NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
6274 East Avon-Lima Road, Avon, NY 14414-9516
P: (585) 226-5353 I F: (585) 226-8139
www.dec.ny.gov

October 6, 2015

Genesee Valley Real Estate Co., LLC
Hartel Properties, LLC
Mr. Dante Gullace, Member
First Federal Plaza
28 East Main St., Suite 500
Rochester, NY 14614

Dear Mr. Gullace:

Subject: 690 St. Paul Street, Site #C828159
Modification to Remedial Design Work Plan: AOC #8
October 5, 2015
City of Rochester, Monroe County

The New York State Department of Environmental Conservation (the Department) and the New York State Department of Health have completed their review of the document entitled *"Modification to Remedial Design Work Plan: AOC #8"* (the Work Plan) dated October 5, 2015, and prepared by LaBella Associates, D.P.C. for the 690 Saint Paul Street site located in the City of Rochester. Based on this review, the Department has determined that the Work Plan substantially address the requirements of the Brownfield Cleanup Agreement. In accordance with 6 NYCRR 375-1.6, the Work Plan is hereby approved.

Prior to the start of field activities, please attach a copy of this letter to the Work Plan and distribute the approved Work Plan as follows:

- Frank Sowers (two hardcopies, 1 with an original signature on the certification page);
- John Frazer- MCHD (electronic copy);
- Wade Silkworth- MCHD (electronic copy);
- Document repositories (1 hardcopy for each of the document repositories established for this site); and
- Copies to other interested parties upon request.

Please provide a detailed schedule for implementing the Work Plan in the next monthly progress report and notify me at least 7 days in advance of the start of field activities.

We look forward to working together to bring this site back into productive use. If you have questions or concerns on this matter, please contact me at 585-226-5357.

Sincerely,

Frank Sowers, P.E.
Environmental Engineer II

ec:

Dan Noll	Suzanne Wheatcraft
Jennifer Gillen	Bridget Boyd
Bernette Schilling	Wade Silkworth
James Mahoney	John Frazer

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

300 State Street, Suite 201 | Rochester, NY 14614 | p 585.454.6110 | f 585.454.3066 | www.labellapc.com

October 5, 2015

Mr. Frank Sowers
NYSDEC- Region 8
6274 East Avon-Lima Rd (Rtes. 5 and 20)
Avon, NY 14414

RE: Modification to Remedial Design Work Plan: AOC #8
C828159 – 690 Saint Paul Street
Rochester, New York 14605
LaBella Project No. 209280

Dear Mr. Sowers:

LaBella Associates, D.P.C. (LaBella) is pleased to provide this letter on behalf of Genesee Valley Real Estate (GVRE) that provides additional details and proposed modifications to be made to the Remedial Design Work Plan (RDWP) for AOC #8, dated January 2015, at the above-referenced New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site. The RDWP was initially approved by the NYSDEC with several modifications on February 27, 2015. A letter was submitted by LaBella on behalf of GVRE on March 18, 2015 to modify some aspects of the RDWP; however, NYSDEC requested additional information be provided in a letter dated May 15, 2015. LaBella submitted a letter on July 9, 2015 with some of the additional information; however, as indicated in NYSDEC's letter dated July 21, 2015 not all the information was provided. The letter provides the information requested by NYSDEC and proposes some additional minor modifications based on equipment, chemical availability and operational issues with the sub-slab depressurization system (SSDS) installed in the southern portion of Building 22.

1. Treatment Chemical – The RDWP initially identified that the treatment chemical (i.e., sodium permanganate) with a specific supplier named (Carus Corporation). The NYSDEC Decision Document indicated only sodium permanganate. Based on availability and cost, the sodium permanganate will be procured from Hepure Technologies, Inc. (Hepure) and will be shipped to the Site via 275-gallon totes at a 40% dilution. A copy of the MSDS from Hepure is attached. As noted in the approved work plan, the 40% solution will be diluted on-site with potable water to a 10% solution prior to gravity-feeding into the underground infrastructure. Additional information on the storage, dilution and injection is below.

    - Four 275-gallon totes of the chemical will be shipped to the Site and stored within a secondary containment berm within the unoccupied, northern portion of Building 22. The secondary containment will consist of at least 2-layers of 10-mil plastic sheeting, which is compatible with sodium permanganate. This sheeting will also be wrapped around and secured to the walls of the berm. The walls consist of lumber approximately 6-in. in height and be constructed such that the lumber is outside the containment area (i.e., wood will not be in contact with permanganate in the event of a spill). The secondary containment area (i.e., berm limits) will be approximately 30-ft. by 30-ft. (i.e., about 900-sq. ft.). The area

occupied by the totes (a total of approximately 64-sq. ft.) and the 1,000-gallon mixing tank (assuming a 6-ft. diameter, a total of 28.3-sq. ft.) and miscellaneous equipment (pump, hosing, etc.) equates to approximately 100-sq. ft. (rounded). As such, the available containment area is approximately 800-sq. ft. and thus a containment capacity of 2,992-gallons. Based on the largest single tank of 1,000-gallons, the containment is over 200%. Figure 2 provides a detail of the containment area.

- The mixing/dilution of the permanganate will be completed within a 1,000-gallon mixing tank (in the containment area). The mixing tank is a poly tank (compatible with the permanganate) and information on this tank is attached. The northern portion of Building 22 (where the mixing will occur) will be secured under lock and key. A former overhead rolling door was in-place in this building but was removed and the doorway secured with wood in front of the door and fastened to the interior of the space. The wood extends approximately 9 ft. off the ground but leaves approximately 4-5 ft. of open space above. The open air portion of the overhead door provides substantial ventilation of the space. Additional measures will also be implemented as needed (e.g., fans).

- A small diameter (approximately 6-inch) hole will be drilled in the northern side of Building 22 and a sleeve (section of piping) will be placed within the hole to protect the hosing. The hosing will be used to convey the solution from the mixing tank to the underground infrastructure. The hosing will be 1-inch braided PVC hosing (which is compatible with permanganate). The portion of the hosing that extends through the building wall will be supported with cradles every 4-ft. where elevated above the ground surface. The cradles will be lumber constructed as needed. Note, any material placed within the containment area will be compatible with the sodium permanganate (i.e., wood will not be used within the containment area). Figure 1 depicts the approximate proposed layout of the treatment chemical storage and injection set up. As noted on Figure 1, earthen berms will be constructed around each of the injection well heads in order to contain any accidental leaks/spillage. The earthern berms will consist of 3-ft. by 3 ft. by 1 ft. tall berms. Similar earthen berms will be constructed where hosing connections are present (couplings, valves, etc.). Any spillage will be allowed to dissipate into the subsurface and the surface material neutralized with the neutralizing agent.

- The hosing from the pump will be lowered at least 5-ft. below the top of the injection point to prevent spillage at the injection point well head.

- A valve will be placed on the hosing at the well head to allow for shutting off the flow of permanganate at the injection point.

- The pump is a 1-inch heavy duty Jesco drum pump with polypropylene (which is compatible with permanganate). A copy of the pump cut sheet is attached. As noted in the previously approved work plan, the permanganate will be allowed to gravity feed into the subsurface; however, the pump will be utilized to move the material from the mixing area to the well head (the floor slab of Building 22 is lower in elevation than the injection well heads).

- Each injection trench will be injected via small batches initially in order to determine the dispersion rate of the permanganate into the subsurface. Initially batches between 50 and 100 gallons will be utilized. Batches will increase in volume as is practical based on field conditions.

- A technician will be at the injection point head with proper PPE (tyvek, face shield, gloves, etc.) to observe the well head for potential surcharge (i.e., the technician will observe down the vertical riser for any back up of permanganate). The technician at the well head will be in constant communication with a technician at the pumping location in order to allow for turning the pump off in the event the permanganate appears to begin to surcharge.

- Subsequent to completing a day of work and/or an injection event at an infrastructure location, the hoses and infrastructure will be flushed with potable water. No residual permanganate will be left within the equipment or hoses. All hoses and equipment after flushing will be placed within Building 22 and secured at the end of the work day.

- Any areas of surface spillage will be diluted to less than 6% and then neutralized with the neutralizing agent.

2. Fencing – The RDWP initially indicated that the work area would be fenced in with chain-linked fencing (as opposed to the typical orange construction fencing which was previously utilized during excavation in this area of the Site). The chain-linked fencing was selected to provide extra security based on the initial plan to store the treatment chemical outside, to the north of Building 22. However, based on the above proposed modifications, the chemical will be stored securely within Building 22 and will not be present on the outside of Building 22 when not actively being pumped into the underground infrastructure. Furthermore, all such pumping work will be completed while technicians are on-site and in the area to maintain a secure area. As such, orange construction fencing will be utilized in place of the chain-linked fencing. The construction fencing will be maintained throughout the injection process.

3. Sub-Slab Depressurization System (SSDS) – The SSDS was installed in the southern (occupied) portion of Building 22 in substantial accordance with the AOC #8 RDWP and a separate RDWP for the installation of this system. However, adequate pressure field extension (i.e., -0.004 inches of water column) has not been generated by this system. The inadequate pressure appears to be the result of unidentified cracks and/or damage to the concrete floor slab which is covered by a plywood floor surface in many places throughout the building. A comprehensive inspection and repair of the concrete floor slab is not feasible in the immediate future due to the current tenant and their need for a usable space. It should be noted GVRE will continue to work with the tenant to assess the SSDS; however, such work will have to be done as is practical for the tenants operations. As such and with the intent to complete the injection in AOC #8 as soon as possible, indoor air sampling will be completed in the occupied portion of Building 22 on a quarterly basis beginning subsequent to the injection of the treatment chemical in AOC #8. Currently, adequate vacuum readings have not been measured associated with the SSDS; however, pressure field extension testing will be completed on the day of indoor air sampling, prior to setting up the indoor air sample for collection. The indoor air sample will be collected outside of the footprint of system influence, if any influence is measured.

   Each quarterly air sampling event will consist of the collection of one (1) indoor air sample within the center of the southern portion of Building 22 (refer to Figure 3) and the collection of one (1) ambient air sample from the exterior portion of the Site in an upwind location. Based on the use of products containing VOCs for operational purposes within this portion of the Building (paint thinners, etc.), the air sample analyses will be limited to specific AOC #8 contaminants of concern (i.e., TCE and its breakdown products). Specifically, air samples will be analyzed for the following compounds:

- Trichloroethene (TCE)
- Cis-1,2-dichloroethene
- Trans-1,2-dichloroethene
- Vinyl chloride
- 1,1-Dichloroethene
- Chloroethane

The air samples will be collected in accordance with procedures outlined in the NYSDOH's *Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006 (NYSDOH SVI Guidance). The air samples will be collected using one (1) liter Summa Canisters® equipped with pre-calibrated laboratory supplied flow regulators set for a sampling time of eight (8) hours. The Summa Canisters® will be certified clean by the laboratory. Subsequent to completing the air sampling, the samples will be sent under chain of custody control to the laboratory for testing. The samples will be tested for the list of targeted VOCs listed above using USEPA Method TO-15 with a minimum detection limit of 1 µg/m3 with 0.25 µg/m3 for TCE and vinyl chloride. An "ASP-Category B-like" deliverables package will be generated by the laboratory and a DUSR will be completed and submitted to the NYSDEC.

The quarterly air monitoring will begin subsequent to introduction of the treatment chemical into the subsurface and cease when one of the following occurs:

1. The building is no longer occupied (i.e., tenants vacate);
2. The SSDS is modified to a point where adequate pressure is generated below the floor slab; or,
3. The NYSDEC indicates quarterly monitoring may be reduced or terminated.

In the event that tenants move into the northern (currently unoccupied) portion of Building 22 prior to any of the above events, indoor air quality testing locations may be added to the quarterly testing events.

All fieldwork will be completed in accordance with the Health and Safety Plan and Community Air Monitoring Program as described in the approved RDWP.

If you have any questions, please do not hesitate to contact me at (585) 295-6611.

Respectfully submitted,

LABELLA ASSOCIATES, D.P.C.

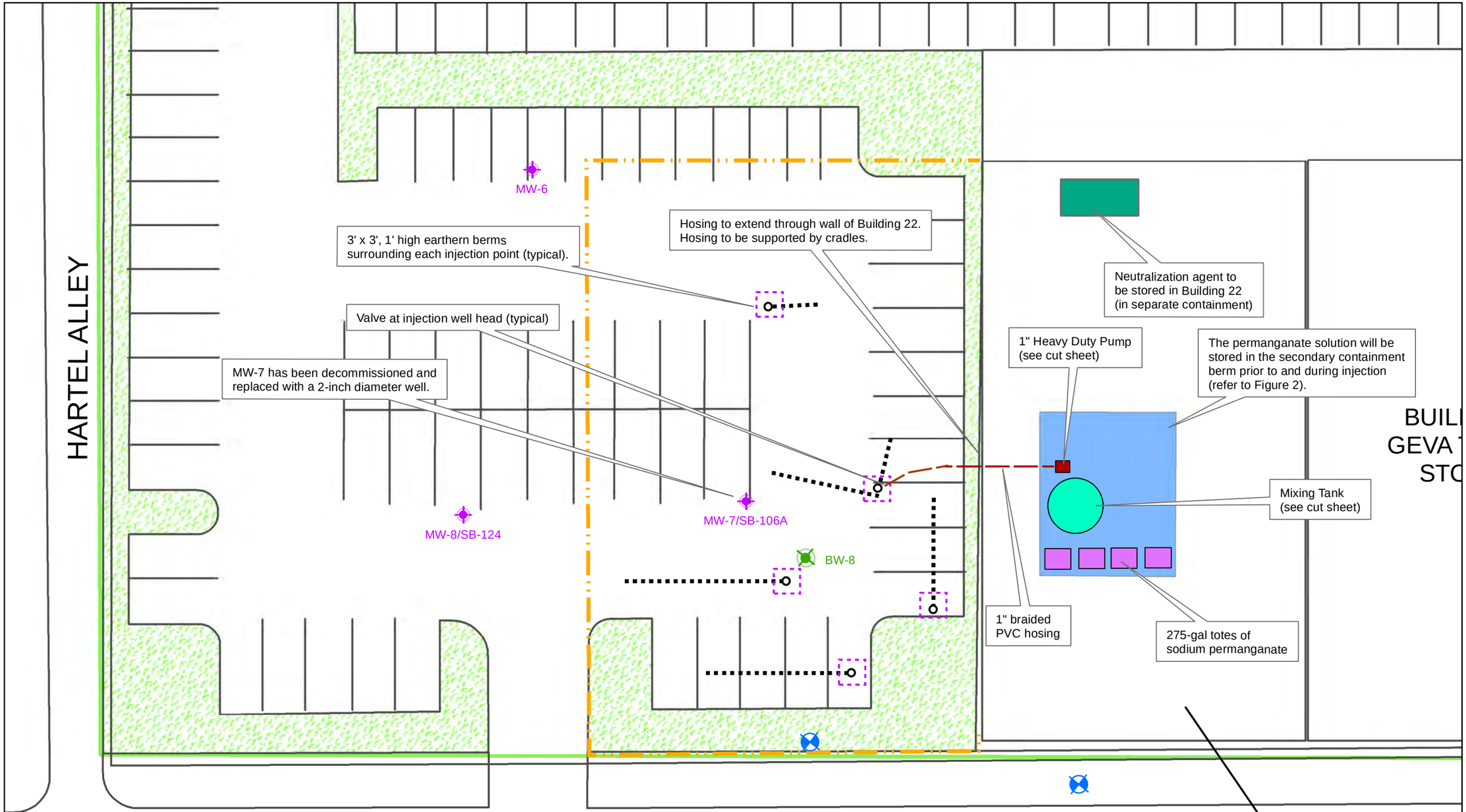
Dan Noll, P.E.
Project Manager

"I, Daniel P. Noll, certify that I am currently a NYS registered professional engineer and that this Amendment to the Remedial Design Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)."

Attachments

Cc: Bridget Boyd, NYSDOH
Dante Gullace, GVRE
Chris Gullace, GVRE

I:\GENESEE VALLEY REAL ESTATE CO\209280\REPORTS\RAWP AOC #8\REVISED NOV 2014\MOD LETTER\RDWP AOC8 MOD LTR 9.30.2015.DOCX



LEGEND

- PROPOSED OVERBURDEN MONITORING WELL
- CHAIN LINK FENCE
- 4" VERTICAL RISER PIPE - INSTALLED TO GRADE
- 4" HORIZONTAL SLOTTED PVC PIPE (0.020")
- SECONDARY CONTAINMENT
- COMPLETED BCP OVERBURDEN WELLS
- COMPLETED BCP BEDROCK WELLS
- BCP BOUNDARY

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) EQUIPMENT/STAGING LOCATIONS ARE APPROXIMATE AND FOR INFORMATIONAL PURPOSES. THESE LOCATIONS MAY SHIFT BASED ON FIELD CONDITIONS.

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LABELLA Associates, D.P.C.
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PROPOSED INJECTION PLAN

REMEDIAL DESIGN
WORK PLAN MODIFICATION:
AOC #8

BROWNFIELD CLEANUP PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

STATE OF NEW YORK
DANIEL P. NOLL
No. 081996
LICENSED PROFESSIONAL ENGINEER

N E S W

10 0 10 Feet

1 inch = 20 feet
Figure intended to print as 11" x 17".

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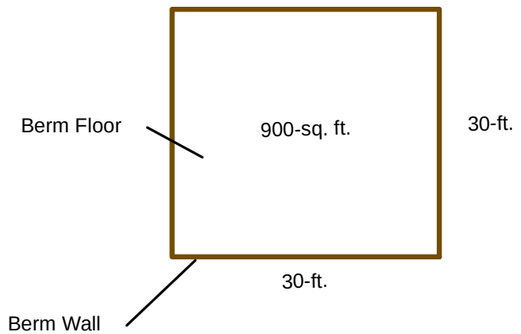
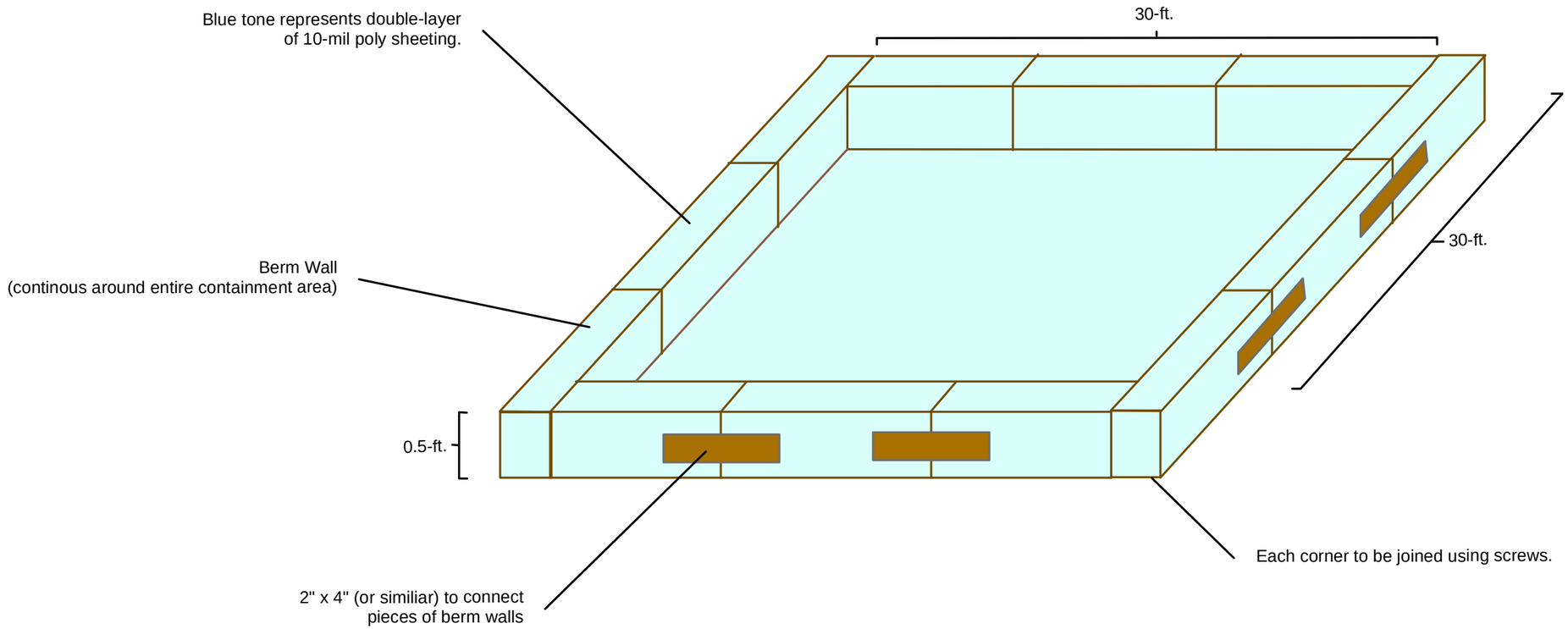
FIGURE 1

Secondary Containment: Birds-Eye View





NOTE: NOT TO SCALE (DIMENSIONS ONLY AS SHOWN)

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PROPOSED
SECONDARY CONTAINMENT

REMEDIAL DESIGN
WORK PLAN MODIFICATION:
AOC #8

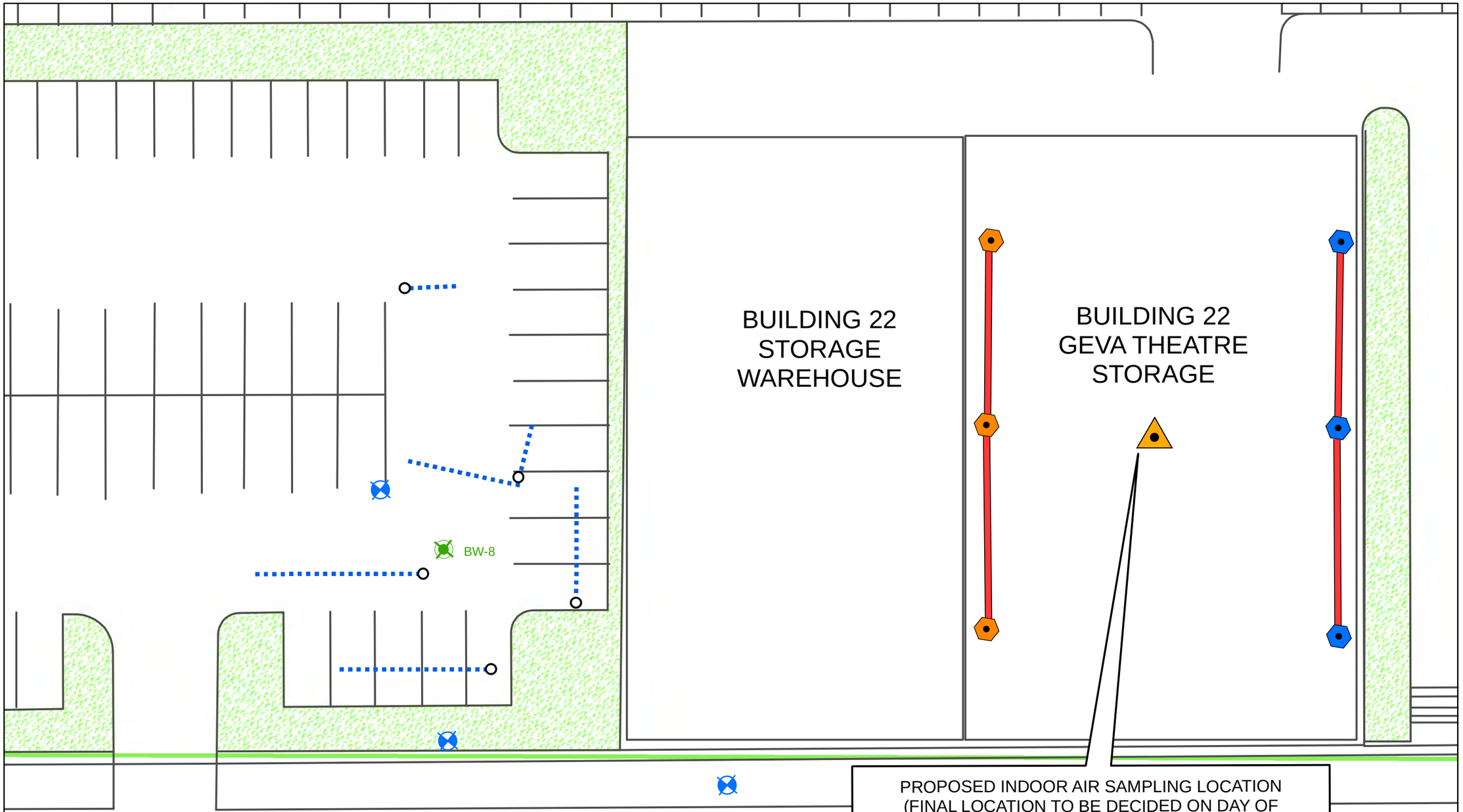
BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

209280

FIGURE 2



LEGEND

- OVERBURDEN MONITORING WELL
- SSDS 1
- SSDS 2
- SSDS HEADER PIPE
- 4" VERTICAL RISER PIPE - INSTALLED TO GRADE
- 4" HORIZONTAL SLOTTED PVC PIPE (0.020")
- COMPLETED BCP BEDROCK WELLS
- COMPLETED PRE-BCP BEDROCK WELLS
- BCP BOUNDARY

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) AMBIENT AIR SAMPLE TO BE PLACED UPWIND OF BUILDING 22. AS SUCH, THE LOCATION OF THIS SAMPLE WILL BE DETERMINED ON THE DAY OF SAMPLING.

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300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
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www.labellapc.com

PROPOSED INDOOR
AIR SAMPLING LOCATION

MODIFICATION TO
REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N E S W

10 0 10 Feet

1 inch = 20 feet
Figure intended to print as 11" x 17".

209280

FIGURE 3

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Mod Letter\Fig 3 - Mod Ltr.mxd

Hepure Technologies Inc

Materials Safety Data Sheet
Sodium Permanganate

EMERGENCY TELEPHONE: CHEMTREC 1-800-424-9300

****

DATE ISSUED: 09/13

SECTION 1 - CHEMICAL PRODUCT IDENTIFICATION

PRODUCT NAME: ***Sodium Permanganate**
DESCRIPTION: *40% minimum as NaMnO4

SECTION 2 - COMPOSITION / INFORMATION ON INGREDIENTS

CHEMICAL NAME	%	TLV	CAS No.
* Sodium Permanganate	40	.20mg Mn per cubic meter of air	*10101-50-5

SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: *

EFFECTS OF OVEREXPOSURE - ACUTE

EYES: *Sodium Permanganate is damaging to eye tissue on contact. It may cause burns that result in damage to the eye.

SKIN: *Momentary contact of solution at room temp may be irritating to the skin, leaving brown stains.

INGESTION: *If swallowed, may cause burns to mucous membranes of the mouth, throat, esophagus, and stomach

INHALATION: *May cause irritation to the respiratory tract

EFFECTS OF OVEREXPOSURE - CHRONIC
*

PRIMARY ROUTE OF ENTRY: *

SECTION 4 - FIRST AID MEASURES

EYES: *Flush immediately with large amounts of water for at least 15 minutes. Seek medical attention immediately.

SKIN: *Wash contaminated area with water. Seek medical attention if irritation persists.

INGESTION: *If person is conscious, give large amounts of water or milk. Seek medical attention.

INHALATION: *Remove person from contaminated area to fresh air. Seek medical attention.

*PHYSICIANS NOTE: *Decomposition products are alkaline.

SECTION 5 - FIRE-FIGHTING MEASURES

FLASHPOINT: *None
FLAMMABILITY: *Nonflammable
AUTOFLAMMABILITY: *None EXPLOSIVE LIMITS: LOWER: n/a UPPER: n/a
EXPLOSION HAZARD: *Explosive in contact with sulfuric acid or peroxides, or readily oxidizable substances
EXTINGUISHING MEDIA: Use large amounts of water. Dike to contain.
EXTINGUISHING MEDIA WHICH MUST NOT BE USED: dry chemicals, Foams
SPECIAL EXPOSURE HAZARDS IN FIRE: Keep containers cool by spraying with water if exposed to fire.
SPECIAL PROTECTIVE EQUIPMENT FOR A FIRE: Self-contained breathing apparatus should be worn.

****

SECTION 6 - ACCIDENTAL RELEASE MEASURES

ENVIRONMENTAL PRECAUTIONS: *Contain spill by collecting the liquid in a pit or holding behind a dam. Dilute to approx 6% solution with water and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution.
METHODS FOR CLEANUP: *Flush with abundant water into the sewer, if permitted by federal, state, and local authorities. If not, collect and treat as above.

SECTION 7 - HANDLING AND STORAGE

HANDLING: *Wash hands thoroughly with soap and water after handling.
STORAGE: *Store in a cool, well-ventilated area. Segregate from acids, peroxides, Formaldehyde, and all combustible, organic or easily oxidized materials.

SECTION 8 - EXPOSURE CONTROL / PERSONAL PROTECTION

ENGINEERING CONTROLS: General ventilation is recommended. Eyewash and safety shower stations must be located in the immediate area.
EXPOSURE GUIDELINES: not established

PERSONAL PROTECTION EQUIPMENT:

RESPIRATORY: NIOSH-approved self-contained breathing apparatus for exposure to levels above limits.
HAND: Rubber gloves and boots.
EYE: Chemical goggles which are splash and dust proof or face shield.
SKIN: If clothing is contaminated, wash skin and launder clothing.

NOTE: BEFORE EATING, DRINKING OR SMOKING, WASH FACE AND HANDS THOROUGHLY WITH SOAP AND WATER.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE, COLOR AND ODOR: *Purple Solution
PH as is: *6-9
BOILING POINT: *>105 degrees C
FLASH POINT: *not determined
VAPOR PRESSURE: *760 mm @ 105 degrees C
SPECIFIC GRAVITY: *1.36-1.39
SOLUBILITY IN WATER: *Complete solubility in all proportions
VISCOSITY: *

SECTION 10 - STABILITY AND REACTIVITY

HAZARDOUS POLYMERIZATION: Material is not known to polymerize.
CHEMICAL STABILITY: Under normal conditions, the material is stable.
CONDITIONS TO AVOID: Contact with incompatible materials or heat (135°C/275°F) could result in violent exothermic chemical reaction.
MATERIALS TO AVOID: Acids, peroxides, and all combustible organic or readily oxidizable materials including inorganic oxidizable materials and metal powders. With hydrochloric acid, chlorine gas is liberated.
HAZARDOUS DECOMPOSITION PRODUCTS: When involved in a fire, sodium permanganate may form corrosive fumes.

SECTION 11 - TOXICOLOGICAL INFORMATION

ACUTE TOXICITY: LD_{50} ORAL (rat) = x.x g/kg
IRRITANCY: *
SENSITIZATION: *
SUB-ACUTE, SUB-CHRONIC AND PROLONGED TOXICITY: * no information available
EMPIRICAL DATA ON EFFECTS ON HUMANS: * no information available

****

SECTION 12 - ECOLOGICAL INFORMATION

PERSISTENCE IN THE ENVIRONMENT:
BIOLOGICAL OXYGEN DEMAND:
CHEMICAL OXYGEN DEMAND:
AQUATIC TOXICITY
Daphnia magna
Fathead minnow
OTHER INFORMATION: * Discharge of this product must be in accordance with all federal, state, local or other applicable laws and regulations.

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: When it becomes a waste, sodium permanganate is considered a D001 hazardous)ignitable) waste. For disposal of sodium permanganate solutions, follow procedures in Section 6 and deactivate the permanganate to insoluble manganese dioxide. Dispose of it in a permitted landfill. Contact F2 Industries, LLC for additional recommendations.

SECTION 14 - TRANSPORTATION INFORMATION

DOT SHIPPING NAME: 49 CFR172.101 Permanganates, inorganic, aqueous solution, n.o.s. (contains sodium permanganate)
UN Number: 49 CFR172.101….UN 3214
DOT HAZARD CLASS: 49 CFR172.101….5.1
PACKING GROUP: 49 CFR172.101….II
HAZARD CLASS: 49 CFR172.101….Oxidizer

SECTION 15 - REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA): All components of this product are listed in the Toxic Substances Control Act inventory.
COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND LIABILITY ACT (CERCLA): Reportable Quantity - * pounds (RCRA hazardous waste).
SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA Title III) - Section 311 Hazard Categories:

Acute Health:	Yes
Chronic Health:	Yes
Fire:	Yes
Sudden Release of Pressure:	No
Reactive:	No

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA Title III) - Section 311:
Components of this product subject to reporting: none

SECTION 16 - OTHER INFORMATION

NFPA 704 RATINGS:

HEALTH: 1 FLAMMABILITY: 0 REACTIVITY: 0

The information and recommendations contained in this Material Safety Data Sheet have been compiled from sources believed to be reliable and to represent the best opinion on the subject as of the date on this sheet. However, no warranty, guarantee or representation, expressed or implied, is made by F2 Industries, LLC, as to the correctness or sufficiency of this information or to the results to be obtained from the use thereof.

NSF
Certified to ANSI/NSF 60

1" (25 mm) HEAVY DUTY **CLAMPED** STYLE **DRUM** PUMP

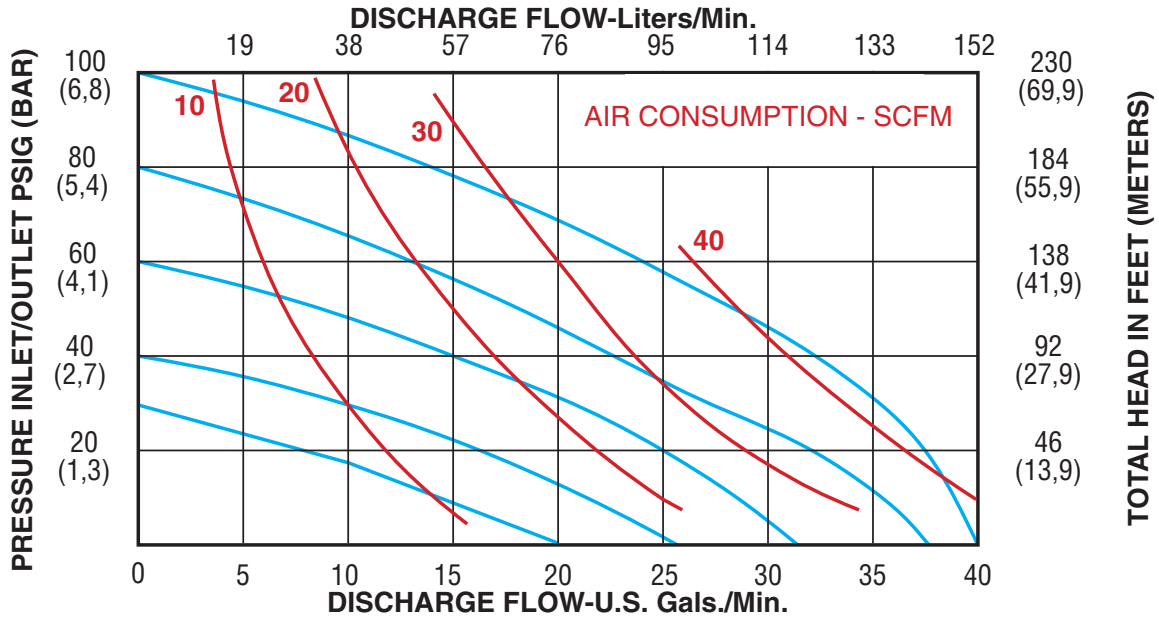
Reliable polypropylene air center section combined with non-metallic clamped casing materials ensure maximum chemical compatibility. Available in a variety of materials and options.

- Suitable for Clean Fluids, Slurries or up to 1/4" Solids
- Heavy Duty Air Valve
- Non-Metallic Wetted Components
- Muffler Included

SPECIFICATIONS

Dimension	
Physical Dimensions	See Drawing Page 76
Air Inlet	¼"
Liquid Inlet	1" (25 mm)
Liquid Outlet	1" (25 mm)
Weight	See Product Tables
Performance	
Maximum Flow	40 gpm (152 lpm)
Maximum Air Pressure	100 psi (6.8 bar)
Maximum Solids	1/8" (3.2 mm)
Max Suction Lift Dry	15 ft (4.5 m)
Max Suction Lift Wet	26 ft (7.9 m)
Max Suction Lift Dry with PTFE	10 ft (3 m)
Max Temperature	See Product Tables
Noise Level (with muffler)	80 dBA
Displacement Per Stroke	0.083 Gallons (0.314 l)

PERFORMANCE CURVE (Based on water-flooded suction)



Lutz-JESCO America Corp.

1" (25mm) - POLYPROPYLENE - A non-metallic material, suitable for water, caustics, soap solutions, mild acids and general purpose applications. Please consult chemical compatibility tables or www.all-flo.com for your particular application.

PART NUMBER	DIAPHRAGM MATERIAL	VALVE/BALL MATERIAL	VALVE SEAT MATERIAL	O-RING MATERIAL	FASTENER MATERIAL	WEIGHT LBS (KG)	MAX TEMPERATURE °F (°C)	DIMENSIONAL DIAGRAM	CONNECT TYPE
NND-10	Geolast®	Nitrile	Polypropylene	Nitrile	SS	26 (11.8)	150 (66)	Pg. 76	NPT
NCD-10	Geolast®	Geolast®	Polypropylene	Nitrile	SS	26 (11.8)	150 (66)	Pg. 76	NPT
BKD-10	PTFE	PTFE	Polypropylene	PTFE	SS	26 (11.8)	150 (66)	Pg. 76	NPT
BKD-10E	Santoprene®	Santoprene®	Polypropylene	EPDM	SS	26 (11.8)	150 (66)	Pg. 76	NPT
BKD-10V	Viton®	Viton®	Polypropylene	Viton®	SS	26 (11.8)	150 (66)	Pg. 76	NPT

1" (25mm) - PVDF - Polyvinylidene fluoride suitable in applications requiring the highest purity, strength, and resistance to solvents, acids, and bases. Please consult chemical compatibility tables or www.all-flo.com for your particular application.

PART NUMBER	DIAPHRAGM MATERIAL	VALVE/BALL MATERIAL	VALVE SEAT MATERIAL	O-RING MATERIAL	FASTENER MATERIAL	WEIGHT LBS (KG)	MAX TEMPERATURE °F (°C)	DIMENSIONAL DIAGRAM	CONNECT TYPE
KND-10	PTFE	PTFE	PVDF	PTFE	SS	29 (13.2)	200 (93)	Pg. 75	NPT
KND-10E	Santoprene®	Santoprene®	PVDF	EPDM	SS	29 (13.2)	200 (93)	Pg. 75	NPT
KND-10V	Viton®	Viton®	PVDF	Viton®	SS	29 (13.2)	200 (93)	Pg. 75	NPT

AVAILABLE OPTIONS - Each pump can be configured to suit a particular application. Please see the options section for detailed product information on the following available options.

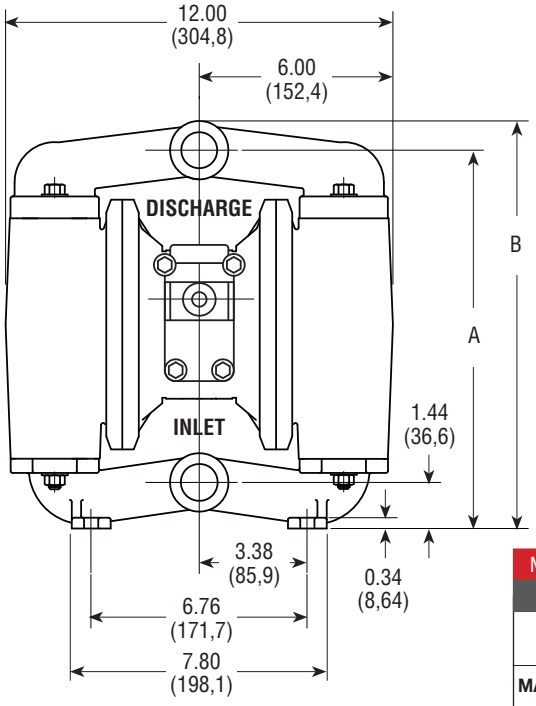
AIR VALVE OPTIONS	SEE PAGE 67
CYCLE COUNT VALVE	SOLENOID ADAPTOR VALVE
BALL VALVE OPTIONS	SEE PAGE 67
GEOLAST®	PTFE
SANTOPRENE®	HEAVY NITRILE
FDA NITRILE	STAINLESS STEEL
HARDWARE OPTIONS	SEE PAGE 67
PTFE COATED HARDWARE	
O-RINGS	SEE PAGE 67
PTFE O-RINGS	NITRILE O-RINGS
EPDM O-RINGS	VITON® O-RINGS
PORTING OPTIONS	SEE PAGE 68
BSP THREADS	ALL PORTS OPEN
DISCHARGE AIR INLET / EXHAUST	
SUCTION / AIR INLET / EXHAUST	
SUCTION / DISCHARGE LEFT	
SUCTION RIGHT & DISCHARGE LEFT	
SUCTION LEFT & DISCHARGE RIGHT	
VALVE SEAT OPTIONS	SEE PAGE 68
POLYPROPYLENE	NYLON
PVDF	STAINLESS STEEL

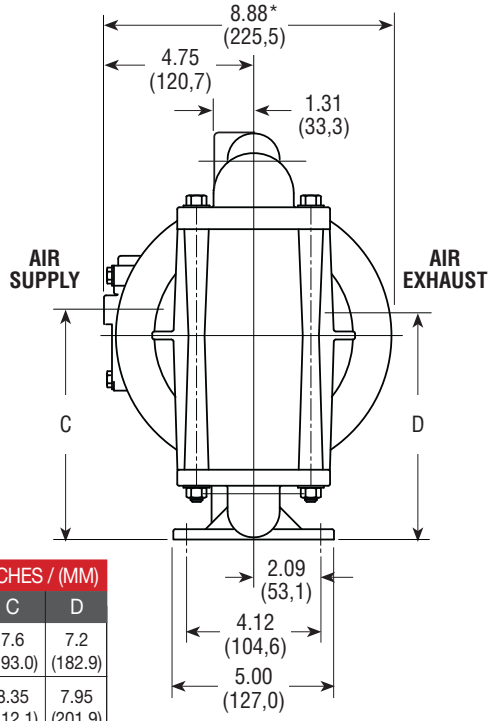
AVAILABLE ACCESSORIES - Please see the accessories section for detailed product information on the following available accessories.

AIR	SEE PAGE
FILTER / REGULATOR / GAUGE	60
SOLENOID VALVES	60
AIR FLOW CONTROL VALVES	60
NEEDLE VALVE	60
LIQUID	
COMPANION FLANGE KIT	61
SUCTION STRAINER	61
PUMP	
GROUNDING LUG	64

1" BOLTED STYLE HEAVY DUTY PUMP (METALLIC)

Dimensions in inches and (mm). For detailed dimensional drawings, please visit www.all-flo.com

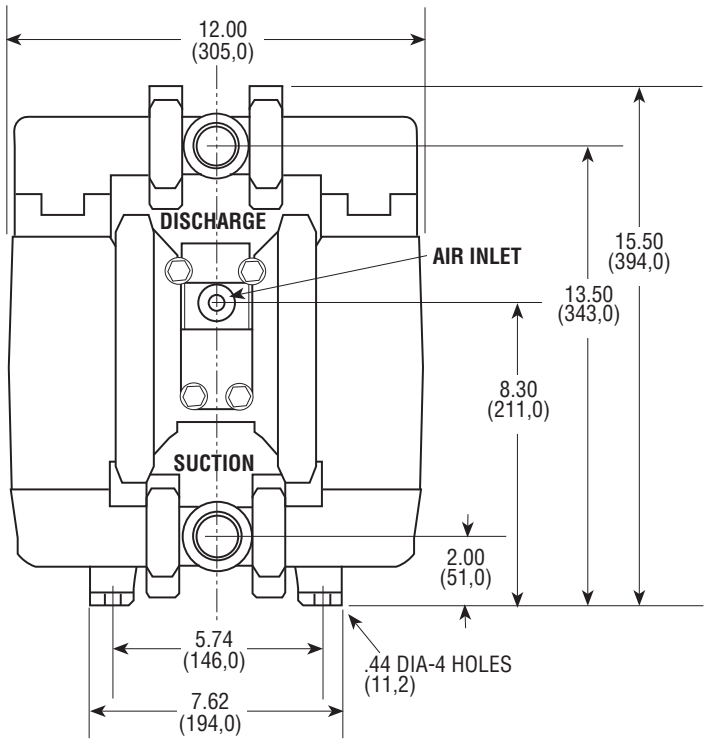


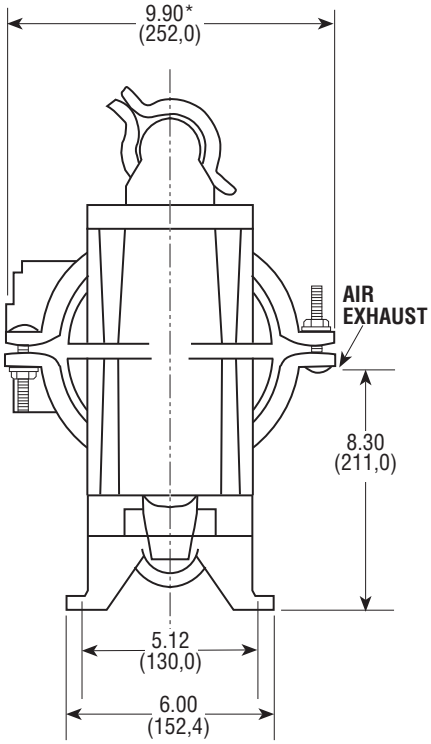


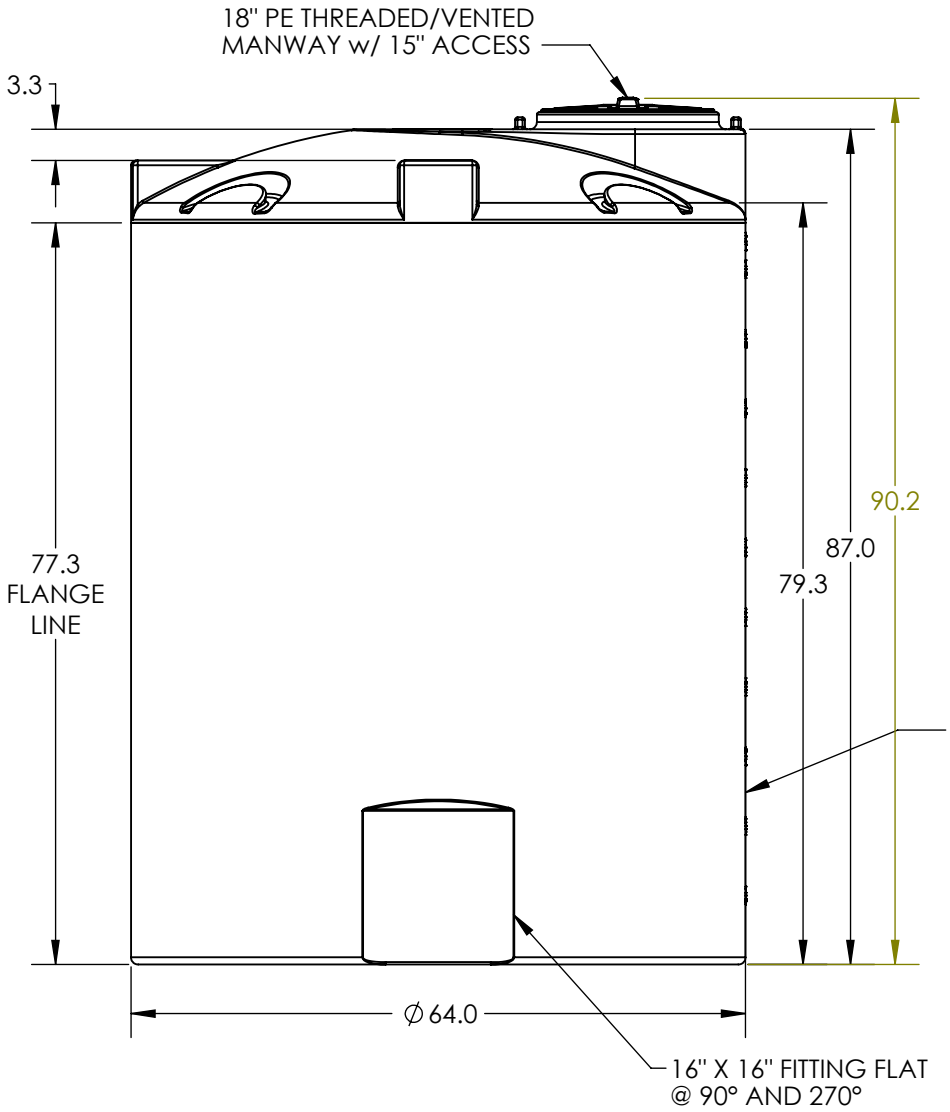
MODEL	DIMENSIONS INCHES / (MM)			
TYPE	A	B	C	D
BALL	13.21 (335.5)	13.96 (354.8)	7.6 (193.0)	7.2 (182.9)
MAX-PASS™	14.02 (356.1)	15.46 (392.7)	8.35 (212.1)	7.95 (201.9)

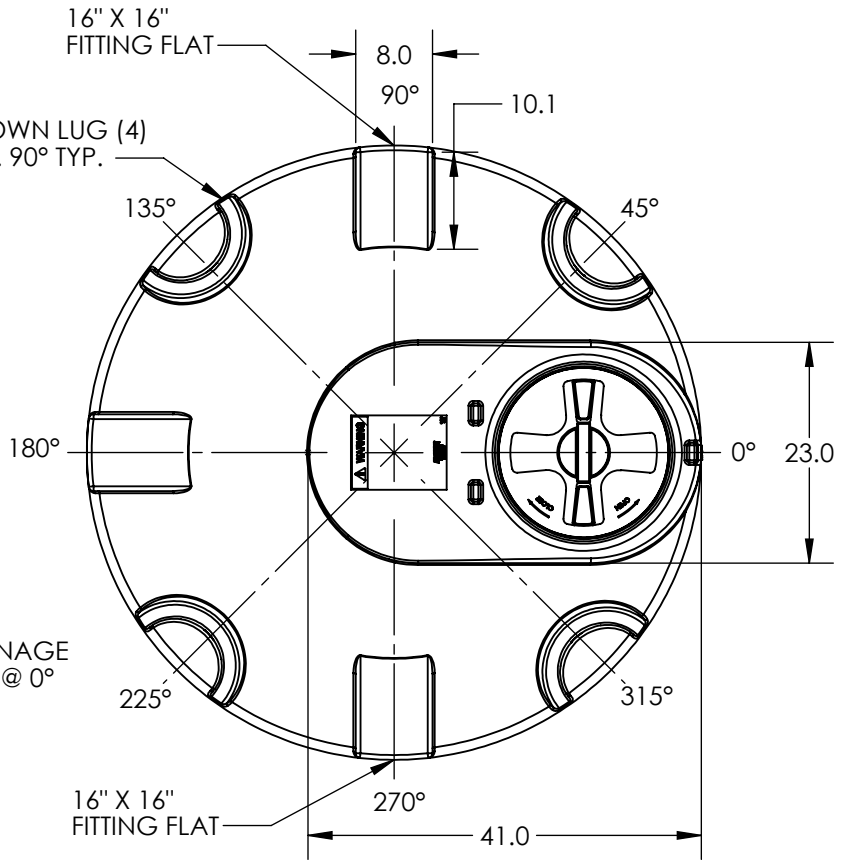
1" CLAMPED STYLE HEAVY DUTY PUMP (PLASTIC)

Dimensions in inches and (mm). For detailed dimensional drawings, please visit www.all-flo.com









NOTE:
1. GALLONAGE MARKS MAY BE REMOVED FOR FITTING PLACEMENT AS NEEDED.

***ALL EXTERNAL PIPING MUST BE INDEPENDENTLY SUPPORTED.**
***ONLY BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SII PROCEDURE.**
***Consult Snyder's Guidelines for Use and Installation prior to delivery.**
Available on-line at http://www.snyderindustriestanks.com/Technical

ALL DIMENSIONS ARE IN INCHES, NOMINAL, & SUBJECT TO CHANGE WITHOUT NOTICE.
ALL DIMENSIONS ON ROTATIONAL MOLDED PARTS ARE SUBJECT TO A ± 3% TOLERANCE.

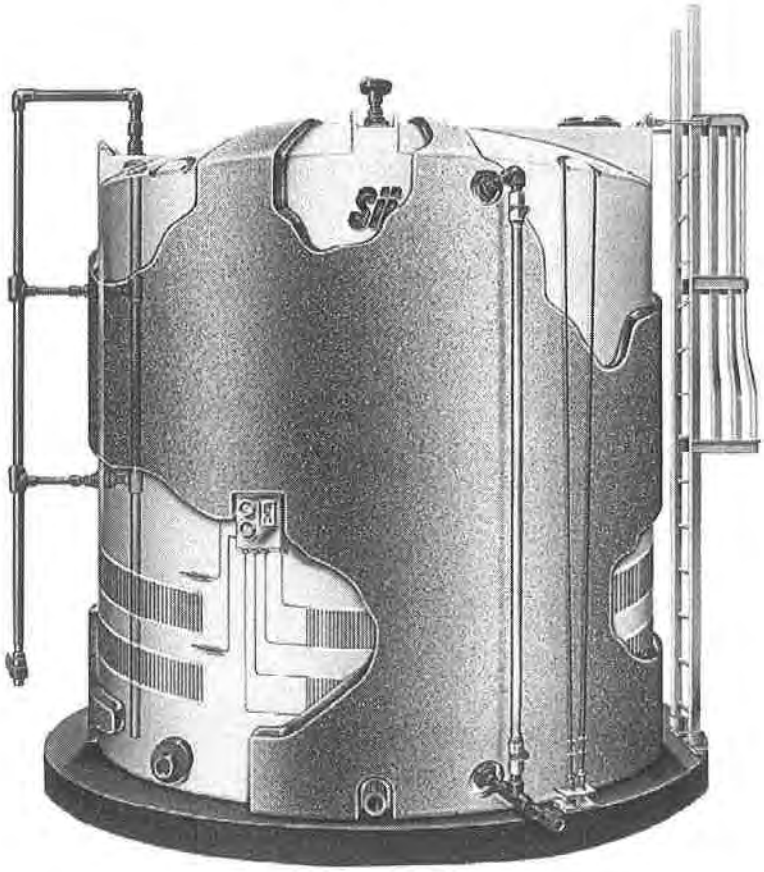
DO NOT SCALE	DRAWN BY	DATE
STATUS: **Released**	ET3	2/22/2014

SNYDER INDUSTRIES, INC.
4700 Fremont Street
Lincoln, NE 68504
(402) 467-5221
www.snydernet.com

TITLE:	REVISION
ASM TK 1100VDT X 64	**A**
	SHEET 1 OF 1
PART NO. **1830100N**	ENG. ID. **D001112**

GUIDELINES FOR

USE AND INSTALLATION



PROVIDING INDUSTRY WITH TANK SOLUTIONS

Protect your warranty – Read these instructions!

SNYDER INDUSTRIES, INC.

P.O. Box 4583 • Lincoln, Nebraska • 68504 • Phone: 402-467-5221
Fax: 402-465-1220 • www.snydernet.com

TABLE OF CONTENTS

1. SAFETY CHECKLIST

1.1 Confirm that the product to be stored is compatible with the tank and fittings.

1.2 Do not rigidly pipe tanks. Refer to section 5.3.2 for additional information.

1.3 All tanks must be properly vented. These tanks are not pressure vessels and must be vented to atmosphere. Venting equipment should be sized to limit pressure or vacuum in the tank to a maximum of ½" of water. Review the chemical to see if it can be vented to atmosphere or if it needs treatment prior to venting. Your application may need a sealed tank with a vent line going to a scrubber system for proper chemical safety.

1.4 **WARNING:** It is the installer's responsibility to follow all appropriate NFPA, OSHA, and governmental safety precautions. The following information has been provided as guidelines for tank use and installation. It does not address safety issues which may be present at specific tank installation sites. Use appropriate safety practices when handling any tank and/or using heavy equipment.

1.5 Prevent excessive heat near or inside the tank. Standard polyethylene tanks are designed for a maximum continuous temperature of 100°F. Consult factory for applications above 100°F.

1.6 Consider tank entry as a confined space entry. Follow proper entry procedures.

1.7 Do not stand or work on top of a tank. Remember – Safety First!

1.8 Read all warning labels on the tank prior to use and installation.

1.9 Record all warranty information as per section 2 while all information is available at time of tank receipt. Please refer to section 10 for warranty and policy statements.

2. WARRANTY INFORMATION

2.1 Record all required warranty information detailed below. Fax or mail this information to Snyder Industries at the number or address shown above. Retain a copy of this information for use in the advent of a warranty question.

2.1.1 Tank Part Number:_____

2.1.2 Tank Serial Number:_____

2.1.3 Tank Description/Size:_____

2.1.4 Date of Original Factory Invoice:_____

2.1.5 Snyder Customer Order Number:_____

2.1.6 Distributor Supplying Tank (name, address, and phone number):_____

2.1.7 Date of Water Pre-Test:_____

2.1.8 Water Pre-Test Observations:_____

2.1.9 Type of Chemical Stored:_____

2.1.10 Concentration of Chemical:_____

2.1.11 Tank Use Temperature:_____

3. RECEIVING AND INSPECTING YOUR TANK

3.1 Upon arrival at the destination, the purchaser and/or his agent shall be responsible for inspection for damage in transit. If damage has occurred or parts are missing, the purchaser should document this on the bill of lading, file a claim with the carrier, and notify the manufacturer prior to putting the tank into service.

3.2 Verify that the tank part number on the packing slip matches the tank bar code being delivered.

3.3 Do not drop a tank off a truck onto the ground. Please see section 4 for proper unloading instructions.

3.4 Please match tank components to bill of lading. Some tank components may be shipped inside the tank. Please review before putting the tank into a vertical position.

4. TANK LOADING, UNLOADING, AND POSITIONING

4.1 HORIZONTAL TANKS

4.1.1 Tanks shall be wrapped if ordered by the customer.

4.1.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).

4.1.3 Tanks should be loaded and unloaded from a horizontal position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.

4.1.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.**

4.2 SMALL VERTICAL and CONE BOTTOM TANKS (LESS THAN 2000 GALLON CAPACITY)

4.2.1 Tanks shall be wrapped if ordered by the customer.

4.2.2 Tanks should be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions (to prevent sharp forks from damaging tanks and to provide adequate support for the tank as it is being moved).

4.2.3 Tanks should be loaded and unloaded from a horizontal or vertical position in the truck with a minimal amount of sliding. The tank shall be hand carried, moved with a handling cart, or moved with a forklift with protected or rounded fork extensions to minimize sliding.

4.2.4 Tanks should be loaded or unloaded from a dock of proper height or with a forklift with protected or rounded fork extensions. **NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the warranty.**

4.3 LARGE VERTICAL and CONE BOTTOM TANKS (GREATER THAN OR EQUAL TO 2000 GALLONS)

4.3.1 Tanks shall be wrapped if ordered by the customer.

4.3.2 Tanks should be moved, loaded, and unloaded in a horizontal position with a forklift with protected or rounded fork extensions, or with a crane with a spreader bar and 2 slings of appropriate size positioned on each tank as shown in Figure 4.1. NEVER drop a tank off of a truck onto the ground since this may damage the tank and void the tank warranty.

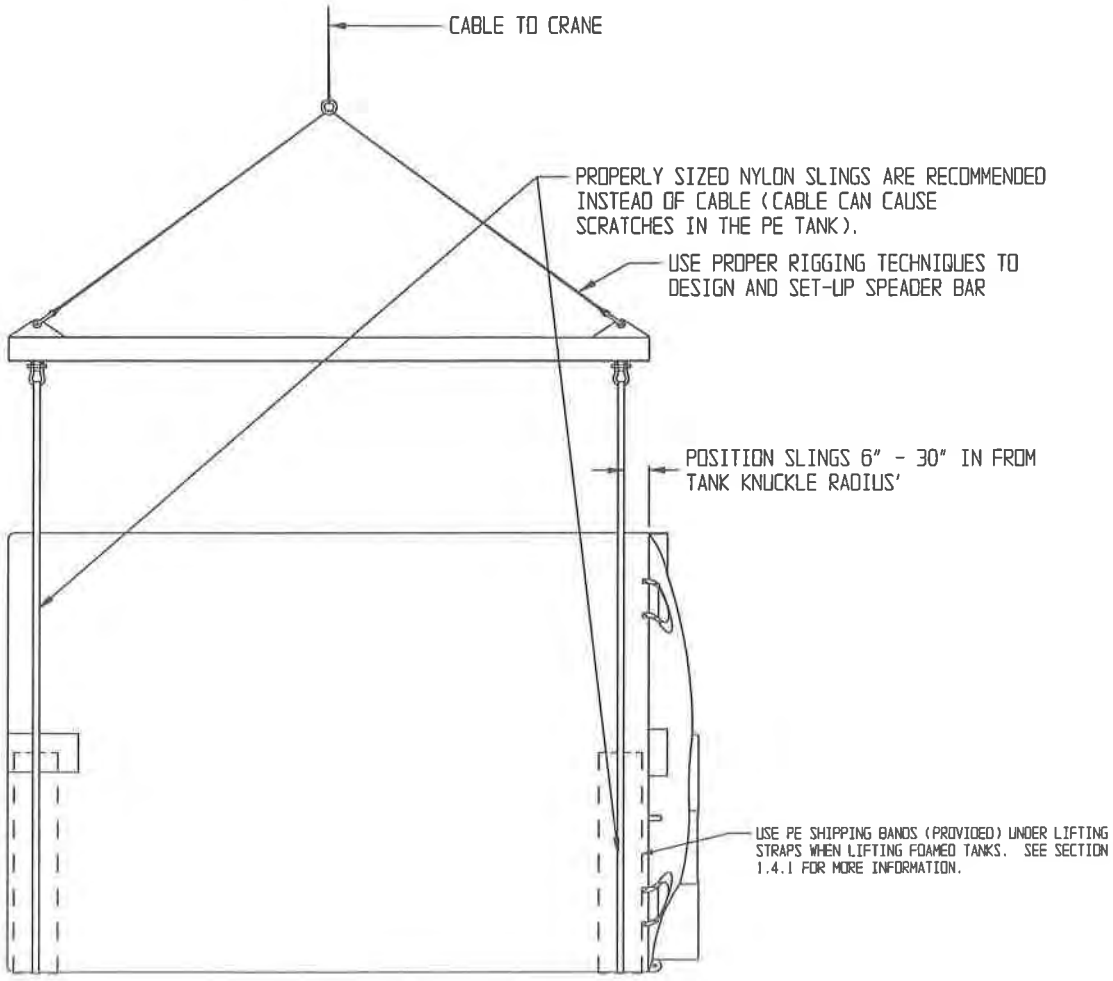
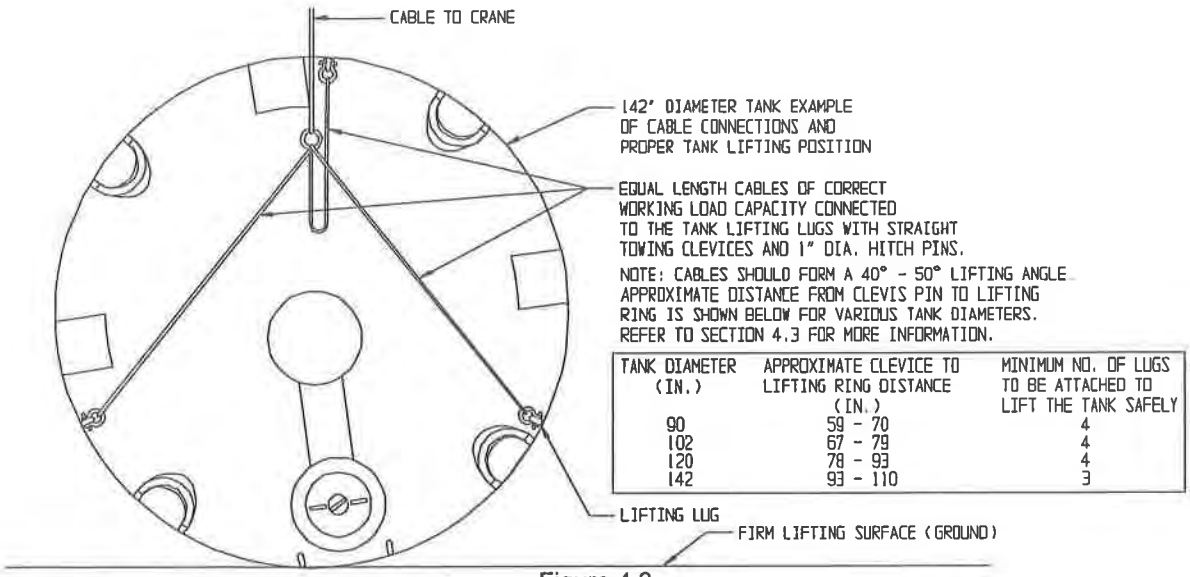


Figure 4.1

4.3.3 Tank lifting lugs are intended for moving the tank from a horizontal position to a vertical position from a firm surface. **Lifting lugs should not be used to load or unload tanks from trailers. This is a dangerous situation since the tank could roll off of the shifting trailer surface as the load is being moved.**

4.3.4 After the tank has been placed on a firm, level surface in a horizontal position, the lifting lugs may be used to erect the tank in a vertical position on an appropriate support pad. The tank should be lifted using a symmetrical arrangement of lugs to disperse the load evenly throughout the tank. To properly attach to the lifting lugs a straight clevis should be used with a minimum open throat distance of 1-1/2" and 1" diameter pins. A minimum of 4 lugs should be attached with equal length cables on all large vertical tank sizes except 142" diameter tanks. 142" diameter tanks require 3 lugs to be attached. All tanks should be positioned with 2 lugs closest to the ground prior to lifting the tank to the vertical position. Refer to Figure 4.2 for additional in-

formation. If the tank does not have lifting lugs, it may be necessary to rig the tank with slings or use a pipe and chain through the tank manway to upright the tank. Please contact the factory for additional information as necessary.



TANK DIAMETER (IN.)	APPROXIMATE CLEVICE TO LIFTING RING DISTANCE (IN.)	MINIMUM NO. OF LUGS TO BE ATTACHED TO LIFT THE TANK SAFELY
90	59 - 70	4
102	67 - 79	4
120	78 - 93	4
142	93 - 110	3

Figure 4.2

4.4 INSULATED TANKS (ADDITIONAL INSTRUCTIONS)

4.4.1 Insulated tanks must be moved with devices that have large padded contact surfaces to prevent damage to the foam insulation. **NEVER allow the tank to drop or roll on rough surfaces as this may damage the foam insulation.** When transporting foam insulated tanks, use a 30" wide PE sheet 1/4" or more thick conforming to the curvature of the insulated tank as banding supports. This will assist in decreasing the stress on the foam caused by the banding straps.

4.5 CAPTOR CONTAINMENT TANKS (ADDITIONAL INSTRUCTIONS)

4.5.1 Captor containment tanks are shipped assembled (primary tank inside of containment tank) with a shipping cable assembly holding the two tanks together. Lift and position the tank as per previous instructions. Once the tank is in position, remove the shipping cables from the tank. Do not leave the shipping cables under the tank. Follow standard vertical tank restraining methods shown in section 8.2 to restrain the tank assembly for wind or seismic conditions.

5. PRE-INSTALLATION NOTES

5.1 TANK OPERATING CRITERIA

5.1.1 TEMPERATURE - All standard SII tanks are designed for a maximum continuous service temperature of 100° F. Service temperatures greater than 100° F reduce the strength of the tank. Applications with temperatures greater than 100° F require greater wall thickness to accommodate this reduction in strength. Please consult factory for applications with service temperatures greater than 100° F.

5.1.2 PRESSURE - All standard SII tanks are designed for use at atmospheric pressure. **Pressure or vacuum situations can cause excessive deformation or damage to the tanks and void warranty.** Please consult factory for applications which may develop pressure or vacuum situations.

5.1.3 CHEMICAL COMPATIBILITY - Suitability of the tank assembly (tank, fittings, gaskets, etc.) for storing a particular chemical must be confirmed by chemical data (this should have been done by the tank distributor

or the end user prior to placing the tank order). However, changes to the tank (i.e. tank accessories, or the service of the tank) can occur. Please consult the factory with any questions.

5.1.4 LOCATION REQUIREMENTS - There may be location requirements which should be considered prior to placing the tank into service. Some items to consider are: secondary containment; locating the tank in a flood plain; locating the tank so it is easy to install and access for service; locating a tank in an area where seismic or wind forces may be experienced; and heat from surrounding equipment. **It is the responsibility of the end user to ensure that all location requirements have been taken into consideration.** Check for all federal, state, and local regulations that may apply to the tank installation. A thorough evaluation of the proposed tank location prior to tank installation is recommended.

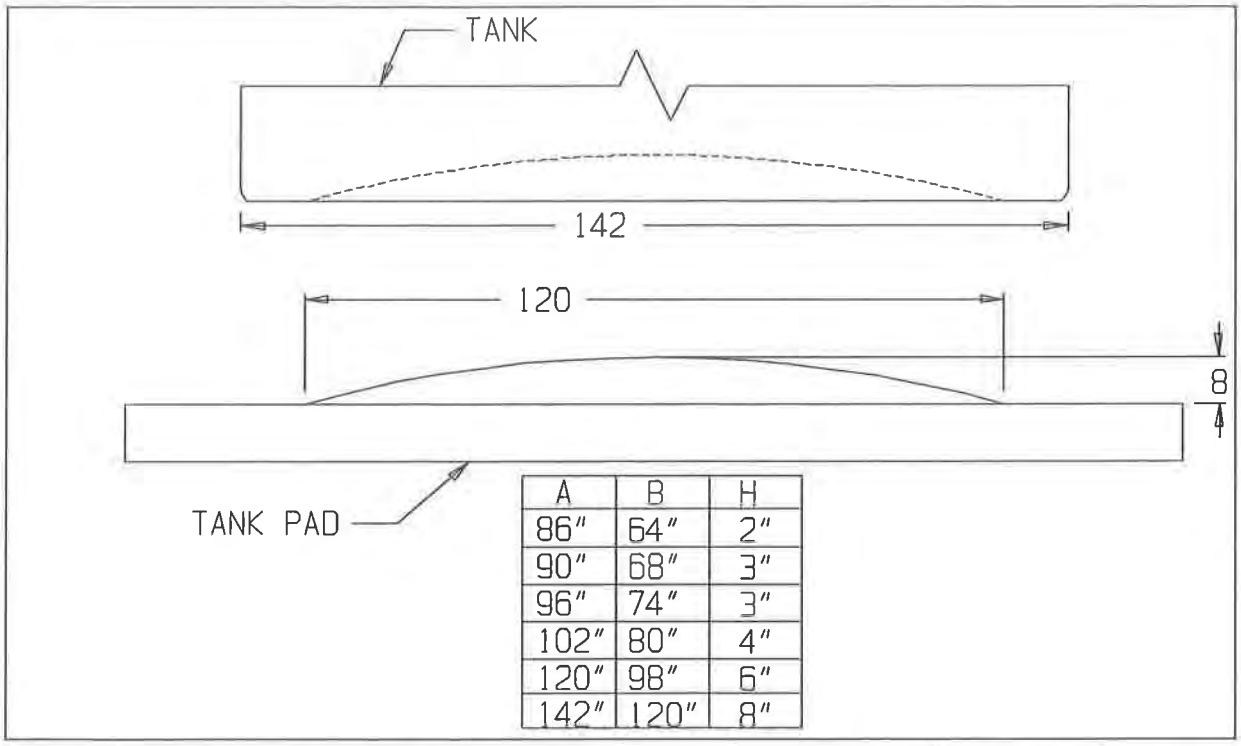
5.1.5 TANK ENTRY PRECAUTIONS - If entry into the tank is necessary, be sure to take all necessary precautions and follow all applicable regulations. Entry into a tank should be considered a "CONFINED SPACE ENTRY" with appropriate OSHA safety precautions required. There are many safety practices which should be considered depending on the specific conditions at the site. Please follow all local, state, and Federal rules and regulations.

5.2 FOUNDATIONS AND SUPPORTS

5.2.1 Vertical flat bottom tanks should be positioned on a concrete pad providing adequate support and a method to attach a tank restraint system (see Section 8 for restraint system pad placement criteria). The pad should be clean, smooth, and level so it fully supports the entire tank bottom with no deflection. The construction site engineer must design an appropriate concrete pad based on the specific application. A sand mound support can be placed under the tank bottom to promote tank drainage and extend tank life in certain applications. This is recommended for all tanks 10,000 gallons and larger. The sand should be a construction grade utility sand or finer. The tank and pad placement must be done to prevent any erosion of the sand from under the tank. Please refer to Figure 5.1. The sand mound must be very uniform without lumps or foreign objects. Per the chart in Figure 5.1, draw a circle on the tank pad and rake the sand uniformly with zero elevation at the circle perimeter and an elevation in the center per the chart in Figure 5.1. The chart recommendations are nominal dimensions. The best support is a sand mound that follows the normally convex shape of the tank bottom. If the tank bottom is not as convex as the dimensions shown for the sand mound in Figure 5.1, then follow the tank bottom. Adjust the sand mound shape/size so the tank has minimal contact with the sand when properly centered on the mound.

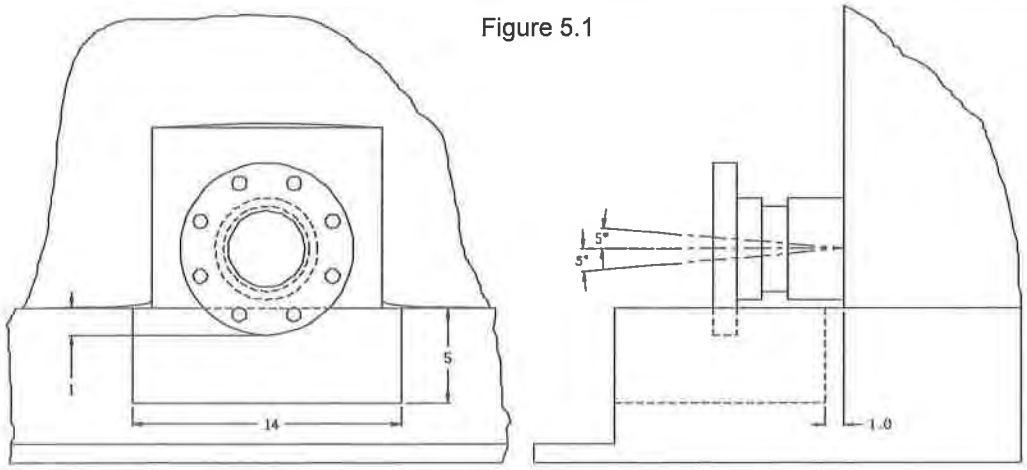
5.2.2 Vertical flat bottom tanks with SUMO fittings may require a notch in the concrete support pad just in front of the SUMO fitting for piping and piping accessories. The SUMO fitting has a ±5° tolerance for fitting projection off horizontal. Since the SUMO fitting comes out from the tank very near ground level, concrete support pads which project past the SUMO fitting may interfere with the SUMO and/or its piping accessories. SII recommends that the support pad be notched to provide adequate clearance for piping and tank expansion/contraction movement. Please refer to Figure 5.2.

5.2.3 Cone bottom or horizontal tanks require specifically designed support structures. Inadequate or improperly designed support structures may cause premature tank failure. **Therefore, any support structure that is not of SII manufacture must be approved by SII in writing or ALL WARRANTIES WILL BE VOIDED.**



A	B	H
86"	64"	2"
90"	68"	3"
96"	74"	3"
102"	80"	4"
120"	98"	6"
142"	120"	8"

Figure 5.1



NOTES:
1. TANK MUST BE FULLY SUPPORTED BY A SOLID PAD. (CONSULT A LOCAL CIVIL OR STRUCTURAL ENGINEER).
2. ALL TANK OUTLETS MUST BE CONNECTED TO PIPING WITH FLEXIBLE CONNECTORS OR EXPANSION JOINTS CAPABLE OF 4% DIMENSIONAL MOVEMENT AS CLOSE TO TANK AS POSSIBLE (18" OR LESS). FLEXIBLE CONNECTION SHOULD BE DESIGNED FOR ±5° ANGULAR MOVEMENT DUE TO TANK EXPANSION/CONTRACTION.
3. OTHER CONNECTION METHODS ARE AVAILABLE FOR SUMP OUTLETS. (FLANGE ADAPTER SHOWN FOR EXAMPLE ONLY)
4. DIMENSIONS "B" AND "C" ARE RECOMMENDED MINIMUM DIMENSIONS ONLY (NOT REQUIRED).

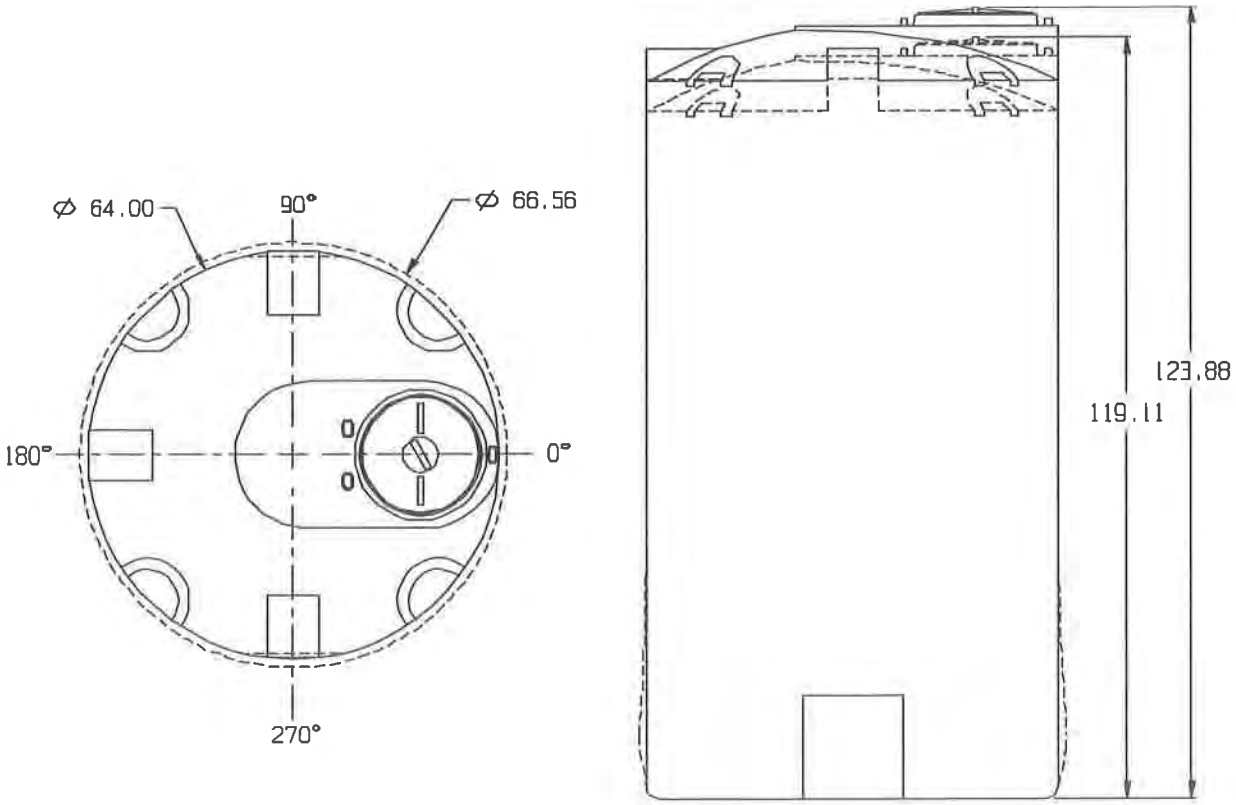
SIZE	DIM. "A"	DIM. "B"	DIM. "C"
2"	1.13"	10"	5"
3"	1.13"	12"	5"
4"	1.40"	14"	5"
6"	1.35"	15"	5"

Figure 5.2

5.3 TANK FITTINGS AND CONNECTIONS

5.3.1 Most tank fittings are typically left installed in the tank. Some fittings are not installed due to damage potential or customer request. Customer job site fitting installation insures proper gasket compression and minimizes fitting damage potential. Some distributors sell or install their own tank fittings or accessories. **These fittings or accessories are not warranted by SII.**

5.3.2 Tank connections must have adequate provisions for tank expansion/contraction due to temperature and load changes. See Figure 5.3. The overall height of the tank will shorten during filling. Therefore on the top dome of the tank, the piping to top fitting connections must be allowed to move with the tank or flexible connections may be used. Rigid piping must not be directly plumbed to tank sidewall connections. Provisions should be made that allow **4%** dimensional movement on sidewall connections. SII strongly recommends using flexible hose, expansion joints or other provisions for all tank sidewall connections. Please see the hose connection examples in Figure 5.4. SII has developed the Flexmaster expansion joint for 2" and 3" bolted tank connections. Please see section 7.11 for more details. **The use of rigid piping or the failure to provide for the expansion of the tank will void all warranties**.



THIS EXAMPLE SHOWS 4% DIMENSIONAL CHANGE AFTER LONG TERM COLD FLOW HAS OCCURRED. THE HIDDEN LINES SHOWN THE LONG TERM DEFLECTED CASE FOR THIS TANK AT 4% DEFLECTION. TANK DEFLECTION IN THE SHORT TERM WILL EXHIBIT A DIFFERENT SHAPE THAN WHAT IS SHOWN. SHORT TERM DEFLECTION IS GOING TO OCCUR MORE AT THE MID POINT OF THE TANK AND THEN SETTLE OVER A LONG TIME PERIOD TO WHAT IS SHOWN. THIS IS THE AMOUNT OF DEFLECTION THAT SHOULD BE DESIGNED INTO ANY PIPING CONNECTIONS TO THIS TANK. THE FLEXIBLE CONNECTION SYSTEM WOULD NEED TO ACCOMODATE THIS TYPE OF MOVEMENT. TYPICAL MOVEMENT UNDER NORMAL LOADING AND TEMPERATURE CONDITIONS IS USUALLY LESS THAN WHAT IS SHOWN.

Figure 5.3

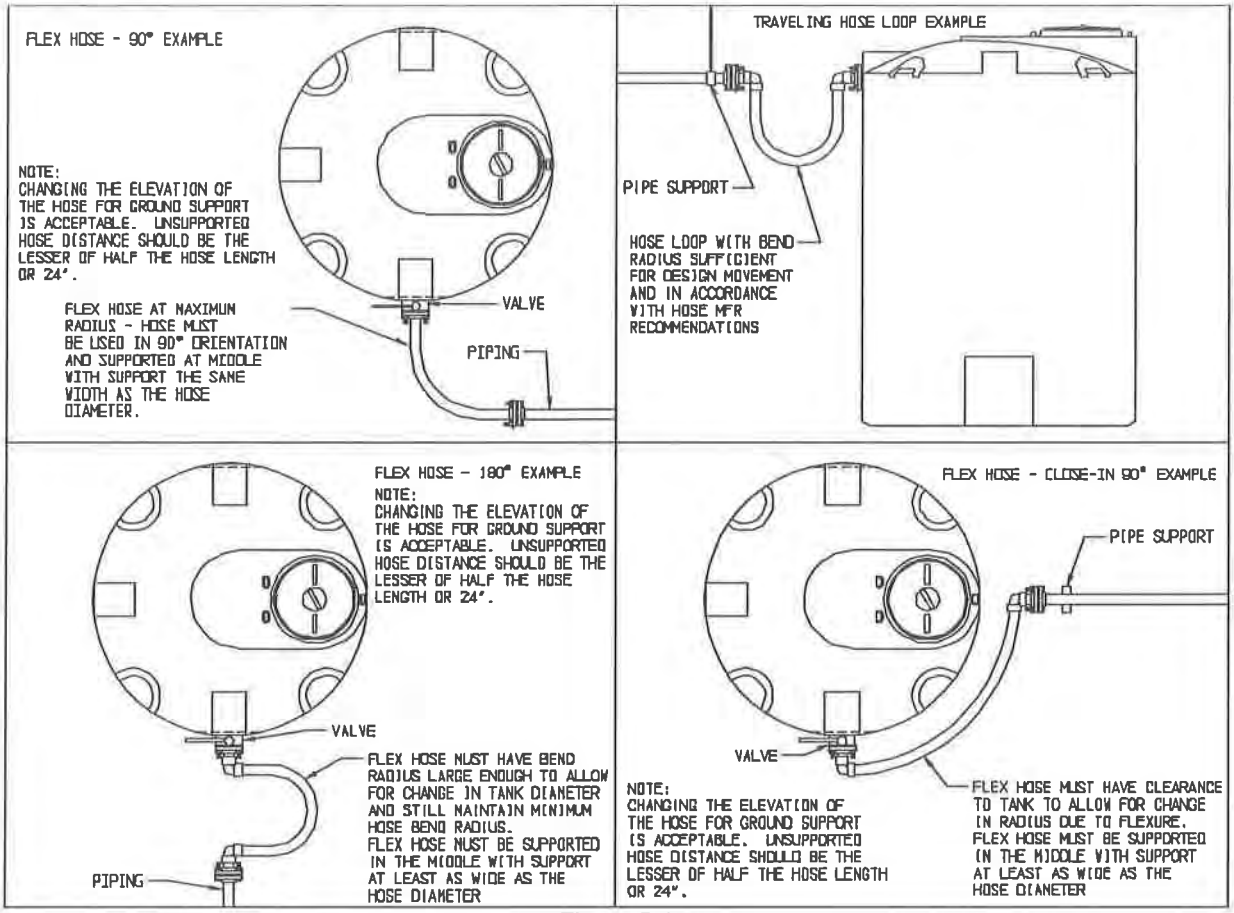


Figure 5.4

5.3.3 FITTING INSTALLATION GENERAL GUIDELINES - If fittings are to be customer drilled and installed, there are some general installation guidelines which may be helpful.

5.3.3.1 LOCATION - It is very important that fitting location be carefully considered prior to cutting any holes. **SII recommends (fitting size dependent) a 6" minimum centerline height for fittings on tanks less than 3000 gallons with the fitting gasket at least 1-1/2" above or below the end of any tank knuckle radius. SII recommends (fitting size dependent) a 9" minimum centerline height for fittings on tanks 3000 gallons or larger with the fitting gasket at least 3" above or below the end of any tank knuckle radius. SII recommends locating all fittings so gasket seal areas do not go through any tank flange lines or any molded-in tank feature (i.e. gallonage markers, logos, ribs, edges of tank flats, etc.).** SII does not recommend field cutting and installation of fittings on insulated tanks. Fittings must be located to avoid interference with tie-down devices and to allow for tightening of fittings nut(s). Mark all of the proposed fitting locations with a marker. Re-inspect all of the locations prior to cutting any holes.

5.3.3.2 TOOLS - It is very important to obtain the correct tools before attempting to install any tank fitting. Tools you will need for installing tank fittings properly include:
*Marker for laying out holes
*Tape measure, straight edge, plum-bob (to align fittings meant to be aligned), etc.
*1/2" drill motor
*Hole saw sized to the O.D. of the fitting body if bulkhead style (see section 6.1, and 6.2).
*Hole saw sized to the I.D. of the fitting flange hole or the same size as the fitting's size if flange style (see section 6.3, and 6.5).
*Drills for any bolt holes (size +1/16" larger than the size of the bolts)
*Deburring tool (a drum sander and 150 - 220 grit sandpaper may also be used)

*Wrenches (adjustable, sockets, strap wrench, etc.)

5.3.3.3 PROCEDURE

1. Disassemble the fitting and use it as a final location check as noted in 5.3.3.1.
2. With the center hole marked, cut the tank hole using the correct size hole saw (see 5.3.3.2).
3. If the fitting is a flange style (see section 6.3 and 6.5) then mark one of the bolt holes using the outer flange. The bolt holes should be oriented so the bolt holes straddle the principal centerline of the tank. With the hole correctly located and marked, drill the bolt hole.
4. Temporarily install one bolt and position the flange over the main fitting hole.
5. Mark the bolt hole opposite the bolt hole already drilled and drill that bolt hole.
6. Temporarily install another bolt and drill the remaining bolt holes using the flange as a guide.
7. With all of the fitting's holes drilled, gently deburr the hole(s) with the deburring tool. Do not put any nicks or scratches into the tank. Sand any nicks or scratches out with sandpaper greater than 120 grit.
8. Clean away any debris from the sealing surface of the tank.
9. For tanks greater than 1/2" thick, measure the tank wall thickness. If the wall thickness is not consistent within ± 1/32" around all of the fitting hole(s), some sanding on the inside of the tank wall will be necessary. This must be done carefully and as little as necessary. The purpose of the sanding is to make the wall thickness even, not to create a flat on the tank wall. The final finish sanding should be done with greater than 120 grit sand paper (preferably 220 grit).
10. With all of the fitting's hole(s) prepared, install the fitting using the instructions from the appropriate section (6.1, 6.2, 6.3, or 6.5). The inside tank wall surface must be clean and smooth at time of fitting installation.

5.4 TESTING AND FINAL INSPECTION

5.4.1 After all fittings are installed and all connections to the tank have been made, fill the tank with water and hold for at least 5 hours to identify any leaks. **A record of the water pre-test must be submitted to SII to validate the tank warranty.**

5.5 ACCESSORY PARTS

5.5.1 Various parts must be packaged separately to prevent damage during transportation. These parts are usually bagged or boxed to prevent loss or damage. Some parts may be shipped inside of the tank.

6. FITTINGS

NOTE: The following installation instructions assume the tank has been predrilled and prepared for fitting installation by the factory. Most fittings are factory installed, but check fittings for damage and gasket compression. See section 5.2 for general tank fitting information if a fitting is to be installed without a factory prepared location. Prior to installing fittings, check the sealing surface for debris and/or scratches which could cause leakage.

6.1 THREADED BULKHEAD FITTING

6.1.1 Remove the nut (C) from the fitting body (A) and gasket (B). See Figure 6.1 for part identification.

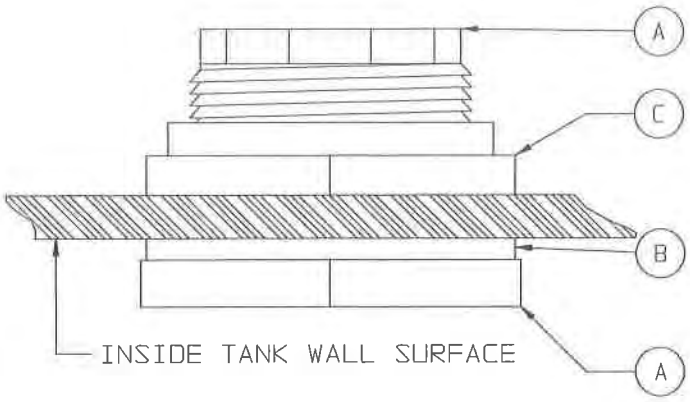


Figure 6.1

6.1.2 Working from inside the tank, slide the fitting body (A) through the hole in the tank. The gasket (B) should be between the fitting body flange and the inside tank wall. Install the nut (C) on the fitting threads protruding on the outside of the tank.

6.1.3 To obtain proper gasket compression for bulkhead fitting installation, tighten the fitting nut hand tight (check to see if it engages the tank wall). Tighten the nut an additional 3/4 turn for fittings less than 1 in., or 1/3 turn for fittings 1 in. or larger. A light lubricant, such as PAM cooking spray, is recommended to prevent thread seizing on bulkhead fittings. Inspect the gasket to make sure it is fully contacting the inner surface of the fitting body flange and the inside tank wall. Gasket compression should be between 25 - 50%. **Recheck fitting tightness periodically.**

6.2 SELF-ALIGNING THREADED BULKHEAD FITTING

6.2.1 Follow the same procedures as detailed under threaded bulkhead fitting installation steps 6.1.1 - 6.1.3.

6.2.2 Piping should be installed into the fitting ball with an appropriate thread sealant (i.e. Teflon pipe sealant). Adjust the piping to the required angle (within the limits of the fitting). When the piping has been located as required, tighten the PVC ball retainer ring located on top of the PVC ball.

6.3 BOLTED FLANGE FITTING

6.3.1 The bolted flange fitting shall be constructed with 2 ea. 150 lb. flanges (C1 and C2), 2 ea. 150 lb. flange gaskets (D1 and D2), the correct number of full threaded bolts (A), bolt gaskets (B), flat washers (E), lock washers (F), and hex nuts (G) for the flange specified. NOTE: If the tank wall thickness is greater than or equal to 0.75", the inner flange (C1) and the inner flange gasket (D1) may be omitted in certain low stress applications only. Please consult factory prior to omitting any components or the tank warranty may be voided. Refer to Figure 6.2 for part identification.

6.3.2 Disassemble the fitting as shipped by removing the bolt's hex nuts, lock washers, flat washers, outer flange, and outer flange gasket. Locate the fitting hole on the inside of the tank and insert the bolts (still installed on the inner flange and gasket) through the drilled holes in the tank. Place the outer flange gasket over the bolts on the outside surface to the tank. Place the outer flange over the outer gasket and bolts. Install the flat washers, lock washers, and hex nuts on the bolts. Check to make sure the fitting assembly appears as shown in Figure 6.2.

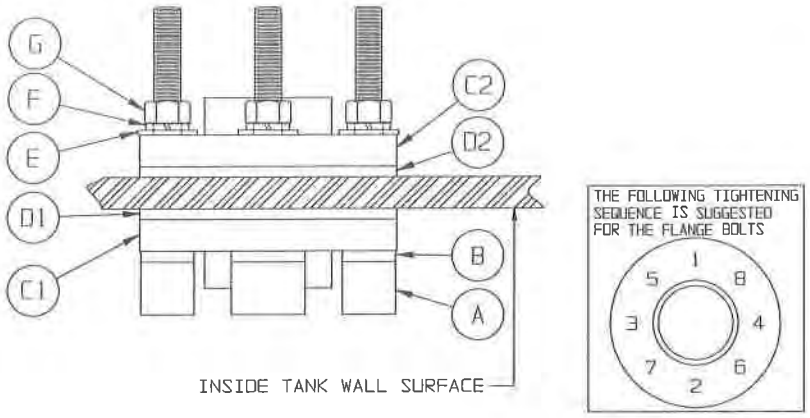


Figure 6.2

6.3.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gaskets engage the tank wall and the lock washers are compressed. Tighten each nut an additional 3 turns (2 turns if the inner flange and gasket are not utilized) using the same sequence (do not tighten more than 1 turn at a time). A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. While gasket compression needs to be the controlling factor to obtain a proper seal, do not apply more torque than recommended by the flange manufacturer. See torque value listed on flange. **Recheck fitting tightness periodically.**

6.4 BOLTED STAINLESS STEEL FITTING

6.4.1 The bolted stainless steel fitting shall be constructed with 1 ea. inside flange with studs (A), 2 ea. fitting gaskets (B), 1 ea. outside flange (C), and the correct number of lock washers (D), and hex nuts (E) for the fitting specified. Refer to Figure 6.4 for part identification.

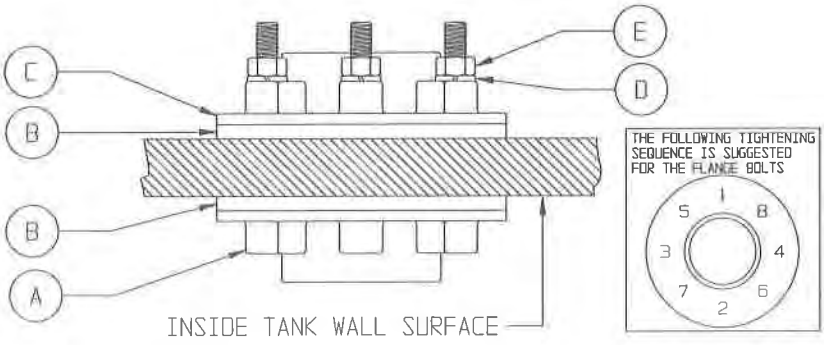


Figure 6.4

6.4.2 Disassemble the fitting as shipped by removing the hex nuts, lock washers, outside flange and outside flange gasket. Locate the fitting hole on the inside of the tank and insert the fitting's studs through the drilled holes in the tank. A gasket (B) should be between the inside fitting flange and the inside tank wall. Place the outside flange gasket and outside flange over the studs on the outside surface of the tank. Install the lock washers and hex nuts on the studs. Check to make sure the fitting assembly appears as shown in Figure 6.4.

6.4.3 To obtain proper gasket compression, tighten all the fitting nuts hand tight with a deep socket using the bolt tightening sequence shown until the gasket engages the tank wall and the lock washers are compressed. Tighten each nut an additional 1-1/4 - 2 turns using the same sequence (do not tighten more than 1

turn at a time). Do not apply more than 15 ft. - lbs. of torque. A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. **Recheck gasket tightness periodically.**

6.5 SNYDER UNITIZED MOLDED OUTLET - (SUMO™) (PATENT NO. 5,374,026)

6.5.1 The SUMO fitting shall be constructed with 1 ea. smaller o-ring (A), 1 ea. larger o-ring (B), and 1 ea. SUMO adapter (C). Refer to Figure 6.5 for part identification. **NOTE - The tank is shipped with a shipping stabilizer installed in the SUMO outlet. NEVER move the container without the shipping stabilizer installed.**

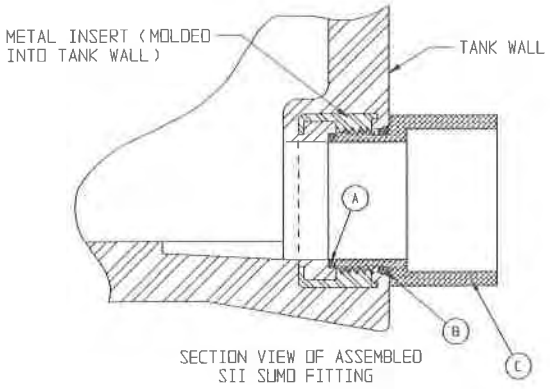


Figure 6.5

6.5.2 Once the tank has been properly placed on its foundation, remove the shipping stabilizer and clean away any dirt or debris from the SUMO outlet threads and o-ring seats. Use only a soft moist cloth. NEVER USE A TOOL THAT COULD SCRATCH THE O-RING SEATS.

6.5.3 Install the smaller o-ring inside the SUMO molded-in fitting. Make sure it is placed in the o-ring seat area evenly. Carefully stretch the larger o-ring enough to install it on the SUMO adapter. Only a SII SUMO adapter may be used. Use of a non-approved adapter will void the tank warranty. The o-ring may be lubricated with a suitable lubricant such as water. Do not use silicone or Teflon sealants. Screw the adapter in until the step on the adapter is flush with the tank wall. Do not over-torque the adapter (25 ft. - lbs. of torque maximum). Figure 6.5 shows a sectional view of an assembled SUMO fitting.

6.5.4 Once the SUMO adapter is installed, other components may be attached to the adapter. A union or flange adapter with a flexible expansion joint should be installed as close to the tank as possible to allow for future disassembly. The SUMO fitting must have adequate clearance for any piping accessories and allow for a ±5° outlet angle change. Consult factory for pad and/or accessory clearance questions. A notch in the tank support pad may be necessary (see Figure 5.2).

6.6 SIPHON TUBE FITTINGS

6.6.1 Siphon tubes may be added to the fittings specified in sections 6.1, 6.3, 6.4, and 6.5. Siphon tubes shall be customer installed with the tank in a vertical position after fitting installation.

6.6.2 PVC and CPVC siphon tubes need to be solvent welded with the proper solvent cement into the socket of a previously installed fitting. Threaded siphon tubes need to be threaded in place with Teflon pipe sealant applied to the threads prior to the fitting being installed.

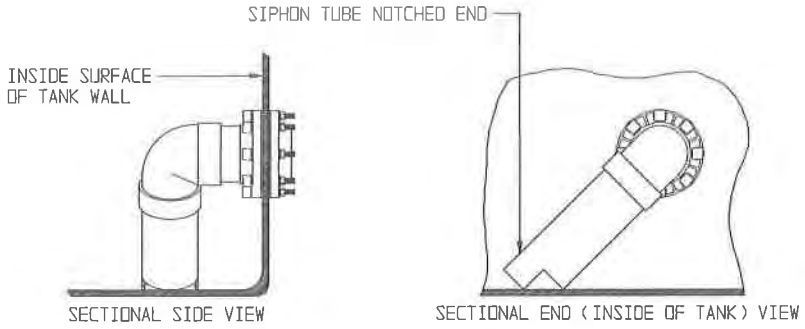
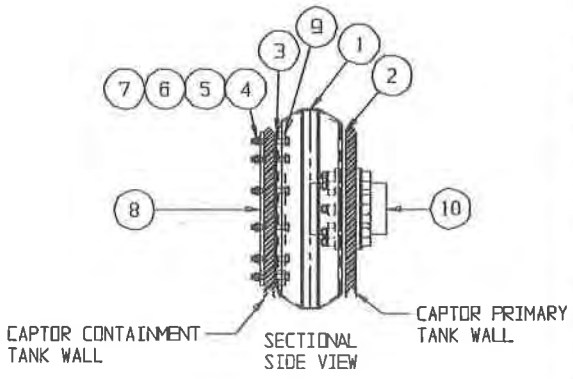


Figure 6.6

6.6.3 Siphon tubes should be located with the cut notch corner in close proximity of the floor of the tank for maximum drainage, and the siphon tube tilted to the side of the fitting. Refer to Figure 6.6 for proper placement of the siphon tube in the tank.

6.7 UNIFIED FITTING OUTLET (UFO™) - FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY

3.7.1 The Unified Fitting Outlet (UFO™) is a flexible outlet device that allows primary tanks to be equipped with sidewall fittings while maintaining a seal between the primary and containment tanks that moves with tank expansion/contraction. The UFO will allow 2 to 4 in. bolted fittings to be utilized while maintaining a flexible containment seal. This option is normally a factory installed option for use with a Captor containment tank assembly only. This option can be field installed. Consult factory for more details. The bolted fittings used with this option follow the same sealing/tightening criteria as detailed in sections 6.3 and 6.4. An example of this option (patent pending) is shown in Figure 6.7.



ITEM	PART DESCRIPTION	QTY
10	PROPER BOLTED FITTING ASSEMBLY	1
9	FLANGE 1PC. S.S. CAPTOR FITTING BOOT	1
8	FLANGE 2PC. S.S. CAPTOR FITTING BOOT	1
7	NUT HEX S.S.	12
6	WASHER LOCK S.S.	12
5	WASHER FLAT S.S.	24
4	BOLT S.S.	12
3	GASKET - CAPTOR BOOT 12 BOLT FLANGE	1
2	GASKET - BOLTED FITTING	1
1	FITTING BOOT - CAPTOR	1

Figure 6.7

7. TANK ATTACHMENTS

7.1 U-VENTS

7.1.1 Standard u-vents are constructed from PVC or CPVC and are provided with a loose male adapter. This allows the u-vent to be cut to the desired height. A threaded or solvent welded socket fitting can be used. U-vents can be purchased with an optional bug screen insert (CPVC holder and fiberglass 17 x 17 screen) installed.

7.1.2 When installing the u-vent in a solvent weld socket fitting, solvent weld the u-vent with the proper solvent cement in the desired position into a previously installed fitting. If the u-vent is to be used in a threaded fitting, solvent weld the male adapter provided to the u-vent and install the u-vent assembly into a previously installed threaded fitting. Refer to Figure 7.1 for an exploded illustration of this assembly.

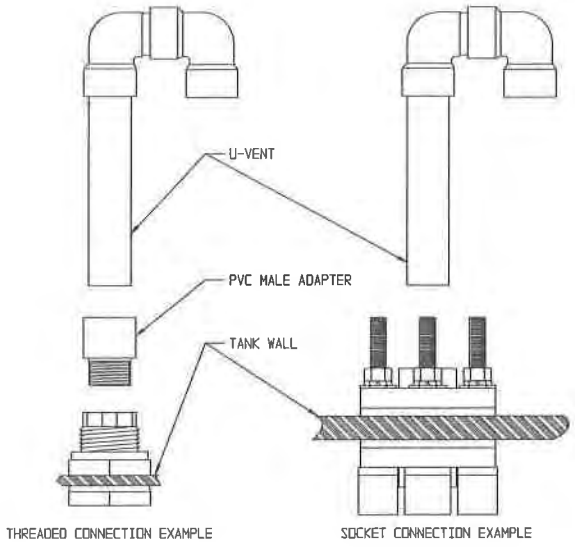


Figure 7.1

7.2 DOWN PIPES (TANK FITTING SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.2.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided.

7.2.2 Assemble the piping loosely using Figure 7.2, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.2.

7.2.3 Assemble and install support structures as shown in Figure 7.2 (without the saddle clamp covercaps and clips). Make sure the support clamp orientation is correct (with the small width of the wedge toward the

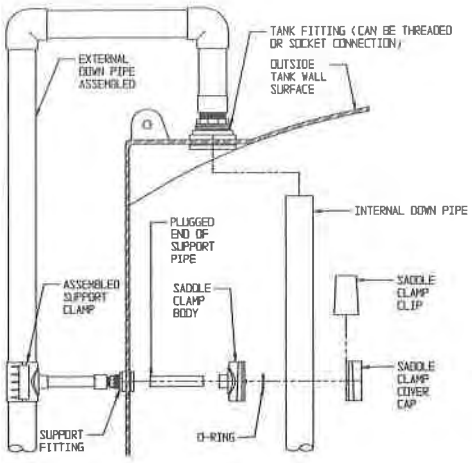


Figure 7.2

top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

7.3 DOWN PIPES (WELDED BOSS SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.3.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided. Internal down pipes is required to have 6" minimum clearance height.

7.3.2 Assemble the piping loosely using Figure 7.3, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.3.

7.3.3 Assemble and install support structures as shown in Figure 7.3 (without the saddle clamp cover caps and clips). Since the support fitting does not penetrate the tank wall, the threaded connection to the support fitting does not need pipe sealant. Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank). Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all threaded pipe connections (except the support fittings) with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

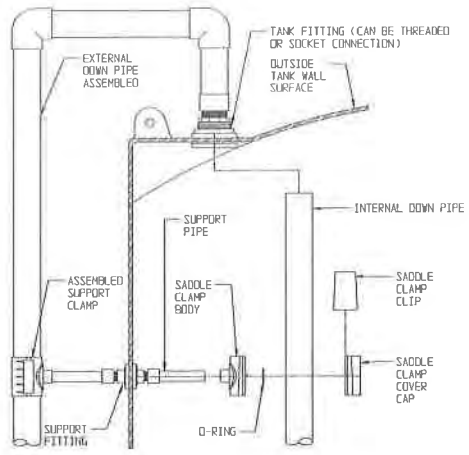


Figure 7.3

7.4 DOWN PIPES (WELDED PE SUPPORTED) - EXTERNAL AND/OR INTERNAL

7.4.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 5 ft. maximum intervals with the support structures provided. Internal down pipes is required to have 6" minimum clearance height.

7.4.2 Assemble the piping loosely using Figure 7.4, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. The piping should be inserted into the holes in the welded support structures prior to installing the fitting in the tank. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.4. Seal all threaded pipe connections with Teflon pipe sealant and connect solvent weld sockets with the correct type of solvent cement.

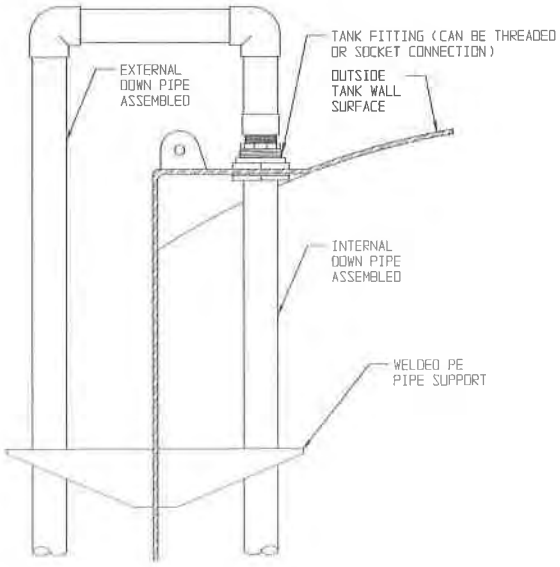


Figure 7.4

7.5 DOWN PIPE - INDEPENDENTLY SUPPORTED - (EXTERNAL ONLY)

7.5.1 Down pipes are shipped loose and have been cut to size to meet customer specifications. To maintain warranty, all down pipes shall be supported at 42 in. maximum intervals with the support clamps provided.

7.5.2 Assemble the piping loosely using Figure 7.5, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to meet the customer's requirements. Mark the strut post base on the concrete when in proper position. Install 2 ea. 3/8" adhesive anchors and bolt base into position. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.5.

7.5.3 Assemble and install support structures as shown in Figure 7.5. Make sure the support clamps are spaced evenly. Locate the strut catchers and twist 90° to lock in place. Install the clamps to the strut catchers with the #10 screws provided. Clamps 3 in. and larger require 2 ea. strut catchers, #10 screws and #10 washers. The pipe will click into position in the clamps. Make sure all clamps have clicked to full engagement and are tight. Assemble and install piping as per the customer approval drawing. Seal all threaded

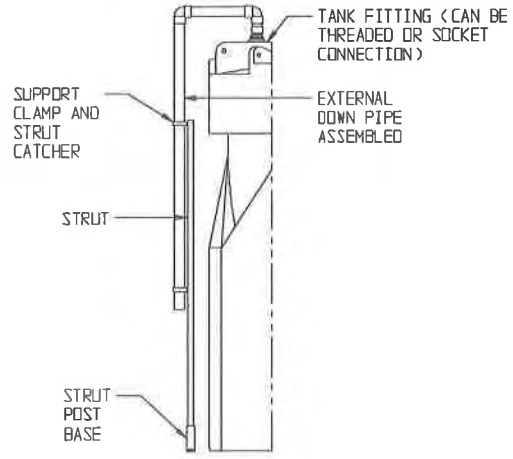


Figure 7.5

pipe connections with Teflon pipe sealant and connect solvent weld sockets with solvent cement.

7.6 FLEXIBLE SIGHT LEVEL GAGES

7.6.1 Sight level gage assemblies are shipped loose and have been cut to size to meet customer specifications. Sight gages may be ordered with either no valve, 1, 2, or 3 valves. Please refer to the customer approved drawing to determine the number of valves required.

7.6.2 Using the assembly drawings shown in Figure 7.6, verify that all parts are present and assemble the unit per the appropriate drawing. Seal all threaded pipe connections with Teflon pipe sealant. Gallonage decals may be purchased as separate items and customer applied to the tank to assist in indication of tank gallonage. NOTE - Gallonage decals are not available for all tank sizes.

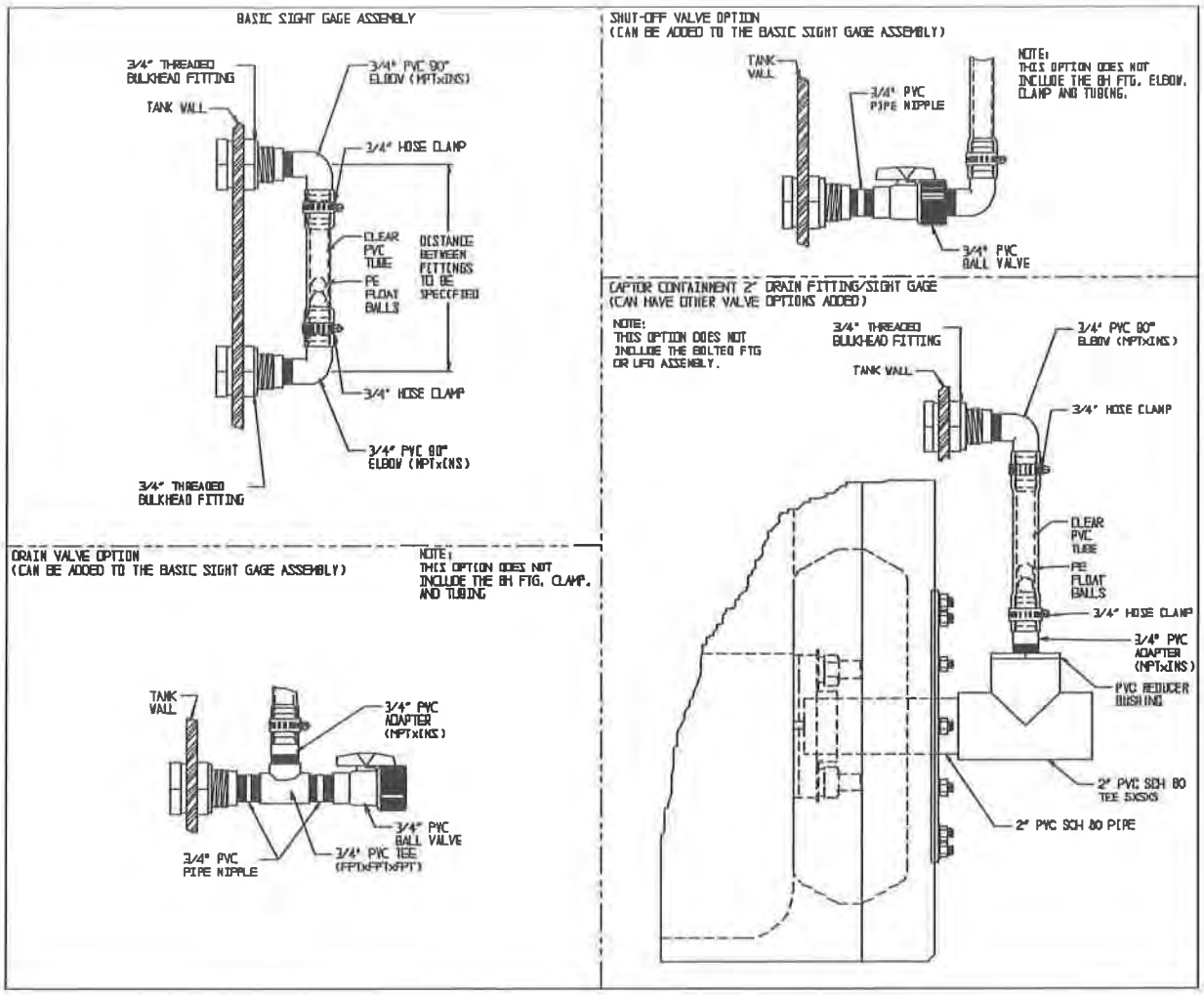


Figure 7.6

7.7 REVERSE LEVEL SIGHT GAGE

7.7.1 The component parts (except the rope) have been cut to meet SII and customer specifications. The sight gage shall be supported at 5 ft. maximum intervals to the liquid holding tank with the support structures provided.

7.7.2 Assemble the piping loosely using Figure 7.7, the guidelines detailed below, and the customer approved tank drawing to ensure all parts are present and cut to length. As soon as all parts have been checked, assemble the parts with solvent weld cement and/or threaded connections as shown in Figure 7.7. NOTE - Do not use solvent weld cement on the outside joints indicated in Figure 7.7. SII recommends periodic inspection of the rollers in the tee assemblies and the rope to ensure proper operation of the gage. If it is a requirement to seal these joints, a silicone based caulking should be sufficient.

7.7.3 Assemble and install the support structures as shown in Figure 7.7 (without the saddle clamp cover caps and clips). Make sure the support clamp orientation is correct (with the small width of the wedge toward the top of the tank) and that the plugged support pipes are installed with the plugged end as close to the support fitting as possible. Make sure that the indicator board has been installed over the outer pipe supports as shown in Figure 7.7. Assemble and install piping as per the customer approved drawing. As piping is being installed on the tank, lock it in place with the saddle clamp cover caps and clips provided (make sure that the sealing o-ring is in the proper position as the pipe is positioned into the saddle support body). Seal all thread-

ed pipe connections with Teflon pipe sealant and connect solvent weld sockets with the correct solvent cement (except the joints as noted in Figure 7.7).

7.7.4 With the inner and outer tank pipes in place, connect the rope provided to the tank float (This is accomplished by threading the rope through the center hole in the float and out one of the side holes, double knotting the rope, cutting off any excess material and pulling the rope back so the knot holds under the center hole.) and lower it into the inner pipe as shown. Thread the rope through the tee assemblies and the connecting pipe as shown. At this point the float should be at the bottom of the tank, the tee assemblies and connecting pipe should be assembled and sitting off at an angle from the outer clear 2" PVC pipe. With the rope threaded through the outer tee assembly, attach the rope to the indicator in a position parallel with the zero mark on the indicator board. (This is accomplished by threading the rope through the center hole in the indicator, double knotting the rope, checking the indicator position, adjusting as necessary and cutting any excess material protruding from the bottom of the indicator.) Put the indicator into the outer clear 2" PVC pipe while swinging the tee assemblies and connecting pipe into position. With all piping and tee assemblies installed, install the 3" PVC pipe plugs. During the tank hydrotest and first operations of the tank, check the gage for proper level indication and adjust as necessary. NOTE - This is a gallonage indicator and is not intended as an accurate measuring device.

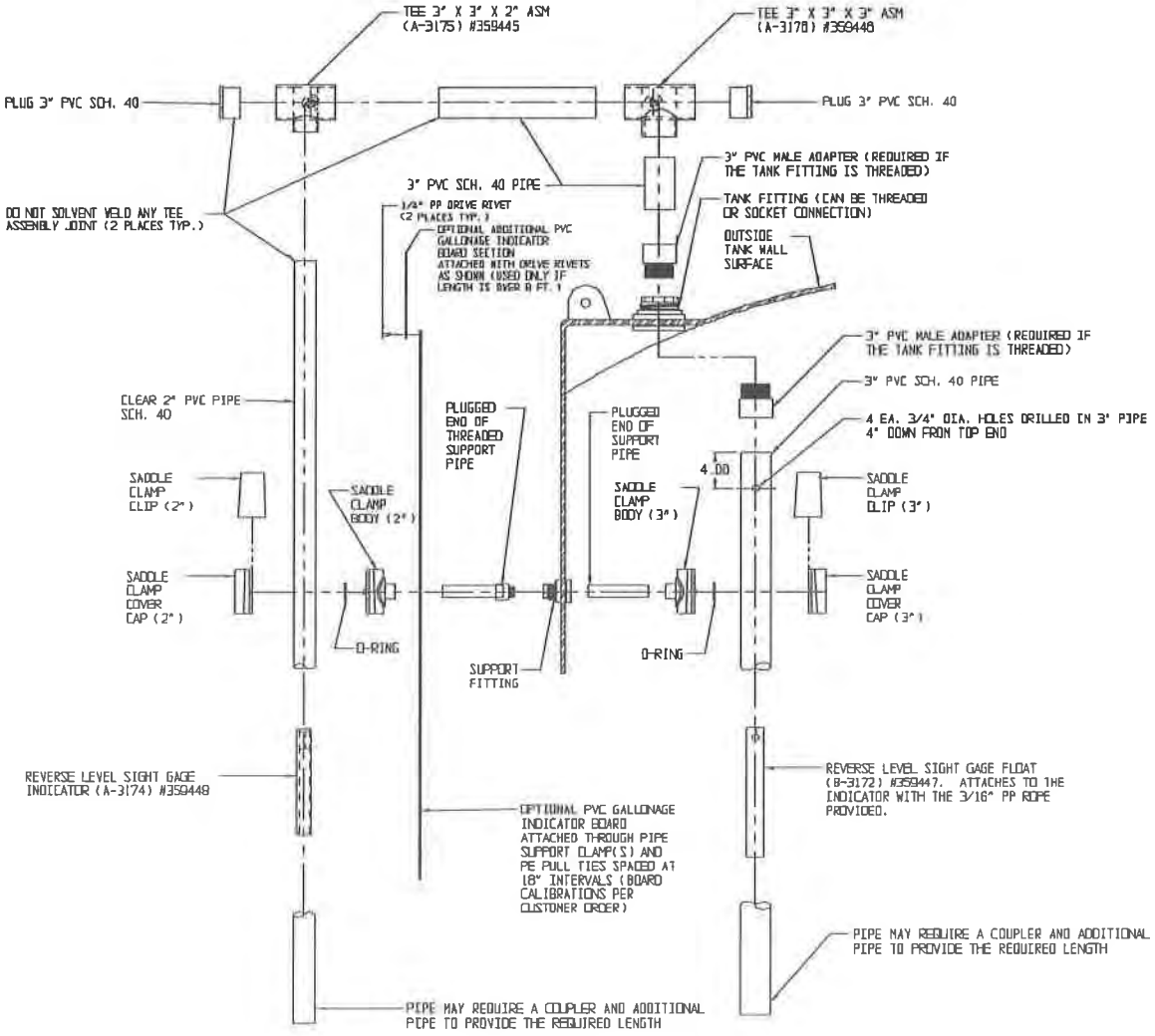


Figure 7.7

7.8 ULTRASONIC LEVEL INDICATOR

7.8.1 Install the PE bulkhead fitting per section 6.1 for sensors with male pipe threads. Install the sensor into the fitting with Teflon® pipe sealant. Remove the display unit box cover. Attach the display unit to the PE mounting plates provided on the tank with 4 ea. #10 S.S. Self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Please see Figure 7.8 below for sensor wire attachment information. Attach the unit to 110 VAC and test unit. The display unit is preprogrammed for the tank ordered. The display with show hundreds of gallons (display x 100 = gallons). Refer to literature shipped with unit to answer any additional questions.

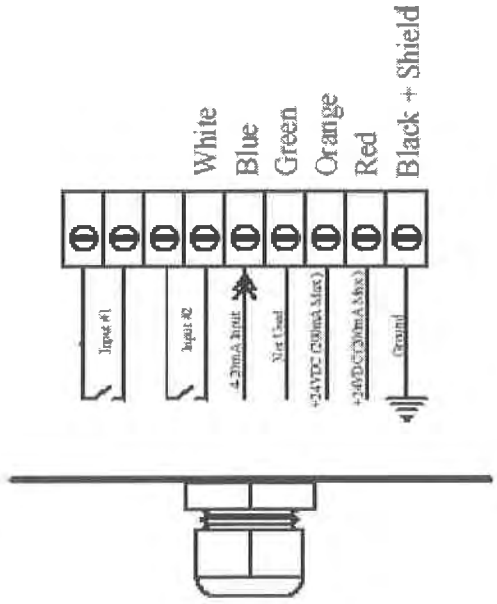


Figure 7.8

7.9 LEAK DETECTOR UNIT (FOR USE WITH CAPTOR CONTAINMENT TANKS ONLY)

7.9.1 The leak detector unit consists of a proximity sensor, 2 in. FPT fitting connection, 2 in. bung plug, ¾ in. strain relief, and an indicator box. Install the ¾ in. strain relief into the 2 in. bung plug. Loosely install the proximity sensor cord into the strain relief with the sensor face to the inside of the plug assembly. Place the sensor in the interstitial space between the primary and secondary tanks approximately 1 in. above the tank bottom and securely tighten the strain relief to hold the sensor and sensor cord into position. Remove the indicator box cover. Attach the indicator box to the PE mounting plates provided on the tank with the 2 ea. #10 S.S. self-tapping screws. Attach the sensor cable to the control box with small strain relief and connect wires per label in the box. Please see Figure 7.9. Connect unit to 110 VAC per label in the box using strain relief provided or other acceptable methods and test the unit. The indicator box will show a green light when power is on and the sensor is not detecting a liquid. The light is a push to test light allowing the operator to test for power outage or malfunction. If the green light goes out there are two possibilities. If the green light does not come on when the button is pushed, this would indicate a lack of power to the unit or the light bulb is burned out. If the green light comes on when pushed, then a possible leak condition is indicated.

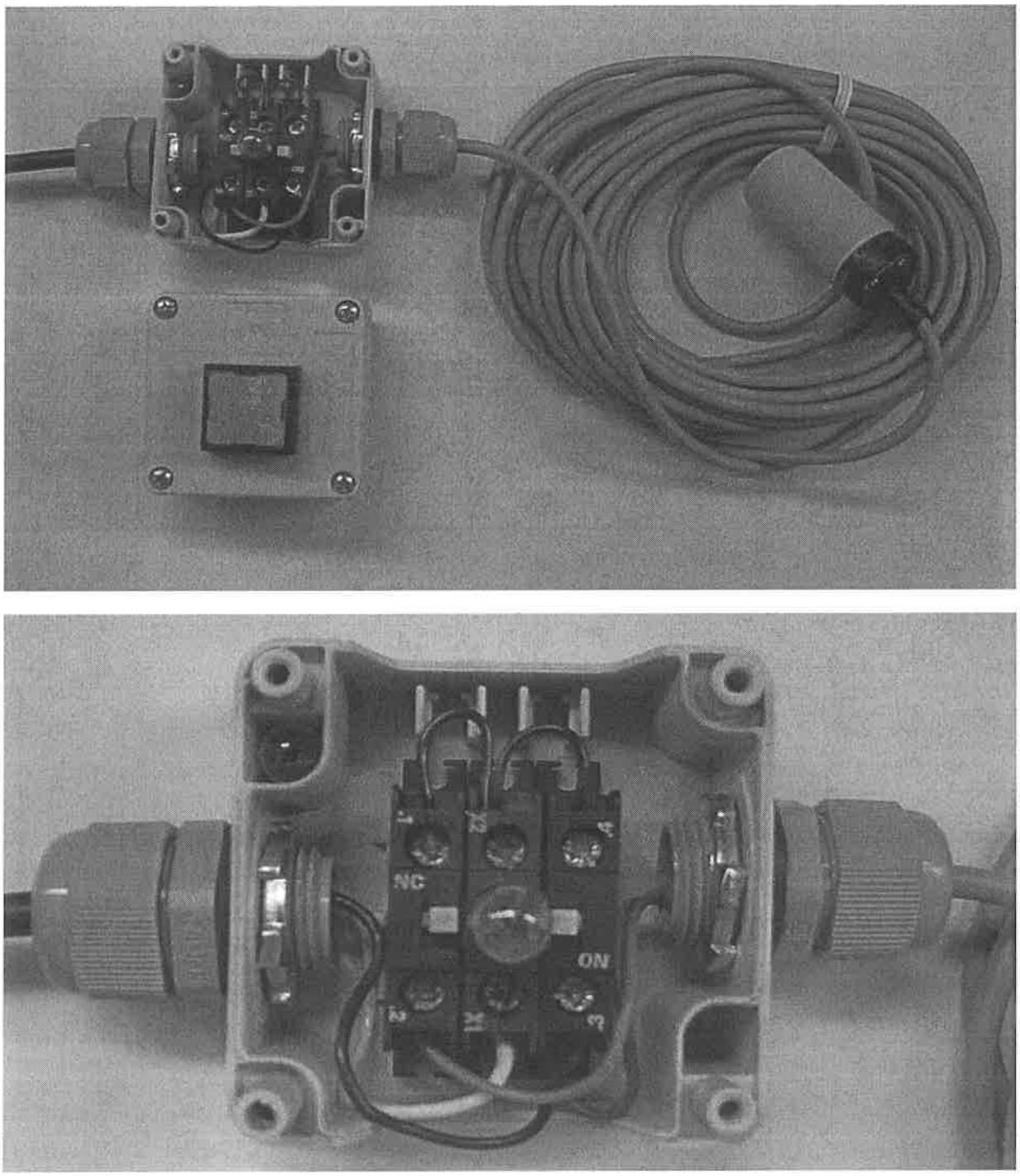


Figure 7.9

7.10 FLANGE ADAPTERS

7.10.1 Standard flange adapters are constructed from PVC or CPVC and may be purchased for solvent weld socket fittings or threaded fittings. Flange adapters for threaded fittings are provided with loose male adapter to allow the customer to adjust adapter length and flange position to match the piping at the installation. Refer to Figure 7.10 for an illustration of a flange adapter.

7.10.2 When installing the flange adapter in a solvent weld socket fitting, cut the flange adapter pipe to desired length (factory supplied 12" length) and solvent weld the flange adapter with the proper solvent cement in the desired position in a previously installed fitting. If the flange adapter is to be used in a threaded fitting, install the male adapter into the fitting with Teflon® pipe sealant, cut the flange adapter to the desired length, and solvent weld the flange adapter to the male adapter in the desired position with the proper solvent cement.

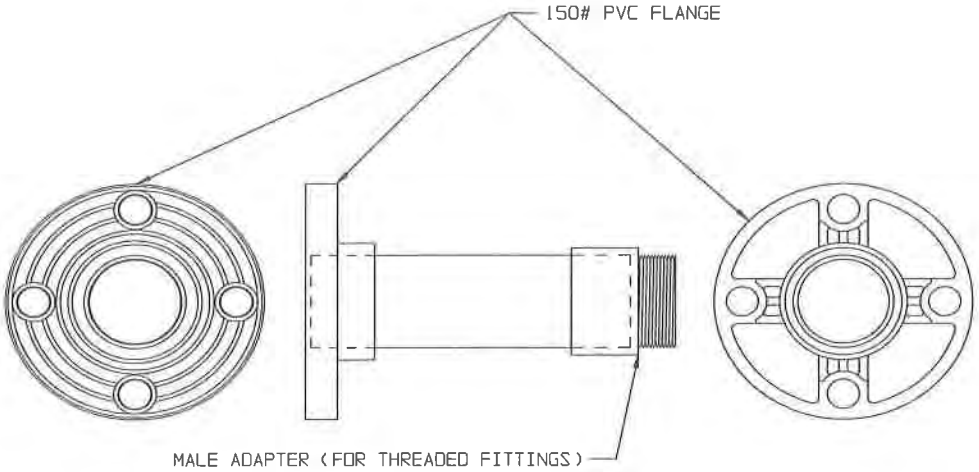


Figure 7.10

7.11 Flexmaster Expansion Joints

7.11.1 Service Conditions:

.2. The expansion joints are intended for use in low pressure (< 20 PSIG) piping applications or for use as the inlet of a flooded suction feed connection. The maximum use temperature of the expansion joints is 130°F for HDLPE materials and 140°F for XLPE materials.

.3. The application must be properly defined for the expansion joint. Application design movement must not exceed the design movement of the expansion joint. Please refer to the chart attached for design movement capabilities and spring rates. Also refer to the piping examples for proper installation examples. If the application exceeds the design capabilities of the expansion joint, please contact the manufacturer.

7.11.2 Alignment:

.1. Expansion joints are not designed to make up for piping misalignment error. Pipe misalignment should be no more than ¼" in any direction.

7.11.3 Pipe Support:

.1. Piping must be supported in all directions so expansion joints to not carry any piping weight.

7.11.4 Installation:

.1. Unbolt and remove split flanges from the faces of the expansion joint. Check to make sure the flange faces are clean and free of foreign materials. Flange faces should be free of any scratches or nicks. If scratches or nicks occur, sand the surface smooth with 220 grit sand paper using a random orbital sander.

.2. Locate the expansion joint between two 150# flanges spaced for the prescribed neutral length + ½" (the thickness of two full face 150# flange gaskets). Install bolts as shown in the drawing below. To obtain proper gasket compression, tighten all the fitting nuts hand tight using an opposing bolt tightening sequence until the gaskets engage the flanges and the lock washers are compressed. Tighten

each nut an additional 5/8 turn – 1-3/8 turns using the same sequence (do not tighten more than 1/2 turn at a time). A light application of lubricating oil is necessary to prevent thread seizing on S.S. bolts. Gasket compression should be between 25 - 50%. Tighten bolts to achieve gasket compression. Recheck fitting tightness periodically.

Flexmaster Expansion Joints										
Nominal size I.D.	Neutral Length (in.)	± Axial Movement	± Lateral Movement	Angular Deflection	Axial Spring Rate lbs./in.	Lateral Spring Rate lbs./in.	# Holes	Bolt Pattern	Bolt Size	Weight (lbs.)
2	20.71	4	2	5	N/A	N/A	4	150#	5/8"	8.44
3	31.5	4	2	5	27.3	6.6	4	150#	5/8"	13.86

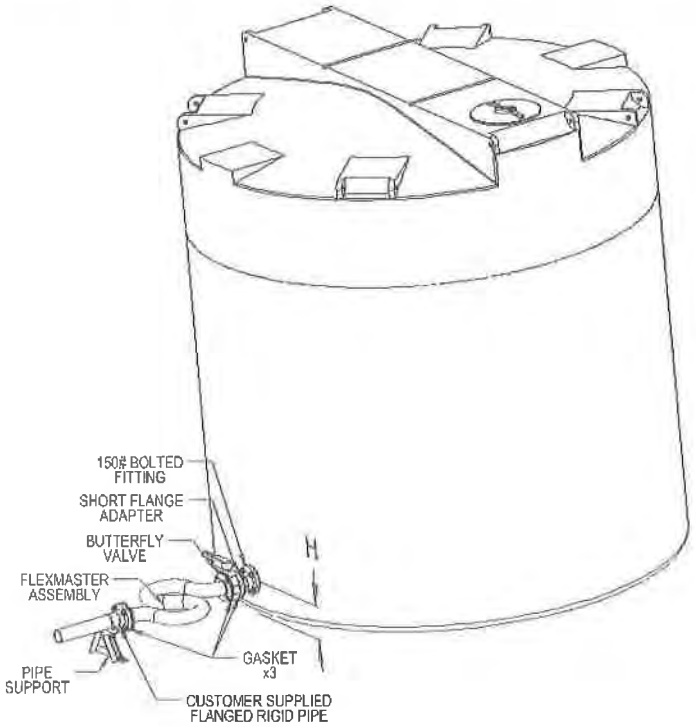


Figure 7.11

With the Flexmaster expansion joint installed horizontally as shown in the example above, dimension "H" can be up to 50" maximum and still meet the SII recommendation of 4% dimensional movement design. If the height of the fitting is above 50", install the Flexmaster in a vertical configuration as shown in Figure 7.13.

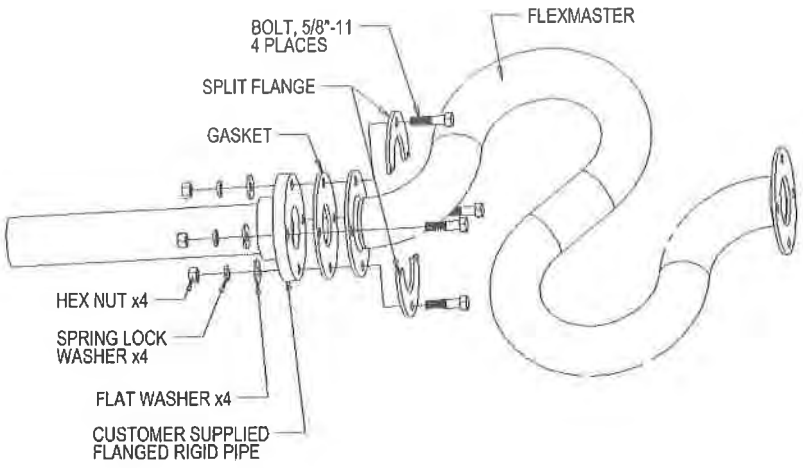


Figure 7.12 – Exploded Assembly

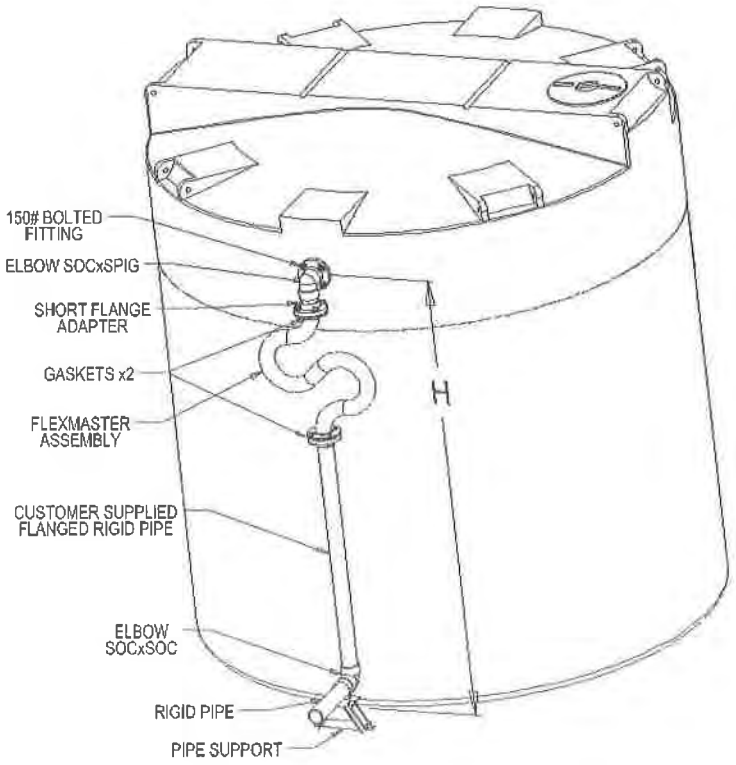


Figure 7.13

With the Flexmaster expansion joint installed vertically as shown in the example above, dimension "H" can be up to 100" maximum and still meet the SII recommendation of 4% dimensional movement design. If the

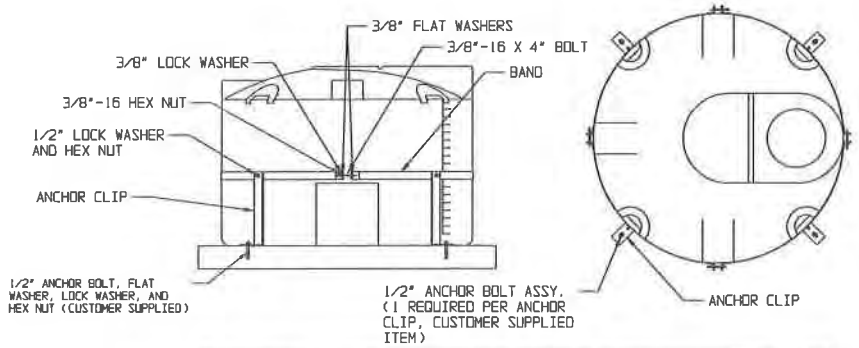
height of the fitting is above 100", an additional Flexmaster can be installed in the vertical configuration to provide additional movement capability.

8. TANK ACCESSORIES

8.1 LATERAL RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

8.1.1 The lateral restraint system is designed for tank position restraint on a concrete pad inside of an enclosed building. **It is not designed for wind or seismic restraint capabilities.** Using the assembly drawing and table shown in Figure 8.1, verify that all parts are present.

8.1.2 Locate the tank on the concrete pad as desired. The pad required for the restraint system must be 18-3/4" larger in diameter than the tank diameter for proper application of 1/2" adhesive anchor bolts (assumes 6-3/8" edge distance required). Lay out the bands around the tank (alternate long bands and short bands if both lengths are provided) with the studs and angle ends sticking out away from the tank. Fasten the bands together with the 3/8" - 16 x 4" hex head bolts as shown in the drawing. Raise the bands 17" and loosely install the anchor clips using the 1/2" - 13 hex nuts and 1/2" washers provided. Tighten the 3/8" - 16 x 4" hex head bolts to remove band looseness. Mark the slot locations of the anchor clips, remove the clips, and install the required number of 1/2" anchor bolts. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.



TANK DIA. (IN.)	QUANTITY REQUIRED					
	BAND 44 IN.	BAND 48 IN.	ANCHOR CLIPS	3/8"-16 X 4" BOLTS AND HEX NUTS	3/8" FLAT WASHERS	1/2" HEX NUTS AND FLAT WASHERS
48	0	3	3	3	6	3
64	0	4	4	4	8	4
86	5	0	5	5	10	5
90	3	3	6	6	12	6
102	7	0	7	7	14	7
120	4	4	8	8	16	8
137	4	5	9	9	18	9
142	0	9	9	9	18	9

Figure 8.1

8.1.3 Replace the anchor clips and secure the clips to both bands and the concrete pad. Do not over tighten the bands to the tank. The band tension should only remove looseness and not cause any tank deflection.

8.2 WIND/SEISMIC TANK RESTRAINT SYSTEM (FLAT BOTTOM TANKS)

8.2.1 The wind/seismic tank restraint system is designed for tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions. Using the assembly drawing and table sent with the assembly, verify that all parts are present. Please see Figure 8.2 for a restraint system installation and assembly information.

8.2.2 Locate the tank on the concrete pad as desired. Lay out all anchors required (4 or 8) equally spaced, (4 anchors must be directly below the tank tie down locations). Make sure all anchors are located next to the tank with the front face of the anchor weldment located next to the tank. Mark all the anchor bolt locations, remove the anchors and install the required Hilti adhesive model HVA anchor bolts as specified in the assem-

bly drawing and table sent with the assembly. These anchor bolts are not provided by the manufacturer and must be purchased by the customer. Customer must follow all Hilti anchor bolt installation instructions.

8.2.3 Replace the anchors and secure the anchors to the concrete. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - DO NOT re-tension the cables.

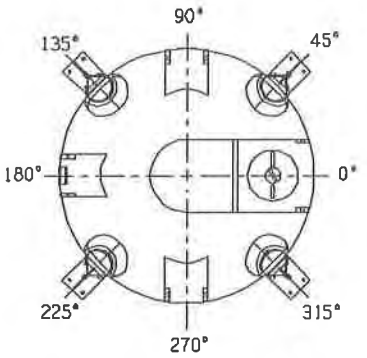


TABLE 1

CLIP SIZE (INCHES)	ROPE SIZE (INCHES)	MINIMUM # CLIPS REQ.	AMOUNT OF ROPE TURN-BACK (INCHES)	*TORQUE (IN Ft. Lbs
1/4	1/4	2	4-3/4	15
3/8	3/8	2	6-1/2	45
1/2	1/2	3	11-1/2	65
5/8	5/8	3	12	95

* THE TIGHTENING TORQUE VALUES SHOWN ARE BASED UPON THE THREADS BEING CLEAN, DRY, AND FREE OF LUBRICATION.)

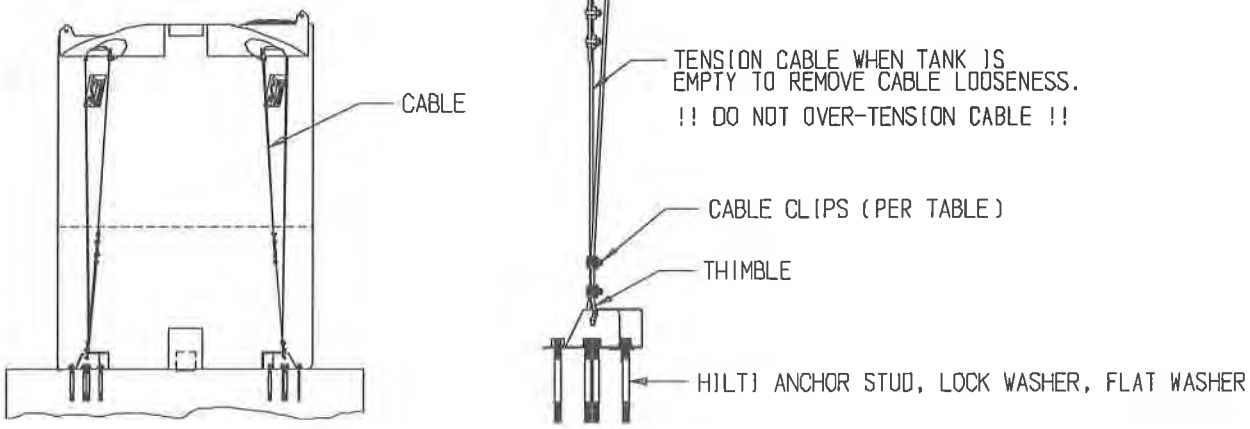
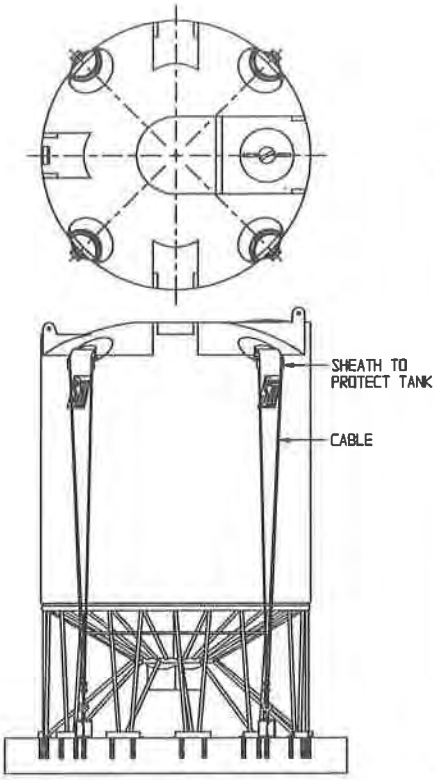
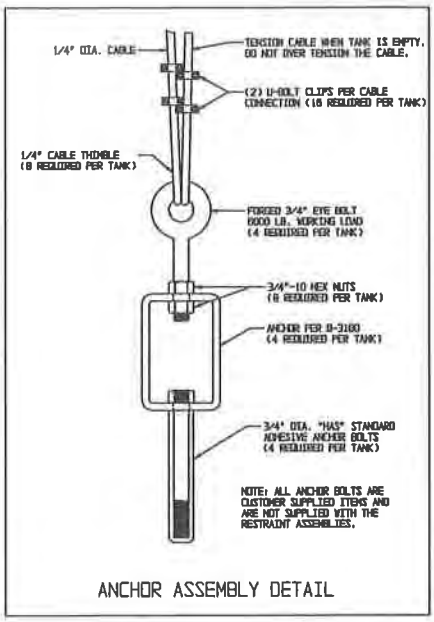


Figure 8.2

8.3 WIND/SEISMIC TANK RESTRAINT SYSTEM (CONE BOTTOM TANKS)

8.3.1 The wind/seismic tank restraint system is designed for cone bottom tank restraint on an appropriate concrete pad under 110 MPH wind or seismic zone 4 conditions using a SII cone stand for proper tank support. Using the assembly drawing and table shown in Figure 8.3, verify that all parts are present.





TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.9 SPECIFIC GRAVITY FLUID STAND REQUIRED	STAND ANCHOR BOLTS REQUIRED
500	64	78800	8 EA. 1/2" DIA. "HAS" STANDARD
500	86	79000	8 EA. 1/2" DIA. "HAS" STANDARD
1000	64	78800	8 EA. 1/2" DIA. "HAS" STANDARD
1400	86	79000	8 EA. 1/2" DIA. "HAS" STANDARD
1500	64	78800	8 EA. 1/2" DIA. "HAS" STANDARD
1650	86	78900*	8 EA. 1/2" DIA. "HAS" STANDARD
2000	90	79300	24 EA. 3/4" DIA. "HAS" STANDARD
2500	90	79300	24 EA. 3/4" DIA. "HAS" STANDARD
2600	90	79400	24 EA. 3/4" DIA. "HAS" STANDARD

*NOTE: 79000 STAND ACCEPTABLE FOR SPECIFIC GRAVITIES UNDER 1.7

TANK SIZE (GALLONS)	TANK DIAMETER (INCHES)	1.9 SPECIFIC GRAVITY FLUID STAND REQUIRED	STAND ANCHOR BOLTS REQUIRED
3000	90	79300	24 EA. 3/4" DIA. "HAS" STANDARD
3900	90	79300	24 EA. 3/4" DIA. "HAS" STANDARD
4100	90	79900	24 EA. 3/4" DIA. "HAS" STANDARD
4400	90	79800	24 EA. 3/4" DIA. "HAS" STANDARD
5500	90	79800	24 EA. 3/4" DIA. "HAS" STANDARD
5600	90	79900	24 EA. 3/4" DIA. "HAS" STANDARD
6000	142	79500	24 EA. 3/4" DIA. "HAS" STANDARD
6500	90	79800	24 EA. 3/4" DIA. "HAS" STANDARD
7400	142	79500	24 EA. 3/4" DIA. "HAS" STANDARD
11500	142	79500	24 EA. 3/4" DIA. "HAS" STANDARD

Figure 8.3

8.3.2 Locate the tank and stand on the concrete pad as desired. The pad required for the restraint system must be 24" larger in diameter than the tank diameter for proper application of 3/4" adhesive anchor bolts (assumes 10" edge distance required. Lay out the four anchors provided directly below the tank tie down locations. Make sure all anchors are located so the hole in the anchor aligns with the tank wall. Mark all the anchor bolt locations (stand and anchor positions), remove the stand and anchors and install the required Hilti adhesive model HVA anchor bolts as specified by the assembly drawing and the SII seismic restraint drawing B-3182. These anchor bolts are not provided by the manufacturer and must be purchased by the customer.

8.3.3 Replace the stand and anchors and secure to the concrete pad. Install the 3/4" eyebolts loosely as shown by the drawing. Fasten the tank to the concrete pad with the required cable (make sure the cable sheath is on the cable and located around the lug locations) as shown by the assembly drawing utilizing the cable thimbles and clamps provided. Tension the cable before filling the tank to remove cable looseness. Do not over-tension the cables as this may cause tank damage. The cable tension will change with tank loading and temperature changes - DO NOT re-tension the cables.

8.4 STEEL LADDERS

8.4.1 Steel ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 1/4" anchor bolts (check with anchor bolt manufacturer for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 8.4, verify that all parts are present and assemble accordingly.

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper equipment for other than inspection work.

8.4.2 Attach the two pivoting attachment arms to the ladder using 1 ea. 1/2"-13 x 2" hex head bolt and 2 ea. 1/2" - 13 hex nuts. Double nut each bolt by tightening the first nut to 85 ft. - lbs. of torque and then jamming the second nut to the first nut by holding the first nut and tightening the second to 85 ft. - lbs. of torque. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter pin provided (see Figure 8.4). Position the ladder parallel with the side of the tank and mark the 1/4" anchor bolt locations. Install appropriate 1/4" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

8.5 STEEL LADDER CAGES

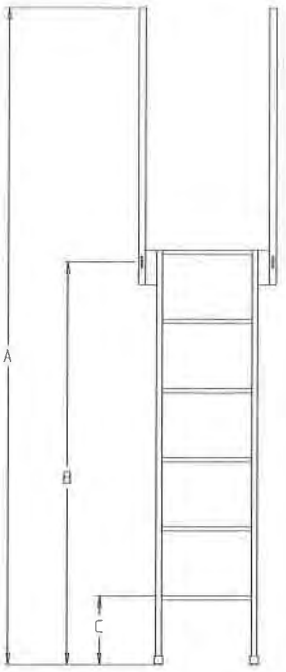
8.5.1 Using the assembly drawing shown in Figure 8.5 and the instructions in section 8.5.2, verify that all parts are present and assemble accordingly. These cages are designed for use only with the SII steel ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cages are installed on the ladder before the ladder installation to the tank.

8.5.2 Install the cages loosely using the u-bolts provided starting with the top cage unit (4 ft. unit with a larger bolt pattern). The bottom cage unit must have a larger diameter at the bottom than at the top of the unit and the bottom edge of the unit be located a minimum of 7 feet and a maximum of 8 feet above the ground. When the cage units have been properly located and spaced evenly, tighten the u-bolts securely.

8.6 FRP LADDERS (up to 300" height)

8.6.1 FRP ladders are designed in accordance with OSHA 1910.27 and are to be mounted next to the tank on a concrete pad at the same elevation as the bottom of the tank. The concrete pad area that the ladder mounts to must be of sufficient size as to comply with OSHA standards regarding proper access to and from the ladder. This should be determined by the construction site engineer based on the specific application. The pad must be of sufficient size to allow proper attachment of 5/8" anchor bolts (check with anchor bolt manufacture for embedment and edge distance required). The ladder mounting system is designed to allow for tank expansion and contraction due to temperature and loading changes. Using the assembly drawing and table shown in Figure 8.6, verify that all parts are present and assemble accordingly.



TANK SIZE	TANK P/N	A	B	C	CAGE
2000 X 90	505XXX	126.0	84.0	12	NO
2500 X 90	509XXX	145.0	103.0	7	NO
3000 X 90	513XXX	162.0	122.0	9	NO
3000 X 102	741XXX	135.0	93.0	12	NO
3900 X 90	519XXX	198.0	158.0	12	NO
4400 X 90	521XXX	219.0	178.0	9	NO
4400 X 120	8200XX	138.0	96.0	12	NO
4500 X 102	742XXX	183.0	139.0	9	NO
4900 X 90	548XXX	239.0	197.0	5	NO
5500 X 90	702XXX	258.0	215.0	12	NO
5500 X 120	700XXX	159.0	119.0	9	NO
5600 X 142	525XXX	126.0	85.0	12	NO
6000 X 102	743XXX	227.0	183.0	5	NO
6200 X 120	8220XX	179.0	135.0	5	NO
6500 X 120	714XXX	181.0	140.0	7	NO
7000 X 142	530XXX	147.0	105.0	9	NO
7500 X 102	744XXX	270.0	228.0	12	NO
8500 X 120	740XXX	222.0	182.0	12	NO
8750 X 142	536XXX	169.0	129.0	7	NO
9500 X 120	745XXX	243.0	203.0	9	NO
10500 X 142	533XXX	193.0	152.0	7	NO
12500 X 142	535XXX	222.0	181.0	12	NO
15000 X 142	537XXX	258.0	217.0	12	NO
16500 X 142	538XXX	282.0	240.0	12	YES

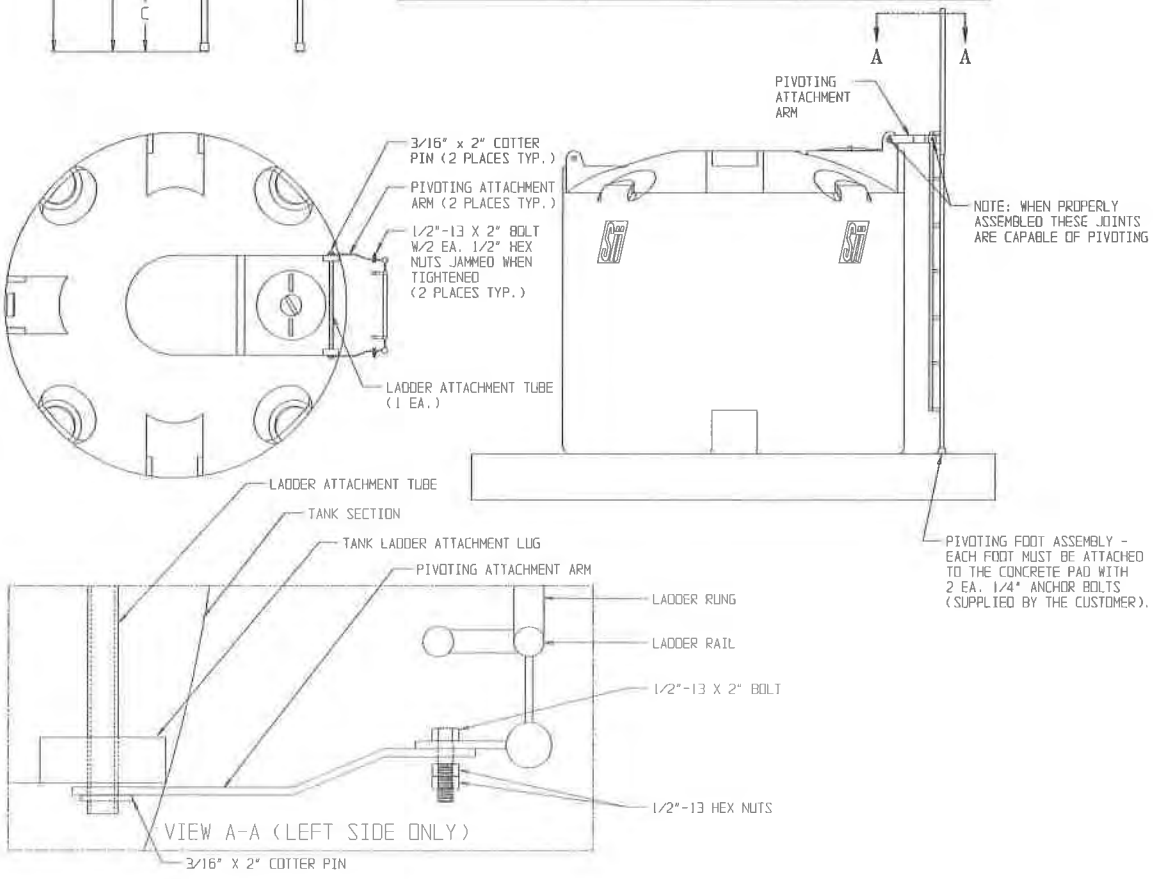


Figure 8.4

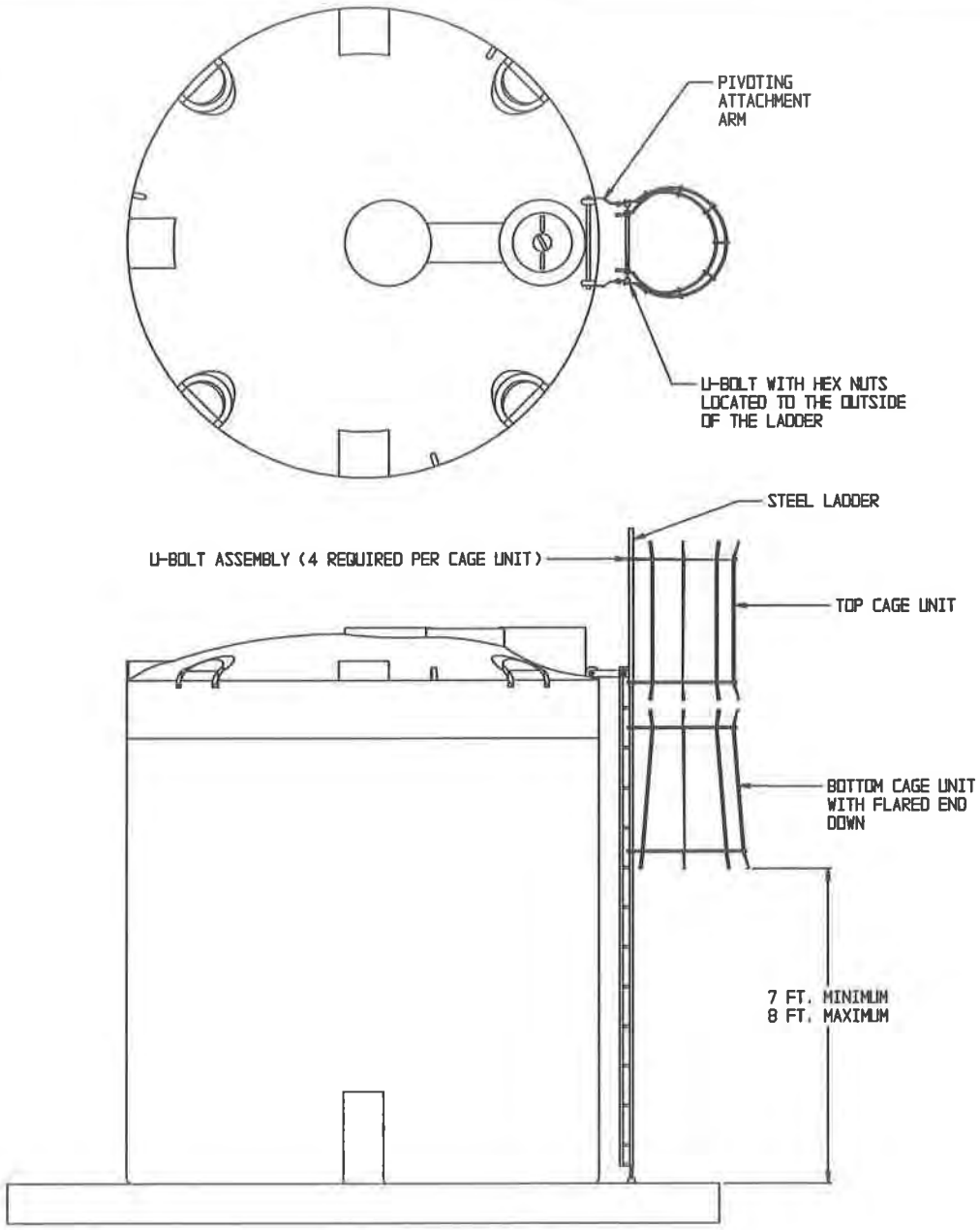


Figure 8.5

NOTE: This ladder is provided for tank inspection only. At no time should the operator step off this ladder onto the tank unless stepping onto an approved work platform with guard rails or utilizing some other approved safety device. Proper safety equipment (i.e. guard rails, safety harness, etc.) must be used to step onto the tank. Consult applicable regulations to determine proper safety equipment.

8.6.2 Attach the stainless steel top pivoting attachment arms to the ladder using the 1/2" bolt and 3/4" bushing assemblies (2 required) as shown in Figure 8.6. Position the ladder on the tank and attach the top pivoting attachment arms to the tank with the ladder attachment tube and cotter keys provided (see assembly drawing). Position the ladder parallel with the side of the tank and mark 4 ea. 5/8" anchor bolt locations. Install appropriate 5/8" anchor bolts and attach the bottom of the ladder to the concrete pad. Anchor bolts are not provided by the manufacturer and must be purchased by the customer.

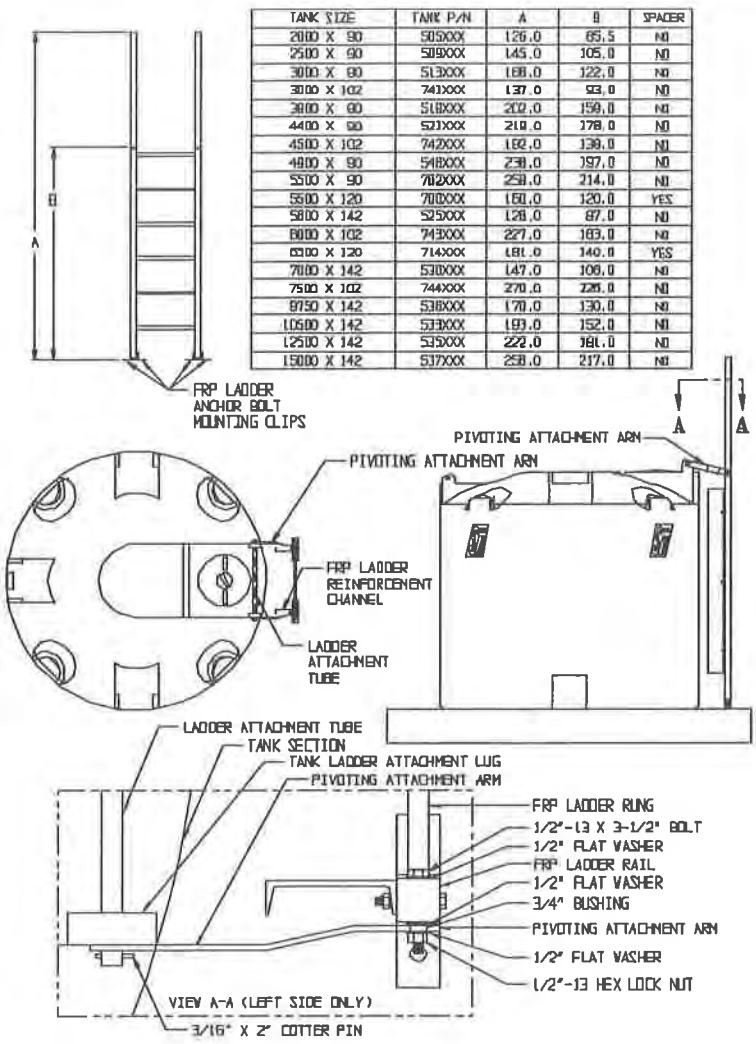


Figure 8.6

8.7 FRP LADDER CAGES

8.7.1 Using the assembly drawing shown in Figure 8.7 and the instructions in section 8.7.2, verify that the correct number of fasteners have been shipped to attach the FRP cage unit. These cages are designed for use only with the SII FRP ladder design. Cages are required for ladders used to ascend to heights exceeding 20 ft.

NOTE: Assembly is easier if the cage unit is installed on the ladder before ladder installation.

8.7.2 Position the cage unit on the ladder with the flared end toward the ladder base. Attach the cage to the ladder using the 3/8" stainless steel bolts provided (4 bolt assemblies per cage hoop).

8.8 HORIZONTAL LEG TANK INSTALLATION

8.8.1 Horizontal leg tanks are to be used only with adequate support. Horizontal leg tank skids are available for SII horizontal leg tanks (750-1685 gallons) to provide adequate support and a structural support frame that provides easy attachment for a variety of stationary applications. The hoop pipe restraints restrain the leg tank and give it additional structural support. Hoop restraints are available for tanks 525 gallons and larger. Hoops are required on tank sizes above 730 gallons. The use of a SII skid is not required, but it is important to have proper support under all of the tank support areas (points which would contact the ground if

the tank was sitting on level ground) and a method to attach and tighten the hoop pipe restraint system. An example assembly drawing is shown in Figure 8.8.

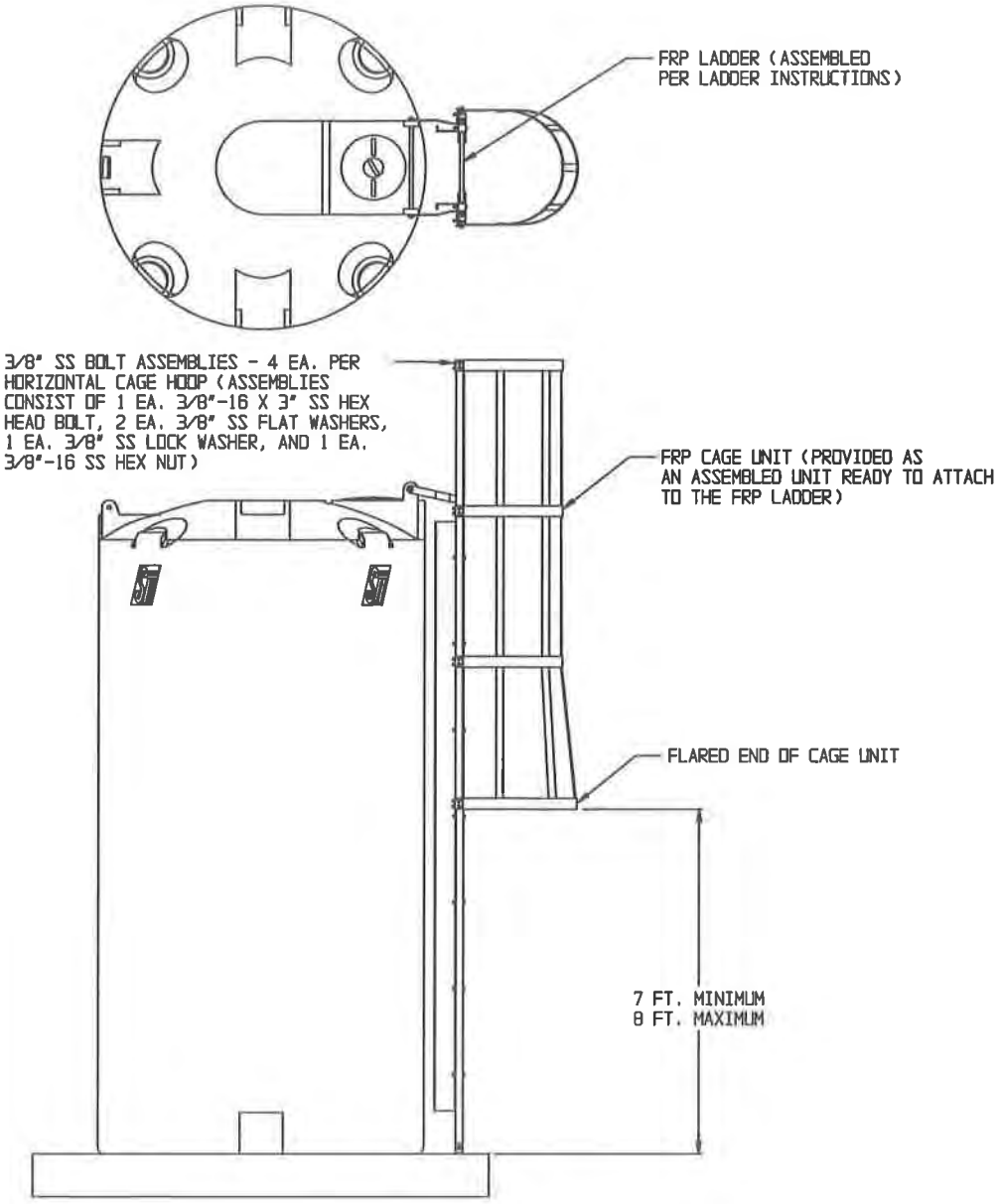


Figure 8.7

8.8.2 In the example shown, position the skid provided in the desired location and attach as necessary for the application. Position the tank on the skid with the legs centered over the hoop mounting holes in the top of the skid.

8.8.3 With one person on each side of the tank, insert J-bolts into the hoop holes and lift the hoop into position directly above the tank legs. Spread the hoop slightly while sliding the hoop (centered in the pipe guide channel formed into the tank legs) onto the tank. Insert the J-bolts into the proper holes in the top of the skid. Install the bevel washer, lock washer, and hex nut on each of the J-bolts loosely. Do not tighten the hex nuts yet. See view A-A shown in Figure 8.8 for an illustration of the loosely assembled J-bolt/hoop assembly.

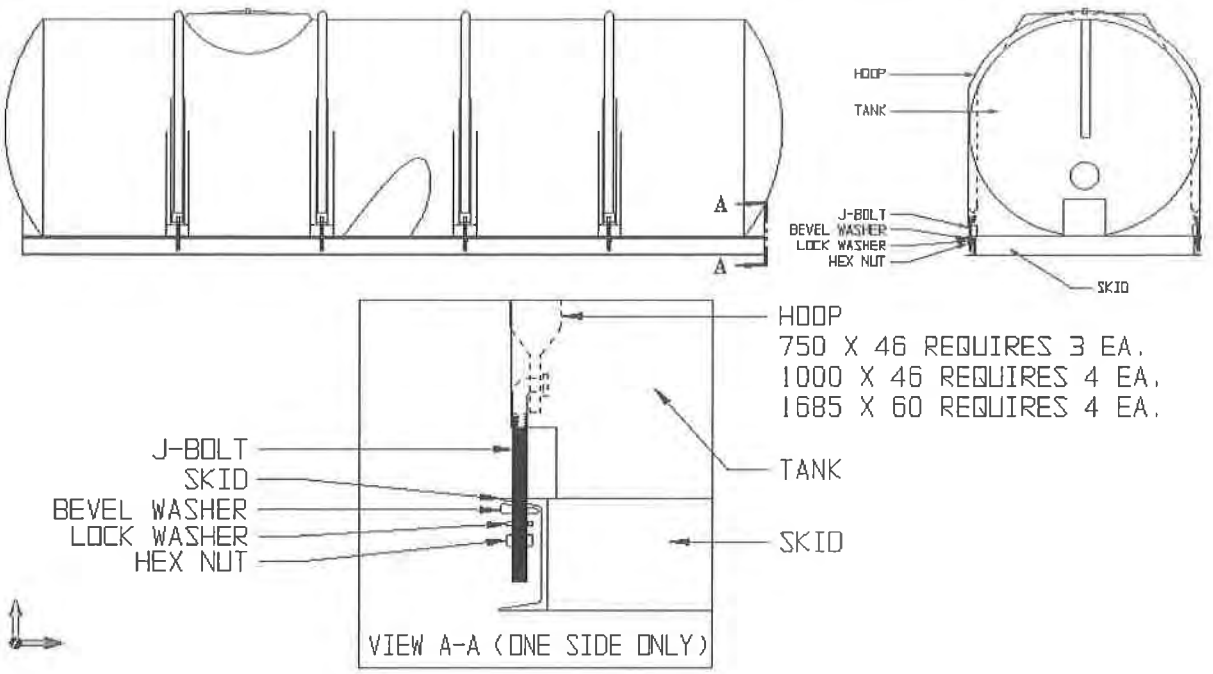


Figure 8.8

8.8.4 Repeat the procedure as detailed in section 8.8.3 for each of the remaining hoops required. When all hoops have been loosely installed, check the tank and hoop alignment to make sure the placement is correct. When proper alignment has been established, start tightening the hex nuts on each hoop. Tighten both sides of the hoop equally until the top of the hoop is tight all the way around the top of the tank and proper tension is obtained. Proceed to the next hoop and repeat the tightening procedure until all of the hoops have proper tension. Recheck the hoop tension after the tank has been filled. Tighten the hoops as necessary until the top of the hoop is tight all the way around the top of the tank.

8.9 CONE BOTTOM TANK STAND EXTENSIONS

8.9.1 Cone bottom tank stand extensions are designed specifically for use with SII cone bottom tank stands. Cone bottom tank stands equipped with extensions are not approved for seismic restraint applications. The extensions are provided in 20" and 40" welded units and are used to increase cone bottom tank clearance 20" or 40".

8.9.2 Install the extensions onto the cone stand legs with the bolt assemblies provided. Tighten bolts to 300 ft.-lbs of torque. With the extensions in place, proceed with the cone stand installation as previously described.

8.10 HEATED TANKS

8.10.1 Heated tanks are insulated with a minimum of 2" of 2-3 lb./ft.^{3} polyurethane foam material with an "R" valve of 8.33/in. The insulation is sealed with 2 coats of acrylic latex mastic. Although this appears to be a tough, resilient covering, it can be easily torn or broken if the tank is not properly transported. **Use only carpeted and padded equipment to move an insulated tank.** Do not allow the tank to drop or roll on rough surface as this may damage the insulation.

8.10.2 Heated tanks are equipped with at least 1 control box with maintenance temperature and over-limit temperature settings. The maintenance temperature setting should be set at the desired maintenance temperature. The over-limit temperature setting should be adjusted to 10 degrees above the desired maintenance temperature. The maximum temperature the over- limit control should be set to is 140° F for cross-

linked polyethylene tanks and 130° F for high density linear polyethylene tanks. Be sure to check tank material type and design before setting any control temperatures over 100° F. It is best to keep the tank at the lowest temperature necessary to accomplish the desired objective. The Figure 8.11 on the next page shows a standard 110 VAC control box front cover with the control functions shown. This control box has calibration functions for the temperature probes. The control box is factory calibrated and should not need recalibrated. If there are any questions about control box calibration, consult the factory. Figure 8.12 shows a schematic of the terminal connections possible located under the control box front cover. The terminals available for customer connection are: line in, over-limit alarm relay, and low-limit alarm relay. There are other control boxes available with different functions not detailed in these instructions. Please consult the factory with questions regarding other types of control boxes available. Do not expose control box to atmosphere during or after installation for extended periods of time as this could cause condensation. Refer to the control box instructions and schematics sent with each tank for further details.

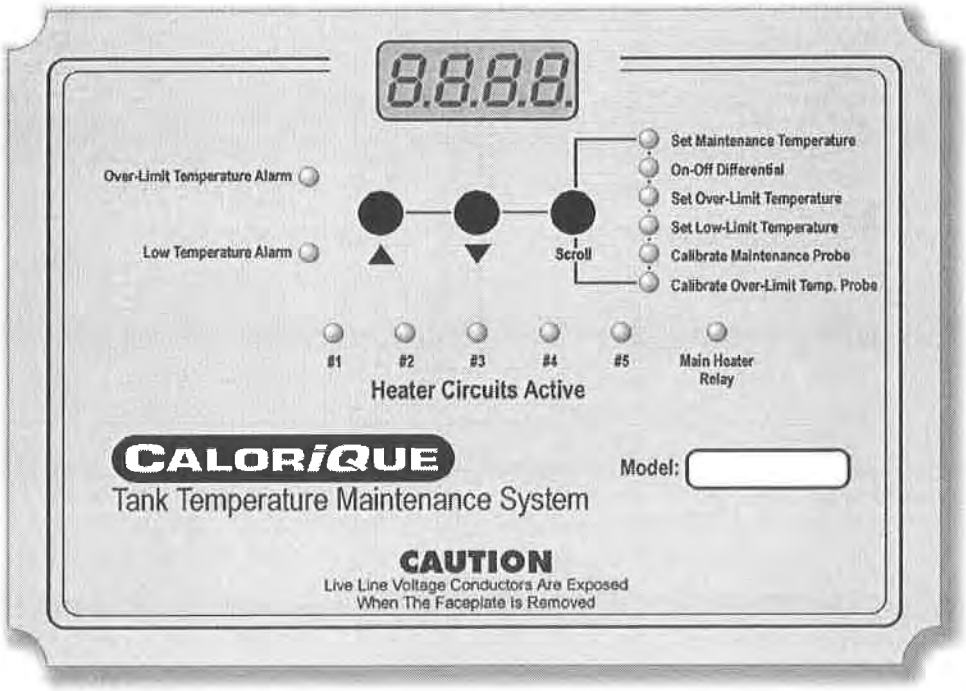


Figure 8.11

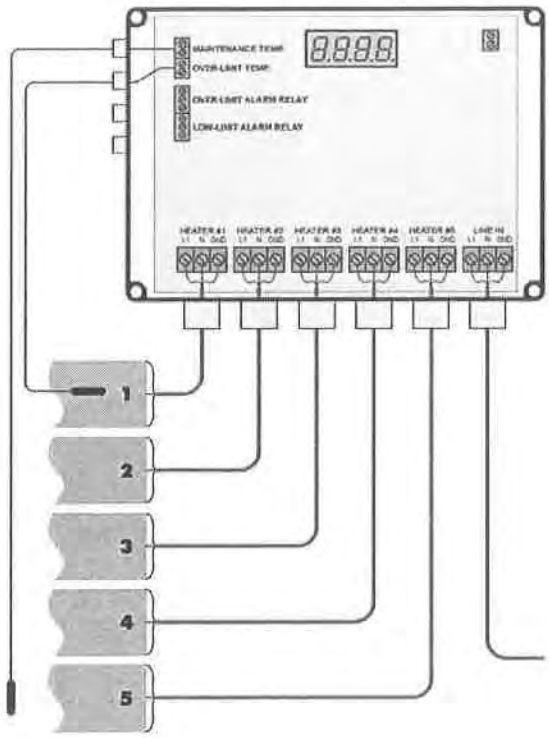


Figure 8.12

9. TANK MAINTENANCE

9.1 TANK INSPECTION

9.1.1 Simple periodic inspections of the tank installation can prevent problems and chemical loss from occurring. Inspection intervals should be consistent with site usage (the more times liquid is processed through the tank site, the more frequent the inspections). The checking procedure should be as follows:

1. Inspect the tank for physical damage such as cuts, impacts, cracks, swelling, softening of tank walls, and stress cracks (caused by long term exposure to environmental conditions and stress). NOTE: A tank inspection guide is available on the SII website at the following address: www.snydernet.com or can be obtained for tank inspections and analysis through the Customer Service Department at SII.

2. Inspect the fittings for broken parts, cracks, wear marks, or other signs of potential leaks.

3. Inspect gaskets for deterioration. Look for discoloration, bulges, checking or crazing. All of these symptoms could indicate potential failure.

4. Inspect any valves and/or pumps that may be connected to the tank. Also inspect the hoses and connections for any signs of wear.

10. SII PRODUCT POLICY STATEMENTS

10.1 SII STANDARD LIMITED WARRANTY

10.1.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers the following Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product. Record all required warranty information in section 2.1 and retain this information for use in the advent of a warranty question.

10.1.2 Snyder Industries, Inc. warrants to the purchaser for use that if any manufactured tank product is proven to be defective in material or workmanship within 3 YEARS from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. Snyder Industries, Inc. warrants to the purchaser for use that if any tank fitting, attachment, or accessory product is proven to be defective in material or workmanship within 1 YEAR from the date of original invoice from factory, and Snyder Industries, Inc. is notified within 15 days after such defect is discovered, Snyder Industries, Inc. will (at company option) either replace or repair said part. This Snyder Industries Standard Limited Warranty does not apply to damage resulting from misuse, improper application of recommended materials, neglect, material wear, accident, or improper installation or maintenance. Said part will not be considered defective if it substantially fulfills performance specifications. THE FOREGOING STANDARD LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS FOR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESSED OR IMPLIED. Snyder Industries, Inc. neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said tank product and will not be liable for incidental or consequential damages. THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS STANDARD WARRANTY. CLAIMS UNDER THIS STANDARD LIMITED WARRANTY SHALL BE HANDLED UNDER THE SNYDER INDUSTRIES, INC. SERVICE POLICY. Snyder Industries, Inc. will not be responsible for any charges incurred in repairing or servicing any Snyder Industries, Inc. product except as such repairs are made at Snyder Industries, Inc. or by Snyder Industries, Inc. personnel or as approved in writing from Snyder Industries, Inc. Customer Service.

10.2 SII WARRANTY EXCEPTIONS

10.2.1 Distributors and their authorized distribution have the responsibility of calling to the attention of their customers any exceptions to the Snyder Industries, Inc. standard limited warranty, prior to acceptance of an order from the customer for any Snyder Industries, Inc. product.

10.2.2 Due to the uniqueness of tank applications, Snyder Industries, Inc. may offer warranties other than the standard warranty. These warranty statements will be in writing from Snyder Industries, Inc. The warranty period may be longer than 3 years as in the case for purchased extended warranties, or the warranty period may be shorter than 3 years as in the case for certain chemical/material applications. Please consult Snyder Industries, Inc. if you have any questions regarding warranty coverage and/or requirements.

10.3 RETURN MERCHANDISE/WARRANTY CLAIM PROCEDURE

10.3.1 SII has specific procedures for return merchandise and warranty claims. To make a claim, please contact the Customer Service Department at SII by mail, phone or e-mail:

Snyder Industries, Inc.
P.O. BOX 4583
Lincoln, NE 68504
(402) 467-5221
FAX: (402) 467-6493
E-mail: sales@snydernet.com

The following information will be required to assist in filing your claim:

1. Product identification (tank size, part number, serial number, etc.)
2. SII customer order number
3. Name and phone number of person making the claim
4. Distributor/company name, address, and phone number
5. Description of reason for claim
6. Pictures of failure and installation
7. MSDS of chemicals stored
8. Temperature of tank application

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 8
6274 East Avon-Lima Road, Avon, New York 14414-9519
Phone: (585) 226-5353 • **Fax:** (585) 226-8139
Website: www.dec.ny.gov

Joe Martens
Commissioner

February 27, 2015

Genesee Valley Real Estate Co., LLC
Hartel Properties, LLC
Mr. Dante Gullace, Member
First Federal Plaza
28 East Main St., Suite 500
Rochester, NY 14614

Dear Mr. Gullace:

Subject: 690 St. Paul Street, Site #C828159
Remedial Design Work Plan AOC #8
January 2015
City of Rochester, Monroe County

The New York State Departments of Environmental Conservation (NYSDEC) and Health, collectively referred to as the Departments, have completed their review of the document entitled *Remedial Design Work Plan AOC #8* (the Work Plan) dated January 2015 for the 690 Saint Paul Street site located in the City of Rochester. In accordance with 6 NYCRR Part 375-1.6, the Departments have determined that the Work Plan, with modifications, substantially addresses the requirements of the Brownfield Cleanup Agreement. The modifications are outlined as follows:

1. **Section 5:** The selected remedy and remedial action objectives are included in NYSDEC's Decision Document dated December 2014.

2. **Sections 5.1 and 6.8:** Groundwater monitoring will be completed at existing well BW-8 in addition to the three new wells.

3. **Section 6.1:** Roll-off containers will meet the following specifications:
   - Roll-offs will meet all requirements and specifications for use with hazardous waste.
   - Roll-offs will be lined with and covered by a minimum of double 6-mil polyethylene sheeting.
   - Roll-offs will be covered at the end of each business day (or as needed based on air monitoring and weather conditions).
   - Roll-offs containing hazardous wastes, if any, will be transported to a disposal and/or treatment facility under a hazardous waste manifest and will be transported by USEPA permitted transportation companies only.
   - The four (4) digit United Nations/North American Hazardous Waste Materials Code (UN/NA) number will be displayed when hazardous wastes are transported off-site (e.g. TCE - UN/NA number = 1710).
   - Depending on the results of the waste characterization sampling and a NYSDEC contained-in determination, the soils staged in roll-off dumpsters will be transported to the appropriate landfill(s) or treatment facility. Loaded vehicles/roll-offs leaving the Site

will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

4. **Section 6.1:** Excavated material that is staged on plastic sheeting in anticipation of being used for backfill will be managed as follows:
    - Non-soils (construction and demolition material, concrete, gravel, brick, slag, etc) will be staged separately from soil.
    - Non-soils will either be managed off-site in accordance with all applicable laws and regulations or will be tested in accordance with DER-10 Table 5.4(3)10. Demolition material will also be tested for asbestos. Test results will be shared with the Departments and the material may be used as backfill upon written approval from NYSDEC.
    - Hay bales will be used, as needed, near catch basins.
    - Staged material will be covered as needed (rain wind, left overnight etc).
    - Based on a number of factors, NYSDEC may require that stockpile(s) of staged material be covered with appropriately anchored tarps/plastic sheeting and continuously circled with a berm and/or silt fence. In this event, the stockpile will be routinely inspected and damaged covers will be promptly replaced. Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and included in the Final Engineering Report.

5. **Section 6.6:** As indicated in the attached email, the oxidant will arrive and be stored in a bulk tanker truck (not totes) with a locking cam-lock cap.

6. **Section 6.6:** Visual analysis of oxidant distribution will be completed at existing well BW-8 in addition to the three new wells.

7. **Section 6.7:** The Departments will be sent electronic copies of all correspondence with USEPA, the City of Rochester, the City of Rochester Fire Department, and any other agencies. Copies of this correspondence and issued permits will also be included in the Final Engineering Report.

8. **Section 6.8:** In accordance with CP-43, well MW-07 will be decommissioned by pulling the riser while grouting from the bottom up. If the riser breaks below grade, the remaining part of the well will be overdrilled with an auger and grouted.

9. **Section 6.8:** Before the passive diffusion bags are deployed, NYSDEC will be notified if the length of the passive diffusion bag is longer than the column of water in the well.

10. **Section 6.10:** A water spray, or equivalent, will be used to prevent visible dust from leaving the work area. It is anticipated that this will be especially important when working with fill material.

11. **Section 6.11:** All data will be also submitted in the DEC-approved Electronic Data Deliverable (EDD) format for inclusion into the EQuIS™ database. Moreover, new data must be submitted on a continuous basis immediately after data validation occurs but in no event more than 90 days after the data has been submitted to the remedial party or its consultant(s). In other words, data is not to be held and submitted with the related reports.

12. **Section 7.0:** The cover system is an engineering control that is applicable to the entire site including AOC #8. Following completion of construction activities (well installation and infrastructure construction), the parking lot will be re-paved and/or patched as necessary. Areas of soil removal within grass areas will be backfilled to grade and the vegetative cover restored. Any off-site material used for backfill must be approved by NYSDEC before being brought onto the site. In addition, the top two feet of the soil cover must meet the DER-10 Appendix 5 Allowable Constituent Levels for Imported Fill or Soil for Restricted Residential Use.

13. **Section 9.0:** Two Interim Site Management Plans were previously completed for the site.

14. The above comments also apply to corresponding sections in the Appendices.

With the understanding that the above noted modifications are agreed to, the Work Plan is hereby approved. If you choose not to accept NYSDEC's modifications, you are required to notify this office within 20 days after receipt of this letter or prior to the start of field activities. In this event, I suggest a meeting be scheduled to discuss your concerns prior to the end of this 20-day period.

By **March 31, 2015** and prior to the start of field activities, please attach a copy of this letter to the Work Plan and distribute the approved Work Plan as follows:

- Frank Sowers (two hardcopies, 1 with an original signature on the certification page);
- John Frazer (electronic copy on CD);
- Document repositories (1 hardcopy for each of the document repositories established for this site); and
- Copies to other interested parties upon request.

Per the approved schedule in the Work Plan, field activities are scheduled to begin within approximately 2 weeks of this letter. Please notify me at least 7 days in advance of the start of field activities.

Per the approved schedule, the next submittal is the Site Management which is due by **April 3, 2015**.

Additionally, please be advised that the approved schedule in the Work Plan does not appear to account for the design and installation of the sub-slab depressurization system (SSDS) in the occupied portion of Building 22. As specified in the Work Plan, a separate work plan will be submitted for the SSDS and oxidant injections will not begin until the SSDS is operating.

Thank you for your cooperation in this matter and please contact me at (585) 226-5357 if you have any questions regarding these modifications.

Sincerely,

Frank Sowers

Frank Sowers, P.E.
Environmental Engineer II

Attach.

ec:w/attach

Bridget Boyd	John Frazer
Suzanne Wheatcraft	James Mahoney
Dan Noll	Bart Putzig
Greg Senecal	Justin Deming

From: Noll, Dan
To: Sowers, Frank (DEC)
Cc: Gillen, Jennifer; Boyd, Bridget (HEALTH)
Subject: Re: 690 Saint Paul AOC 8 Design questions
Date: Thursday, February 26, 2015 1:09:03 PM

That is fine.

Dan

On Feb 26, 2015, at 9:48 AM, Sowers, Frank (DEC) <frank.sowers@dec.ny.gov> wrote:

> Dan,
>
> At the moment, my only concern with your responses is with MW-7. My interpretation of CP-43 Figure 2 is that if the riser breaks below grade, you would proceed directly to augering out the remaining portion of the well and finish grouting from the bottom up.
>
> **Frank Sowers, P.E.**
> Environmental Engineer II, Division of Environmental Remediation
>
> **New York State Department of Environmental Conservation**
> 6274 East Avon-Lima Rd, Avon, NY 14414
> P: (585) 226-5357 | F: (585) 226-8139 | frank.sowers@dec.ny.gov
>
> www.dec.ny.gov | <image003.jpg> | <image004.jpg>
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> ---
>
> **From:** Noll, Dan [mailto:dnoll@LaBellaPC.com]
> **Sent:** Monday, February 23, 2015 2:58 PM
> **To:** Sowers, Frank (DEC)
> **Cc:** Gillen, Jennifer
> **Subject:** RE: 690 Saint Paul AOC 8 Design questions
>
> Frank – Sorry for the delayed response. Please see below answers to the questions.
>
> **Dan Noll, PE**
> Environmental Engineer
> Direct: 585-295-6611 | dnoll@labellapc.com
>
> ---
>
> **From:** Sowers, Frank (DEC) [mailto:frank.sowers@dec.ny.gov]
> **Sent:** Thursday, February 12, 2015 2:07 PM
> **To:** Noll, Dan
> **Cc:** Gillen, Jennifer

Subject: 690 Saint Paul AOC 8 Design questions

Dan,

I started looking at the AOC 8 work plan and have a couple of preliminary questions:

1. Are you planning to use hazardous waste or solid waste roll-offs? We plan on having haz. Waste roll-offs used but also plan on pursuing contained in.
2. Can either of the options for permanganate be stored inside Building 22? With the tank being pretty visible from Saint Paul, I'm concerned about someone hopping the fence, messing with the tank and getting themselves hurt. At a recent KMnO4 project in the city we had a fence, the solution was stored in locked sea containers, there was 24-hr human security, and motion sensitive lighting. I am not proposing that you need that level of security, but I am also not sure if just a 6-ft fence is sufficient. We are planning to just go with the tanker truck option and we can get a locking cam-lock cap to provide added security.
3. You propose to pump rain water that collects in the secondary containment back to the batch tank. Do you know if there is enough oxidant demand in rainwater that it needs to be accounted for? I haven't been able to find any literature indicating rainwater would provide any significant oxidant demand (although I have not literature indicating it wouldn't either). I think the volume of water we anticipate would be negligible; however, if you see this as an issue we could discharge the rainwater to the ground surface pending confirmation that there is no permanganate present (simple visual assessment for pink/purple color).
4. How will MW-7 be decommissioned? We plan to pull the well if possible then grout from the bottom up. If the well does not pull (i.e., breaks below grade) we would puncture the bottom and then grout from the bottom up. If that gave us any issues, we would plan to overdrill with an auger and then grout.

Bridget and I are continuing our review and will let you know if we have any other questions we want to discuss before providing a formal response to the design plan.

Thanks,

Frank Sowers, P.E.

Environmental Engineer II, Division of Environmental Remediation

New York State Department of Environmental Conservation
6274 East Avon-Lima Rd, Avon, NY 14414

P: (585) 226-5357 | F: (585) 226-8139 | frank.sowers@dec.ny.gov

www.dec.ny.gov | <image005.jpg> | <image006.jpg>

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Remedial Design Work Plan
AOC #8
BCP Site #C828159

Location:

690 Saint Paul Street
Rochester, New York

Prepared for:

Genesee Valley Real Estate Company, LLC
First Federal Plaza
28 East Main Street, Suite 500
Rochester, New York 14614

LaBella Project No. 209280

September 2014
January 2015

Remedial Design Work Plan
AOC #8
BCP Site #C828159

Location:

690 Saint Paul Street
Rochester, New York

Prepared for:

Genesee Valley Real Estate Company, LLC
First Federal Plaza
28 East Main Street
Rochester, New York 14614

LaBella Project No. 209280

September 2014
January 2015

LaBella Associates, D.P.C.
300 State Street
Rochester, New York 14614

CERTIFICATIONS

"I DANIEL NOLL *certify that I am currently a NYS registered professional engineer and that this Remedial Design Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10)."*

081996	7/4/2015	
NYS Professional Engineer #	Date	Signature

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1.0 Introduction

This Remedial Action Design Work Plan (RDWP) details the selected remedial actions and their proposed implementation to be completed for the property located at 690 Saint Paul Street, located in the City of Rochester, Monroe County, New York, New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP) Site #C828159. Hereinafter, this property will be referred to as "the Site." A Project Locus Map is included as Figure 1. Specifically, this RDWP is for Area of Concern (AOC) #8.

The proposed remedial actions were identified and evaluated in the Remedial Alternatives Analysis Report (RAAR) based on the data obtained during pre-BCP activities, the Remedial Investigation (RI), and Interim Remedial Measures (IRMs) conducted at the Site. This RDWP summarizes the findings of the previous work for the Site; however, these previous reports should be referenced for greater details on those investigation activities. A comprehensive list of the previous studies utilized in the development of this RDWP is included in the RI Report (RIR).

2.0 Background

2.1 Site History and Description

The Site consists of approximately 4.73 acres of land improved with three inter-connected buildings and a fourth separate building. In total, these buildings occupy approximately 89,280 square feet of the Site (footprint area). Building 14B is currently utilized as a Charter School and by the City of Rochester School District as a temporary school ("swing" school space while a school is under construction) as well as administrative office space (on the first and second floors). Building 16 is currently partially occupied by a light industrial tenant (assembly of parts), a janitorial service for storage, and the remainder is vacant. Building 14A is partially occupied by a machine shop and the Genesee Valley Real Estate (GVRE) offices on the second floor and Building 22 is utilized by Geva Theatre for storage and scene construction.

The Site was developed prior to 1875 and was utilized primarily for residential purposes prior to approximately the 1920s. Based on the review of historical mapping and local street directories, the Site was primarily utilized for industrial purposes by Bausch & Lomb, Inc., formerly known as Bausch & Lomb Optical Company ("B&L") from sometime around 1920 until it was abandoned by the company in the late 1960s. The property was developed for industrial use by "B&L" to manufacture lenses and other products. From the early 1970s until 2000, the Site was used predominantly for light commercial and storage applications. Occupants and/or owners of the Site have included various individual residences, B&L, Thomas Edison Technical and Industrial High School, Geva Theater storage, and various manufacturing and industrial tenants.

In the early 1900s, B&L purchased various properties that now comprise the Project Site. In 1973, B&L conveyed the Project Site to the New York State Urban Development Corporation ("UDC"), subject to a Memorandum of Agreement and Lease extending B&L's occupancy of certain portions of the Site. In 1982, Dante Gullace and Ralph Gullace purchased the Project Site from UDC and continued to own the Site, first as tenants-in-common and then solely by Dante Gullace until December 31, 1997, wherein all of Dante Gullace's interests in the Site were conveyed to GVRE.

Figure 2 illustrates the Site features and boundaries.

In July 2009, the Site was entered into the NYSDEC BCP (BCP Site #C828159). Subsequent to entering the Site in the BCP, a RI and three IRMs have been completed at the Site. The RI report was submitted in January 2014 and the RAAR was submitted in May 2014.

2.2 Physical Characteristics of Site

The Site is situated in a mixed commercial, light industrial and residential area of the City of Rochester. The Site is bordered by St. Paul Street to the west with a Monroe County office building beyond, Lowell St. to the south with a City of Rochester park beyond, Martin Street to the east with a restaurant and residential properties beyond, and Hartel Alley to the north with a vacant restaurant and a light industrial (machine shop) building beyond.

2.2.1 Geology

The overburden material at the Site ranges in depth from less than two feet on the southern portion of the Site to twelve feet on the northern portion of the Site and consists of a combination of fill and native material. The fill material is up to eight feet thick and includes sand, crushed gravel and brick, construction and demolition debris, foundry sand, cinders, and ash. The native material underlies the fill material in some areas while in other areas the fill material appears to be absent. The thickness of native material ranges up to ten feet, and the material is primarily a glacial till. The till contains silt, sand, and gravel in varying amounts.

The Decew Dolomite underlies the overburden at the Site. The Decew Dolomite is the uppermost formation of the Clinton Group and consists of variably bedded, dark-gray to olive-gray, argillaceous to sandy, fine-grained dolomite that contains shaly partings and interbeds, as well as frequent pits and vugs. The thickness of this unit is generally 8 to 12 feet.

The Rochester Shale underlies the Decew Dolomite, and is a relatively uniform dark- to medium-gray, pale- and platy-weathering, highly calcareous to dolomitic mudstone. It contains abundant thin interbeds of medium gray, pale-buff weathering, laminated calcisiltites. Although the bottom of this unit was not encountered at the Site, its thickness in Western New York is generally 58 to 65 feet.

2.2.2 Hydrogeology

Apparent groundwater was generally encountered at the Site in the overburden at depths ranging from approximately four to nine feet below the ground surface. The groundwater in this interval generally flows to the west-southwest.

Underlying the overburden water-bearing zone, the shallow bedrock water-bearing interval was identified as the uppermost bedrock down to depths of approximately 20 feet below grade. This interval is the uppermost water-bearing unit within the bedrock, and no low permeability horizon separates this zone from the overburden. Groundwater flow direction is generally to the west, and water elevations in the overburden and bedrock wells suggest a downward flow direction.

3.0 Summary of Site Contamination

The RI was designed to investigate known Areas of Concern (AOCs), and the investigation also revealed additional AOCs. These AOCs are discussed in detail in the RIR. The BCP RI fieldwork conducted at the Site ultimately included advancing approximately 125 soil borings, excavating six test pits and installing 15 overburden groundwater monitoring wells (including three that were destroyed during IRM activities and four recovery wells) and 13 bedrock wells (including four bedrock-overburden interface wells) at the Site. Groundwater sampling was conducted in several rounds. The overall RI sampling program consisted of:

Sampled Media	Sample Quantities
Surface Soils	11
Test Pit Soils	7
Test Boring Soils	107
Geoprobe Groundwater	60
Monitoring Well Groundwater	47
Soil Gas	6
Standing Water	4

All samples were submitted for analysis of a combination of the following parameters:

- Volatile organic compounds (VOCs)
- Semivolatile organic compounds (SVOCs)
- Polychlorinated biphenyls (PCBs)
- Pesticides
- Metals

Contaminants of concern (COCs) at the Site were found to be primarily petroleum- and solvent-related VOCs. The area partially under the northern portion of Building 22 and immediately north of Building 22 was identified as AOC #8 (the subject of this RDWP). Concentrations of trichloroethene (TCE) and its degradation products (e.g., cis-1,2-dichloroethene, vinyl chloride, etc.) have been identified in soil and both overburden and bedrock groundwater in AOC #8, with substantially higher concentrations detected in overburden groundwater than in the bedrock groundwater. Based on field observations and data generated by the laboratory analysis of soil and groundwater samples collected from AOC #8, the nature and extent of on-site impacts within this AOC appear adequately defined. Specifically, the following remaining contamination appears present associated with AOC #8:

Soil:

- Approximately 375 square feet of VOC impacted soil (concentrations above Unrestricted Use SCOs) appears to be present in AOC #8 between 8 and 12 feet below grade, as depicted on Figure 3.
- No soil has been documented in AOC #8 which contains COCs above Restricted Residential SCOs.

Groundwater:

- Groundwater impacts (concentrations above Part 703 Groundwater Standards) appear to be present within an approximately 27,000-square foot area in AOC #8, as depicted on Figure 4.

Soil Vapor:

- Soil vapor intrusion testing completed on the southern occupied portion of Building 22 as part of the RI did not identify a soil vapor intrusion concern in this building. However, groundwater sampling results indicate the presence of VOCs at concentrations above Part 703 Groundwater Standards beneath the northwestern portion of Building 22. In addition, the planned *in-situ* chemical treatment of VOCs in groundwater will likely increase volatilization and therefore may represent a future soil vapor intrusion issue if not addressed. As such, a sub-slab depressurization system (SSDS) will be installed in this building as part of the remedy. A Remedial Design Work Plan detailing the proposed design and installation procedures of the SSDS is to be submitted under separate cover.

In anticipation of potential *in-situ* remediation in this AOC, hydraulic conductivity testing was completed and infrastructure was installed in two test pits located in the areas of impacts in July 2012. In addition, soil samples were collected and submitted for laboratory analysis of soil oxidant demand to two separate *in-situ* chemical treatment vendors to determine the best chemical approach for *in-situ* remediation.

The infrastructure installation consisted of placing pea gravel in the test pits in order to provide a location for groundwater to collect over time. The pea gravel was placed from the bottom of the excavations (between 11.8 feet and 12 feet below grade) to approximately eight feet below grade with a geofabric placed above the pea gravel to retain fines. The geofabric is constructed of polyethylene and as such is not anticipated to have an adverse reaction with the *in-situ* treatment chemical (i.e., permanganate). In addition to the pea gravel, horizontal 4-inch PVC slotted pipes were placed approximately one foot above bedrock (viz., approximately one foot of pea gravel was placed into the bottom of the excavation prior to placing the PVC piping). This perforated piping is wrapped with a geofabric to reduce the introduction of fines into the piping. The ends of the PVC piping are capped and the other ends are connected to a solid 4-inch PVC riser pipe that extends to finished grade with a flush mount curb box. This piping was installed in anticipation of future *in-situ* chemical treatment in AOC #8. The estimated extent of the pea gravel and PVC piping installations are shown on Figure 5.

4.0 Standards, Criteria and Guidance Values

This section identifies the Standards, Criteria and Guidelines (SCGs) for the Site. The SCGs identified are used in order to quantify the extent of contamination at the Site that require remedial work based on the cleanup goal. The SCGs for soil and groundwater are provided below.

Soil SCGs

The SCGs for soil used in this RDWP are:

- NYCRR Subpart 375-6 Remedial Program Soil Cleanup Objectives (RPSCOs) for Unrestricted Use
- NYCRR Subpart 375-6 RPSCOs for the Protection of Groundwater
- NYCRR Subpart 375-6 RPSCOs for the Protection of Public Health – Restricted Residential Use
- NYSDEC Commissioner Policy-51 (CP-51) Supplemental Soil Cleanup Objectives (SSCOs) for

Restricted Residential Use, Protection of Groundwater and/or Protection of Ecological Resources. The lower of these three SSCOs was used for comparison purposes of compounds for which Part 375 SCOs do not exist.

Groundwater SCGs

The SCGs for groundwater used in this RDWP are:

- NYSDEC Part 703 Groundwater Standards.
- Technical and Operational Guidance Series (TOGS) 1.1.1 Groundwater Standards and Guidance Values.

Soil Vapor SCGs

The SCGs for groundwater used in this RDWP are:

- Soil Gas SCGs: Currently, no state regulatory (NYSDEC or NYSDOH) guidance values exist for soil gas.
- Sub-Slab Soil Vapor and Indoor Air SCGs: The NYSDOH *Guidance for Evaluating Soil Vapor Intrusion in the State of New York* dated October 2006 (including the USEPA Building Assessment and Survey Evaluation (BASE) Database (90th Percentile), in Appendix C of the NYSDOH document) is utilized for the SCG for soil vapor and indoor air.

The SCGs selected are presented in tables included in Appendix 1 for each of the contaminants of concern identified for the Site above these SCGs.

5.0 Proposed Remedy

Based on the RAAR, this section presents the selected remedy for AOC #8. The development of this remedy is in accordance with Brownfield Cleanup Program Guide dated May 2004 and NYSDEC DER-10 dated May 2010. The following sub-sections present the methods for implementation of the RDWP.

5.1 Summary of the Remedial Goals

The proposed future use for the Site will be classified as restricted residential. As such, at a minimum, the remedy must eliminate or mitigate all significant threats to public health and/or the environment presented by the impacts identified at the Site through the proper application of scientific and engineering principles.

The Remedial Action Objectives (RAOs) for this RDWP are to eliminate or reduce to the extent practicable:

Soil RAOs

The RAOs for soil used in this RDWP are:

- Prevention of ingestion, inhalation or direct contact with contaminated soil and/or fill..
- Prevention of the migration of COCs that would result in groundwater or surface water contamination.

- Prevention of the inhalation of or exposure from contaminants volatilizing from contaminants in soil.

Groundwater RAOs

The RAOs for groundwater used in this RDWP are:

- Prevention of ingestion or direct contact with impacted groundwater, and to prevent off-site migration of groundwater with impacts to the extent practicable.
- Prevention of the discharge of impacted groundwater to surface water.
- Prevention of contact with, or inhalation of volatiles, from contaminated groundwater.
- Remove the source of ground or surface water contamination.
- Restore groundwater aquifer to pre-disposal/pre-release conditions, to the extent practicable.

Soil Vapor

The RAOs for soil vapor used in this RDWP are:

- Prevention of inhalation or exposure to contaminants entering an interior air space via volatilization from impacted soil or groundwater.

This work will be completed by implementing the following tasks:

1.) Excavate soils in three locations to facilitate the installation of infrastructure similar to that installed within AOC #8 in 2012.

2.) Install three sets of horizontal infrastructure which will consist of four-inch diameter slotted piping at a depth of approximately 10.5 feet below grade in the area between the worst case soil and groundwater impacts and the western property line, as shown in Figure 6.

3.) Install three overburden monitoring wells on the southern portion of AOC #8, as shown on Figure 6.

4.) Install and operate a SSDS in the southern portion of Building 22 based on data previously obtained from a mitigation system subcontractor.

5.) Inject *in-situ* chemical oxidation treatment chemicals via gravity-feed to the infrastructure to significantly reduce the VOCs in groundwater and off-site migration.

6.) Place institutional controls to manage residual impacts over the long-term. These institutional controls will provide contingencies in the event that this treatment does not significantly reduce contaminant concentrations in groundwater and include requirements to address potential soil vapor intrusion for Building 22.

7.) Complete groundwater monitoring at three new wells immediately prior to treatment, one month after confirming permanganate has reached the new wells, on a quarterly basis for the first year, and on a semi-annual basis thereafter or until the completion of the Site Management Plan, which will dictate the long-term sampling frequency. The samples will be analyzed for VOCs. Following the collection of monitoring data, additional treatments may be completed if deemed necessary.

All work will be completed in accordance with applicable local, state, and federal regulations. In addition, all work will be completed in accordance with the Quality Control Plan (QCP) included as

Appendix 5.

5.2 Summary of Remedial Actions

The groundwater impacts in AOC #8 will be addressed via chemical oxidation treatment which will be introduced to overburden groundwater via horizontal infrastructure previously installed in July 2012 as well as via additional infrastructure to be installed. Three overburden groundwater monitoring wells would be installed in the right-of-way along Saint Paul Street to monitor the effectiveness of this treatment. In addition, an Environmental Easement and development of a Site Management Plan (SMP) including an Excavation Work Plan (EWP) and a Health and Safety Plan (HASP) would be implemented to control future Site use and protect against human exposure to soil remaining on-site that contained VOCs at levels above the Unrestricted Use SCO. Furthermore, prior to the introduction of treatment chemicals to the subsurface, a SSDS will be installed in Building 22 to mitigate potential soil vapor intrusion issues associated with the increased volatilization which could be a byproduct of the remedial action.

6.0 Design Scope

The field activities are presented in the following subsections:

- Soil Excavation and Off-site Disposal (Section 6.1)
- Liquid Management Plan (Section 6.2)
- Waste Stream Tracking and Verification (Section 6.3)
- Infrastructure Construction (Section 6.4)
- SSDS Remedial Design Work Plan (Section 6.5)
- Chemical Oxidant Injection (Section 6.6)
- Regulatory Requirements for Injection (Section 6.7)
- Well Installation and Groundwater Monitoring (Section 6.8)
- Decontamination (Section 6.9)
- Health and Safety and Community Air Monitoring (Section 6.10)
- Reporting Requirements (Section 6.11)
- Quality Control Plan (Section 6.12)

6.1 Soil Excavation and Off-site Disposal

The areas in which the infrastructure will be installed will be excavated and the excavated soil will be either staged on-site or disposed of off-site (see below). The three (3) trenches will be approximately 35 feet in length and approximately five to six feet wide. Each trench will be excavated to the top of bedrock, which is anticipated to be approximately 12 feet below grade. The trench locations are shown on Figure 6.

Soils located above the water table (estimated to be 8 to 9-ft. bgs) and not exhibiting elevated PID readings (i.e., above background) will be staged on-site on plastic sheeting for reuse as backfill in the trenches (refer to Figure 8). All soils below the water table and/or exhibiting elevated PID readings will be temporarily staged on-site in roll-off containers for waste characterization and future disposal. The material will be covered by a minimum of double 6-mil polyethylene sheeting which will be sufficiently anchored to prevent any wind and water erosion. The cover will be inspected at least once per day with

corrective action taken as needed. The inspections and any corrective actions will be documented in logs and will occur until the soil has been properly removed from the Site and properly disposed. Subsequent to characterization, transportation of the excavated soil will be completed by properly permitted vehicles to a properly permitted landfill or disposal facility. Documentation associated with the transportation and off-site disposal will be included in the FER. If necessary for disposal, a separate contained-in demonstration may be submitted to NYSDEC in order to disposal of the soil as non-hazardous.

Good housekeeping practices will be followed during all work to prevent leaving contaminated material on the ground surface (e.g., precautions will be taken to prevent impacts to the ground surface due to material spilled from the excavator bucket). Any material that does spill on to the ground surface will be promptly picked up and placed in its appropriate location as will any soils impacted as a result of such a spill. To prevent cross-contamination to surrounding areas, vehicles (i.e., excavators, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the exclusion zone (this includes when moving from one excavation area to another).

6.2 Liquid Management Plan

This section identifies proper handling, treatment and discharge procedures for groundwater and/or rainwater that may enter excavations. The specific steps are identified below:

In the event that groundwater or rainwater enter the excavation, containment tank(s) of adequate size will be mobilized to the Site and staged at a location close to the excavation. The appropriate number and size of pumps to dewater the excavation will be mobilized, or a vacuum truck will be mobilized. The pumps will be able to generate enough head to pump the water to the containment tanks. Site conditions may warrant the need for additional containment tanks at the Site.

Water Management:

- When a containment tank holding water becomes full, one sample of water from the tank will be collected and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval (ELAP) certified laboratory. The groundwater samples will be analyzed for parameters specified by local municipality requirements or (if discharge through the local system is not an option) for parameters specified by the appropriate, approved disposal facility.

- The laboratory test results will be compared to the local municipality discharge standards. In the event that contaminant concentrations exceed these standards, the water in the containment tank will either be disposed of off-site at an appropriate, approved waste facility or it will be treated using an appropriate system (e.g., carbon, filters, air stripper, etc.) to remove contaminants, if necessary. Following treatment, a second sample of the water will be collected in order to confirm that contaminants were removed to concentrations below the municipality's standards.

- Subsequent to obtaining samples of the containerized water that are below the municipality's standards and under a sewer use permit, the water will be discharged to a municipality-approved sewer inlet. In the event that discharge criteria cannot be met, the water will be sent off-site for disposal at an approved facility.

6.3 Waste Stream Tracking and Verification

The following documentation will be kept in relation to waste streams:

- Correspondence from the facility accepting the waste stream
- Waste profiles
- Waste characterization sampling logs and results
- Manifests
- Bills of lading
- Weigh tickets

The tracking information will be provided in the FER, as discussed in Section 9.0.

6.4 Infrastructure Construction

Following excavation, the infrastructure will be installed as shown in Figure 7 and include:

- Approximately one foot of washed pea gravel will be placed on the bedrock in the bottom of each trench.
- Four-inch PVC slotted (20-slot) piping will be placed on the pea gravel.
- Solid four-inch PVC riser piping will be installed using an elbow joint into the slotted piping.
- The solid riser piping will extend to grade and will be finished with a 12-inch, flush-mount curb box and lockable J-Plug.
- An additional four feet of pea gravel will be placed in the trench, for a total of five feet of pea gravel.
- A geotextile fabric will be placed on top of pea gravel.
- The trenches will be backfilled and compacted as necessary to replace surface finishes, which include:
    - Asphalt – approx. 500 sq. ft.
    - Topsoil/grass – approx. 200 sq. ft.
- All imported backfill is to be from a NYSDEC approved source (may require chemical testing in accordance with NYSDEC DER-10).
    - For each source of backfill that is imported to the Site, one of the following will be completed prior to importing the backfill.
        - Documentation will be provided to NYSDEC as to the source of the material and the consistency of the material in accordance with the exemption for no chemical testing listed in DER-10 Section 5.4(e)(5), or
        - Chemical testing will be completed in accordance with Table 5.4(e)10 of DER-10.
    - In the event that laboratory analytical testing is conducted, the results for each new source of fill must meet the values provided in Appendix 5 of DER-10 (provided as Appendix 2 in this Work Plan) for Restricted Residential use and must receive approval by the NYSDEC prior to importing.

6.5 Sub-Slab Depressurization System Remedial Design Work Plan

A Remedial Design Work Plan for installation of SSDS for the occupied southern portion of Building 22 will be submitted under separate cover. The work plan will detail the proposed design and installation of the SSDS based on diagnostic testing and will be developed and submitted to the

NYSDEC and NYSDOH for review. It is understood that the SSDS will need to be installed prior to injection of treatment chemicals.

6.6 Chemical Oxidant Injection

The *In-Situ* Chemical Oxidation (ISCO) process includes the injection of a chemical oxidant into the subsurface to chemically oxidize contaminants of concern (in AOC #8: TCE) and enhance degradation, as shown in the chemical reactions depicted below:

Trichloroethene:

$$2NaMnO_4 + C_2HCl_3 \rightarrow 2CO_2 + 2MnO_2 + 2Na^+ + 3Cl^- + H^+$$

Dichloroethene:

$$8NaMnO_4 + 3C_2H_2Cl_2 \rightarrow 6CO_2 + 8MnO_2 + 8Na^+ + 6Cl^- + 2H_2O + 2OH^-$$

Vinyl Chloride:

$$10NaMnO_4 + 3C_2H_2Cl_2 \rightarrow 6CO_2 + 10MnO_2 + 10Na^+ + 3Cl^- + H_2O + 7OH^+$$

To facilitate the ISCO process in AOC #8, a total of approximately 13,150-pounds (lbs) sodium permanganate ("RemOx® L") will be introduced at a 10% concentration into the five sets of infrastructure via gravity feed. The volume and injection concentrations were estimated by the chemical vendor (Carus Corporation) using analytical data (including "Permanganate Natural Oxidant Demand") and the known geology of the Site with the vendor's proprietary algorithm for estimating permanganate mass necessary to degrade the contaminants and to overcome the natural oxidant demand within the soil. A copy of the Carus Corporation ("Carus") calculation sheet and MSDS for the sodium permanganate ("RemOx® L") are included in Appendix 4.

The solution will be provided in one (1) of the following shipment methods:

1. Totes of solution containing approximately 40% RemOx® L: A total of approximately 1,150-gallons of this solution (containing approximately 13,150 lbs of RemOx® L) is recommended by Carus. This solution will be mixed with water to further dilute the RemOx® L to a concentration of approximately 10%. It should be noted that the final dilution percentage may be decreased based on field conditions. Approximately 4,625-gallons of water are estimated to be required to dilute the 40% solution to the recommended 10%. The 40% solution will be pumped into one (1) 1,000-gallon plastic "batch tank" for mixing with water. When properly diluted, the 10% solution will be gravity feed via hoses to each set of infrastructure. Totes holding the RemOx® L and the batch tank will be kept in a secondary containment berm capable of holding at least 110% the volume of the totes and batch tank. It should be noted that the total required number of totes of solution will not be on-site at one time and thus the secondary containment volume has been calculated accordingly.

2. Bulk tanker of solution containing approximately 10% RemOx® L: A total of approximately 5,775-gallons of this solution (containing approximately 13,150 pounds of RemOx® L) will be shipped to the Site in two (2) shipments via bulk storage tanks. Further dilution is not anticipated for injection purposes. However, it should be noted that the final dilution percentage may be decreased based on field conditions and if dilution of the 10% solution is needed, the process described in Item 1, above, will be implemented. The storage tanks will be kept in a secondary

containment berm capable of holding at least 110% of the volume of the storage tanks. It should be noted that only one tank of solution (up to 4,000-gallons) will be on-site at one time and thus the secondary containment volume has been calculated accordingly.

Dispersion of the treatment chemical will be evaluated by visually observing the color of groundwater in the three (3) overburden monitoring wells to be installed in AOC #8. These wells are depicted on Figure 8. Visual analysis will allow the presence or absence of sodium permanganate in the groundwater to be determined (purple/pink color). This visual analysis will continue daily during the injection work and weekly thereafter in each well until breakthrough has been determined and recorded.

In addition to the visual analysis, long-term groundwater monitoring will also be completed periodically following injection, as described in Section 6.8.

Several utilities including water, sewer and electric lines are located approximately 30-ft. down-gradient of the proposed location of the southern-most infrastructure. These utilities are located to the south of the Site and AOC #8, under Saint Paul Street. It should be noted that unlike many other oxidants, permanganate does not generate heat during reaction and is not typically introduced to the subsurface at high concentrations. In addition, based on information from the chemical vendor, permanganate is not known to react with the piping typically associated with water, sewer and electric lines. As such, it appears that the introduction of permanganate to the subsurface will not damage the down-gradient utilities.

6.7 Regulatory Requirements for Injection

In order to comply with the USEPA's underground injection control (UIC) program, a letter of notification and an injection well inventory form will be submitted to the USEPA's UIC division at least 30-days prior to injection. A copy of the form is included in Appendix 4.

A letter of notification will also be submitted to the City of Rochester Fire Department at least one week prior to injection.

In addition, a permit will be obtained from the City of Rochester for the installation of a monitoring well within the right-of-way along Saint Paul Street (i.e., the sidewalk).

6.8 Well Installation and Long-Term Groundwater Monitoring

Well Installation:

Three (3) new overburden groundwater monitoring wells will be installed as part of the remedy for AOC #8. One (1) monitoring well will be installed in the right-of-way along Saint Paul Street to monitor the effectiveness of this treatment. A second well will be installed in AOC #8 along the Site's southern property line, to the south of the horizontal infrastructure (refer to Figure 6). A third well will be installed to replace MW-07. MW-07 is a 1-inch diameter well and will be replaced with a 2-inch diameter well to allow for passive diffusion bag sampling. Subsequent to the installation of the MW-07 replacement well, MW-07 will be decommissioned in accordance with NYSDEC CP-43.

The new wells will be installed via rotary drilling in substantial accordance with the below procedures, which were implemented during the Remedial Investigation:

- At each overburden monitoring well location, overburden soils will be collected using Macrocore or split-spoon samplers from the ground surface to equipment refusal (i.e., assumed bedrock). Soil will be screened in the field for "evidence of impairment." Field screening results will be recorded on a soil-boring log and will be included in the Final Engineering Report.

- Each well will be completed with 5 to 10-feet of 2-inch diameter Schedule 40 0.020-slot well screen connected to an appropriate length of schedule 40 PVC well riser to complete the well. The annulus around the screen section will be sand packed with quartz sand to approximately 1 to 2-feet above the screen section. The remaining annulus will be bentonite sealed to approximately 1 to 2-feet below ground surface, and then grouted to ground surface. Each well will be completed with a flush mount well cover. Details on the installation of groundwater monitoring wells are included in Section 6 of the QCP included as Appendix 5. The proposed well construction is also depicted on Figure 9.

- Initially, each monitoring well will be developed by removing the approximate volume of water introduced during drilling (if any) and an additional five (5) well volumes. Well development will be performed using dedicated bailers and/or pumping equipment (depending on volumes), and will continue until groundwater turbidity reaches 50 National Turbidity Units (NTUs), or lower. In the event that 50 NTUs is not reached after removing a reasonable number of well volume (10), the NYSDEC will be contacted to request ceasing development. If dedicated equipment is not used, then the equipment will be decontaminated between each well (alconox wash with potable water rinse).

- Soil and groundwater generated during drilling and well installation activities will be containerized in 55-gallon drums, characterized, and disposed of off-Site in accordance with applicable regulations. See Section 9 of the QCP for additional details regarding the management of investigation-derived wastes at the Site.

Long-Term Groundwater Monitoring:

In addition to the active remediation to be completed at the Site as described above, the selected remedy includes long-term groundwater monitoring to confirm the continued attenuation of VOCs in groundwater. Based on the relatively limited sampling frequency proposed as part of this remedy (additional groundwater monitoring will be described in the SMP), a Remedial Action Monitoring Plan (RAMP) does not appear appropriate for this RDWP. Specifically, this project does not include any of the project elements listed in DER-10 Section 5.1(e)(2). The plan to be implemented to monitor the effectiveness of the injection is summarized below.

Groundwater monitoring will occur subsequent to the introduction of treatment chemicals to AOC #8. The three newly installed wells will be sampled for VOCs immediately prior to treatment; one month after confirming permanganate reached the new wells; on a quarterly basis for the first year; and on a semi-annual basis thereafter or until the completion of the Site Management Plan, which will dictate the long-term sampling frequency. Groundwater samples will be collected using passive diffusion bags (PDBs). The PDBs will be deployed in the wells at least 14 days prior to sampling. Refer to the attached QCP for additional information regarding PDB sampling. Following the collection of monitoring data, additional treatments may be completed if deemed necessary.

6.9 Decontamination

To prevent cross-contamination to surrounding areas, vehicles (excavators, loaders, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the Site. Water utilized for decontamination will be containerized and handled the same as any groundwater and/or excavation water, as discussed in Section 6.2. It should be noted that trucks carrying impacted soil are anticipated to stay on concrete/asphalt pavement or crushed stone at all times and thus truck decontamination will be limited to ensuring impacted soil is not located on the exterior portion of the truck bed/trailer, unless otherwise required (i.e., if a truck drives over impacted soil).

6.10 Health and Safety and Community Air Monitoring

Appendix 2 provides LaBella's Health and Safety Plan (HASP) and the NYSDOH Generic Community Air Monitoring Plan and Fugitive Dust and Particulate Monitoring that will be utilized during the remedy.

In addition to the typical safety activities outlined in the HASP and CAMP, due to the potential hazards associated with the transport, storage and usage of sodium permanganate, the following additional safety activities will be completed prior to and during injection. In addition, a Community and Environmental Response Plan (CERP) has been developed and is included in Appendix 6.

- RemOx® L is classified by the Hazardous Materials Transportation Board as an oxidizer and is shipped as Freight Class 70. Containers holding the solution will be stored within a secondary containment berm in the parking lot directly to the north of Building 22 (refer to Figure 8).
- Sandbags will be utilized to create small berms around each point at which the solution is actively being introduced. This will be completed to prohibit surface migration of any material inadvertently released during the introduction of the solution to the subsurface infrastructure.
- If dilution is required (pending solution selection, refer to Section 6.6), the 40% RemOx® L solution will be diluted in water in 1,000-gallon batches. The 40% solution will be pumped as needed from the 275-gallon totes to one (1) 1,000-gallon plastic tank to be utilized for dilution and gravity fed to the infrastructure. The tank will have quantity indicators and the volume of solution fed into the infrastructure will be monitored and recorded. The batch tank will also be kept within the secondary containment berm in the parking lot directly to the north of Building 22.
- Field personnel actively involved with the dilution and/or injection of the treatment chemical will be required to wear personal protective equipment (PPE) including chemical-resistant suits, gloves and boots and face shields. All other field personnel are required to wear at least Class D PPE.
- The secondary containment berm in which the RemOx® L solution will be held will be able to hold a volume at least 110% of the volume of the largest container with solution. The berm anticipated to be used at the Site will be a Spillguard™ Portable Containment Berm with dimensions of 12-ft. by 50-ft. with 12-in. high walls. This Spillguard is a one-piece, heat-welded berm with permanently attached support legs and reinforced seams. The material used to construct the berm is a heavy duty 35-mil polyurethane coated fabric. The

berm material is chemically resistant to the diluted sodium permanganate solution. Specifications for the berm are included in Appendix 4. A sump will be constructed within the berm to pool stormwater which may accumulate in the berm. Any significant stormwater which accumulates in the sump will be pumped to the batch tank. The secondary containment berm will be inspected at least once daily.

- The work area will be cordoned off using chain link fence to keep bystanders away (refer to Figure 8). The fence will be locked during non-working hours for security purposes. All field personnel will be notified whenever the solution is in use.
- A neutralizing agent (e.g., sodium thiosulfate) will be made readily available in the event that a spill of the sodium permanganate occurs. However, the agent will not be kept in the same containment berm as the permanganate. Approximately 50 pounds of the neutralizing agent as well as an empty mixing tank are currently planned to be stored within secondary containment in Building 22. The secondary containment will be similar in construction to that in which the sodium permanganate will be stored. The neutralizing agent will only be applied in a diluted form. Prior to applying the neutralizing agent any release of sodium permanganate will first be heavily diluted with water. The manufacturer recommends the permanganate solution be diluted to 6% or less permanganate prior to applying any neutralizing agent.
- A sub-slab depressurization system (SSDS) will be installed in Building 22 prior to injection activities. This system is designed to mitigate any soil vapor intrusion issues that may be created by the increased volatilization caused by the *in-situ* treatment. Additional details associated with the SSDS are included in Section 7.0.
- Additional safety information obtained from Carus Corporation can be found in Appendix 4.

6.11 Reporting Requirements

Following the implementation of this RDWP, all data will be tabulated and summarized in the Final Engineering Report. Section 9.0 contains additional information associated with the Final Engineering Report. In addition, the Site Management Plan will be updated to include the extent of remedial work and the limits of remaining contamination.

6.12 Quality Control Program

Activities completed at the Site will be managed under LaBella's Quality Control Program, which is included in Appendix 5. Laboratory QA/QC sampling will include analysis of one (1) trip blank and and one (1) duplicate sample for each matrix type at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater. Additionally, one (1) Matrix Spike/Matrix Spike Duplicate (MS/MSD) will be collected and analyzed for each twenty samples collected for each parameter group, or one per shipment, whichever is greater. The MS/MSD will be analyzed for the same parameters as that of the field samples. The samples will be delivered under Chain of Custody procedures to a NYSDOH ELAP-certified laboratory. The laboratory will provide a NYSDEC ASP Category B Deliverables data package for all samples except the TO-15 samples (indoor air, outdoor air, sub-slab soil vapor). A DUSR will be completed for all ASP-B laboratory data packages per DER-10. The DUSRs will include the laboratory data summary pages showing corrections made by the data validator and each page will be initialed by the data validator. The laboratory data summary pages will be included even if no changes were made.

7.0 Engineering Controls

Engineering controls are not currently anticipated to be required in AOC #8 following the above-described remedial actions, with the exception of the installation of a SSDS in the occupied portion of Building 22 (i.e., the southern portion). As previously noted in Section 6.5, a separate Remedial Design Work Plan for the SSDS installation in Building 22 detailing the proposed design of the SSDS will be submitted under separate cover.

8.0 Institutional Controls

Imposition of an institutional control in the form of an environmental easement for the controlled property that:

- Requires the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3).
- Allows the use and development of the controlled property for restricted residential uses as defined by Part 375-1.8(g), although land use is subject to local zoning laws.
- Restricts the use of groundwater as a source of potable or process water, without necessary water quality treatment as determined by the NYSDOH or County DOH.
- Requires compliance with the Department approved Site Management Plan that includes a description of soil handling procedures; groundwater monitoring requirements; methods to address potential soil vapor intrusion concerns in Building 22.

9.0 Schedule and Reporting (Deliverables)

Schedule

A detailed schedule of the implementation of the remedial actions is included as Appendix 3 of this RDWP.

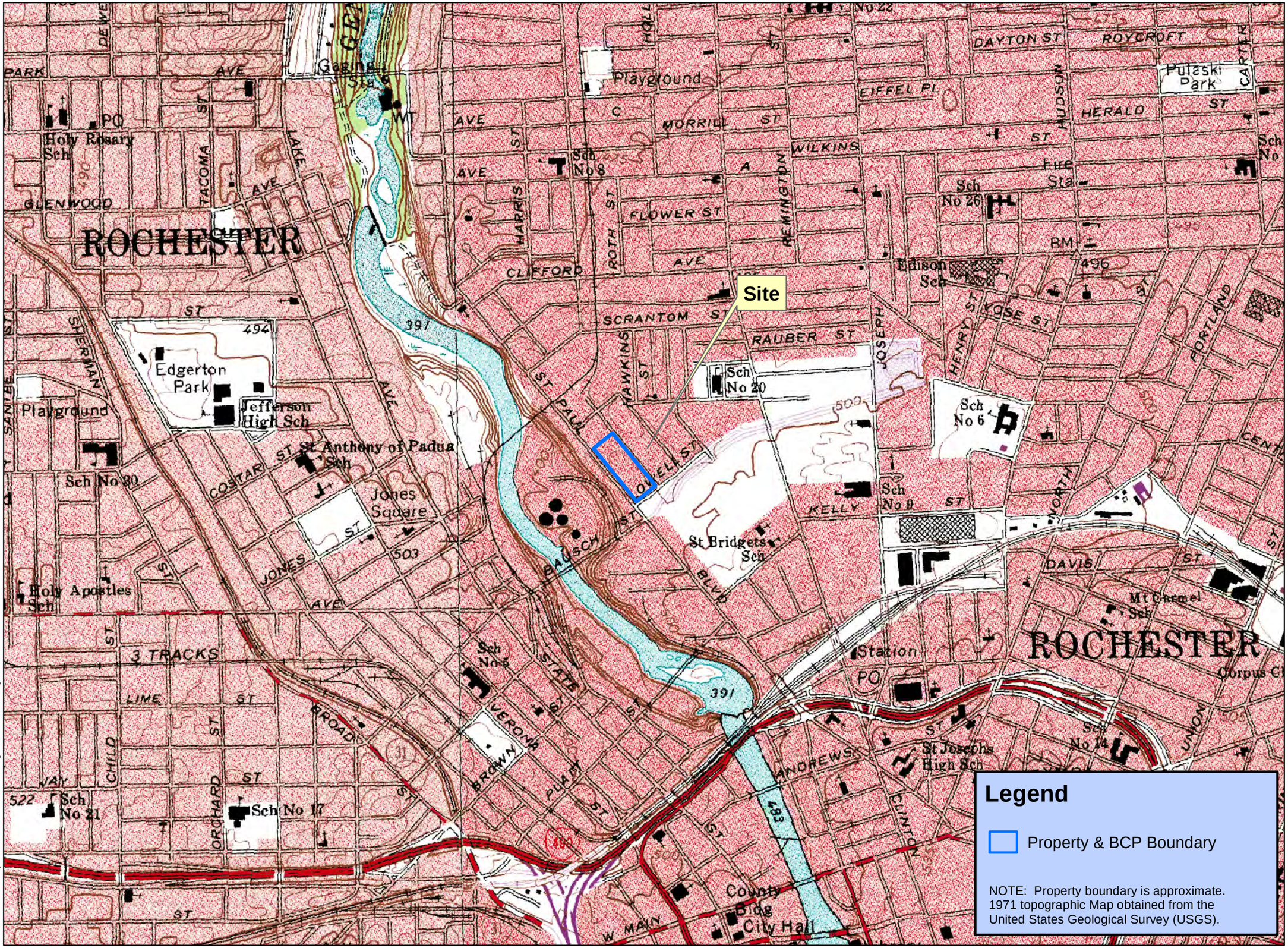
Final Engineering Report

The information and laboratory analytical data obtained during the remedy will be included in the FER. The FER will be completed in accordance with DER-10.

Site Management Plan/Institutional Controls

The remedy for the Site assumes that a SMP will be utilized for long-term management of the residual impacts at the Site. LaBella previously completed an SMP for the Site, dated January 2011. Following the completion of remedial activity at the Site, the SMP will be updated and resubmitted to the NYSDEC.

FIGURES



Legend

Property & BCP Boundary

NOTE: Property boundary is approximate.
1971 topographic Map obtained from the United States Geological Survey (USGS).

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PROJECT LOCUS MAP

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N W E S

250 0 1,000

1 inch = 1,000 feet

209280

FIGURE 1

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Figure 1.USGS.mxd

Legend

PROPERTY & BCP BOUNDARY

NOTE: Property boundary is approximate.
2012 Aerial photograph obtained from GIS Clearinghouse.

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SITE LOCATION MAP

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N W E S

0 20 40 80 Feet

1 inch = 80 feet
Intended to Print on 11"x17"

209280

FIGURE 2

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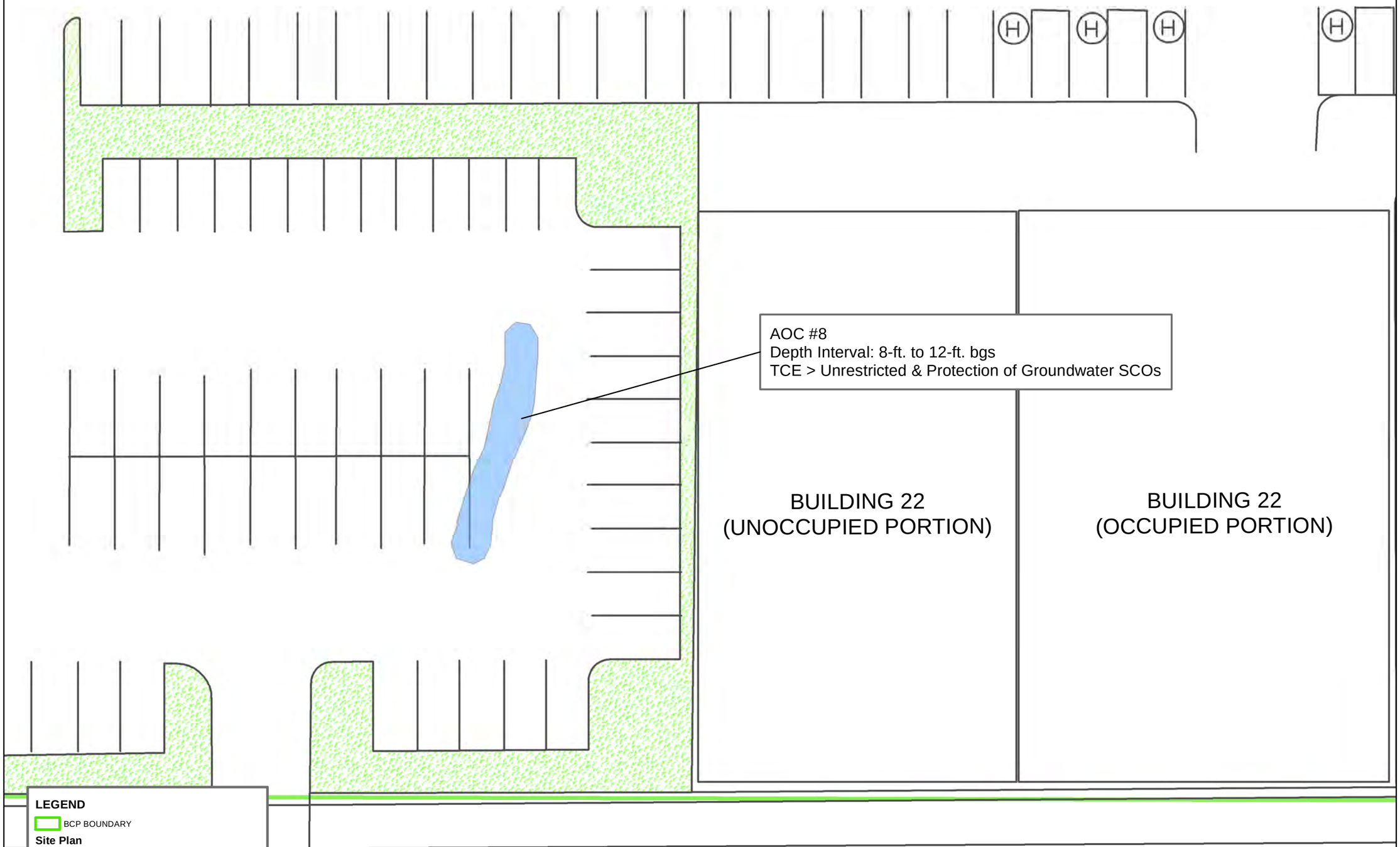

Notes:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) THE EXTENTS OF EXCEEDANCES SHOWN ARE BASED ON AVAILABLE DATA.
(3) "TCE" REFERS TO TRICHLOROETHENE.

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Fig 3 - Soil Impacts.mxd

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SOIL IMPACTS

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

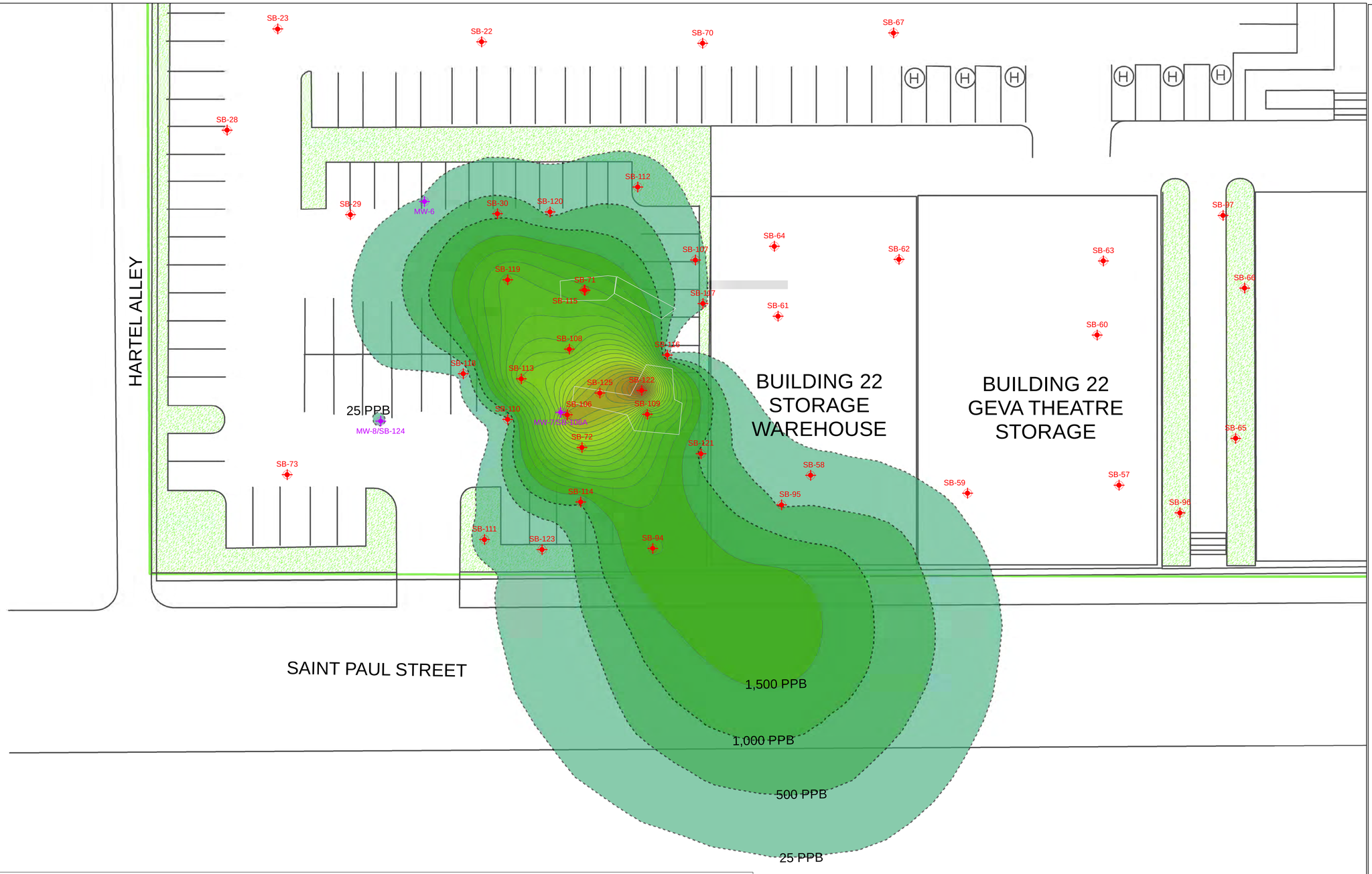
N E W S

0 5 10 20 Feet

1 inch = 20 feet
Intended to print as 11" x 17" size.

209280

FIGURE 3



LEGEND

- NEW OVERBURDEN MONITORING WELLS (OCT. 2012)
- COMPLETED BCP SOIL BORING
- COMPLETED BCP OVERBURDEN WELLS
- COMPLETED PRE-BCP BEDROCK WELLS
- COMPLETED TEST PITS JULY 2012
- FLOOR DRAIN
- WATER FILLED PIPE IN FLOOR
- CONCRETE FILLED FLOOR TRENCH (POSSIBLE FORMER PIPE CHASE)
- OPEN FLOOR TRENCH (POSSIBLE PIPE CHASE)
- GRASS COVERED MEDIAN
- STAIRWAY
- BCP BOUNDARY

TOTAL VOCS IN OVERBURDEN GROUNDWATER (PPB):

25 — 2,000 — 7,000 — 10,000 — 12,500

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) INITIAL RI DATA USED FOR SP-15 SAMPLES (I.E. 2010) AND AS SUCH IT SHOULD BE NOTED THAT THE MAJORITY OF THE DATA WAS COLLECTED PRIOR TO THE REMOVAL OF APPROX. 60 TONS OF TCE-IMPACTED SOIL DURING TEST PITTING IN JULY 2012. NOVEMBER 2012 DATA USED FOR OVERBURDEN MONITORING WELL SAMPLES. GROUNDWATER DATA DISPLAYED IN PARTS PER BILLION (PPB).
(3) KIRGING MODELING COMPLETED USING GOLDEN SOFTWARE SURFER 8.0. DASHED LINES INDICATE PARTIALLY INTERPRETED CONTOUR LINES COMPLETED DUE TO MODELING LIMITATIONS.

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AOC #8
TOTAL VOC ISOPLETHS: OVERBURDEN GROUNDWATER

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

10 0 30 Feet

1 inch = 15 feet
Figure Intended to Print as ARCH D (24"x36")

209280

FIGURE 4

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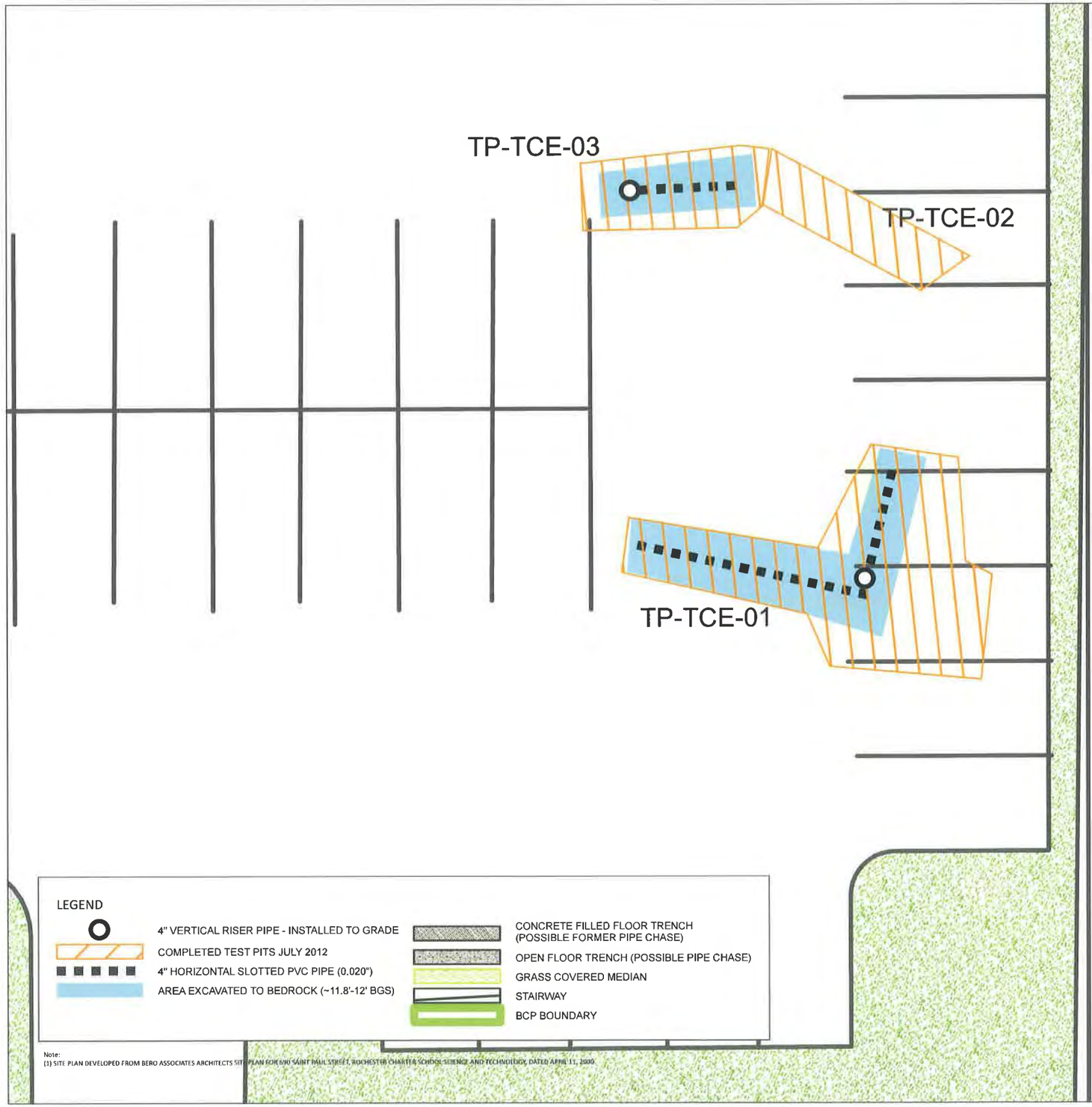

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Fig 5 - Installed Infrastructure.mxd

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AOC #8:
INSTALLED INFRASTRUCTURE

REMEDIAL DESIGN WORK PLAN: AOC #8

BROWNFIELD CLEANUP PROGRAM

690 SAINT PAUL STREET ROCHESTER, NEW YORK

VOLUNTEER: GENESEE VALLEY REAL ESTATE COMPANY

0 10 Feet

1 inch = 5 feet

Figure intended to print as 11" x 17"

209280

FIGURE 5

LEGEND

- PROPOSED OVERBURDEN MONITORING WELL
- PROPOSED HORIZONTAL INFRASTRUCTURE
- 4" VERTICAL RISER PIPE - INSTALLED TO GRADE
- 4" HORIZONTAL SLOTTED PVC PIPE (0.020")
- COMPLETED PRE-BCP BEDROCK WELLS
- COMPLETED TEST PITS JULY 2012
- BCP BOUNDARY

TOTAL VOCS IN OVERBURDEN GROUNDWATER (PPB):

25 — 2,000 — 7,000 — 10,000 — 12,500

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) INITIAL RI DATA USED FOR SP-15 SAMPLES (I.E. 2010) AND AS SUCH IT SHOULD BE NOTED THAT THE MAJORITY OF THE DATA WAS COLLECTED PRIOR TO THE REMOVAL OF APPROX. 60 TONS OF TCE-IMPACTED SOIL DURING TEST PITTING IN JULY 2012. NOVEMBER 2012 DATA USED FOR OVERBURDEN MONITORING WELL SAMPLES. GROUNDWATER DATA DISPLAYED IN PARTS PER BILLION (PPB).
(3) KIRGING MODELING COMPLETED USING GOLDEN SOFTWARE SURFER 8.0. DASHED LINES INDICATE PARTIALLY INTERPRETED CONTOUR LINES COMPLETED DUE TO MODELING LIMITATIONS.

LABELLA Associates, D.P.C.
300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
F: (585)454-3066
www.labellapc.com

PROPOSED INFRASTRUCTURE AND WELL LOCATIONS

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N E S W

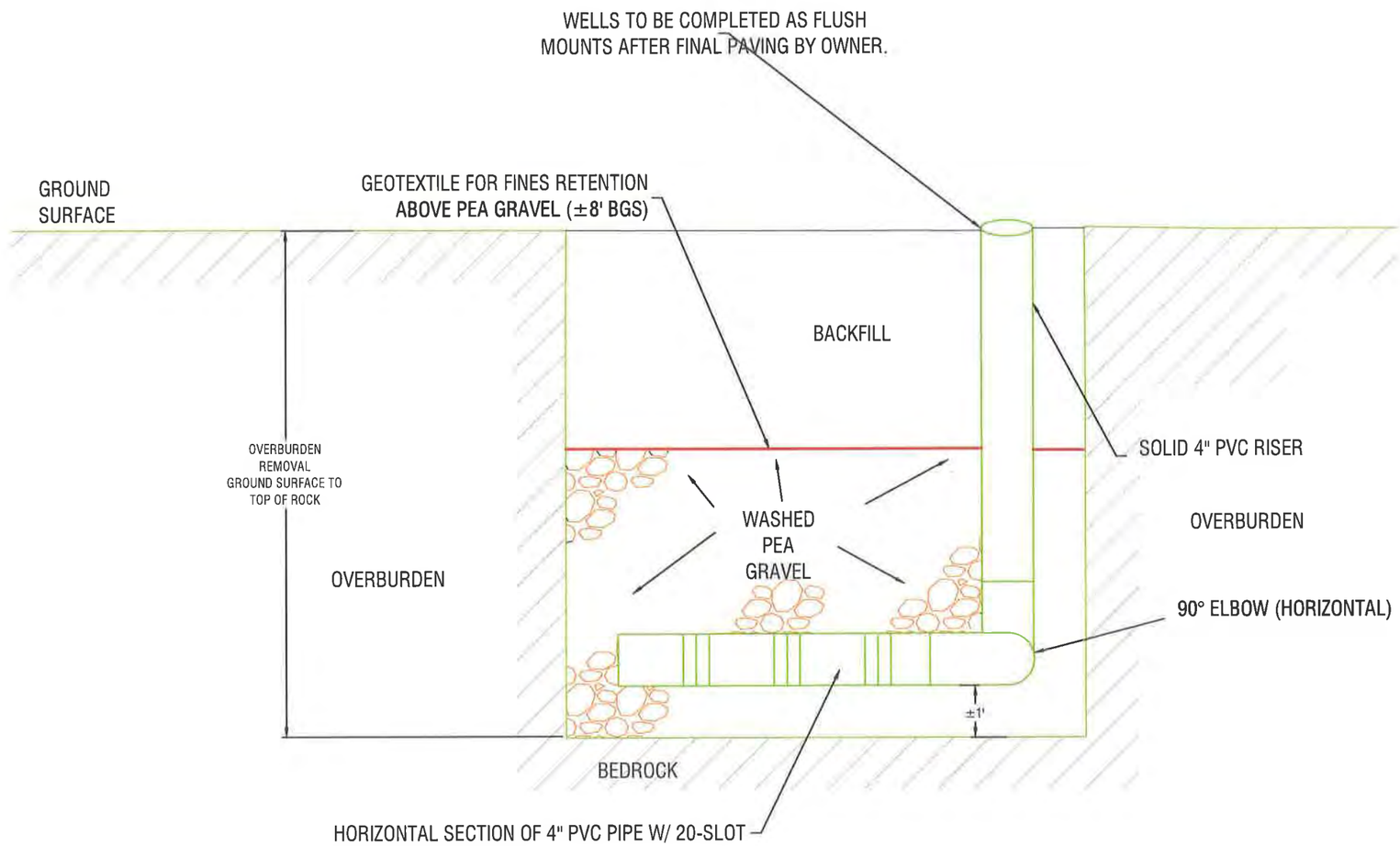
10 0 20 Feet

1 inch = 30 feet
Figure intended to print as 11" x 17".

209280

FIGURE 6

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Fig 6 - Proposed.mxd



* NOTES:
1. NOT TO SCALE (DIMENSIONS ONLY AS SHOWN).

LABELLA Associates, PC
300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
F: (585) 454-3066
www.labellapc.com

PROJECT LOCATION
GENESEE VALLEY REAL ESTATE
690 ST. PAUL STREET
ROCHESTER, NY

REMEDIAL DESIGN WORK PLAN:
AOC #8
BCP SITE #C828159

DRAWING TITLE
PROPOSED INJECTION INFRASTRUCTURE CROSS SECTION AND DETAILS

ISSUED FOR: DRAFT
DESIGNED BY: DPN
DRAWN BY: JMG
REVIEWED BY: DPN
DATE: APRIL 2013

PROJECT/DRAWING NUMBER
209280

FIGURE 7

The RemOx L solution will be stored in the secondary containment berm prior to and during injection.

Neutralization agent to be stored in Building 22 within secondary containment berm similiar to that depicted in Figure 9.

MW-7 will be decommissioned. A 2-inch diameter replacement well will be installed in the immediate vicinity of the current location of MW-7.

MW-6

MW-7/SB-106A

MW-8/SB-124

BW-8

BUILDING 22
STORAGE
WAREHOUSE

LEGEND

- PROPOSED OVERBURDEN MONITORING WELL
- CHAIN LINK FENCE
- PROPOSED HORIZONTAL INFRASTRUCTURE
- 4" VERTICAL RISER PIPE - INSTALLED TO GRADE
- 4" HORIZONTAL SLOTTED PVC PIPE (0.020")
- SECONDARY CONTAINMENT
- ROLLOFF DUMPSTER LOCATION
- COMPLETED BCP OVERBURDEN WELLS
- COMPLETED BCP BEDROCK WELLS
- BCP BOUNDARY

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) EQUIPMENT/STAGING LOCATIONS ARE APPROXIMATE AND FOR INFORMATIONAL PURPOSES. THESE LOCATIONS MAY SHIFT BASED ON FIELD CONDITIONS.

Path: I:\Genesee Valley Real Estate Co\209280\Drawings\RAWP - AOC #8\Fig 8 - Implementation.mxd

LABELLA Associates, D.P.C.
300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
F: (585)454-3066
www.labellapc.com

PROPOSED
INJECTION PLAN

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N E S W

10 0 10 Feet

1 inch = 15 feet
Figure intended to print as 11" x 17".

209280

FIGURE 8

LABELLA Associates, D.P.C.
300 STATE STREET, ROCHESTER, NEW YORK
ENVIRONMENTAL ENGINEERING CONSULTANTS

FIGURE 9
PROJECT
Remedial Design Work Plan - AOC #8
690 Saint Paul Street, Rochester, New York

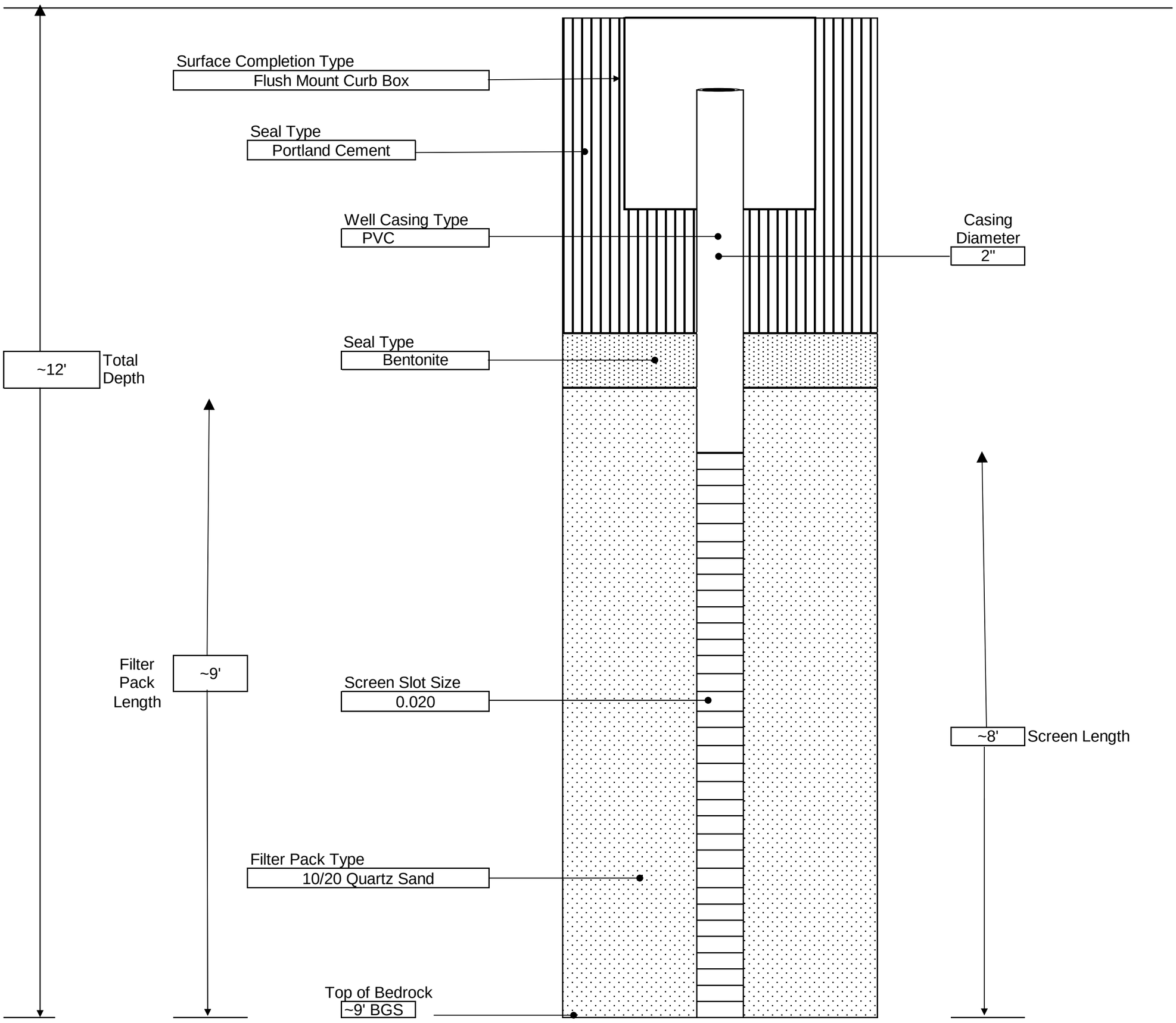
BORING: OVERBURDEN WELLS
SHEET 1 OF 1
JOB # 209280
CHKD. BY:

CONTRACTOR: TBD
DRILLER: TBD
LABELLA REPRESENTATIVE: TBD

BORING LOCATION: AOC #8
GROUND SURFACE ELEVATION: N/A DATUM: N/A
START DATE: TBD END DATE: TBD

TYPE OF DRILL RIG: TBD
AUGER SIZE AND TYPE: Hollow-Stem; 4.25" Inner Diameter
OVERBURDEN SAMPLING METHOD: Direct-Push
ROCK DRILLING METHOD: NA

WATER LEVEL DATA				
DATE	TIME	WATER	CASING	REMARKS



NOTE: NOT TO SCALE
ALL DIMENSIONS IN FEET UNLESS OTHERWISE INDICATED

GENERAL NOTES:
1) STRATIFICATION LINES REPRESENT APPROXIMATE BOUNDARY BETWEEN SOIL TYPES, TRANSITIONS MAY BE GRADUAL
2) THE ABOVE IS THE PROPOSED DESIGN FOR THREE WELLS IN AOC #8; DEPTHS MAY VARY SLIGHTLY BASED ON FIELD CONDITIONS.

APPENDIX 1

Standards, Criteria and Guidance Values

Table 1

Restricted Use Soil Cleanup Objectives
6 NYCRR Subpart 375-6 and CP-51 Remedial Program Soil Cleanup Objectives
(All Soil Cleanup Objectives are in mg/kg (ppm)

Contaminant	CAS No.	Restricted Residential	Protection of Groundwater
VOLATILE ORGANIC COMPOUNDS (VOCs)			
1,1,1-Trichloroethane	71-55-6	100 [a]	0.68
1,1-Dichloroethane	75-34-3	26	0.27
1,1-Dichloroethene	75-35-4	100 [a]	0.33
1,2-Dichlorobenzene	95-50-1	100 [a]	1.1
1,2-Dichloroethane	107-06-2	3.1	0.02 [f]
cis-1,2-Dichloroethene	156-59-2	0.25	0.25
trans-1,2-Dichloroethene	156-60-5	0.19	0.19
1,3-Dichlorobenzene	541-73-1	49	2.4
1,4-Dichlorobenzene	106-46-7	13	1.8
1,4-Dioxane	123-91-1	13	0.1 [e]
Acetone	67-64-1	100 [a]	0.05
Benzene	71-43-2	4.8	0.06
Butylbenzene	104-51-8	100 [a]	12
Carbon Tetrachloride	56-23-5	2.4	0.76
Chlorobenzene	108-90-7	100 [a]	1.1
Chloroform	67-66-3	49	0.37
Ethylbenzene	100-41-4	41	1
Hexachlorobenzene	118-74-1	1.2	3.2
Methyl Ethyl Ketone (MEK)	78-93-3	100 [a]	0.12
Methyl tert-Butyl Ether (MtBE)	1634-04-4	100 [a]	0.93
Methylene Chloride	75-09-2	100 [a]	0.05
n-Propylbenzene	103-65-1	100 [a]	3.9
sec-Butylbenzene	135-98-8	100 [a]	11
tert-Butylbenzene	98-06-6	100 [a]	5.9
Tetrachloroethene	127-18-4	19	1.3
Toluene	108-88-3	100 [a]	0.7
Trichloroethene	79-01-6	0.47	0.47
1,2,4-Trimethylbenzene	95-63-6	52	3.6
1,3,5-Trimethylbenzene	108-67-8	52	8.4
Vinyl Chloride	75-01-4	0.02	0.02
Xylenes (Mixed)	1330-20-7	100 [a]	1.6

Contaminant	CAS No.	Restricted Residential	Protection of Groundwater
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)			
Acenaphthene	83-32-9	100 [a]	98
Acenaphthylene	208-96-8	100 [a]	107
Anthracene	120-12-7	100 [a]	1,000 [c]
Benzo(a)anthracene	56-55-3	1 [f]	1 [f]
Benzo(a)pyrene	50-32-8	1 [f]	22
Benzo(b)fluoranthene	205-99-2	1 [f]	1.7
Benzo(g,h,i)perylene	191-24-2	100 [a]	1,000 [c]
Benzo(k)fluoranthene	207-08-9	3.9	1.7
Chrysene	218-01-9	3.9	1 [f]
Dibenz(a,h)anthracene	53-70-3	0.33 [e]	1,000 [c]
Fluoranthene	206-44-0	100 [a]	1,000 [c]
Fluorene	86-73-7	100 [a]	386
Indeno(1,2,3-cd)pyrene	193-39-5	0.5 [f]	8.2
m-Cresol	108-39-4	100 [a]	0.33 [e]
Naphthalene	91-20-3	100 [a]	12
o-Cresol	95-48-7	100 [a]	0.33 [e]
p-Cresol	106-44-5	100 [a]	0.33 [e]
Pentachlorophenol	87-86-5	6.7	0.8 [e]
Phenanthrene	85-01-8	100 [a]	1,000 [c]
Phenol	108-95-2	100 [a]	0.33 [e]
Pyrene	129-00-0	100 [a]	1,000 [c]

Notes:

SCO denotes Soil Cleanup Objectives.

NS denotes Not Specified.

[a] The SCOs for Restricted-Residential use were capped at a maximum of 100-mg/kg (ppm).

[d] The SCOs for metals were capped at a maximum of 10,000-mg/kg (ppm).

[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL was used as the SCO.

[f] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and the Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for use of the site.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[i] The SCO is for the sum of Endosulfan I, Endosulfan II, and Endosulfan Sulfate.

[j] The SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).

Table 1 (Continued)

Restricted Use Soil Cleanup Objectives
6 NYCRR Subpart 375-6 and CP-51 Remedial Program Soil Cleanup Objectives
(All Soil Cleanup Objectives are in mg/kg (ppm)

Contaminant	CAS No.	Restricted Residential	Protection of Groundwater
METALS			
Arsenic	7440-38-2	16 [f]	16 [f]
Barium	7440-39-3	400	820
Beryllium	7440-41-7	72	47
Cadmium	7440-43-9	4.3	7.5
Chromium (Hexavalet)	18540-29-9	110	19
Chromium (Trivalent)	16065-83-1	180	NS
Copper	7440-50-8	270	1,720
Total Cyanide		27	40
Lead	7439-92-1	400	450
Manganese	7439-96-5	2,000 [f]	2,000 [f]
Total Mercury		0.81 [j]	0.73
Nickel	7440-02-0	310	130
Selenium	7782-49-2	180	4 [f]
Silver	7440-22-4	180	8.3
Zinc	7440-66-6	10,000 [d]	2,480

Contaminant	CAS No.	Restricted Residential	Protection of Groundwater
PCB & PESTICIDES			
2,4,5-TP Acid (Silvex)	93-72-1	100 [a]	3.8
4,4'-DDE	72-55-9	8.9	17
4,4'-DDT	50-29-3	7.9	136
4,4'-DDD	72-54-8	13	14
Aldrin	309-00-2	0.097	0.19
alpha-BHC	319-84-6	0.48	0.02
beta-BHC	319-85-7	0.36	0.09
Chlordane (alpha)	5103-71-9	4.2	2.9
delta-BHC	319-86-8	100 [a]	0.25
Dibenzofuran	132-64-9	59	210
Dieldrin	60-57-1	0.2	0.1
Endosulfan I	959-98-8	24 [i]	102
Endosulfan II	33213-65-9	24 [i]	102
Endosulfan Sulfate	1031-07-8	24 [i]	1,000 [c]
Endrin	72-20-8	11	0.06
Heptachlor	76-44-8	2.1	0.38
Lindane	58-89-9	1.3	0.1
Polychlorinated Biphenyls	1336-36-3	1	3.2

Notes:

SCO denotes Soil Cleanup Objectives.

NS denotes Not Specified.

[a] The SCOs for Restricted-Residential use were capped at a maximum of 100-mg/kg (ppm).

[d] The SCOs for metals were capped at a maximum of 10,000-mg/kg (ppm).

[e] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL was used as the SCO.

[f] For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the Department and the Department of Health rural soil survey, the rural soil background concentration is used as the Track 2 SCO value for use of the site.

[h] The SCO for this specific compound (or family of compounds) is considered to be met if the analysis for the total species of this contaminant is below the specific SCO.

[i] The SCO is for the sum of Endosulfan I, Endosulfan II, and Endosulfan Sulfate.

[j] The SCO is the lower of the values for mercury (elemental) or mercury (inorganic salts).

Table 2
Groundwater Standards and Guidance Values
(All Groundwater Criteria are in ug/L (ppb)

Contaminant	CAS No.	NYSDEC Part 703 Groundwater Standards and TOGS 1.1.1 Guidance Values
VOLATILE ORGANIC COMPOUNDS (VOCs)		
Chloromethane	74-87-3	5
Vinyl chloride	75-01-4	2
1,1-Dichloroethene	75-35-4	5
Acetone	67-64-1	50
Carbon disulfide	75-15-0	60*
Methylene chloride	75-09-2	5
trans-1,2-dichloroethene	156-60-5	5
Methyl tert-butyl ether	1634-04-4	10
1,1-Dichloroethane	75-34-3	5
2-Butanone	78-93-3	50
cis-1,2-dichloroethene	156-59-2	5
Chloroform	67-66-3	7
Chloroethane	75-00-3	5
1,2-Dichloroethane	107-06-2	0.6
Benzene	71-43-2	1
Trichloroethene	79-01-6	5
Toluene	108-88-3	5
1,1,2-Trichloroethane	79-00-5	1
Tetrachloroethene	127-18-4	5
Ethylbenzene	100-41-4	5
Xylenes (mixed)	1330-20-7	5
Bromoform	75-25-2	50*
Isopropylbenzene	98-82-8	5
n-Propylbenzene	103-65-1	5
1,3,5-Trimethylbenzene	108-67-8	5
tert-Butylbenzene	98-06-6	5
1,2,4-Trimethylbenzene	95-63-6	5
sec-Butylbenzene	135-98-8	5
4-Isopropyltoluene	99-87-6	5
n-Butylbenzene	104-51-8	5
1,2-Dichlorobenzene	95-50-1	3
Naphthalene	91-20-3	10

Contaminant	CAS No.	NYSDEC Part 703 Groundwater Standards and TOGS 1.1.1 Guidance Values
SEMI-VOLATILE ORGANIC COMPOUNDS (SVOCs)		
Acenaphthene	83-32-9	20
Acenaphthylene	208-96-8	NA
Anthracene	120-12-7	50
Benzo(a)anthracene	56-55-3	0.002
Benzo(a)pyrene	50-32-8	ND
Benzo(b)fluoranthene	205-99-2	0.002
Benzo(g,h,i)perylene	191-24-2	NA
Benzo(k)fluoranthene	207-08-9	0.002
Chrysene	218-01-9	0.002
Dibenz(a,h)anthracene	53-70-3	NA
Fluoranthene	206-44-0	50
Fluorene	86-73-7	50
Indeno(1,2,3-cd)pyrene	193-39-5	0.002
Naphthalene	91-20-3	10
Phenanthrene	85-01-8	50
Pyrene	129-00-0	50

Notes:

NA denotes Not Available.

* Indicates value is from Division of Water Techinical and Operational Guidance Series (TOGS 1.1.1)

Table 2 (Continued)
Groundwater Standards and Guidance Values
(All Groundwater Criteria are in ug/L (ppb)

Contaminant	CAS No.	NYSDEC Part 703 Groundwater Standards and TOGS 1.1.1 Guidance Values
METALS		
Arsenic	7440-38-2	25
Barium	7440-39-3	1,000
Beryllium	7440-41-7	3
Cadmium	7440-43-9	5
Chromium (Trivalent)	16065-83-1	50
Copper	7440-50-8	200
Total Cyanide	57-12-5	200
Lead	7439-92-1	25
Manganese	7439-96-5	300
Total Mercury	7439-97-6	0.7
Nickel	7440-02-0	100
Selenium	7782-49-2	10
Silver	7440-22-4	50
Zinc	7440-66-6	2,000

Contaminant	CAS No.	NYSDEC Part 703 Groundwater Standards and TOGS 1.1.1 Guidance Values
PCBs & PESTICIDES		
2,4,5-TP Acid (Silvex)	93-72-1	10
4,4'-DDE	72-55-9	0.2
4,4'-DDT	50-29-3	0.2
4,4'-DDD	72-54-8	0.3
Aldrin	309-00-2	50
alpha-BHC	319-84-6	0.01
beta-BHC	319-85-7	0.04
Chlordane (alpha)	5103-71-9	0.05
delta-BHC	319-86-8	0.04
Dibenzofuran	132-64-9	NA
Dieldrin	60-57-1	0.004
Endosulfan I	959-98-8	NA
Endosulfan II	33213-65-9	50
Endosulfan Sulfate	1031-07-8	50
Endrin	72-20-8	50
Heptachlor	76-44-8	0.03
Lindane	58-89-9	0.05
Polychlorinated Biphenyls	1336-36-3	0.09

Notes:

NA denotes Not Available.

* Indicates value is from Division of Water Techinical and Operational Guidance Series (TOGS 1.1.1)

APPENDIX 2

Health and Safety Work Plan (HASP)
and
Community Air Monitoring Plan (CAMP)

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Site Health and Safety Plan

Location:

690 Saint Paul Street
Rochester, New York 14605

Prepared For:

Genesee Valley Real Estate Company
First Federal Plaza
28 East Main Street, Suite 500
Rochester, New York 14614

LaBella Project No. 209280

January 2014

Site Health and Safety Plan

Location:

690 Saint Paul Street
Rochester, New York 14605

Prepared For:

Genesee Valley Real Estate Company
First Federal Plaza
28 East Main Street, Suite 500
Rochester, New York 14614

LaBella Project No. 209280

January 2015

LaBella Associates, D.P.C.
300 State Street
Rochester, New York 14614

Table of Contents

Page

SITE HEALTH AND SAFETY PLAN

Project Title:	690 Saint Paul Street Brownfield Cleanup Program
Project Number:	209280
Project Location (Site):	690 Saint Paul Street, Rochester, New York 14605-1742
Environmental Director:	Gregory Senecal, CHMM
Project Manager:	Dan Noll, P.E.
Plan Review Date:	_____
Plan Approval Date:	_____
Plan Approved By:	_____ Mr. Richard Rote, CIH
Site Safety Supervisor:	Mike Pelychaty
Site Contact:	Christopher Gullace
Safety Director:	Rick Rote, CIH
Proposed Date(s) of Field Activities:	To Be Determined
Site Conditions:	Slightly sloping, encompassing approximately 4.73 acres
Site Environmental Information Provided By:	Remedial Investigation Report by LaBella Associates, D.P.C. (LaBella) Remedial Alternatives Anaysis by LaBella Remedial Design Work Plan: AOC #8 by LaBella
Air Monitoring Provided By:	LaBella Associates, D.P.C.
Site Control Provided By:	Contractor(s)

EMERGENCY CONTACTS

	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Rochester General Hospital	585-922-4000
Poison Control Center:	Finger Lakes Poison Control	585-273-4621
Police (local, state):	Monroe County Sheriff	911
Fire Department:	Rochester Fire Department	911
Site Contact:	Chris Gullace	Cell: 585-330-7173
Agency Contact:	NYSDEC – Frank Sowers, P.E. NYSDOH – Justin Deming Finger Lakes Poison Control MCDOH – John Frazier	585-226-5357 518-402-7860 1-800-222-1222 585-753-5904
Environmental Director:	Greg Senecal, CHMM	Direct: 585-295-6243 Cell: 585-752-6480 Home: 585-323-2142
Project Manager:	Dan Noll, P.E.	Direct: 585-295-611 Cell: 585-301-8458
Site Safety Supervisor:	Mike Pelychaty	Direct: 585-295-6253
Safety Director	Rick Rote, CIH	Direct: 585-295-6241

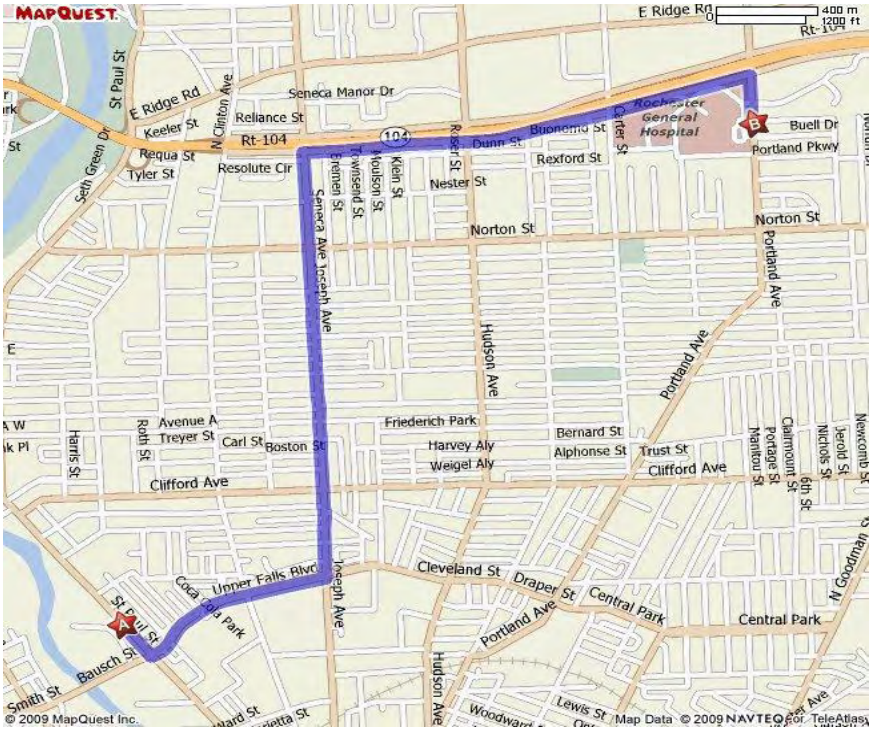
MAP AND DIRECTIONS TO THE MEDICAL FACILITY - ROCHESTER GENERAL HOSPITAL

Total Time: 8 minutes
Total Distance: 3.50 miles

Start: 690 Saint Paul St, Rochester, NY 14605-1742

START	1: Start out going SOUTHEAST on ST PAUL ST toward LOWELL ST.	0.1 mi
	2: Turn LEFT onto UPPER FALLS BLVD.	0.6 mi
	3: Turn LEFT onto JOSEPH AVE.	1.1 mi
	4: JOSEPH AVE becomes SENECA AVE.	0.3 mi
	5: Turn RIGHT onto RT-104.	1.2 mi
	6: Turn RIGHT onto PORTLAND AVE/CR-114.	0.2 mi
END	7: End at 1425 Portland Ave Rochester, NY 14621-3001	

End: 1425 Portland Ave, Rochester, NY 14621-3001



LABELLA

1.0 Introduction

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the remedial actions to be performed at the Site located at 690 Saint Paul Street in the City of Rochester, Monroe County, New York. This HASP only reflects the policies of LaBella Associates D.P.C. The requirements of this HASP are applicable to all approved LaBella personnel at the work site. This document's project specifications and the Community Air Monitoring Plan (CAMP) are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or any other regulatory body.

2.0 Responsibilities

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel and their authorized visitors. The Project Manager shall implement the provisions of this HASP for the duration of the project. It is the responsibility of each LaBella employee to follow the requirements of this HASP, and all applicable company safety procedures.

3.0 Activities Covered

The activities covered under this HASP are limited to the following:

- Management of environmental investigation and remediation activities
- Environmental monitoring
- Collection of samples
- Management of excavated soil and fill

4.0 Work Area Access and Site Control

The contractor(s) will have primary responsibility for work area access and site control. However, a minimum requirement for work area designation and control will consist of:

- Placing chain link fencing around the work area;
- Placing orange fencing around any excavation required to be left open overnight;
- Donning high visibility vests, hard hats, and safety glasses on-site during IRM activities; and,
- Adhering to this Site-specific Health & Safety Plan.

5.0 Potential Health and Safety Hazards

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for

good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed.

5.1 Hazards Due to Sodium Permanganate

Potential Hazard:
Sodium permanganate (specially, RemOx® L ISCO Reagent) is a strong chemical oxidant which can react violently with oxidizable materials. At a concentrated form (20%-40% solution) it can cause a fire if left on dirty rags or paper towels thrown in garbage. This chemical is damaging to eye tissue on contact and may cause burns that result in damage to the eye. The chemical can also irritate skin during momentary contact and damage skin during prolonged contact. If shallowed, this chemical may cause burns to the mucous membranes of the mouth, throat, esophagus and stomach. If airborne, concentrations of the chemical in the former of mist may cause irritation to the respiratory tract.

Protective Action:
Field personnel actively involved with the dilution and/or injection of the treatment chemical will be required to wear personal protective equipment (PPE) including chemical-resistant suits, gloves and boots and face shields. All other field personnel are required to wear at least Class D PPE. A chain-linked fence will be constructed around the work zone to keep the public at a safe distance from activities involved sodium permanganate use.

The MSDS for sodium permanganate is included in Appendix 1 of this HASP. Additional safety information regarding this chemical is included in Appendix 4 of the RDWP for AOC #8.

5.2 Hazards Due to Neutralizing Agent

Sodium thiosulfate, sodium bisulfate or ferrous salt will be kept on Site in the event that the RemOx® L ISCO Reagent requires neutralization. Information regarding these three potential neutralizing agents is included below:

Sodium thiosulfate
Potential Hazard:
May cause mild eye irritation, skin irritation and may cause a sore throat, coughing, nausea, and/or abdominal pain if injested. Inhalation may cause coughing, respiratory irritation, dyspnea and/or pulmonary edema. Chronic exposure may result in mucous membrane irritation, dermatitis, conjunctivitis.

Sodium Bisulfate
Potential Hazard:
Inhalation of dust may irritate nose, throat and/or lungs. Ingestion of small amounts of the chemical are not likely to cause injury; however, swallowing large amounts may irritate or burn the digestive tract. Prolonged exposure to the chemical may cause skin irritation. Contact with eye tissue causes serious irritation.

Ferrous Salt (ferrous ammonium sulfate hexahydrate)
Potential Hazard:
Irritating to skin, eyes and internally if ingested or inhaled.

Protective Action:
Field personnel actively involved with the dilution and/or use of the neutralization agent will be required to wear personal protective equipment (PPE) including chemical-resistant suits, gloves and boots and face shields. All other field personnel are required to wear at least Class D PPE. A chain-linked fence will be constructed around the work zone to keep the public at a safe distance from activities involved with neutralization agent use.

The MSDS for these three chemicals is included in Appendix 1 of this HASP.

5.3 Hazards Due to Heavy Machinery

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, etc will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses and steel toe shoes are required.

5.4 Excavation Hazards

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Activities that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0).

Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. All excavations will be backfilled by the end of each day. Additionally, no test pit will be left unattended during the day.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.5 Cuts, Punctures and Other Injuries

Potential Hazard:
In any excavation or construction, work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer

5.6 Injury Due to Exposure of Chemical Hazards

Potential Hazards:
Volatile organic vapors from petroleum products, chlorinated solvents or other chemicals may be encountered during excavation activities at the project work site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis.

Protective Action:
The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of organic vapors are present. Air monitoring (refer to Section 9.0 and to the Site specific CAMP in Appendix 7 of the IRM Work Plan) of the work area will be performed at least every 60 minutes or more often using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm for a 5 minute average. In the event that an ambient air reading for total volatile organic compound (VOC) of 25 ppm is encountered for a 5 minute average, personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0).

5.7 Injuries Due to Extreme Hot or Cold Weather Conditions

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

5.8 Potential Exposure to Asbestos

Potential Hazards:
During ground intrusive activities (e.g., test pitting or drilling) soil containing asbestos may be encountered. Asbestos is friable when dry and can be inhaled when exposed to air.

Protective Action:
The presence of asbestos can be identified through visual observation of a white magnesium silicate material. If encountered, work should be halted and a sample of the suspected asbestos should be collected and placed in a plastic sealable bag. This sample should be sent to the asbestos laboratory at LaBella Associates for analysis.

6.0 Work Zones

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 Decontamination Procedures

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 Personal Protective Equipment

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to

Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8 hours of use or more frequently*.]

9.0 Air Monitoring

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring will consist at a minimum of the procedures described in Appendix 2 "Site Specific CAMP". Please refer to the Site Specific CAMP for further details on air monitoring at the Site.

The Air Monitor will utilize a photoionization detector (PID) to screen the ambient air in the work areas for total Volatile Organic Compounds (VOCs) and a DustTrak tm Model 8520 aerosol monitor or equivalent for measuring particulates. Work area ambient air will generally be monitored in the work area and downwind of the work area. Air monitoring of the work areas and downwind of the work areas will be performed at least every 60 minutes or more often using a PID, and the DustTrak meter.

If ambient air PID readings of greater than 25 ppm are recorded in the breathing zone for a 5 minute average, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8 hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 25 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

If dust concentrations exceed the upwind concentration by 150 $\mu g/m^3$ (0.15 mg/m^3) consistently for a 10 minute period within the work area or at the downwind location, then LaBella personnel may not re-enter the work area until dust concentrations in the work area decrease below 150 $\mu g/m^3$ (0.15 mg/m^3), which may be accomplished by the construction manager implementing dust control or suppression measures.

10.0 Emergency Action Plan

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 Medical Surveillance

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 Employee Training

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the remedial investigation must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL (d)	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69
Anthracene	0.2	0.2	NA	NA	NA	NA	Faint aromatic	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	0.096	10.07
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07
Ethylbenzene	100	100	NA	1	6.7	2,000	Ether	2.3	8.76
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56
Metals									
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond	NA	NA
Cadmium	0.2	0.5	NA	NA	NA	NA	NA	NA	NA
Chromium	1	0.5	NA	NA	NA	NA	NA	NA	NA
Lead	0.05	0.15	NA	NA	NA	700	NA	NA	NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless	NA	NA
Selenium	0.2	0.02	NA	NA	NA	Unknown	NA	NA	NA
Other									
Asbestos	0.1 (f/cc)	NA	1.0 (f/cc)	NA	NA	NA	NA	NA	NA
Sodium Permanganate (RemOx® L)	5	0.2	3	NA	NA	NA	Odorless	NA	NA

(a) Skin = Skin Absorption
(b) OSHA-PEL Permissible Exposure Limit (flame weighted average, 8-hour): NIOSH Guide, June 1990
(c) ACGIH – 8 hour time weighted average from Threshold Limit Values and Biological Exposure Indices for 2003.
(d) Metal compounds and sodium permanganate in mg/m3
(e) Lower Exposure Limit (%)
(f) Upper Exposure Limit (%)
(g) Immediately Dangerous to Life or Health Level: NIOSH Guide, June 1990.

Notes:
1. All values are given in parts per million (PPM) unless otherwise indicated
2. Ca = Possible Human Carcinogen, no IDLH information

APPENDIX 1

Material Safety Data Sheets

SAFETY DATA SHEET

1. Identification

Product identifier	**RemOx® L ISCO Reagent**
Other means of identification	Not available.
Recommended use	Liquid oxidant recommended for applications that require a concentrated permanganate solution.
Recommended restrictions	Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Manufacturer/Supplier	CARUS CORPORATION
Address	315 Fifth Street, Peru, IL 61354, USA
Telephone	815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
E-mail	salesmkt@caruscorporation.com
Website	www.caruscorporation.com
Contact person	Dr. Chithambarathanu Pillai
Emergency Telephone	For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at CHEMTREC®, USA: 001 (800) 424-9300 CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531 CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards	Oxidizing liquids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. May cause respiratory irritation.

Precautionary statement

Prevention	Keep away from heat. Take any precaution to avoid mixing with combustibles. Keep/Store away from clothing//combustible materials. Use only outdoors or in a well-ventilated area. Do not breathe mist or vapor. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.
Response	In case of fire: Use water for extinction. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	Not classified.	
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

Supplemental information

Hazard symbol

Hazard statement Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Avoid release to the environment.

Response Collect spillage.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sodium permanganate	10101-50-5	36 - 40

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Move to fresh air. For breathing difficulties, oxygen may be necessary. Call a physician or poison control center immediately. Get medical attention immediately. Call a physician if symptoms develop or persist. Get medical attention if symptoms persist.

Skin contact Take off immediately all contaminated clothing. (Caution: Solution may ignite certain textiles). Immediately flush skin with plenty of water. Get medical attention immediately. Wash contaminated clothing before reuse.

Contact with skin may leave a brown stain of insoluble manganese dioxide. This can be easily removed by washing with a mixture of equal volume of household vinegar and 3% hydrogen peroxide, followed by washing with soap and water.

Eye contact Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Continue rinsing. Get medical attention immediately.

Ingestion Immediately rinse mouth and drink plenty of water. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately.

Before using, read Material Safety Data Sheet (MSDS) for this product. Rinse container at least three times to an absence of pink color before disposing.

Most important symptoms/effects, acute and delayed Contact with this material will cause burns to the skin, eyes and mucous membranes. Corrosive effects. Irritation of eyes and mucous membranes. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause temporary blindness and severe eye damage. Permanent eye damage including blindness could result. Show this safety data sheet to the doctor in attendance.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Decomposition products are alkaline. Brown stain is insoluble manganese dioxide.

General information In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. For personal protection, see Section 8 of the MSDS. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media Flood with water from a distance, water spray or fog.

Unsuitable extinguishing media The following extinguishing media are ineffective: Dry chemical. Foam. Carbon dioxide (CO2). Halogenated materials.

Specific hazards arising from the chemical May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 ºC / 275 ºF) could result in violent exothermic chemical reaction. Oxidizing agent, may cause spontaneous ignition of combustible materials. By heating and fire, corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions

Move container from fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Dike fire control water for later disposal. Water runoff can cause environmental damage.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Should not be released into the environment. This product is miscible in water.

Large Spills: Stop leak if possible without any risk. Dike the spilled material, where this is possible. Proceed with either of the following two options depending upon the size of the spill and the availability of the neutralizing agents:

Option # 1: Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water.

Option # 2: Absorb with inert media like diatomaceous earth or inert floor dry, collect into a drum and dispose of properly. Do not use saw dust or other incompatible media. Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to permanganates.

To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as described above. Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Otherwise, absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Do not use sawdust or other combustible material. Following product recovery, flush area with water. Prevent product from entering drains.

Small Spills: Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. Never return spills in original containers for re-use.

Environmental precautions

Do not allow to enter drains, sewers or watercourses. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling

Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not get this material in your eyes, on your skin, or on your clothing. Do not breathe mist or vapor. If clothing becomes contaminated, remove and wash off immediately. Spontaneous ignition may occur in contact with cloth or paper. When using, do not eat, drink or smoke. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep container tightly closed and in a well-ventilated place. Store in a cool, dry place. Store away from incompatible materials (See Section 10). Follow applicable local/national/international recommendations on storage of oxidizers. Store in accordance with NFPA 430 requirements for Class II oxidizers.

8. Exposure controls/personal protection

Occupational exposure limits

No exposure limits noted for ingredient(s).

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium permanganate (CAS 10101-50-5)	Ceiling	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	1 mg/m3	Fume.

US NIOSH Pocket Guide to Chemical Hazards: Short Term Exposure Limit (STEL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	STEL	3 mg/m3	Fume.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Follow standard monitoring procedures.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. An eye wash and safety shower must be available in the immediate work area.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.

Skin protection

Hand protection Wear chemical-resistant, impervious gloves. Use protective gloves made of: Rubber or plastic. Suitable gloves can be recommended by the glove supplier.

Other Wear appropriate chemical resistant clothing. Rubber or plastic apron.

Respiratory protection In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations When using, do not eat, drink or smoke. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance Dark purple liquid.

Physical state Liquid.

Form Aqueous solution.

Color Dark purple.

Odor Odorless.

Odor threshold Not available.

pH 5 - 8

Melting point/freezing point < 24.8 °F (< -4 °C)

Initial boiling point and boiling range > 213.8 °F (> 101 °C)

Flash point Does not flash.

Evaporation rate As water.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not applicable.

Flammability limit - upper (%) Not applicable.

Vapor pressure 760 mm Hg (105 °C)

Vapor density Not available.

Relative density 1.37 - 1.4 (20 °C) (Water = 1)

Solubility(ies) Miscible with water.

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Other information

Explosive properties	Not explosive. Can explode in contact with sulfuric acid, peroxides and metal powders.
Oxidizing properties	Strong oxidizing agent.

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Contact with combustible material may cause fire. Can explode in contact with sulfuric acid, peroxides and metal powders.
Conditions to avoid	Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.
Incompatible materials	Acids. Peroxides. Reducing agents. Combustible material. Metal powders.
Hazardous decomposition products	By heating and fire, corrosive vapors/gases may be formed. Contact with hydrochloric acid liberates chlorine gas.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Causes digestive tract burns. Harmful if swallowed. Ingestion causes burns of the upper digestive and respiratory tracts.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Causes severe skin burns and eye damage. Causes burns. Harmful if swallowed. Health injuries are not known or expected under normal use. Harmful if swallowed.

Components	Species	Test Results
Potassium permanganate (CAS 7722-64-7)		
Acute		
Dermal		
LD50	Rat	2000 mg/kg
Oral		
LD50	Rat	2000 mg/kg

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Skin corrosion/irritation	Causes severe skin burns.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory sensitization	Not classified.
Skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	May cause irritation of respiratory tract.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.
Further information	Chronic effects are not expected when this product is used as intended. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.

12. Ecological information

Ecotoxicity	Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Potassium permanganate (CAS 7722-64-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.7 mg/l, 96 hours, static
			2.3 mg/l, 96 hours, flow through
			2.3 mg/l, 96 hours
			1.8 - 5.6 mg/l
		Carp (Cyprinus carpio)	3.16 - 3.77 mg/l, 96 hours
			2.97 - 3.11 mg/l, 96 hours
		Goldfish (Carassius auratus)	3.3 - 3.93 mg/l, 96 hours, static
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours
		Rainbow trout (Oncorhynchus mykiss)	1.8 mg/l, 96 hours
			1.08 - 1.38 mg/l, 96 hours
			0.77 - 1.27 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.275 - 0.339 mg/l, 96 hours

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Persistence and degradability Expected to be readily converted by oxidizable materials to insoluble manganese oxide.

Bioaccumulative potential Potential to bioaccumulate is low.

Mobility in soil The product is miscible with water. May spread in water systems.

Mobility in general The product is miscible with water. May spread in water systems.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Rinse container at least three times to an absence of pink color before disposing.

Hazardous waste code D001: Ignitable waste
The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Do not allow this material to drain into sewers/water supplies. Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Rinse container at least three times to an absence of pink color before disposing. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards
Marine pollutant Yes
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 26, 353, IB2, T4, TP1
Packaging exceptions 152
Packaging non bulk 202
Packaging bulk 242

IATA

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards Yes
Labels required 5.1
ERG Code 5L

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN3214
UN proper shipping name	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. (Sodium permanganate)
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	
Marine pollutant	Yes
Labels required	5.1
EmS	F-H, S-Q
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

Drug Enforcement Administration (DEA) (21 CFR 1310.02 (b) 8: List II chemical.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium permanganate (CAS 10101-50-5) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Sodium permanganate	10101-50-5	36 - 40
Potassium permanganate	7722-64-7	2

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Sodium permanganate (CAS 10101-50-5)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Sodium permanganate (CAS 10101-50-5) 15 % wt

DEA Exempt Chemical Mixtures Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Food and Drug Administration (FDA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Sodium permanganate (CAS 10101-50-5) 500 lbs

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

US. Rhode Island RTK

Sodium permanganate (CAS 10101-50-5)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 27-November-2013

Revision date -

Version # 01

NFPA Ratings

References

HSDB® - Hazardous Substances Data Bank
Registry of Toxic Effects of Chemical Substances (RTECS)
EPA: AQUIRE database
NLM: Hazardous Substances Data Base
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This safety data sheet was prepared in accordance with the Safety Data Sheet for Chemical Products (JIS Z 7250:2005). The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CORPORATION DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CORPORATION MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

ISO9001:2000 Certified

Material Safety Data Sheet
Sodium Thiosulfate, Pentahydrate

Section 1 - Chemical Product and Company Identification

MSDS Name:
Sodium Thiosulfate, Pentahydrate
Catalog Numbers:
LC24990
Synonyms:

Company Identification:
LabChem, Inc.
200 William Pitt Way
Pittsburgh, PA 15238
Company Phone Number:
(412) 826-5230
Emergency Phone Number:
(800) 424-9300
CHEMTREC Phone Number:
(800) 424-9300

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name:	Percent
7772-98-7	Sodium Thiosulfate	100

Section 3 - Hazards Identification

Emergency Overview

Appearance: *White Crystals.*

Caution! *May cause irritation to eyes and skin. May cause irritation to respiratory and digestive tracts.*

Target Organs: *None.*

Potential Health Effects

Eye:
May cause mild eye irritation.
Skin:
May cause skin irritation.
Ingestion:
Ingestion may cause sore throat, coughing, nausea, abdominal pain.
Inhalation:
Inhalation may cause coughing, respiratory irritation, dyspnea, pulmonary edema.
Chronic:
Exposure may result in mucous membrane irritation, dermatitis, conjunctivitis.

Section 4 - First Aid Measures

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids until no evidence of chemical remains. Get medical aid.

Skin:
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.

Ingestion:
Give conscious victim 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.

Inhalation:
Move victim to fresh air immediately. Give artificial respiration if necessary. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information:
Negligible fire and explosion hazard when exposed to heat or flame. Move container if possible, avoid breathing vapors or dust.

Extinguishing Media:
For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.

Autoignition Temperature:
Not applicable.

Flash Point:
Not applicable.

NFPA Rating:
CAS# 7772-98-7: Not published.

Explosion Limits:
Lower: No information Upper: No information

Section 6 - Accidental Release Measures

General Information:
Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Absorb spills with absorbent (vermiculite, sand, fuller's earth) and place in plastic bags for later disposal. Scoop material into suitable (plastic or glass) container, label for disposal.

Section 7 - Handling and Storage

Handling:
Avoid prolonged or repeated contact with skin. Avoid ingestion and inhalation. Use with adequate ventilation.

Storage:
Store at room temperature. Keep away from heat and incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.

Exposure Limits:

Chemical Name:	ACGIH	NIOSH	OSHA
Sodium Thiosulfate	None of the components are on this list.	None of the components are on this list.	None of the components are on this list.

OSHA Vacated PELs:

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1910.134. Always use a NIOSH-approved respirator when necessary.

Section 9 - Physical and Chemical Properties

Physical State: Crystals.
Color: White.
Odor: Odorless.
pH: 6.0 – 8.4
Vapor Pressure: No information found.
Vapor Density: No information found.
Evaporation Rate: No information found.
Viscosity: No information found.
Boiling Point: No information found.
Freezing/Melting Point: 48.5°C
Decomposition Temperature: >45°C
Solubility in water: Soluble. 680g/L (20°C)
Specific Gravity/Density: 1.73
Molecular Formula: $Na_2S_2O_3 \cdot 5H_2O$

Material Safety Data Sheet
Sodium Thiosulfate, Pentahydrate

Molecular Weight: 248.18

Section 10 - Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials.
Incompatibilities with Other Materials:
Sodium nitrite, metal nitrates, chlorine solutions, acids.
Hazardous Decomposition Products:
Hydrogen sulfide, sodium oxide, sulfur oxides (SOx), including sulfur oxide and sulfur dioxide.
Hazardous Polymerization:
Has not been reported.

Section 11 - Toxicological Information

RTECS:
CAS# 7772-98-7: XN6476000.
LD50/LC50:
CAS# 7772-98-7:
No information found.
Carcinogenicity:
CAS# 7772-98-7: Not listed as a carcinogen by ACGIH, IARC, NIOSH, NTP, OSHA, or CA Prop 65.
Epidemiology:
Sodium thiosulfate is an eye, skin, mucous membrane irritant. Large doses have a cathartic action.
Teratogenicity:

Reproductive:

Mutagenicity:

Neurotoxicity:

Section 12 - Ecological Information

No information found.

Section 13 - Disposal Considerations

Dispose of in accordance with Federal, State, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: Not regulated.
Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information

US Federal

TSCA:
CAS# 7772-98-7 is listed on the TSCA Inventory.
SARA Reportable Quantities (RQ):
None of the components are on this list.
CERCLA/SARA Section 313:
None of the components are on this list.
OSHA - Highly Hazardous:
None of the components are on this list.

US State

State Right to Know:

California Regulations:

European/International Regulations

Canadian DSL/NDSL:
CAS# 7772-98-7 is listed on Canada's DSL List.
Canada Ingredient Disclosure List:
CAS# 7772-98-7 is not listed on Canada's Ingredient Disclosure List.

Section 16 - Other Information

MSDS Creation Date: March 7, 2005
Revision Date: May 30, 2007

Information in this MSDS is from available published sources and is believed to be accurate. No warranty, express or implied, is made and LabChem Inc. assumes no liability resulting from the use of this MSDS. The user must determine suitability of this information for his application.

Conforms to ANSI Z400.1-2004 Standard

Material Safety Data Sheet

Sodium bisulfate, anhydrous, technical grade

1. Product and company identification

Product name : Sodium bisulfate, anhydrous, technical grade

Synonym : Nitre cake, GBS

Code : SBSCUN01

Material uses : Cleaning compounds, pH adjustment. *Not approved for use in food or animal feed.*

Supplier/Manufacturer : Jones Hamilton
30354 Tracy Road
Walbridge, OHIO, 43465
Tel: (419) 666-9838
Fax: (419) 666-1817

MSDS authored by : KMK Regulatory Services Inc.

In case of emergency : CHEMTREC, U.S. : 1-800-424-9300 International: +1-703-527-3887

2. Hazards identification

Emergency overview

Physical state : Dry (Anhydrous) crystalline solid spherical shape beads.

Color : Off-white.

Odor : Fresh to pungent.

Signal word : WARNING!

Hazard statements : Causes serious eye irritation. May cause respiratory irritation. May be harmful if swallowed.

Precautionary measures : Do not get in eyes. Avoid contact with skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling. Material is non-flammable. Use extinguishing media suitable for surrounding materials.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Potential acute health effects

Inhalation : Inhalation of dust may irritate nose, throat and/or lungs.

Ingestion : Small amounts (tablespoonful) swallowed are not likely to cause injury; however, swallowing large amounts may irritate or burn digestive tract.

Skin : Prolonged exposure may cause skin irritation.

Eyes : Causes serious eye irritation.

Potential chronic health effects

Chronic effects : Contains material that may cause target organ damage, based on animal data.

Carcinogenicity : No known significant effects or critical hazards.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Target organs : Contains material which may cause damage to the following organs: mucous membranes, skin, eyes.

Over-exposure signs/symptoms

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing

Ingestion : No specific data.

2. Hazards identification

Skin : No specific data.

Eyes : Adverse symptoms may include the following:
pain
watering
redness

Medical conditions aggravated by over-exposure : Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

3. Composition/information on ingredients

United States

Name	CAS number	%
Sodium bisulfate	7681-38-1	>90

Canada

Name	CAS number	%
Sodium bisulfate	7681-38-1	>90

Mexico

					Classification			
Name	**CAS number**	**UN number**	**%**	**IDLH**	**H**	**F**	**R**	**Special**
Sodium bisulfate	7681-38-1	Not regulated.	>90	-	1	0	0	-

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact : Immediately flush eyes with plenty of water for at least 20 minutes, occasionally lifting the upper and lower eyelids. If redness or irritation persists, get prompt medical attention.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 20 minutes. If skin irritation occurs, seek medical attention.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. If irritation or discomfort persists, seek medical attention.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Call medical doctor or poison control center immediately.

Protection of first-aiders : If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : Contact poison treatment specialist immediately if large quantities have been ingested or inhaled.

5. Fire-fighting measures

Flammability of the product : No specific fire or explosion hazard.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Hazardous decomposition products : Decomposition products may include the following materials:
sulfur oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal precautions : Do not breathe dust. Provide adequate ventilation. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Avoid breathing dusts. Wash thoroughly after handling.

Storage : Material is hygroscopic and will readily absorb moisture. DO NOT store dry product where exposed to moist conditions. Keep container tightly closed.

8. Exposure controls/personal protection

Canada

Occupational exposure limits

No exposure limit value known.

Mexico

Occupational exposure limits

No exposure limit value known.

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : Personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures : Ensure that eyewash stations and safety showers are close to the workstation location. Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period.

Personal protection

Respiratory : In dusty atmospheres (>10 mg/m³), use a NIOSH-approved dust respirator.

Hands : Rubber gloves.

8. Exposure controls/personal protection

Eyes : Safety glasses or chemical goggles.

Skin : Cotton-blend coveralls.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation.

9. Physical and chemical properties

Physical state : Dry (Anhydrous) crystalline solid spherical shape beads.

Color : Off-white.

Odor : Fresh to pungent.

Molecular weight : 120

Molecular formula : $NaHSO_4$

pH : <1 [Conc. (% w/w): 5%]

Melting/freezing point : 177°C (350.6°F)

Specific gravity : 1.28 g/cm^3

Solubility : Partially soluble in the following materials: cold water and hot water.

10. Stability and reactivity

Chemical stability : The product is stable.

Conditions to avoid : DO NOT store dry product where exposed to moist conditions.

Incompatible materials : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis. DO NOT MIX dry or concentrated solutions of this product with concentrated solutions of chlorine bleach, ammonia cleansers or similar products.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Sodium bisulfate	LD50 Oral	Rat	2800 mg/kg	-

IDLH : Not available.

Synergistic products : Not available.

12. Ecological information

Environmental effects : This product readily dissolves in water to form a weak acid solution. A 0.05 percent or greater (by weight) solution of this product will likely be acutely harmful to aquatic life.

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. This material and its container must be disposed of in a safe way. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Empty containers or liners may retain some product residues. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

International transport regulations

DOT / TDG / Mexico / IMDG / IATA : Not regulated by any transport mode.

15. Regulatory information

United States

HCS Classification : Irritating material

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: Sodium bisulfate
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Sodium bisulfate: Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

Clean Air Act Section 602 Class I Substances : Not listed

Clean Air Act Section 602 Class II Substances : Not listed

DEA List I Chemicals (Precursor Chemicals) : Not listed

DEA List II Chemicals (Essential Chemicals) : Not listed

State regulations

Massachusetts : None of the components are listed.

New York : None of the components are listed.

New Jersey : None of the components are listed.

Pennsylvania : None of the components are listed.

California Prop. 65

No products were found.

Canada

WHMIS (Canada) : Class D-2B: Material causing other toxic effects (Toxic).

Canadian lists

Canadian NPRI : None of the components are listed.

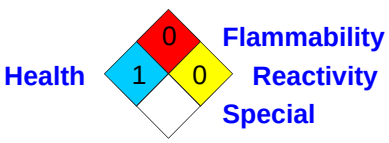
CEPA Toxic substances : None of the components are listed.

Canada inventory : All components are listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Mexico

Classification :



International regulations

15. Regulatory information

International lists : **Australia inventory (AICS)**: All components are listed or exempted.
China inventory (IECSC): All components are listed or exempted.
Japan inventory: All components are listed or exempted.
Korea inventory: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC): All components are listed or exempted.
Philippines inventory (PICCS): All components are listed or exempted.

16. Other information

Label requirements : Warning - Causes serious eye irritation. May cause respiratory irritation. May be harmful if swallowed. Wear protective gloves and eye/face protection. Avoid breathing dust. Wash thoroughly after handling.

Hazardous Material Information System (U.S.A.) : **Health :** 1 **Flammability :** 0 **Physical hazards :** 0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) : **Health :** 1 **Flammability :** 0 **Instability :** 0

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Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.

Canada

WHMIS (Canada) :

Other information : **NSF/ANSI Standard 60:** Function – Corrosion and scale control, pH adjustment; Maximum use rate – 500 mg/L.

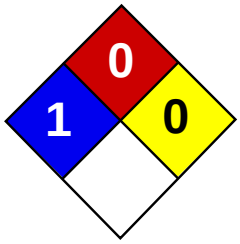
History

Date of issue : 11/01/2010

Version : 1

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.



Health	1
Fire	0
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Ferrous ammonium sulfate hexahydrate MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ferrous ammonium sulfate hexahydrate

Catalog Codes: SLF1990

CAS#: 7783-85-9 (Hexahydrate); 10045-89-3 (anhydrous)

RTECS: BR6500000

TSCA: TSCA 8(b) inventory: No products were found. Ferrous Ammonium Sulfate hexahydrate is not TSCA listed because it is a hydrate.

CI#: Not applicable.

Synonym: Ammonium ferrous sulfate, hexahydrate; Iron ammonium sulfate hydrate; Sulfuric acid, ammomium iron (2+) salt, hexahydrate

Chemical Name: Ammonium iron (II) sufate, hexahydrate (2:1:2:6)

Chemical Formula: FeSO4(NH4)2SO4.6H2O

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ferrous ammonium sulfate hexahydrate	7783-85-9	100
	(Hexahydrate);	
	10045-89-3	
	(anhydrous)	

Toxicological Data on Ingredients: Ferrous ammonium sulfate hexahydrate: ORAL (LD50): Acute: 3250 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects: Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to liver, spleen. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention if irritation occurs.

Skin Contact:
Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops. Cold water may be used.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation: Not available.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Use appropriate tools to put the spilled solid in a convenient waste disposal container. If necessary: Neutralize the residue with a dilute solution of sodium carbonate. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:
Use a shovel to put the material into a convenient waste disposal container. Neutralize the residue with a dilute solution of sodium carbonate. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary

system. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Do not ingest. Do not breathe dust. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, acids.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection: Safety glasses. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 1 (mg(Fe)/m) [Norway] TWA: 1 (mg(Fe)/m) [United Kingdom (UK)] TWA: 1 (mg(Fe)/m) from ACGIH (TLV) [United States] TWA: 1 (mg(Fe)/m) from NIOSH [United States] TWA: 1 (mg(Fe)/m) from OSHA (PEL) [United States]3 Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance:
Solid. (Crystals solid. Deliquescent crystals solid. Efflorescent crystals solid.)

Odor: Odorless.

Taste: Not available.

Molecular Weight: 392.14 g/mole

Color: Green. Blue-green (Light.)

pH (1% soln/water): Not available.

Boiling Point: Not available.

Melting Point: Decomposition temperature: 100°C (212°F) - 110 C.

Critical Temperature: Not available.

Specific Gravity: 1.864 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Not available.

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:
Soluble in cold water, hot water. Solubility in Water: 26.9 g/100 ml water @ 20 deg. C; 73 g/100 ml water @ 80 deg. C. Insoluble in Ethanol.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials, light, air

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Air and light sensitive. Slowly oxidizes in air

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 3250 mg/kg [Rat].

Chronic Effects on Humans: May cause damage to the following organs: liver, spleen.

Other Toxic Effects on Humans: Slightly hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects: Skin: Causes skin irritation. Eyes: Causes transient eye irritation and inflammation. Inhalation: Causes respiratory tract irritation. Symptoms may include coughing, wheezing, shortness of breath. May cause pulmonary edema. Ingestion: Causes irritation to the gastrointestinal tract. Symptoms may include stomach/abdominal pain, nausea, lack of appetite, vomiting/vomiting brown or bloody stomach contents, diarrhea, black stool. Other symptoms may include pallor or cyanosis, central nervous system effects (CNS depression, lethargy, restlessness, confustion, lassitude, drowsiness), hyperventilation due to metabolic acidosis, hyperglycemia or hypoglycemia, hypotension, and cardiovascular collapse. May cause kidney damage. Pink urine is a strong idicator of iron poisoning. May also cause liver damage (hepatonecrosis, hepatoxicity, hepatic failure). Although rare, acute iron poisoning may also cause Early Coagulopathy. This is a blood coagulation disorder which is associated with severe hepatotoxicity. Acute or serious poisoning from iron or iron salts is rare in adults. Chronic Potential Health Effects: Chronic (Repeated or prolonged) ingestion of iron or iron salts results in increased accumulation of iron in the body, particularly the liver, spleen, and lymphatic system. It may cause Liver damage (Hemosiderosis in the liver), and rarely Hemochromatosis in the Kupffer cells of the liver. Chronic iron poisoning may also cause leukocytosis and anemia. Eyes: Prolonged eye contact may cause conjunctivitis, and a brownish discoloration of the eye lens.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: RQ: 1000 lbs. (Listed as Ferrous Ammonium Sulfate (anhydrous CAS no. 10045-89-3)

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut carcinogen reporting list.: Ferrous ammonium sulfate (CAS number 10045-89-3) Illinois chemical safety act: Ferrous ammonium sulfate anhydrous (CAS number 10045-89-3) New York release reporting list: Ferrous ammonium sulfate (CAS number 10045-89-3) Massachusetts RTK: Ferrous ammonium sulfate (CAS number 10045-89-3) Massachusetts spill list: Ferrous ammonium sulfate (CAS number 10045-89-3) New Jersey: Ferrous ammonium sulfate (CAS number 10045-89-3) New Jersey spill list: Ferrous ammonium sulfate (CAS number 10045-89-3) Louisiana spill reporting: Ferrous ammonium sulfate (CAS number 10045-89-3) California Director's list of Hazardous Substances: Ferrous ammonium sulfate (CAS number 10045-89-3) CERCLA: Hazardous substances.: Ferrous ammonium sulfate (CAS number 10045-89-3): 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200). Ferrous Ammonium Sulfate hexahydrate is not on the Canadian DSL or the European EINES inventory

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):
This product is not classified according to the EU regulations. Not applicable.

HMIS (U.S.A.):

Health Hazard: 1

Fire Hazard: 0

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 1

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Safety glasses.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/09/2005 05:33 PM

Last Updated: 05/21/2013 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Site-Specific Community Air Monitoring Plan
NYSDEC Site #C828159

Location:

690 Saint Paul Street
Rochester, New York

Prepared For:

Genesee Valley Real Estate Company
First Federal Plaza
28 East Main Street
Rochester, New York 14614

LaBella Project No. 209280

July 2014

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July 2014

Table of Contents

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1.0 INTRODUCTION

This Site Specific Community Air Monitoring Plan (CAMP) has been prepared by LaBella Associates, P.C. (LaBella) on behalf of Genesee Valley Real Estate Company (GVRE). This CAMP addresses potential Volatile Organic Compound (VOC) vapor and particulate emissions that may occur during implementation of the remedial measures at 690 Saint Paul Street, Rochester, New York which encompasses approximately 4.73 acres in the City of Rochester, Monroe County, New York herein after referred to as the "Site." The Site is enrolled into the New York State Department of Environmental Conservation (NYSDEC) Brownfield Cleanup Program (BCP).

2.0 PURPOSE

Various levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and metals (collectively refered to as "constituents of concern" (COCs)) have been detected in the soil and groundwater at the Site or are suspected to be contained in the soil and/or groundwater at the Site. The presence of these COCs through disturbance of soil and groundwater at the Site can potentially result in nuisance odors or fugitive emissions to the neighborhood in the immediate vicinity of the Site as well as to the various occupants of the Site.

This CAMP is specific to activities being conducted as part of the implementation of the Remedial Action Work Plan (RAWP) for AOC #8. The CAMP describes the air monitoring activities to be completed in order to provide a measure of protection for any downwind receptors including Site occupants and occupants of neighboring properties. This CAMP is not intended to provide action levels for respiratory protection of workers involved with the implementation of the RAWP. Rather, a Health & Safety Plan (HASP) has been developed and is included as Appendix 1 to the RAWP to cover workers directly involved with the implementation of the RAWP.

This CAMP is based on the air monitoring specified in the New York State Department of Health (NYSDOH) Generic CAMP (included as Appendix 1A of the DER-10 NYSDEC Technical Guidance for Site Investigation and Remediation dated May 2010). However, this CAMP also includes more stringent (i.e., lower level) criteria for VOC monitoring as an added level of protection for Site occupants.

3.0 METHODOLOGY

This CAMP has been designed for remedial activities at the Site. These activities, hereinafter referred to as "remedial activities," include, but are not limited to: soil excavation, bedrock excavation, soil borings via a Geoprobe, soil borings via a rotary drill rig, installation of monitoring wells, test pitting, soil sampling, and groundwater sampling. The CAMP is arranged in the following sections:

- Section 3.1: Background Monitoring – This section identifies the background monitoring (VOC and fugitive dust) to be completed at the beginning of each day and periodically throughout the day when remedial activities are being conducted. The background monitoring is used for comparing readings from the other monitoring locations.

- Section 3.2: Downwind Perimeter Monitoring – This section identifies the downwind perimeter work area monitoring (VOC and fugitive dust) to be completed continuously during the remedial activities. Action levels are identified in this section.

- Section 3.3: Nearest Potential Receptor Monitoring – This section identifies additional VOC monitoring that will be completed during remedial activities to provide an added measure of protection at this Site that would not normally be required by NYSDEC or NYSDOH (i.e., this is above and beyond the NYSDOH Generic CAMP). Action levels are identified in this section.

In addition to the above, this CAMP also contains a Vapor Emission to Sensitive Receptors Response Plan (Section 4.0). This includes actions to be taken in the event that sustained exceedences of the specified action levels occur.

3.1 Site Background Monitoring

At the beginning of each day of field work during the remedial activities, a wind sock or flag will be used to monitor wind direction in the work areas. Based upon daily wind conditions, a background monitoring location will be established. In the event that the wind direction changes, the background monitoring location will be moved to an appropriate upwind location. It should also be noted that previous work has shown that the wind at this Site has been erratic. As such, the two (2) background monitoring locations will need to be north or east of the soil removal area. The background monitoring location will be at least 25 feet from the work area in an upwind location. Subsequent to establishing the initial background measurements (VOC and particulate, see below), background measurements will be collected every 60 minutes throughout the duration of the remedial activities for that day. The specific background monitoring is defined below:

Background VOC Monitoring:

A photoionization Detector (PID) capable of data logging will be used to screen the ambient air or VOCs in the background location (i.e., upwind). The PID will be calibrated daily (in accordance with the manufacturer's specifications) prior to collecting the background readings. The background readings will be collected by a 15-minute running average which will be used for comparison to the downwind perimeter monitoring (refer to Section 3.2) and the nearest potential receptor monitoring (refer to Section 3.3). After the initial reading, periodic background readings will be collected every 60 minutes.

Background Fugitive Dust Monitoring:

A DustTrak™ Model 8520 aerosol monitor or equivalent will be used for measuring particulates. The meter must be capable of measuring matter less than 10 micrometers in size (PM-10). The dust monitor will be calibrated daily (in accordance with the manufacturer's specifications) prior to collecting the background readings. The background dust monitoring will consist of collecting measurements integrated over a 15-minute period and will be used for comparison to the downwind perimeter monitoring (refer to Section 3.2). After the initial reading, periodic background readings will be collected every 60 minutes.

3.2 Downwind Perimeter Monitoring

Subsequent to collecting the initial Background Monitoring measurements, continuous monitoring of the downwind perimeter of the work area (i.e., exclusion zone) will be conducted throughout the duration of the remedial activities that day. The downwind perimeter will vary depending on the work; however, in general this will be approximately 30 feet from the location of the work being completed. As discussed in Section 3.1, the contains 6-plus story buildings, and as such, upwind and downwind may be difficult to determine and/or may constantly change. As such, should conditions indicate varying wind patterns, two (2) downwind monitoring locations will be established. One (1) will be located on the northern portion of the Exclusion Zone and one (1) will be located on the eastern portion of the Exclusion Zone.

Downwind Perimeter VOC Monitoring:

A MiniRae Lite PID or equivalent will be used to continuously monitor for VOCs at the downwind perimeter location. The PID will be calibrated daily (in accordance with the manufacturer's specifications) at the beginning of each day. An audible alarm will be set on the PID to sound in the event that total organic vapors exceed 5 parts per million (ppm) above the background readings. For example, if the background reading is 2 ppm, then the alarm will be set for 7 ppm.

Actions for Elevated VOC Readings

1. In the event that the action level of 5 ppm above background is exceeded, then work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

2. If total organic vapor levels at the downwind perimeter of the work area persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions (refer to Section 4.0 for engineering controls), and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200-feet downwind of the work area or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm over background (background based on the 15-minute average).

3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown and the Vapor Emission to Sensitive Receptors Response Plan initiated, refer to Section 4.0.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request. Instantaneous readings, if any, that are used for decision purposes will also be recorded.

Downwind Perimeter Fugitive Dust Monitoring:

A DustTrak™ Model 8520 aerosol monitor or equivalent will be used for measuring particulates. The dust meter must be capable of measuring matter less than 10 micrometers in size (PM-10) and be equipped with an audible alarm. The dust meter will be calibrated daily (in accordance with the manufacturer's specifications) prior to collecting readings. The dust monitoring will be conducted continuously and the measurements integrated over a 15-minute period. The results will be compared to the background monitoring (refer to Section 3.1). An audible alarm will be set on the dust meter to sound in the event that particulate levels exceed 100 micrograms per cubic meter ($\mu g/m^3$) greater than background for the 15-minute period. For example, if the background reading is 100 $\mu g/m^3$, then the alarm will be set for 200 $\mu g/m^3$.

Actions for Elevated Particulate Readings

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter ($\mu g/m^3$) greater than background (upwind) for the 15-minute period or if airborne dust is observed leaving the work area, then Fugitive Dust Control Techniques must be employed (see below). Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 $\mu g/m^3$ above the upwind level and provided that no visible dust is migrating from the work area.

2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 $\mu g/m^3$ above the upwind level, work must be stopped and the Fugitive Dust Control Techniques identified below will be reevaluated. In this event the NYSDEC Project Manager will be contacted immediately. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 $\mu g/m^3$ of the upwind level and in preventing visible dust migration.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request.

Fugitive Dust Control Techniques

One or more of the following dust control measures will be implemented in the event that the above action levels are exceeded:

- Apply water on exposed soils.
- Wetting equipment and test pit faces.
- Reducing test pit sizes.
- Immediately placing any investigation derived waste in drums and/or covering with plastic sheeting.

3.3 Nearest Potential Receptor Monitoring

A ppbRAE will be used to continuously monitor for VOCs between the nearest potential receptor and the work area. Specifically, the ppbRAE will be located half the distance between the perimeter of the work area (exclusion zone) and the nearest potential receptor, hereinafter referred to as the "Nearest Potential Receptor Monitoring Location". It should be noted that this location is not dependent on wind direction. The ppbRAE will be calibrated daily (in accordance with the manufacturer's specifications) prior to collecting readings. The ppbRAE will be operated in continuous mode and evaluate 15-minute running averages to account for any drift. An audible alarm will be set on the ppbRAE to sound in the event that total organic vapors exceed 1 ppm above the background readings. For example, if the background reading is 2 ppm, then the alarm will be set for 3 ppm.

Actions for Elevated VOC Readings

1. In the event that the action level of 1 ppm above background is exceeded, then work activities will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 1 ppm over background at the Nearest Potential Receptor Monitoring Location work activities can resume with continued monitoring (assuming the downwind perimeter location is also below it's action level, refer to Section 3.2).

2. If total organic vapor levels at the Nearest Potential Receptor Monitoring Location persist at levels in excess of 1 ppm over background but less than 10 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions (refer to Section 4.0 for engineering controls), and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level at the Nearest Potential Receptor Monitoring Location is below 1 ppm over background (background based on the 15-minute average).

3. If the organic vapor level is above 10 ppm at the Nearest Potential Receptor Monitoring Location, activities must be shutdown and the Vapor Emission to Sensitive Receptors Response Plan initiated, refer to Section 4.0.

All of the 15-minute readings will be recorded and will be available to NYSDEC and NYSDOH for viewing upon request. Instantaneous readings, if any, that are used for decision purposes will also be recorded.

4.0 Vapor Emission to Sensitive Receptors Response Plan

Engineering controls to abate VOC emissions source will immediately be put into effect if the action levels for VOC monitoring identified in Sections 3.2 and 3.3 are exceeded. These engineering controls may include:

- Vapor suppression utilizing foam vapor suppressants, polyethylene sheeting, or water.
- Backfilling of excavations (test pits).
- Covering emission sources with stockpiled materials.

If the measures taken to abate the emission source are ineffective and the total organic vapor readings continue to be above the specified action levels for more than 15 minutes (5 ppm at the downwind perimeter monitoring location or 1 ppm at the Nearest Potential Receptor Monitoring Location), then the following actions shall be placed into effect.

- Occupants of the commercial buildings on-site will be advised to stay inside their respective structure and to close all windows.
- All personnel listed in the Emergency Contacts section of the HASP for this project will be contacted.
- The Site Safety Supervisor will immediately contact the local authorities (fire department) and advise them of the circumstances.
- Continuous air monitoring will be conducted at the Downwind Perimeter Location, the Nearest Potential Receptor Monitoring Location and within the work zone and 1 minute average measurements will be recorded every 15 minutes. Air monitoring may be halted or modified by the Site Safety Supervisor when two successive measurements are below the specified action levels.

If readings remain elevated above the specified action levels for a period of 60 minutes (5 ppm at the downwind perimeter monitoring location or 1 ppm at the Nearest Potential Receptor Monitoring Location) the Site Safety Officer will request that local authorities evacuate the occupants of the buildings.

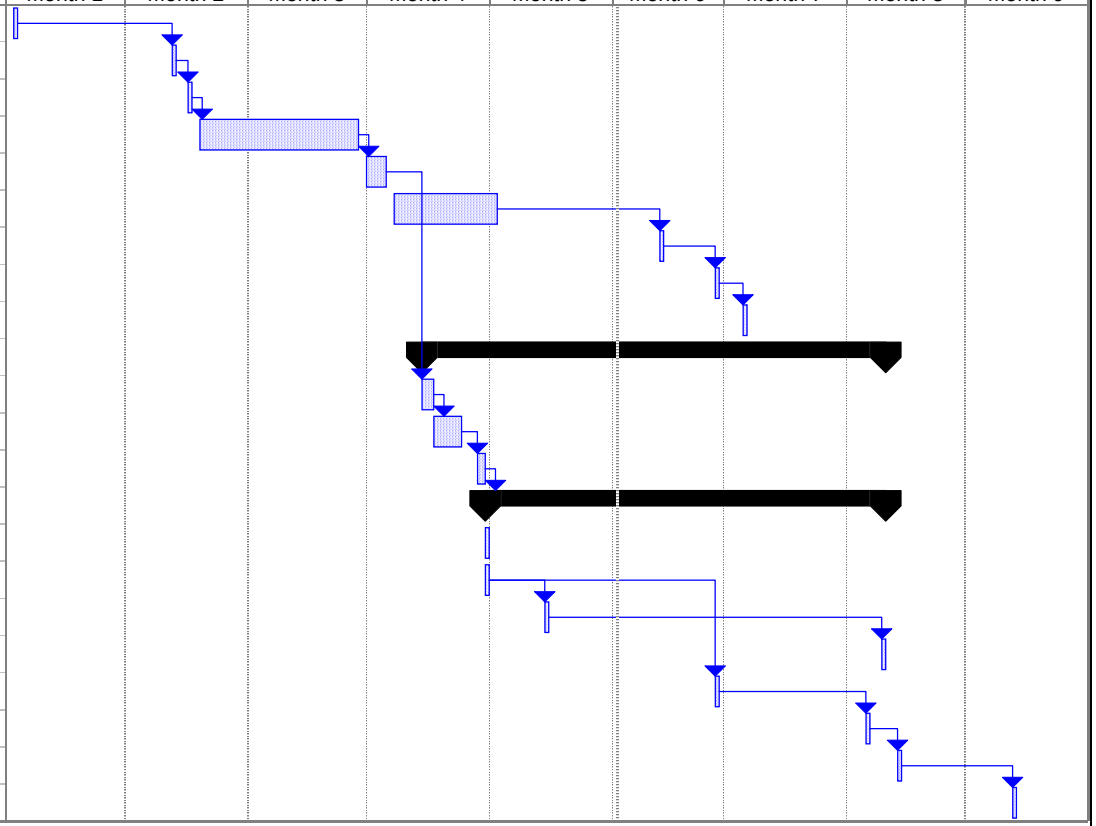
I:\GENESEE VALLEY REAL ESTATE CO\209280\REPORTS\RAWP AOC #8\SITE SPECIFIC CAMP.DOC

APPENDIX 3

Estimated Remedial Action Implementation Schedule (AOC #8)

PROPOSED PROJECT SCHEDULE
REMEDIAL DESIGN WORK PLAN - AOC #8
690 ST. PAUL STREET SITE, ROCHESTER, NY

ID	Task Name	Duration
1	Submit Draft RDWP to NYSDEC	1 day
2	Receive NYSDEC Comments of Draft RDWP	1 day
3	Submit Final RDWP	1 day
4	RDWP Public Comment Period	6 wks
5	Receive NYSDEC Approval of RDWP	1 wk
6	Develop and Submit Site Management Plan	4 wks
7	Receive NYSDEC Comments on SMP	1 day
8	Submit Final SMP	1 day
9	Receive NYSDEC Approval of SMP	1 day
10	**Implement Remedial Actions**	**85 days**
11	Mobilize Equipment	3 days
12	Complete Excavations/Install Infrastructure	1 wk
13	Install Monitoring Wells	2 days
14	**Inject Chemical Oxidant**	**73 days**
15	Complete Groundwater Sampling	1 day
16	Immediately Following Injection	1 day
17	Two Weeks After Injection	1 day
18	First Quarterly Event	1 day
19	Submit Draft Final Engineering Report	1 day
20	Receive NYSDEC Comments of Draft FER	1 day
21	Submit Final FER	1 day
22	Receive NYSDEC Approval of FER	1 day



Project: AOC 8 RDWP Schedule
Date: December 2014

Task
Split
Progress
Milestone
Summary
Project Summary
External Tasks
External Milestone
Deadline

APPENDIX 4

Sodium Permanganate & Secondary Containment Information

Carus Corporation Estimation Spreadsheet

RemOx® S and L ISCO Reagents Estimation Spreadsheet

Input data into box with blue font

Site Name: AOC #8
Date: 5/6/2013

	Estimates	Units
Treatment Area Volume		
Length	66	ft
Width	66	ft
Area	4356	sq ft
Thickness	4.5	ft
Total Volume	726	cu yd
Soil Characteristics/Analysis		
Porosity	30	%
Total Plume Pore Volume	43990	gal
Avg Contaminant Conc	13	ppm
Mass of Contaminant	4.77	lb
PNOD	3.01	g/kg
Effective PNOD	60	%
Effective PNOD Calculated	1.806	
PNOD Oxidant Demand	3894.133	lb
Avg Stoichiometric Demand	2.4	lb/lb
Contaminant Oxidant Demand	11.45	lb
Theoretical Oxidant Demand	3905.59	lb
Confidence Factor	1.5	
Calculated Oxidant Demand	5858.381	
Injection Volumes for RemOx S		
RemOx S Injection Concentration	1.0%	%
Total Volume of Injection Fluid	70,202	gal
Pore Volume Replaced	1.60	%

Amount of RemOx S ISCO Reagent Estimated **5,858 pounds**

Injection Volumes for RemOx L		
RemOx L Injection Concentration	10.0%	%
Calculated Specific Gravity	1.091623	g/ml
Total Volume of Injection Fluid	5,775	gal
Pore Volume Replaced	0.13	%

Amount of RemOx L ISCO Reagent Estimated **13,152 pounds**
1,151 gallons

USEPA Injection Form 7520-16

Type or print all information. See reverse for instructions. OMB No. 2040-0042 Approval Expires 11/30/2014

INVENTORY OF INJECTION WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF GROUND WATER AND DRINKING WATER

(This information is collected under the authority of the Safe Drinking Water Act)

1. DATE PREPARED *(Year, Month, Day)*

2. FACILITY ID NUMBER

PAPERWORK REDUCTION ACT NOTICE

The public reporting burden for this collection of information is estimated at about 0.5 hour per response including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, includingsuggestions for reducing this burden, Director, Collection Strategies Division (2822), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, and to the Office of Management and Budget, Paperwork Reduction Project, Washington, DC20503.

3. TRANSACTION TYPE *(Please mark one of the following)*

☐ Deletion ☐ First Time Entry
☐ Entry Change ☐ Replacement

4. FACILITY NAME AND LOCATION

A. NAME *(last, first, and middle initial)*

B. STREET ADDRESS/ROUTE NUMBER

C. LATITUDE

DEG	MIN	SEC
		.

D. LONGITUDE

DEG	MIN	SEC
		.

E. TOWNSHIP/RANGE

TOWNSHIP	RANGE	SECT	1/4 SECT

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. NUMERIC COUNTY CODE

J. INDIAN LAND *(mark "x")* ☐ Yes ☐ No

5. LEGAL CONTACT:

A. TYPE *(mark "x")* ☐ Owner ☐ Operator

B. NAME *(last, first, and middle initial)*

C. PHONE *(area code and number)*

D. ORGANIZATION

E. STREET/P.O. BOX

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. OWNERSHIP *(mark "x")*

☐ PRIVATE ☐ PUBLIC ☐ SPECIFY OTHER
☐ STATE ☐ FEDERAL

6. WELL INFORMATION:

A. CLASS AND TYPE		B. NUMBER OF WELLS		C. TOTAL NUMBER OF WELLS	D. WELL OPERATION STATUS				
		COMM	NON-COMM		UC	AC	TA	PA	AN
				0					
				0					
				0					
				0					
				0					
				0					
				0					

COMMENTS *(Optional):*

KEY:

DEG = Degree
MIN = Minute
SEC = Second
SECT = Section
1/4 SECT = Quarter Section

COMM = Commercial
NON-COMM = Non-Commercial
AC = Active
UC = Under Construction
TA = Temporarily Abandoned
PA = Permanently Abandoned and Approved by State
AN = Permanently Abandoned and not Approved by State

SECTION 1. DATE PREPARED: Enter date in order of year, month, and day.

SECTION 2. FACILITY ID NUMBER: In the first two spaces, insert the appropriate U.S. Postal Service State Code. In the third space, insert one of the following one letter alphabetic identifiers:

D - DUNS Number,
G - GSA Number, or
S - State Facility Number.

In the remaining spaces, insert the appropriate nine digit DUNS, GSA, or State Facility Number. For example, A Federal facility (GSA - 123456789) located in Virginia would be entered as : VAG123456789.

SECTION 3. TRANSACTION TYPE: Place an "x" in the applicable box. See below for further instructions.

Deletion. Fill in the Facility ID Number.
First Time Entry. Fill in all the appropriate information.
Entry Change. Fill in the Facility ID Number and the information that has changed.
Replacement.

SECTION 4. FACILITY NAME AND LOCATION:

A. Name. Fill in the facility's official or legal name.
B. Street Address. Self Explanatory.
C. Latitude. Enter the facility's latitude (all latitudes assume North Except for American Samoa).
D. Longitude. Enter the facility's longitude (all longitudes assume West except Guam).
E. Township/Range. Fill in the complete township and range. The first 3 spaces are numerical and the fourth is a letter (N,S,E,W) specifying a compass direction. A township is North or South of the baseline, and a range is East or West of the principal meridian (e.g., 132N, 343W).
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.

SECTION 4. FACILITY NAME & LOCATION (CONT'D.):

I. Numeric County Code. Insert the numeric county code from the Federal Information Processing Standards Publication (FIPS Pub 6-1) June 15, 1970, U.S. Department of Commerce, National Bureau of Standards. For Alaska, use the Census Division Code developed by the U.S. Census Bureau.
J. Indian Land. Mark an "x" in the appropriate box (Yes or No) to indicate if the facility is located on Indian land.

SECTION 5. LEGAL CONTACT:

A. Type. Mark an "x" in the appropriate box to indicate the type of legal contact (Owner or Operator). For wells operated by lease, the operator is the legal contact.
B. Name. Self Explanatory.
C. Phone. Self Explanatory.
D. Organization. If the legal contact is an individual, give the name of the business organization to expedite mail distribution.
E. Street/P.O. Box. Self Explanatory.
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.
I. Ownership. Place an "x" in the appropriate box to indicate ownership status.

SECTION 6. WELL INFORMATION:

A. Class and Type. Fill in the Class and Type of injection wells located at the listed facility. Use the most pertinent code (specified below) to accurately describe each type of injection well. For example, 2R for a Class II Enhanced Recovery Well, or 3M for a Class III Solution Mining Well, etc.
B. Number of Commercial and Non-Commercial Wells. Enter the total number of commercial and non-commercial wells for each Class/Type, as applicable.
C. Total Number of Wells. Enter the total number of injection wells for each specified Class/Type.
D. Well Operation Status. Enter the number of wells for each Class/Type under each operation status (see key on other side).

CLASS I Industrial, Municipal, and Radioactive Waste Disposal Wells used to inject waste below the lowermost Underground Source of Drinking Water (USDW).

TYPE	**1I**	Non-Hazardous Industrial Disposal Well.
	1M	Non-Hazardous Municipal Disposal Well.
	1H	Hazardous Waste Disposal Well injecting below the lowermost USDW.
	1R	Radioactive Waste Disposal Well.
	1X	Other Class I Wells.

CLASS II Oil and Gas Production and Storage Related Injection Wells.

TYPE	**2A**	Annular Disposal Well.
	2D	Produced Fluid Disposal Well.
	2H	Hydrocarbon Storage Well.
	2R	Enhanced Recovery Well.
	2X	Other Class II Wells.

CLASS III Special Process Injection Wells.

TYPE	**3G**	*In Situ* Gasification Well
	3M	Solution Mining Well.

CLASS III (CONT'D.)

TYPE	**3S**	Sulfur Mining Well by Frasch Process.
	3T	Geothermal Well.
	3U	Uranium Mining Well.
	3X	Other Class III Wells.

CLASS IV Wells that inject hazardous waste into/above USDWs.

TYPE	**4H**	Hazardous Facility Injection Well.
	4R	Remediation Well at RCRA or CERCLA site.

CLASS V Any Underground Injection Well not included in Classes I through IV.

TYPE	**5A**	Industrial Well.
	5B	Beneficial Use Well.
	5C	Fluid Return Well.
	5D	Sewage Treatment Effluent Well.
	5E	Cesspools (non-domestic).
	5F	Septic Systems.
	5G	Experimental Technology Well.
	5H	Drainage Well.
	5I	Mine Backfill Well.
	5J	Waste Discharge Well.

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RemOx® L Fact Sheet

CARUS
REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent has been specifically manufactured for environmental applications such as remediation of soils and associated groundwater. This product can be used to degrade a variety of contaminants including chlorinated solvents, polyaromatic hydrocarbons, phenolics, organo-pesticides, and substituted aromatics. RemOx L is shipped with a certificate of analysis to document assay, pH, and trace metals.

PRODUCT SPECIFICATIONS

Assay
39.5-41.0% as $NaMnO_4$

pH
5.0-8.0

Trace Metals
(see Table 1)

CHEMICAL/PHYSICAL DATA

Formula	$NaMnO_4$
Formula Weight	141.93 g/mol
Appearance	Dark Purple Solution
Specific Gravity	1.365-1.385 g/mL
Freezing Point	-15° C/ 5° F
Solubility in Water	Miscible with water in all proportions.

Material will pass through a 10 micron filter.

APPLICATIONS

RemOx L is used for soil and groundwater remediation by *in situ* or *ex situ* chemical oxidation and as an active agent in subsurface reactive barriers for treatment of: chlorinated ethenes, phenolic compounds, polyaromatic hydrocarbons, RDX, HMX, and various pesticides.

SHIPPING CONTAINERS

5-gallon pail (20-L) (UN Specification: UN3H1/Y1.8/100) Made of high-density polyethylene (HDPE), weighs 3.5 lbs (1.6 kg). The net weight is 57 lbs (25.9 kg). The pail stands approximately 14.8 in (37.6 cm) tall, 10.6 in (26.9 cm) wide, and 11.0 in (27.9 cm) deep. (Domestic and international)

55-gallon drum (208-L) (UN Specification: UN1H1/Y1.41100) Made of high-density polyethylene (HDPE), weighs 22 lbs (10 kg). The net weight is 550 lbs (250 kg). The drum stands approximately 34.8 in (88.3 cm) tall, has an outside diameter of 23.3 in (59.1 cm). (Domestic and international)

SHIPPING CONTAINERS

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 139 lbs (65 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.4 in (115.3 cm) high, 48 in (121.9 cm) long, and 40 in (101.6 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (Domestic)

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 132.5 lbs (60 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.8 in (116.2 cm) high, 39.4 in (100.0 cm) long, and 47.3 in (120.0 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (International)

Bulk Shipping- Quantities up to 4000-gallons (15,142-L) are available. (Domestic only)

HANDLING, STORAGE, AND INCOMPATIBILITY

Like any strong oxidizer RemOx L should be handled with care. Protective equipment during handling should include face shields and/or goggles, rubber or plastic gloves, and rubber or plastic apron. If clothing becomes spotted, wash off immediately; spontaneous ignition can occur with cloth or paper. In cases where significant exposure exists use the appropriate NIOSH-MSHA dust or mist respirator.

Store in accordance with NFPA 30 requirements in the United States or the European Fire Protection Association in Europe for Class II oxidizers. Additional regulations in Europe are REACH (Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals), and CLP (Classification, Labeling, Packaging). REACH is a regulation that increases the responsibility of the industry to manage the risks that the chemical may pose. For REACH registration numbers refer to the eSDS. The product should be stored in a cool, dry area in closed containers. Concrete floors are preferred. Check local regulations to ensure proper storage. Avoid wooden decks. Spillage should be collected and disposed of properly. To clean up spills and leaks follow the steps recommended in our MSDS or eSDS.

Avoid contact with acids, peroxides, and all combustible organic or readily oxidizable materials including inorganic oxidizable materials and metal powders. With hydrochloric acid, chlorine gas is liberated. RemOx L is not combustible, but will support combustion. It may decompose if exposed to intense heat. Fires may be controlled and extinguished by using large quantities of water. Refer to the MSDS or eSDS for more information.

CARUS CORPORATION

ONE COMPANY, ENDLESS SOLUTIONS

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rev. 09/13
form RX 1603

CARUS REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent is classified as an oxidizer for both domestic and international transportation. Liquid permanganate is shipped domestically as Freight Class 70 and in E.U. as Class 5.1.

Proper Shipping Name: Permanganates, inorganic, aqueous solution n.o.s. (contains sodium permanganate).

Hazard Class: Oxidizer, Class 5.1
Identification Number: UN 3214
Division/APR/RID Class: 5.1
Label Requirements: Oxidizer, 5.1
Packaging Group: II
Packaging Requirements: 49 CFR Parts 171 to 180
Sections: 173.152, 173.202, 173.242
Quantity Limitations:

1 liter net for passenger aircraft or railcar:
5 liters net for cargo aircraft.

Vessel Stowage, (IMDG Regulation):

D-material must be stowed " on-deck" on a cargo vessel, but is prohibited on a passenger vessel. Other provisions: stow separately from ammonium compounds, hydrogen peroxide, peroxides, super-oxides, cyanide compounds, and powdered metal.

H.S. Code 28.41.69.00

SHIPPING CONTAINERS

RemOx L is compatible with many metals and synthetic materials. Natural rubbers and fibers are often incompatible. Solution pH and temperature are also important factors. The material selected for use with liquid permanganate must be compatible with any kind of acid or alkali being used.

In neutral and alkaline solutions, RemOx L is not corrosive to carbon steel and 316 stainless steel. However, chloride corrosion of metals may be accelerated when an oxidant such as liquid permanganate is present in solution. Plastics such as Teflon, polypropylene, and HDPE are also compatible with liquid permanganate.

Aluminum, zinc, copper, lead, and alloys containing these metals may be (slightly) affected by RemOx L. Actual corrosion or compatibility studies should be made under the conditions in which RemOx L will be used.

Table 1: Typical Trace Metal Content and Specifications

Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)	Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)
Ag	BDL	0.15	0.034	Fe	BDL	2.00	0.053
Al	BDL	2.00	0.24	Hg	BDL	0.03	0.003
As	BDL	4.00	0.006	Ni	BDL	0.1	0.03
Ba	2.96	15.00	0.016	Pb	BDL	0.70	0.16
Be	BDL	0.50	0.08	Sb	BDL	0.70	0.16
Cd	BDL	0.10	0.016	Se	0.0034	0.50	0.0003
Cr	3.2	5.00	0.031	Tl	BDL	3.50	0.80
Cu	BDL	0.10	0.022	Zn	0.034	0.40	0.011

DL* is detection limit
BDL is below detection limit

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rev. 09/13
form RX 1603

RemOx® L Safety Data Sheet

SAFETY DATA SHEET

1. Identification

Product identifier	**RemOx® L ISCO Reagent**
Other means of identification	Not available.
Recommended use	Liquid oxidant recommended for applications that require a concentrated permanganate solution.
Recommended restrictions	Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Manufacturer/Supplier	CARUS CORPORATION
Address	315 Fifth Street, Peru, IL 61354, USA
Telephone	815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
E-mail	salesmkt@caruscorporation.com
Website	www.caruscorporation.com
Contact person	Dr. Chithambarathanu Pillai
Emergency Telephone	For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at CHEMTREC®, USA: 001 (800) 424-9300 CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531 CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards	Oxidizing liquids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. May cause respiratory irritation.

Precautionary statement

Prevention	Keep away from heat. Take any precaution to avoid mixing with combustibles. Keep/Store away from clothing//combustible materials. Use only outdoors or in a well-ventilated area. Do not breathe mist or vapor. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.
Response	In case of fire: Use water for extinction. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	Not classified.	
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

Supplemental information

Hazard symbol

Hazard statement Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Avoid release to the environment.

Response Collect spillage.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sodium permanganate	10101-50-5	36 - 40

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Move to fresh air. For breathing difficulties, oxygen may be necessary. Call a physician or poison control center immediately. Get medical attention immediately. Call a physician if symptoms develop or persist. Get medical attention if symptoms persist.

Skin contact Take off immediately all contaminated clothing. (Caution: Solution may ignite certain textiles). Immediately flush skin with plenty of water. Get medical attention immediately. Wash contaminated clothing before reuse.

Contact with skin may leave a brown stain of insoluble manganese dioxide. This can be easily removed by washing with a mixture of equal volume of household vinegar and 3% hydrogen peroxide, followed by washing with soap and water.

Eye contact Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Continue rinsing. Get medical attention immediately.

Ingestion Immediately rinse mouth and drink plenty of water. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately.

Before using, read Material Safety Data Sheet (MSDS) for this product. Rinse container at least three times to an absence of pink color before disposing.

Most important symptoms/effects, acute and delayed Contact with this material will cause burns to the skin, eyes and mucous membranes. Corrosive effects. Irritation of eyes and mucous membranes. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause temporary blindness and severe eye damage. Permanent eye damage including blindness could result. Show this safety data sheet to the doctor in attendance.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Decomposition products are alkaline. Brown stain is insoluble manganese dioxide.

General information In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. For personal protection, see Section 8 of the MSDS. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media Flood with water from a distance, water spray or fog.

Unsuitable extinguishing media The following extinguishing media are ineffective: Dry chemical. Foam. Carbon dioxide (CO2). Halogenated materials.

Specific hazards arising from the chemical May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 ºC / 275 ºF) could result in violent exothermic chemical reaction. Oxidizing agent, may cause spontaneous ignition of combustible materials. By heating and fire, corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions

Move container from fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Dike fire control water for later disposal. Water runoff can cause environmental damage.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Should not be released into the environment. This product is miscible in water.

Large Spills: Stop leak if possible without any risk. Dike the spilled material, where this is possible. Proceed with either of the following two options depending upon the size of the spill and the availability of the neutralizing agents:

Option # 1: Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water.

Option # 2: Absorb with inert media like diatomaceous earth or inert floor dry, collect into a drum and dispose of properly. Do not use saw dust or other incompatible media. Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to permanganates.

To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as described above. Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Otherwise, absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Do not use sawdust or other combustible material. Following product recovery, flush area with water. Prevent product from entering drains.

Small Spills: Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. Never return spills in original containers for re-use.

Environmental precautions

Do not allow to enter drains, sewers or watercourses. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling

Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not get this material in your eyes, on your skin, or on your clothing. Do not breathe mist or vapor. If clothing becomes contaminated, remove and wash off immediately. Spontaneous ignition may occur in contact with cloth or paper. When using, do not eat, drink or smoke. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep container tightly closed and in a well-ventilated place. Store in a cool, dry place. Store away from incompatible materials (See Section 10). Follow applicable local/national/international recommendations on storage of oxidizers. Store in accordance with NFPA 430 requirements for Class II oxidizers.

8. Exposure controls/personal protection

Occupational exposure limits

No exposure limits noted for ingredient(s).

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium permanganate (CAS 10101-50-5)	Ceiling	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	1 mg/m3	Fume.

US NIOSH Pocket Guide to Chemical Hazards: Short Term Exposure Limit (STEL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	STEL	3 mg/m3	Fume.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Follow standard monitoring procedures.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. An eye wash and safety shower must be available in the immediate work area.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.

Skin protection

Hand protection Wear chemical-resistant, impervious gloves. Use protective gloves made of: Rubber or plastic. Suitable gloves can be recommended by the glove supplier.

Other Wear appropriate chemical resistant clothing. Rubber or plastic apron.

Respiratory protection In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations When using, do not eat, drink or smoke. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance Dark purple liquid.

Physical state Liquid.

Form Aqueous solution.

Color Dark purple.

Odor Odorless.

Odor threshold Not available.

pH 5 - 8

Melting point/freezing point < 24.8 °F (< -4 °C)

Initial boiling point and boiling range > 213.8 °F (> 101 °C)

Flash point Does not flash.

Evaporation rate As water.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not applicable.

Flammability limit - upper (%) Not applicable.

Vapor pressure 760 mm Hg (105 °C)

Vapor density Not available.

Relative density 1.37 - 1.4 (20 °C) (Water = 1)

Solubility(ies) Miscible with water.

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Other information

Explosive properties	Not explosive. Can explode in contact with sulfuric acid, peroxides and metal powders.
Oxidizing properties	Strong oxidizing agent.

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Contact with combustible material may cause fire. Can explode in contact with sulfuric acid, peroxides and metal powders.
Conditions to avoid	Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.
Incompatible materials	Acids. Peroxides. Reducing agents. Combustible material. Metal powders.
Hazardous decomposition products	By heating and fire, corrosive vapors/gases may be formed. Contact with hydrochloric acid liberates chlorine gas.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Causes digestive tract burns. Harmful if swallowed. Ingestion causes burns of the upper digestive and respiratory tracts.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Causes severe skin burns and eye damage. Causes burns. Harmful if swallowed. Health injuries are not known or expected under normal use. Harmful if swallowed.

Components	Species	Test Results
Potassium permanganate (CAS 7722-64-7)		
Acute		
Dermal		
LD50	Rat	2000 mg/kg
Oral		
LD50	Rat	2000 mg/kg

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Skin corrosion/irritation	Causes severe skin burns.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory sensitization	Not classified.
Skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	May cause irritation of respiratory tract.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.
Further information	Chronic effects are not expected when this product is used as intended. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.

12. Ecological information

Ecotoxicity	Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Potassium permanganate (CAS 7722-64-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.7 mg/l, 96 hours, static
			2.3 mg/l, 96 hours, flow through
			2.3 mg/l, 96 hours
			1.8 - 5.6 mg/l
		Carp (Cyprinus carpio)	3.16 - 3.77 mg/l, 96 hours
			2.97 - 3.11 mg/l, 96 hours
		Goldfish (Carassius auratus)	3.3 - 3.93 mg/l, 96 hours, static
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours
		Rainbow trout (Oncorhynchus mykiss)	1.8 mg/l, 96 hours
			1.08 - 1.38 mg/l, 96 hours
			0.77 - 1.27 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.275 - 0.339 mg/l, 96 hours

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Persistence and degradability Expected to be readily converted by oxidizable materials to insoluble manganese oxide.

Bioaccumulative potential Potential to bioaccumulate is low.

Mobility in soil The product is miscible with water. May spread in water systems.

Mobility in general The product is miscible with water. May spread in water systems.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Rinse container at least three times to an absence of pink color before disposing.

Hazardous waste code D001: Ignitable waste
The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Do not allow this material to drain into sewers/water supplies. Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Rinse container at least three times to an absence of pink color before disposing. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards
Marine pollutant Yes
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 26, 353, IB2, T4, TP1
Packaging exceptions 152
Packaging non bulk 202
Packaging bulk 242

IATA

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards Yes
Labels required 5.1
ERG Code 5L

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN3214
UN proper shipping name	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. (Sodium permanganate)
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	
Marine pollutant	Yes
Labels required	5.1
EmS	F-H, S-Q
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

Drug Enforcement Administration (DEA) (21 CFR 1310.02 (b) 8: List II chemical.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium permanganate (CAS 10101-50-5) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Sodium permanganate	10101-50-5	36 - 40
Potassium permanganate	7722-64-7	2

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Sodium permanganate (CAS 10101-50-5)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Sodium permanganate (CAS 10101-50-5) 15 % wt

DEA Exempt Chemical Mixtures Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Food and Drug Administration (FDA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Sodium permanganate (CAS 10101-50-5) 500 lbs

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

US. Rhode Island RTK

Sodium permanganate (CAS 10101-50-5)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 27-November-2013

Revision date -

Version # 01

NFPA Ratings

References

HSDB® - Hazardous Substances Data Bank
Registry of Toxic Effects of Chemical Substances (RTECS)
EPA: AQUIRE database
NLM: Hazardous Substances Data Base
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This safety data sheet was prepared in accordance with the Safety Data Sheet for Chemical Products (JIS Z 7250:2005). The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CORPORATION DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CORPORATION MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

Permanganate Safety Presentation

Carus Corporation

The Safe Use and Handling of Permanganate Products

Responsible Care

Responsible Care®
Good Chemistry at Work

no accidents ▪ no injuries ▪ no harm to the environment

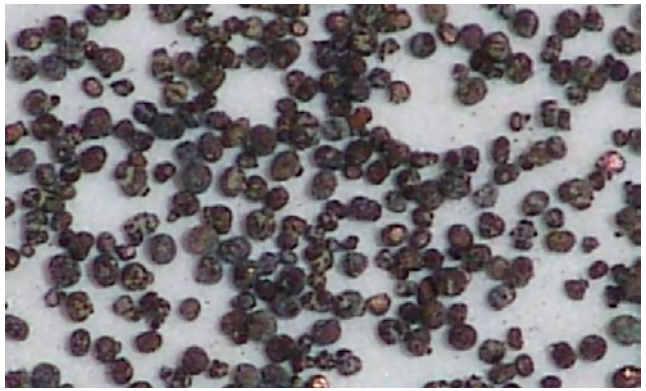
Responsible Care® Performance Excellence

- Facility Security
- Reducing Emissions
- Energy Efficiency
- Employee, Transportation, and Process Safety
- Product Safety and Communication
- Accountability

Product Overview

Permanganate products are available as:

- Crystalline Solids
- Concentrated Liquids



Crystalline Permanganate Safety and Handling

Crystalline Permanganate is a hazardous chemical

- Strong oxidant
- It can react violently with oxidizable materials.

Permanganate presents no health hazard during ordinary handling and storage.

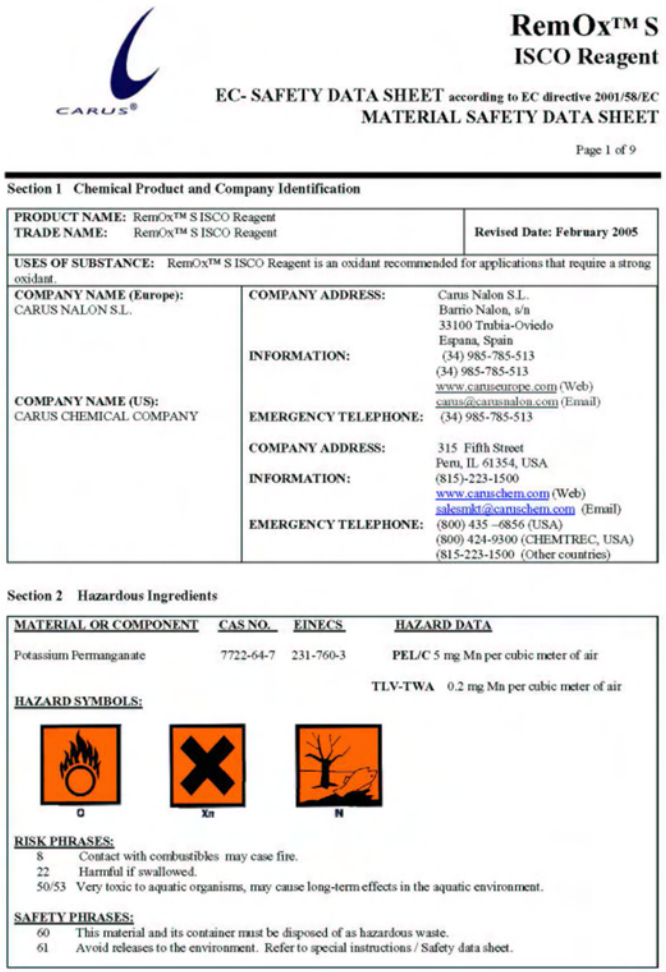
Solid Form (>97% active):

Stable under normal conditions

Incompatible with acids, peroxides, combustible organics, metal powders, oil & grease

Dilute Solution (1-6%):

Very stable



RemOx™ S
ISCO Reagent

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC
MATERIAL SAFETY DATA SHEET

Page 1 of 9

Section 1 Chemical Product and Company Identification

PRODUCT NAME: RemOx™ S ISCO Reagent **TRADE NAME:** RemOx™ S ISCO Reagent	**Revised Date: February 2005**
USES OF SUBSTANCE: RemOx™ S ISCO Reagent is an oxidant recommended for applications that require a strong oxidant.	
COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:** Carus Nalon S.L. Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain **INFORMATION:** (34) 985-785-513 (34) 985-785-513 www.caruseurope.com (Web) carus@carusnalon.com (Email) **EMERGENCY TELEPHONE:** (34) 985-785-513
COMPANY NAME (US): CARUS CHEMICAL COMPANY	**COMPANY ADDRESS:** 315 Fifth Street Peru, IL 61354, USA **INFORMATION:** (815)-223-1500 www.caruschem.com (Web) salesmkt@caruschem.com (Email) **EMERGENCY TELEPHONE:** (800) 435 –6856 (USA) (800) 424-9300 (CHEMTREC, USA) (815-223-1500 (Other countries)

Section 2 Hazardous Ingredients

MATERIAL OR COMPONENT	CAS NO.	EINECS	HAZARD DATA
Potassium Permanganate	7722-64-7	231-760-3	PEL/C 5 mg Mn per cubic meter of air TLV-TWA 0.2 mg Mn per cubic meter of air

HAZARD SYMBOLS:

RISK PHRASES:
8 Contact with combustibles may case fire.
22 Harmful if swallowed.
50/53 Very toxic to aquatic organisms, may cause long-term effects in the aquatic environment.

SAFETY PHRASES:
60 This material and its container must be disposed of as hazardous waste.
61 Avoid releases to the environment. Refer to special instructions / Safety data sheet.

Liquid Permanganate Safety and Handling

Liquid Permanganate is a hazardous chemical

- –Strong oxidant
- –It can react violently with oxidizable materials.

Concentrated Form (20%-40%)

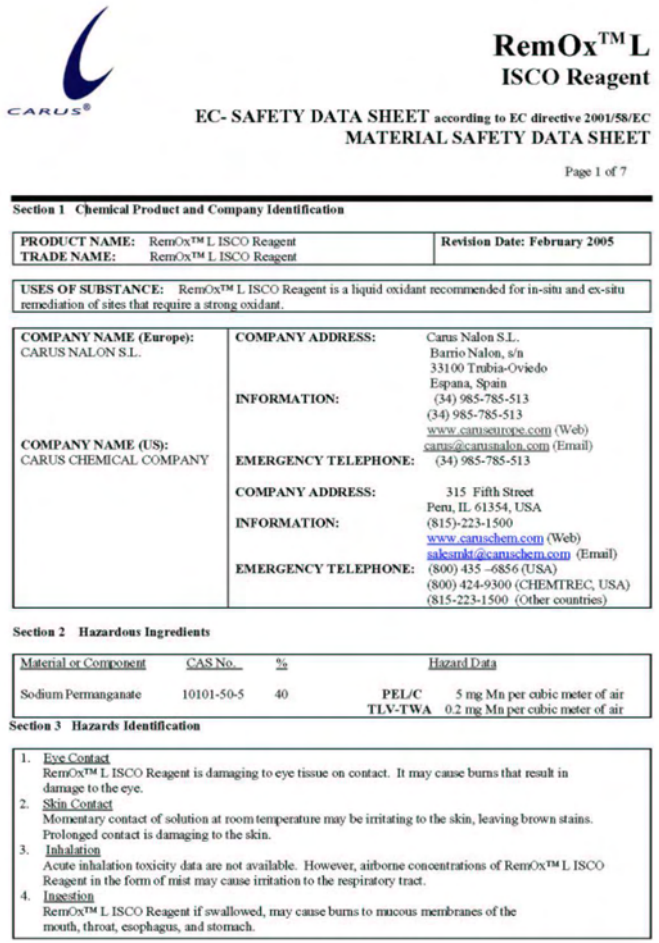
Stable under normal conditions.

Incompatible with acids, peroxides, combustible organics, metal powders, oil & grease.

Can cause a fire if left on dirty rags or paper towels and thrown in garbage. Dilute to less than 6% with water to neutralize.

Dilute Solution (<6% solution):

Very stable



RemOx™ L
ISCO Reagent

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC
MATERIAL SAFETY DATA SHEET

Page 1 of 7

Section 1 Chemical Product and Company Identification

PRODUCT NAME: RemOx™ L ISCO Reagent **TRADE NAME:** RemOx™ L ISCO Reagent	**Revision Date: February 2005**

USES OF SUBSTANCE: RemOx™ L ISCO Reagent is a liquid oxidant recommended for in-situ and ex-situ remediation of sites that require a strong oxidant.

COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:**	Carus Nalon S.L. Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain
	INFORMATION:	(34) 985-785-513 (34) 985-785-513 www.carusnalon.com (Web) carus@carusnalon.com (Email)
COMPANY NAME (US): CARUS CHEMICAL COMPANY	**EMERGENCY TELEPHONE:**	(34) 985-785-513
	COMPANY ADDRESS:	315 Fifth Street Peru, IL 61354, USA
	INFORMATION:	(815)-223-1500 www.caruschem.com (Web) salesmkt@caruschem.com (Email)
	EMERGENCY TELEPHONE:	(800) 435 –6856 (USA) (800) 424-9300 (CHEMTREC, USA) (815-223-1500 (Other countries)

Section 2 Hazardous Ingredients

Material or Component	CAS No.	%	Hazard Data
Sodium Permanganate	10101-50-5	40	**PEL/C** 5 mg Mn per cubic meter of air **TLV-TWA** 0.2 mg Mn per cubic meter of air

Section 3 Hazards Identification

1. Eye Contact
   RemOx™ L ISCO Reagent is damaging to eye tissue on contact. It may cause burns that result in damage to the eye.
2. Skin Contact
   Momentary contact of solution at room temperature may be irritating to the skin, leaving brown stains. Prolonged contact is damaging to the skin.
3. Inhalation
   Acute inhalation toxicity data are not available. However, airborne concentrations of RemOx™ L ISCO Reagent in the form of mist may cause irritation to the respiratory tract.
4. Ingestion
   RemOx™ L ISCO Reagent if swallowed, may cause burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Handling Permanganate Safely

- Eye protection must be worn
  Safety glasses with side shields as well as goggles or a face shield
- Provide adequate ventilation
  Dust or mist may irritate the respiratory tract
- Avoid skin contact with permanganate
  In addition to normal work clothing covering arms and legs, wear plastic gloves and apron
- Do not eat or drink permanganate
  If permanganate is swallowed, it may cause severe burns of the mouth, throat, esophagus, and stomach

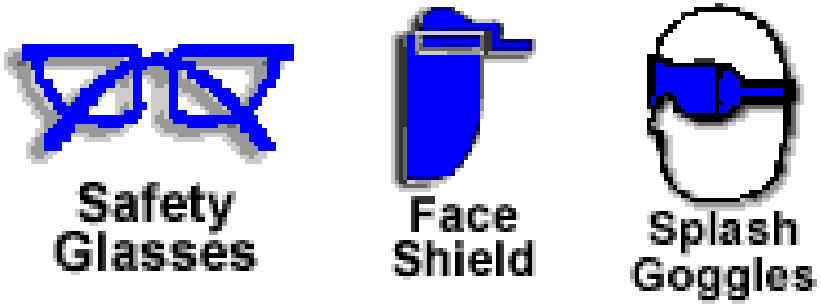
Inhalation

- Provide adequate ventilation

  Airborne concentrations of permanganate in the form of dust or mist may be irritating to the respiratory tract

  NIOSH-MSHS approved dust or mist respirators are recommended

Eye Contact

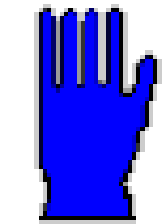


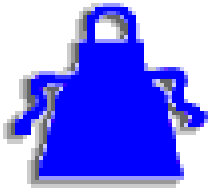
- Eye protection must be worn

  Decomposition products are alkaline and may cause burns that result in damage to the eye

  Safety glasses with eye shields and goggles or a face shield are recommended

Skin Contact


Gloves


Protective Apron

- Avoid skin contact with permanganate

  Momentary contact may be irritating to the skin and leave brown stains

  Contact with concentrated solutions or crystals will damage the skin

  In addition to normal work clothing covering arms and legs, wear plastic gloves and an apron

Ingestion

DO NOT EAT or DRINK permanganate or any other chemical.

If permanganate is swallowed, it may cause severe burns to the mouth, throat, esophagus, and stomach.

Always wash hands before eating, drinking or smoking.

Thermal Stability of Permanganate

$$5\ MnO_4^- \longrightarrow MnO_4^{3-} + MnO_4^{2-} + 3\ MnO_2 + 3\ O_2$$

Crystalline Permanganate

Decomposition may start at 302° F (150° C)

Liquid Permanganate

Decomposition may start at 275° F (135° C)

NFPA Hazard Code

Health Hazard - 1

Under fire conditions will give off irritating combustion products

Flammability Hazard – 0

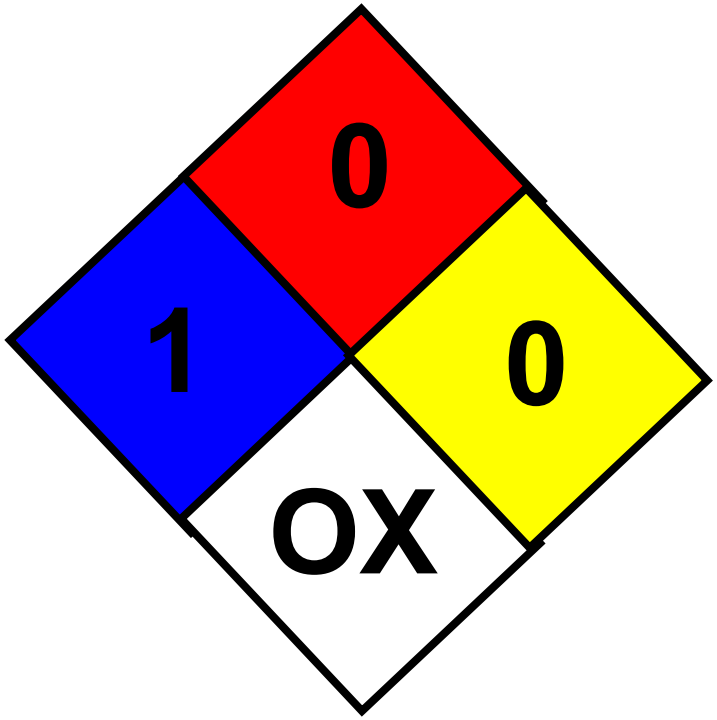
Nonflammable; Will not burn, but will support combustion

Reactivity Hazard – 0

Normally stable, not reactive with water

Special Hazard – OX

Oxidizer

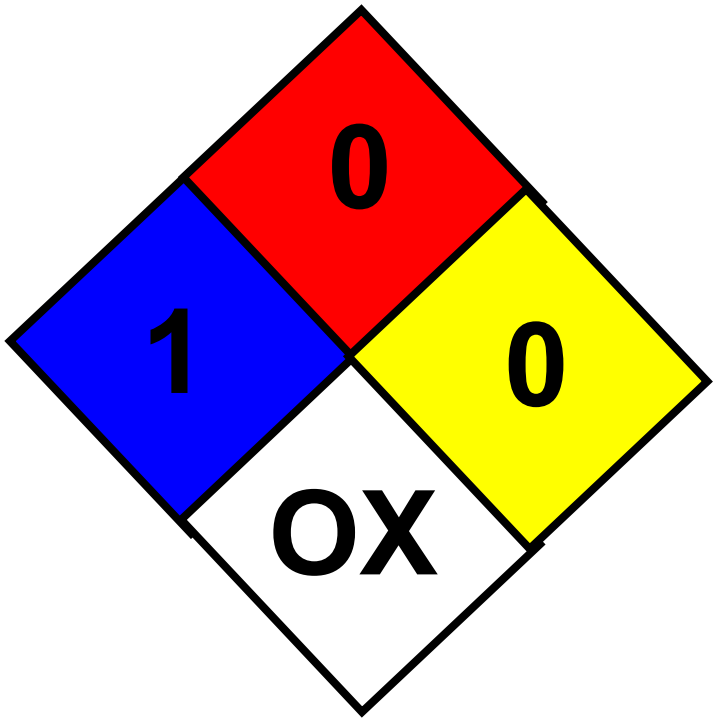


Fire Extinguishing

Use large quantities of water

Berm to contain the water

DO NOT use dry chemical extinguishers, CO_2, Halon® or foams



HMIS Hazard Code

Health Hazard - 1

Under fire conditions will give off irritating combustion products

Flammability Hazard – 0

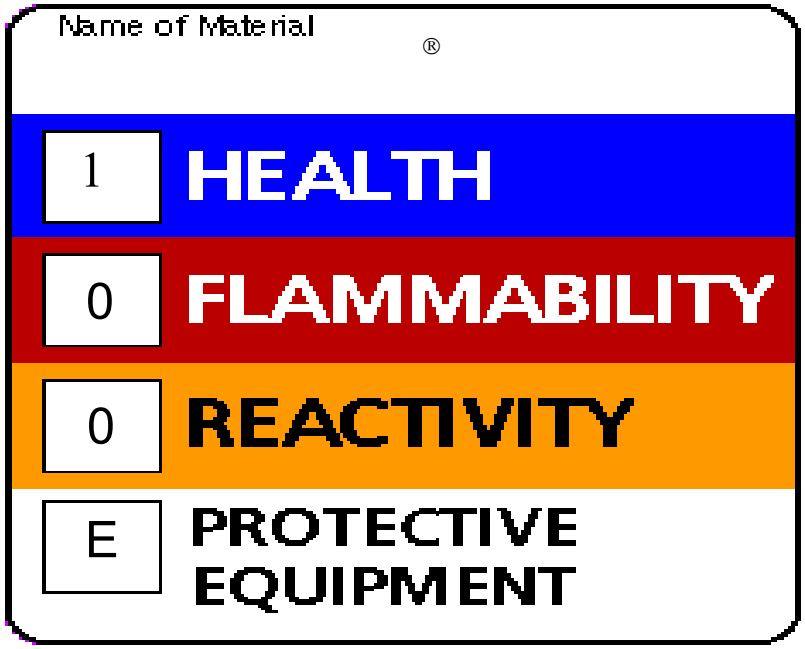
Nonflammable; Will not burn, but will support combustion

Reactivity Hazard – 0

Normally stable, not reactive with water

Protective Equipment – E

Safety glasses, gloves, dust respirator



Permanganate Storage Requirements

- Stable under normal conditions
- Keep dry and away from heat
- Do not store next to acids, peroxides, combustible organics, such as brake fluid or antifreeze, metal powders, or other materials identified in the MSDS
- Take care to protect the containers from physical damage

Dry Permanganate Spill Clean-up

Crystalline permanganate

- Clean up immediately by sweeping or shoveling

- Do not return to the original drum. Transfer to clean metal drum and dispose of according to approved local regulations

Liquid Permanganate Spill Clean-up

- Contain and isolate the liquid, collecting in a pit or holding area**

- Dilute the solution with water until the permanganate concentration is less than 6% (MnO_4^-)

- Neutralize the permanganate using a solution of sodium thiosulfate, bisulfite, or ferrous salt

** Carus tested the following materials and found them to be compatible with 40% sodium permanganate:

PIG® Haz Mat Adsorbent Sock
Spill-tek Adsorbent Pad
United Sorbents Polypropylene Adsorbent Pad

Additional Safety Considerations for Liquid Permanganate

WATER . . . . WATER . . . . WATER!

- NEVER neutralize a concentrated solution
  - Always dilute the permanganate to less than 6% before attempting any type of chemical neutralization

- May ignite wood, cloth, or paper
  - If clothing becomes contaminated wash with water immediately
  - Spontaneous ignition may occur with wood or paper
  - Store on a concrete floor

DILUTE . . . . DILUTE . . . . DILUTE!

Permanganate Neutralization Reactions

Sodium thiosulfate

$$8\ MnO_4^- + 3\ Na_2S_2O_3 + H_2O \longrightarrow 3\ SO_4^{=} + 3\ Na_2SO_4 + 8\ MnO_2 + 2\ OH^-$$

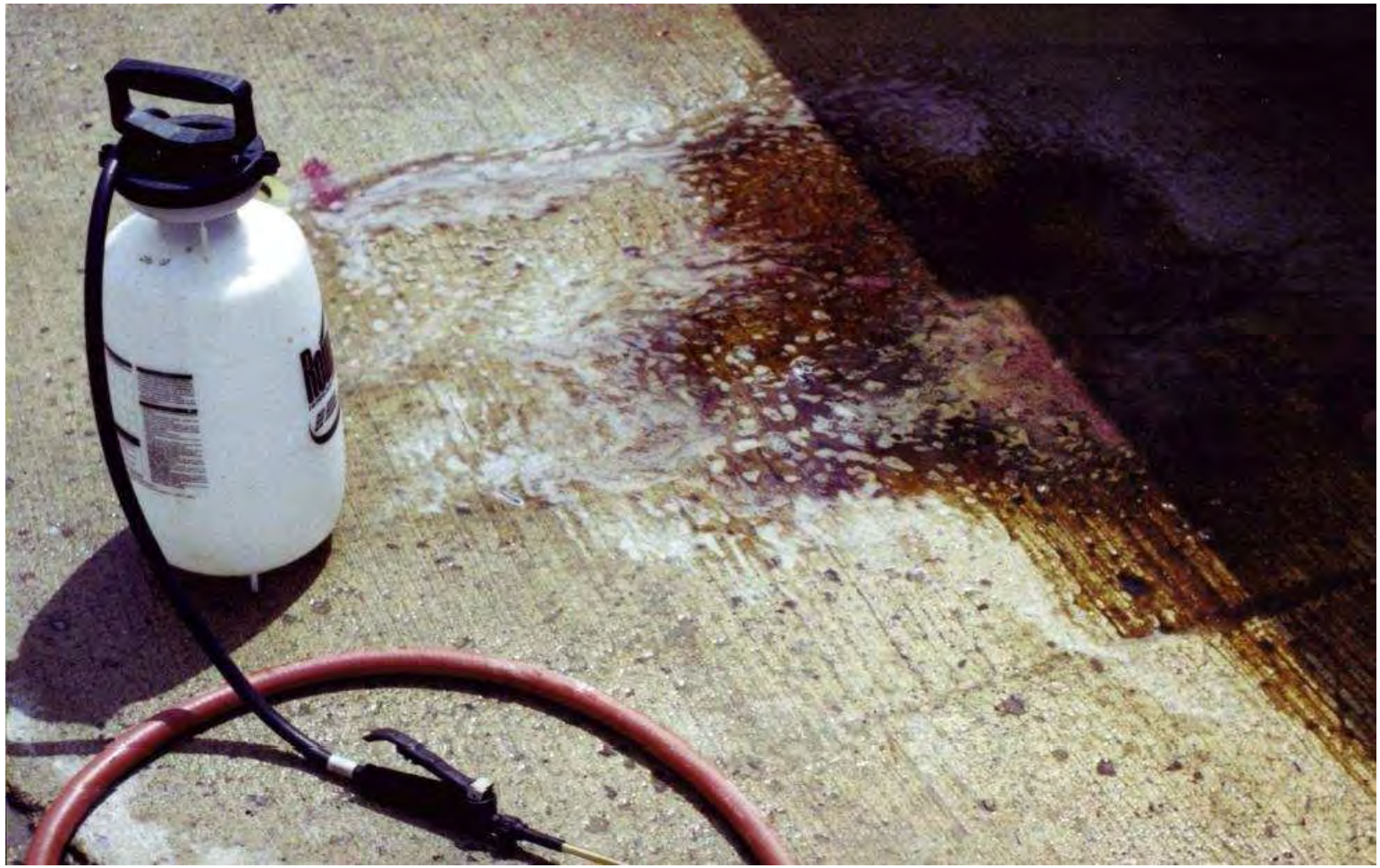
Weight ratio: 0.375 parts $Na_2S_2O_3$ to 1 part MnO_4^-

Sodium bisulfite (meta)

$$2\ MnO_4^- + 3\ NaHSO_3 + H_2O \longrightarrow 3\ NaHSO_4 + 2\ MnO_2 + 2\ OH^-$$

Weight ratio: 1 part $NaHSO_3$ to 1 part MnO_4^-

Permanganate Neutralization Reactions



MnO_2 Stain Removal

CLEANING SOLUTION

- 30 parts water
- 40 parts white vinegar
- 30 parts 3% hydrogen peroxide

Never use on sensitive tissue

- Eyes, mucous membranes, open wounds, burns, etc.

DO NOT add directly to concentrated permanganate solutions

Dilute the permanganate solution to less than 6% with water before using this stain removal solution

Hazardous Materials Transportation Act

In the United States, domestic shipments of hazardous commodities over the highways is governed by Title 49, Code of Federal Regulations (CFR)

- Identifies and classifies hazardous materials
- Establishes quantity limitations
- Specifies the proper packaging
- Describes how to mark and label the package
- Defines shipping certificates
- Details how to placard the vehicle transporting the shipment

Department of Transportation

Proper Shipping Name - Crystalline
Potassium permanganate

ID Number	Reportable Quantity
UN 1490	100 lb.

Proper Shipping Name – Liquid
Permanganates, inorganic, aqueous solutions

ID Number	Reportable Quantity
UN 3214	none established

Hazard Class	Division	Packing Group
Oxidizer	5.1	II

Release of Permanganate to the Environment

Resource Conservation and Recovery Act (RCRA) 1976

Establishes 4 characteristics of hazardous waste:

- Ignitability
- Corrosivity
- Reactivity
- EP Toxicity

It identifies oxidizers as hazardous under the ignitable waste characteristic and lists potassium permanganate by name

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 1980 "Superfund"

A crystalline or liquid permanganate release to the environment must be reported if it exceeds the "reportable quantity"

Reportable Quantities

- Dry crystalline permanganate has an RQ of 100 lbs.

- To report a release to the environment contact the National Response Center (NRC) at 1-800-424-8802.

Secondary Containment Specifications

Spillguard

12’ x 50’ x 12”

Overview:

The 12’ x 50’ x 12” Spillguard is a patented one-piece, heat-welded berm with permanently attached support legs and reinforced seams. In an effort to carry over our vision of an environmentally safe and incident-free workplace, our exclusive patented Spillguard comes in both standard and acid resistant models.

Features:

- Wrap around corners to prevent leaks
- Chemically resistant containment fabric
- Safety orange support straps
- Sturdy tie-down grommets
- Available in acid and standard tan models

Specs:

- Acid model Spillguards approved for a temperature range of -10 to 160 degrees Fahrenheit.
- Standard model (tan) Spillguards are approved for use in temperatures ranging from -50 to 160 degrees Fahrenheit.
- All Spillguard models feature chemical compatibility for use with Sodium Hydroxide, Water and Fertilizer solutions.
- Acid model Spillguards can be used in applications with Sulfuric acid, Sodium Hydroxide, Hydrochloric acid and Sodium Hypochlorite.
- Standard model spillguards require engineering review prior to use with Diesel, Gasoline, Crude oil and Mineral-based Hydraulic Fluid.

Accessories:

- Hose bridge
- Modular spillguards to run under pipeline
- Puncture resistant track belts
- Puncture-resistant ground mats
- SolidGround™ Traction Mats
- Spillguard Hose Bridge

PUMPS • TANKS • FILTRATION • PIPE • SPILLGUARDS

Liquid Ingenuity©
800-742-7246
rainforrent.com

RAIN FOR RENT

Spillguard™
Portable Containment Berms

FEATURES

- Lightweight
- Compact
- Portable
- Durable
- No Inflation Necessary, Sets Up in Minutes
- Heavy Duty, Chemical Resistant Materials

TECHNICAL

The SPILLGUARD™ berm is a compact, portable system ideal for use with temporary liquid storage tanks, pumps, or other equipment used in handling hazardous materials. The SPILLGUARD™ berm can be set up in minutes. The patented, collapsible walls and light-weight materials allow for quick deployment. Tough, one piece construction, reinforced seams, and chemically resistant materials give extra protection under field conditions.

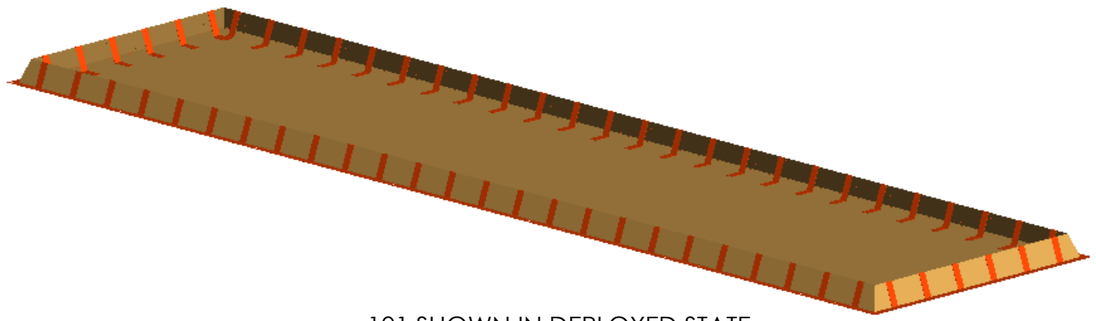
MATERIAL SPECIFICATIONS

The SPILLGUARD™ berm is manufactured of heavy duty 35 mil polyurethane coated fabric that offers excellent chemical resistance characteristics and durability. The unique design, patented collapsible walls, and compact size allow for convenient storage. SPILLGUARD™ units are available in a variety of sizes and can be made to fit specific applications. The heavy duty ground tarp and traffic belting supplied with the unit gives the drive-on capabilities and operator safety. Chemical and environmental resistance data available upon request.

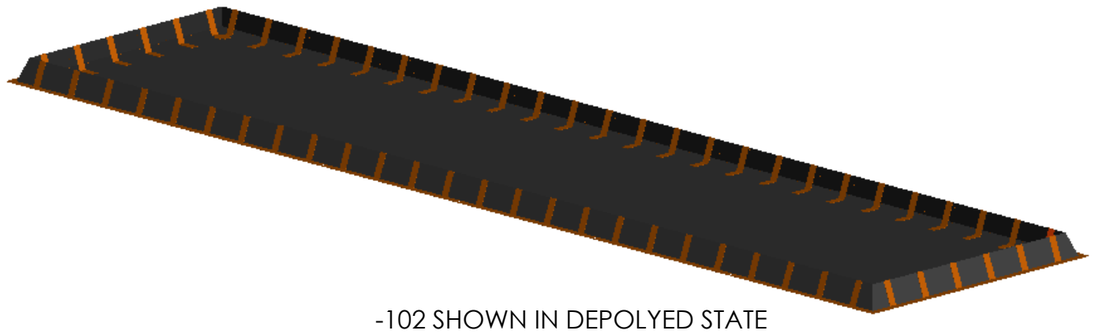
Rain for Rent
P.O Box 2248 • Bakersfield, CA 93303
800-742-7246 • rainforrent.com

RAIN FOR RENT

TABLE 1				
DASH	PART NUMBER	MATERIAL	COLOR	APPROX WEIGHT
-101	1001-00008-101	32OZ POLYURETHANE REINFORCED WITH NYLON FABRIC	TAN WITH ORANGE STRAPS	235 LBS
-102	1001-00008-102	46OZ MODIFIED VINYL	BLACK WITH GOLD STRAPS	310 LBS



-101 SHOWN IN DEPLOYED STATE



-102 SHOWN IN DEPOLYED STATE

REVISIONS				
ZONE	REV.	DESCRIPTION	DATE	APPROVED
SH2 C1-8	A	REVISED USABLE AREA TO DEFINE FOLD ZONES AND ENTRY/EXIT AREAS	6/20/07	TB/KJ/RG

CAD MAINTAINED

NOTES:

1. FOR USE IN SECONDARY CONTAINMENT OF AROMATIC HYDROCARBONS AND OTHER CHEMICALS (SEE COMPATIBILITY TABLE)
2. MATERIAL: SEE TABLE 1
3. COLOR: SEE TABLE 1
4. APPROXIMATE WEIGHT: SEE TABLE 1
5. APPROXIMATE FOLDED SIZE: 40"X45"X24
6. ALL SEAMS ARE NOMINAL 1" WELDS, NO EPOXIES OR ADHESIVES
7. STAKING GROMMETS ARE SPACED APPROXIMATELY EVERY 24 INCHES AND ONE IN EACH CORNER
8. PATENTED INSIDE SUPPORT STRAP DESIGN TO ELIMINATE TRIPPING HAZARD (PATENT NUMBER: 5316175)
9. EACH STRAP IS REINFORCED WITH DOUBLE RIBBED ALUMINUM SUPPORTS ALONG WALL AND TRIANGULATED LEG
10. DRAIN VALVES AVAILABLE UPON REQUEST
11. ALL WALL TOPS HAVE 1" HEM FOR ADDITIONAL SUPPORT
12. FULL CHEMICAL/ENVIRONMENTAL RESISTANCE TABLE AVAILABLE AT: WWW.BASICCONCEPTS.COM/RESISTANCETABLE.ASP

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED:

DIMENSIONS ARE IN INCHES
TOLERANCES:
NA

INTERPRET GEOMETRIC TOL. PER: ASME Y14.5M -1994

MATERIAL NA

FINISH NA

DO NOT SCALE DRAWING

	NAME	DATE
DRAWN	TB	01/24/07
CHECKED	KJ	01/24/07
GEN MGR	RG	01/24/07

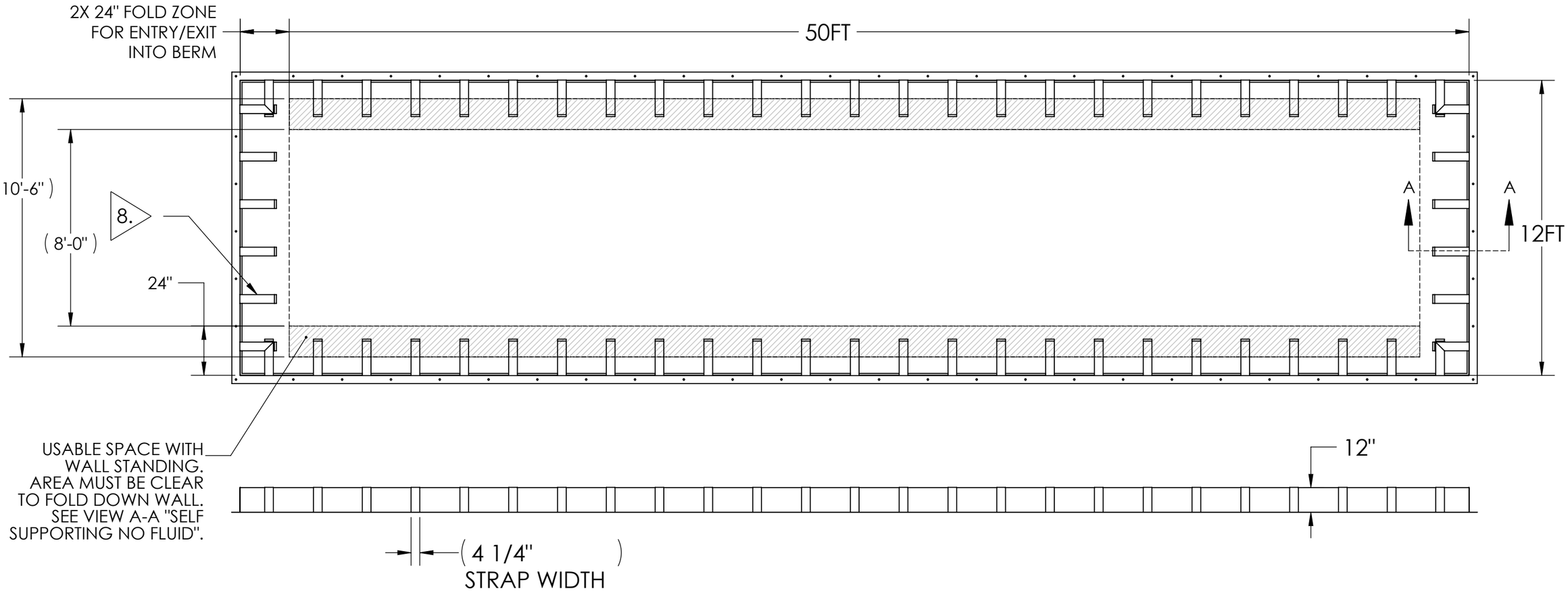
COMMENTS: DRAWING IS INTENDED TO PROVIDE PRODUCT INFORMATION ONLY. ACTUAL CONSTRUCTION MAY VARY SLIGHTLY FROM DEPICTED MODEL.

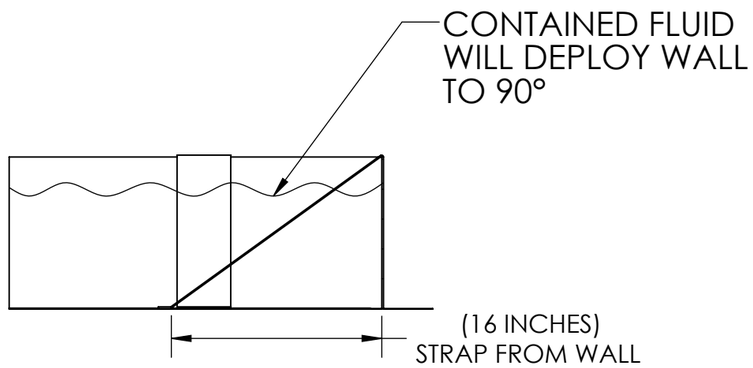
BASIC CONCEPTS, INC.

TITLE: BERM, SPILLGUARD, 12'X50'X12", INSIDE STRAP

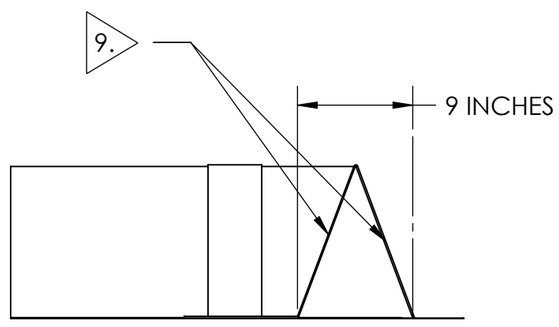
SIZE	DWG. NO.	REV
B	1001-00008-10X	A

SCALE: 1:75 SHEET 1 OF 2





SECTION A-A
SCALE 1 : 12
WITH FLUID PRESENT



SECTION A-A
SCALE 1 : 12
SELF SUPPORTING
WITH NO FLUID

DWG. NO.	REV
1001-00008-10X	A
SCALE: 1:50	SHEET 2 OF 2

APPENDIX 5

Quality Control Program

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Quality Control (QC) Program

Location:

690 Saint Paul Street
Rochester, New York

Prepared For:

Genesee Valley Real Estate Company
First Federal Plaza
28 East Main Street
Rochester, New York 14614

LaBella Project No. 209280

December 2014

Quality Control (QC) Program

Location:

690 Saint Paul Street
Rochester, New York

Prepared For:

Genesee Valley Real Estate Company
First Federal Plaza
28 East Main Street
Rochester, New York 14614

LaBella Project No. 209280

December 2014

LaBella Associates, D.P.C.
300 State Street
Rochester, New York 14614

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1. Introduction

LaBella's Quality Control (QC) Program is an integral part of its approach to environmental investigations. By maintaining a rigorous QC program, our firm is able to provide accurate and reliable data. QC also provides safe working conditions for all on-site workers.

The Quality Control program contains procedures, which provide for collected data to be properly evaluated, and which document that quality control procedures have been followed in the collection of samples. The quality control program represents the methodology and measurement procedures used in collecting quality field data. This methodology includes the proper use of equipment, documentation of sample collection, and sample handling practices.

Procedures used in the firm's Quality Control program are compatible with federal, state, and local regulations, as well as, appropriate professional and technical standards.

This QC program has been organized into the following areas:

- QC Objectives and Checks
- Field Equipment, Handling, and Calibration
- Sampling Techniques
- Sample Handling and Packaging

It should be noted that the Remedial Investigation (RI) Work Plan may have project specific details that will differ from the procedures in this QC program. In such cases, the RI Work Plan should be followed (subsequent to regulatory approval).

2. Quality Control Objectives

The United States Environmental Protection Agency (EPA) has identified five general levels of analytical data quality as being potentially applicable to site investigations conducted under CERCLA. These levels are summarized below:

- **Level I -** Field screening. This level is characterized by the use of portable instruments, which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Data can be generated regarding the presence or absence of certain contaminants (especially volatiles) at sampling locations.
- **Level II -** Field analysis. This level is characterized by the use of portable analytical instruments, which can be used on site or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of contaminants, sample matrix, and personnel skills, qualitative and quantitative data can be obtained.
- **Level III -** Laboratory analysis using methods other than the Contract Laboratory Program (CLP) Routine Analytical Services (RAS). This level is used primarily in support of engineering studies using standard EPA-approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP requirements for documentation.
- **Level IV -** CLP Routine Analytical Services. This level is characterized by rigorous QC protocols and documentation and provides qualitative and quantitative analytical data. Some regions have obtained similar support via their own regional laboratories, university

laboratories, or other commercial laboratories.

- **Level V** - Non-standard methods. Analyses, which may require method modification and/or development. CLP Special Analytical Services (SAS) are considered Level V.

Unless stated otherwise, all data will be generated in accordance with Level IV. When CLP methodology is not available, federal and state approved methods will be utilized. Level III will be utilized, as necessary, for non-CLP RAS work which may include ignitability, corrosivity, reactivity, EP toxicity, and other state approved parameters for characterization. Level I will be used throughout the RI for health and safety monitoring activities.

All measurements will be made to provide that analytical results are representative of the media and conditions measured. Unless otherwise specified, all data will be calculated and reported in units consistent with other organizations reporting similar data to allow comparability of data bases among organizations. Data will be reported in µg/L and mg/L for aqueous samples, and µg/kg and mg/kg (dry weight) for soils, or otherwise as applicable.

The characteristics of major importance for the assessment of generated data are accuracy, precision, completeness, representativeness, and comparability. Application of these characteristics to specific projects is addressed later in this document. The characteristics are defined below.

2.1. Accuracy

Accuracy is the degree of agreement of a measurement or average of measurements with an accepted reference or "true" value and is a measure of bias in the system.

2.2. Precision

Precision is the degree of mutual agreement among individual measurements of a given parameter.

2.3. Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount expected to be obtained under correct normal conditions.

2.4. Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition

Careful choice and use of appropriate methods in the field will ensure that samples are representative. This is relatively easy with water or air samples since these components are homogeneously dispersed. In soil and sediment, contaminants are unlikely to be evenly distributed, and thus it is important for the sampler and analyst to exercise good judgment when removing a sample.

2.5. Comparability

Comparability expresses the confidence with which one data set can be compared to another. The data sets may be inter- or intra- laboratory.

3. Measurement of Data Quality

3.1. Accuracy

Accuracy of a particular analysis is measured by assessing its performance with "known" samples. These "knowns" take the form of EPA standard reference materials, or laboratory prepared solutions of target analytes spiked into a pure water or sample matrix. In the case of GC or GC/MS analyses, solutions of surrogate compounds, which can be spiked into every sample and are designed to mimic the behavior of target analytes without interfering with their determination, are used.

In each case the recovery of the analyte is measured as a percentage, correcting for analytes known to be present in the original sample if necessary, as in the case of a matrix spike analysis. For EPA supplied known solutions, this recovery is compared to the published data that accompany the solution.

For the firm's prepared solutions, the recovery is compared to EPA-developed data or the firm's historical data as available. For surrogate compounds, recoveries are compared to EPA CLP acceptable recovery tables.

If recoveries do not meet required criteria, then the analytical data for the batch (or, in the case of surrogate compounds, for the individual sample) are considered potentially inaccurate. The analyst or his supervisor must initiate an investigation of the cause of the problem and take corrective action. This can include recalibration of the instrument, reanalysis of the QC sample, reanalysis of the samples in the batch, or flagging the data as suspect if the problems cannot be resolved. For highly contaminated samples, recovery of the matrix spike may depend on sample homogeneity. As a rule, analyses are not corrected for recovery of matrix spike or surrogate compounds.

3.2. Precision

Precision of a particular analysis is measured by assessing its performance with duplicate or replicate samples. Duplicate samples are pairs of samples taken in the field and transported to the laboratory as distinct samples. Their identity as duplicates is sometimes not known to ASC and usually not known to bench analysts, so their usefulness for monitoring analytical precision at bench level is limited. For most purposes, precision is determined by the analysis of replicate pairs (i.e., two samples prepared at the laboratory from one original sample). Often in replicate analysis the sample chosen for replication does not contain target analytes so that quantitation of precision is impossible. For EPA CLP analyses, replicate pairs of spiked samples, known as matrix spike/matrix spike duplicate samples, are used for precision studies. This has the advantage that two real positive values for a target analyte can be compared.

Precision is calculated in terms of Relative Percent Difference (RPD).

- Where X_1 and X_2 represent the individual values found for the target analyte in the two replicate analyses or in the matrix spike/matrix spike duplicate analyses.
- RPDs must be compared to the method RPD for the analysis. The analyst or his supervisor must investigate the cause of RPDs outside stated acceptance limits. This may include a visual inspection of the sample for non homogeneity, analysis of check samples, etc. Follow-up action may include sample reanalysis or flagging of the data as suspect if problems cannot be resolved.
- During the data review and validation process (see Section 9), field duplicate RPDs are assessed as a measure of the total variability of both field sampling and laboratory analysis.

3.3. Completeness

Completeness for each parameter is calculated as follows:

- The firm's target value for completeness for all parameters is 100%. A completeness value of 95% will be considered acceptable. Incomplete results will be reported to the site managers. In planning the field sample collection, the site manager will plan to collect field duplicates from identified critical areas. This procedure should assure 100% completeness for these areas.

3.4. Representativeness

The characteristic of representativeness is not quantifiable. Subjective factors to be taken into account are as follows:

- The degree of homogeneity of a site;
- The degree of homogeneity of a sample taken from one point in a site; and
- The available information on which a sampling plan is based.

To maximize representativeness of results, sampling techniques and sample locations will be carefully chosen so that they provide laboratory samples representative of the site and the specific area. Within the laboratory, precautions are taken to extract from the sample bottle an aliquot representative of the whole sample. This includes premixing the sample and discarding pebbles from soil samples.

4. Quality Control Targets

Target values for detection limit, percent spike recovery and percent "true" value of known check standards, and RPD of duplicates/replicates are included in the QCP, Analytical Procedures. Note that tabulated values are not always attainable. Instances may arise where high sample concentrations, non homogeneity of samples, or matrix interferences preclude achievement of target detection limits or other quality control criteria. In such instances, the firm will report reasons for deviations from these detection limits or noncompliance with quality control criteria.

5. Sampling Procedures

This section describes the sampling procedures to be utilized for each environmental medium that will be collected and analyzed in accordance with appropriate state and federal requirements. All procedures described are consistent with EPA sampling procedures as described in SW-846, third edition, September 1986. All samples will be delivered to the laboratory within 24 to 28 hours of collection.

6. Soil & Groundwater Investigation

The groundwater sampling plan outlined in this subsection has been prepared in general accordance with RCRA Groundwater Monitoring Technical Enforcement Guidance Document 9950.1 (September 1986), Office of Solid Waste and Emergency Response.

Prior to drilling, all drill sites will be cleared with appropriate utility companies to avoid potential accidents relating to underground utilities.

6.1. Test Borings and Well Installation

6.1.1. Drilling Equipment

Direct Push "Geo-Probe" Soil Borings:

Borings will be advanced with a "geo-probe" direct push sampling system. The use of direct push technology allows for rapid sampling, observation, and characterization of relatively shallow overburden soils. The geo-probe utilizes a four-foot macro-core sampler, with disposable polyethylene sleeves. Soil cores will be retrieved in four-foot sections, and can be easily cut from the polyethylene sleeves for observation and sampling. The macro-core sampler will be decontaminated between samples and borings using an alconox and water solution.

Drill Rig Advanced Soil Borings:

The drilling and installation of monitoring wells will be performed using a rotary drill rig which will have sufficient capacity to perform 4 1/2-inch inside diameter (ID) hollow-stem auger drilling in the overburden, retrieve split-spoon samples, and perform necessary rock coring to provide a minimum 3-inch diameter core, known in the industry as "NX." The borehole may be reamed to 5 1/2-inch diameter prior to monitoring well installation as cased hole in the bedrock, or may be left as open hole, with NYSDEC concurrence.

6.1.2. Drilling Techniques

Direct Push "Geo-Probe" Advanced Borings:

Prior to initiating drilling activities, the Geo-probe, macro cores, drive rods, pertinent equipment, well pipe and screens will be steam cleaned or washed with an alconox and water solution followed by a clean water rinse. This cleaning procedure will also be used between each boring. These activities will be performed in a designated on-site decontamination area. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used. The drilling rig and all equipment will be steam cleaned upon completion of the investigation and prior to leaving the site.

Test borings will be advanced with 2-inch direct push macro-cores through overburden soils. Drilling

fluids, other than water from a NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative.

It will be the responsibility of the consultant to arrange for the appropriate drilling equipment to be present at the site. Standby time to arrange for additional equipment or a water supply will not be allowed unless caused by unexpected site conditions.

During the drilling, a Photoionization detector (PID) will be used to monitor the gases exiting the hole. Macro-core cuttings will be contained if the PID meter readings are greater than 5 ppm above background or the cuttings show visible evidence of contamination, or as specified in the RI Work Plan.

Drill Rig Advanced Borings:

Prior to initiating drilling activities, the drilling rig, augers, rods, split spoons, pertinent equipment, well pipe and screens will be steam cleaned. This cleaning procedure will also be used between each boring. These activities will be performed in a designated on-site decontamination area. Throughout and after the cleaning processes, direct contact between the equipment and the ground surface will be avoided. Plastic sheeting and/or clean support structures (e.g., pallets, sawhorses) will be used. The drilling rig and all equipment will be steam cleaned upon completion of the investigation and prior to leaving the site.

Test borings will be advanced with 4 1/2-inch (ID) hollow stem augers through overburden, and NX-sized diamond core barrels in competent rock, driven by truck-, track-, or trailer-mounted drilling equipment. Alternative methods of drilling or equipment may be allowed or requested for site-specific criteria, but must be approved by the NYSDEC. Drilling fluids, other than water from a NYSDEC-approved source, will not be allowed without special consideration and agreement from NYSDEC. The use of lubricants is also not allowed unless approved by the NYSDEC representative. One sample from each drilling water source may be analyzed for full TCL.

It will be the responsibility of the consultant to arrange for the appropriate drilling equipment to be present at the site. Standby time to arrange for additional equipment or a water supply will not be allowed unless caused by unexpected site conditions.

During the drilling, a photoionization detector (PID) will be used to monitor the gases exiting the hole. Auger cuttings will be contained if the PID meter readings are greater than 5 ppm above background or the cuttings show visible evidence of contamination, or as specified in the RI Work Plan.

Where bedrock wells are required, test borings shall be advanced into rock with NX coring tools. Only water from an approved source shall be used in rock coring. The consultant shall monitor and record the petrology, core recovery, fractures, rate of advance, water levels, and water lost or produced in each test boring. The Rock Quality Determination (RQD) value shall be calculated for each 5-foot core. Each core shall be screened with a PID upon extraction to determine proper handling procedure. All core samples shall be retained and stored by the consultant, for review by NYSDEC, in an approved wooden core box for a period of not less than one year.

Bedrock well installation will involve construction of a rock socket. The socket will be drilled into the top of rock at each bedrock well location to allow permanent 3-inch casing to be grouted securely in place prior to completion of the well. The purpose for this is to provide a seal at the overburden/bedrock interface and into the upper bedrock surface, to prevent the entrance of overburden water into the bedrock.

To construct the rock socket, a core hole will be reamed out to a minimum diameter of 3 7/8-inches and set into the first 5-feet of bedrock. This will allow the placement of permanent 3-inch diameter Polyvinyl chloride (PVC) well casing into the bedrock surface. The method selected may be percussion or rotary drilling at the option of the subcontractor. The method and equipment selected must be capable of penetrating the bedrock at each well location to a depth required by the work plan and will be selected based on the results of the rock coring performed.

While the augers are seated on top of bedrock, a cement grout will be tremied into the bedrock socket. Once sufficient grout has been place, the 3-inch PVC casing will be lowered into the bedrock socket. A PVC plug will be placed in the end of the 3-inch PVC casing, prior to insertion in the borehole, to prevent grout from entering the PVC casing. Once the 3-inch PVC casing is in place, the augers can be removed and the remaining grout should be added. After the grout and 3-inch PVC casing have set up for 24 hours, the remaining amount of bedrock can be NX cored through the 3-inch PVC casing to a depth determined by the RI work plan.

6.1.3. Well Casing (Riser)

Direct Push Geo-Probe Groundwater Monitoring Wells:

Direct Push Geo-Probe advanced groundwater-monitoring wells utilized 1.25-inch threaded flush joint PVC pipe.

Drill Rig Advanced Groundwater Monitoring Wells:

The well riser shall consist of 2-inch or 4-inch diameter, threaded flush-joint PVC pipe. All well risers will conform to the requirements of ASTM-D 1785 Schedule 40 pipe, and shall bear markings that will identify the material as that which is specified. All materials used to construct the wells will be NSF/ASTM approved.

6.1.4. Well Screen

Direct Push Geo-Probe Groundwater Monitoring Wells:

Direct Push Geo-Probe advanced groundwater-monitoring wells utilized 1.25-inch diameter well screen. Groundwater-monitoring wells will set to intersect the top of the shallow overburden groundwater table. Each geo-probe advanced well will be equipped with 5 to 10 feet (based on anticipated groundwater level and bedrock depth) of .010 inch slotted PVC screen connected to an appropriate length of PVC riser to complete the well installation.

Drill Rig Advanced Groundwater Monitoring Wells:

Generally, wells will be constructed with 10-foot machine-slotted screens, unless otherwise specified or dictated by field conditions (i.e., screens of less than 10-feet in length may be used, depending on the characteristics of the well). The well screen slot size will be selected based on the filter pack grain size and the ability to hold back 85 percent or more of the filter pack materials. Screen and riser sections shall be joined by flush-threaded coupling to form watertight unions that retain 100% of the strength of the casing. Solvent PVC glue shall not be used at any time in the construction of the wells. The bottom of the screen shall be sealed with a treated cap or plug. No lead shot or lead wool is to be employed in sealing the bottom of the well or for sealant at any point in the well.

All risers and screens shall be set round, plumb, and true to line.

6.1.5. Artificial Sand Pack

Granular backfill will be chemically and texturally clean (as determined using a 10x hand lens), inert, siliceous, and of appropriate grain size for the screen slot size and the host environment. Sand pack grain size will be selected based on sieve analyses of formation samples. The sand pack will be installed using a tremie pipe and the casing will be equipped with centralizers (wells 15 ft. or deeper only) to minimize the tendency for particle separation and bridging. Prior to casing and screen insertion, a minimum of 1-foot of gravel-pack bedding will be placed in the bottom of the hole. The well screen and casing will be installed, and the sand pack placed around the screen and casing to a depth extending at least 25 percent of the screen length above the top of the screen.

6.1.6. Bentonite Seal

A minimum 2-foot thick seal of tamped bentonite pellets will be placed directly on top of the sand pack, and care will be taken to avoid bridging. The seal will be measured immediately after placement, without allowance for swelling.

6.1.7. Grout Mixture

Upon completion of the bentonite seal, the well will be grouted with a non-shrinking cement grout (e.g., Volclay®) mix to be placed from the top of the bentonite seal to the ground surface. The cement grout shall consist of a mixture of Portland cement (ASTM C 150) and water, in the proportion of not more than 7 gallons of clean water per bag of cement (1 cubic foot or 94 pounds). Additionally, 3% by weight of bentonite powder shall be added, if permitted.

6.1.8 Surface Protection

At all times during the progress of the work, precautions shall be used to prevent tampering with or the entrance of foreign material into the well. Upon completion of the well, a suitable lockable cap shall be installed to prevent material from entering the well. The PVC well riser shall be protected by a flush mounted road box set into a concrete pad. A concrete pad, sloped away from the well, shall be constructed around the flush mount road box at ground level.

Any well that is to be temporarily removed from service or left incomplete due to delay in construction shall be capped with a watertight cap and equipped with a "vandal-proof" cover, satisfying applicable NYSDEC regulations or recommendations.

6.1.9. Surveying

Coordinates and elevations will be established for each monitoring well and sampling location. Elevations to the closest 0.01 foot shall be used for the survey. These elevations shall be referenced to a regional, local, or project-specific datum. USGS benchmarks will be used whenever available. The location, identification, coordinates, and elevations of the wells will be plotted on maps with a scale large enough to show their location with reference to other structures at each site.

6.1.10. Well Development

After completion of the well, but not sooner than 24 hours after grouting is completed, development will be accomplished using pumping, bailing, or surge blocking. No dispersing agents, acids, disinfectants, or other additives will be used during development or introduced into the well at any other time. During development, water will be removed throughout the entire water column by periodically lowering and raising the pump intake (or bailer stopping point).

Well development will include washing the entire well cap and the interior of the well casing above the water table, using only water from the well itself. As a result of this operation, the well casing will be free of extraneous materials (grout, bentonite, and sand) inside the riser, well cap, and blank casing between top of the well casing and water table. This washing will be conducted before and/or during development; not after development. Development water will be either properly contained and treated as waste until the results of chemical analysis of samples are obtained or discharged on site as determined by the site-specific work plans and/or consultation with the NYSDEC representatives on site.

The development process will continue until a stabilization of pH, specific conductance, temperature, and clarity (goal of <50 NTUs) of the discharge is achieved or for a maximum of two hours.

After final development of the well, water levels will be recorded and approximately 1 liter of water from the well will be collected in a clear glass jar, labeled and photographed, and submitted as part of the well log. The photograph will be taken to show the relative clarity of the water. Visual identification of the physical characteristics of removed sediments will also be recorded.

7. Geologic Logging and Sampling

At each investigative location, the boring will be advanced through overburden using either a drill rig and hollow-stem auger or direct push technology; soils will be visually inspected for stains and monitored with a PID to help determine potential for vertical migration of contaminants. Soil samples will be collected continuously in both the unsaturated soil zone and the saturated zone. Selected wells will be sampled continuously over the entire depth of the well. The sampling device will be decontaminated according to procedures outlined in the Decontamination section of this document. The split-spoon sampler will be driven into the soil using a 140-pound safety hammer and allowed to free-fall 30-inches, in accordance with ASTM-D 1586-84 specifications. The number of blows required to drive the sampler each 6-inches of penetration will be recorded. Soil samples will be screened in the field for volatile organic vapors using a PID, classified in accordance with Unified Soil Classification System (USCS) specifications, and logged. Samples will be stored in glass jars until they are needed for testing or the project is complete.

All samples will be screened with a PID during collection. The headspace of all samples taken in the field will be screened using USEPA method 3810.

Monitoring well borings will be advanced to maximum design depth below the ground surface, as indicated by the work plan for each site. If hard boulders or bedrock result in auger refusal, rock coring will be used to advance the hole to design depth. If hydrogeologic conditions are favorable for well installation at a depth less than design, the well will be installed at the boring or coring termination depth. In the event that maximum design depth is reached and hydrogeologic conditions are not suitable for well installation, the maximum drilling depth will be revised. Hydrogeologic suitability for well emplacement will be determined by the supervising geologist in consultation with NYSDEC, based on thickness and estimated hydraulic conductivity of the saturated zone encountered. If necessary, the borehole will be advanced to water or abandoned.

Boulders and bedrock encountered during well installation shall be cored by standard diamond-core drilling methods using an "NX" size core barrel. All rock cores recovered will be logged by a geologist, labeled, photographed, and stored in wooden core boxes. The photographs will be submitted as part of the completed boring logs. The cores will be stored by the firm until the project is completed or for at least one year. Drilling logs will be prepared by an experienced geologist or geotechnical engineer, who will be present during all drilling operations. One copy of each field boring and well construction log,

including color photographs of the rock core, if encountered, and groundwater data, will be submitted as part of the RI report. The RQD value shall be calculated for each 5-foot section. Information provided in the logs shall include, but not be limited to, the following:

- Date, test hole identification, and project identification;
- Name of individual developing the log;
- Name of driller and assistant(s);
- Drill, make and model, auger size;
- Identification of alternative drilling methods used and justification thereof (e.g., rotary drilling with a specific bit type to remove material from within the hollow stem augers);
- Standard penetration test (ASTM D-1586) blow counts;
- Field diagram of each monitoring well installed with the depth to bottom of screen, top of screen, and pack, bentonite seal, etc.;
- Reference elevation for all depth measurements;
- Depth of each change of stratum;
- Thickness of each stratum;
- Identification of the material of which each stratum is composed, according to the USCS system or standard rock nomenclature, as appropriate;
- Depth interval from which each sample was taken;
- Depth at which hole diameters (bit sizes) change;
- Depth at which groundwater is encountered;
- Depth to static water level and changes in static water level with well depth;
- Total depth of completed well;
- Depth or location of any loss of tools or equipment;
- Location of any fractures, joints, faults, cavities, or weathered zones;
- Depth of any grouting or sealing;
- Nominal hole diameters;
- Amount of cement used for grouting or sealing;
- Depth and type of well casing;
- Description of well screen (to include depth, length, location, diameter, slot sizes, material, and manufacturer);
- Any sealing-off of water-bearing strata;
- Static water level upon completion of the well and after development;
- Drilling date or dates;
- Construction details of well; and
- An explanation of any variations from the work plan.

8. Groundwater Sampling Procedures

The groundwater in all new monitoring wells will be allowed to stabilize for 7 days following development. Water levels will be measured to within 0.01 foot prior to purging and sampling. A temporary staff gauge or other surface water elevation measuring device will be established on any nearby surface water body, which may significantly influence groundwater movement. The surface elevation of these water bodies will be checked whenever groundwater elevations are measured. Sampling of each well will be accomplished in one of two ways.

Active Sampling:

Purging will be completed prior to active sampling. In general, wells will be purged until the pH, conductivity, temperature, and turbidity of the water being pumped from the well have stabilized. All

wells will be purged of at least three well-bore volumes or to dryness. Groundwater samples will be collected via active methods (i.e., purging) according to the following procedures and in the volumes specified in Table 11-1:

- Water clarity will be quantified during sampling with a turbidity meter;
- When transferring water from the bailer or pump line to sample containers, care will be taken to avoid agitating the sample, since agitation promotes the loss of volatile constituents;
- Any observable physical characteristics of the groundwater (e.g., color, sheen, odor, turbidity) at the time of sampling will be recorded; and
- Weather conditions (i.e., air temperature, sky condition, recent heavy rainfall, drought conditions) at the time of sampling will be recorded.

Passive Sampling:

Groundwater samples will be collected via passive methods (i.e., no-purge) according to the following procedures and in the volumes specified in Table 11-1:

- Samples will be collected via passive diffusion bag (PDB) samplers. PDB samplers are made of low-density polyethylene plastic tubing (typically 4 mil), filled with laboratory grade (ASTM Type II) deionized water and sealed at both ends.
- PDB samplers will only be used to collect groundwater samples which will be analyzed for VOCs.
- PDB samplers will be deployed by hanging in the well at the middle of the well screen unless a low water table, need to deploy multiple samplers or the targeting of a specific depth interval is identified. The PDB samplers will be deployed at least 14 days prior to sampling.
- The PDB samplers will be deployed using a Teflon® coated string or synthetic rope.
- When transferring water from the PDB to sample containers, care will be taken to avoid agitating the sample, since agitation promotes the loss of volatile constituents;
- Any observable physical characteristics of the groundwater (e.g., color, sheen, odor, turbidity) at the time of sampling will be recorded; and
- Weather conditions (i.e., air temperature, sky condition, recent heavy rainfall, drought conditions) at the time of sampling will be recorded.

All groundwater samples and their accompanying QC samples will be run for volatile organic chemicals using NYSDEC Analytical Services Protocol (ASP; revised July 2005 and subsequent amendments or revisions).

9. Management of Investigative-Derived Waste

Purpose:

The purposes of these guidelines are to ensure the proper holding, storage, transportation, and disposal of materials that may contain hazardous wastes. Investigation-derived waste (IDW) included the following:

- Drill cuttings, discarded soil samples, drilling mud solids, and used sample containers;
- Well development and purge waters and discarded groundwater samples;
- Decontamination waters and associated solids;
- Soiled disposable personal protective equipment (PPE);
- Used disposable sampling equipment;
- Used plastic sheeting and aluminum foil;

- Other equipment or materials that either contain or have been in contact with potentially-impacted environmental media.
- Because these materials may contain regulated chemical constituents, they must be managed as a solid waste. This management may be terminated id characterization analytical results indicate the absence of these constituents.

Procedure:

1. Contain all investigation-derived wastes in Department of Transpiration (DOT)-approved 55-gallon drums, roll-off boxes, or other containers suitable for the wastes.
2. Contain wastes from separate borings or wells in separate containers (i.e. do not combine wastes from several borings/wells in a single container, unless it is a container used specifically for transfer purposes, or unless specific permission to do so has been provided by the LaBella Project Manager. Unused samples from surface sample locations within a given area may be combined.
3. To the extent practicable, separate solids from drilling muds, decontamination waters, and similar liquids. Place solids within separate containers.
4. Transfer all waste containers to a staging area. Access to this area will be controlled. Waste containers must be transferred to the staging area as soon as practicable after the generating activity is complete.
5. Pending transfer, all containers will be covered and secured when not immediately attended,
6. Label all containers with regard to contents, origin, and date of generation. Use indelible ink for all labeling.
7. Collect samples for waste characterization purposes, use boring/well sample analytical data for characterization.
8. For wastes determined to be hazardous in character, be aware on accumulation time limitations. Coordinate the disposal of these wastes with the Owner and NYSDEC.
9. Dispose of investigation-derived wastes as follows;
    - Soil, water, and other environmental media for which analysis does not detect organic constituents, and for which inorganic constituents are at levels consistent with background, may be spread on-site (pending NYSDEC approval) or otherwise treated as a non-waste material.
    - Soils, water, and other environmental media in which organic compounds are detected or metals are present above background will be disposed as industrial waste. Alternate disposition must be consistent with applicable State and Federal laws.
    - Personal protective equipment, disposable bailers, and similar equipment may be disposed as municipal waste, unless waste characterization results mandate disposal as industrial wastes

10. Decontamination

Sampling methods and equipment have been chosen to minimize decontamination requirements and to prevent the possibility of cross-contamination. Decontamination of equipment will be performed between discrete sampling locations. Equipment used to collect samples between composite sample locations will not require decontamination between collection of samples. All drilling equipment will be decontaminated prior to drilling, after drilling each monitoring well, and after the completion of all

drilling. Special attention will be given to the drilling assembly, augers, and PVC casing and screens.

Drilling decontamination will consist of:

- Steam cleaning;
- Scrubbing with brushes, if soil remains on equipment; and
- Steam rinse.

Split spoons and other non-disposable equipment will be decontaminated between each sampling event. The sampler will be cleaned prior to each use, by one of the following procedures:

- Initially cleaned of all foreign matter;
- Sanitized with a steam cleaner;

OR

- Initially cleaned of all foreign matter;
- Scrubbed with brushes in alconox solution;
- Triple rinsed with deionized water; and
- Allowed to air dry.

11. Sample Containers

The volumes and containers required for the sampling activities are included in pre-washed sample containers will be ordered directly from a firm, which prepares the containers in accordance with EPA bottle washing procedures.

Table 11-1
Water Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics	40-ml glass vial with Teflon-backed septum	Two (2); fill completely, no air space	Cool to 4° C (ice in cooler), Hydrochloric acid to pH <2	7 days
Semivolatile Organics	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Pesticides	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
PCBs	1,000-ml amber glass jar	One (1); fill completely	Cool to 4° C (ice in cooler)	7/40 days
Metals	500-ml polyethylene	One (1); fill completely	Cool to 4° C (Nitric acid to pH <2	6 months

* Holding time is based on verified time of sample receipt at laboratory.

Note: All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992

TABLE 11-2
Soil Samples

Type of Analysis	Type and Size of Container	Number of Containers and Sample Volume (per sample)	Preservation	Maximum Holding Time
Volatile Organics, Semivolatile Organics, PCBs, and Pesticides	8-oz, glass jar with Teflon-lined cap	Two (2), fill as completely as possible	Cool to 4° C (ice in cooler)	7 days
RCRA Characterization	8-oz. glass jar with Teflon-lined cap	One (1); fill completely	Cool to 4° C (ice in cooler)	Must be extracted within 10 days; analyzed with 30 days

* Holding time is based on the times from verified time of sample receipt at the laboratory.

Note: All sample bottles will be prepared in accordance with USEPA bottle washing procedures. These procedures are incorporated in LaBella Associates Quality Control Procedures Manual, January, 1992.

TABLE 11-3
List of Major Instruments for Sampling and Analysis

- MSA 360 0_2 /Explosimeter
- Hollige Series 963 Nephlometer (turbidity meter)
- EM-31 Geomics Electromagnetic Induction Device
- pH/Temperature/Conductivity Meter - Portable
- Hewlett Packard (HP) 1000 computer with RTE-6 operating system; and HP 9144 computer with RTE-4 operating system equipped with Aquarius software for control and data acquisition from gas chromatograph/mass spectrometer (GC/MS) systems; combined wiley and National Bureau of Standards (NBS) mass spectral library; and data archiving on magnetic tape
- Viriam 6000 and 37000 gas chromatrographs equipped with flame ionization, electron capture, photoionization and wall detectors as appropriate for various analyses,, and interfaced to Variam DS604 or D5634 data systems for processing data.
- Spectra-Physics Model SP 4100 and SP 4270 and Variam 4270 cam puting integrators
- Perkin Eimer (PE) 3000% and 3030% fully Automated Atomic Absorption Spectrophotometers (AAS) with Furnace Atomizer and background correction system
- PE Plasma II Inductively Coupled Argon Plasma (ICAP) Spectre meter with PE7500 laboratory computer
- Dionex 20001 ion chromatograph with conductivity detector for anion analysis, with integrating recorder

12. Sample Custody

This section describes standard operating procedures for sample identification and chain-of-custody to be utilized for all Phase II field activities. The purpose of these procedures is to ensure that the quality of the samples is maintained during their collection, transportation, and storage through analysis. All chain-of-custody requirements comply with standard operating procedures indicated in EPA sample handling protocol.

Sample identification documents must be carefully prepared so that sample identification and chain-of-custody can be maintained and sample disposition controlled. Sample identification documents include:

- Field notebooks,
- Sample label,
- Custody seals, and
- Chain-of-custody records.

13. Chain-of-Custody

The primary objective of the chain-of-custody procedures is to provide an accurate written or computerized record that can be used to trace the possession and handling of a sample from collection to completion of all required analyses. A sample is in custody if it is:

- In someone's physical possession;
- In someone's view;
- Locked up; or
- Kept in a secured area that is restricted to authorized personnel.

13.1. Field Custody Procedures

- As few persons as possible should handle samples.
- Sample bottles will be obtained precleaned from a source such as I-Chem. Coolers or boxes containing cleaned bottles should be sealed with a custody tape seal during transport to the field or while in storage prior to use.
- The sample collector is personally responsible for the care and custody of samples collected until they are transferred to another person or dispatched properly under chain-of-custody rules.
- The sample collector will record sample data in the notebook.
- The site manager will determine whether proper custody procedures were followed during the fieldwork and decide if additional samples are required.

13.2. Sample Tags

Sample tags attached to or affixed around the sample container must be used to properly identify all samples collected in the field. The sample tags are to be placed on the bottles so as not to obscure any QC lot numbers on the bottles; sample information must be printed in a legible manner using waterproof ink. Field identification must be sufficient to enable cross-reference with the logbook. For chain-of-custody purposes, all QC samples are subject to exactly the same custodial procedures and documentation as "real" samples.

13.3. Transfer of Custody and Shipment

- The coolers in which the samples are packed must be accompanied by a chain-of-custody record. When transferring samples, the individuals relinquishing and receiving them must sign, date, and note the time on the chain-of-custody record. This record documents sample custody transfer
- Shipping containers must be sealed with custody seals for shipment to the laboratory. The method of shipment, name of courier, and other pertinent information are entered in the "Remarks" section of the chain-of-custody record and traffic reports.
- All shipments must be accompanied by the chain-of-custody record identifying their contents. The original record accompanies the shipment. The other copies are distributed appropriately to the site manage.
- If sent by mail, the package is registered with return receipt requested. If sent by common carrier, a bill of lading is used. Freight bills, Postal Service receipts, and bill of lading are retained as part of the permanent documentation.

13.4. Chain-of-Custody Record

The chain-of-custody record must be fully completed in duplicate, using black carbon paper where possible, by the field technician who has been designated by the project manager as responsible for sample shipment to the appropriate laboratory for analysis. In addition, if samples are known to require rapid turnaround in the laboratory because of project time constraints or analytical concerns (e.g., extraction time or sample retention period limitations, etc.), the person completing the chain-of-custody record should note these constraints in the "Remarks" section of the record.

13.5. Laboratory Custody Procedures

A designated sample custodian accepts custody of the shipped samples and verifies that the sample identification number matches that on the chain-of-custody record and traffic reports, if required. Pertinent information as to shipment, pickup, and courier is entered in the "Remarks" section.

13.6. Custody Seals

Custody seals are preprinted adhesive-backed seals with security slots designed to break if the seals are disturbed. Sample shipping containers (coolers, cardboard boxes, etc., as appropriate) are sealed in as many places as necessary to ensure security. Seals must be signed and dated before use. On receipt at the laboratory, the custodian must check (and certify, by completing the package receipt log and LABMIS entries) that seals on boxes and bottles are intact. Strapping tape should be placed over the seals to ensure that seals are not accidentally broken during shipment.

14. Documentation

14.1. Sample Identification

All containers of samples collected from the project will be identified using the following format on a label or tag fixed to the sample container (labels are to be covered with Mylar tape):

XX-YY-O/D

- XX This set of initials indicates the specific Phase II sampling project
- YY These initials identify the sample location. Actual sample locations will be recorded in the task log.
- O/D An "O" designates an original sample; "D" identifies it as a duplicate.

Each sample will be labeled, chemically preserved, if required and sealed immediately after collection. To minimize handling of sample containers, labels will be filled out prior to sample collection. The sample label will be filled out using waterproof ink and will be firmly affixed to the sample containers and protected with Mylar tape. The sample label will give the following information:

- Name of sampler,
- Date and time of collection,
- Sample number,
- Analysis required,
- pH, and
- Preservation.

14.2. Daily Logs

Daily logs and data forms are necessary to provide sufficient data and observations to enable participants to reconstruct event that occurred during the project and to refresh the memory of the field personnel if called upon to give testimony during legal proceedings. All daily logs will be kept in a bound waterproof notebook containing numbered pages. All entries will be made in waterproof ink, dated, and signed. No pages will be removed for any reason. Corrections will be made according to the procedures given at the end of this section. The daily logs will include a site log and task log.

The site log is the responsibility of the site manager and will include a complete summary of the day's activity at the site.

The **Task Log** will include:

- Name of person making entry (signature).
- Names of team members on-site.
- Levels of personnel protection:
  - Level of protection originally used;
  - Changes in protection, if required; and
  - Reasons for changes.

- Time spent collecting samples.
- Documentation on samples taken, including:
  - Sampling location and depth station numbers;
  - Sampling date and time, sampling personnel;
  - Type of sample (grab, composite, etc.); and
  - Sample matrix.
- On-site measurement data.
- Field observations and remarks.
- Weather conditions, wind direction, etc.
- Unusual circumstances or difficulties.
- Initials of person recording the information.

15. Corrections to Documentation

15.1. Notebook

As with any data logbooks, no pages will be removed for any reason. If corrections are necessary, these must be made by drawing a single line through the original entry (so that the original entry can still be read) and writing the corrected entry alongside. The correction must be initialed and dated. Most corrected errors will require a footnote explaining the correction.

15.2. Sampling Forms

As previously stated, all sample identification tags, chain-of-custody records, and other forms must be written in waterproof ink. None of these documents are to be destroyed or thrown away, even if they are illegible or contain inaccuracies that require a replacement document.

If an error is made on a document assigned to one individual, that individual may make corrections simply by crossing a line through the error and entering the corrected information. The incorrect information should not be obliterated. Any subsequent error discovered on a document should be corrected by the person who made the entry. All corrections must be initialed and dated.

15.3. Photographs

Photographs will be taken as directed by the site manager. Documentation of a photograph is crucial to its validity as a representation of an existing situation. The following information will be noted in the task log concerning photographs:

- Date, time, location photograph was taken;
- Photographer (signature);
- Weather conditions;
- Description of photograph taken;
- Reasons why photograph was taken;
- Sequential number of the photograph and the film roll number; and
- Camera lens system used.

After the photographs have been developed, the information recorded in the field notebook should be transferred to the back of the photographs

16. Sample Handling, Packaging, and Shipping

The transportation and handling of samples must be accomplished in a manner that not only protects the integrity of the sample, but also prevents any detrimental effects due to the possible hazardous nature of samples. Regulations for packaging, marking, labeling, and shipping hazardous materials are promulgated by the United States Department of Transportation (DOT) in the Code of Federal Regulation, 49 CFR 171 through 177. All samples will be delivered to the laboratory with 24 to 48 hours from the day of collection.

All chain-of-custody requirements must comply with standard operating procedures in the EPA sample handling protocol. All sample control and chain-of-custody procedures applicable to the Consultant are presented in the Field Personnel Chain-of-Custody Documentation and Quality Control Procedures Manual, January 1992.

16.1. Sample Packaging

Samples must be packaged carefully to avoid breakage or contamination and must be shipped to the laboratory at proper temperatures. The following sample packaging requirements will be followed:

- Sample bottle lids must never be mixed. All sample lids must stay with the original containers.
- The sample volume level can be marked by placing the top of the label at the appropriate sample height, or with a grease pencil. This procedure will help the laboratory to determine if any leakage occurred during shipment. The label should not cover any bottle preparation QC lot numbers.
- All sample bottles are placed in a plastic bag to minimize the potential for vermiculite contamination.
- Shipping coolers must be partially filled with packing materials and ice when required, to prevent the bottles from moving during shipment.
- The sample bottles must be placed in the cooler in such a way as to ensure that they do not touch one another.
- The environmental samples are to be cooled. The use of "blue ice" or some other artificial icing material is preferred. If necessary, ice may be used, provided that it is placed in plastic bags. Ice is not to be used as a substitute for packing materials.
- Any remaining space in the cooler should be filled with inert packing material. Under no circumstances should material such as sawdust, sand, etc., be used.
- A duplicate custody record and traffic reports, if required must be placed in a plastic bag and taped to the bottom of the cooler lid. Custody seals are affixed to the sample cooler.

16.2. Shipping Containers

Shipping containers are to be custody-sealed for shipment as appropriate. The container custody seal will consist of filament tape wrapped around the package at least twice and custody seals affixed in such a way that access to the container can be gained only by cutting the filament tape and breaking a seal.

Field personnel will make arrangements for transportation of samples to the lab. When custody is relinquished to a shipper, field personnel will telephone the lab custodian to inform him of the expected time of arrival of the sample shipment and to advise him of any time constraints on sample analysis. The lab must be notified as early in the week as possible, and in no case later than 3 p.m. (EST) on Thursday, regarding samples intended for Saturday delivery.

16.3. Marking and Labeling

- Use abbreviations only where specified.
- The words "This End Up" or "This Side Up" must be clearly printed on the top of the outer package. Upward pointing arrows should be placed on the sides of the package. The words "Laboratory Samples" should also be printed on the top of the package.
- After a sample container has been sealed, two chain-of-custody seals are placed on the container, one on the front and one on the back. The seals are protected from accidental damage by placing strapping tape over then.
- If samples are designated as medium or high hazard, they must be sealed in metal paint cans, placed in the cooler with vermiculite and labeled and placarded in accordance with DOT regulations.
- In addition, the coolers must also be labeled and placarded in accordance with DOT regulations if shipping medium and high hazard samples.

17. Calibration Procedures and Frequency

All instruments and equipment used during sampling and analysis will be operated, calibrated, and maintained according to the manufacturer's guidelines and recommendations as well as criteria set forth in the applicable analytical methodology references. Operation, calibration, and maintenance will be performed by personnel properly trained in these procedures. Documentation of all routine and special maintenance and calibration information will be maintained in an appropriate logbook or reference file, and will be available on request. Section 7 lists the major instruments to be used for sampling and analysis. Brief descriptions of calibration procedures for major field and laboratory instruments follow.

18. Field Instrumentation

18.1. Photovac/MiniRae Photoionization Detector (PID)

Standard operating procedures for the PID require that routine maintenance and calibration be performed every six months. Field calibration will be performed on a daily basis. The packages used for calibration are non-toxic analyzed gas mixtures available in pressurized containers.

18.2. Organic Vapor Analyzer

Organic vapor analyzers (OVAs) are calibrated and routine maintenance performed every six months when the units are not in use. Calibration is performed and the major system checks are performed prior to the instrument being released for field use.

Calibration of the OVA 128 GC must be performed by a factory-authorized service representative. The instrument is removed from its protective case and the probe is connected to the base unit. After checking for an airtight seal in the sample line (plugging the sample inlet to stop the pump), the hydrogen supply is turned on and the pressure is set to 10 psi. The electronics are turned on and the instrument is allowed to warm up for at least 5 minutes. After warm up, the instrument is zeroed on the "X10" scale using the adjust knob. The flame is then lit and a gas-tight sample bag is filled with a mixture of 100 ppm methane in air. The sample bag is then attached to the probe inlet and the internal pump is allowed to draw in as much sample as is needed. R32 on the control board is adjusted to read 100 ppm on the "X10" scale and then the hydrogen supply is shut down. The pump can now be turned off and the sample bag removed. Using the adjust knob, the meter is set to read 4 ppm on the "X1" scale. Switching back to the "X10" scale the adjust knob is again used to set the meter to 40 ppm. The scale is then set to "X100" and R33 is adjusted until the meter reads 40 ppm on the "X100" scale.

The OVA has a detection limit of 0.1 ppm in methane equivalents and a working range of 0 to 1,000 ppm. During daily field use, system checks are performed which involve calibration and maintenance of the pump systems, gases, and filters. Care is taken to check for and prevent clogging or leaks. Quad rings and the burner chamber are examined on a weekly basis. Routine biannual maintenance includes a thorough cleaning as well as a re-examination of the pump system for leaks and wear. Parts are replaced as necessary. Instrument operation is verified by calibrating and running the OVA for 4 to 6 hours. An instrument specific logbook is maintained with the OVA to document its use and maintenance.

18.3. Conductance, Temperature, and pH Tester

Temperature and conductance instruments are factory calibrated. Temperature accuracy can be checked against an NBS certified thermometer prior to field use if necessary. Conductance accuracy may be checked with a solution of known conductance and recalibration can be instituted, if necessary.

To recalibrate conductance, remove the black plug revealing the adjustment potentiometer screw. Add standard solution to cup, discard and refill. Repeat procedure until the digital display indicates the same value twice in a row. Adjust the potentiometer until the digital display indicates the known value of conductance. To increase the digital display reading, turn the adjustment potentiometer screw counter-clockwise (clockwise to decrease).

To standardize the pH electrode and meter, place the pH electrode in the 7.0 buffer bottle. Adjust the "ZERO" potentiometer on the face of the tester so that the digital display indicates 7.00.

Then place the pH electrode in the 4.0 or 10.0 buffer bottle (depending on where you expect the actual measurement to be). Adjust the "SLOPE" potentiometer on the face of the tester so that the digital display indicates the value of the buffer chosen.

Note: There is interaction between the "ZERO" and "SLOPE" adjustments, so the procedure should be repeated several times.

Do not subject the pH electrode to freezing temperatures.

It is good practice to rinse the electrode in distilled water when going from one buffer to another. When not in use the cap should be kept on the electrode. Keeping the cotton in the cap moist will keep the electrode ready to use. Moisten the cotton frequently (once a week, usually).

18.4. 0_2/Explosimeter

The primary maintenance item of the Model 260 is the rechargeable 2.4 volt (V) nickel cadmium battery. The battery is recharged by removing the screw cap covering receptacle and connecting one end of the charging cable to the instrument and the other end to a 115V AC outlet.

The battery can also be recharged using a 12V DC source. An accessory battery charging cable is available, one end of which plugs into the Model 260 while the other end is fitted with an automobile cigarette lighter plug.

Recommended charging time is 16 hours.

Before the calibration of the combustible gas indicator can be checked, the Model 260 must be in operating condition. Calibration check-adjustment is made as follows:

1. Attach the flow control to the recommended calibration gas tank.
2. Connect the adapter-hose to the flow control.
3. Open flow control valve.
4. Connect the adapter-hose fitting to the inlet of the instrument; after about 15 seconds the LEL meter pointer should be stable and within the range specified on the calibration sheet accompanying the calibration equipment. If the meter pointer is not in the correct range, stop the flow; remove the right hand side cover. Turn on the flow and adjust the "S" control with a small screwdriver to obtain a reading as specified on the calibration sheet.
5. Disconnect the adapter-hose fitting from the instrument.
6. Close the flow control valve.
7. Remove the adapter-hose from the flow control.
8. Remove the flow control from the calibration gas tank.
9. Replace the side cover on the Model 260.

CAUTION: Calibration gas tank contents are under pressure. Use no oil, grease, or flammable solvents on the flow control or the calibration gas tank. Do not store calibration gas tank near heat or fire or in rooms used for habitation. Do not throw in fire, incinerate, or puncture. Keep out of reach of children. It is illegal and hazardous to refill this tank. Do not attach the calibration gas tank to any other apparatus than described above. Do not attach any gas tank other than MSA calibration tanks to the regulator.

18.5. Nephelometer (Turbidity Meter)

The Series 95 nephelometer is calibrated before each use. Allow the instrument to warm up for approximately 2 hours. Using turbidity-free deionized water, zero the meter. Set the scale to 100, fill with a 40 NTU standard (AEPA-1 turbidity standard from Advanced Polymer Systems, Inc.), and insert into the instrument. Adjust the standardize control to give a readout of 200. Re-zero the instrument and repeat these steps with the scale set at 10 and 1 using 4.0 and 0.4 NTU standards, respectively. These standards are prepared by diluting aliquots of the 40 NTU standard.

19. Internal Quality Control Checks

QC data are necessary to determine precision and accuracy and to demonstrate the absence of interferences and/or contamination of field equipment. Field-based QC will comprise at least 10% of each data set generated and will consist of standards, replicates, spikes, and blanks. Field duplicates and field blanks will be analyzed by the laboratory as samples and will not necessarily be identified to the laboratory as duplicates or blanks. For each matrix, field duplicates will be provided at a rate of one per 10 samples collected or one per shipment, whichever is greater. Field blanks which consist of trip, routine field, and rinsate blanks will be provided at a rate of one per 20 samples collected for each parameter group, or one per shipment, whichever is greater.

Calculations will be performed for recoveries and standard deviations along with review of retention times, response factors, chromatograms, calibration, tuning, and all other QC information generated. All QC data, including split samples, will be documented in the site logbook. QC records will be retained and results reported with sample data.

19.1. Blank Samples

Blank samples are analyzed in order to assess possible contamination from the field and/or laboratory so that corrective measures may be taken, if necessary. Field samples are discussed in the following subsection:

19.2. Field Blanks

Various types of blanks are used to check the cleanliness of field handling methods. The following types of blanks may be used: the trip blank, the routine field blank, and the field equipment blank. They are analyzed in the laboratory as samples, and their purpose is to assess the sampling and transport procedures as possible sources of sample contamination. Field staff may add blanks if field circumstances are such that they consider normal procedures are not sufficient to prevent or control sample contamination, or at the direction of the project manager. Rigorous documentation of all blanks in the site logbooks is mandatory.

- **Routine Field Blanks** or bottle blanks are blank samples prepared in the field to access ambient field conditions. They will be prepared by filling empty sample containers with deionized water and any necessary preservatives. They will be handled like a sample and shipped to the laboratory for analysis.
- **Trip Blanks** are similar to routine field blanks with the exception that they are **not** exposed to field conditions. Their analytical results give the overall level of contamination from everything except ambient field conditions. For the RI/FS, one trip blank will be collected with every batch of water samples for volatile organic analysis. Each trip blank will be prepared by filling a 40-ml vial with deionized water prior to the sampling trip, transported to the site, handled like a sample, and returned to the laboratory for analysis without being opened in the field.
- **Field Equipment Blanks** are blank samples (sometimes called transfer blanks or rinsate blanks) designed to demonstrate that sampling equipment has been properly prepared and cleaned before field use, and that cleaning procedures between samples are sufficient to minimize cross contamination. If a sampling team is familiar with a particular site, they may be able to predict which areas or samples are likely to have the highest concentration of contaminants. Unless other constraints apply, these samples should be taken last to avoid excessive contamination of sampling equipment.

19.3. Field Duplicates

Field duplicate samples consist of a set of two samples collected independently at a sampling location during a single sampling event. In some instances the field duplicate can be a blind duplicate, i.e., indistinguishable from other analytical samples so that personnel performing the analyses are not able to determine which samples are field duplicates. Field duplicates are designed to assess the consistency of the overall sampling and analytical system.

19.4. Quality Control Check Samples

Inorganic and organic control check samples are available from EPA free of charge and are used as a means of evaluating analytical techniques of the analyst. Control check samples are subjected to the entire sample procedure, including extraction, digestion, etc., as appropriate for the analytical method utilized.

APPENDIX 6

Community Environmental Response Plan

LABELLA Associates, D.P.C.
Engineering
Architecture
Environmental
Planning

Community and Environmental Response Plan
BCP Site #C828159

Location:

690 Saint Paul Street
Rochester, New York

Prepared for:

Genesee Valley Real Estate Company, LLC
First Federal Plaza
28 East Main Street, Suite 500
Rochester, New York 14614

LaBella Project No. 209280

January 2015

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1.0 INTRODUCTION

LaBella Associates, D.P.C. ("LaBella") has prepared this Community and Environmental Response Plan (CERP) to summarize the controls, monitoring and work practices that will be completed during the implementation of the Remedial Design Work Plan (RDWP) for AOC #8 at NYSDEC Brownfield Cleanup Program (BCP) Site #C828159 addressed as 690 Saint Paul Street, Rochester, New York. The remedial work includes the injection of in-situ chemical oxidation treatment chemicals via gravity-feed to the horizontal infrastructure to significantly reduce the VOCs in groundwater and off-site migration.

The CERP is designed to summarize the controls, monitoring and/or work practices that will be implemented during the remedial work to address the potential for short-term impacts to the surrounding community or environmental resources. Additional details associated with the measures necessary to be implemented to protect the community and environmental resources are detailed in the Community Air Monitoring Plan (CAMP), Health and Safety Plan (HASP), Community Participation Plan (CPP) and RDWP. The purpose of the CERP is to provide members of the community with information on the steps and programs that have been put in place in order to protect their health and minimize the disturbance caused by construction activity.

This CERP has been prepared in accordance with NYSDEC "Final DER-10 Technical Guidance for Site Investigation and Remediation" ("DER-10") and is organized in the following way:

Section 2.0 – Citizen Participation Activities
Section 3.0 – Community Air Monitoring Plan
Section 4.0 – Temporary Measures and Security
Section 5.0 – Vapor/Odor Management Plan
Section 6.0 – Waste Management Controls
Section 7.0 – Traffic Control and Site Access Plans
Section 8.0 – Decontamination
Section 9.0 – Sodium Permanganate
Section 10.0 – Emergency Procedures
Section 11.0 – Cultural Resources

It should be noted that this response plan does not address noise/vibration mitigation or erosion and sediment control as measures associated with these items are not applicable to the anticipated remedy for AOC #8. Specifically, noise and vibrations will be limited to what is generated during installation of exterior monitoring wells. In addition, the work will be completed on an asphalt parking lot in an urban area and as such erosion and sediment control is not anticipated to be an issue.

2.0 CITIZEN PARTICIPATION ACTIVITIES

2.1 Public Comment Period

As part of the NYSDEC BCP, public comment periods were established and fact sheets were distributed to the Site Contact List associated with numerous documents developed for the Site, most recently the Proposed Decision Document (PDD). The PDD describes the proposed final remedy for the Site. The public comment period for the PDD ran between September 29, 2014 to November 14, 2014. In addition, a public meeting was held at the Site on October 14, 2014. Significant comments do not appear to have

been generated during the public comment period associated with the fact sheet and a final Decision Document was issued by the NYSDEC and NYSDOH.

2.2 Document Repositories

There are currently four (4) document repositories for the Site at which project-related documents are available for review by the public. The locations of the repositories are below:

1. Central Library of Rochester and Monroe County
   115 South Avenue
   Rochester, NY 14604-1896

2. Phillis Wheatley Community Library
   33 Dr. Samuel McCree Way
   Rochester, NY 14608

3. Rochester City School District Offices
   131 W Broad St
   Rochester, NY 14614-1187

4. Lincoln Branch Library
   851 Joseph Avenue
   Rochester, NY 14621

2.3 Regulatory Agency Contact Information

Contact information for the NYSDEC and NYSDOH Project Managers is below:

Frank Sowers, P.E.
NYSDEC- Region 8
6274 East Avon-Lima Rd
Avon, NY 14414
585-226-5357

Bridget K. Boyd
Project Manager
NYSDOH, BEEI
Empire State Plaza
Corning Tower, Room 1787
Albany, NY12233
(518) 402-7860

3.0 COMMUNITY AIR MONITORING PLAN

A site-specific CAMP has been developed for the project and can be found in the appendix of the RDWP. The CAMP addresses potential volatile organic compound (VOC) vapor and particulate emissions that may occur during implementation of the remedial measures and is specific to activities being conducted as part of the implementation of the RDWP for AOC #8. Monitoring described in the CAMP will be implemented during any subsurface work completed as part of the AOC #8 remedial measures.

4.0 TEMPORARY MEASURES AND SECURITY

To keep the public a safe distance away from the work zone, chain-linked fence will be erected with a minimum height of 6-ft. For security purposes, gates installed as part of the fencing will be locked while

work is not being actively completed at the Site. In addition, the fence will be inspected on a daily basis to ensure that this safety and security measure has not been compromised to the extent at which public safety may be threatened.

The chain-linked fence will be erected to enclose the excavation areas, horizontal infrastructure, secondary containment/solution storage area and the roll-off to be used for staging of impacted soil. The proposed extent of the fence is depicted on attached Figure CERP-1. It should be noted that chain-linked fence may not be erected during the installation of overburden monitoring wells. However, bystanders will be kept a safe distance away from the drilling activities via other temporary measures including traffic cones and personnel.

5.0 DUST, VAPOR AND ODOR MANAGEMENT PLAN

Based on previous excavation work completed in AOC #8 as part of the Remedial Investigation and the diluted nature of the treatment chemical, significant vapors and/or odors are not anticipated to be encountered during the implementation of the remedial measures. In addition, in dry conditions dust control measures will be proactively applied. However, in the event that the CAMP monitoring indicates perimeter limits are exceeded or if significant odors are noted, one or more of the measures described below will be taken.

- Cease work causing the elevated vapors and/or odors until control of the vapors and/or odors can be maintained;
- Notification of the NYSDEC and NYSDOH and discussion with these agencies regarding the most effective way to combat any significant vapors and/or odors;
- Spraying water on exposed surfaces to reduce the disturbance of particulates (i.e., dust);
- Covering exposed areas with plastic sheeting or similar materials to contain the vapors and/or odors;
- Changing work methods or equipment to alternatives that reduce the potential to create significant air impacts; and/or
- Spraying vapor suppressant liquids and/or foams onto exposed soil and/or groundwater which appear to be emitting the problem vapors and/or odors.

6.0 WASTE MANAGEMENT CONTROLS

6.1 Soil Management Plan

As described in the RDWP, the areas in which the horizontal infrastructure will be installed will be excavated and the excavated soil will be temporary staged on-site pending reuse or disposed of off-site. The on-site and off-site designations were established during previous excavation work in AOC #8 as part of the Remedial Investigation and during the installation of the pre-existing horizontal infrastructure described in the RDWP.

Soils located above the water table (estimated to be 8 to 9-ft. bgs) and not exhibiting elevated PID readings (i.e., above background) will be staged on-site on plastic sheeting for reuse as backfill in the trenches (refer to Figure CERP-1). All soils below the water table and/or exhibiting elevated PID readings will be temporarily staged on-site in roll-off containers for waste characterization and future disposal. The material will be covered by a minimum of double 6-mil polyethylene sheeting which will

be sufficiently anchored to prevent any wind and water erosion. The cover will be inspected at least once per day with corrective action taken as needed. The inspections and any corrective actions will be documented in logs and will occur until the soil has been properly removed from the Site and properly disposed. Subsequent to characterization, transportation of the excavated soil will be completed by properly permitted vehicles to a properly permitted landfill or disposal facility. Documentation associated with the transportation and off-site disposal will be included in the Final Engineering Report (FER).

6.2 Liquid Management Plan

This section identifies proper handling, treatment and discharge procedures for groundwater and/or rainwater that may enter excavations. The specific steps are identified below:

In the event that groundwater or rainwater enter the excavation, containment tank(s) of adequate size will be mobilized to the Site and staged at a location close to the excavation. The appropriate number and size of pumps to dewater the excavation will be mobilized, or a vacuum truck will be mobilized. The pumps will be able to generate enough head to pump the water to the containment tanks. Site conditions may warrant the need for additional containment tanks at the Site.

Water Management:

- When a containment tank holding water becomes full, one sample of water from the tank will be collected and submitted to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval (ELAP) certified laboratory. The groundwater samples will be analyzed for parameters specified by local municipality requirements or (if discharge through the local system is not an option) for parameters specified by the appropriate, approved disposal facility.

- The laboratory test results will be compared to the local municipality discharge standards. In the event that contaminant concentrations exceed these standards, the water in the containment tank will either be disposed of off-site at an appropriate, approved waste facility or it will be treated using an appropriate system (e.g., carbon, filters, air stripper, etc.) to remove contaminants, if necessary. Following treatment, a second sample of the water will be collected in order to confirm that contaminants were removed to concentrations below the municipality's standards.

- Subsequent to obtaining samples of the containerized water that are below the municipality's standards and with approval of the NYSDEC, the water will be discharged to a municipality-approved catch basin. In the event that discharge criteria cannot be met, the water will be sent off-site for disposal at an approved facility.

Documentation associated with the transportation and off-site disposal will be included in the Final Engineering Report (FER).

7.0 TRAFFIC CONTROL AND SITE ACCESS PLANS

7.1 Traffic Control

AOC #8 is located in the immediate vicinity of an entrance to the Site's northern parking lot. As depicted on Figure CERP-1, the work zone will be enclosed by fencing which will make a portion of this parking lot inaccessible. However, this fencing will not prohibit vehicles from accessing the parking lot entrance.

This entrance may be temporarily (i.e., less than 5-minutes) blocked during the following instances:

- Delivery of construction equipment, roll-off dumpster, treatment chemical solution, liquid storage tanks, etc.
- Removal of impacted soil from the Site;
- Removal of impacted groundwater/liquids from the Site (if necessary, refer to Section 6.0); and/or,
- Delivery of imported backfill to Site;

In those instances, traffic will be temporarily diverted by Site personnel, traffic cones and caution tape to prevent any vehicular accidents. A second entrance to the Site parking lot is located on the eastern portion of the Site, along Martin Street.

Construction vehicles will access the Site from Saint Paul Street and following the trucking route depicted on Figure CERP-2.

7.2 Required Access Permitting

As part of the remedial measures for AOC #8, one (1) overburden groundwater monitoring well is planned to be installed in the right-of-way (ROW) directly adjacent to the Site. Specifically, this well is anticipated to be installed in the sidewalk between the Site and Saint Paul Street. As such, a permit will be obtained from the City of Rochester to allow drilling in the ROW.

8.0 DECONTAMINATION

To prevent cross-contamination to surrounding areas, vehicles (excavators, loaders, etc.) and equipment that contact contaminated material will be decontaminated prior to leaving the work zone. Water utilized for decontamination will be containerized and handled the same as any groundwater and/or excavation water, as discussed in Section 6.0. It should be noted that trucks carrying impacted soil are anticipated to stay on concrete/asphalt pavement or crushed stone at all times and thus truck decontamination will be limited to ensuring impacted soil is not located on the exterior portion of the truck bed/trailer, unless otherwise required (i.e., if a truck drives over impacted soil).

In addition, good housekeeping practices will be followed during all work to prevent leaving contaminated material on the ground surface (e.g., precautions will be taken to prevent impacts to the ground surface due to material spilled from the excavator bucket). Any material that does spill on to the ground surface will be promptly picked up and placed in its appropriate location as will any soils impacted as a result of such a spill.

9.0 SODIUM PERMANGANATE

In addition to the controls, monitoring and/or work practices described in the preceding sections, additional measures will be implemented associated with the use of the *in-situ* chemical oxidation (ISCO) treatment chemical (i.e., sodium permanganate).

The ISCO process includes the injection of a chemical oxidant into the subsurface to chemically oxidize contaminants of concern (in AOC #8: TCE) and enhance degradation, as shown in the chemical reactions depicted below:

Trichloroethene:

$$2NaMnO_4 + C_2HCl_3 \rightarrow 2CO_2 + 2MnO_2 + 2Na^+ + 3Cl^- + H^+$$

Dichloroethene:

$$8NaMnO_4 + 3C_2H_2Cl_2 \rightarrow 6CO_2 + 8MnO_2 + 8Na^+ + 6Cl^- + 2H_2O + 2OH^-$$

Vinyl Chloride:

$$10NaMnO_4 + 3C_2H_2Cl_2 \rightarrow 6CO_2 + 10MnO_2 + 10Na^+ + 3Cl^- + H_2O + 7OH^+$$

To facilitate the ISCO process in AOC #8, a total of approximately 13,150-pounds (lbs) sodium permanganate ("RemOx® L") will be introduced at a 10% concentration into the five sets of infrastructure via gravity feed. The volume and injection concentrations were estimated by the chemical vendor (Carus Corporation) using analytical data (including "Permanganate Natural Oxidant Demand") and the known geology of the Site with the vendor's proprietary algorithm for estimating permanganate volumes. A copy of the Carus Corporation ("Carus") calculation sheet and MSDS for the sodium permanganate ("RemOx® L") are included in Appendix 1.

- RemOx® L is classified by the Hazardous Materials Transportation Board as an oxidizer and is shipped as Freight Class 70. Containers holding the solution will be stored within a secondary containment berm in the parking lot directly to the north of Building 22 (refer to Figure CERP-1).
- Sandbags will be utilized to create small berms around each point at which the solution is actively being introduced. This will be completed to prohibit surface migration of any material inadvertently released during the introduction of the solution to the subsurface infrastructure.
- Pending the selection of the chemical's shipping method (i.e., 40% solution versus 10% solution), dilution may be required. Refer to the RDWP for additional information regarding shipping. If dilution is required, the 40% RemOx® L solution will be diluted in water in 1,000-gallon batches. The 40% solution will be pumped as needed from 275-gallon totes to one (1) 1,000-gallon plastic tank to be utilized for dilution and gravity fed to the infrastructure. The tank will have quantity indicators and the volume of solution fed into the infrastructure will be monitored and recorded. If needed, the batch tank will also be kept within the secondary containment berm in the parking lot directly to the north of Building 22.
- Field personnel actively involved with the dilution and/or injection of the treatment chemical will be required to wear personal protective equipment (PPE) including chemical-resistant

suits, gloves and boots and face shields. All other field personnel are required to wear at least Class D PPE.

- The secondary containment berm in which the RemOx® L solution will be held will be able to hold a volume at least 110% of the volume of the largest container with solution. The berm anticipated to be used at the Site will be a Spillguard™ Portable Containment Berm with dimensions of 12-ft. by 50-ft. with 12-in. high walls. This Spillguard is a one-piece, heat-welded berm with permanently attached support legs and reinforced seams. The material used to construct the berm is a heavy duty 35-mil polyurethane coated fabric. The berm material is chemically resistant to the diluted sodium permanganate solution. Specifications for the berm are included in Appendix 1. A sump will be constructed within the berm to pool stormwater which may accumulate in the berm. Any significant stormwater which accumulates in the sump will be pumped to the batch tank. The secondary containment berm will be inspected at least once daily.
- The work area will be cordoned off using chain-linked fence to keep bystanders away (refer to Figure CERP-1). The fence will be locked during non-working hours for security purposes. All field personnel will be notified whenever the solution is in use. Refer to Section 4.0 for additional details regarding temporary security measures.
- A neutralizing agent (e.g., sodium thiosulfate) will be made readily available in the event that a spill of the sodium permanganate occurs. However, the agent will not be kept in the same containment berm as the permanganate. Approximately 50 pounds of the neutralizing agent as well as an empty mixing tank are currently planned to be stored within secondary containment in Building 22. The secondary containment will be similar in construction to that in which the sodium permanganate will be stored. The neutralizing agent will only be applied in a diluted form. Prior to applying the neutralizing agent any release of sodium permanganate will first be heavily diluted with water. The manufacturer recommends the permanganate solution be diluted to 6% or less permanganate prior to applying any neutralizing agent.
- A sub-slab depressurization system (SSDS) will be installed in Building 22 prior to injection activities. This system is designed to mitigate any soil vapor intrusion issues that may be created by the increased volatilization caused by the *in-situ* treatment.

Additional safety information associated with sodium permanganate obtained from Carus Corporation as well as specification for the secondary containment berm can be found in Appendix 1.

10.0 EMERGENCY PROCEDURES

Should an emergency situation arise, the appropriate emergency response team will be immediately notified followed by the NYSDEC and the NYSDOH. Emergency contact information is included below:

	Name	**Phone Number**
Ambulance:	As Per Emergency Service	911

Hospital Emergency:	Rochester General Hospital	585-922-4000
Poison Control Center:	Finger Lakes Poison Control	585-273-4621
Police (local, state):	Monroe County Sheriff	911
Fire Department:	Rochester Fire Department	911
Site Contact:	Chris Gullace	Cell: 585-330-7173
Agency Contact:	NYSDEC – Frank Sowers, P.E. NYSDOH – Bridget Boyd Finger Lakes Poison Control MCDOH – John Frazier	585-226-5357 518-402-7860 1-800-222-1222 585-753-5904

11.0 CULTURAL RESOURCES

According to the NY State Historic Preservation Office GIS-Public Access site the site is located within an archeo-sensitive area. However, designated historical sites are not located within 1000-ft. of the Site and the Site is already heavily developed. As such, the need for mitigation of potential impacts to cultural resources is not anticipated to be required.

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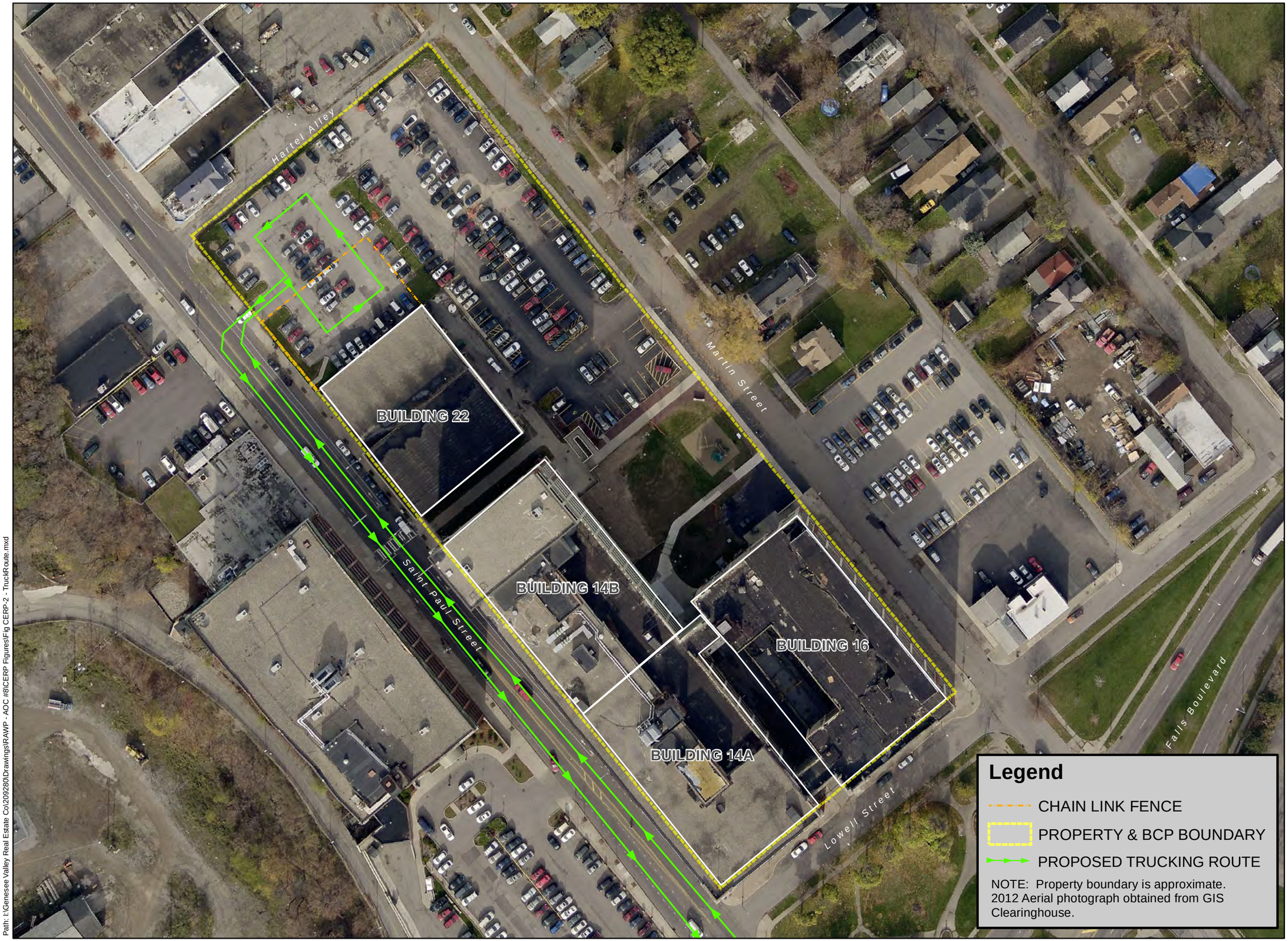
FIGURES



LABELLA Associates, D.P.C.
300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
F: (585)454-3066
www.labellapc.com

PROPOSED
TRUCKING ROUTE

REMEDIAL DESIGN
WORK PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N
W E
S

0 20 40 80 Feet

1 inch = 80 feet
Intended to Print on 11"x17"

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FIGURE CERP-2

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The RemOx L solution will be stored in the secondary containment berm prior to and during injection.

Neutralization agent to be stored in Building 22 within a secondary containment berm.

MW-7 will be decommissioned. A 2-inch diameter replacement well will be installed in the immediate vicinity of the current location of MW-7.

MW-6

MW-8/SB-124

MW-7/SB-106A

BW-8

HARTEL ALLEY

BUILDING 22
STORAGE
WAREHOUSE

SAINT PAUL STREET

LEGEND

- PROPOSED OVERBURDEN MONITORING WELL
- CHAIN LINK FENCE
- PROPOSED HORIZONTAL INFRASTRUCTURE
- 4" VERTICAL RISER PIPE - INSTALLED TO GRADE
- 4" HORIZONTAL SLOTTED PVC PIPE (0.020")
- SECONDARY CONTAINMENT
- ROLLOFF DUMPSTER LOCATION
- COMPLETED BCP OVERBURDEN WELLS
- COMPLETED BCP BEDROCK WELLS
- BCP BOUNDARY

Note:
(1) SITE PLAN DEVELOPED FROM BERO ASSOCIATES ARCHITECTS SITE PLAN FOR 690 SAINT PAUL STREET, ROCHESTER CHARTER SCHOOL SCIENCE AND TECHNOLOGY, DATED APRIL 11, 2000.
(2) EQUIPMENT/STAGING LOCATIONS ARE APPROXIMATE AND FOR INFORMATIONAL PURPOSES. THESE LOCATIONS MAY SHIFT BASED ON FIELD CONDITIONS.

LABELLA Associates, D.P.C.
300 STATE STREET
ROCHESTER, NY 14614
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www.labellapc.com

PROPOSED
INJECTION PLAN

COMMUNITY AND
ENVIRONMENTAL
RESPONSE PLAN: AOC #8

BROWNFIELD CLEANUP
PROGRAM

690 SAINT PAUL STREET
ROCHESTER, NEW YORK

VOLUNTEER:
GENESEE VALLEY
REAL ESTATE COMPANY

N E S W

10 0 10 Feet

1 inch = 15 feet
Figure intended to print as 11" x 17".

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FIGURE CERP-1

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APPENDIX 1

RemOx® L Information from Carus Corporation

&

Secondary Containment Berm Specifications

Carus Corporation Estimation Spreadsheet

RemOx® S and L ISCO Reagents Estimation Spreadsheet

Input data into box with blue font

Site Name: AOC #8
Date: 5/6/2013

	Estimates	Units
Treatment Area Volume		
Length	66	ft
Width	66	ft
Area	4356	sq ft
Thickness	4.5	ft
Total Volume	726	cu yd
Soil Characteristics/Analysis		
Porosity	30	%
Total Plume Pore Volume	43990	gal
Avg Contaminant Conc	13	ppm
Mass of Contaminant	4.77	lb
PNOD	3.01	g/kg
Effective PNOD	60	%
Effective PNOD Calculated	1.806	
PNOD Oxidant Demand	3894.133	lb
Avg Stoichiometric Demand	2.4	lb/lb
Contaminant Oxidant Demand	11.45	lb
Theoretical Oxidant Demand	3905.59	lb
Confidence Factor	1.5	
Calculated Oxidant Demand	5858.381	
Injection Volumes for RemOx S		
RemOx S Injection Concentration	1.0%	%
Total Volume of Injection Fluid	70,202	gal
Pore Volume Replaced	1.60	%

Amount of RemOx S ISCO Reagent Estimated **5,858 pounds**

Injection Volumes for RemOx L		
RemOx L Injection Concentration	10.0%	%
Calculated Specific Gravity	1.091623	g/ml
Total Volume of Injection Fluid	5,775	gal
Pore Volume Replaced	0.13	%

Amount of RemOx L ISCO Reagent Estimated **13,152 pounds**
1,151 gallons

USEPA Injection Form 7520-16

Type or print all information. See reverse for instructions. OMB No. 2040-0042 Approval Expires 11/30/2014

INVENTORY OF INJECTION WELLS

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF GROUND WATER AND DRINKING WATER

(This information is collected under the authority of the Safe Drinking Water Act)

1. DATE PREPARED *(Year, Month, Day)*

2. FACILITY ID NUMBER

PAPERWORK REDUCTION ACT NOTICE

The public reporting burden for this collection of information is estimated at about 0.5 hour per response including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, includingsuggestions for reducing this burden, Director, Collection Strategies Division (2822), U.S. Environmental Protection Agency, 1200 Pennsylvania Avenue, NW, Washington, DC 20460, and to the Office of Management and Budget, Paperwork Reduction Project, Washington, DC20503.

3. TRANSACTION TYPE *(Please mark one of the following)*

☐ Deletion ☐ First Time Entry
☐ Entry Change ☐ Replacement

4. FACILITY NAME AND LOCATION

A. NAME *(last, first, and middle initial)*

B. STREET ADDRESS/ROUTE NUMBER

C. LATITUDE

DEG	MIN	SEC
		.

D. LONGITUDE

DEG	MIN	SEC
		.

E. TOWNSHIP/RANGE

TOWNSHIP	RANGE	SECT	1/4 SECT

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. NUMERIC COUNTY CODE

J. INDIAN LAND *(mark "x")* ☐ Yes ☐ No

5. LEGAL CONTACT:

A. TYPE *(mark "x")* ☐ Owner ☐ Operator

B. NAME *(last, first, and middle initial)*

C. PHONE *(area code and number)*

D. ORGANIZATION

E. STREET/P.O. BOX

F. CITY/TOWN

G. STATE

H. ZIP CODE

I. OWNERSHIP *(mark "x")*

☐ PRIVATE ☐ PUBLIC ☐ SPECIFY OTHER
☐ STATE ☐ FEDERAL

6. WELL INFORMATION:

A. CLASS AND TYPE		B. NUMBER OF WELLS		C. TOTAL NUMBER OF WELLS	D. WELL OPERATION STATUS				
		COMM	NON-COMM		UC	AC	TA	PA	AN
				0					
				0					
				0					
				0					
				0					
				0					
				0					

COMMENTS *(Optional):*

KEY:

DEG = Degree
MIN = Minute
SEC = Second
SECT = Section
1/4 SECT = Quarter Section

COMM = Commercial
NON-COMM = Non-Commercial
AC = Active
UC = Under Construction
TA = Temporarily Abandoned
PA = Permanently Abandoned and Approved by State
AN = Permanently Abandoned and not Approved by State

SECTION 1. DATE PREPARED: Enter date in order of year, month, and day.

SECTION 2. FACILITY ID NUMBER: In the first two spaces, insert the appropriate U.S. Postal Service State Code. In the third space, insert one of the following one letter alphabetic identifiers:

D - DUNS Number,
G - GSA Number, or
S - State Facility Number.

In the remaining spaces, insert the appropriate nine digit DUNS, GSA, or State Facility Number. For example, A Federal facility (GSA - 123456789) located in Virginia would be entered as : VAG123456789.

SECTION 3. TRANSACTION TYPE: Place an "x" in the applicable box. See below for further instructions.

Deletion. Fill in the Facility ID Number.
First Time Entry. Fill in all the appropriate information.
Entry Change. Fill in the Facility ID Number and the information that has changed.
Replacement.

SECTION 4. FACILITY NAME AND LOCATION:

A. Name. Fill in the facility's official or legal name.
B. Street Address. Self Explanatory.
C. Latitude. Enter the facility's latitude (all latitudes assume North Except for American Samoa).
D. Longitude. Enter the facility's longitude (all longitudes assume West except Guam).
E. Township/Range. Fill in the complete township and range. The first 3 spaces are numerical and the fourth is a letter (N,S,E,W) specifying a compass direction. A township is North or South of the baseline, and a range is East or West of the principal meridian (e.g., 132N, 343W).
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.

SECTION 4. FACILITY NAME & LOCATION (CONT'D.):

I. Numeric County Code. Insert the numeric county code from the Federal Information Processing Standards Publication (FIPS Pub 6-1) June 15, 1970, U.S. Department of Commerce, National Bureau of Standards. For Alaska, use the Census Division Code developed by the U.S. Census Bureau.
J. Indian Land. Mark an "x" in the appropriate box (Yes or No) to indicate if the facility is located on Indian land.

SECTION 5. LEGAL CONTACT:

A. Type. Mark an "x" in the appropriate box to indicate the type of legal contact (Owner or Operator). For wells operated by lease, the operator is the legal contact.
B. Name. Self Explanatory.
C. Phone. Self Explanatory.
D. Organization. If the legal contact is an individual, give the name of the business organization to expedite mail distribution.
E. Street/P.O. Box. Self Explanatory.
F. City/Town. Self Explanatory.
G. State. Insert the U.S. Postal Service State abbreviation.
H. Zip Code. Insert the five digit zip code plus any extension.
I. Ownership. Place an "x" in the appropriate box to indicate ownership status.

SECTION 6. WELL INFORMATION:

A. Class and Type. Fill in the Class and Type of injection wells located at the listed facility. Use the most pertinent code (specified below) to accurately describe each type of injection well. For example, 2R for a Class II Enhanced Recovery Well, or 3M for a Class III Solution Mining Well, etc.
B. Number of Commercial and Non-Commercial Wells. Enter the total number of commercial and non-commercial wells for each Class/Type, as applicable.
C. Total Number of Wells. Enter the total number of injection wells for each specified Class/Type.
D. Well Operation Status. Enter the number of wells for each Class/Type under each operation status (see key on other side).

CLASS I Industrial, Municipal, and Radioactive Waste Disposal Wells used to inject waste below the lowermost Underground Source of Drinking Water (USDW).

TYPE	**1I**	Non-Hazardous Industrial Disposal Well.
	1M	Non-Hazardous Municipal Disposal Well.
	1H	Hazardous Waste Disposal Well injecting below the lowermost USDW.
	1R	Radioactive Waste Disposal Well.
	1X	Other Class I Wells.

CLASS II Oil and Gas Production and Storage Related Injection Wells.

TYPE	**2A**	Annular Disposal Well.
	2D	Produced Fluid Disposal Well.
	2H	Hydrocarbon Storage Well.
	2R	Enhanced Recovery Well.
	2X	Other Class II Wells.

CLASS III Special Process Injection Wells.

TYPE	**3G**	*In Situ* Gasification Well
	3M	Solution Mining Well.

CLASS III (CONT'D.)

TYPE	**3S**	Sulfur Mining Well by Frasch Process.
	3T	Geothermal Well.
	3U	Uranium Mining Well.
	3X	Other Class III Wells.

CLASS IV Wells that inject hazardous waste into/above USDWs.

TYPE	**4H**	Hazardous Facility Injection Well.
	4R	Remediation Well at RCRA or CERCLA site.

CLASS V Any Underground Injection Well not included in Classes I through IV.

TYPE	**5A**	Industrial Well.
	5B	Beneficial Use Well.
	5C	Fluid Return Well.
	5D	Sewage Treatment Effluent Well.
	5E	Cesspools (non-domestic).
	5F	Septic Systems.
	5G	Experimental Technology Well.
	5H	Drainage Well.
	5I	Mine Backfill Well.
	5J	Waste Discharge Well.

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RemOx® L Fact Sheet

CARUS
REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent has been specifically manufactured for environmental applications such as remediation of soils and associated groundwater. This product can be used to degrade a variety of contaminants including chlorinated solvents, polyaromatic hydrocarbons, phenolics, organo-pesticides, and substituted aromatics. RemOx L is shipped with a certificate of analysis to document assay, pH, and trace metals.

PRODUCT SPECIFICATIONS

Assay
39.5-41.0% as $NaMnO_4$

pH
5.0-8.0

Trace Metals
(see Table 1)

CHEMICAL/PHYSICAL DATA

Formula	$NaMnO_4$
Formula Weight	141.93 g/mol
Appearance	Dark Purple Solution
Specific Gravity	1.365-1.385 g/mL
Freezing Point	-15° C/ 5° F
Solubility in Water	Miscible with water in all proportions.

Material will pass through a 10 micron filter.

APPLICATIONS

RemOx L is used for soil and groundwater remediation by *in situ* or *ex situ* chemical oxidation and as an active agent in subsurface reactive barriers for treatment of: chlorinated ethenes, phenolic compounds, polyaromatic hydrocarbons, RDX, HMX, and various pesticides.

SHIPPING CONTAINERS

5-gallon pail (20-L) (UN Specification: UN3H1/Y1.8/100) Made of high-density polyethylene (HDPE), weighs 3.5 lbs (1.6 kg). The net weight is 57 lbs (25.9 kg). The pail stands approximately 14.8 in (37.6 cm) tall, 10.6 in (26.9 cm) wide, and 11.0 in (27.9 cm) deep. (Domestic and international)

55-gallon drum (208-L) (UN Specification: UN1H1/Y1.41100) Made of high-density polyethylene (HDPE), weighs 22 lbs (10 kg). The net weight is 550 lbs (250 kg). The drum stands approximately 34.8 in (88.3 cm) tall, has an outside diameter of 23.3 in (59.1 cm). (Domestic and international)

SHIPPING CONTAINERS

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 139 lbs (65 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.4 in (115.3 cm) high, 48 in (121.9 cm) long, and 40 in (101.6 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (Domestic)

275-gallon IBC (Intermediate Bulk Container) (1040-L) (UN Specification: UN31HA1/Y1.9/100) They are also marked "MX" for multi-trip. IBC weighs 132.5 lbs (60 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.8 in (116.2 cm) high, 39.4 in (100.0 cm) long, and 47.3 in (120.0 cm) wide. The IBC has a 2 in (5 cm) butterfly valve with NPT threads in bottom sump. (International)

Bulk Shipping- Quantities up to 4000-gallons (15,142-L) are available. (Domestic only)

HANDLING, STORAGE, AND INCOMPATIBILITY

Like any strong oxidizer RemOx L should be handled with care. Protective equipment during handling should include face shields and/or goggles, rubber or plastic gloves, and rubber or plastic apron. If clothing becomes spotted, wash off immediately; spontaneous ignition can occur with cloth or paper. In cases where significant exposure exists use the appropriate NIOSH-MSHA dust or mist respirator.

Store in accordance with NFPA 30 requirements in the United States or the European Fire Protection Association in Europe for Class II oxidizers. Additional regulations in Europe are REACH (Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals), and CLP (Classification, Labeling, Packaging). REACH is a regulation that increases the responsibility of the industry to manage the risks that the chemical may pose. For REACH registration numbers refer to the eSDS. The product should be stored in a cool, dry area in closed containers. Concrete floors are preferred. Check local regulations to ensure proper storage. Avoid wooden decks. Spillage should be collected and disposed of properly. To clean up spills and leaks follow the steps recommended in our MSDS or eSDS.

Avoid contact with acids, peroxides, and all combustible organic or readily oxidizable materials including inorganic oxidizable materials and metal powders. With hydrochloric acid, chlorine gas is liberated. RemOx L is not combustible, but will support combustion. It may decompose if exposed to intense heat. Fires may be controlled and extinguished by using large quantities of water. Refer to the MSDS or eSDS for more information.

CARUS CORPORATION

ONE COMPANY, ENDLESS SOLUTIONS

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rev. 09/13
form RX 1603

CARUS REMEDIATION



CAS Registry No. 10101-50-5
EINECS No. 233-251-1

RemOx® L ISCO Reagent

FACT SHEET

RemOx® L ISCO reagent is classified as an oxidizer for both domestic and international transportation. Liquid permanganate is shipped domestically as Freight Class 70 and in E.U. as Class 5.1.

Proper Shipping Name: Permanganates, inorganic, aqueous solution n.o.s. (contains sodium permanganate).

Hazard Class: Oxidizer, Class 5.1
Identification Number: UN 3214
Division/APR/RID Class: 5.1
Label Requirements: Oxidizer, 5.1
Packaging Group: II
Packaging Requirements: 49 CFR Parts 171 to 180
Sections: 173.152, 173.202, 173.242
Quantity Limitations:

1 liter net for passenger aircraft or railcar:
5 liters net for cargo aircraft.

Vessel Stowage, (IMDG Regulation):

D-material must be stowed " on-deck" on a cargo vessel, but is prohibited on a passenger vessel. Other provisions: stow separately from ammonium compounds, hydrogen peroxide, peroxides, super-oxides, cyanide compounds, and powdered metal.

H.S. Code 28.41.69.00

SHIPPING CONTAINERS

RemOx L is compatible with many metals and synthetic materials. Natural rubbers and fibers are often incompatible. Solution pH and temperature are also important factors. The material selected for use with liquid permanganate must be compatible with any kind of acid or alkali being used.

In neutral and alkaline solutions, RemOx L is not corrosive to carbon steel and 316 stainless steel. However, chloride corrosion of metals may be accelerated when an oxidant such as liquid permanganate is present in solution. Plastics such as Teflon, polypropylene, and HDPE are also compatible with liquid permanganate.

Aluminum, zinc, copper, lead, and alloys containing these metals may be (slightly) affected by RemOx L. Actual corrosion or compatibility studies should be made under the conditions in which RemOx L will be used.

Table 1: Typical Trace Metal Content and Specifications

Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)	Element	Typical Analysis (mg/kg)	Specifications (mg/kg)	DL* (mg/kg)
Ag	BDL	0.15	0.034	Fe	BDL	2.00	0.053
Al	BDL	2.00	0.24	Hg	BDL	0.03	0.003
As	BDL	4.00	0.006	Ni	BDL	0.1	0.03
Ba	2.96	15.00	0.016	Pb	BDL	0.70	0.16
Be	BDL	0.50	0.08	Sb	BDL	0.70	0.16
Cd	BDL	0.10	0.016	Se	0.0034	0.50	0.0003
Cr	3.2	5.00	0.031	Tl	BDL	3.50	0.80
Cu	BDL	0.10	0.022	Zn	0.034	0.40	0.011

DL* is detection limit
BDL is below detection limit

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rev. 09/13
form RX 1603

RemOx® L Safety Data Sheet

SAFETY DATA SHEET

1. Identification

Product identifier	**RemOx® L ISCO Reagent**
Other means of identification	Not available.
Recommended use	Liquid oxidant recommended for applications that require a concentrated permanganate solution.
Recommended restrictions	Use in accordance with supplier's recommendations.

Manufacturer / Importer / Supplier / Distributor information

Manufacturer/Supplier	CARUS CORPORATION
Address	315 Fifth Street, Peru, IL 61354, USA
Telephone	815 223-1500 - All other non-emergency inquiries about the product should be directed to the company
E-mail	salesmkt@caruscorporation.com
Website	www.caruscorporation.com
Contact person	Dr. Chithambarathanu Pillai
Emergency Telephone	For Hazardous Materials [or Dangerous Goods] Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC at CHEMTREC®, USA: 001 (800) 424-9300 CHEMTREC®, Mexico (Toll-Free - must be dialed from within country): 01-800-681-9531 CHEMTREC®, Other countries: 001 (703) 527-3887

2. Hazard(s) identification

Physical hazards	Oxidizing liquids	Category 2
Health hazards	Acute toxicity, oral	Category 4
	Skin corrosion/irritation	Category 1B
	Serious eye damage/eye irritation	Category 1
	Specific target organ toxicity, single exposure	Category 3 respiratory tract irritation
OSHA defined hazards	Not classified.	

Label elements

Signal word	Danger
Hazard statement	May intensify fire; oxidizer. Harmful if swallowed. Causes severe skin burns and eye damage. May cause respiratory irritation.

Precautionary statement

Prevention	Keep away from heat. Take any precaution to avoid mixing with combustibles. Keep/Store away from clothing//combustible materials. Use only outdoors or in a well-ventilated area. Do not breathe mist or vapor. Wear protective gloves/protective clothing/eye protection/face protection. Do not eat, drink or smoke when using this product. Wash thoroughly after handling.
Response	In case of fire: Use water for extinction. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower. Wash contaminated clothing before reuse. If swallowed: Rinse mouth. Do NOT induce vomiting. If inhaled: Remove person to fresh air and keep comfortable for breathing.
Storage	Store locked up. Store in a well-ventilated place. Keep container tightly closed.
Disposal	Dispose of contents/container in accordance with local/regional/national/international regulations.

Hazard(s) not otherwise classified (HNOC)	Not classified.	
Environmental hazards	Hazardous to the aquatic environment, acute hazard	Category 1
	Hazardous to the aquatic environment, long-term hazard	Category 1

Supplemental information

Hazard symbol

Hazard statement Very toxic to aquatic life with long lasting effects.

Precautionary statement

Prevention Avoid release to the environment.

Response Collect spillage.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Sodium permanganate	10101-50-5	36 - 40

Composition comments All concentrations are in percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

4. First-aid measures

Inhalation If breathing is difficult, remove to fresh air and keep at rest in a position comfortable for breathing. Remove victim to fresh air and keep at rest in a position comfortable for breathing. Move to fresh air. For breathing difficulties, oxygen may be necessary. Call a physician or poison control center immediately. Get medical attention immediately. Call a physician if symptoms develop or persist. Get medical attention if symptoms persist.

Skin contact Take off immediately all contaminated clothing. (Caution: Solution may ignite certain textiles). Immediately flush skin with plenty of water. Get medical attention immediately. Wash contaminated clothing before reuse.

Contact with skin may leave a brown stain of insoluble manganese dioxide. This can be easily removed by washing with a mixture of equal volume of household vinegar and 3% hydrogen peroxide, followed by washing with soap and water.

Eye contact Immediately flush with plenty of water for up to 15 minutes. Remove any contact lenses and open eyelids wide apart. Continue rinsing. Get medical attention immediately.

Ingestion Immediately rinse mouth and drink plenty of water. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting. If vomiting occurs, keep head low so that stomach content doesn't get into the lungs. Get medical attention immediately.

Before using, read Material Safety Data Sheet (MSDS) for this product. Rinse container at least three times to an absence of pink color before disposing.

Most important symptoms/effects, acute and delayed Contact with this material will cause burns to the skin, eyes and mucous membranes. Corrosive effects. Irritation of eyes and mucous membranes. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. May cause temporary blindness and severe eye damage. Permanent eye damage including blindness could result. Show this safety data sheet to the doctor in attendance.

Indication of immediate medical attention and special treatment needed Provide general supportive measures and treat symptomatically. In case of shortness of breath, give oxygen. Decomposition products are alkaline. Brown stain is insoluble manganese dioxide.

General information In the case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). If you feel unwell, seek medical advice (show the label where possible). Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. For personal protection, see Section 8 of the MSDS. Show this safety data sheet to the doctor in attendance. Wash contaminated clothing before reuse.

5. Fire-fighting measures

Suitable extinguishing media Flood with water from a distance, water spray or fog.

Unsuitable extinguishing media The following extinguishing media are ineffective: Dry chemical. Foam. Carbon dioxide (CO2). Halogenated materials.

Specific hazards arising from the chemical May intensify fire; oxidizer. May ignite combustibles (wood, paper, oil, clothing, etc.). Contact with incompatible materials or heat (135 ºC / 275 ºF) could result in violent exothermic chemical reaction. Oxidizing agent, may cause spontaneous ignition of combustible materials. By heating and fire, corrosive vapors/gases may be formed.

Special protective equipment and precautions for firefighters Self-contained breathing apparatus and full protective clothing must be worn in case of fire. Selection of respiratory protection for firefighting: follow the general fire precautions indicated in the workplace.

Fire-fighting equipment/instructions

Move container from fire area if it can be done without risk. Cool containers exposed to flames with water until well after the fire is out. Prevent runoff from fire control or dilution from entering streams, sewers, or drinking water supply. Dike fire control water for later disposal. Water runoff can cause environmental damage.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures

Keep unnecessary personnel away. Keep upwind. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Avoid inhalation of vapors and contact with skin and eyes. Wear protective clothing as described in Section 8 of this safety data sheet. Local authorities should be advised if significant spillages cannot be contained.

Methods and materials for containment and cleaning up

Keep combustibles (wood, paper, oil, etc.) away from spilled material. Should not be released into the environment. This product is miscible in water.

Large Spills: Stop leak if possible without any risk. Dike the spilled material, where this is possible. Proceed with either of the following two options depending upon the size of the spill and the availability of the neutralizing agents:

Option # 1: Dilute to approximately 6% with water, and then reduce with sodium thiosulfate, a bisulfite or ferrous salt solution. The bisulfite or ferrous salt may require some dilute sulfuric acid (10% w/w) to promote reduction. Neutralize with sodium carbonate to neutral pH, if acid was used. Decant or filter and deposit sludge in approved landfill. Where permitted, the sludge may be drained into sewer with large quantities of water.

Option # 2: Absorb with inert media like diatomaceous earth or inert floor dry, collect into a drum and dispose of properly. Do not use saw dust or other incompatible media. Disposal of all materials shall be in full and strict compliance with all federal, state, and local regulations pertaining to permanganates.

To clean contaminated floors, flush with abundant quantities of water into sewer, if permitted by federal, state, and local regulations. If not, collect water and treat as described above. Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Otherwise, absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Do not use sawdust or other combustible material. Following product recovery, flush area with water. Prevent product from entering drains.

Small Spills: Cover with reducing agent (e.g. sodium bisulphite/thiosulphate or a ferrous salt plus 2M H_2SO_4). Transfer to container with water and neutralize with soda ash. Clean surface thoroughly to remove residual contamination.

Never return spills in original containers for re-use. Never return spills in original containers for re-use.

Environmental precautions

Do not allow to enter drains, sewers or watercourses. Contact local authorities in case of spillage to drain/aquatic environment.

7. Handling and storage

Precautions for safe handling

Take any precaution to avoid mixing with combustibles. Keep away from clothing and other combustible materials. Do not get this material in your eyes, on your skin, or on your clothing. Do not breathe mist or vapor. If clothing becomes contaminated, remove and wash off immediately. Spontaneous ignition may occur in contact with cloth or paper. When using, do not eat, drink or smoke. Good personal hygiene is necessary. Wash hands and contaminated areas with water and soap before leaving the work site. Avoid release to the environment.

Conditions for safe storage, including any incompatibilities

Store locked up. Keep container tightly closed and in a well-ventilated place. Store in a cool, dry place. Store away from incompatible materials (See Section 10). Follow applicable local/national/international recommendations on storage of oxidizers. Store in accordance with NFPA 430 requirements for Class II oxidizers.

8. Exposure controls/personal protection

Occupational exposure limits

No exposure limits noted for ingredient(s).

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value
Sodium permanganate (CAS 10101-50-5)	Ceiling	5 mg/m3

US. ACGIH Threshold Limit Values

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	0.1 mg/m3	Inhalable fraction.
		0.02 mg/m3	Respirable fraction.

US NIOSH Pocket Guide to Chemical Hazards: Recommended exposure limit (REL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	TWA	1 mg/m3	Fume.

US NIOSH Pocket Guide to Chemical Hazards: Short Term Exposure Limit (STEL)

Components	Type	Value	Form
Sodium permanganate (CAS 10101-50-5)	STEL	3 mg/m3	Fume.

Biological limit values No biological exposure limits noted for the ingredient(s).

Exposure guidelines Follow standard monitoring procedures.

Appropriate engineering controls Provide adequate general and local exhaust ventilation. An eye wash and safety shower must be available in the immediate work area.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles). Wear face shield if there is risk of splashes.

Skin protection

Hand protection Wear chemical-resistant, impervious gloves. Use protective gloves made of: Rubber or plastic. Suitable gloves can be recommended by the glove supplier.

Other Wear appropriate chemical resistant clothing. Rubber or plastic apron.

Respiratory protection In case of inadequate ventilation or risk of inhalation of vapors, use suitable respiratory equipment. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA 29 CFR 1910.134.

Thermal hazards Wear appropriate thermal protective clothing, when necessary.

General hygiene considerations When using, do not eat, drink or smoke. Keep from contact with clothing and other combustible materials. Remove and wash contaminated clothing promptly. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and chemical properties

Appearance Dark purple liquid.

Physical state Liquid.

Form Aqueous solution.

Color Dark purple.

Odor Odorless.

Odor threshold Not available.

pH 5 - 8

Melting point/freezing point < 24.8 °F (< -4 °C)

Initial boiling point and boiling range > 213.8 °F (> 101 °C)

Flash point Does not flash.

Evaporation rate As water.

Flammability (solid, gas) Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%) Not applicable.

Flammability limit - upper (%) Not applicable.

Vapor pressure 760 mm Hg (105 °C)

Vapor density Not available.

Relative density 1.37 - 1.4 (20 °C) (Water = 1)

Solubility(ies) Miscible with water.

Partition coefficient (n-octanol/water) Not available.

Auto-ignition temperature Not available.

Decomposition temperature Not available.

Viscosity Not available.

Other information

Explosive properties	Not explosive. Can explode in contact with sulfuric acid, peroxides and metal powders.
Oxidizing properties	Strong oxidizing agent.

10. Stability and reactivity

Reactivity	The product is non-reactive under normal conditions of use, storage and transport.
Chemical stability	Stable at normal conditions.
Possibility of hazardous reactions	Contact with combustible material may cause fire. Can explode in contact with sulfuric acid, peroxides and metal powders.
Conditions to avoid	Contact with incompatible materials or heat (135 °C / 275 °F) could result in violent exothermic chemical reaction.
Incompatible materials	Acids. Peroxides. Reducing agents. Combustible material. Metal powders.
Hazardous decomposition products	By heating and fire, corrosive vapors/gases may be formed. Contact with hydrochloric acid liberates chlorine gas.

11. Toxicological information

Information on likely routes of exposure

Ingestion	Causes digestive tract burns. Harmful if swallowed. Ingestion causes burns of the upper digestive and respiratory tracts.
Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes severe skin burns.
Eye contact	Causes serious eye damage.
Symptoms related to the physical, chemical and toxicological characteristics	Contact with this material will cause burns to the skin, eyes and mucous membranes. Permanent eye damage including blindness could result.

Information on toxicological effects

Acute toxicity	Causes severe skin burns and eye damage. Causes burns. Harmful if swallowed. Health injuries are not known or expected under normal use. Harmful if swallowed.

Components	Species	Test Results
Potassium permanganate (CAS 7722-64-7)		
Acute		
Dermal		
LD50	Rat	2000 mg/kg
Oral		
LD50	Rat	2000 mg/kg

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Skin corrosion/irritation	Causes severe skin burns.
Serious eye damage/eye irritation	Causes serious eye damage.
Respiratory sensitization	Not classified.
Skin sensitization	Not classified.
Germ cell mutagenicity	Not classified.
Carcinogenicity	Not classified.
Reproductive toxicity	Not classified.
Specific target organ toxicity - single exposure	May cause irritation of respiratory tract.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not classified.
Further information	Chronic effects are not expected when this product is used as intended. Prolonged exposure, usually over many years, to manganese oxide fume/dust can lead to chronic manganese poisoning, chiefly affecting the central nervous system.

12. Ecological information

Ecotoxicity	Very toxic to aquatic life with long lasting effects.

Components		Species	Test Results
Potassium permanganate (CAS 7722-64-7)			
Aquatic			
Fish	LC50	Bluegill (Lepomis macrochirus)	2.7 mg/l, 96 hours, static
			2.3 mg/l, 96 hours, flow through
			2.3 mg/l, 96 hours
			1.8 - 5.6 mg/l
		Carp (Cyprinus carpio)	3.16 - 3.77 mg/l, 96 hours
			2.97 - 3.11 mg/l, 96 hours
		Goldfish (Carassius auratus)	3.3 - 3.93 mg/l, 96 hours, static
		Milkfish, salmon-herring (Chanos chanos)	> 1.4 mg/l, 96 hours
		Rainbow trout (Oncorhynchus mykiss)	1.8 mg/l, 96 hours
			1.08 - 1.38 mg/l, 96 hours
			0.77 - 1.27 mg/l, 96 hours
		Rainbow trout,donaldson trout (Oncorhynchus mykiss)	0.275 - 0.339 mg/l, 96 hours

Toxicity data are not available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate.

Persistence and degradability Expected to be readily converted by oxidizable materials to insoluble manganese oxide.

Bioaccumulative potential Potential to bioaccumulate is low.

Mobility in soil The product is miscible with water. May spread in water systems.

Mobility in general The product is miscible with water. May spread in water systems.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Dispose of contents/container in accordance with local/regional/national/international regulations.

Local disposal regulations Rinse container at least three times to an absence of pink color before disposing.

Hazardous waste code D001: Ignitable waste
The Waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Do not allow this material to drain into sewers/water supplies. Dispose of in accordance with local regulations.

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Rinse container at least three times to an absence of pink color before disposing. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards
Marine pollutant Yes
Special precautions for user Read safety instructions, SDS and emergency procedures before handling.
Special provisions 26, 353, IB2, T4, TP1
Packaging exceptions 152
Packaging non bulk 202
Packaging bulk 242

IATA

UN number UN3214
UN proper shipping name Permanganates, inorganic, aqueous solution, n.o.s. (Sodium permanganate)
Transport hazard class(es) 5.1
Subsidiary class(es) -
Packing group II
Environmental hazards Yes
Labels required 5.1
ERG Code 5L

Special precautions for user Read safety instructions, SDS and emergency procedures before handling.

IMDG

UN number	UN3214
UN proper shipping name	PERMANGANATES, INORGANIC, AQUEOUS SOLUTION, N.O.S. (Sodium permanganate)
Transport hazard class(es)	5.1
Subsidiary class(es)	-
Packaging group	II
Environmental hazards	
Marine pollutant	Yes
Labels required	5.1
EmS	F-H, S-Q
Special precautions for user	Read safety instructions, SDS and emergency procedures before handling.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code This substance/mixture is not intended to be transported in bulk.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
All components are on the U.S. EPA TSCA Inventory List.

CERCLA/SARA Hazardous Substances - Not applicable.

Drug Enforcement Administration (DEA) (21 CFR 1310.02 (b) 8: List II chemical.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

US. OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Sodium permanganate (CAS 10101-50-5) LISTED

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - Yes
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance No

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Chemical name	CAS number	% by wt.
Sodium permanganate	10101-50-5	36 - 40
Potassium permanganate	7722-64-7	2

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Sodium permanganate (CAS 10101-50-5)

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

Drug Enforcement Administration (DEA). List 2, Essential Chemicals (21 CFR 1310.02(b) and 1310.04(f)(2) and Chemical Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Drug Enforcement Administration (DEA). List 1 & 2 Exempt Chemical Mixtures (21 CFR 1310.12(c))

Sodium permanganate (CAS 10101-50-5) 15 % wt

DEA Exempt Chemical Mixtures Code Number

Sodium permanganate (CAS 10101-50-5) 6588

Food and Drug Administration (FDA) Not regulated.

US state regulations This product does not contain a chemical known to the State of California to cause cancer, birth defects or other reproductive harm.

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Sodium permanganate (CAS 10101-50-5) 500 lbs

US. Pennsylvania RTK - Hazardous Substances

Not regulated.

US. Rhode Island RTK

Sodium permanganate (CAS 10101-50-5)

US. California Proposition 65

US - California Proposition 65 - Carcinogens & Reproductive Toxicity (CRT): Listed substance

Not listed.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	No
Canada	Non-Domestic Substances List (NDSL)	Yes
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 27-November-2013

Revision date -

Version # 01

NFPA Ratings

References

HSDB® - Hazardous Substances Data Bank
Registry of Toxic Effects of Chemical Substances (RTECS)
EPA: AQUIRE database
NLM: Hazardous Substances Data Base
US. IARC Monographs on Occupational Exposures to Chemical Agents
IARC Monographs. Overall Evaluation of Carcinogenicity
National Toxicology Program (NTP) Report on Carcinogens
ACGIH Documentation of the Threshold Limit Values and Biological Exposure Indices

Disclaimer

This safety data sheet was prepared in accordance with the Safety Data Sheet for Chemical Products (JIS Z 7250:2005). The information contained herein is accurate to the best of our knowledge. However, data, safety standards and government regulations are subject to change and, therefore, holders and users should satisfy themselves that they are aware of all current data and regulations relevant to their particular use of product. CARUS CORPORATION DISCLAIMS ALL LIABILITY FOR RELIANCE ON THE COMPLETENESS OR ACCURACY OR THE INFORMATION INCLUDED HEREIN. CARUS CORPORATION MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY WARRANTIES OF MERCHANTIABILITY OR FITNESS FOR PARTICULAR USE OR PURPOSE OF THE PRODUCT DESCRIBED HEREIN. All conditions relating to storage, handling, and use of the product are beyond the control of Carus Corporation, and shall be the sole responsibility of the holder or user of the product.

Permanganate Safety Presentation

Carus Corporation

The Safe Use and Handling of Permanganate Products

Responsible Care

Responsible Care®
Good Chemistry at Work

no accidents ▪ no injuries ▪ no harm to the environment

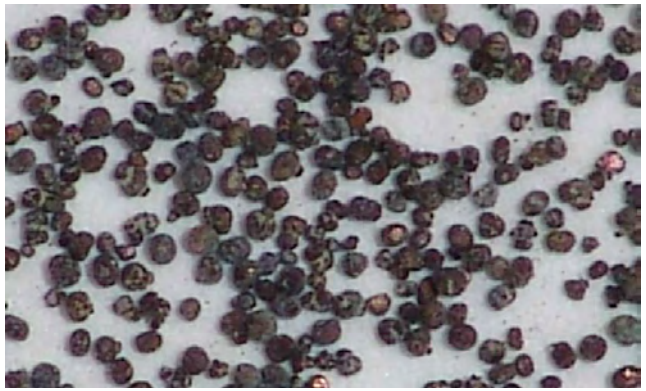
Responsible Care® Performance Excellence

- Facility Security
- Reducing Emissions
- Energy Efficiency
- Employee, Transportation, and Process Safety
- Product Safety and Communication
- Accountability

Product Overview

Permanganate products are available as:

- Crystalline Solids
- Concentrated Liquids



Crystalline Permanganate Safety and Handling

Crystalline Permanganate is a hazardous chemical

- Strong oxidant
- It can react violently with oxidizable materials.

Permanganate presents no health hazard during ordinary handling and storage.

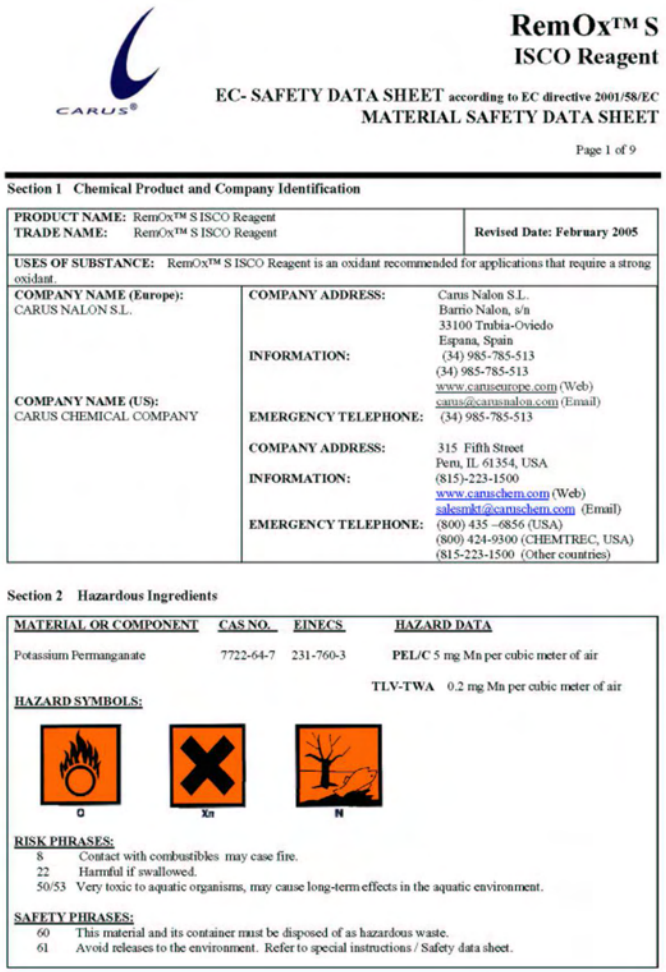
Solid Form (>97% active):

Stable under normal conditions

Incompatible with acids, peroxides, combustible organics, metal powders, oil & grease

Dilute Solution (1-6%):

Very stable



RemOx™ S
ISCO Reagent

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC
MATERIAL SAFETY DATA SHEET

Page 1 of 9

Section 1 Chemical Product and Company Identification

PRODUCT NAME: RemOx™ S ISCO Reagent **TRADE NAME:** RemOx™ S ISCO Reagent	**Revised Date: February 2005**
USES OF SUBSTANCE: RemOx™ S ISCO Reagent is an oxidant recommended for applications that require a strong oxidant.	
COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:** Carus Nalon S.L. Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain **INFORMATION:** (34) 985-785-513 (34) 985-785-513 www.caruseurope.com (Web) carus@carusnalon.com (Email) **EMERGENCY TELEPHONE:** (34) 985-785-513
COMPANY NAME (US): CARUS CHEMICAL COMPANY	**COMPANY ADDRESS:** 315 Fifth Street Peru, IL 61354, USA **INFORMATION:** (815)-223-1500 www.caruschem.com (Web) salesmkt@caruschem.com (Email) **EMERGENCY TELEPHONE:** (800) 435 –6856 (USA) (800) 424-9300 (CHEMTREC, USA) (815-223-1500 (Other countries)

Section 2 Hazardous Ingredients

MATERIAL OR COMPONENT	CAS NO.	EINECS	HAZARD DATA
Potassium Permanganate	7722-64-7	231-760-3	PEL/C 5 mg Mn per cubic meter of air TLV-TWA 0.2 mg Mn per cubic meter of air

HAZARD SYMBOLS:

RISK PHRASES:
8 Contact with combustibles may case fire.
22 Harmful if swallowed.
50/53 Very toxic to aquatic organisms, may cause long-term effects in the aquatic environment.

SAFETY PHRASES:
60 This material and its container must be disposed of as hazardous waste.
61 Avoid releases to the environment. Refer to special instructions / Safety data sheet.

Liquid Permanganate Safety and Handling

Liquid Permanganate is a hazardous chemical

- –Strong oxidant
- –It can react violently with oxidizable materials.

Concentrated Form (20%-40%)

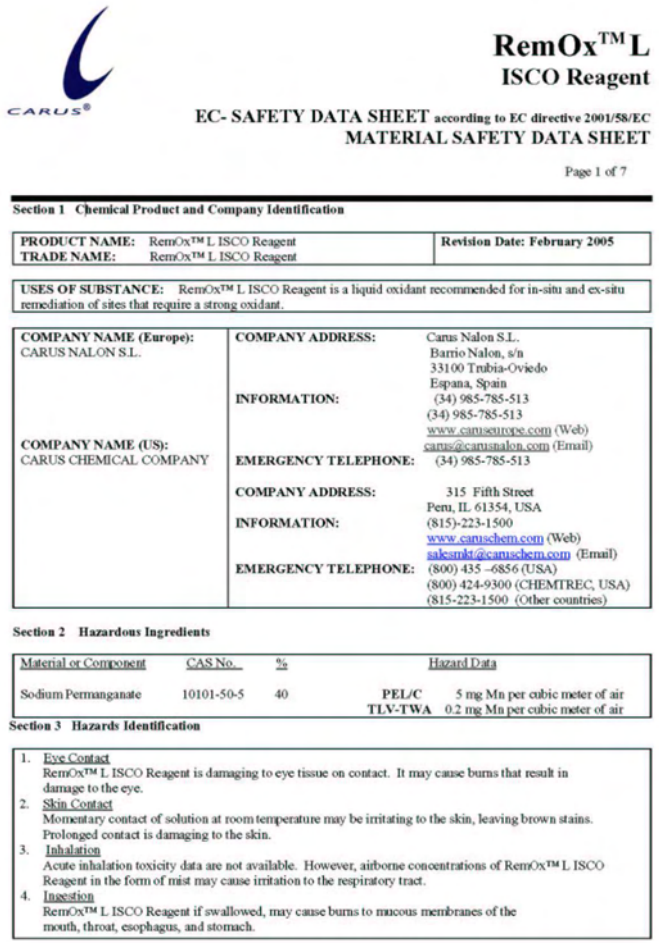
Stable under normal conditions.

Incompatible with acids, peroxides, combustible organics, metal powders, oil & grease.

Can cause a fire if left on dirty rags or paper towels and thrown in garbage. Dilute to less than 6% with water to neutralize.

Dilute Solution (<6% solution):

Very stable



RemOx™ L
ISCO Reagent

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC
MATERIAL SAFETY DATA SHEET

Page 1 of 7

Section 1 Chemical Product and Company Identification

PRODUCT NAME: RemOx™ L ISCO Reagent **TRADE NAME:** RemOx™ L ISCO Reagent	**Revision Date: February 2005**

USES OF SUBSTANCE: RemOx™ L ISCO Reagent is a liquid oxidant recommended for in-situ and ex-situ remediation of sites that require a strong oxidant.

COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:**	Carus Nalon S.L. Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain
	INFORMATION:	(34) 985-785-513 (34) 985-785-513 www.carusnalon.com (Web) carus@carusnalon.com (Email)
COMPANY NAME (US): CARUS CHEMICAL COMPANY	**EMERGENCY TELEPHONE:**	(34) 985-785-513
	COMPANY ADDRESS:	315 Fifth Street Peru, IL 61354, USA
	INFORMATION:	(815)-223-1500 www.caruschem.com (Web) salesmkt@caruschem.com (Email)
	EMERGENCY TELEPHONE:	(800) 435 –6856 (USA) (800) 424-9300 (CHEMTREC, USA) (815-223-1500 (Other countries)

Section 2 Hazardous Ingredients

Material or Component	CAS No.	%	Hazard Data
Sodium Permanganate	10101-50-5	40	**PEL/C** 5 mg Mn per cubic meter of air **TLV-TWA** 0.2 mg Mn per cubic meter of air

Section 3 Hazards Identification

1. Eye Contact
   RemOx™ L ISCO Reagent is damaging to eye tissue on contact. It may cause burns that result in damage to the eye.
2. Skin Contact
   Momentary contact of solution at room temperature may be irritating to the skin, leaving brown stains. Prolonged contact is damaging to the skin.
3. Inhalation
   Acute inhalation toxicity data are not available. However, airborne concentrations of RemOx™ L ISCO Reagent in the form of mist may cause irritation to the respiratory tract.
4. Ingestion
   RemOx™ L ISCO Reagent if swallowed, may cause burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Handling Permanganate Safely

- Eye protection must be worn
  Safety glasses with side shields as well as goggles or a face shield
- Provide adequate ventilation
  Dust or mist may irritate the respiratory tract
- Avoid skin contact with permanganate
  In addition to normal work clothing covering arms and legs, wear plastic gloves and apron
- Do not eat or drink permanganate
  If permanganate is swallowed, it may cause severe burns of the mouth, throat, esophagus, and stomach

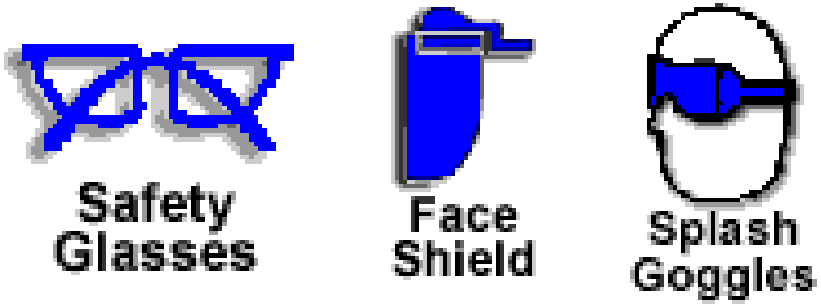
Inhalation

- Provide adequate ventilation

  Airborne concentrations of permanganate in the form of dust or mist may be irritating to the respiratory tract

  NIOSH-MSHS approved dust or mist respirators are recommended

Eye Contact

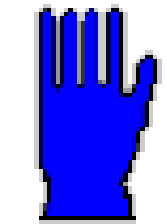


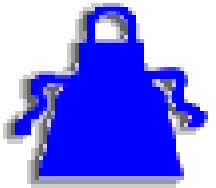
- Eye protection must be worn

  Decomposition products are alkaline and may cause burns that result in damage to the eye

  Safety glasses with eye shields and goggles or a face shield are recommended

Skin Contact


Gloves


Protective Apron

- Avoid skin contact with permanganate

  Momentary contact may be irritating to the skin and leave brown stains

  Contact with concentrated solutions or crystals will damage the skin

  In addition to normal work clothing covering arms and legs, wear plastic gloves and an apron

Ingestion

DO NOT EAT or DRINK permanganate or any other chemical.

If permanganate is swallowed, it may cause severe burns to the mouth, throat, esophagus, and stomach.

Always wash hands before eating, drinking or smoking.

Thermal Stability of Permanganate

$$5\ MnO_4^- \longrightarrow MnO_4^{3-} + MnO_4^{2-} + 3\ MnO_2 + 3\ O_2$$

Crystalline Permanganate

Decomposition may start at 302° F (150° C)

Liquid Permanganate

Decomposition may start at 275° F (135° C)

NFPA Hazard Code

Health Hazard - 1

Under fire conditions will give off irritating combustion products

Flammability Hazard – 0

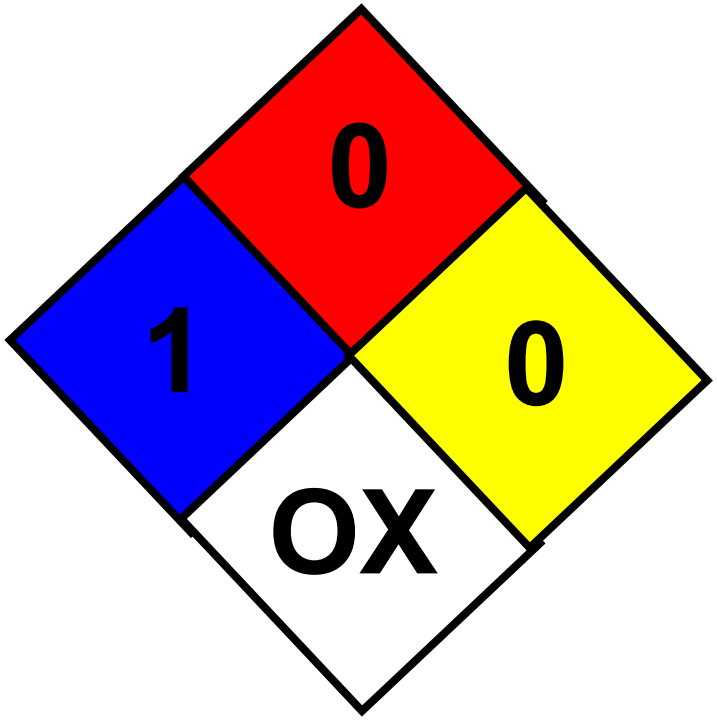
Nonflammable; Will not burn, but will support combustion

Reactivity Hazard – 0

Normally stable, not reactive with water

Special Hazard – OX

Oxidizer

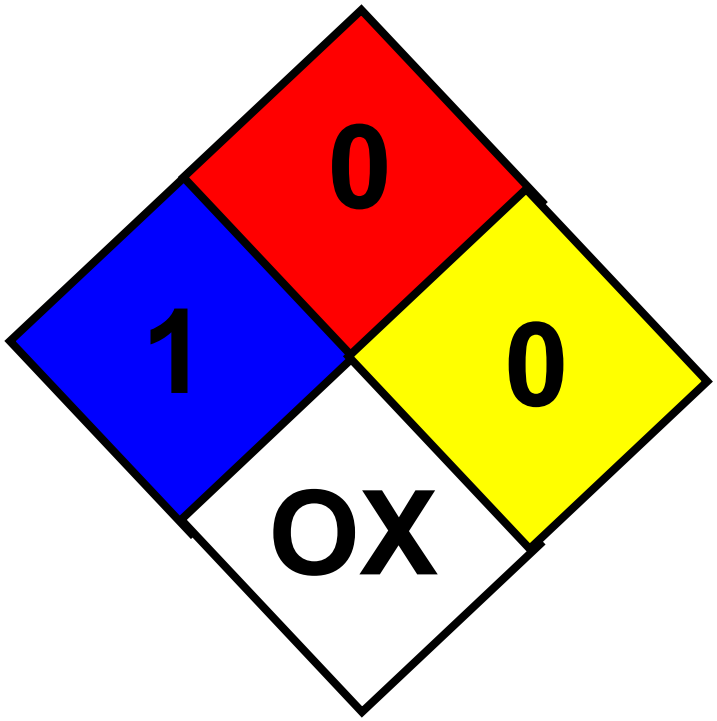


Fire Extinguishing

Use large quantities of water

Berm to contain the water

DO NOT use dry chemical extinguishers, CO_2, Halon® or foams



HMIS Hazard Code

Health Hazard - 1

Under fire conditions will give off irritating combustion products

Flammability Hazard – 0

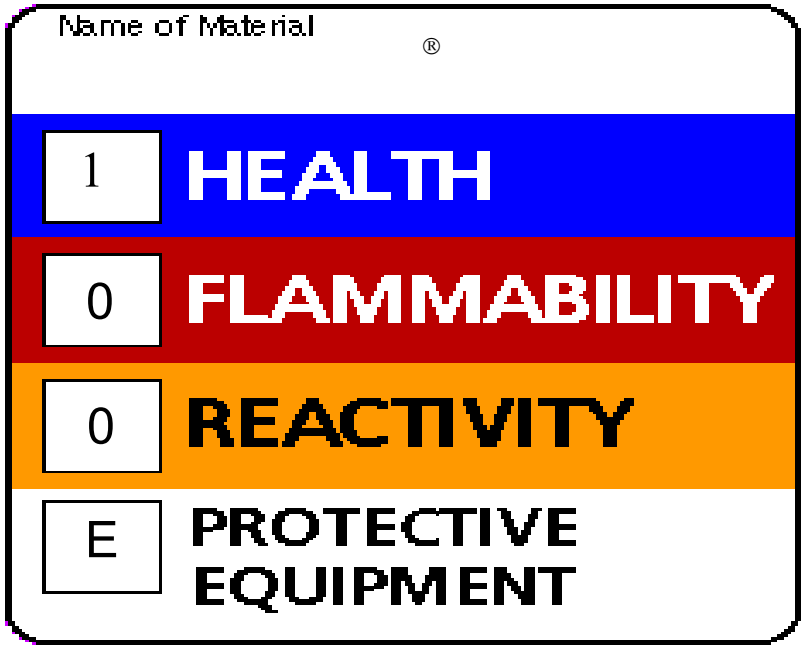
Nonflammable; Will not burn, but will support combustion

Reactivity Hazard – 0

Normally stable, not reactive with water

Protective Equipment – E

Safety glasses, gloves, dust respirator



Permanganate Storage Requirements

- Stable under normal conditions
- Keep dry and away from heat
- Do not store next to acids, peroxides, combustible organics, such as brake fluid or antifreeze, metal powders, or other materials identified in the MSDS
- Take care to protect the containers from physical damage

Dry Permanganate Spill Clean-up

Crystalline permanganate

- Clean up immediately by sweeping or shoveling

- Do not return to the original drum. Transfer to clean metal drum and dispose of according to approved local regulations

Liquid Permanganate Spill Clean-up

- Contain and isolate the liquid, collecting in a pit or holding area**

- Dilute the solution with water until the permanganate concentration is less than 6% (MnO_4^-)

- Neutralize the permanganate using a solution of sodium thiosulfate, bisulfite, or ferrous salt

** Carus tested the following materials and found them to be compatible with 40% sodium permanganate:

PIG® Haz Mat Adsorbent Sock
Spill-tek Adsorbent Pad
United Sorbents Polypropylene Adsorbent Pad

Additional Safety Considerations for Liquid Permanganate

WATER . . . . WATER . . . . WATER!

- NEVER neutralize a concentrated solution
  - Always dilute the permanganate to less than 6% before attempting any type of chemical neutralization

- May ignite wood, cloth, or paper
  - If clothing becomes contaminated wash with water immediately
  - Spontaneous ignition may occur with wood or paper
  - Store on a concrete floor

DILUTE . . . . DILUTE . . . . DILUTE!

Permanganate Neutralization Reactions

Sodium thiosulfate

$$8\ MnO_4^- + 3\ Na_2S_2O_3 + H_2O \longrightarrow 3\ SO_4^{=} + 3\ Na_2SO_4 + 8\ MnO_2 + 2\ OH^-$$

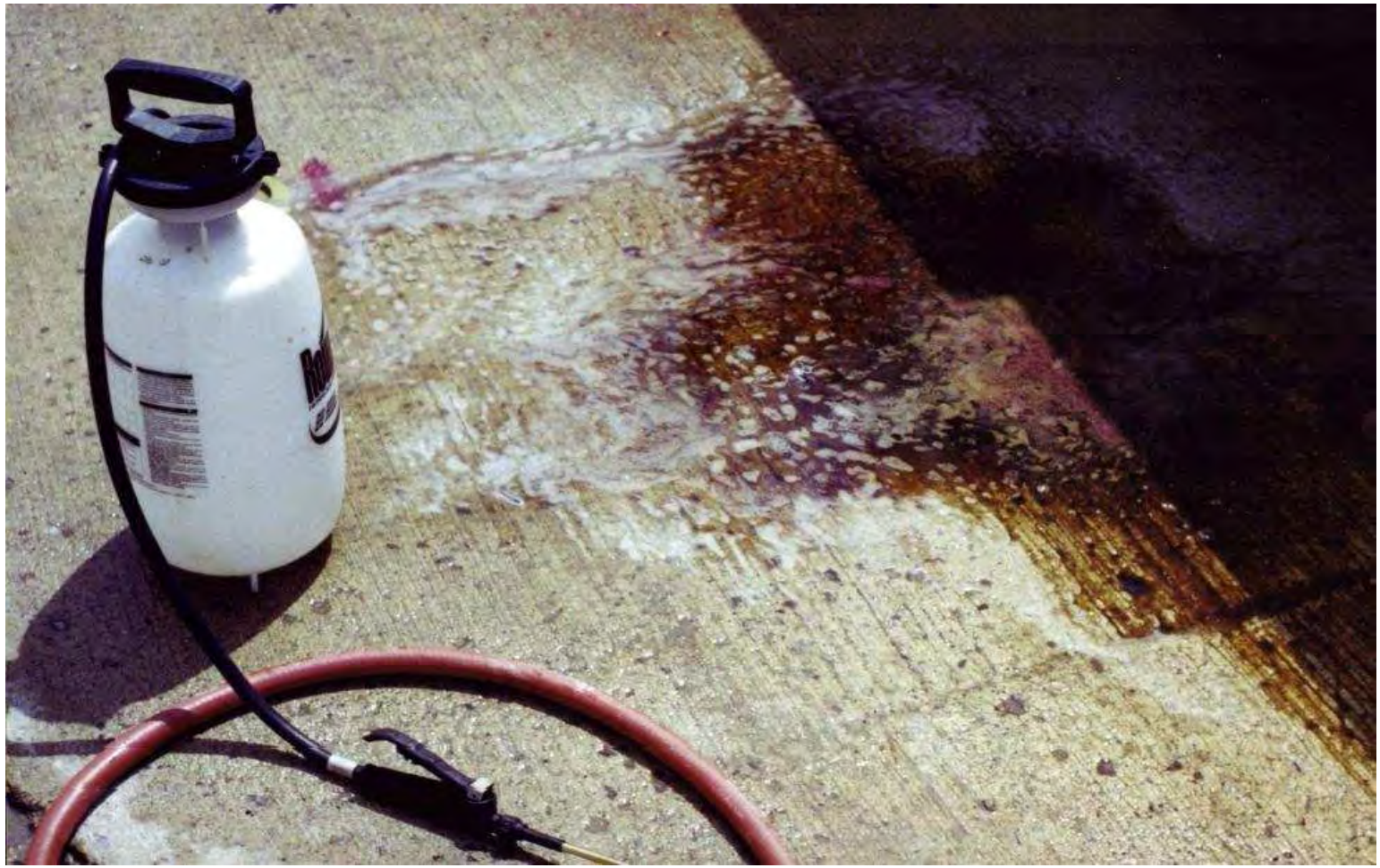
Weight ratio: 0.375 parts $Na_2S_2O_3$ to 1 part MnO_4^-

Sodium bisulfite (meta)

$$2\ MnO_4^- + 3\ NaHSO_3 + H_2O \longrightarrow 3\ NaHSO_4 + 2\ MnO_2 + 2\ OH^-$$

Weight ratio: 1 part $NaHSO_3$ to 1 part MnO_4^-

Permanganate Neutralization Reactions



MnO_2 Stain Removal

CLEANING SOLUTION

- 30 parts water
- 40 parts white vinegar
- 30 parts 3% hydrogen peroxide

Never use on sensitive tissue

- Eyes, mucous membranes, open wounds, burns, etc.

DO NOT add directly to concentrated permanganate solutions

Dilute the permanganate solution to less than 6% with water before using this stain removal solution

Hazardous Materials Transportation Act

In the United States, domestic shipments of hazardous commodities over the highways is governed by Title 49, Code of Federal Regulations (CFR)

- Identifies and classifies hazardous materials
- Establishes quantity limitations
- Specifies the proper packaging
- Describes how to mark and label the package
- Defines shipping certificates
- Details how to placard the vehicle transporting the shipment

Department of Transportation

Proper Shipping Name - Crystalline
Potassium permanganate

ID Number	Reportable Quantity
UN 1490	100 lb.

Proper Shipping Name – Liquid
Permanganates, inorganic, aqueous solutions

ID Number	Reportable Quantity
UN 3214	none established

Hazard Class	Division	Packing Group
Oxidizer	5.1	II

Release of Permanganate to the Environment

Resource Conservation and Recovery Act (RCRA) 1976

Establishes 4 characteristics of hazardous waste:

- Ignitability
- Corrosivity
- Reactivity
- EP Toxicity

It identifies oxidizers as hazardous under the ignitable waste characteristic and lists potassium permanganate by name

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) 1980 "Superfund"

A crystalline or liquid permanganate release to the environment must be reported if it exceeds the "reportable quantity"

Reportable Quantities

- Dry crystalline permanganate has an RQ of 100 lbs.

- To report a release to the environment contact the National Response Center (NRC) at 1-800-424-8802.

Secondary Containment Specifications

Spillguard

12’ x 50’ x 12”

Overview:

The 12’ x 50’ x 12” Spillguard is a patented one-piece, heat-welded berm with permanently attached support legs and reinforced seams. In an effort to carry over our vision of an environmentally safe and incident-free workplace, our exclusive patented Spillguard comes in both standard and acid resistant models.

Features:

- Wrap around corners to prevent leaks
- Chemically resistant containment fabric
- Safety orange support straps
- Sturdy tie-down grommets
- Available in acid and standard tan models

Specs:

- Acid model Spillguards approved for a temperature range of -10 to 160 degrees Fahrenheit.
- Standard model (tan) Spillguards are approved for use in temperatures ranging from -50 to 160 degrees Fahrenheit.
- All Spillguard models feature chemical compatibility for use with Sodium Hydroxide, Water and Fertilizer solutions.
- Acid model Spillguards can be used in applications with Sulfuric acid, Sodium Hydroxide, Hydrochloric acid and Sodium Hypochlorite.
- Standard model spillguards require engineering review prior to use with Diesel, Gasoline, Crude oil and Mineral-based Hydraulic Fluid.

Accessories:

- Hose bridge
- Modular spillguards to run under pipeline
- Puncture resistant track belts
- Puncture-resistant ground mats
- SolidGround™ Traction Mats
- Spillguard Hose Bridge

PUMPS • TANKS • FILTRATION • PIPE • SPILLGUARDS

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800-742-7246
rainforrent.com

RAIN FOR RENT

Spillguard™
Portable Containment Berms

FEATURES

- Lightweight
- Compact
- Portable
- Durable
- No Inflation Necessary, Sets Up in Minutes
- Heavy Duty, Chemical Resistant Materials

TECHNICAL

The SPILLGUARD™ berm is a compact, portable system ideal for use with temporary liquid storage tanks, pumps, or other equipment used in handling hazardous materials. The SPILLGUARD™ berm can be set up in minutes. The patented, collapsible walls and light-weight materials allow for quick deployment. Tough, one piece construction, reinforced seams, and chemically resistant materials give extra protection under field conditions.

MATERIAL SPECIFICATIONS

The SPILLGUARD™ berm is manufactured of heavy duty 35 mil polyurethane coated fabric that offers excellent chemical resistance characteristics and durability. The unique design, patented collapsible walls, and compact size allow for convenient storage. SPILLGUARD™ units are available in a variety of sizes and can be made to fit specific applications. The heavy duty ground tarp and traffic belting supplied with the unit gives the drive-on capabilities and operator safety. Chemical and environmental resistance data available upon request.

Rain for Rent
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