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Memorandum

To	Samantha Salotto, NYSDEC	Page 1
CC	Walt Howard – AECOM	
Subject	Remedial Construction Design Plan and Bid Package – Midtown Shopping Center 5-46-054	
From	Jim Honda, PE – AECOM	
Date	September 4, 2019	

1.0 INTRODUCTION

AECOM has received Contract Work Assignment No. D007626-44 from the New York State Department of Environmental Conservation (NYSDEC) to develop a Remedial Design and Remedial Construction Bid Package for implementation of the remedial action at the Midtown Shopping Center Site (NYSDEC Site No. 5-46-054), located at 112-114 Main St., South Glens Falls, NY (Drawing 1). This document serves as the bid package. It describes the remedial construction elements and requirements and includes:

- A description of the site background and basis of the remedial design,
- A conceptual remedial design plan outlining specific requirements for the remedial construction elements, and,
- A description of the measurement for payment for completion of the remedial construction elements.

Bid package details are provided in the following sections.

1.1 SITE BACKGROUND AND BASIS OF DESIGN

Based on the documentation of soil vapor contamination in the vicinity of a dry cleaner business (Aroxy Cleaners) that previously operated at the site, the property owner installed a sub-slab depressurization system (SSDS) at the northeast end of the shopping center in 2008. The SSDS is comprised of six sub-slab vapor extraction points and currently remains in operation. Between 2012 and 2015, the NYSDEC implemented a Remedial Investigation (RI) to characterize the nature and extent of contamination and a Feasibility Study (FS) to evaluate potential additional remedial alternatives for the site.

RI results were presented in the Remedial Investigation Report (AECOM 2016a). The RI concluded that the original sources of the primary contamination were chlorinated volatile organic compounds (CVOCs) including PCE, TCE, and cis-1,2-dichloroethene (cis-1,2-DCE) from dry cleaning wastes and laundry operations (likely as liquid) that were disposed of on-site. Waste likely entered the subsurface from the facility's sanitary sewer manhole and migrated downward, encountering the groundwater and settling on the glacial lacustrine silty clay unit at about 12 to 13 feet bgs.

Residual soil contamination in the unsaturated soil may remain in the release area, potentially including soil underlying an abandoned unregistered underground storage tank (UST) and utility lines.

PCE concentrations in soil and groundwater indicate that a limited layer of dense non-aqueous phase liquid (DNAPL) waste, perhaps no more than a few inches thick, may exist in the source area at the surface of the silty clay, and serve as a continuing source of groundwater contamination. In order to address a potential exposure pathway to soil vapor intrusion (SVI), the NYSDEC and the New York State Department of Health installed SSDSs at six (6) off-site structures in 2014

Using the RI results, the FS provided evaluation of remedial alternatives to address soil and groundwater contamination. Of the alternatives, in situ chemical oxidation (ISCO) was selected by the NYSDEC, as set forth in the Record of Decision (ROD) (NYSDEC 2016). The ROD specifies that the abandoned UST will be removed as part of the approved remedy.

The RI and FS reports and the ROD are included in Attachment A (on CD) as a Limited Site Data Document, for reference.

1.2 PRE-DESIGN INVESTIGATION

AECOM performed a pre-design investigation (PDI) in March 2018 to obtain additional information needed for the ISCO design. Activities included:

- Performance of surface geophysics to identify the locations of buried utilities in the remediation work area and to clear PDI test boring locations.
- Advancement of test borings to collect additional subsurface data necessary to complete the remedial design.
- Inspection of existing SSDSs.
- Completion of a land survey and preparation of a metes and bounds description of the Midtown Shopping Center Inactive Hazardous Waste Site boundary, as defined by NYSDEC, for use in preparing an Environmental Notice to be filed with the property deed.

Details of the PDI field activities are provided below.

The geophysical survey was completed on March 28, 2018 by Advanced Geological Services (AGS). AGS used electromagnetic and ground penetrating radar geophysical methods, along with a radio frequency utility locating system, to identify subsurface utility features. AGS marked the features on the ground surface and AECOM surveyed the marked out locations for inclusion in the remedial design plans, as described in Section 2.0. AGS identified the location of natural gas, municipal water and sewer lines within the remedial construction work area. In addition, AGS identified the limits of the unregistered UST.

The PDI test borings were completed on March 29, 2018, by North Star Drilling. An AECOM geologist oversaw the drilling and sampling, logged the boreholes and screened the soil samples for the presence of VOCs with a photoionizaton detector. The borings were advanced with a track-mounted direct-push drilling rig equipped with lined Macro-Core® soil sampling equipment. A total of six borings (DP-1 through DP-6) were advanced. The locations of the borings are shown on the remedial design plans as described in Section 2, The borings were drilled to a depth of sixteen feet. This was sufficient to penetrate the contact between the surficial sandy soils and underlying silty clay, which is between 12 and 13 feet deep. The test boring logs are included in Attachment B.

One boring (DP-1) was advanced at an upgradient location on the northern side of the shopping center building near to monitoring wells AMW-3D and MW-8 for the collection of soil samples for ISCO laboratory bench testing. Two samples were collected and submitted for laboratory testing at Carus Corporation (Peru, Illinois), one from the sandy unit and one from the silty clay unit.

The samples were tested for permanganate natural oxidant demand (PNOD) which is needed for determining appropriate dosing of the permanganate amendment. Bench testing results are discussed in Section 2.3. Borings DP-2 through DP-5 were advanced around the perimeter of the proposed ISCO treatment area to verify the extent of impacts.

2.0 REMEDIAL DESIGN PLAN

Specific details and requirements of the remedial construction elements associated with the approved remedy for the Midtown Shopping Center Site are provided in the following sections. Additional details to these requirements are included in the remedial design drawings (Attachment C).

2.1 General Project Elements

These general elements include activities the Contractor shall conduct in association with performing the remedial construction.

2.1.1 Project Schedule

Within five (5) days of a receipt of notice to proceed, the Contractor shall submit a detailed project schedule to the Engineer and NYSDEC for review and approval. The schedule shall show, at a minimum, the planned start and end dates for mobilization, utility locates, UST removal, ISCO injection, UST and stockpiled soil shipment and disposal, and site restoration. On-site work hours are restricted to 7:00 a.m. through 5:00 p.m., Monday through Friday.

2.1.2 Work and Staging Areas and Site Access

The Contractor is advised that access to the project work area is limited, and that operating businesses and residential properties immediately abut the work area. The injection area is situated in a driveway/alleyway area with vehicle traffic from commercial deliveries. The Contractor shall implement measures to preclude interfering with neighboring parcels, and prevent unauthorized access to the work area(s). Upon mobilization, the Contractor shall establish staging areas and site control measures, including traffic control measures. Temporary barriers (where necessary) and signs will be erected to prevent unauthorized access to the site during active field activities.

While the Contractor is to restrict public access to the work area(s), it must ensure that access remains unrestricted at all times during the project to emergency response teams if required. At a minimum, the Contractor shall contact the local fire department and rescue squad to advise them of the project details and schedule, and develop and agree to a plan on site access if it is needed.

Sheet 3 of the remedial design drawings (Attachment C) provides suggestions for areas the Contactor may use for equipment and materials staging and site operations.

Within five (5) days of a receipt of notice to proceed, the Contractor shall submit a modified site plan to the Engineer and NYSDEC for review and approval that shows the proposed equipment and materials staging areas, site access routes and traffic control measures.

2.1.3 Site Security

In addition to securing site access from the general public during work operations, security of all staged equipment and materials and stockpiled waste is the responsibility of the Contractor. As noted on Sheet 3 of the design drawings, the vacant former Aroxy Cleaners building parcel is secured with locked doors and is available to the Contractor to use as appropriate and needed.

2.1.4 Health and Safety

Work will be performed in accordance with a Health and Safety Plan (HASP) which addresses safety precautions related to storage and handling strong chemical oxidants (i.e., secondary containment, signage, and measures to implement should a spill occur), pressurized injection, and heavy equipment operation. The HASP will be developed by the Contractor and submitted to NYSDEC for review and approval. Additionally, the HASP will identify the chemicals to be brought to the Site and will include a detailed spill prevention and response plan to detail precaution and response measures. The Contractor must specifically address the appropriate storage, handling, and spill response for the permanganate, including materials and methods for neutralizing permanganate in the event of a spill.

Exclusion and decontamination zones will be established and demarcated using caution tape, cones, and/or other appropriate barriers to identify chemical storage areas, the dilution and mixing area, and active injection points. All workers entering the exclusion zone will be required to wear appropriate personal protective equipment (PPE), including, but not limited to eye-protection (face shields in the ISCO area), protective gloves, steel toe work boots, and chemical resistance coveralls (i.e., Tyvek). Additional health and safety equipment will be provided including an emergency shower and an eyewash station, PPE and health and safety equipment will be described in detail in the HASP.

2.1.5 Site Utilities

As described above, the AGS geophysical survey identified five buried utility lines in the work area including electric, municipal water, municipal sewer (sanitary and storm), and natural gas. The approximate locations of the utilities as identified from the AGS survey are shown on the design drawings (Attachment C).

It is the Contractor's responsibility to verify the location of all public and private utilities in the work area and to use that information as needed to complete construction activities in a manner that prevents damage to the utilities.

Prior to commencing intrusive site work, the Contractor shall file a public utility markout request from DigSafely NY. Responses from the utility and pipeline companies will be documented by the Contractor. The Contractor may employ additional geophysical survey methods if deemed needed.

2.1.6 Waste Management

Generated wastes will include excavated soils from the UST removal, decontamination fluids and purge water from groundwater monitoring (to be conducted by others), and PPE. Soil wastes are to be managed as described in Section 2.2. Wastewater is to be containerized in 55-gallon drums and securely stored within the former Aroxy Cleaners pending characterization and off-site disposal at a permitted facility. PPE shall be placed in an appropriate container for off-site disposal.

2.1.7 Community Air Monitoring

AECOM will provide field oversight of remedial construction activities. During intrusive work activities (i.e., UST removal and ISCO injection), AECOM will conduct continuous air monitoring for VOCs and particulates in accordance with the generic Community Air Monitoring Plan in DER-10 (the CAMP, Attachment D). Monitoring will be conducted at three locations around the project site perimeter including upwind, downwind and adjacent to the nearest receptor. If air monitoring reveals VOC and/or particulate levels that exceed Response Levels defined in the CAMP, the Contractor shall take appropriate Response Actions, in accordance with the CAMP.

2.2 UST Removal and Closure Element

Prior to the start of ISCO injections, the Contractor shall close the UST by removal. The UST was presumably a fuel oil storage tank for the former Aroxy Cleaners, however no record of the tank is known to the NYSDEC. Based on utility survey work completed during the PDI, it is presumed to be a 1,100 gallon tank that measures approximately 4 feet in diameter and 12 feet in length. The top of the UST is suspected to be only 1 foot below the ground surface, based on reports from AGS.

The UST closure shall be conducted in accordance with applicable laws and regulations, as described in the Division of Environmental Remediation *Technical Guidance for Site Investigation and Remediation* (DER-10), Section 5.5, and the NYSDEC Guidance Document *Permanent Closure of Petroleum Storage Tanks* (1997/1998/2003).

The Contractor shall obtain all necessary permits and issue all required notifications to City and State authorities for the proper decontamination, decommissioning, removal, and disposal of the UST.

The Contractor shall construct a proper temporary containment cell in a designated stockpile staging area for use in storing excavated soil while it is being profiled for off-site treatment/disposal. The Key Map on Sheet 3 of the drawings shows a suggested location for the containment cell. Sheet 4 shows construction details for the cell. Storage of waste soil in lined, tarped roll-off containers is also acceptable.

While in the process of exposing the UST, the Contractor shall employ hand digging or other ‘soft-dig’ techniques (i.e., air knife) to expose utilities that are suspected to fall within the limits of the excavation such that excavation control measure may be necessary. Depending on the results of this work, the Contractor may be required to submit a plan for the Engineer and NYSDEC approval that outlines proposed excavation control measures to prevent damage to the utility(s). Following UST removal, the need for additional soil excavation shall be determined based on field observation of visible impacts, at the direction of NYSDEC and the Engineer. It should be assumed the excavation will extend to a maximum of 8 feet below the ground surface. Excavation deeper than 8 feet will not be permitted without NYSDEC approval. Horizontal excavation limits, as shown on Sheet 4, have been drawn with the assumption that excavation sidewall sloping will not be a viable excavation control measure due to the proximity of buried utilities.

Following UST removal, the Contractor shall be responsible for the collection of post excavation confirmation or documentation samples for independent laboratory analysis to demonstrate that remaining soils meet relevant cleanup criteria to the satisfaction of NYSDEC. Post-excavation samples shall be collected in accordance with DER-10, Section 5.5. Samples shall be analyzed at a laboratory New York State Environmental Laboratory Approval ELAP-accredited laboratory for analysis of VOCs and SVOCs by current Analytical Services Protocol (ASP) methods. Samples

shall be analyzed using test methods that allow the results to be compared to 6 NYCRR Part 375.6(a) and NYSDEC CP-51 (Table 3).

The Contractor shall be responsible for collecting waste characterization samples (including excavated soil, tank contents and any other media required) in accordance with disposal facility requirements to facilitate the proper profiling of the waste.

The Contractor shall conduct the proper loading, transportation and disposal of the waste in accordance with NYSDEC approved waste profiles and manifests. For purposes of this design, it may be assumed that all wastes will be characterized as non-hazardous.

Following approval of post-excavation sample results by NYSDEC the Contractor shall backfill the excavation with appropriate imported backfill materials as described below and shown on the drawings. The Contractor shall submit laboratory testing results by a NYS ELAP-accredited laboratory that demonstrates the proposed imported soil meets NYS unrestricted use criteria as defined in DER-10, in relation to both 6 NYCRR Part 375 and CP-51.

Imported backfill (e.g., Common Fill) shall consist of natural mineral soil substantially free of organic materials, topsoil, wood, trash, debris, frozen materials, and other objectionable materials that may be compressible or cannot be properly compacted. The Contractor shall subcontract an independent geotechnical testing laboratory approved by the Engineer to perform testing of backfill to demonstrate conformance with the applicable ASTM and NYSDOT Standards. The testing laboratory shall submit a written report describing the tests performed, the results of such tests, and a statement of compliance or non-compliance with the specification to the Contractor and Engineer. Material testing shall include:

1. ASTM D698, Standard Proctor Moisture – Density Curve.
2. ASTM D2487, Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System).

The laboratory test results shall demonstrate the proposed imported fill exhibits a grain size distribution within the following gradation limits:

Sieve Size	**Percent Finer by Weight**
3-inch	100
¾-inch	70-95
No. 4	45-80
No. 40	5-50
No. 200	<15

All laboratory analytical data shall be submitted to the Engineer for review and approval no less than fourteen calendar days prior to scheduled delivery of specified material to the Site.

The fill shall be spread evenly above the approved sub-grade in lifts not exceeding twelve (12) inches before compaction and shall be built up in horizontal layers as nearly even as practicable. Each lift shall be compacted using suitable mechanical compactors. Lifts shall be compacted to achieve a minimum compaction of 95%. At the approval of the Engineer, the fill shall be compacted at a moisture content within 2 percent of optimum at the time of placement.

Subbase material for the restored asphalt surface shall conform to NYSDOT Item 304.12. and shall be compacted to the minimum standards described above for common fill.

2.3 ISCO Treatment Element

Sodium permanganate was identified in the 2016 ROD as the selected ISCO reagent. Permanganate is a proven chemical for remediation of chlorinated ethenes such as those present at the site. Carus is a leading vendor for permanganate products including RemOx® L, a proprietary sodium permanganate ISCO reagent. Carus performs in house treatability testing to determine the specific dosing required for treatment using RemOx®.

2.3.1 AMENDMENT SELECTION AND DOSING

Bench scale testing performed by Carus determined that site soils are favorable for ISCO treatment using permanganate. The samples were analyzed by ASTM D7262-10 Test Method A, which yielded results for average permanganate natural oxidant demand (PNOD) of 1.2 g/kg and 2.1 g/kg for the sandy soil sample and silty clay sample, respectively.

Based on observations during the PDI, it was determined that the silty clay unit is not significantly impacted by site COCs; therefore the bench scale test result for the sandy soil unit was used for amendment dosing calculations. Site data were entered into the RemOx® ISCO Reagents Estimation Spreadsheet provided by Carus to calculate the estimated quantity of reagent required for remediation of the target treatment zone (TTZ). In order to account for a small margin of mounding that is likely to occur during injection, the TTZ for calculation of injection volume was based on a treatment zone expanded by 0.5 feet in thickness for a total thickness of 2.5 feet. The calculation also accounts for porosity, estimated soil contact fraction, stoichiometric demand of contaminants, and a safety factor in application of the PNOD value to determine recommended dosing. With a targeted 20% pore volume replacement, the estimated 867 pounds of RemOx® L would be injected at an injection concentration of 2% for a total injection volume of 2,042 gallons. The RemOx® ISCO Reagents Estimation Spreadsheet is provided as Attachment E. Product information for RemOx® L, including the Safety Data Sheet (SDS) is provided in Attachment F.

2.3.2 INJECTION DESIGN

While the dosing calculations provide a basis for an appropriate amount of ISCO reagent, other considerations have been incorporated into the design of the injection scheme. These considerations include:

- Injection point spacing and layout
- Presence of utilities/subsurface obstructions
- Method of injection
- Injection flow rate and pressures
- Injection monitoring and contingencies

The sandy soils present in the TTZ are presumed to be readily permissive. A typical range for achievable radius of influence (ROI) for injection in soils of this type is 5 feet to 10 feet. For the injection calculations, 7.5 feet was selected as a reasonable target radius of influence. Injection

points were spaced within the treatment area to provide maximum coverage assuming the 7.5 foot ROI. Points adjacent to the Midtown Shopping Center building were biased to the north to avoid the utility corridor. The injection point grid includes a total of 17 points, as shown on Figure 4.

Due to the shallow depth and relatively small volume of injection fluid required, injection will be achieved utilizing a direct push method. A direct push drill rig will advance rods including an injection probe to the desired depth just above the clay layer. The reagent will be introduced to the subsurface by connecting the source tank of pre-mixed ISCO reagent to the probe rod via an injection manifold and appropriate hosing. The assembly shall include a pressure gauge and valve to control injection flow and pressure for each injection point. Each injection leg shall be equipped with a flow meter which allows for totalizing of flows to each point on an individual basis. All injection system components shall be compatible with the chemicals with which they come into contact.

The shallow, thin injection target zone consisting of the two feet above the silty clay confining layer presents a scenario where rapid lateral transport of groundwater and injection fluids is possible. The shallow water table also presents a concern for mounding and/or short circuiting of injection fluids, also called “daylighting”. Injection shall therefore be performed at low flow rate and pressure to avoid excessive mounding and displacement of contaminated groundwater and to mitigate the potential for short circuiting. Injection flow rate shall be limited to a maximum of 2 gallons per minute (GPM) with pressure limited to under 5 pounds per square inch (PSI) on average. Should injections require pressure greater than 5 PSI in order to achieve desired flow rates, the situation will be evaluated with the Engineer on a case by case basis. Injection sequencing will target the perimeter points first, beginning with the downgradient row of injection points. This approach will mitigate the potential for the more highly impacted groundwater in the north and center portions of the TTZ from being chased outside of the reactive zone and will promote contact with the ISCO reagent for maximum contaminant destruction. Injections will be set at a single depth corresponding with the midpoint of the target treatment zone (approximately 12 ft bgs at most locations).

Caution must be exercised to avoid distribution of amendments to the utility corridor. It is assumed that pipe bedding material (sand or gravel) may be significantly more permeable than the target treatment zone soils and represents a preferential pathway risk. Similarly, injections must avoid distribution of reagent to the catch basin, which could carry reagent to downgradient receptors. Contact with the utility piping must also be avoided due to chemical incompatibility of the reagent with pipe materials, specifically the water line which is likely constructed of PVC. The low pressure, slow flowrate injection strategy has been specified in an effort to mitigate these risks. Further details regarding performance monitoring are discussed below.

2.3.3 MONITORING

Performance monitoring during active injection shall be performed to evaluate progress and inform field adjustments. The remediation Contractor shall monitor distribution of the sodium permanganate by collecting periodic grab groundwater samples from nearby monitoring wells. Samples will be filtered and measured using a Hach DR890 or 900 colorimeter. The Contractor will be responsible for properly calibrating and recording instrument setup and sample results for evaluation of reagent presence. Observation of permanganate in sentinel wells will verify achievement of the assumed ROI for injections. The Contractor shall gauge groundwater elevations in wells within the TTZ to monitor groundwater mounding, particularly in MW-3 and AMW-5 in the vicinity of the utility corridor. In the event groundwater elevations rise by 1 foot or more, the injection conditions will be evaluated and adjusted, as necessary.

Post remediation monitoring will be conducted at a future time to evaluate the treatment effectiveness and determine the need for follow-up injections.

2.3.4 UNDERGROUND INJECTION CONTROL PERMIT

AECOM understands that an Underground Injection Control (UIC) Permit will likely need to be obtained from EPA prior to performance of injection work. AECOM will prepare the draft permit, which will need to be finalized by the Contractor prior to mobilization. The Contractor will be responsible for notifications in accordance with the UIC permit.

2.4 Site Restoration Element

Following completion of UST removal and injection activities, the site shall be returned to pre-existing conditions, to the extent practicable. The excavation shall be backfilled as described above and the asphalt surfaces in all areas disturbed by the work shall be restored. Other areas shall be swept clean and boreholes shall be patched. Following completion of these restoration activities, the sediment and erosion controls shall be removed and disposed of.

3.0 Measurement for Payment

Measurement for payment for the work will be as described in the following bid items:

Bid Item 1 Mobilization and Demobilization

Work required to complete Mobilization and Demobilization includes, but is not limited to:

a. Movement of personnel, equipment, and materials to the site, if such movement is not included in any other Bid Item.
b. Preconstruction coordination meetings.
c. Submittal of chemical and geotechnical laboratory analysis of proposed imported backfill materials.
d. Preparation of required pre-work documents, including the HASP.
e. Removal of all personnel, equipment, and materials from the Site at the completion of the Work.

Bid Item 2 Site Preparation

Work required to complete Site Preparation includes, but is not limited to:

a. Set up any storage, staging, and/or stockpile areas.
b. Implement and maintain temporary erosion and sedimentation controls shown on the Drawings and/or specified in the General Notes.

Bid Item 3 UST Removal

Work required to complete UST removal includes, but is not limited to:

a. Cutting of the asphalt surface for excavation and UST removal.
b. Excavation and on-site management of soils in the vicinity of the UST.
c. Removal of the suspected 1,100-gallon fuel oil UST
d. Post excavation sampling and analysis.

e. Proper disposal of the UST and associated appurtenances.
f. Waste characterization sampling and disposal of excavated soils.
g. Estimated quantity of soil for disposal is 18 tons.

Bid Item 4 Off-site Disposal of Non-Hazardous Soil and Debris

Work required to complete off-site disposal of non-hazardous soil and debris includes, but is not limited to:

a. Sampling and analysis of soils for waste characterization in accordance with laws, regulations, and facility requirements.
b. Transport and disposal of non-hazardous soil and debris to an appropriate facility.
c. Provision of all pertinent documentation to the Engineer.

Bid Item 5 Excavation Backfill

Work required to complete Excavation Backfill includes, but is not limited to:

a. Delivery of approved imported fill materials.
b. Placement and compaction of fill in accordance with the project specifications.

Bid Item 6 Direct Push Technology (DPT) Drilling

Work required to complete DPT Drilling includes, but is not limited to:

a. Advancement of approximately 17 borings to a depth of approximately 12 feet below the ground surface for injection of ISCO reagent.
b. Decontamination of drill rods and tooling.
c. Backfilling and/or asphalt surface repair following completion of borings, as necessary.

Bid Item 7 In Situ Chemical Oxidation Injection

Work required to complete in Situ Chemical Oxidation Injection includes, but is not limited to:

a. On-site handling and mixing of ISCO reagent.
b. Direct push injection of 2,042 gallons injection fluid (867 pounds RemOx L®) at up to 17 points at a single depth for treatment of the 2.5 depth target treatment interval.
c. Maintenance of field records on injection volumes, flow rates, and pressures and reporting in accordance with the project remedial design plan.

Bid Item 8 Site Restoration

Work required to complete Restoration includes, but is not limited to:

a. Contractor shall restore all disturbed areas to existing conditions as determined by and to the satisfaction of the Engineer and property owner.

ATTACHMENT A

Limited Site Data Document (CD)

ATTACHMENT B

PDI Soil Boring Logs

AECOM

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BOREHOLE LOG

BORING ID #: SB-01 DP

START DATE: 5/29/18 END DATE: —

PROJECT NAME: **Midtown Shopping Center**
SITE LOCATION: **Glens Falls, NY**
DRILLING CO.: **NorthStar Drilling**
BOREHOLE DIAMETER:
TOTAL DEPTH REACHED:
LATITUDE: NA

PROJECT NO.: **60560952**
BORING LOCATION:
DRILLER: Steve
DEPTH TO BEDROCK: NA
INSPECTOR: **RM**
LONGITUDE: NA

PROJECT MANAGER: **Walter Howard**
DRILLING METHOD: **Geoprobe**
TOTAL DEPTH DRILLED:
WEATHER CONDITIONS: cloudy, 40°
ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
							WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						

DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION	LITHOLOGY/ SOIL TYPE	WATER LEVEL / REMARKS
0.0		3'	0				0-1: Concrete overburden 1-3: MC SAND; dry		
2.5									
5.0		4'	0				4-7: SAA 7-8: FM SAND; moist		
7.5									
10.0		4'	0				8-11: SAA 11-12: BR F SAND & SILT; compact; wet		▽ ~11'
12.5							12-14: BR SILT w/ f SAND; trace clay w/ high plasticity		
15.0		2	0				* Collected Samples *		
17.5									
20.0									
22.5									
25.0									

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BOREHOLE LOG

BORING ID #: DP-02

START DATE: 3/29/18 END DATE: 3/29/18

PROJECT NAME: **Midtown Shopping Center**
SITE LOCATION: **Glens Falls, NY**
DRILLING CO.: **NorthStar Drilling**
BOREHOLE DIAMETER:
TOTAL DEPTH REACHED:
LATITUDE: NA

PROJECT NO.: **60560952**
BORING LOCATION: closest to main road
DRILLER: Steve
DEPTH TO BEDROCK: NA
INSPECTOR: **RM**
LONGITUDE: NA

PROJECT MANAGER: **Walter Howard**
DRILLING METHOD: **Geoprobe**
TOTAL DEPTH DRILLED:
WEATHER CONDITIONS:
ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
							WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						

DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION	LITHOLOGY/ SOIL TYPE	WATER LEVEL / REMARKS
0.0		3'	0	N	N	N	0-1: Concrete overburden 1-3: BR MC SAND; dry; loose		
2.5									
4									
5.0		4'	0	N	N	N	4-8: FM-MC SAND; DRY; loose		
7.5									
8		4	0	N	N	N	8-12: SAA; becoming coarser @ 11'		
10.0									
12'							12-13: GR FMC SAND; moist		
12.5			82 ppm 30.0				13-15: BR F SAND & SILT; trace CLAY throughout 15-16: GR/BR SILT & CLAY; med plasticity		
15.0									
17.5									
20.0									
22.5									
25.0									

(+3 = 160.1)

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BOREHOLE LOG

BORING ID #: DP-03

START DATE: END DATE:

PROJECT NAME: **Midtown Shopping Center**
SITE LOCATION: **Glens Falls, NY**
DRILLING CO.: **NorthStar Drilling**
BOREHOLE DIAMETER: 2"
TOTAL DEPTH REACHED:
LATITUDE: NA

PROJECT NO.: **60560952**
BORING LOCATION: closest to the road - step back from DP-01
DRILLER: Steve
DEPTH TO BEDROCK: NA
INSPECTOR: **RM**
LONGITUDE: NA

PROJECT MANAGER: **Walter Howard**
DRILLING METHOD: **Geoprobe**
TOTAL DEPTH DRILLED:
WEATHER CONDITIONS: cloudy, 40°
ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
							WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						

DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION	LITHOLOGY/ SOIL TYPE	WATER LEVEL / REMARKS
0.0		4'	0	N	N	N	0-1: Concrete overburden 1-4: BR FM SAND; dry; loose		
2.5			0				4-7: BR FMC SAND; dry; loose		
5.0		4'		N	N	N	7-8: F(-)M SAND; dry; loose		
7.5		4'	0	N	N	N	8-12: SAA		
10.0							12-13: BR/GR FMC SAND; wet		▽ 12
12.5		4	0.2 HS= 0.6	N	N	N	13-16: BR CLAYEY-SILT: med plasticity w/ silt layering of CLAY		
15.0									
17.5									
20.0									
22.5									
25.0									

AECOM

AECOM, Inc.
40 British American Boulevard
Latham, New York 12110
Phone: (518) 951-2200
Fax: (518) 951-2300

BOREHOLE LOG

BORING ID #: DP-04

START DATE: 3/29/18 END DATE:

PROJECT NAME: **Midtown Shopping Center**
SITE LOCATION: **Glens Falls, NY**
DRILLING CO.: **NorthStar Drilling**
BOREHOLE DIAMETER: 2"
TOTAL DEPTH REACHED:
LATITUDE: NA

PROJECT NO.: **60560952**
BORING LOCATION: Farthest away from Main road
DRILLER: Steve
DEPTH TO BEDROCK: NA
INSPECTOR: **RM**
LONGITUDE: NA

PROJECT MANAGER: **Walter Howard**
DRILLING METHOD: **Geoprobe**
TOTAL DEPTH DRILLED:
WEATHER CONDITIONS: cloudy, 40°
ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:	
							WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:	
							FALL			CASING	TUBE	CORE		RIG TYPE:
							TYPE							
							ID/OD							
DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION					LITHOLOGY/ SOIL TYPE		WATER LEVEL / REMARKS
0.0		3'	0	N	N	N	0-1: Concrete over-burden 1-2: L BR MED SAND; dry loose							
2.5							4-8: SAA; Coarser w/ depth							
5.0		4'	0	N	N	N								
7.5														
8 - 10.0		4'	0	N	N	N	8-12: SAA							
12.5		4'	0.40				12-12.5: SAA 12.5-16: BR/GR F SAND & SILT; trace clay throughout							
15.0			0.20											
16 - 17.5														
20.0														
22.5														
25.0														

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Fax: (518) 951-2300

BOREHOLE LOG

BORING ID #: DP-05

START DATE: 3/29/18 END DATE: 3/29/18

PROJECT NAME: **Midtown Shopping Center** | PROJECT NO.: **60560952** | PROJECT MANAGER: **Walter Howard**
SITE LOCATION: **Glens Falls, NY** | BORING LOCATION:
DRILLING CO.: **NorthStar Drilling** | DRILLER: Steve | DRILLING METHOD: **Geoprobe**
BOREHOLE DIAMETER: | DEPTH TO BEDROCK: NA | TOTAL DEPTH DRILLED:
TOTAL DEPTH REACHED: | INSPECTOR: **RM** | WEATHER CONDITIONS: Cloudy ~45°
LATITUDE: NA | LONGITUDE: NA | ELEVATION AND DATUM:

	HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:
FALL			CASING	TUBE	CORE	RIG TYPE:
TYPE						
ID/OD						

DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION	LITHOLOGY/ SOIL TYPE	WATER LEVEL / REMARKS
0.0		3'	0	N	N	N	0-1: Concrete overburden 1-3: FMC(SP) SAND; dry; loose		
2.5									
5.0		4'	0	N	N	N	4-8: SAA		
7.5		4'	0	N	N	N	12-16: SAA; becoming finer w/ depth		
10.0		2'	11 ppm	N	N	N	12-13: BR/GR FMC SAND; wet 13-14: BR SILTY CLAY; high plasticity No odors		
12.5									
15.0									
17.5									
20.0									
22.5									
25.0									

12-

16-

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40 British American Boulevard
Latham, New York 12110
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Fax: (518) 951-2300

BOREHOLE LOG

BORING ID #: DP-06

START DATE: 3-29-18 END DATE: –

PROJECT NAME: **Midtown Shopping Center**
SITE LOCATION: **Glens Falls, NY**
DRILLING CO.: **NorthStar Drilling**
BOREHOLE DIAMETER:
TOTAL DEPTH REACHED:
LATITUDE: NA

PROJECT NO.: **60560952**
BORING LOCATION:
DRILLER:
DEPTH TO BEDROCK: NA
INSPECTOR: **RM**
LONGITUDE: NA

PROJECT MANAGER: **Walter Howard**
DRILLING METHOD: **Geoprobe**
TOTAL DEPTH DRILLED:
WEATHER CONDITIONS: cloudy 40°
ELEVATION AND DATUM:

FIELD SAMPLE INFORMATION								HAMMER	SAMPLER	ST. WATER LEVELS	DATE 1:	DEPTH 1:	TIME 1:
							WEIGHT(S)				DATE 2:	DEPTH 2:	TIME 2:
							FALL			CASING	TUBE	CORE	RIG TYPE:
							TYPE						
							ID/OD						

DEPTH (feet bgs)	Blow Count	RECOVERY	PID (ppm)	ODOR OBSERVED	LAB ANALYSIS	VISIBLE PRODUCT	GEOLOGIC DESCRIPTION	LITHOLOGY/ SOIL TYPE	WATER LEVEL / REMARKS
0.0		3'	0	N	N	N	0-1: Concrete overburden 1-3: BR FM(+) SAND; dry; loose		
2.5									
5.0		4'	0	N	N	N	4-8: SAA		
7.5		4'	0	N	N	N	8-12: SAA; coarser from 11-12'; dry; No odors		
10.0									
12.5		4'	1ppm	N	N	N	12-13: SAA; moist 13-16: GRAY SILT w/ F SAND; trace CLAY; high plasticity alt layers of clay near 15'		
15.0									
17.5									
20.0									
22.5									
25.0									

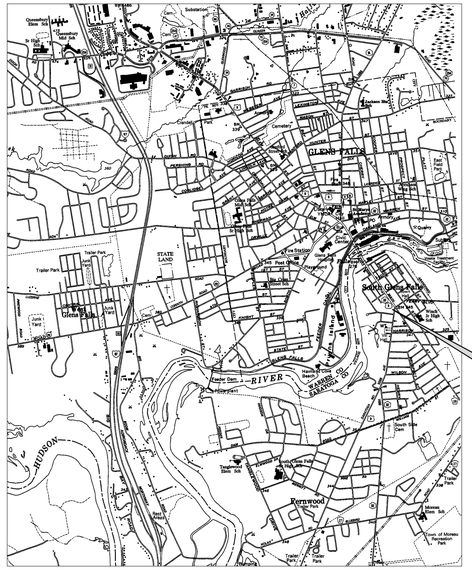
12–

ATTACHMENT C

Remedial Design Drawings

Remedial Design
New York State Department of Environmental Conservation
Midtown Shopping Center (Site # 5-46-054)
Village of South Glens Falls, Saratoga County, New York

AUGUST 2019



REFERENCE:
NYSDOT 7.5 MIN TOPOGRAPHIC QUADRANGLE – GLENS FALLS, NY

PROJECT LOCATION PLAN
NOT TO SCALE

INDEX OF DRAWINGS

Prepared For:

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

New York State Department of
Environmental Conservation
232 Golf Course Road
Warrensburg, New York 12885-0220

Prepared By:

AECOM

AECOM Technical Services Northeast, Inc.
40 British American Blvd.
Latham, New York, 12110
(518) 951-2200

AECOM

60560952

Remedial Design
New York State Department of Environmental Conservation
Midtown Shopping Center (Site # 5-46-054)
Village of South Glens Falls, Saratoga County, New York
August 2019

ANSI D 22" x 34"

Approved:

Checked:

Designer:

Project Management Initials:

GENERAL NOTES:

1. SEE PROJECT DETAILS FOR CONSTRUCTION AND MATERIALS SPECIFICATIONS.

2. ALL ON-SITE ACTIVITIES SHALL BE IN ACCORDANCE WITH THE ENTIRE PROJECT REMEDIAL DESIGN PLAN.

3. ALL SHOP DRAWINGS SUBMITTED FOR THIS PROJECT SHALL BE IN ENGLISH UNITS.

4. THE CONTRACTOR IS ADVISED THAT ADDITIONAL "NOTES" WILL BE FOUND ON SUBSEQUENT SHEETS OF THE REMEDIAL DESIGN PLAN AND SUCH "NOTES", WHILE PERTAINING TO THE SPECIFIC SHEETS THEY ARE PLACED ON, ALSO SUPPLEMENT THE GENERAL NOTES LISTED HEREIN.

5. NO ADDITIONAL PAYMENT WILL BE MADE FOR WORK CALLED FOR BY NOTES ON THE PLANS OR IN THE SPECIFICATIONS UNLESS PAYMENT IS SPECIFICALLY INDICATED BY ITEM NUMBER. THE COST OF WORK FOR WHICH NO PAYMENT ITEM IS INDICATED, SHALL BE INCLUDED IN THE UNIT PRICES BID FOR VARIOUS ITEMS OF THIS PROJECT.

6. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY LOCAL, STATE, AND FEDERAL PERMITS REQUIRED THAT HAVE NOT BEEN PREVIOUSLY OBTAINED AND MADE PART OF THE REMEDIAL DESIGN PLAN.

7. IT WILL BE THE CONTRACTOR'S OBLIGATION AND RESPONSIBILITY TO USE METHODS AND EQUIPMENT WHICH WILL INSURE THE SATISFACTORY COMPLETION OF THE REQUIRED WORK WITHIN THE TIME FRAME STIPULATED IN THE APPROVED PROJECT SCHEDULE.

8. THE CONTRACTOR SHALL PROTECT HIS WORKERS AT ALL TIMES IN CONFORMANCE WITH APPLICABLE OSHA REGULATIONS.

9. ALL INJECTION FLUIDS, FUEL, OIL, PAINT OR OTHER HAZARDOUS MATERIALS SHALL BE STORED IN A SECONDARY CONTAINMENT AREA AND SECURED IN A LOCKED AREA WITH AN IMPERVIOUS FLOOR DURING NON-WORK HOURS.

10. A SUPPLY OF ABSORBENT SPILL RESPONSE MATERIAL SUCH AS BOOMS OR BLANKETS SHALL BE AVAILABLE AT THE PROJECT SITE AT ALL TIMES TO CLEAN UP POTENTIAL SPILLS OF HAZARDOUS MATERIALS SUCH AS GASOLINE AND OIL.

11. THE AREAS OF WORK ARE DESCRIBED IN THE REMEDIAL DESIGN PLAN AND SHOWN ON THE DETAIL DRAWINGS. THE CONTRACTOR SHALL REVIEW AND ACCEPT ALL PLANNED WORK AREAS OR PROVIDE MODIFICATIONS FOR ENGINEER APPROVAL.

12. EXISTING CONDITIONS, AS PRESENTED, REPRESENT THOSE CURRENT AS OF THE DATE OF THE FIELD SURVEY. CONTRACTOR IS RESPONSIBLE FOR FIELD VERIFICATION OF SITE CONDITIONS PRIOR TO THE START OF WORK.

13. ANY SURVEY MARKERS, PRIVATE OR PUBLIC, DISTURBED BY THE CONTRACTOR'S OPERATION SHALL BE RESTORED TO THE ORIGINAL POSITION AT THE CONTRACTOR'S COST.

14. NO EXCAVATIONS SHALL REMAIN OPEN AFTER NORMAL WORKING HOURS WITHOUT PRIOR APPROVAL BY THE ENGINEER.

15. ANY EXCAVATION THAT IS TO REMAIN OPEN ON PRIVATE PROPERTY AFTER NORMAL WORKING HOURS SHALL BE COMPLETELY FENCED AND WITH APPROPRIATE SIGNAGE, CONFORMING WITH OSHA REGULATIONS AND TO THE SATISFACTION OF THE ENGINEER, TO PROTECT THE PUBLIC AND PREVENT UNAUTHORIZED ENTRY.

16. IF AIR MONITORING BY AECOM REVEALS VOC AND/OR PARTICULATE LEVELS THAT EXCEEDS CAMP RESPONSE LEVELS, THE CONTRACTOR SHALL TAKE APPROPRIATE ACTIONS, IN ACCORDANCE WITH THE CAMP

17. WHENEVER ITEMS IN THE CONTRACT REQUIRE MATERIALS TO BE REMOVED AND DISPOSED OF, THE COST OF SUPPLYING A DISPOSAL AREA, HANDLING AND TRANSPORTATION TO THAT AREA SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THOSE ITEMS.

18. BACKFILL OF EXCAVATION SHALL BE PERFORMED FOLLOWING APPROVAL BY THE NYSDEC. NO ADDITIONAL PAYMENTS WILL BE MADE BEYOND THE LIMITS SHOWN.

19. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST OF LABORATORY TESTING OF ALL SAMPLES AND MATERIALS.

20. THE CONTRACTOR SHALL BE RESPONSIBILE TO VERIFY LOCATIONS AND ELEVATIONS OF ALL UTILITIES SHOWN OR ENCOUNTERED WITHIN THE CONTRACT LIMITS PRIOR TO ANY WORK. ANY AND ALL DISCREPANCIES SHALL BE RESOLVED BY THE ENGINEER AND THE UTILITY OWNER.

21. THE CONTRACTOR SHALL IDENTIFY AND PROTECT ALL UTILITIES DURING COMPLETION OF THE WORK AS DESCRIBED IN THE REMEDIAL DESIGN PLAN.

22. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE COST TO REPAIR ANY UTILITY OR OTHER FACILITIES DAMAGED BY THE CONTRACTOR DURING EXECUTION OF THE WORK.

23. THE CONTRACTOR SHALL RESTORE ALL DISTURBED AREAS AS DESCRIBED IN THE REMEDIAL DESIGN PLAN AND TO THE SATISFACTION OF THE ENGINEER.

24. THE CONTRACTOR SHALL NOTIFY THE PROPERTY OWNERS AND VILLAGE OF SOUTH GLENS FALLS 48 HOURS IN ADVANCE OF ANY EXCAVATION WITHIN THEIR PROPERTY OR RIGHT OF WAY (ROW).

25. WORK HOURS ARE 7 AM TO 5 PM MONDAY THROUGH FRIDAY.

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PROJECT

Remedial Design
New York State Department of Environmental Conservation
Midtown Shopping Center (Site ID 5-46-054)
Village of South Glens Falls, Saratoga County, New York
August 2019

CLIENT

New York State Department of Environmental Conservation (NYSDEC)
Warrensburg, New York

CONSULTANT

AECOM
40 British American Blvd.
Latham, NY 12110
518.951.2200 tel 518.951-2300 fax
www.aecom.com

REGISTRATION

REFERENCE

PROJECT NUMBER

60445806

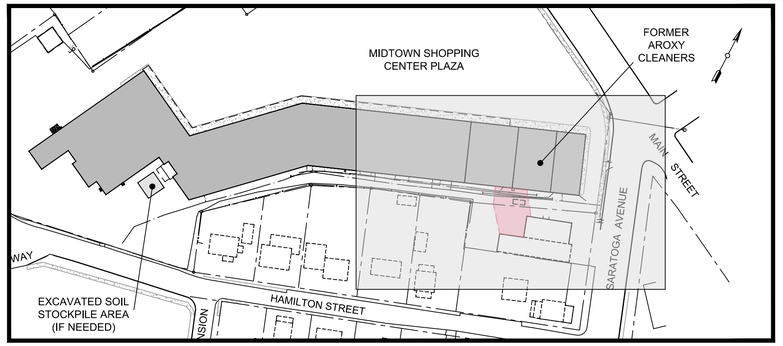
SHEET TITLE

GENERAL NOTES

SHEET NUMBER

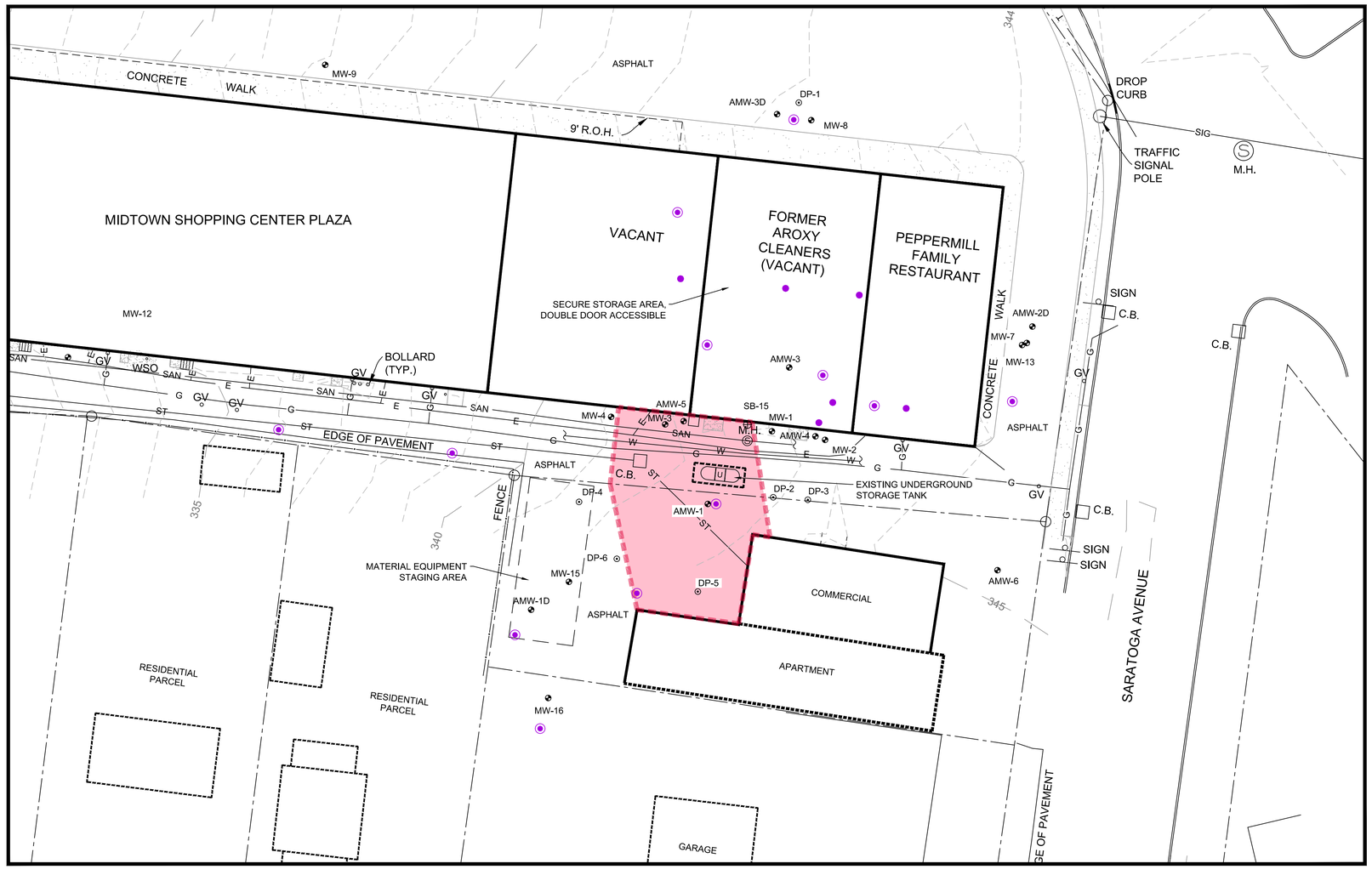
Project Management Initials: Designer: Checked: Approved: ANSI D 22" x 34"

NOTES:



KEY MAP

0 100' 200'



LEGEND

- PROPERTY LINE
- BUILDING
- PAVEMENT
- FENCE
- SANITARY SEWER LINE
- WATER LINE
- STORM SEWER LINE
- GAS LINE
- ELECTRIC LINE
- SANITARY SEWER MANHOLE
- WATER VALVE
- CATCH BASIN
- GAS VALVE
- UTILITY POLE
- GUY WIRE
- BOLLARD
- CONTOUR (INDEX)
- CONTOUR
- UNDERGROUND STORAGE TANK
- MONITORING WELL
- PDI SOIL BORING
- SOIL BORING
- EXISTING SOIL VAPOR SAMPLING POINT
- EXISTING SSDS EXTRACTION POINT
- APPROXIMATE LIMITS OF ISCO TREATMENT
- APPROXIMATE LIMITS OF TANK EXCAVATION
- HAUL ROUTE
- SITE SECURITY FENCE
- SEDIMENT CONTROL MEASURES

MAP REFERENCE:

1) MAPPING BASED ON A PLAN TITLED TOPOGRAPHIC MAP FOR MIDTOWN SHOPPING CENTER PLAZA (112-114 MAIN STREET) BY S.Y. KIM DATED APRIL 13, 2012.

2) ADDITIONAL INFORMATION ADDED BY AECOM FROM DIGITIZED AERIAL PHOTOGRAPHS AND MAPPING IMAGES BY OTHERS. THIS APPROXIMATE INFORMATION SHOWN WITH DASHED LINES.

AECOM

PROJECT

Remedial Design
New York State Department of Environmental Conservation
Midtown Shopping Center (Site ID 5-46-054)
Village of South Glens Falls, Saratoga County, New York
August 2019

CLIENT

New York State Department of Environmental Conservation (NYSDEC)
Warrensburg, New York

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www.aecom.com

REGISTRATION

REFERENCE

PLAN

0 20' 40'

PROJECT NUMBER

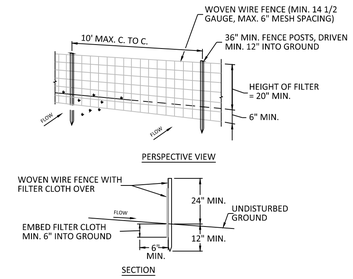
60445806

SHEET TITLE

EXISTING CONDITIONS AND SITE LAYOUT PLAN

SHEET NUMBER

3 of 4



SILT FENCE DETAILS

NOT TO SCALE

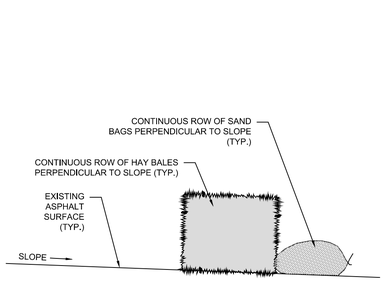
SILT FENCE NOTES:

1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES.
2. FILTER CLOTH TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.
4. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

POSTS:
1 1/4" X 1 1/4" HARDWOOD.

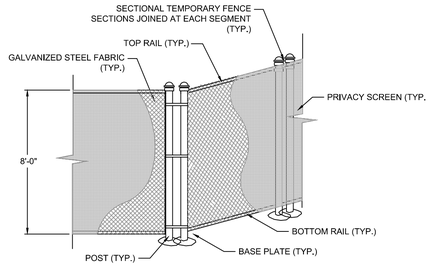
FENCE:
WOVEN WIRE, 14 1/2 GA. 6" MAX. MESH OPENING.

FILTER CLOTH:
FILTER X. MIRAFI 100X. STABILINKA T140N OR APPROVED EQUAL.



SEDIMENT CONTROL MEASURES AT PAVED EXISTING SURFACE

NOT TO SCALE



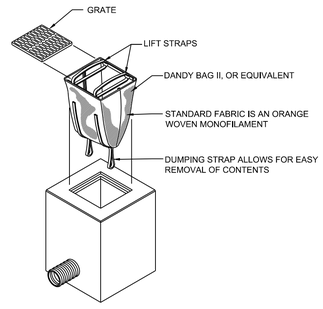
TEMPORARY SECURITY FENCE DETAIL

NOT TO SCALE

TEMPORARY SECURITY FENCE NOTES:

1) CONTRACTOR SHALL SUPPLY GATE(S) AS REQUIRED AND MAINTAIN INTEGRITY OF SECURITY FENCING AND ENCLOSURE AT ALL TIMES.

2) POSTS SHALL BE DRIVEN INTO GROUND OR BE SECURELY CONNECTED TO BASE PLATES AND SUFFICIENTLY WEIGHTED TO RESIST OVERTURNING.



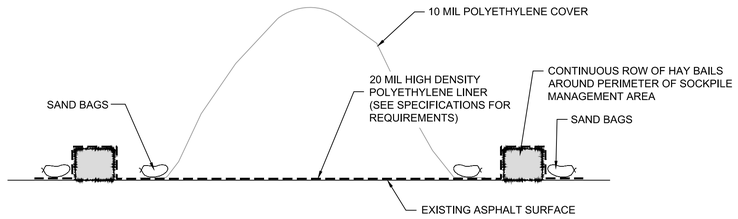
STORMWATER INLET PROTECTION

NOT TO SCALE

INLET PROTECTION NOTES

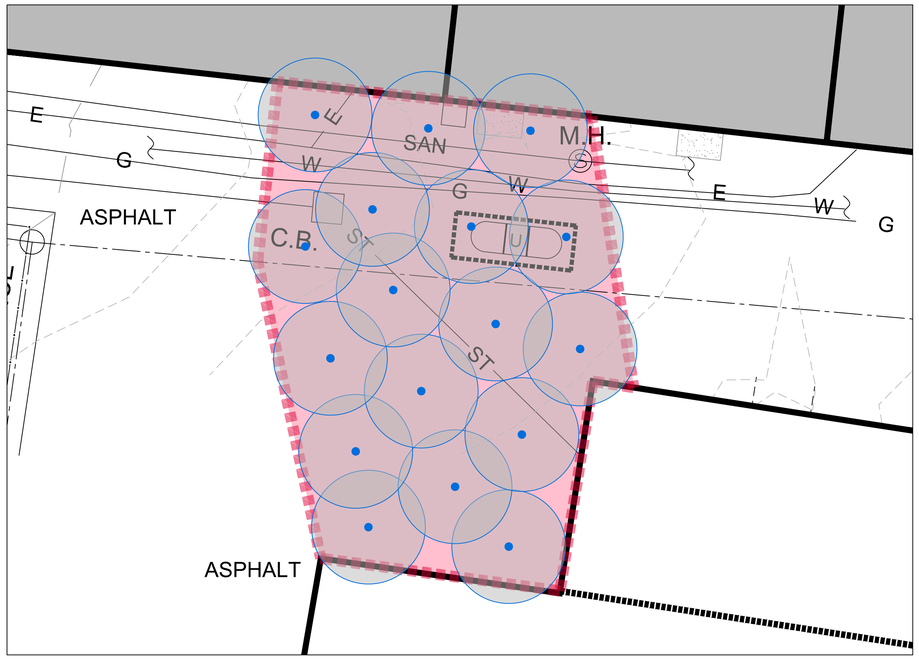
INSTALLATION: REMOVE THE GRATE FROM CATCH BASIN. IF USING OPTIONAL OIL ABSORBENTS; PLACE ABSORBENT PILLOW IN UNIT. STAND THE GRATE ON END; MOVE THE TOP LIFTING STRAPS OUT OF THE WAY AND PLACE THE GRATE INTO THE DANDY BAG II, OR EQUIVALENT, SO THAT THE GRATE IS BELOW THE TOP STRAPS AND ABOVE THE LOWER STRAPS, HOLDING THE LIFTING DEVICES, INSERT THE GRATE INTO THE INLET.

MAINTENANCE: INSPECT AFTER EACH STORM EVENT AND AT REGULAR INTERVALS. REMOVE ALL ACCUMULATED SEDIMENT AND DEBRIS FROM VICINITY OF UNIT. IF THE CONTAINMENT AREA IS MORE THAN 1/3 FULL OF SEDIMENT, THE UNIT MUST BE EMPTIED. TO EMPTY UNIT, LIFT THE UNIT OUT OF THE INLET USING THE LIFTING STRAPS AND REMOVE THE GRATE. IF USING OPTIONAL OIL ABSORBENTS; REPLACE ABSORBENT WHEN NEAR SATURATION.



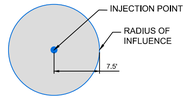
STOCKPILE MANAGEMENT AREA

NOT TO SCALE



PROPOSED ISCO INJECTION PATTERN AND LAYOUT

0 10' 20'



INJECTION POINT DETAIL

NOT TO SCALE

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PROJECT

Remedial Design
New York State Department of Environmental Conservation
Midtown Shopping Center (Site ID 5-46-054)
Village of South Glens Falls, Saratoga County, New York
August 2019

CLIENT

New York State Department of Environmental Conservation (NYSDEC)
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REGISTRATION

REFERENCE

PROJECT NUMBER

60445806

SHEET TITLE

CONSTRUCTION DETAILS

SHEET NUMBER

4 of 4

ATTACHMENT D

NYSDEC DER-10 Generic CAMP

Appendix 1A
New York State Department of Health
Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical- specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or

overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must 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 or exclusion zone 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, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone 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 for 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.

4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/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 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

December 2009

ATTACHMENT E

ISCO Reagent Estimation Spreadsheet

CRT

Carus Remediation Technologies

RemOx® S and RemOx® L
ISCO Reagents
Estimation Spreadsheet

Input data into box with black font

Site Name: Midtown Shopping Center
Date: 5/2/2018

	Estimates	Units
Treatment Area Volume		
Length	**60**	ft
Width	**43**	ft
Area	2,580	sq ft
Thickness	**2.5**	ft
Total Volume	239	cu yd
Soil Characteristics/Analysis		
Porosity	**30**	%
Total Plume Pore Volume	14,475	gal
Avg Contaminant Conc	**10**	ppm
Mass of Contaminant	1.21	lb
PNOD	**1.2**	g/kg
Effective PNOD	**30**	%
Effective PNOD Calculated	0.360	
PNOD Oxidant Demand	255.42	lb
Avg Stoichiometric Demand	**1.8**	lb/lb
Contaminant Oxidant Demand	2.17	lb
Theoretical Oxidant Demand	257.59	lb
Confidence Factor	**1.5**	
Calculated Oxidant Demand	386.39	

	Estimates	Units
Injection Volume for RemOx S		
Injection Concentration	**2.0%**	%
Total Volume of Injection Fluid	2,316	gal
Pore Volume Replaced	16.00	%
Amount of RemOx S Estimated:	**386**	**pounds**
Injection Volume for RemOx L		
Injection Concentration	**2.0%**	%
Calculated Specific Gravity	1.02	g/ml
Total Volume of Injection Fluid	2,042	gal
Pore Volume Replaced	14.10	%
Amount of RemOx L Estimated:	**867**	**pounds**
	76	**gallons**

ATTACHMENT F

ISCO Reagent Safety Data 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 3.3 lbs (1.5 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/Y 1.9/100) 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 123 lbs (55.8 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.3 in (114.9 cm) high, 47.3 in (120.0 cm) long, and 39.4 in (100.0cm) 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 123 lbs (55.8 kg). The net weight is 3000 lbs (1360 kg). The IBC contains 263 gallons (1000 L) of product. The IBC dimensions are 45.3 in (115.1 cm) high, 47.2 in (119.9 cm) long, and 39.4 in (100.1 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. 04/15
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. 04/15
form RX 1603

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).

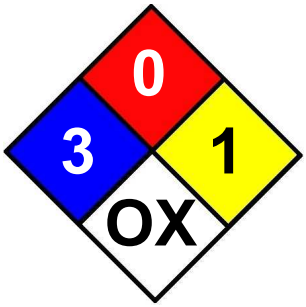
16. Other information, including date of preparation or last revision

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.