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ENVIRONMENT

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
Henry Johnson Boulevard Properties
City of Albany, New York
Project No. E401049

Date:
May 7, 2015

Contact:
Stefan Bagnato

Phone:
518-250-7300

Email:
Stefan.Bagnato@arcadis-us.com

Our ref:
04279009.0000

Dear Mr. Alden:

On behalf of the City of Albany Community Development Agency, ARCADIS of New York, Inc. is pleased to submit this work plan for the use of sustained release permanganate treatment at the above-referenced site in response to your April 15, 2015 letter.

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 sustained release potassium permanganate product will be deployed 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. The sustained release product consists of a 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). An example of this type of product is described in the attached cut sheet. Following deployment of the permanganate, dissolution into groundwater will be verified during the ongoing quarterly permanganate distribution monitoring events.

Upon confirmation of permanganate presence in the affected wells, a letter report will be submitted to the NYSDEC summarizing the field work.

If you have any questions concerning this matter, please call me at (518) 250-7300.

Sincerely,

ARCADIS of New York, Inc.

Stefan Bagnato, P.G.
Project Geologist

Attachment

Copies:
Luis Perez, ACDA
Michael Komoroske, NYSDEC

CARUS
REMEDIATION



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.

REMEDIATION GRADE

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

Assay 38% as $KMnO_4$
Assay 38% as $Na_2S_2O_8$

CHEMICAL/PHYSICAL DATA

Formula $KMnO_4$: $Na_2S_2O_8$: Paraffin wax
Form Extruded solid of granular crystalline inside wax
Congealing point of wax is 54-57° C/ 129-134° F
Paraffin wax will start to melt at 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 $KMnO_4$: $Na_2S_2O_8$: Paraffin wax.

APPLICATIONS

SR+ was developed to provide a sustained release of postassium 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 INCOMAPTIBILITY

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.

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Table 1
Budget Estimate
ARCADIS of New York, Inc.
Sustained Release Permaganate Deployment
Henry Johnson Blvd. Properties ERP (Project #. E401049)

Classification	Hourly Rate
Project Scientist	$120
Scientist	$93

Drilling/Soil & Groundwater Sampling					
Task	**Personnel**	**Hours**	**Cost**		
Field Oversight/Sampling	Scientist	8	$744		
Project Management	Project Scientist	1	$120		
Reporting	Scientist	5	$465		
Reporting	Project Scientist	1	$120		
Expenses					
Permanganate Cylinders			$1,200		
ODCs			$250		
		Subtotal	$2,899		
10% Contingency			$290		
		Total	$3,189	Say	$3,190