior to initiating any confined space activities.

- Retrieval lines and safety harnesses should be checked for unusual signs of wear and self-contained breathing apparatus shall be fully charged.
- Portable gas detectors will be re-zeroed daily or more often, if necessary, and calibrated per manufacturer's instructions.
- Blank off, bleed, block, secure, and isolate the confined space to a zero-mechanical state.
- Lock-out and tag-out all electrical and mechanical equipment. Verify it is properly locked out by attempting to start equipment.
- All manholes, pump station wet wells, and confined spaces shall be considered dangerous before entry until proven safe.
- Prepare a Confined Space Entry Permit for each manhole or other confined space to be entered.

The following air tests will be taken:

- Oxygen level - An oxygen-deficient atmosphere has a percent oxygen concentration below 19.5%. An oxygen-enriched atmosphere is above 22%.
- HNU readings for presence of organic vapors - Any organic vapor concentration will be considered excessive, until the compound is identified.
- Combustible gas meter readings for potentially explosive atmospheres - A flammable atmosphere has a reading above 10% of the Lower Explosive Limit (LEL).
- Hydrogen sulfide meter for the detection of H_2S - Excessive hydrogen sulfide concentrations occur when the measured level is above 5 ppm. This testing will occur at all depths (top to bottom) of the confined space.

If necessary, the Contractor will provide for the ventilation of the confined space prior to workers entering and during all phases of work. A positive draft will be maintained into the confined space. The Contractor will also continuously monitor the atmosphere of the confined space using portable, combustible gas, oxygen deficiency, and hydrogen sulfide detectors during activities that require workers to enter the confined space.

Finally, the Contractor will verify that the confined space is isolated from all unwanted forms of energy and material. This can be done by verifying that lock-out/tag-out systems have not been tampered with. After this check, the Contractor will attempt to restart equipment as part of verification. During entry, the Contractor will:

- Visually inspect ladder rungs for corrosion, if necessary.
- Work will take place with adequate lighting provided.
- Monitor atmosphere using a combustible gas, oxygen deficiency, and hydrogen sulfide detector when work is being performed.
- Use safety harness at all times with a minimum of ½ inch nylon rope retrieval line attached.
- The trailing end of the retrieval line must be tied to the portable hoist assembly lifting device or to an anchor point outside the confined space.
- When using SCBAs, the buddy system shall be used. Two persons (entrants) wearing SCBAs shall be in the confined space.
- Outside attendant/observer shall keep an accurate count of all entrants and maintain effective and continuous contact with entrants.
- At least one crew member (attendant), shall keep a constant watch and a continuous hold on the retrieval line of the worker in the confined space, whenever a portable hoist is not being used. The end of the line must be secured to an anchor point outside the entry portal.
- The attendant shall recognize potential signs of trouble from those within the confined space. The attendant shall have sufficient training to recognize the potential hazardous activities both inside and outside the confined space.
- Tools shall be lowered by a line and never thrown into a manhole or other confined space.
- Contractor crew members shall wear proper work shoes, hard hats, and reflective traffic vests.

- When the confined space is re-entered, the atmosphere must be re-tested if testing has stopped.
- The attendant should not attempt a rescue unless another observer or back-up person arrives and only if trained to attempt a rescue and has proper rescue equipment. If not trained, the attendant will call for professional emergency rescue crews.
- In the event of a rescue or extrication of a person from the lower level of the confined space, an additional rescue person is needed on the platform level to assist in guiding the injured worker out of the confined space.

A copy of the confined space entry permit, which is to be posted at the entry into the space, and a copy of the training certification form will be furnished to the Project HSO and maintained in the project master files.

7.5 PERSONAL AND EQUIPMENT DECONTAMINATION

The Contractor will provide and require the use of:

- Contained storage and disposal for used disposable outerwear.
- Hand/face washing facilities.
- A facility for changing into and out of and storing work clothing separate from street clothing.
- A lunch and/or break room.

The features of the personal decontamination facilities include:

- Provisions for workers leaving the Exclusion Zone and Contamination Reduction Zones to remove protective outer clothing and wash face and hands before eating.
- Provisions for workers leaving the Exclusion Zones and Contamination Reduction Zones to remove clothing and undergarments before leaving the work site.
- Wastewater from sinks and the floor drains from any temporary facilities shall be piped to a sanitary holding tank.
- Provisions for washing contamination from boots and clothing.
- Pure (non-perfumed) liquid soap will be used.

Personnel decontamination consists of the following steps:

- Disposable PPE will be removed and discarded into properly labeled "contaminated material" impermeable receptacles.
- At the end of the workday non-disposable PPE such as respirators will be washed in a low sudsing detergent, rinsed with warm water, and wiped dry with a disposable cloth.
- Decontaminated PPE will be stored in a secure area of the Support Zone.
- Personnel who have worked in the Exclusion Zone will be required wash their hands and face prior to eating and/or smoking.

Equipment decontamination will consist of the following steps:

- Equipment in the Exclusion Zone will be assumed to be contaminated and will be decontaminated in the Contamination Reduction Zone.
- No vehicle shall leave the Contaminant Reduction Zone of the site until it has been properly inspected and approved by the Remedial Action Contractor Safety Coordinator for general cleanliness of frame and tires.
- No vehicle shall leave the site unless it is in a broom-clean condition, free of loose dirt or stabilized material on tailgates, axles, and wheels.
- The Project HSO or the Remedial Action Contractor Safety Coordinator shall be responsible for monitoring vehicles to confirm proper decontamination prior to exiting. Approval shall be based on visual inspection of all exposed surfaces.
- Wash water residues shall be collected and stored in a secured area on-site and assumed to be hazardous waste until analyzed by a validated laboratory. Based on analytical results and discharge standards allowed by NYSDEC, the wash water shall either be treated or discharged directly to the Olin process sewer.
- Personnel engaged in vehicle decontamination shall wear protective equipment including appropriate protective clothing and respiratory protection consistent with the established Health and Safety program.
- The Contractor will provide an equipment decontamination pad within each Contamination Reduction Zone for removing soil from all equipment leaving the work area. At a minimum, this shall include a high-pressure wash area for equipment and vehicles and a steam cleaning system for use after the mud and/or dirt has been cleaned from the equipment. A special "clean area" should be established for performing equipment maintenance. This area should be used when personnel are required by normal practices to come in contact with soil, (i.e., vehicle repair). Equipment being decontaminated by washdown shall be located in the Contamination Reduction Zone prior to maintenance work. Decontamination waters will be collected on site for treatment or disposal in the Olin process sewer.

Site workers will follow the decontamination procedures listed in Table 7.3 to decontaminate their PPE.

7.6 HEAT STRESS

Heat stress is one of the most common hazards encountered at a site, and there are a number of factors which have an effect in determining the amount of heat stress experienced by an individual worker. These factors include environmental conditions, type of clothing worn, workload, and individual characteristics. Since heat stress is a common hazard and has the potential to become a serious illness, a program has been developed to protect site workers.

Workers will be trained in the following:

- Individual factors which influence an individual's susceptibility to heat

- Environmental characteristics such as temperature, humidity, wind speed, and cloud cover
- Body response to heat
- Effect of personal protective equipment and workload
- The various types of heat disorders and their associated symptoms
- The heat stress program - acclimatization, monitoring, work/rest regimen, and fluid intake (balanced electrolytic fluids)

Training for the heat stress program will be conducted at the time of the initial training. Monitoring will be initiated when the ambient air temperature in the work area is 70°F or greater. The monitoring frequency will depend upon the temperature and the type of protective clothing worn. As the temperature increases, the monitoring will become more frequent. Also, if a worker is wearing impermeable protective clothing, the frequency of monitoring will increase. For example, at 72.5°F (adjusted temperature)[1] and wearing an impermeable suit, a worker will be monitored after every 120 minutes.

The monitoring will include:

- Heart rate
- Body temperature (oral)
- Body water loss (if required)

The heart rate will be determined for 30 seconds as soon as practicable during the rest period. If this heart rate exceeds 110 beats per minute, the next work cycle will be shortened by one third.

The temperature will also be taken at the end of the work period. If the temperature exceeds 99.6°F, then the next work cycle will be shortened by one third. If the worker's body temperature exceeds 100.6°F, that worker will not be assigned work which requires an impermeable protective suit.

If the heat stress conditions become severe, then the Project HSO or Remedial Action Contractor Safety Coordinator will recommend that body water loss be determined. The worker will be weighed, and the total body water loss will be kept below 1.5 percent body weight loss in a work day.

The length of the work cycle will depend upon the monitoring cycle. The length of the rest cycle depends upon the physical monitoring results. The initial rest period will be 15 minutes (minimum) in duration. During the 15-minute rest period the body will usually return to normal. If not, the rest period will then be increased to ensure that a normal condition is reached.

7.7 MEDICAL SURVEILLANCE

The services of physicians who are board certified in occupational medicine will be used to supervise the medical surveillance program.

The medical examination will typically consist of:

- Medical History
- General Physical, including evaluation of all major organ systems
- Pulmonary Function Examination (at least FVC and FEV 1.0)
- Electrocardiogram
- Stress Test (optional physician's discretion)
- Chest X-Ray (Baseline, one scheduled every 10 years, or upon leaving employment)
- Otoscopic Examination
- Audiometric Examination
- Visual Acuity Examination
- Blood Tests, Blood Count, Blood Profile - (SMAC 25)
- Tetanus Shot

[1] Adjusted Temperature = Air Temperature + (13) x % Sunshine

- Urine for Mercury

A baseline examination will be given prior to the start of work activities. Medical examinations will be repeated in the following conditions:

- More than two years have passed since the worker's last examination.
- The worker experiences an acute exposure to a toxic, hazardous material or an injury.
- The examining physician, the Construction QA/QC Manager, the Project HSO, or the Remedial Action Contractor Safety Coordinator recommends one.
- At the request of a worker with demonstrated symptoms of exposure to toxic or hazardous materials.

A certification will be obtained from the occupational physician that the worker is medically fit to wear respiratory protection and has no medical condition that would place him at an increased risk. No worker will be permitted to work in the Exclusion Zone until this certificate has been submitted.
If a worker who works in the Exclusion and/or Contamination Reduction Zone is taking prescription medicines, this information will be transmitted to the consulting occupational health physician who will make a determination whether this drug enhances the effect of the contaminants present on-site. Medical records will be kept for at least 30 years by the worker's employer.

7.8 LEVELS OF PROTECTION/PERSONAL PROTECTIVE EQUIPMENT

The Contractor will provide its personnel with the necessary protective clothing and equipment and maintain that equipment in accordance with the manufacturer's specifications. The Project HSO will provide necessary protective clothing and equipment for other personnel and for site visitors. Equipment will be NIOSH-approved.
Personnel who are required to wear a respirator will have to pass a fit test given in accordance with 29 CFR 1926.58. Respirators will not be interchanged between workers without cleaning and sanitizing. Cartridges will be changed daily or upon increased resistance.
Prescription glasses worn on-site will be safety glasses. Prescription lens inserts will be provided for workers who wear a full-face air-purifying respirator.
Personal protective equipment worn on-site will be decontaminated or properly disposed of at the end of the work day. The following are the various levels of protection that will be in effect for this project.

Level D

- Work Clothing, as dictated by the weather
- Work shoes or boots
- Hard hat
- Safety glasses, goggles, or face shield
- Hearing Protection (for noisy areas)
- Gloves

Modified Level D

- Work clothing as dictated by weather
- Work shoes or boots
- Safety glasses, goggles, or face shield
- Hearing Protection (for noisy areas)
- Coveralls (Tyvek or equivalent)
- Nitrile gloves
- Hard hat
- Chemical-resistant, washable safety boots (neoprene or equivalent)

Level C

- Full-face air purifying respirator with combination organic vapor cartridges and High Efficiency Particulate Air (HEPA) filters and Mersorb Cartridges
- Chemical-resistant suit
- Latex inner gloves
- Chemical-resistant outer gloves (neoprene or equivalent)
- Chemical-resistant, washable safety boots (neoprene or equivalent)
- Work shoes or boots
- Hard hat
- Hearing Protection (for noisy areas)

Level B

- Positive pressure, full facepiece SCBA or positive pressure supplied air respirator with escape breathing apparatus (MSHA/NIOSH Approved)
- Chemical-resistant suit with attached hood
- Latex inner gloves
- Chemical-resistant outer gloves (neoprene or equivalent)
- Established communication system
- Hard hat
- Chemical-resistant, washable safety boots (neoprene or equivalent)
- Boots - Inner (Work shoe)

The initial minimum level of protection for each major site activity is outlined below. Personnel will conform to the initial levels of protection unless an upgrade or downgrade is warranted by air monitoring data and an evaluation of work practices/controls.

PROJECT TASK	ANTICIPATED INITIAL LEVEL OF PROTECTION
Mobilization	D
Temporary Facilities	D
Temporary Erosion and Sediment Control	Modified D
Clearing and Grubbing	Modified D
Site Demolition and Handling of Debris	Modified D
Construction Dewatering	Modified D
Abandonment and Reconstruction of Facilities	Modified D
Site Grading and Preparation of Subgrade for Asphalt Cover	Modified D
Storm Drainage System Construction	Modified D
Fencing	Modified D

PROJECT TASK	ANTICIPATED INITIAL LEVEL OF PROTECTION
Aggregate Base Course	Modified D
Asphalt Concrete Cover	D
Site Access Grading and Paving (outside limits of cover)	D
Permanent Erosion Control	D
Demobilization	D

Personal protective equipment downgrade will only occur when:

- The Remedial Action Contractor Safety Coordinator makes the change based on-site activity, air monitoring of contaminant levels, and work place practices as specified in this plan.
- The Project HSO approves the change with the knowledge and approval of the Construction QA/QC Manager.
- Changes in Level of Protection will be transmitted in writing to Olin's Representatives. These changes will be amended to the HASP.

The following provisions apply to respiratory protection:

- Workers who are required to wear respirators must pass a pulmonary function test.
- Each time a respirator is donned the worker must perform a positive pressure/negative pressure fit test.
- No facial hair which interferes with a satisfactory fit is permitted. A "one day" growth of beard is considered to interfere with the fit.
- Cartridges and filters shall be changed daily or more frequently if breakthrough or increased resistance occurs.

7.9 SAFETY TRAINING

Personnel assigned to or entering the site will be provided with complete training or refresher sessions prior to entering the site. A Site Safety Orientation will be provided by the Remedial Action Contractor Safety Coordinator or Project HSO. Training and refresher sessions will ensure that personnel are capable of and familiar with the use of safety, health, respiratory, and protective equipment and with the safety and security procedures required for this site. The training session will include the OSHA-mandated 40 hour training course for new contractor personnel, as well as 8-hour refresher courses for those persons who have had not had refresher training within 13 months. Documentation will be available to Project HSO that each worker or subcontractor worker has satisfied the requirements of the OSHA training regulation 1910.120(e). There will be at least one person present on-site who will be trained and certified in First Aid and CPR.

In addition, individuals functioning in a supervisory capacity will have an additional eight hours of specialized supervisory training. Individuals who function independently of an immediate supervisor will have had a minimum of three days of actual field experience under a skilled supervisor.

The Remedial Action Contractor Safety Coordinator or Project HSO will provide and conduct a site-specific program on-site for site personnel prior to commencing work within the Exclusion Zone. This training program will address as a minimum the following topics:

- Potential hazards
- Biology, chemistry, and physics of hazardous materials

- Rights and responsibilities of workers under OSHA, and the Hazard Communication Program
- Standard safety operating procedures
- Types of monitoring equipment to be used
- Project HASP
- Internal and external communications
- Medical surveillance program
- Personal protective clothing and equipment
- Respiratory equipment including training and qualitative fit-testing for full facepiece respirators
- Air monitoring program
- Decontamination procedures
- Evacuation, first aid, and emergency procedures dealing with fire and medical situations
- Work zones established at the site
- Safe work practices associated with worker's work assignment, including dust control measures, hazardous materials recognition, and use of the buddy system
- Basic operational safety, emphasizing hazards expected on-site
- Prohibitions (inside Exclusion and Contamination Reduction Zones), including
  - Glasses or facial hair, such as beards or long sideburns, which interfere with respirator fit when respirators are required
  - Contact lenses
  - Eating, drinking, smoking, chewing in the Exclusion or Contamination Reduction Zone
  - Wearing of personal articles, e.g. watches, rings
  - Working when ill
- Use of Self-Contained Breathing Apparatus (SCBA) and emergency supplied air respirators
- Confined space
- Excavation
- Lockout/tag out

Personnel assigned to the site will receive safety and health training. Upon completion of this training, a training acknowledgment log will be completed.

The training acknowledgment logs will include provisions for the following information:

- Employee or visitor's name
- Verification of topics covered, including:
  - Materials used
  - Equipment demonstration
  - Hands-on equipment practice for each worker
  - Prohibitions covered
  - Buddy-System explanation
  - Standard operating procedures
- Date and signature

On-site personnel, contractor and subcontractor(s) and owner representatives, will participate in daily safety tailgate meetings that address the health and safety concerns presented by the day's tasks. Training attendance and participation shall be documented in a training log. A copy of the logs will be provided to the Project HSO by the Remedial Action Contractor Safety Coordinator.

Visitors will be required to undergo a training program conducted by the Project HSO providing the training does not prevent the Project HSO from performing his designated duties consequently causing a delay in site work. The training will consist of:

- Hazards present at the site
- Effects of these hazards
- Progress of work and the relationship of the present work in regard to the type of hazards that may be encountered
- Emergency signals and procedures
- Type and limitations of personal protective equipment in use
- Proper use of protective equipment
- General safety rules and policies in effect at the site
- Completion of a training acknowledgment log

7.10 EXCAVATION AND CONSTRUCTION

The following steps will be taken prior to and during all excavation activities:

- Utility lines will be located and disconnected before digging near them.
- Trenches, greater than 5 feet in depth or in the opinion of the competent person when soil conditions such as moisture and consistency may require protection, will be shored or sloped in accordance with OSHA Regulation 1926.650-652 including Appendices A,B,C. A copy of 1926.650 is on-site for the use of the Remedial Action Contractor Safety Coordinator.
- Where workers are required to enter into trenches greater than 4 feet in depth suitable means of access and egress such as a ladder will be provided within 25 feet.
- A visible barrier or fence will be erected at the edge of any open excavation.
- Neither heavy equipment nor excavated material will be placed closer to the edge than ½ the depth of the excavation.

The following general rules will be adhered to during construction activity:

- Mobile equipment will be provided with working back-up alarms, brakes, and shut-off switches.
- Operators shall not leave their equipment while it is running.
- A daily inspection will be made by the Remedial Action Contractor Safety Coordinator to determine compliance with this plan.
- Illumination in the working zone will be a minimum of 5 foot candles. Supplementary lighting will be provided, if necessary.
- Electrical installations will be in compliance with the 1990 edition of the National Electric Code.
- Electrical equipment will be grounded and further protected by the use of ground fault circuit interrupters.
- An adequate number of toilet facilities will be provided. There will be at least one toilet for every twenty workers.
- A source of potable water will be provided.
- An on-site wash facility will be provided.
- Food will only be consumed in prescribed clean locations.
-

7.11 EMERGENCY EQUIPMENT AND FIRST AID REQUIREMENTS

The following emergency and first aid equipment will be provided by the Contractor:

- Industrial type first aid kit which includes a burn kit

- 20A-80B:C; 2A:10B:C; and 5-B:C fire extinguishers
- Stretcher
- Emergency eye wash units which provide 15 minutes of fresh water to the eyes and shower units
- Spill kit consisting of shovels, drums, and absorbent material
- Self-contained breathing apparatuses located in the CRZ

One emergency eye wash unit and one 2A:10B:C fire extinguisher will be placed in each Contamination Reduction Zone. First Aid units will be located at a manned location. In isolated work areas, they will be located in close proximity to the work.
Fire extinguishers will also be placed at:

- Engineer's Office
- Construction Equipment
- Contractor's Office Trailer

All emergency equipment will be checked weekly to determine its availability and whether it is functioning properly by the Remedial Action Contractor Safety Coordinator. The Project HSO will verify these checks.

7.12 SPILL CONTAINMENT

The potential hazards depend, in part, upon the physical properties and the basic characteristics of the spill material (i.e., is it volatile, heavier or lighter than water, water soluble, solid/liquid/semi-liquid?)
Potential hazards that may exist due to a release of liquid to land include:

- Exposure to vapors of volatile organics when liquid is released and during containment
- Back strain and muscle fatigue due to lifting and shoveling techniques
- Slipping on wet, muddy surfaces created by spilled liquid
- Electrical hazards associated with use of electrical equipment around water or wet surfaces
- Possible liquid splashing in eyes and on skin during containment

Planning is essential in order to be prepared to contain and isolate releases of hazardous materials.

- To minimize exposure to volatiles from the spill, a monitoring instrument (HNU, OVA) should be placed near the spill to monitor organic vapor concentrations. The breathing zone will also be monitored. The action levels must be identified before site work begins, and will be outlined in the safety plan. To prevent contact with contaminated liquids or soils, adequate protective equipment will be provided.
- Back strain can be prevented by employing proper lifting techniques.
- Slipping on wet surfaces can be minimized by taking care and remaining out of the spill itself. Also, if the area is wet, wear boots with good treads and be alert of where personnel are walking to decrease the chance of slipping.
- Ground fault interrupter should be used in the absence of properly grounded circuitry or when pumps are used around wet conditions.
- Electrical extension cords should be protected or guarded from damage (i.e., cuts from other machinery) and be maintained in good condition.
- Eye and skin protection should be worn as appropriate to prevent water splashing into eyes and on to skin.

To quickly respond to a spill, the following actions should be followed:

- Evaluate surface topography and drainage patterns so that spill can be contained to as small an area as possible.

- Respond rapidly to prevent spill material from entering sewers, surface water bodies, or infiltrating into the ground.
- Intercept spill at point downstream with dams or dikes using materials available at the site.
- Maintain supplies at a site where major spills may occur; e.g., shovel, pick, sandbags, granular sorbent, plastic sheeting, sorbent pillows/socks/booms, and salvage drums and pump.
- Use plastic sheets to block off manhole covers, sewer gates, etc. Dig diversion ditches if necessary to divert spills away from entry points or to divert spill into a catch basin or diked area for subsequent recovery.

7.13 HEARING CONSERVATION

When noisy operations make normal conversation difficult, sound level pressure meter readings will be taken to document noise exposure to on-site personnel. Previous sound level pressure readings have been taken and it has been determined that the heavy equipment exceeds 85 dBA. Therefore, operators and laborers in close proximity to the equipment will participate in a hearing conservation program. The hearing conservation program will consist of the use of personal protection (ear plugs or muffs), audiometric examinations, and worker training. On-site contract workers are given the audiometric examination and the training.

7.14 BIOLOGICAL HAZARDS

The biological hazards that could be encountered by site personnel include, but are not limited to, the following:

- Poisonous snakes, spiders, and scorpions
- Stinging insects
- Ticks and chiggers
- Poisonous plants (e.g., poison sumac, poison ivy, poison oak)
- Bloodborne pathogens

Control measures to help protect site personnel from these biological hazards are presented below.

Poisonous Snakes, Spiders, and Scorpions

Reactions from snakebite are aggravated by acute fear and anxiety. Other factors that affect the severity of local and general reaction from a poisonous snakebite include: the amount of venom injected and the speed of absorption of venom into the victim's circulation; the size of the victim; protection from clothing, including shoes and gloves; quick anti-venom therapy; and location of the bite.

Spiders in the United States are generally harmless, with two notable exceptions: the Black Widow spider (Latrodectus Mactans) and the Brown Recluse or violin spider (Lox Osceles Reclusa). The symptoms of a Black Widow spider bite are: slight local reaction, severe pain produced by nerve toxin, profuse sweating, nausea, painful cramps in abdominal muscles, and difficulty in breathing and speaking. Victims recover in almost all cases, but an occasional death is reported. Field personnel should exercise caution when lifting logs, rocks, covers to manholes, and sumps.

First Aid Procedures (Snakebite)

The objective of first aid is to reduce the circulation of blood through the bite area, to delay absorption of venom, to prevent aggravation of the local wound, and to sustain respiration. Several steps are listed to properly care for a snakebite victim. The most important step is to get the snakebite victim to the hospital quickly. In the interim, take the following first aid measures:

- Keep the victim from moving around.

- Keep the victim as calm as possible and preferably in a lying position.
- Immobilize the bitten extremity and keep it at or below heart level. If the victim can reach a hospital within 4 to 5 hours and if no symptoms develop, no further first aid measures need to be applied.
- If mild-to-moderate symptoms develop, apply a constricting band 2 to 4 inches above the bite, but not around a joint (the elbow, knee, wrist, or ankle) and not around the head, neck, or trunk. The band should be ¾ to 1½ inches wide, not thin like a rubber band. The band should be snug but loose enough for a finger to be slipped underneath. Watch for swelling and loosen the band if it becomes too tight, but do not remove it. Periodically check the pulse in the extremity beyond the bite to insure that the blood flow has not stopped.

Several other factors must be considered in cases of snakebite:

- Shock. Keep the victim lying down and comfortable, and maintain his or her body temperature.
- Breathing and heartbeat. If breathing stops, give mouth-to-mouth resuscitation. If breathing stops and there is no pulse, perform CPR if you have been trained to do so.
- Identifying the snake. If you can kill the snake without risk or delay, bring it to the hospital for identification, but exercise extreme caution in handling the snake.
- Cleaning the bitten area. You may wash the bitten area with soap and water and blot it dry with sterile gauze. You may apply dressings and bandages, but only for a short period of time.
- Medicine to relieve pain. Do not give the victim alcohol, sedatives, aspirin, or any medicine containing aspirin. Consult a doctor or other medical personnel for specific medications that may be used.

It is not recommended that cold compresses, ice, dry ice, chemical ice packs, spray refrigerants, or other methods of cold therapy be used in the first aid treatment of snakebite.

General First Aid for Poisonous Insect Bites

For minor bites and stings use cold applications and soothing lotions, such as calamine. For more severe reactions, take the following first aid measures:

- Apply a constricting band above the injection site on the victim's arm or leg (between the site and the heart). Do not apply tightly. You should be able to slip your index finger under the band when it is in place. Give artificial respiration if necessary;
- Keep the affected part below the level of the victim's heart.
- If medical care is ready available, leave the band in place; otherwise, remove it after 30 minutes.
- Apply ice contained in a towel or plastic bag, or cold cloths, to the site of the sting or bite.
- Give home medicine, such as aspirin, for pain.
- If the victim has a history of allergic reactions to insect bites or is subject to attacks of hay fever or asthma, or if he or she is not promptly relieved of symptoms, call a physician or take the victim immediately to the nearest location where medical treatment is available. In a highly sensitive person, do not wait for symptoms to appear, since delay can be fatal.
- In case of a bee sting, remove and discard the stinging apparatus and venom sac.

Workers who have had severe allergic reactions to bee/wasp stings in the past will inform the Project HSO when they arrive at the site for the first time.

Ticks and Chiggers

Field personnel should be aware of the presence of ticks (i.e., deer tick) and chiggers at the site. Common carriers of ticks and chiggers are the white-footed mouse and white-tailed deer. The deer tick is about the size of a sesame seed, as distinguished from the dog tick, which is significantly larger. The deer tick is principally found along the Atlantic coast, living in grassy and wooded areas, and feeds on mammals such as mice, shrews, birds, raccoons, opossums, deer, and humans. Common diseases caused by ticks are presented in the following subsections.

Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp it

where the mouth parts enter the skin and tug gently, not firmly, until it releases its hold on the skin. Save the tick in a jar labeled with the date, body location of the bite, and the place where it may have been acquired. Wipe the bite thoroughly with an antiseptic. Seek medical attention in the event tick-related disease symptoms develop.

When in an area suspected of harboring ticks (grassy, bushy, or woodland area) the following precautions can minimize the changes of being bitten by a tick:

- Wear long pants and long-sleeved shirts that fit tightly at the ankles and wrists.
- Wear light colored clothing so ticks can be easily spotted.
- Wearing tick repellents may be useful.
- Inspect clothing frequently while in tick habitat.
- Inspect your head and body thoroughly when you return from the field.
- Remove any attached ticks by tugging with tweezers where the tick's mouth parts enter the skin. Do not squeeze or crush it.

Lyme Disease

Lyme disease is an illness caused by a bacterium which may be transmitted by the bite of a tick (Ixodes Dammini), commonly referred to as the "Deer Tick". Not all ticks are infected with the bacterium, however. When an infected tick bites, the bacterium is passed into the bloodstream of the host, where it multiplies. The various stages and symptoms of the disease are well recognized and, if detected early, can be treated with antibiotics.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash, which develops a few days to a few weeks after the bite of an infected tick. This may be accompanied by flu-like symptoms along with headache, stiff neck, fever, muscle aches, and/or general malaise. At this stage treatment by a physician is usually effective; but, if left too long, these early symptoms may disappear and more serious problems may follow. The most common late symptom of the untreated disease is arthritis. Other problems which may occur include meningitis and neurological and cardiac abnormalities. It is important to note that some people do not get the characteristic rash but progress directly to the later manifestations. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

Rocky Mountain Spotted Fever

In the eastern and southern United States this tick-borne disease is transmitted by the infected Dog Tick (Dermacentor Variabilis). It is important to note that the Dog Tick is significantly larger than the Deer Tick. Nearly all cases of infection occur in the spring and summer, generally several days after exposure to infected ticks. The onset of illness is abrupt and often accompanied by high fever, headache, chills, and severe weakness. After the fourth day of fever, victims develop a spotted pink rash that usually starts on the hands and feet and gradually extends to most of the body. As with Lyme disease, early detection and treatment significantly reduces the severity of illness. The disease responds to antibiotic therapy with tetracycline or chloramphenicol.

Other Tick-borne Diseases

Ticks transmit several other diseases, most of which are rare and occur only in specific areas. Babesiosis occurs mainly in the Cape Cod area and eastern Long Island. Colorado tick fever is similarly regional and occurs only among those who live or work at altitudes above 4,000 feet.

Poisonous Plants

The majority of skin reactions following contact with offending plants is allergic in nature and are characterized by general symptoms of headache and fever, itching, redness, and a rash.

Some of the most common and most severe allergic reactions result from contact with plants of the Poison Ivy group including Poison Ivy, Poison Oak and Poison Sumac. The most distinctive features of Poison Ivy and Poison Oak are their leaves, which are composed of three leaflets each. Both plants also have greenish-white flowers and berries that grow in clusters. Such plants produce a severe rash characterized by redness, blisters, swelling, and intense burning and itching. The victim can also develop a high fever and become very ill. Ordinarily, the rash begins within a few hours after

exposure, but it may be delayed for 24 to 48 hours.

First Aid Procedure

- Remove contaminated clothing.
- Wash all exposed areas thoroughly with soap and water, followed by rubbing alcohol.
- Apply calamine or other soothing skin lotion if the rash is mild.
- Seek medical advice if a severe reaction occurs, or if there is a known history of previous sensitivity.

7.15 BLOODBORNE PATHOGENS

(Refer to attachment at end of this section)

7.16 CONSTRUCTION WATER sampling

Potential Hazards

Hazards generally encountered during construction water sampling include the following:

- Exposure to vapors of organics when the storage vessel (i.e., frac tank) is initially opened.
- Back strain due to lifting bailers, pumps or other equipment and moving equipment.
- Slipping on wet, muddy surfaces created by spilled water.
- Electrical hazards associated with use of electrical equipment around water or wet surfaces.
- Possible water splashing in eyes during sampling.

Hazard Prevention

- To minimize exposure to volatiles when the tank is initially opened, a monitoring instrument (HNU, OVA) should be placed near the opening to monitor organic levels. The breathing zone should also be monitored. The action levels on the instruments should be chosen before site work begins, and should be outlined in the safety plan. To prevent contact with contaminated ground water, or product material, provide adequate protective equipment.
- Back strain can be prevented by employing proper lifting and bailing techniques. Heavy equipment should be only lifted with the legs, preferably using two or three personnel.
- Slipping on wet surfaces can be prevented by placing all purged water in drums for removal. Also, if the area is wet wear boots with good treads and be alert of where personnel are walking to decrease the change of slipping.
- Ground fault interrupter should be used in the absence of properly grounded circuitry or when pumps are used around wet conditions.
- Electrical extension cords should be protected or guarded from damage (i.e., cuts from other machinery) and be maintained in good condition.

8.0 RECORD KEEPING

Records documenting the implementation of this site safety and health plan will be maintained by the Contractor. The records will include:

- Training logs
- Daily logs
- Weekly reports
- Real time air monitoring
- Documentation of safety meetings
- Decontamination logs
- Monitoring equipment calibration sheets
- Permit for open flame or welding
- Confined space entry permit
- Incident Report
- Employee/visitor register
- Medical certifications
- Training certifications

A copy of the forms will be provided to the Project HSO for the project master file.

If an accident, an explosion or fire, or a release of toxic materials occurs during the course of the project, Owner's Representative will be contacted immediately and receive a written notification within 24 hours. The report shall include the following items:

- Name, organization, telephone number, and location of the person reporting
- Date and time of the accident/incident
- Location of the accident/incident, i.e., site location, facility name
- Brief summary of the accident/incident giving pertinent details including type of operation ongoing at the time of the accident/incident
- Cause of the accident/incident, if known
- Casualties (fatalities, disabling injuries)
- Details of any existing chemical hazard or contamination
- Estimated property damage, if applicable
- Nature of damage, effect on contract schedule
- Action taken by the Contractor and Project HSO to ensure safety and security
- Other damage or injuries sustained, public or private
- Current status of site

The Project HSO will notify Owner's Representative of all person(s) exposed at levels exceeding OSHA standards at the time of occurrence or determination and follow up in writing within 24 hours. This notification will include, but not be limited to, the date, time, and identify of individual(s) involved in the exposure episode, what the individual(s) were exposed to, the personal protective equipment worn during the exposure, and the steps taken to prevent recurrence.

At the end of the project, the following items shall be maintained in the project file:

_X_ HASP
_X_ Incident Response Forms (if applicable)
_X_ Air Monitoring Sampling Results

TABLES

TABLE 3.1
TRAINING/MEDICAL SURVEILLANCE/RESPIRATORY PROTECTION RECORD

Personnel	40-Hour Initial	8-Hour Supervisor (if applicable)	8-Hour Refresher	Hazard Comm.	Confined Space Entry (if applicable)	First Aid/CPR* (if applicable)	Medical Surveillance (if applicable)	Respirator Fit Test (if applicable)
	Date	Date	Date	Date	Date	Date	Date	Date

X Training/Test has been completed but date not available
*At least one worker must be trained in First Aid/CPR and must be included in the company's Bloodborne Pathogen Program

Prepared/Date: LS 6/24/99
Checked/Date: BI 6/30/99

TABLE 4.1
DIRECT-READ MONITORING IN ACTIVE WORK ZONE
Packard Road Parcel of Industrial Welding Site
Niagara Falls, New York

Monitored Constituent	Action Level	Location	Response
Total Organic Vapor	25 ppm Above Background	Active Work Area of the Exclusion Zone	Obtain a second sample within a time period of no less than 5 minutes but no more than 15 minutes; if the second sample reading exceeds 25 ppm above background, on-site workers wearing Level D+ will upgrade to Level C protection. Take appropriate action as directed by HSO in accordance with the HASP.
	25 - 250 ppm Above Background	Active Work Area of the Exclusion Zone	Obtain a second sample within a time period of no less than 5 minutes but no more than 15 minutes. Exposed workers will be in Level C protection. Take appropriate action as directed by the HSO in accordance with the HASP.
	250 ppm (Above background) for 2 successive readings within a 15 minute period.	Active Work Zone of the Exclusion Zone	Active work area will shut down. Level B protection will be used, and vapor control techniques will be implemented.
Mercury Vapor	<0.025 mg/m3	Active Work Area	Level D
	>0.025 <0.25 mg/m3	Active Work Area	Level C
	>0.25 mg/m3	Active Work Area	Stop work & determine cause of excessive vapor.
Respirable Particulates	250 $\mu g/m^3$	Active Work Area	Stop work and implement engineering controls.
Oxygen	<19.5 Percent	Excavation Area	Upgrade to level B PPE
Explosive Gases	>10% LEL	Excavation Area	Stop work and consult with Project HSO for further direction.

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Checked/Date: BI 6/30/99

TABLE 4.2
DIRECT-READ MONITORING AT SITE PERIMETER
Industrial Welding Site and American Legion Post Property
Niagara Falls, New York

Monitored Constituent	Action Level	Location	Response
Total Organic Vapor	Greater than 5 ppm above background	Site Perimeter	Stop work and implement engineering controls (e.g. water suppression or barriers of plastic on soil)
	Greater than 5 ppm above background but less than 25 ppm above background	Site Perimeter	Resume work if organic vapor 200 feet downwind of work area or ½ distance to nearest residential/commercial structure, whichever is less, is below 5 ppm above background
	25 Above background	Site Perimeter	Stop work and implement downwind air monitoring to insure vapor emission does not impact the nearest residential/commercial structure
	5 ppm Above background	200 feet downwind or ½ distance to nearest residential/commercia l structure	Halt work and monitor 20 Foot Zone around perimeter of nearest residential/commercial structure and persist with vapor suppression
	5 ppm Above background	20 Foot Zone around perimeter of nearest residential/commercia l structure	If levels persist for more than 30 minutes, notify emergency response contacts specified in Health and Safety Plan.
	10 ppm Above background	20 Foot Zone around perimeter of nearest residential/commercia l structure	Immediately notify emergency response contacts specified in Health and Safety Plan. Monitor at 30-minute intervals in the 20-Foot Zone. Resume work if two successive readings are below 5 ppm above background
Respirable Particulates	150 $\mu g/m^3$ above background	Site Perimeter	Implement engineering controls. Dust Suppression.

Site Perimeter - refers to the perimeter of the active work area

Prepared/Date: LS 6/24/99
Checked/Date: BI 6/30/99

TABLE 7.1
EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
FIRE AND POLICE DEPARTMENTS:	911		
HOSPITAL: Niagara Falls Memorial Hospital	911 [(716) 278-4000]		
PROJECT SAFETY AND HEALTH OFFICER: TBD	OFFICE:	PAGER:	
OWNER CONTACTS: Mike Bellotti: Olin, Charleston, TN Brian Vain: Niagara Falls Plant Niagara Falls Plant Guard House	OFFICE: (423)336-4587 (716) 278-6585 (716) 278-6469	MOBILE: (423) 596-1005	
CONSTRUCTION MANAGER: TBD	OFFICE:		
ENGINEER CONTACTS: Glenn Coffman (MACTEC)	OFFICE: (770) 421-3470	HOME: (770)451-7267	
Steve Lind (MACTEC)	OFFICE: (770)421-3543		
MACTEC CORPORATE SAFETY OFFICER: Scott Wells	OFFICE: (205) 733-7600	MOBILE: (256) 810-9346	
CONSTRUCTION QA/QC: TBD	OFFICE:		
NYSDEC: Jeff Konsella	(716) 851-7220		
NYSDOH: Dawn Hettrick	(800) 458-1158, Ext. 6309		
PROJECT MANAGER: Rick Marotte	OFFICE: (770) 421-3581	MOBILE: (404) 925-0055	
OTHER:			

Prepared/Date: LMS 9/28/06
Checked/Date: FKM 9/28/06

TABLE 7.2
EMERGENCY PROCEDURES

- The Project HSO (or alternate) should be immediately notified via the on-site communication system. The Project HSO assumes control of the emergency response.
- The Project HSO notifies the Construction Manager, the Construction Safety Coordinator and Owner Representative of the emergency. The Project HSO shall then contact the LAW Corporate Representatives.
- If applicable, the Project HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the Project HSO evacuates the site. Site workers should move to their respective refuge stations using the evacuation routes established prior to the start-up of the project.
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs, should be donned.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and/or shower.
- If a worker is injured, first aid shall be administered by certified first aid provider.
- Before continuing site operations after an emergency involving toxic gases, the Project HSO shall communicate with the Construction Safety Coordinator concerning proper resolution of the emergency and the need to upgrade PPE.
- An injured worker shall be decontaminated appropriately.
- After the response, the Project HSO shall follow-up with the required company reporting procedures, including the Incident Response Form (Appendix B).

Prepared/Date: LS 6/24/99
Checked/Date: BI 6/30/99

TABLE 7.3
DECONTAMINATION PROCEDURES
Task: Remedial Construction
Decontamination Solution: Nonionic and anionic detergent with surfactants

MODIFIED LEVEL D & LEVEL C		
Station 1:	Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2:	Outer Garment, Boots, and Gloves Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4: (Level C only)	Canister or Mask Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6: (Level C only)	Face Piece Removal	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Prepared/Date:LS 6/24/99
Checked/Date:BI 6/30/99

FIGURES

Source: USGS 7.5 Minute Topographic Quadrangle Map, Niagara Falls, New York Contour Interval = 5 feet (US), Updated 2001.

OLIN CORPORATION

NIAGARA FALLS, NEW YORK

Remedial Design Report: Industrial Welding Site - Operable Unit 3 (Packard Road Site)

SITE LOCATION MAP

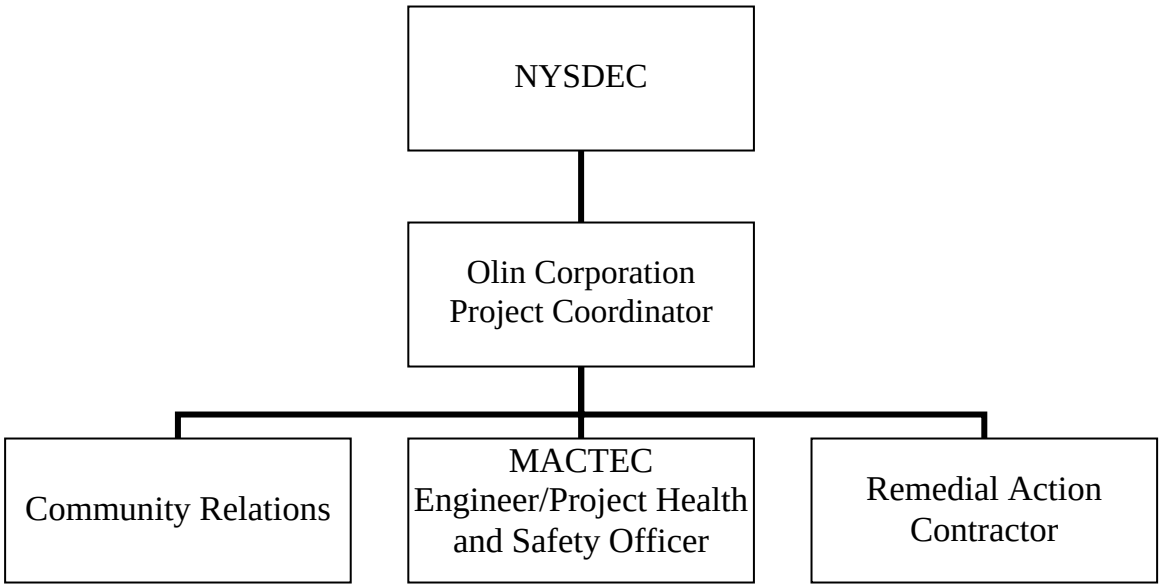
MACTEC ENGINEERING AND CONSULTING, INC.

MACTEC Project Number: 6300060001

FIGURE 1.1

APPENDIX A

Figure 2.1- Organizational Chart



CHEMICAL FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Lindane
CAS Number:
Synonyms:
BHC, benzene hexachloride

HEALTH HAZARD DATA

Color: white-yellow

Physical State: Solid X
Liquid
Gas

Odor: slightly musty

Odor Threshold: NA

Vapor Density: NA

Ionization Potential (IP): NA

IDLH: 50 mg/m³

Carcinogen: OSHA
IARC x
NTP x
ACGIH x
NIOSH

Skin absorbable yes x no
Skin corrosive: yes no

Signs/Symptoms of Acute Exposure:
Irritation of eyes, skin, respiratory tract, headache,nausea, breathing difficulty, muscle spasm

Source	TWA (units)	STEL (units)	C (units)
OSHA PEL	0.5 mg/m³		
ACGIH TLVs	0.5 mg/m³		
NIOSH RELs	0.5 mg/m³		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level

Checked by: Emmet F. Curtis Date: 2/15/00

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials
Suits: Butyl rubber
Gloves: Butyl rubber
Boots: Butyl rubber

Service Limit Concentration (ppm) NA

MUC 1/2 Mask APR=TWA x 10= 5 mg/m³
MUC Full-Face APR=TWA x 10= 5 mg/m³

FIRE/REACTIVITY DATA

Flash Point: Not flammable

LEL/UEL: Not flammable

Fire Extinguishing Media
Dry Chemical Foam
Water Spray CO_2

Incompatibilities:
Corrosive to metals. Decomposed by alkali

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

CHEMICAL FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name
Mercury
CAS Number:7439-97-6
Synonyms
Mercury metal, quicksilver
elemental mercury, colloidal mercur
metallic memrcury

HEALTH HAZARD DATA

Color: Silver-white

Physical State: Solid ___ Liquid X Gas ___

Odor: odorless

Odor Threshold: N/A

Vapor Density: N/A

Ionization Potential (IP): Unknown

IDLH: 10 mg/m³

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: yes X no ___

Skin corrosive: yes X no ___

Signs/Symptoms of Acute Exposure
Irritates eyes and skin, cough, chest pai
tremors, insomnia, difficult breathing
headache, irritability, weakness
salivation, GI disturbance

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs			0.1 mg/m³
ACGIH TLVs	0.025 mg/m³ (inorganic)		
NIOSH RELs	0.05 mg/m³ (vapor)		0.1 mg/m³

AIR MONITORING

Type	Brand/Mode No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Emmet F. Curtis Date: 10/4/2004

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials

Suits: ___

Gloves: Nitrile, Viton, Rubber

Boots: Rubber

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 0.25 mg/m³
MUC Full-Face APR = TWA x 10 = 0.25 mg/m³

FIRE/REACTIVITY DATA

Flash Point: N/A

LEL/UEL: N/A / N/A

Fire Extinguishing Media
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities
Acetylene, ammonia, chlorine dioxide
azides, calcium, sodium carbide, lithiun
rubidium, copper

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

CHEMICAL FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name
Polycyclic Aromatic Hydrocarbon
CAS Number: 12-90-00
Synonyms
Coal tar pitch volatile
(CAS 65996-93-2)

HEALTH HAZARD DATA

Color: Black or dark-browr

Physical State: Solid — Residue; Liquid; Gas

Odor: NA

Odor Threshold: NA

Vapor Density: >1.0 g/L

Ionization Potential (IP): NA

IDLH: 80 mg/m³

Carcinogen:

OSHA	
IARC	X
NTP	X
ACGIH	X
NIOSH	X

Skin absorbable: yes X no
Skin corrosive: yes X no

Signs/Symptoms of Acute Exposure
Dermatitis, bronchitis

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	0.2 mg/m³		
ACGIH TLVs	0.2 mg/m³		
NIOSH RELs	0.1 mg/m³		

AIR MONITORING

Type	Brand/Mode No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
Not Applicable				

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials
Suits: Tyvek
Gloves: Nitrile or Neoprene
Boots: Neoprene

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR = TWA x 10 = 1 mg/m³
MUC Full-Face APR = TWA x 10 = 1 mg/m³

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA

Fire Extinguishing Media
Dry Chemical X Foam X
Water Spray — CO_2 X

Incompatibilities
Strong oxidizers

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

APPENDIX B

APPENDIX B

INVESTIGATION REPORT TO THE ATTENTION OF GENERAL COUNSEL (ATTORNEY CLIENT PRIVLEDGED)

INCIDENT

1. COMPANY OR DIVISION	2. DEPARTMENT		
3. LOCATION OF INCIDENT	4. DATE OF INICIDENT	5. TIME AM : PM	6. DATE OF REPORT
7. LOSS SEVERITY ☐ MAJOR ☐ SERIOUS ☐MINOR	8. RECURRENCE POTENTIAL ☐ FREQUENT ☐ OCCASIONAL ☐ RARE		

EVENT

INJURY OR ILLNESS		PROPERTY DAMAGE	OTHER ACTUAL OR POTENTIAL INCIDENT
9. INJURED'S NAME		16. PROPERTY DAMAGED	20. TYPE OF LOSS
10. PART OF BODY	11. DAYS LOST	17. NATURE OF DAMAGE	21. COST
12. NATURE OF INJURY OR ILLNESS		18. COST: ESTMATED/ACTUAL	22. NATURE OF LOSS
13. OBJECT/EQUIPMENT/SUBSTANCE INFLICTING HARM		19. OBJECT/EQUIPMENT/SUBSTANCE INFLICTING DAMAGE	23. OBJECT/EQUIPMENT/SUBSTANCE RELATED
14. OCCUPATION	15. EXPERIENCE	24. PERSON IN CONTROL OF ACTIVITY AT TIME OF OCCURRENCE	

DESCRIPTION

25. DESCRIBE HOW THE EVENT OCCURRED AND EMERGENCY ACTIONS

CAUSE ANALYSIS

26. IMMEDIATE CAUSES: WHAT ACTIONS AND CONDITIONS CAUSED OR COULD CAUSE THE EVENT? CHECK ON BACK, EXPLAIN HERE.
27. BASIC CAUSES: WHAT SPECIFIC PERSONAL FACTORS CAUSED OR COULD CAUSE THIS EVENT? CHECK ON BACK, EXPLAIN HERE.
28. BASIC CAUSES: WHAT SPECIFIC JOB FACTORS CAUSED OR COULD CAUSE THIS EVENT? CHECK ON BACK, EXPLAIN HERE.

ACTION PLAN

29. REMEDIAL ACTIONS: WHAT HAS AND/OR SHOULD BE DONE TO CONTROL THE CAUSES LISTED?

30. SIGNATURE OF INVESTIGATOR	31. FOLLOW-UP. CIRCLE NUMBER FOR TEMPORARY. X OUT FOR FINAL ACTION/DATE 1._____ 3._____ 5._____ 2._____ 4._____ 6._____

CAUSE CHECKLIST

26A. CODING OF IMMEDIATE CAUSES CHECK ALL APPLICABLE.

SUBSTANDARD ACTIONS	SUBSTANDARD CONDITIONS
☐ Operating equipment without authority	☐ Inadequate guards or barriers
☐ Failure to warn	☐ Inadequate or improper protective equipment
☐ Failure to secure	☐ Defective tools, equipment or materials
☐ Operating at improper speed	☐ Congestion or restricted action
☐ Making safety devices inoperable	☐ Inadequate warning system
☐ Removing safety devices	☐ Fire and explosion hazards
☐ Using defective equipment	☐ Poor housekeeping; disorder
☐ Failing to use personal protective equipment properly	☐ Hazardous environmental conditions: gases, dusts, etc
☐ Using equipment improperly	☐ Noise exposures
☐ Improper loading	☐ Radiation exposures
☐ Improper placement	☐ High or low temperature exposures
☐ Improper position for task	☐ Inadequate or excess illumination
☐ Servicing equipment in operation	☐ Inadequate ventilation
☐ Horseplay	☐ Under influence of alcohol and or other drugs

CODING OF BASIC CAUSES CHECK ALL APPLICABLE.

27A. PERSONAL FACTORS	28A. JOB FACTORS
☐ Inadequate capability	☐ Inadequate leadership
☐ Lack of knowledge	☐ Inadequate engineering
☐ Lack of skill	☐ Inadequate purchasing
☐ Stress	☐ Inadequate maintenance
☐ Improper motivation	☐ Inadequate tools and equipment
	☐ Inadequate work standards
	☐ Wear and tear
	☐ Abuse or misuse

REVIEW

32. THIS INCIDENT OCCURRED DUE TO CHECK ALL APPLICABLE AND EXPLAIN	☐ Inadequate program ☐ Inadequate standards ☐ Inadequate compliance

33. SIGNATURE	TITLE	DATE

CODING FOR INCIDENT ANALYSIS

1. LOCATION	☐	
5. TIME OF DAY	☐	
8. POTENTIAL	☐	☐
7. SEVERITY	☐	☐
19. LOSS TYPE	☐	
13. AGENCY	☐	☐
14. OCCUPATION	☐	
15. EXPERIENCE	☐	
16. DAMAGE	☐	
18. COST	☐	
19. AGENCY	☐	
26. IMMEDIATE CAUSES	☐	☐
27. PERSONAL FACTORS	☐	☐
28. JOB FACTORS ☐	☐	
32. PROGRAM FACTORS	☐	☐

SKETCH OF INCIDENT SITE INVOLVED/CONTINUATION OF EXPLANATION LIST REPORT ITEM NUMBER

APPENDIX C

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7615

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ALCONOX(tm)

MSDS Number: A2052 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Alkyl Aryl Sulfonates
CAS No.: Not applicable.
Molecular Weight: Not applicable.
Chemical Formula: Not applicable.
Product Codes: A461

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Alconox(tm)	N/A	90 - 100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! CAUSES IRRITATION.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
None identified.

Ingestion:

May be harmful.

Skin Contact:
Irritation.

Eye Contact:
Irritation.

Chronic Exposure:
No information found.

Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Prompt action is essential.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes.

Eye Contact:
In case of eye contact, immediately flush with plenty of water for at least 15 minutes.

5. Fire Fighting Measures

Fire:
Not expected to be a fire hazard.

Explosion:
None identified.

Fire Extinguishing Media:
Use extinguishing media appropriate for surrounding fire.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Wear self-contained breathing apparatus and full protective clothing. With clean shovel, carefully place material into clean, dry container and cover; remove from area. Flush spill area with water.

7. Handling and Storage

Keep container tightly closed. Suitable for any general chemical storage area. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the substance is apparent, consult an industrial hygienist. For emergencies, or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
White Powder.

Odor:
No information found.

Solubility:
Appreciable (>10%)

Specific Gravity:
0.00

pH:
No information found.

% Volatiles by volume @ 21C (70F):
N/A

Boiling Point:
No information found.

Melting Point:
No information found.

Vapor Density (Air=1):
Not applicable.

Vapor Pressure (mm Hg):
Not applicable.

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.

Hazardous Decomposition Products:
No information found.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
No information found.

Conditions to Avoid:
No information found.

11. Toxicological Information

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Alconox(tm)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Alconox(tm)	Yes	No	No	No

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Alconox(tm)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Alconox(tm)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Alconox(tm)	No	No	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Solid)
```

Australian Hazchem Code: No information found.
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

Label Hazard Warning:
WARNING! CAUSES IRRITATION.

Label Precautions:
Keep in tightly closed container. Wash thoroughly after handling.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse.

Product Use:
Laboratory Reagent. Research and Development Use Only.

Revision Information:
Pure. New 16 section MSDS format, all sections have been revised.

Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

ACETONE

MSDS Number: A0446 --- *Effective Date: 04/09/98*

1. Product Identification

Synonyms: Dimethylketone; 2-propanone; dimethylketal
CAS No.: 67-64-1
Molecular Weight: 58.08
Chemical Formula: (CH3)2CO
Product Codes:
J.T. Baker: 5356, 5580, 5805, 9001, 9002, 9003, 9004, 9005, 9006, 9007, 9008, 9009, 9010, 9015, 9125, 9254, A134

Mallinckrodt: 0018, 2432, 2435, 2437, 2438, 2440, 2443, 2445, 2850, H451, H580

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Acetone	67-64-1	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 1 - Slight
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 2 - Moderate
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors irritates the respiratory tract. May cause coughing, dizziness, dullness, and headache. Higher concentrations can produce central nervous system depression, narcosis, and unconsciousness.
Ingestion:
Swallowing small amounts is not likely to produce harmful effects. Ingestion of larger amounts may produce abdominal pain, nausea and vomiting. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms are expected to parallel inhalation.
Skin Contact:
Irritating due to defatting action on skin. Causes redness, pain, drying and cracking of the skin.
Eye Contact:
Vapors are irritating to the eyes. Splashes may cause severe irritation, with stinging, tearing, redness and pain.
Chronic Exposure:
Prolonged or repeated skin contact may produce severe irritation or dermatitis.
Aggravation of Pre-existing Conditions:
Use of alcoholic beverages enhances toxic effects. Exposure may increase the toxic potential of chlorinated hydrocarbons, such as chloroform, trichloroethane.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention.

5. Fire Fighting Measures

Fire:
Flash point: -20C (-4F) CC
Autoignition temperature: 465C (869F)
Flammable limits in air % by volume:
lel: 2.5; uel: 12.8
Extremely Flammable Liquid and Vapor! Vapor may cause flash fire.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Vapors can flow along surfaces to distant ignition source and flash back. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. This material may produce a floating fire hazard. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, alcohol foam or carbon dioxide. Water may be ineffective. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Acetone:
-OSHA Permissible Exposure Limit (PEL):
1000 ppm (TWA)

-ACGIH Threshold Limit Value (TLV):
500 ppm (TWA), 750 ppm (STEL) A4 - not classifiable as a human carcinogen
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a half-face organic vapor respirator may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless, volatile liquid.
Odor:
Fragrant, mint-like
Solubility:
Miscible in all proportions in water.
Specific Gravity:
0.79 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
56.5C (133F) @ 760 mm Hg
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
2.0
Vapor Pressure (mm Hg):
400 @ 39.5C (104F)
Evaporation Rate (BuAc=1):
ca. 7.7

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Concentrated nitric and sulfuric acid mixtures, oxidizing materials, chloroform, alkalis, chlorine compounds, acids, potassium t-butoxide.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Oral rat LD50: 5800 mg/kg; Inhalation rat LC50: 50,100mg/m3; Irritation eye rabbit, Standard Draize, 20 mg severe; investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Acetone (67-64-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material is expected to readily biodegrade. When released to water, this material is expected to quickly evaporate. This material has a log octanol-water partition coefficient of less than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material may be moderately degraded by photolysis. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is not expected to be toxic to aquatic life. The LC50/96-hour values for fish are over 100 mg/l.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: ACETONE
Hazard Class: 3
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: ACETONE
Hazard Class: 3.1
UN/NA: UN1090
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Acetone (67-64-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Acetone (67-64-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Acetone (67-64-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Acetone (67-64-1)	5000	U002	No

Chemical Weapons Convention: No TSCA 12(b): Yes CDTA: Yes
SARA 311/312: Acute: Yes Chronic: No Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2[Y]E
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS CENTRAL NERVOUS SYSTEM.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases, get medical attention.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: **Mallinckrodt Baker, Inc.**
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HYDROCHLORIC ACID (10%-33%)

MSDS Number: H3886 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: This MSDS applies to the concentrated standard used to make laboratory solutions and any solution that contains more than 10% but less than 33% Hydrochloric acid. For diluted product, see MSDS for Hydrochloric Acid (less than 10%). For saturated solution
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl in H2O
Product Codes:
J.T. Baker: 4654, 4657, 4658, 5618, 5619
Mallinckrodt: 2608, 2609, 2625, H151, H168, V024, V035, V328

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	10 - 33%	Yes
Water	7732-18-5	67 - 90%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 3 - Severe (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Water or water spray. Neutralize with soda ash or slaked lime.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(tm) or TEAM(tm) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
5 ppm (STEL/Ceiling)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge may be worn up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent odor.
Solubility:
Infinitely soluble.
Density:
1.05 @ 15C (59F)
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101 - 103C (214 - 217F)
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

11. Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 137LB

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 137LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Hydrogen Chloride (7647-01-0)	5000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2R
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

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CHEMTREC: 1-800-424-9300

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NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

METHYL ALCOHOL

MSDS Number: M2015 — ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Wood alcohol; methanol; carbinol
CAS No.: 67-56-1
Molecular Weight: 32.04
Chemical Formula: CH3OH
Product Codes:
J.T. Baker: 5217, 5370, 5794, 5807, 5811, 5842, 5869, 9049, 9063, 9067, 9069, 9070, 9071, 9073, 9075, 9076, 9077, 9091, 9093, 9096, 9097, 9098, 9263, 9893
Mallinckrodt: 3004, 3006, 3016, 3017, 3018, 3024, 3041, 3701, 4295, 5160, 8814, H080, H488, H603, V079, V571

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Methyl Alcohol	67-56-1	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 4 - Extreme (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
A slight irritant to the mucous membranes. Toxic effects exerted upon nervous system, particularly the optic nerve. Once absorbed into the body, it is very slowly eliminated. Symptoms of overexposure may include headache, drowsiness, nausea, vomiting; blurred vision, blindness, coma, and death. A person may get better but then worse again up to 30 hours later.
Ingestion:
Toxic. Symptoms parallel inhalation. Can intoxicate and cause blindness. Usual fatal dose: 100-125 milliliters.
Skin Contact:
Methyl alcohol is a defatting agent and may cause skin to become dry and cracked. Skin absorption can occur; symptoms may parallel inhalation exposure.
Eye Contact:
Irritant. Continued exposure may cause eye lesions.
Chronic Exposure:
Marked impairment of vision and enlargement of the liver has been reported. Repeated or prolonged exposure may cause skin irritation.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired liver or kidney function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
Skin Contact:
Remove any contaminated clothing. Wash skin with soap or mild detergent and water for at least 15 minutes. Get medical attention if irritation develops or persists.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Flash point: 12C (54F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:
lel: 7.3; uel: 36
Flammable.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Moderate explosion hazard and dangerous fire hazard when exposed to heat, sparks or flames. Sensitive to static discharge.
Fire Extinguishing Media:
Water spray, dry chemical, alcohol foam, or carbon dioxide.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Use water spray to blanket fire, cool fire exposed containers, and to flush non-ignited spills or vapors away from fire. Vapors can flow along surfaces to distant ignition source and flash back.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer!

J. T. Baker SOLUSORB(tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Methyl Alcohol:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA)
- ACGIH Threshold Limit Value (TLV):
200 ppm (TWA), 250 ppm (STEL) skin
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Miscible in water.
Specific Gravity:
0.8
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
64.5C (147F)
Melting Point:
-98C (-144F)
Vapor Density (Air=1):
1.1
Vapor Pressure (mm Hg):
97 @ 20C (68F)
Evaporation Rate (BuAc=1):
5.9

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:

May form carbon dioxide, carbon monoxide, and formaldehyde when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents such as nitrates, perchlorates or sulfuric acid. Will attack some forms of plastics, rubber, and coatings. May react with metallic aluminum and generate hydrogen gas.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Methyl Alcohol (Methanol) Oral rat LD50: 5628 mg/kg; inhalation rat LC50: 64000 ppm/4H; skin rabbit LD50: 15800 mg/kg; Irritation data-standard Draize test: skin, rabbit: 20mg/24 hr. Moderate; eye, rabbit: 100 mg/24 hr. Moderate; Investigated as a mutagen, reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Methyl Alcohol (67-56-1)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material is expected to readily biodegrade. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. When released into water, this material is expected to readily biodegrade. When released into the air, this material is expected to exist in the aerosol phase with a short half-life. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into air, this material is expected to have a half-life between 10 and 30 days. When released into the air, this material is expected to be readily removed from the atmosphere by wet deposition.
Environmental Toxicity:
This material is expected to be slightly toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: METHANOL
Hazard Class: 3
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 350LB

International (Water, I.M.O.)

Proper Shipping Name: METHANOL
Hazard Class: 3.2, 6.1
UN/NA: UN1230
Packing Group: II
Information reported for product/size: 350LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Methyl Alcohol (67-56-1)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Methyl Alcohol (67-56-1)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Methyl Alcohol (67-56-1)	No	No	Yes	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Methyl Alcohol (67-56-1)	5000	U154	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Pure / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! VAPOR HARMFUL. MAY BE FATAL OR CAUSE BLINDNESS IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CANNOT BE MADE NONPOISONOUS. FLAMMABLE LIQUID AND VAPOR. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
New 16 section MSDS format, all sections have been revised.
Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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NITRIC ACID, 50-70%

MSDS Number: N3660 --- *Effective Date: 12/08/96*

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 50%; Nitric Acid 65%; nitric acid 69-70%
CAS No.: 7697-37-2
Molecular Weight: 63.00
Chemical Formula: HNO3
Product Codes: J.T. Baker: 5371, 5555, 5876, 9597, 9598, 9600, 9601, 9602, 9604, 9606, 9607, 9616 Mallinckrodt: 1409, 2703, 2704, 6623, V069, V077, V336, V561

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	65 - 70%	Yes
Water	7732-18-5	30 - 35%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Yellow (Reactive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.

Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.
Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Fire Extinguishing Media:
Water spray may be used to keep fire exposed containers cool. Do not get water inside container.

Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. J. T. Baker NEUTRASORB(tm) or TEAM(tm) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL): 2 ppm (TWA), 4 ppm (STEL) -ACGIH Threshold Limit Value (TLV): 2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.

Odor:
Suffocating, acrid.

Solubility:
Infinitely soluble.

Specific Gravity:
1.41

pH:
1.0 (0.1M solution)

% Volatiles by volume @ 21C (70F):
100 (as water and acid)

Boiling Point:
122C (252F)

Melting Point:
-42C (-44F)

Vapor Density (Air=1):
2-3

Vapor Pressure (mm Hg):
48 @ 20C (68F)

Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

Conditions to Avoid:
Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 150LB

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 150LB

International (Air, I.C.A.O.)

Proper Shipping Name: NITRIC ACID
Hazard Class: 8
UN/NA: UN2031
Packing Group: I
Information reported for product/size: 150LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Australian Hazchem Code: 2PE
Poison Schedule: S6

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 3 **Flammability:** 0 **Reactivity:** 0 **Other:** Oxidizer

Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

Label Precautions:
Do not get in eyes, on skin, or on clothing. Do not breathe vapor or mist. Use only with adequate ventilation. Wash thoroughly after handling. Keep from contact with clothing and other combustible materials. Do not store near combustible materials. Store in a tightly closed container. Remove and wash contaminated clothing promptly.

Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:
Laboratory Reagent.

Revision Information:
Mixture. New 16 section MSDS format, all sections have been revised.

Disclaimer:
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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

Sulfuric Acid 57%

MSDS Number: S8231 --- ***Effective Date: 09/24/97***

1. Product Identification

Synonyms: Oil of Vitriol,57%; Hydrogen Sulfate,57%
CAS No.: 7664-93-9
Molecular Weight: 98.08
Chemical Formula: H2SO4 in H2O
Product Codes: 9695, 9706

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	43 - 57%	Yes
Water	7732-18-5	43 - 57%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Water Reactive)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:

Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.
Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.
Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
Ingestion:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.
Explosion:
Contact with most metals causes formation of flammable and explosive hydrogen gas. A violent exothermic reaction occurs with water. Sufficient heat may be produced to ignite combustible materials.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Neutralize with alkaline material (soda ash, lime), then absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker NEUTRASORB(tm) or TEAM(tm) 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Sulfuric Acid:
-OSHA Permissible Exposure Limit (PEL):
1 mg/m3 (TWA).
-ACGIH Threshold Limit Value (TLV):
1 mg/m3 (TWA), 3 mg/m3 (STEL)
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, a full facepiece respirator with an acid gas cartridge and dust/mist filter may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellow liquid.
Odor:
Odorless.
Solubility:
Complete (100%)
Specific Gravity:
1.40 (50%)
pH:
1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
No information found.
Melting Point:
-64C (-83F) (65%)
Vapor Density (Air=1):
3.4
Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:

Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.
Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.
Conditions to Avoid:
Heat, moisture, incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m3/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified; LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 12.5LB

International (Water, I.M.O.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 12.5LB

International (Air, I.C.A.O.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 12.5LB

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sulfuric Acid (7664-93-9)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sulfuric Acid (7664-93-9)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sulfuric Acid (7664-93-9)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sulfuric Acid (7664-93-9)	1000	No	No
Water (7732-18-5)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: Yes
SARA 311/312: Acute: Yes Chronic: Yes Fire: No Pressure: No
Reactivity: Yes (Mixture / Liquid)

Australian Hazchem Code: 2P
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Keep container closed.

Use only with adequate ventilation.
Wash thoroughly after handling.
Do not contact with water.

Label First Aid:

In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.

Product Use:

Laboratory Reagent.

Revision Information:

Disclaimer:

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Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

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MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

HEXANE

MSDS Number: H2381 --- *Effective Date: 12/09/96*

1. Product Identification

Synonyms: Hexanes,Normal Hexane; Hexyl Hydride
CAS No.: 110-54-3 (n-hexane)
Molecular Weight: 86.18
Chemical Formula: CH3(CH2)4CH3 n-hexane
Product Codes: 9262, 9304, 9308, N168

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hexane	110-54-3	85 > 99%	Yes
Methylcyclopentane	96-37-7	1 - 2%	Yes
Trace amount of Benzene (10 ppm)	071-43-2	*	No

3. Hazards Identification

Emergency Overview

DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 2 - Moderate
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 0 - None
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

The health hazards addressed are for the major component: n-hexane.

Inhalation:
Inhalation of vapors irritates the respiratory tract. Overexposure may cause lightheadedness, nausea, headache, and blurred vision. Greater exposure may cause muscle weakness, numbness of the extremities, unconsciousness and death.

Ingestion:
May produce abdominal pain, nausea. Aspiration into lungs can produce severe lung damage and is a medical emergency. Other symptoms expected to parallel inhalation.

Skin Contact:
May cause redness, irritation, with dryness, cracking.

Eye Contact:
Vapors may cause irritation. Splashes may cause redness and pain.

Chronic Exposure:
Repeated or prolonged skin contact may defat the skin and produce irritation and dermatitis. Chronic inhalation may cause peripheral nerve disorders and central nervous system effects.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance. May affect the developing fetus.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Contact:
Remove any contaminated clothing. Wipe off excess from skin. Wash skin with soap and water for at least 15 minutes. Get medical attention if irritation develops or persists.

Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
BEI=2,5-hexadione in urine, sample at end of shift at workweeks end, 5 mg/g creatine. Also, measure n-hexane in expired air. Analgesics may be necessary for pain management, there is no specific antidote. Monitor arterial blood gases in cases of severe aspiration.

5. Fire Fighting Measures

Fire:
Flash point: -23C (-9F) CC Autoignition temperature: 224C (435F) Flammable limits in air % by volume: lel: 1.2; uel: 7.7 Extremely Flammable Liquid and Vapor! Vapor may cause flash fire. Dangerous fire hazard when exposed to heat or flame.

Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with oxidizing materials may cause extremely violent combustion.Explodes when mixed @ 28C with dinitrogen tetraoxide. Sensitive to static discharge.

Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be ineffective.

Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool. Vapors can flow along surfaces to distant ignition source and flash back. Vapor explosion hazard exists indoors, outdoors, or in sewers.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802. J. T. Baker SOLUSORB (tm) solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from direct sunlight and any area where the fire hazard may be acute. Store in tightly closed containers (preferably under nitrogen atmosphere). Outside or detached storage is preferred. Inside storage should be in a standard flammable liquids storage room or cabinet. Separate from oxidizing materials. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
N-Hexane [110-54-3]: -OSHA Permissible Exposure Limit (PEL): 500 ppm (TWA) -ACGIH Threshold Limit Value (TLV): 50 ppm (TWA) other isomers of hexane -ACGIH Threshold Limit Value (TLV): 500 ppm (TWA),1000ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices* , most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. This substance has poor warning properties.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.

Odor:
Light odor.

Solubility:
Insoluble in water.

Specific Gravity:
0.66

pH:
No information found.

% Volatiles by volume @ 21C (70F):
100

Boiling Point:
ca. 68C (ca. 154F)

Melting Point:
ca. -95C (ca. -139F)

Vapor Density (Air=1):
3.0

Vapor Pressure (mm Hg):
130 @ 20C (68F)

Evaporation Rate (BuAc=1):
9

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Heat will contribute to instability.

Hazardous Decomposition Products:
May produce acrid smoke and irritating fumes when heated to decomposition.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
Strong oxidizers.

Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

N-Hexane: Oral rat LD50: 28710 mg/kg. Irritation eye rabbit: 10 mg mild. Investigated as a tumorigen, mutagen and reproductive effector.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Trace amount of Benzene (10 ppm) (071-43-2)	Yes	No	1
Hexane (110-54-3)	No	No	None
Methylcyclopentane (96-37-7)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may biodegrade to a moderate extent. When released into the soil, this material is not expected to leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released into water, this material may biodegrade to a moderate extent. When released to water, this material is expected to quickly evaporate. When released into the water, this material is expected to have a half-life between 1 and 10 days. This material has an estimated bioconcentration factor (BCF) of less than 100. This material has a log octanol-water partition coefficient of greater than 3.0. This material is not expected to significantly bioaccumulate. When released into the air, this material is expected to be readily degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.

Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: HEXANES
Hazard Class: 3
UN/NA: UN1208
Packing Group: II
Information reported for product/size: 215L

International (Water, I.M.O.)

Proper Shipping Name: HEXANES
Hazard Class: 3.1
UN/NA: UN1208
Packing Group: II
Information reported for product/size: 215L

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\----------

Ingredient	TSCA	EC	Japan	Australia
Trace amount of Benzene (10 ppm) (071-43-2)	Yes	Yes	Yes	Yes
Hexane (110-54-3)	Yes	Yes	Yes	Yes
Methylcyclopentane (96-37-7)	Yes	Yes	No	Yes

--------\Chemical Inventory Status - Part 2\----------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Trace amount of Benzene (10 ppm) (071-43-2)	Yes	Yes	No	Yes
Hexane (110-54-3)	Yes	Yes	No	Yes
Methylcyclopentane (96-37-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Trace amount of Benzene (10 ppm) (071-43-2)	No	No	Yes	No
Hexane (110-54-3)	No	No	Yes	No
Methylcyclopentane (96-37-7)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Trace amount of Benzene (10 ppm) (071-43-2)	10	U019	No
Hexane (110-54-3)	5000	No	No
Methylcyclopentane (96-37-7)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No

SARA 311/312: Acute: Yes Chronic: Yes Fire: Yes Pressure: No
Reactivity: No (Mixture / Liquid)

Prop 65:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 3[Y]E
Poison Schedule: No information found.

WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: 1 **Flammability:** 3 **Reactivity:** 0

Label Hazard Warning:
DANGER! EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE CENTRAL AND PERIPHERAL NERVOUS SYSTEMS.

Label Precautions:
Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Wash thoroughly after handling. Avoid breathing vapor or mist. Avoid contact with eyes, skin and clothing.

Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.

Product Use:
Laboratory Reagent.

Revision Information:
Mixture. New 16 section MSDS format, all sections have been revised.

Disclaimer:
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****
Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

Please reduce your browser font size for better viewing and printing.

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

MALLINCKRODT J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 202-483-7616

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SODIUM THIOSULFATE

MSDS Number: S5230 --- ***Effective Date: 12/08/96***

1. Product Identification

Synonyms: Sodium thiosulfate, pentahydrate; thiosulfuric acid, disodium salt, pentahydrate
CAS No.: 7772-98-7 (Anhydrous)
Molecular Weight: 248.17
Chemical Formula: Na2S2O3.5H2O
Product Codes:
J.T. Baker: 3946
Mallinckrodt: 7763, 7802, 8100

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Thiosulfate	7772-98-7	100%	Yes

3. Hazards Identification

Emergency Overview

CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 0 - None
Reactivity Rating: 1 - Slight
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
May cause irritation to the respiratory tract. Symptoms may include coughing and shortness of breath.

Ingestion:
Low level of toxicity by ingestion. Diarrhea may occur by ingestion of large quantities.
Skin Contact:
Irritation may occur from prolonged skin contact.
Eye Contact:
Contact may cause mechanical irritation.
Chronic Exposure:
Chronic exposure may cause skin effects.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Wash exposed area with soap and water. Get medical advice if irritation develops.
Eye Contact:
Wash thoroughly with running water. Get medical advice if irritation develops.

5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
Use protective clothing and breathing equipment appropriate for the surrounding fire.

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to the dust or mist is apparent, a half-face dust/mist respirator may be worn. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.

Eye Protection:
Safety glasses. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Monoclinic, colorless crystals.
Odor:
Odorless.
Solubility:
79g/100 ml water @ 4C (39F)
Density:
1.75
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
> 100C (> 212F)
Melting Point:
48C (118F) Loses water @ 100C (212F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Stability limited in solution.
Hazardous Decomposition Products:
Oxides of sulfur and hydrogen sulfide.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Sodium nitrate, halogens, and oxidizing agents. Reacts with acids to release sulfur dioxide.
Conditions to Avoid:
Incompatibles.

11. Toxicological Information

No LD50/LC50 information found relating to normal routes of occupational exposure.

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Thiosulfate (7772-98-7)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Not regulated.

15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Sodium Thiosulfate (7772-98-7)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Thiosulfate (7772-98-7)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Thiosulfate (7772-98-7)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Sodium Thiosulfate (7772-98-7)	No	No	No

Chemical Weapons Convention: No TSCA 12(b): No CDTA: No
SARA 311/312: Acute: Yes Chronic: No Fire: No Pressure: No
Reactivity: No (Mixture / Solid)

Australian Hazchem Code: No information found.
Poison Schedule: No information found.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
CAUTION! MAY BE HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.
Label Precautions:
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.
Label First Aid:
If inhaled, remove to fresh air. Get medical attention for any breathing difficulty. In case of contact, immediately flush

eyes or skin with plenty of water for at least 15 minutes. Get medical attention if irritation develops or persists. If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

Product Use:
Laboratory Reagent.

Revision Information:
New 16 section MSDS format, all sections have been revised.

Disclaimer:
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****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)

M S D S

Canadian Centre for Occupational Health and Safety

*** IDENTIFICATION ***

RECORD NUMBER : 542527
LANGUAGE : ENGLISH
PRODUCT NAME(S) : DIESEL FUEL # 2
DATE OF MSDS : 1991-11-29

*** MANUFACTURER INFORMATION ***

MANUFACTURER : IRVING OIL LIMITED
ADDRESS : Post Office Box 1421
Saint John New Brunswick
Canada E2L 4K1
Telephone: 506-632-2000
EMERGENCY TELEPHONE NO.(S) : 506-648-3060

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*** SUPPLIER INFORMATION ***

SUPPLIER/DISTRIBUTOR : IRVING OIL LIMITED
ADDRESS : Post Office Box 1421
Saint John New Brunswick
Canada E2L 4K1
Telephone: 506-632-2000
EMERGENCY TELEPHONE NO.(S) : 506-648-3060

*** MATERIAL SAFETY DATA ***

MATERIAL SAFETY DATA SHEET

1. PRODUCT INFORMATION

PRODUCT IDENTIFIER — IRVING PRODUCT CODE
DIESEL FUEL # 2

WHMIS Classification	CLASS BE DIV. 3 COMBUSTIBLE LIQUID	Application and Use MOTOR FUEL
	CLASS D DIV. 2B TOXIC MATERIAL	HEATING OIL

2. TYPICAL PHYSICAL & CHEMICAL PROPERTIES

Physical State

Gas - - Liquid	
Odour and Appearance	PALE YELLOW WITH BYCARBON ODOR
Odour Threshold (p.p.m.)	NOT AVAILABLE
Specific Gravity	.830 @ 15 C
Vapour Pressure (mm)	0.5 KPA @ 15 C
Vapour Density (Air = 1)	3
Evaporation Rate	0.1 (N-BUTYLACETATE=1)
Boiling Point (deg C)	150 - 370 C
Freezing Point (deg C)	-7 - -32 C
Solubility in Water (20 deg C)	INSOLUABLE
% Volatile (by volume)	0%
pH	9.0 MAX
Density (g/cm3)	.829
Coefficient of water/oil dist.	NOT AVAILABLE

3. HAZARDOUS INGREDIENTS OF MATERIAL

Hazardous Ingredients	Approximate Concentration %	C.A.S. N.A. or U.N. Numbers
PETROLEUM MIDDISTALLATE	100%	UN 1202

LD50 Specify Species and Route: NOT AVAILABLE
LC50 Specify Species and Route: NOT AVAILABLE

4. HEALTH HAZARD INFORMATION

ROUTE OF ENTRY
SKIN CONTACT [X] SKIN ABSORPTION [ ] EYE CONTACT [X]
INHALATION [X] INGESTION [X]

EFFECTS OF ACUTE EXPOSURE TO PRODUCT
VAPOURS IRRITATE EYES AND RESPIRATORY PASSAGE. LIQUID IN LUNGS HIGHLY TOXIC. CAN CAUSE SEVERE CHEMICAL PNEUMONITIS.

EFFECTS OF CHRONIC EXPOSURE TO PRODUCT
PROLONGED EXPOSURE TO HIGH VAPOUR CONCENTRATION CAN CAUSE HEADACHE AND DIZZINESS. PROLONGED SKIN CONTACT CAN CAUSE DERMITITIS.

REPRODUCTIVE TOXICITY
NOT AVAILABLE

EXPOSURE LIMITS
NOT AVAILABLE

IRRITANCY OF PRODUCT
MINOR SKIN IRRITANCY

SENSITIZATION TO PRODUCT
NOT AVAILABLE

CARCINOGENICITY
NOT AVAILABLE

TERATOGENICITY
NOT AVAILABLE

MUTAGENICITY
NOT AVAILABLE

SYNERGISTIC PRODUCTS
NOT AVAILABLE

5. FIRE AND EXPLOSION HAZARD

FLAMMABILITY IF YES, UNDER AT OR ABOVE FLASH POINT
YES [X] NO [ ] WHICH CONDITIONS?

MEANS OF EXTINCTION which conditions

SPECIAL PROCEDURES
DO NOT ENTER CONFINED OR ENCLOSED AREA WITHOUT PROTECTIVE EQUIPMENT, SELF CONTAINED BREATHING APPARATUS.
FLASHPOINT (DEG C) AND METHOD
65 DEGREES C
UR FLAMMABLE LIMIT (% BY VOLUME)
5.0%
LOWER FLAMMABLE LIMIT (% BY VOLUME)
0.7%
AUTO IGNITION TEMPERATURE (DEG C)
336
DG FLAMMABILITY CLASSIFICATION
3.3
HAZARDOUS COMBUSTION PRODUCTS
CARBON DIOXIDE

EXPLOSION DATA	SENSITIVITY TO IMPACT NO DATA AVAILABLE	SENSITIVITY TO STATIC DISCHARGE YES

6. FIRST AID MEASURES

INHALATION
REMOVE TO FRESH AIR. IF EFFECTS CONTINUE SEE DOCTOR
INGESTION
GIVE WATER OR MILK. DO NOT MAKE PERSON VOMIT. GET DOCTOR
EYE
FLUSH WITH FRESH WATER FOR AT LEAST 15 MIN. IF IRRITATION PERSISTS, SEE DOCTOR.
SKIN
REMOVE CONTAMINATED CLOTHING. WASH SKIN WITH SOAP AND WATER. LAUNDER CLOTHING. SEE DOCTOR IF IRRITATION PERSISTS.
NERAL ADVICE
AVOID BREATHING VAPOURS. GOOD PERSONAL HYGIENE.

7. PREVENTIVE AND CORRECTIVE MEASURES

PERSONAL PROTECTIVE EQUIPMENT
KEEP FROM EXPOSURE TO SKIN.
GLOVES (SPECIFY)
IMPERVIOUS GLOVES
RESPIRATORY (SPECIFY)
IN CONFINED AREA USE SCBA
EYE (SPECIFY)
CHEMICAL SAFETY GOGGLES
FOOTWEAR (SPECIFY)

CLOTHING (SPECIFY)
IMPERVIOUS CLOTHING
OTHER (SPECIFY)

ENGINEERING CONTROLS (SPECIFY, E.G. VENTILATION, ENCLOSED PROCESS)
EXPLOSION PROOF MOTORS AND EQUIPMENT SHOULD BE USED. PROPER VENTILATION SHOULD BE USED IN ENCLOSED AREAS.
EAK AND SPILL PROCEDURE
ELIMINATE SOURCE OF IGNITION. KEEP OUT OF SEWERS AND WATERWAYS. CONTAIN LIQUID AND CLEAN UP WITH ABSORBING MATERIAL NOT WOOD CHIPS.
STE DISPOSAL
PLACE IN DISPOSABLE CONTAINERS. REMOVE TO APPROVED SITE BY WAY OF

HANDLING PROCEDURES AND EQUIPMENT
DO NOT CUT, DRILL, GRIND, WELD ON OR NEAR CONTAINERS.
STORAGE REQUIREMENTS
STORE IN COOL, DRY, WELL VENTILATED AREA. KEEP AWAY FROM SOURCES OF IGNITION.
ECIAL SHIPPING INFORMATION
USE GROUNDING EQUIPMENT WHEN TRANSFERRING PRODUCT.

). REACTIVITY DATA

CHEMICAL STABILITY IF NO, UNDER
'ES [X] NO [ ] WHICH CONDITIONS?

INCOMPATIBILITY WITH OTHER SUBSTANCES
'ES [X] NO [ ] IF SO, KEEP AWAY FROM OXIDIZERS AND ACIDS.
WHICH ONES?

REACTIVITY, AND UNDER WHAT CONDITIONS

HAZARDOUS DECOMPOSITION PRODUCTS
CARBON MONOXIDE AND CARBON DIOXIDE ARE PRODUCED ON COMBUSTION.

). PREPARATION

PREPARED BY: IRVING OIL LIMITED,
SAINT JOHN, N.B.
(506) 632-2000
DATE: NOVEMBER 29, 1991

Cette fiche signaletique est aussi disponible en francais

ASHLAND OIL -- UNLEADED 87 - GASOLINE,AUTOMOTIVE
MATERIAL SAFETY DATA SHEET
NSN: 913000D003077
Manufacturer's CAGE: 81355
Part No. Indicator: A
Part Number/Trade Name: UNLEADED 87

General Information

Item Name: GASOLINE,AUTOMOTIVE
Company's Name: ASHLAND OIL INC
Company's Street: 1409 WINCHESTER AVE
Company's P. O. Box: 391
Company's City: ASHLAND
Company's State: KY
Company's Country: US
Company's Zip Code: 41114
Company's Emerg Ph #: 606-329-3333
Company's Info Ph #: 606-329-3333
Distributor/Vendor # 1: BASEVIEW PETROLEUM INC
Distributor/Vendor # 1 Cage: 5W146
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SE
Date MSDS Prepared: 29JAN93
Safety Data Review Date: 29JUL93
Supply Item Manager: CD
MSDS Serial Number: BRFXP
Hazard Characteristic Code: F2
Unit Of Issue Container Qty: NOT KNOWN
Type Of Container: NOT KNOWN
Net Unit Weight: NOT KNOWN

Ingredients/Identity Information

Proprietary: NO
Ingredient: BENZINE (MOTOR FUEL)/GASOLINE - INCLUDES COMPOUNDS LISTED BELOW
Ingredient Sequence Number: 01
Percent: 100
NIOSH (RTECS) Number: DE3550000
CAS Number: 86290-81-5
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: XYLENES (O-,M-,P- ISOMERS) (SARA III), 4-10%
Ingredient Sequence Number: 02
Percent: SEE # 1
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM/150 STEL
ACGIH TLV: 100 PPM/150STEL;9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: TOLUENE (SARA III), 3-10%
Ingredient Sequence Number: 03
Percent: SEE # 1
NIOSH (RTECS) Number: XS5250000
CAS Number: 108-88-3
OSHA PEL: 200 PPM/150 STEL

ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: BENZENE (SARA III), 1-5%
Ingredient Sequence Number: 04
Percent: SEE # 1
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: PENTANE, 1-4%
Ingredient Sequence Number: 05
Percent: SEE # 1
NIOSH (RTECS) Number: RZ9450000
CAS Number: 109-66-0
OSHA PEL: 1000 PPM/750 STEL
ACGIH TLV: 600 PPM/750STEL;9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: 1,2,4-TRIMETHYLBENZENE (SARA III), 0-4%
Ingredient Sequence Number: 06
Percent: SEE # 1
NIOSH (RTECS) Number: DC3325000
CAS Number: 95-63-6
OSHA PEL: 25 PPM
ACGIH TLV: 25 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: HEXANE (N-HEXANE), 1-3%
Ingredient Sequence Number: 07
Percent: SEE # 1
NIOSH (RTECS) Number: MN9275000
CAS Number: 110-54-3
OSHA PEL: 500 PPM
ACGIH TLV: 50 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: BUTANE/N-BUTANE, 1-3%
Ingredient Sequence Number: 08
Percent: SEE # 1
NIOSH (RTECS) Number: EJ4200000
CAS Number: 106-97-8
OSHA PEL: 800 PPM
ACGIH TLV: 800 PPM; 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: ETHYL BENZENE (SARA III), 1-2%
Ingredient Sequence Number: 09
Percent: SEE # 1
NIOSH (RTECS) Number: DA0700000
CAS Number: 100-41-4
OSHA PEL: 100 PPM/125 STEL
ACGIH TLV: 100 PPM/125STEL 9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO

Ingredient: N-HEPTANE, 1-2%
Ingredient Sequence Number: 10
Percent: SEE # 1
NIOSH (RTECS) Number: MI7700000
CAS Number: 142-82-5
OSHA PEL: 500 PPM/500 STEL
ACGIH TLV: 400 PPM/500STEL;9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: METHYL TERT-BUTYL ETHER (SARA III), 0-2%
Ingredient Sequence Number: 11
Percent: SEE # 1
NIOSH (RTECS) Number: KN5250000
CAS Number: 1634-04-4
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR LIQUID - GASOLINE ODOR
Boiling Point: <100F,<38C
Melting Point: NOT KNOWN
Vapor Pressure (MM Hg/70 F): >259 @ 68F
Vapor Density (Air=1): >3
Specific Gravity: >0.70
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: <1 (ETHER=1)
Solubility In Water: NEGLIGIBLE
Percent Volatiles By Volume: 100
Corrosion Rate (IPY): UNKNOWN

Fire and Explosion Hazard Data

Flash Point: -40F,-40C
Flash Point Method: TCC
Lower Explosive Limit: 1.5
Upper Explosive Limit: 7.6
Extinguishing Media: USE CARBON DIOXIDE, FOAM, DRY CHEMICAL AND VAPORIZING LIQUID TYPE EXTINGUISHERS. WATER MAY BE INEFFECTIVE.
Special Fire Fighting Proc: WEAR FIRE FIGHTING PROTECTIVE EQUIPMENT & A FULL FACED SELF CONTAINED BREATHING APPARATUS/SUPPLIED-AIR RESPIRATOR.COOL FIRE EXPOSED CONTAINERS WITH WATER SPRAY.
Unusual Fire And Expl Hazrds: THE INVISIBLE VAPORS ARE HEAVIER THAN AIR AND TRAVEL SOME DISTANCE TO IGNITION SOURCES & FLASH BACK. CAN FORM FLAMMABLE MIXTURE WITH AIR & FLASH AT ROOM TEMP.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH HEAT, SPARKS, OPEN FLAMES AND OTHER SOURCES OF IGNITION
Materials To Avoid: STRONG OXIDIZING AGENTS
Hazardous Decomp Products: FUMES, CARBON MONOXIDE, CARBON DIOXIDE AND OTHER DECOMPOSITION PRODUCTS
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT

Health Hazard Data

LD50-LC50 Mixture: TLV FOR BENZENE IS 10 PPM.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES

Route Of Entry - Ingestion: NO
Health Haz Acute And Chronic: ACUTE- INHALATION OF VAPORS MAY CAUSE CNS DEPRESSION, CONVULSION, LOSS OF CONSCIOUSNESS. INGESTION HAS SYMPTOMS SIMILAR TO INHALATION & ASPIRATION HAZARD. EYE/SKIN CONTACT CAUSES IRRITATION. CHRONIC- DERMATITIS, NERVOUS SYSTEM, KIDNEY, LIVER & BLOOD DISORDERS INCLUDING ANEMIA & LEUKEMIA. KIDNEY CANCER IN LAB ANIMALS.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: YES
Explanation Carcinogenicity: CONTAINS BENZENE. MAY CAUSE BLOOD DISEASES INCLUDING LEUKEMIA. VAPORS MAY CAUSE KIDNEY CANCER IN MALE RATS.
Signs/Symptoms Of Overexp: HEADACHE, NASAL & RESPIRATORY IRRITATION, NAUSEA, DROWSINESS, FATIGUE, EYE & SKIN IRRITATION, PULMONARY EDEMA, CONVULSION & LOSS OF CONSCIOUSNESS
Med Cond Aggravated By Exp: BENZENE- INDIVIDUALS WITH LIVER, KIDNEY AND BLOOD DISEASES. HEXANE- INDIVIDUALS WITH NEUROLOGICAL DISEASES. PETROLEUM SOLVENT- THOSE WITH EXISTING DERMATITIS.
Emergency/First Aid Proc: CALL A PHYSICIAN IN ALL CASES. EYES: IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES, HOLDING EYELIDS OPEN. SKIN: WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR & PROVIDE CPR/OXYGEN IF NECESSARY. ORAL:DO NOT INDUCE VOMITING UNLESS INSTRUCTED BY A PHYSICIAN. CALL A PHYSICIAN IMMEDIATELY. IF VOMITING OCCURS SPONTANEOUSLY, KEEP HEAD BELOW HIPS.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: WEAR PROTECTIVE EQUIPMENTS.ELIMINATE ALL SOURCES OF IGNITION.USE EXPLOSION-PROOF TOOLS.SHUT OFF FUEL SOURCE.DIKE SPILL.PREVENT LIQUID FROM ENTERING SEWERS/WATERWAYS.RECOVER FREE LIQUID.ADD SAND,EARTH OR OTHER ABSORBENT MATERIAL.TRANSFER TO CONTAINER.
Neutralizing Agent: NOT APPLICABLE
Waste Disposal Method: RECYCLE AS MUCH AS POSSIBLE. TREATMENT, STORAGE, TRANSPORTATION AND DISPOSAL MUST BE IN ACCORDANCE WITH ALL APPLICABLE LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS.
Precautions-Handling/Storing: STORE IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION REGULATIONS. KEEP CONTAINERS CLOSED.
Other Precautions: "EMPTY" CONTAINERS RETAIN RESIDUE AND CAN BE DANGEROUS. DO NOT PRESSURIZE, CUT, WELD, SOLDER, DRILL OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS. THEY MAY EXPLODE AND CAUSE INJURY/DEATH. AVOID REPEATED OR PROLONGED CONTACT WITH SKIN.

Control Measures

Respiratory Protection: NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS OR ORGANIC VAPOR RESPIRATOR OR SUPPLIED-AIR RESPIRATOR, IF NEEDED.
Ventilation: LOCAL/MECHANICAL (GENERAL) VENTILATION - EXPLOSION PROOF, WELL GROUNDED EQUIPMENTS
Protective Gloves: RUBBER RECOMMENDED
Eye Protection: CHEMICAL SPLASH GOGGLES & FACE SHIELD
Other Protective Equipment: IMPERVIOUS CLOTHING TO AVOID SKIN AND EYE CONTACT. EYE WASH STATION & SAFETY SHOWER.
Work Hygienic Practices: AVOID CONTACT WITH EYES, SKIN OR CLOTHING. WASH HANDS AFTER USING PRODUCT. AVOID BREATHING VAPORS OR MISTS.

Transportation Data

Trans Data Review Date: 93210
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
DOT Class: 3
DOT ID Number: UN1203
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRV

IMO Proper Shipping Name: GASOLINE
IMO Regulations Page Number: 3141
IMO UN Number: 1203
IMO UN Class: 3.1
IMO Subsidiary Risk Label: -
IATA PSN Code: RNE
AFI PSN Code: MUC
AFI Prop. Shipping Name: GASOLINE
AFI Class: 3
AFI ID Number: UN1203
AFI Pack Group: II
AFI Basic Pac Ref: 7-7

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 29JUL93
MFR Label Number: NOT APPLICABLE
Label Status: G
Common Name: UNLEADED 87
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Slight: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE- INHALATION OF VAPORS MAY CAUSE CNS DEPRESSION, CONVULSION, LOSS OF CONSCIOUSNESS. INGESTION HAS SYMPTOMS SIMILAR TO INHALATION & ASPIRATION HAZARD. EYE/SKIN CONTACT CAUSES IRRITATION. CHRONIC- DERMATITIS, NERVOUS SYSTEM, KIDNEY, LIVER & BLOOD DISORDERS. STORE IN ACCORDANCE WITH NATIONAL FIRE PROTECTION ASSOCIATION REGULATIONS. REMOVE SPILL WITH NON-FLAMMABLE ABSORBENT MATERIAL. FIRST AID-CALL A PHYSICIAN IN ALL CASES. EYES:IMMEDIATELY FLUSH WITH WATER FOR 15 MINUTES, HOLDING EYELIDS OPEN. SKIN:WASH WITH SOAP & WATER. INHALED:REMOVE TO FRESH AIR & PROVIDE CPR/OXYGEN IF NEEDED. ORAL:DO NOT INDUCE VOMITING UNLESS INSTRUCTED BY A DOCTOR.
Protect Eye: Y
Label Name: ASHLAND OIL INC
Label Street: 1409 WINCHESTER AVE
Label P.O. Box: 391
Label City: ASHLAND
Label State: KY
Label Zip Code: 41114
Label Country: US
Label Emergency Number: 606-329-3333

RONEX MP

EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED 2/10/86

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
RONEX MP

PRODUCT CODE
255164 - 05164

CHEMICAL NAME
Petroleum Lubricating Grease

CAS NUMBER
Complex Mixture
CAS Number not applicable

PRODUCT APPEARANCE AND ODOR
Smooth dark green grease
Mild, bland odor

EMERGENCY TELEPHONE NUMBER
(713) 656-3424

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Lubricating Oil Base Stocks	64742-54-7 or 64742-65-0 and 64741-96-4 and 64742-57-0 and Mixture	Greater than 93%
and Lithium complex soap thickener	Mixture	
Proprietary additives	Mixture	Less than 7%

See Section E for Health and Hazard Information

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)
Health 1 Flammability 1 Reactivity 0 BASIS Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT
5 mg/m3 for oil mist in air

BASIS
OSHA Regulation 29 CFR 1910.1000

C. EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If lubricant gets into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN CONTACT
In case of skin contact, remove any contaminated clothing and wash skin with soap and water. If injected under the skin, regardless of the appearance of the wound or its size, contact a physician IMMEDIATELY. Delay may cause loss of affected part of the body.

INHALATION
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a

problem. If overcome by vapor from hot product, immediately remove from exposure and call a physician. If breathing is irregular or has stopped, start resuscitation; administer oxygen, if available. If overexposed to oil mist, remove from further exposure until excessive oil mist condition subsides.

INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
221°C (430°F)
ASTM D 92, Cleveland Open Cup

AUTOIGNITION TEMPERATURE
Greater than 260°C (500°F)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

HANDLING PRECAUTIONS
Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Lower Flammable Limit 0.9% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use water spray, dry chemical, foam or carbon dioxide. Use water to keep fire-exposed containers cool. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, metal oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

RONEX MP

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated skin contact may cause skin irritation. High pressure grease gun injection injury, where grease is injected through the skin or any part of the body, can cause serious delayed soft tissue damage and should be treated immediately as a surgical emergency.

NATURE OF HAZARD AND TOXICITY INFORMATION
Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
IBP Approximately 310°C (590°F)
by ASTM D 2887

VAPOR PRESSURE
Less than 0.01 mm Hg @ 20°C

SPECIFIC GRAVITY (15.6°C/15.6°C)
0.93

VAPOR DENSITY (AIR = 1)
Greater than 5

MOLECULAR WEIGHT
Not determined

PERCENT VOLATILE BY VOLUME
Negligible from open container in 4 hours @ 38°C (100°F)

EVAPORATION RATE @ 1 ATM. AND 25°C (77°F)
(n-BUTYL ACETATE = 1)
Less than 0.01

pH
Essentially neutral

SOLUBILITY IN WATER @ 1 ATM. AND 25°C (77°F)
Negligible: less than 0.1%

POUR, CONGEALING OR MELTING POINT
260°C plus (500°F plus)
Dropping Point by ASTM D 2265

VISCOSITY
285 Worked penetration, mm/10, @ 25°C, ASTM D 217

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

H. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Recover free product. Add sand, earth, or other suitable absorbent to spill area. Minimize skin contact. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas. Assure conformity with applicable governmental regulations.

ZONEX MP

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapor in air. Use explosion-proof equipment. No smoking or open lights.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS
Keep containers and storage containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

PERSONAL HYGIENE
Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean before reuse; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
Not applicable

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use.

The Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR ADDITIONAL INFORMATION ON HEALTH

FOR OTHER PRODUCT INFORMATION CONTACT:

RONEX MP

EFFECTS CONTACT:
DIRECTOR OF INDUSTRIAL HYGIENE
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 2737
HOUSTON, TX 77252-2180
(713) 656-2443

MANAGER, MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 2455
HOUSTON, TX 77252-2180
(713) 656-5949

XD-3 30

EXXON COMPANY, U.S.A.
A DIVISION OF EXXON CORPORATION

DATE ISSUED: 12/06/88
SUPERSEDES DATE: **********

MATERIAL SAFETY DATA SHEET

EXXON COMPANY, U.S.A. P.O. BOX 2180 HOUSTON, TX 77252-2180

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
XD-3 30

CHEMICAL NAME
Petroleum Lubricating Oil

PRODUCT APPEARANCE AND ODOR
Clear, dark amber liquid
Mild, bland petroleum odor

EMERGENCY TELEPHONE NUMBER
(713) 656-3424

PRODUCT CODE
211752 - 01752

CAS NUMBER
Complex Mixture
CAS Number not applicable

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
Lubricating Oil Base Stock	64742-54-7 or 64742-65-0	Greater than 80%
Proprietary additives.	Mixture	Less than 20%

See Section E for Health and Hazard Information.

See Section H for additional Environmental Information.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS)

Health	Flammability	Reactivity	BASIS
1	1	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT	BASIS
5 mg/m3 for oil mist in air	OSHA Regulation 29 CFR 1910.1000
5 mg/m3 for oil mist or fumes (10 mg/m3 STEL)	Recommended by the American Conference of Governmental Industrial Hygienists (ACGIH)
5 mg/m3 for mist in air	Recommended by Exxon

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, remove any contaminated clothing and wash skin thoroughly with soap and water.

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E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION
In accordance with the current OSHA Hazard Communication Standard criteria, this product does not require a cancer hazard warning. This is because the product is formulated from base stocks which are severely hydrotreated, severely solvent extracted, and/or processed by mild hydrotreatment and extraction. Alternatively, it may consist of components not otherwise affected by IARC criteria, such as atmospheric distillates or synthetically derived materials, and as such is not characterized by current IARC classification criteria.

Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis. However, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Continuous contact with used motor oil has caused skin cancer in animal tests.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
None Recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
IBP Approximately 302°C (575°F)

SPECIFIC GRAVITY (15.6 C/15.6 C)
0.89

MOLECULAR WEIGHT
Not determined

pH
Essentially neutral

POUR, CONGEALING OR MELTING POINT
-18°C (0°F)
Pour Point by ASTM D 97

VISCOSITY
11.8 cSt @ 100°C

VAPOR PRESSURE
Less than 0.01 mm Hg @ 20°C

VAPOR DENSITY (AIR = 1)
Greater than 5

PERCENT VOLATILE BY VOLUME
Negligible from open container in 4 hours @ 38°C (100°F)

EVAPORATION RATE @ 1 ATM. AND 25 C (77 F)
(n-BUTYL ACETATE = 1)
Less than 0.01

SOLUBILITY IN WATER @ 1 ATM. AND 25 C (77 F)
Negligible: less than 0.1%

X5-3 33

J. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
Not applicable

OSHA REQUIRED LABEL INFORMATION
In compliance with hazard and right-to-know requirements, the following OSHA Hazard Warnings should be found on a label, bill of lading or invoice accompanying this shipment.

(OSHA Hazard Warnings not applicable for this product; therefore, no OSHA warnings would appear on the label.)

Note: Product label will contain additional non-OSHA related information.

The information and recommendations contained herein are, to the best of Exxon's knowledge and belief, accurate and reliable as of the date issued. Exxon does not warrant or guarantee their accuracy or reliability, and Exxon shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal council should be consulted to insure proper health, safety and other necessary information is included on the container.

The Environmental Information included under Section H hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by Exxon Company, U.S.A. in order to provide additional health and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with Exxon's interpretation of the available data.

FOR ADDITIONAL INFORMATION ON HEALTH EFFECTS CONTACT:
DIRECTOR OF INDUSTRIAL HYGIENE
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 3157
HOUSTON, TX 77252-2180
(713) 656-2443

FOR OTHER PRODUCT INFORMATION CONTACT:
MANAGER, MARKETING TECHNICAL SERVICES
EXXON COMPANY, U.S.A.
P. O. BOX 2180 ROOM 2355
HOUSTON, TX 77252-2180
(713) 656-5949

ARTESIA READY MIX CONCRETE -- PORTLAND CEMENT CONCRETE (READY MIXED CONCRETE)
MATERIAL SAFETY DATA SHEET
NSN: 561000N080167
Manufacturer's CAGE: ARTES
Part No. Indicator: A
Part Number/Trade Name: PORTLAND CEMENT CONCRETE (READY MIXED CONCRETE)

General Information

Company's Name: ARTESIA READY MIX CONCRETE INC
Company's Street: 1000 SOUTH 19TH AVE
Company's City: LEMOORE
Company's State: CA
Company's Country: US
Company's Emerg Ph #: 209-686-1596
Company's Info Ph #: 209-686-1596
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Status: SMJ
Date MSDS Prepared: 01NOV96
Safety Data Review Date: 07NOV97
MSDS Serial Number: CFPXX

Ingredients/Identity Information

Proprietary: NO
Ingredient: PORTLAND CEMENT
Ingredient Sequence Number: 01
NIOSH (RTECS) Number: VV8770000
CAS Number: 65997-15-1
OSHA PEL: 50 MPPCF
ACGIH TLV: 10 MG/M3 TDUST

Proprietary: NO
Ingredient: SAND
Ingredient Sequence Number: 02
NIOSH (RTECS) Number: 1005020SA
OSHA PEL: 0.05 MG/M3 RESP DUST
ACGIH TLV: 0.05 MG/M3 RESP DUST

Proprietary: NO
Ingredient: GRAVEL
Ingredient Sequence Number: 03
NIOSH (RTECS) Number: 1013976GL
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: SILICA, CRYSTALLINE - QUARTZ
Ingredient Sequence Number: 04
NIOSH (RTECS) Number: VV7330000
CAS Number: 14808-60-7
OSHA PEL: SEE TABLE Z-3
ACGIH TLV: 0.1 MG/M3 RDUST

Proprietary: NO
Ingredient: FLY ASH
Ingredient Sequence Number: 05
NIOSH (RTECS) Number: 1009659FA
CAS Number: 68131-74-8
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: WATER
Ingredient Sequence Number: 06
NIOSH (RTECS) Number: ZC0110000
CAS Number: 7732-18-5
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Proprietary: NO
Ingredient: HEAVY METALS
Ingredient Sequence Number: 07
Percent: TRACE
NIOSH (RTECS) Number: 1000104HM
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: WET MASS OF PORTLAND CEMENT & FINE & COARSE AGGREGATE HAVING LITTLE/NO ODOR

Fire and Explosion Hazard Data

Extinguishing Media: USE MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Special Fire Fighting Proc: WEAR NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire And Expl Hazrds: PORTLAND CEMENT IS NON-COMBUSTIBLE AND NOT EXPLOSIVE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): NONE SPECIFIED BY MANUFACTURER.
Materials To Avoid: PORTLAND CEMENT-AGGREGATE MIXES, WHEN MIXED W/WATER TO PRDCE CONCRETE, FORM BINDER BASICALLY OF CALCIUM (SUP DAT)
Hazardous Decomp Products: CONCRETE WILL NOT DECOMPOSE IN HAZARDOUS BY-PRODUCTS.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE: WET PORTLAND CEMENT CONCRETE IN A PLASTIC STATE CAN DRY THE SKIN AND CAUSE ALKALI IRRITATION.
Carcinogenicity - NTP: YES
Carcinogenicity - IARC: YES
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: SILICA, CRYSTALLINE-QUARTZ: IARC MONO, VOL 68, 1997: GROUP 1. NTP 7TH ANNUAL RPT ON CARCINS, 1994: ANTIC TO BE (SUP DAT)
Signs/Symptoms Of Overexp: SEE HEALTH HAZARDS.
Med Cond Aggravated By Exp: NONE SPECIFIED BY MANUFACTURER.
Emergency/First Aid Proc: SKIN: EXPOSED SKIN AREAS SHOULD BE WASHED WITH SOAP AND WATER. EYES: IF CONCRETE PASTE GETS INTO THE EYES, THEY SHOULD BE IRRIGATED IMMEDIATELY AND REPEATEDLY WITH CLEAN WATER FOR AT LEAST 15 MINUTES. INHALATION: REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE OXYGEN OR ARTIFICIAL RESPIRATION) (FP N). INGESTION: CALL MD IMMEDIATELY (FP N).

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: NONE SPECIFIED BY MANUFACTURER.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS (FP N).
Precautions-Handling/Storing: NONE SPECIFIED BY MANUFACTURER.
Other Precautions: NONE SPECIFIED BY MANUFACTURER.

Control Measures

Respiratory Protection: USE NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation: NONE SPECIFIED BY MANUFACTURER.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: EMERGENCY EYEWASH AND DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N). WEAR PROTECTIVE CLOTHING AND BOOTS.
Work Hygienic Practices: AFTER WORK IS COMPLETED, WORKER SHOULD SHOWER WITH SOAP AND WATER.
Suppl. Safety & Health Data: MATLS TO AVOID: SILICATE HYDRATES WHICH ARE LUNG.

Transportation Data

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 07NOV97
Label Date: 07NOV97
Label Status: G
Common Name: READY MIXED CONCRETE
Chronic Hazard: YES
Signal Word: WARNING!
Acute Health Hazard-Slight: X
Contact Hazard-Moderate: X
Fire Hazard-None: X
Reactivity Hazard-None: X
Special Hazard Precautions: ACUTE: WET PORTLAND CEMENT CONCRETE IN A PLASTIC STATE CAN DRY THE SKIN AND CAUSE ALKALI IRRITATION. CHRONIC: CANCER HAZARD. CONTAINS SILICA, CRYSTALLINE-QUARTZ, WHICH IS LISTED AS A HUMAN LUNG CARCINOGEN (FP N).
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ARTESIA READY MIX CONCRETE INC
Label Street: 1000 SOUTH 19TH AVE
Label City: LEMOORE
Label State: CA
Label Country: US
Label Emergency Number: 209-686-1596

AERVOE-PACIFIC -- 770 ASPHALT BLACK
MATERIAL SAFETY DATA SHEET
NSN: 801000N014089
Manufacturer's CAGE: 0UPL1
Part No. Indicator: B
Part Number/Trade Name: 770 ASPHALT BLACK

General Information

Company's Name: AERVOE-PACIFIC CO INC
Company's Street: 1198 SAWMILL RD
Company's City: GARDENERVILLE
Company's State: NV
Company's Country: US
Company's Zip Code: 89410
Company's Emerg Ph #: 800-424-9300 (CHEMTREC)
Company's Info Ph #: 702-782-0100
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 002
Status: SMJ
Date MSDS Prepared: 19JAN93
Safety Data Review Date: 19MAY95
MSDS Preparer's Name: MIKE A TRAQUINA
Preparer's Company: SAME
MSDS Serial Number: BXSKW
Hazard Characteristic Code: NK

Ingredients/Identity Information

Proprietary: NO
Ingredient: XYLENE (SARA 313) (CERCLA). LD50:(ORAL,RAT)4300 MG/KG
Ingredient Sequence Number: 01
Percent: 8
NIOSH (RTECS) Number: ZE2100000
CAS Number: 1330-20-7
OSHA PEL: 100 PPM
ACGIH TLV: 100 PPM/150 STEL

Proprietary: NO
Ingredient: ACETONE (SARA 313) (CERCLA). LD50:(ORAL,RAT)9750 MG/KG
Ingredient Sequence Number: 02
Percent: 22
NIOSH (RTECS) Number: AL3150000
CAS Number: 67-64-1
OSHA PEL: 1000 PPM
ACGIH TLV: 750 PPM/1000

Proprietary: NO
Ingredient: SOLVENT NAPHTHA (PETROLEUM); (PETROLEUM NAPHTHA). LD50:(ORAL,
RAT)>25 ML/KG
Ingredient Sequence Number: 03
Percent: 15
NIOSH (RTECS) Number: 1004249NP
CAS Number: 64742-89-8
OSHA PEL: 400 PPM (MFR)
ACGIH TLV: 400 PPM (MFR)

Proprietary: NO
Ingredient: STODDARD SOLVENT; (MINERAL SPIRITS)
Ingredient Sequence Number: 04
Percent: <5.0
NIOSH (RTECS) Number: WJ8925000
CAS Number: 8052-41-3

OSHA PEL: 500 PPM
ACGIH TLV: 100 PPM

Proprietary: NO
Ingredient: PROPANE
Ingredient Sequence Number: 05
Percent: 10
NIOSH (RTECS) Number: TX2275000
CAS Number: 74-98-6
OSHA PEL: 1000 PPM
ACGIH TLV: ASPHYXIANT

Proprietary: NO
Ingredient: PROPANE, 2-METHYL-; (ISOBUTANE)
Ingredient Sequence Number: 06
Percent: <5.0
NIOSH (RTECS) Number: TZ4300000
CAS Number: 75-28-5
OSHA PEL: 800 PPM (MFR)
ACGIH TLV: 800 PPM (MFR)

Proprietary: NO
Ingredient: BUTANE; (NORMAL BUTANE)
Ingredient Sequence Number: 07
Percent: <5.0
NIOSH (RTECS) Number: EJ4200000
CAS Number: 106-97-8
OSHA PEL: 800 PPM
ACGIH TLV: 800 PPM

Proprietary: NO
Ingredient: COATING VOLATILE ORGANIC CONTENT:5.70 LBS/MP GAL. 4.75LBS/US GAL. 569 GMS/LTR
Ingredient Sequence Number: 08
NIOSH (RTECS) Number: 9999999VO
OSHA PEL: N/K (FP N)
ACGIH TLV: N/K (FP N)

Physical/Chemical Characteristics

Appearance And Odor: OPAQUE LIQUID WITH A SOLVENT BASED ODOR.
Boiling Point: 10F,-12C
Melting Point: N/A
Vapor Density (Air=1): HVR/AIR
Specific Gravity: 0.9 (H*2O=1)
Evaporation Rate And Ref: FASTER/N-BUTYL ACETATE
Solubility In Water: NEGLIGIBLE
pH: N/A

Fire and Explosion Hazard Data

Flash Point: -22F,-30C
Flash Point Method: TCC
Lower Explosive Limit: 0.7%
Upper Explosive Limit: 12.8%
Extinguishing Media: FOAM, ALCOHOL FOAM, CO*2, DRY CHEMICAL, WATER FOG.
Special Fire Fighting Proc: NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP (FP N). WATER SPRAY MAY BE INEFTIVE, BUT WATER SPRAY MAY BE USED TO COOL CNTNRS EXPOSED TO HEAT/FIRE TO PVNT (SUPDAT)
Unusual Fire And Expl Hazrds: CLOSED CONTAINERS MAY EXPLODE DUE TO BUILD UP OF PRESSURE FROM EXTREME HEAT/FIRE. AEROSOL SPRAY IS EXTREMELY FLAMMABLE.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH TEMPERATURES.
Materials To Avoid: STRONG OXIDIZING AGENTS.
Hazardous Decomp Products: CARBON MONOXIDE AND CARBON DIOXIDE.
Hazardous Poly Occur: NO
Conditions To Avoid (Poly): NOT RELEVANT.

Health Hazard Data

LD50-LC50 Mixture: SEE INGREDIENTS
Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: ACUTE:INHALATION:ANESTHETIC. IRRITATION OF RESPIRATORY TRACT, OR NERVOUS SYSTEM DEPRESSION-CHARACTERIZED BY HEADACHE, DIZZINESS, NAUSEA OR POSSIBLE UNCONSCIOUSNESS. SKIN OR EYE CONTACT:PRIMARY IRRITATION. SKIN:IRRITATION, REDNESS. SKIN ABSORPTION:MAY CAUSE IRRITATION OR BURNING SENSATION. CHRONIC:(EFTS OF OVEREXP)
Carcinogenicity - NTP: NO
Carcinogenicity - IARC: NO
Carcinogenicity - OSHA: NO
Explanation Carcinogenicity: NOT RELEVANT.
Signs/Symptoms Of Overexp: HLTH HAZ:PROLONGED OR REPEATED CONTACT TO SKIN MAY CAUSE DERMATITIS-EXERCISE DUE CARE.
Med Cond Aggravated By Exp: NONE KNOWN.
VAPORS:REMOVE FROM EXPOSURE & RESTORE BRTHG, SEEK MED ATTN. SKIN:WASH FLUSH IMMED W/WATER FOR @ LEAST 15 MINUTES & TAKE TO PHYSICIAN.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: REMOVE ALL SOURCES OF IGNITION; FLAMES, SPARKS, STATIC ELECTRICITY & ELECTRICAL. VENTILATE AREA & SOAK UP W/INERT ABSORB USING NON-SPARKING TYPE TOOLS.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. DO NOT INCINERATE CLOSED CONTAINERS.
Precautions-Handling/Storing: DO NOT STORE ABOVE 120F. DO NOT STORE OR USE NEAR HEAT, SPARKS, OR FLAME. DO NOT GET IN EYES. DO NOT BREATHE VAPORS. AVOID SKIN CONTACT.
Other Precautions: DO NOT TAKE INTERNALLY. SMOKING WHILE USING THIS PRODUCT MUST BE STRICTLY PROHIBITED. IN ADDITION TO ALL OTHER HAZARDS & PRECAUT-DUST FROM SANDING DRY PAINT FILMS SHOULD BE TREATED AS NUISANCE DUST WITH TLV OF 10MG/CUBIC METER.

Control Measures

Respiratory Protection: OUTDOORS:NIOSH/MSHA APPRVD PARTICULATE FILTER TO REMOVE ANY AIRBORNE OVERSPRAY. IN RESTRICTED AREA W/POOR VENT & CLOSE TO TLV, NIOSH/MSHA APPRVD RESP W/ORGANIC VAPOR CARTRIDGE IS RECOMMENDED.
Ventilation: ALL APPLICATION AREAS SHOULD BE ADEQUATELY VENTILATED IN ORDER TO KEEP INGREDS BELOW THEIR EXPOSURE LIMITS.
Protective Gloves: IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: ANSI APPRVD EMERGENCY EYE WASH & DELUGE SHOWER (FP N).
Work Hygienic Practices: REMOVE & WASH CONTAMD CLTHG BEFORE REUSE. AVOID PROLONGED OR REPEATED CONTACT. DO NOT BREATHE VAPORS.
Suppl. Safety & Health Data: FIRE FIGHT PROC:PRESS BUILD UP.

Transportation Data

Disposal Data

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Label Data
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Label Required: YES
Technical Review Date: 19MAY95
Label Date: 19MAY95
Label Status: G
Common Name: 770 ASPHALT BLACK
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Moderate: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
ANESTHETIC. IRRITATION OF RESPIRATORY TRACT, OR NERVOUS SYSTEM DEPRESSION-CHARACTERIZED BY HEADACHE, DIZZINESS, NAUSEA OR POSSIBLE UNCONSCIOUSNESS. SKIN OR EYE CONTACT:PRIMARY IRRITATION. SKIN:IRRITATION, REDNESS. SKIN ABSORPTION:MAY CAUSE IRRITATION OR BURNING SENSATION. CHRONIC:PROLONGED OR REPEATED CONTACT TO SKIN MAY CAUSE DERMATITIS-EXERCISE DUE CARE.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: AERVOE-PACIFIC CO INC
Label Street: 1198 SAWMILL RD
Label City: GARDENERVILLE
Label State: NV
Label Zip Code: 89410
Label Country: US
Label Emergency Number: 800-424-9300 (CHEMTREC)

APPENDIX F

AGENCY LETTERS

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
ebsite: www.dec.state.ny.us

Denise M. Sheehan
Acting
Commissioner

June 24, 2005

Mr. Michael J. Bellotti
Olin Corporation
P.O. Box 248, 1186 Lower River Road, NW
Charleston, TN 37310-0248

Dear Mr. Bellotti:

Olin Corp. Industrial Welding (Site #9-32-050)
Inactive Hazardous Waste Site
Operable Unit #3 (a.k.a. Packard Road Parcel)

The New York State Department of Environmental Conservation (NYSDEC) has reviewed Olin's June 2005 Conceptual Engineering Design for Operable Unit (OU)#3 of the Olin Industrial Welding site. The conceptual design consists of an asphalt cap similar to the one employed on the adjacent portion of the Industrial Welding site. The conceptual design is acceptable to the NYSDEC.

I anticipate the release of a Proposed Remedial Action Plan (PRAP) for OU3 of the Industrial Welding Site later in 2005. Olin will receive a copy of the PRAP and the public announcement of the proposed remedy upon completion. Should you have any questions, please feel free to contact me at (716) 851-7220.

Sincerely,

Jeffrey A. Konsella, P.E.
Environmental Engineer II
Division of Environmental Remediation

cc: Mr. Greg Sutton, DEC Buffalo
Ms. Denise Radtke, DEC Albany
Mr. Matthew Forcucci, DOH Buffalo
Mr. Paul Dicky, Niagara County Health Department