



Mr. Larry Alden, P.E.  
Project Manager  
New York State Department of Environmental Conservation  
Division of Environmental Remediation  
625 Broadway, 12th Floor  
Albany, NY 12233-7016

Subject:

Sustained Release Permanganate Treatment Report  
Henry Johnson Boulevard Properties  
City of Albany, New York  
Project No. E401049

Dear Mr. Alden:

On behalf of the City of Albany Community Development Agency (ACDA), ARCADIS of New York, Inc. (ARCADIS) is pleased to submit this report summarizing the deployment of sustained release permanganate treatment at the above-referenced site in response to your April 15, 2015 letter and request.

Based on the Remedial Investigation conducted at the site, a Soil Removal Action (SRA) was previously conducted in which the main source of tetrachloroethene (PCE)-impacted soil was removed. Subsequently, a full-scale chemical oxidation pilot study was conducted to address residual groundwater impacts. Post-injection monitoring of the site has shown rebound of PCE and breakdown product concentrations in groundwater. Additional investigative work was performed that confirmed that significant residual soil chlorinated volatile organic compound (CVOC) mass is not likely present in the down-gradient vicinity of the SRA and that remaining CVOC-impacted groundwater is residual in nature.

In accordance with your letter, dated April 15, 2015, a Work Plan was submitted and approved by the New York State Department of Environmental Conservation (NYSDEC) on May 7, 2015 for deployment of sustained release potassium permanganate in the affected monitoring wells in the vicinity of 124 Henry Johnson Boulevard (IW-1, MW-10R, and MW-22R) to address the residual CVOC groundwater impacts at the site.

Imagine the result

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ENVIRONMENT

Date:  
July 23, 2015

Contact:  
Stefan Bagnato

Phone:  
518-250-7334

Email:  
[Stefan.Bagnato@arcadis-us.com](mailto:Stefan.Bagnato@arcadis-us.com)

Our ref:  
04279009.0000

On June 11, 2015 ARCADIS deployed the sustained release product in the affected wells. The sustained release product consists of a cylindrical paraffin wax matrix impregnated with granular potassium permanganate and sodium persulfate (to improve remedial chemistry and minimize the potential of cylinder fouling from manganese dioxide formation). Details of the product used are provided in the attached cut sheet. The sustained release cylinders were deployed within the water column of each affected well as measured on June 11, 2015 as summarized below:

- IW-01: 4 cylinders deployed within 6.66 feet of water column.
- MW-10R: 3 cylinders deployed within 7.12 feet of water column.
- MW-22R: 5 cylinders deployed within 9.27 feet of water column.

On July 22, 2015 ARCADIS conducted the ongoing quarterly permanganate distribution monitoring, which verified the dissolution of permanganate from the sustained release product into the affected wells. As previously provided to the NYSDEC, field comparison to a serial dilution provided the following field estimates of permanganate concentrations:

- IW-01: approximately 50 milligrams per liter (mg/L).
- MW-10R: greater than 100 mg/L.
- MW-22R: greater than 100 mg/L.

In accordance with your April 15, 2015 letter, this deployment of the sustained release permanganate product at the site satisfies remaining remedial actions required by the NYSDEC. It is understood that a final Site Management Plan, Environmental Easement, and Final Engineering Report are required in order for the ACDA to receive a Certificate of Completion for the site.

If you have any questions concerning this matter, please call me at (518) 250-7334.

Sincerely,

ARCADIS of New York, Inc.

A handwritten signature in black ink, appearing to read 'Stefan Bagnato'.

Stefan Bagnato, P.G.  
Senior Geologist

Attachment

Copies:

Luis Perez, ACDA

Michael Komoroske, NYSDEC

# CARUS REMEDATION

CAS Registry No. 7722-64-7 EINECS No. 231-760-3  
CAS Registry No. 7775-27-1 EINECS No. 231-892-1  
CAS Registry No. 64742-51-4 EINECS No. 265-154-5



RemOx® SR+ ISCO Reagent  
FACT SHEET

RemOx® SR+ 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 ethenes, chlorinated ethanes, chlorinated methanes, benzene, toluene, ethylbenzene, and xylene, methyl tertiary butyl ether, polyaromatic hydrocarbons, petroleum hydrocarbons, 1,4-dioxane and pesticides.

## REMEDATION GRADE

SR+ is manufactured with potassium permanganate and sodium persulfate. Potassium permanganate and sodium persulfate meets specifications for assay.

<b>Assay</b>	38% as $\text{KMnO}_4$
<b>Assay</b>	38% as $\text{Na}_2\text{S}_2\text{O}_8$

## CHEMICAL/PHYSICAL DATA

<b>Formula</b>	$\text{KMnO}_4$ ; $\text{Na}_2\text{S}_2\text{O}_8$ ; Paraffin wax
<b>Form</b>	Extruded solid of granular crystalline inside wax
<b>Congealing point of wax is</b>	54-57° C/ 129-134° F
<b>Paraffin wax will start to melt at</b>	55° C/ 132° F

## DESCRIPTION

Dark purple potassium permanganate crystals and white crystals of sodium persulfate in a clear wax.

Standard size is 2.5 in (6.4 cm) diameter by 18 in (45.7 cm) long with 38:38:24% by weight  $\text{KMnO}_4$ ;  $\text{Na}_2\text{S}_2\text{O}_8$ ; Paraffin wax.

## APPLICATIONS

SR+ was developed to provide a sustained release of potassium permanganate and sodium persulfate for soil and groundwater treatment. SR+ can be emplaced in the subsurface using direct push technology or suspended into existing wells. This technology can be used for source treatment as well as barrier applications.

## SHIPPING CONTAINERS

**2.5 in (6.4 cm) by 18 in (45.7 cm) cylinder - Qty 6/box** Corrugated box that is 12.5 in (31.75 cm) by 10.625 in (26.987 cm) by 22 in (55.88 cm) with foam insert. Weight of box is 3.303 lbs (1.498 kg). Weight per cylinder is 5.75 lbs. (2.61 kg) or 38.088 lbs (17.276 kg) per box. Total weight of box and cylinders is 40.1 lbs (18.2 kg). (Domestic and international)

**Orders can only be placed as full boxes in multiples of 6.**

**Packaging meets UN performance-oriented packaging requirements.**

## SHIPPING

SR+ is classified as an oxidizer in accordance with the classification requirements of the Hazardous Materials Transportation regulations. It is shipped under Interstate Commerce Commission's (ICC) Tariff 19.

**Proper Shipping Name:** Oxidizing solid, n.o.s. (potassium permanganate, sodium persulfate)

**Hazard Class:** Oxidizer

**Identification Number:** UN 1479

**Label Requirements:** Oxidizer

**Packaging Requirements:** 49 CFR Parts 100 to 185

### Shipping Limitations:

*Minimum quantities:*

Rail car: See Tariff for destination

Truck: No minimum

## HANDLING, STORAGE, AND INCOMPATIBILITY

Protect containers against physical damage. Eye protection should also be worn when handling SR+. Avoid breathing vapors or mists of the wax. Exposure or inhalation may cause irritation.

Store in a cool, clean, dry place away from point of sources of heat. Concrete floors are preferred to wooden decks. To clean up spills and leaks, follow the steps recommended in the SDS or eSDS. Be sure to use goggles, rubber gloves, and respirator when cleaning up a spill or leak.

Avoid contact with acids, halides, combustible materials, most metals and heavy metals, oxidizable materials, other oxidizers, reducing agents, cleaners, and organic or carbon containing compounds. Fires may be controlled and extinguished by using large quantities of water. Refer to the SDS or eSDS for more information.

SR+ is stable under normal conditions. Do not expose to sparks, heat, open flames, or hot surfaces. It is important that smoking is not allowed in proximity to SR+. Do not cut with any cutting tool which could produce friction (i.e. hand saws, circular saws, reciprocal saws, etc.) as it may cause ignition of the material.

## CARUS CORPORATION

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