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Civil and Environmental Engineering
8232 LOOP ROAD, BALDWINSVILLE, NEW YORK 13027
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August 24, 2007

Mr. Kevin J. Kelly, P.E.
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
Division of Environmental Remediation, Region 7
615 Erie Boulevard West
Syracuse, New York 13204-2400

RE: Former North Star Cleaners, Chemical Oxidation Work Plan
Site No. V-00150-7
Project No. 2003074

Dear Mr. Kelly:

Per your request at our August 15, 2007 meeting, attached is a work plan for chemical oxidation at the above-referenced site. As the primary infrastructure is currently in place, we will implement this plan quickly after approval is received.

We request your review at the earliest possible time, as we would like to complete this treatment in early September. If you have any questions regarding this information, please contact our office.

Sincerely,

, P.C.

Dale Vollmer

DRV/WJS/cas
Attachments
cc: Wendy Marsh, Esquire (w/attachments)
Ms. Mary Jane Peachey (w/attachments)
Mr. Gregg Townsend (w/attachments)
Ms. Melissa Menetti (w/attachments)

VOLUNTARY CLEANUP PROGRAM

CHEMICAL OXIDATION WORK PLAN

for

SITE NO. V-00150-7

VOLUNTARY CLEANUP AGREEMENT NO. A7-0466-0702

Prepared by:

PLUMLEY ENGINEERING

8232 Loop Road
Baldwinsville, New York 13027
(315) 638-8587
Project No. 2003074

August 2007

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1.0 INTRODUCTION

As requested by DEC in its letter sent August 9, 2007, the Volunteers will implement an additional chemical oxidation application in lieu of waiting for more rounds of data for DEC to issue the Release and Covenant Not to Sue for the Site. Specifically, the DEC requested that chemical oxidant be placed into the following locations:

- Existing well RW-1
- Existing remedial trench
- Existing access pits along the former sewer line bedding; and
- Proposed access pit upgradient of well TW-5

Refer to *Figure 1 – Site Plan* for the injection locations.

2.0 CHEMICAL OXIDANT APPLICATION

The same chemical oxidant as used on the 2006 injections will be utilized [Carus Chemical Company (Carus) liquid 40% sodium permanganate solution for groundwater remediation]. The chemical oxidant dose for each injection location was estimated based on soil samples from the remedial trench and one groundwater sample from MW-2 collected in 2006 and sent to Carus for analysis of the site-specific permanganate soil and groundwater oxidant demand. The soils were taken from six locations at depth during construction of the trench and MW-2 represents a high groundwater concentration. This analysis determined a low (3.4 g/kg), medium (15.0 g/kg) and high dose (24.4 g/kg) oxidant demand on a dry weight basis.

The 2006 oxidant dosing was applied at the high oxidant demand dose rate and using a Carus recommended confidence factor of 2 (doubled the mass of oxidant applied). As documented since the injection, the result observed was very slow permanganate consumption in the access pits and remedial trench. This suggests that oxidant demand is generally lower across the site than the high oxidant demand used for the first injection. Therefore, this second application is based on the medium dose oxidant demand (15.0

g/kg dry) and a confidence factor of 1. The following oxidant doses were calculated for each injection location.

Location	40% Sodium Permanganate Solution Dose	
RW-1	1,496 lbs.	2.73 drums
Access Pits (5)	459 lbs.	0.84 drums
Remedial Trench	1,175 lbs.	2.15 drums
Total Oxidant	**3, 130 lbs.**	**5.72 drums**

RW-1 & Remedial Trench

Sodium permanganate is delivered by Carus as a 40% liquid solution. Carus recommends an optimum concentration range for permanganate application of 8% to 12%. The solution to be applied to RW-1 and the remedial trench will be mixed with in-situ groundwater. Mixing will be accomplished by pumping groundwater from an extraction point and pumping both the groundwater and permanganate back into the ground to a common injection point. An injection well will be installed near RW-1 to allow for this subsurface circulation. The mixing in the remedial trench will be accomplished by using the existing wells.

Access Pits

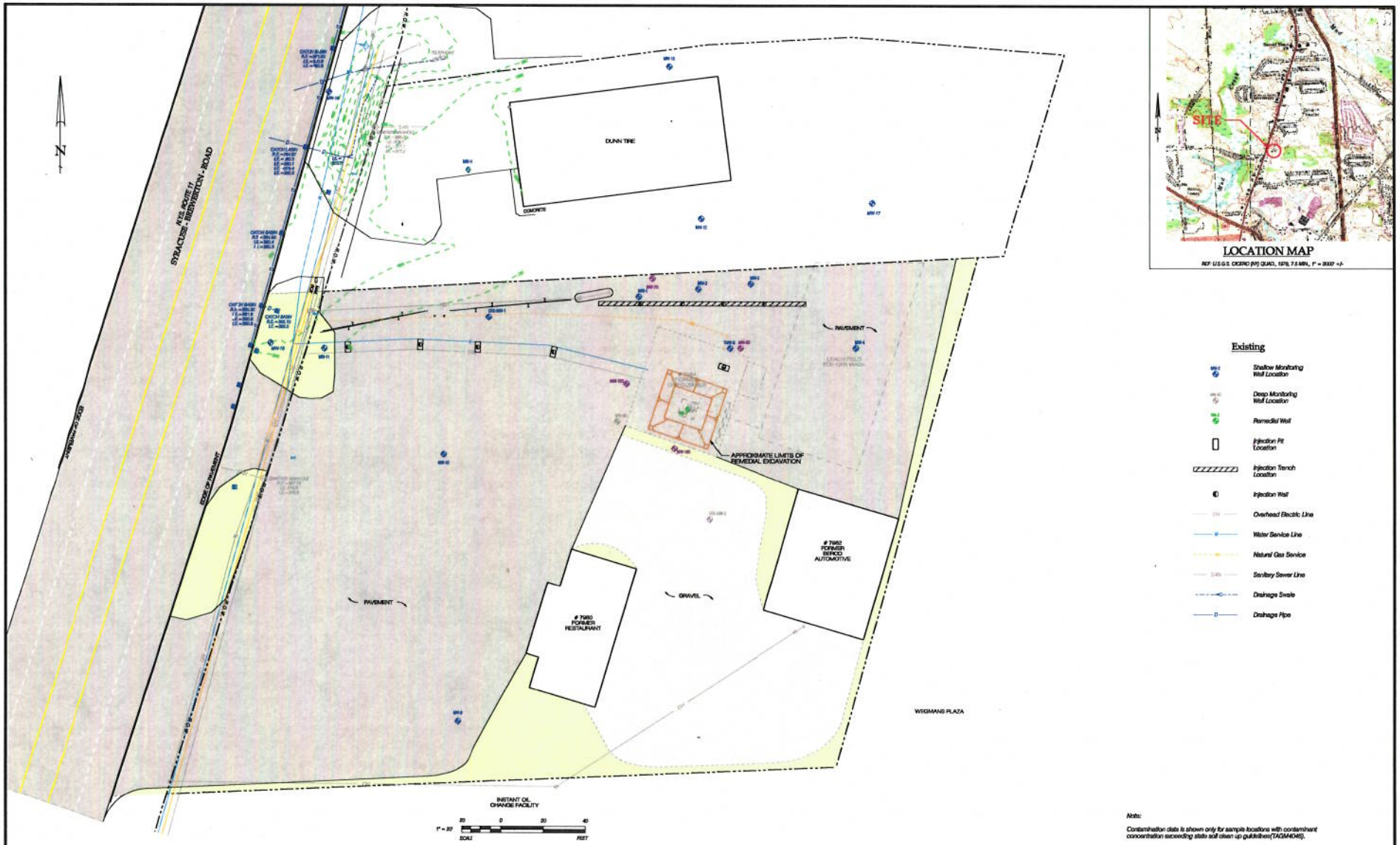
The solution to be added to the five access pits will be diluted with clean dilution water to attain the desired application concentration. Due to the small size of the five access pits, no recirculation will be done.

3.0 HEALTH & SAFETY

Sodium permanganate solution (40%) is a strong oxidizer, an odorless dark purple liquid, and is water miscible. It has the volatility of water (low) and is a strong skin irritant. Protection from eye or skin contact is required. Flush with water if any contact occurs. If eye contact occurs, the point of contact must be flushed with water for 15 minutes holding the lids apart to assure flushing of the entire eye surface. Then medical attention is required. The Material Safety Data Sheet (MSDS) is attached as Appendix A.

The health and safety procedures outlined in the site Health & Safety Plan (HASP), dated February 2004, will be implemented during the intrusive work.

Refer to the MSDS in Appendix A and the HASP for additional information on health and safety procedures.



Notes:

Contamination data is shown only for sample locations with contaminant concentration exceeding state soil clean up guidelines(TAGM4046).

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REVISIONS: DATE: BY:

NOTE: NO ALTERATION PERMITTED HEREON EXCEPT AS PROVIDED UNDER SECTION 7209 SUBDIVISION 2 OF THE NEW YORK STATE EDUCATION LAW.

PROJECT: VOLUNTARY CLEANUP PROGRAM
VCA No. A7-0466-0702

CLIENT: HANCOCK & ESTABROOK, LLP

LOCATION: TOWN OF CICERO, ONONDAGA COUNTY, NEW YORK

DWG. TITLE:
SITE PLAN-CHEMICAL OXIDATION 2
AUGUST 2007

PROJECT No.:	2003074
FILE NAME:	ChemOx2
SCALE:	1" = 20'
DATE:	AUG. 2007
ENG'D BY:	WJS
DRAWN BY:	JMD
CHECKED BY:	WJS

SHEET NO.:
FIGURE 1

LIQUOX® sodium permanganate

EC- SAFETY DATA SHEET according to EC directive 2001/58/EC

Material Safety Data Sheet

Section 1 Chemical Product and Company Identification

PRODUCT NAME:	LIQUOX® sodium permanganate, $NaMnO_4$	**Revision Date: October 2005**
TRADE NAME:	LIQUOX® sodium permanganate	
SYNONYMS:	Permanganic acid sodium salt Sodium permanganate	
USES OF SUBSTANCE:	LIQUOX® sodium permanganate is a liquid oxidant recommended for applications that require a concentrated permanganate solution.	

COMPANY NAME (Europe): CARUS NALON S.L.	**COMPANY ADDRESS:** Barrio Nalon, s/n 33100 Trubia-Oviedo Espana, Spain **INFORMATION:** (34) 985-785-513 **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 (815) 224-6816 (FAX) www.caruschem.com (Web) salesmkt@caruschem.com (Email) **EMERGENCY TELEPHONE:** (800) 435 –6856 (USA) (815) 223-1500 (Other countries) (800) 424-9300(CHEMTREC®, USA) (703) 527-3887 (CHEMTREC®, Other countries)

Section 2 Hazardous Ingredients

MATERIAL OR COMPONENT	CAS NO.	EINECS	%	HAZARD DATA
Sodium Permanganate	10101-50-5	233-251-1	20-40	**PEL/C** 5 mg Mn per cubic meter of air
				TLV-TWA 0.2 mg Mn per cubic meter of air

HAZARD SYMBOLS:


O


Xn


N

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:

17 Keep away from combustible materials.
24/25 Avoid contact with skin and eyes.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Section 3 Hazards Identification

1. **EYE CONTACT**
   Sodium Permanganate 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 sodium permanganate in the form of mist may cause irritation to the respiratory tract.

4. **INGESTION**
   Sodium permanganate solution, if swallowed, may cause burns to mucous membranes of the mouth, throat, esophagus, and stomach.

Section 4 First Aid Measures

1. **EYES**
   Immediately flush eyes with large amounts of water for at least 15 minutes holding lids apart to ensure flushing of the entire surface. Do not attempt to neutralize chemically. Seek medical attention immediately. **Note to physician**: Decomposition products are alkaline. Brown stain formed is insoluble manganese dioxide.

2. **SKIN**
   Immediately wash contaminated areas with water. Remove contaminated clothing and footwear. (**Caution:** Solution may ignite certain textiles). Wash clothing and decontaminate footwear before reuse. Seek medical attention if irritation is severe or persistent.

3. **INHALATION**
   Remove person from contaminated area to fresh air. If breathing has stopped, resuscitate and administer oxygen if readily available. Seek medical attention immediately.

4. **INGESTION**
   Never give anything by mouth to an unconscious or convulsing person. If person is conscious, give large quantities of water or milk. Seek medical attention immediately.

Section 5 Fire Fighting Measures

NFPA* HAZARD SIGNS		
Health Hazard	1 =	Materials which under fire conditions would give off irritating combustion products. (less than 1 hour exposure) Materials that on the skin could cause irritation.
Flammability Hazard	0 =	Materials that will not burn.
Reactivity Hazard	0 =	Materials which in themselves are normally stable, even under fire exposure conditions, and which are not reactive with water.
Special Hazard	OX =	Oxidizer

*National Fire Protection Association 704 (USA)

FIRST RESPONDERS:	Wear protective gloves, boots, goggles, and respirator. In case of fire, wear positive pressure breathing apparatus. Approach incident with caution.
FLASHPOINT	None
FLAMMABLE OR EXPLOSIVE LIMITS	Lower: Nonflammable Upper: Nonflammable
EXTINGUISHING MEDIA	Use large quantities of water. Water will turn pink to purple if in contact with sodium permanganate. Dike to contain. Do not use dry chemicals, CO_2 Halon® or foams.
SPECIAL FIREFIGHTING PROCEDURES	If material is involved in fire, flood with water. Cool all affected containers with large quantities of water. Apply water from as far a distance as possible. Wear self-contained breathing apparatus and full protective clothing.
UNUSUAL FIRE AND EXPLOSION	Powerful oxidizing material. May decompose spontaneously if exposed to heat (135°C / 275°F). May be explosive in contact with certain other chemicals (Section 10). May react violently with finely divided and readily oxidizable substances. Increases burning rate of combustible material. May ignite wood and cloth.

Section 6 Accidental Release Measures

PERSONAL PRECAUTIONS

Personnel should wear protective clothing suitable for the task. Remove all ignition sources and incompatible materials before attempting clean up.

ENVIRONMENTAL PRECAUTIONS:

Do not flush into sanitary sewer system or surface water. If accidental release into the environment occurs, inform the responsible authorities. Keep the product away from drains, sewers, surface and ground water and soil.

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED

Contain spill by collecting the liquid in a pit or holding behind a dam (sand or soil). 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. 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 above.

Section 7 Handling and Storage

WORK/HYGIENIC PRACTICES

Wash hands thoroughly with soap and water after handling permanganate solution. Do not eat, drink or smoke when working with sodium permanganate. Wear proper protective equipment. Remove clothing, if it becomes contaminated.

VENTILATION REQUIREMETNS

Provide sufficient mechanical and/or local exhaust to maintain exposure below the TLV/TWA.

CONDITIONS FOR SAFE STORAGE

Store in accordance with NFPA 430 requirements for Class II oxidizers. Protect containers from physical damage. Store in a cool, dry area in closed containers. Segregate from acids, peroxides, formaldehyde, and all combustible, organic, or easily oxidizable materials including antifreeze and hydraulic fluid.

Section 8 Exposure Controls and Personal Protection

RESPIRATORY PROTECTION

In cases where overexposure to mist may occur, the use of an approved NIOSH-MSHA mist respirator or an air supplied respirator is advised. Engineering or administrative controls should be implemented to control mist.

EYE

Faceshield, goggles, or safety glasses with side shields should be worn. Provide eyewash in working area.

GLOVES

Rubber or plastic gloves should be worn.

OTHER PROTECTIVE EQUIPMENT

Chemically resistant clothing covering arms and legs, and rubber, or plastic apron should be worn. **Caution:** If clothing becomes contaminated, wash off immediately. Spontaneous ignition may occur with cloth or paper.

Section 9 Physical and Chemical Properties

APPEARANCE AND ODOR	Dark purple solution, odorless
BOILING POINT, 760 mm Hg	>101°C
VAPOR PRESSURE (mm Hg)	760 mm at 105°C
SOLUBILITY IN WATER % BY SOLUTION	Miscible in all proportions with water
PERCENT VOLATILE BY VOLUME	61-85% (as water)
EVAPORATION RATE	Same as water
FREEZING POINT	<-4.0 °C
SPECIFIC GRAVITY	1.16 - 1.36
pH	6-9
OXIDIZING PROPERTIES	Strong oxidizer. May ignite wood and cloth.
EXPLOSIVE PROPERTIES	Explosive in contact with sulfuric acid or peroxides, or readily oxidizable substances.

Section 10 Stability and Reactivity

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.
INCOMPATIBLE MATERIALS	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.
CONDITIONS CONTRIBUTING TO HAZARDOUS POLYMERIZATION	Material is not known to polymerize.

Section 11 Toxicological Information

SODIUM PERMANGANATE: **Acute oral LD_{50} not known.**

1. ACUTE TOXICITY

Irritating to body tissue with which it comes into contact. No acute toxicity data is available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate. The toxicity data for potassium permanganate is given below:

INGESTION:
LD 50 oral rat: 780 mg/kg male (14 days); 525 mg/kg female (14 days).
Harmful if swallowed. ALD: 10g. Ingestion may cause nausea, vomiting, sore throat, stomach-ache and eventually lead to a perforation of the intestine. Liver and kidney injuries may occur.

SKIN CONTACT:
LD 50 dermal no data available.
Major effects of exposure: severe irritation, brown staining of skin.

INHALATION:
LC 50 inhal. no data available.
The product may be absorbed into the body by inhalation. Major effects of exposure: respiratory disorder, cough.

2. CHRONIC TOXICITY

No known cases of chronic poisoning due to permanganates have been reported. Prolonged exposure, usually over many years, to heavy concentrations of manganese oxides in the form of dust and fumes may lead to chronic manganese poisoning, chiefly involving the central nervous system.

3. CARCINOGENICITY

Sodium permanganate has not been classified as a carcinogen by ACGIH, NIOSH, OSHA, NTP, or IARC.

4. MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE

Sodium permanganate solution will cause further irritation of tissue, open wounds, burns or mucous membranes.

Section 12 Ecological Information

ENTRY TO THE ENVIRONMENT

Permanganate has a low estimated lifetime in the environment, being readily converted by oxidizable materials to insoluble MnO_2.

BIOCONCENTRATION POTENTIAL

In non-reducing and non-acidic environments, MnO_2 is insoluble and has a very low bioaccumulative potential.

AQUATIC TOXICITY

No aquatic toxicity data is available for sodium permanganate. Toxicity is expected to be similar to that of potassium permanganate. The toxicity data for potassium permanganate is given below:

Rainbow trout, 96 hour LC_{50} for potassium permanganate:	1.8 mg/L
Bluegill sunfish, 96 hour LC_{50} LC50 for potassium permanganate:	2.3 mg/L
Milk fish (Chanos Chanos)/ 96 hour LC_{50} LC50 for potassium permanganate:	>1.4mgl

Section 13 Disposal Considerations

WASTE DISPOSAL

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 Carus Chemical Company for additional recommendations.

Section 14 Transport Information

USA (land, D.O.T.)	**Proper Shipping Name:**	49 CFR172.101 Permanganates, inorganic, aqueous solution, n.o.s. (contains sodium permanganate)
	Hazard Class:	49 CFR172.101....Oxidizer
	ID Number:	49 CFR172.101....UN 3214
	Packing Group:	49 CFR172.101....II
	Division:	49 CFR172.101....5.1
European Labeling in accordance Road/Rail Transport (ADR/RID)	**ID Number:**	UN 3214
	ADR/RID Class	5.1
	Description of Goods:	Permanganates, inorganic, aqueous solution, n.o.s. (contains sodium permanganate)
	Hazard Identification No.	50
European Labeling in accordance with EC directive (Water, I.M.O.)	**Proper Shipping Name:**	Permanganates, inorganic, aqueous solution, n.o.s. (contains sodium permanganate)
	Hazard Class:	Oxidizer
	ID Number:	UN 3214
	Packing Group:	II
	Division:	5.1
	Marine Pollutant:	No

Section 14 Transport Information (contd.)

European Labeling in accordance with EC directive (Air, I.C.A.O.)	**Proper Shipping Name:**	Permanganates, inorganic, aqueous solution, n.o.s (contains sodium permanganate)
	Hazard Class:	Oxidizer
	ID Number:	UN 3214
	Packing Group:	II
	Division:	5.1

Section 15 Regulatory Information

EUROPEAN AND INTERNATIONAL REGULATIONS:

MARKINGS ACCORDING TO EU GUIDELINES:

The product has been classified and marked in accordance with EU directives/ordinances on hazardous materials.

CHEMICAL NAME	CAS NO.	EINECS	UN NUMBER
Sodium Permanganate	10101-50-5	233-251-1	UN 3214

CODE LETTER AND HAZARD DESIGNATION OF THE PRODUCT:

O
Oxidizer

Xn
Harmful

N
Dangerous to the Environment

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:

17 Keep away from combustible materials.
24/25 Avoid contact with skin and eyes.
26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

Section 15 Regulatory Information (contd.)

US FEDERAL REGULATIONS:

CHEMICAL INVENTORY STATUS – PART 1

Ingredient	CAS. NO.	TSCA	EC	Japan	Australia
Sodium permanganate	10101-50-5	Yes	Yes		

CHEMICAL INVENTORY STATUS – PART 2 -- CANADA --

Ingredient	CAS. NO.	Korea	DSL	NDSL	PHIL
Sodium permanganate	10101-50-5	No	No	Yes	

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulation (CPR, Canada) and the MSDS contains all of the information required by the CPR.

FEDERAL, STATE & INTERNATIONAL REGULATIONS – PART 1

		SARA 302		SARA 313	
Ingredient	CAS. NO.	RQ	TPQ	List	Chemical Catg.
Sodium permanganate	10101-50-5	N/A	N/A	No	Yes (Manganese compounds)

FEDERAL, STATE & INTERNATIONAL REGULATIONS – PART 2

Ingredient	CAS. NO.	CERCLA	RCRA	TSCA 8(d)
Sodium permanganate	10101-50-5	No	D001	No

Ingredient	CAS. NO.	CWC	TSCA 12(b)	CDTA	SARA 311/312
Sodium permanganate	10101-50-5	No	No		4545 Kg

Ingredient	CAS. NO.	Acute	Chronic	Fire	Pressure	Reactivity	Pure/Liquid
Sodium permanganate	10101-50-5	Yes	Yes	Yes	No	No	Liquid

Ingredient	CAS. NO.	Australian Hazchem Code	Poison Schedule	WHMIS
Sodium permanganate	10101-50-5			C, D2B

Section 16 Other Information

NIOSH	National Institute for Occupational Safety and Health
MSHA	Mine Safety and Health Administration
OSHA	Occupational Safety and Health Administration
NTP	National Toxicology Program
IARC	International Agency for Research on Cancer
PEL	Permissible Exposure Limit
C	Ceiling Exposure Limit
TLV-TWA	Threshold Limit Value-Time Weighted Average
CAS	Chemical Abstract Service
EINECS	Inventory of Existing Chemical Substances (European)

Chithambarathanu Pillai (S.O.F.)
October 2005

CARUS CHEMICAL COMPANY IS A DIVISION OF CARUS CORPORATION, 315 5TH STREET, PERU, ILLINOIS 61354
CARUS NALON S.L. IS A DIVISION OF CARUS CORPORATION, 315 5TH STREET, PERU, ILLINOIS 61354

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Good Chemistry at Work