January 24, 2018

Jennifer Borski
Wisconsin Department of Natural Resources
625 E County Rd Y, Suite 700
Oshkosh, WI 54901

Re: Remediation Injection Request

Dear Ms. Borski:

EnviroForensics is proposing a pilot test subsurface injection utilizing products that create and support reducing aquifer conditions as a method of groundwater treatment at the former Albany International Chrome Plant in Appleton, Wisconsin (Site). On behalf of Albany International Corp, we are requesting review and approval of the attached request. Site information is provided below.

Site Details:	Albany International Chrome Plant - Former 908 North Lawe Street Appleton, WI 54911 BRRTS# 02-45-000015
Site Owner:	Luvata Appleton, LLC P.O. Box 1714 Appleton, WI 54912-1714
Responsible Party:	Albany International Corp. Joseph Gaug, General Counsel P.O. Box 1907 Albany, NY 12201-1907 518-445-2273 Joseph.Gaug@albint.com
Consultant:	EnviroForensics, LLC Brian Kappen, Project Manager Wayne Fassbender, Senior Project Manager N16 W23390 Stone Ridge Drive, Suite G, Waukesha, WI 53188 262-290-4001 wfassbender@enviroforensics.com

An injection request and WPDES general permit application are attached. A Technical Assistance review fee of $700 is enclosed with the copy of this letter sent to Ms. Danelski.

Sincerely,
EnviroForensics, LLC

Wayne Fassbender, PG, PMP	Brian Kappen, PG
Senior Project Manager	*Project Manager*

cc: Denise Danelski, WDNR
Joe Gaug, Albany International Corp.

enclosure

INJECTION REQUEST
FORMER ALBANY INTERNATIONAL CHROME PLANT
908 NORTH LAWE STREET, APPLETON

EnviroForensics is requesting approval to conduct pilot test injections at the Site. The objectives of the pilot test are to determine radius of influence of injections and to evaluate the performance of remediation products designed to promote the reduction of hexavalent chromium to trivalent chromium. The products selected for testing are:

- 3-D Microemulsion (electron donor emulsion);
- Chemical Reducing Solution (CRS) (Iron-based reagent); and
- Provect-IRM in-situ chemical reduction reagent.

Product brochures prepared by the manufacturers are provided in **Attachment 1**.

The soil beneath the Site was determined by EnviroForensics to be a relatively homogenous blanket of reddish-brown lean clay with trace amounts of sand. Depth to the water table at the Site is approximately 5 feet below ground surface (bgs). The target compound for treatment is hexavalent chromium, identified in Site groundwater at concentrations up to 331 mg/L. The target treatment zone is 8 to 23 feet below ground surface (bgs).

Implementation Plan

The implementation plan consists of two (2) separate pilot test injections to evaluate the performance of two (2) different remedial solutions. Design summary documents are provided in **Attachment 2**.

- 3-D Microemulsion and CRS. 3-D Microemulsion and CRS will be mixed together in solution and pumped under pressure into eight (8) direct-push injection points designated IP-1 through IP-8 as shown on the attached **Figure 1**. The solution will be injected from 10 to 20 feet bgs at each point. Approximately 251 gallons of solution per point will be injected (2,000 gallons total).

- Provect-IRM. Provect-IRM solution will be mixed independently with water and injected into nine (9) direct-push injection points designated IP-9 through IP-17 as shown on **Figure 1**. The solution will be injected from 8 to 23 feet bgs at each point. Approximately 1205 gallons of solution per point will be injected (1,080 gallons total).

The products will be stored inside the Site building prior to mixing. The products will be mixed with water at the site (supplied by the City of Appleton) in tanks to reach the design ratios of product mixtures. Injections will occur through direct-push rods with a retractable screen injection tool similar to http://ectmfg.com/product/2-25-retractable-injection-tool-24-exposed/.

The direct-push tooling will be removed from each location after the prescribed volume of solution is injected, and the boreholes will be abandoned in accordance with s. NR 141.25 and patched with concrete.

Monitoring Plan

Existing monitoring wells MW-19, MW-20, MW-26, and MW-29 will be used for performance monitoring purposes. Additionally, three (3) new monitoring wells will be installed at the locations depicted on **Figure 1** (attached). The new monitoring wells, designated OW-1 through OW-3, will be constructed of 2-inch diameter schedule 40 PVC, with screened intervals from approximately 5 to 15 feet bgs. The monitoring wells will be constructed in accordance with the requirements of Wisconsin Administrative Code Chapter NR 141.

Groundwater samples will be collected from the monitoring wells prior to injections to establish baseline concentrations. Three (3) post-injection monitoring events will be conducted monthly for three (3) months following injections. Groundwater samples will be collected by disposable bailers and analyzed for total and hexavalent chromium, as well as iron and manganese. Water quality data including electrical conductivity, temperature, dissolved oxygen, total dissolved solids, pH and oxidation-reduction potential (ORP) will be measured in the field with a portable meter.

In the short term, we expect there to be increases in dissolved iron and manganese in groundwater resulting from the reduction of ferric iron and manganese oxides. These inorganics will likely reach concentrations exceeding public welfare standards. However, concentrations should return to background levels over time as metal co-precipitates are formed with stable trivalent chromium. The native clay soil will limit migration of injected solutions outside of the designated pilot test treatment areas. Furthermore, since the injection products are non-hazardous and there are no public or private supply wells in the area, the migration of the injected materials is not a concern.

Vapor Screening

Although the risk is low considering the nature and distribution of contaminants at the site, methane and hydrogen sulfide can be produced via in-situ chemical reduction processes. The production of vapors at each injection area will be evaluated by collecting headspace field measurements at monitoring wellheads using a portable gas analyzer. Vapor screening measurements will be collected prior to injections and during the groundwater monitoring events. The wellheads will be fitted with expandable plugs with ports designed for vapor monitoring. If the vapor concentration exceeds 10% of the LEL (i.e., 0.5% by volume methane or 0.4% by volume hydrogen sulfide), vapors will be evacuated using appropriate, intrinsically-safe equipment. The vapor screening results will be considered in the performance comparison of the two remedial solutions.

Timeframe

Pilot testing is tentatively scheduled to begin in February 2018. EnviroForensics anticipates the injection activities can be completed in one (1) week. Post-injection monitoring will be performed monthly for three (3) months following injections.

Certifications

I, Andrew Horwath, hereby certify that I am a registered professional engineer in the State of Wisconsin, registered in accordance with the requirements of ch. A-E 4, Wis. Adm. Code; that this document has been prepared in accordance with the Rules of Professional Conduct in ch. A-E 8, Wis. Adm. Code; and that, to the best of my knowledge, all information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

WISCONSIN
ANDREW D
HORWATH
E-43831-6
NOBLESVILLE,
IN
PROFESSIONAL ENGINEER

Digitally signed by Andrew D. Horwath
Date: 2018.01.24 12:06:54 -05'00'

Manager, Technical Group, P.E. #E-43831-6

Signature, title and P.E. number

P.E. stamp

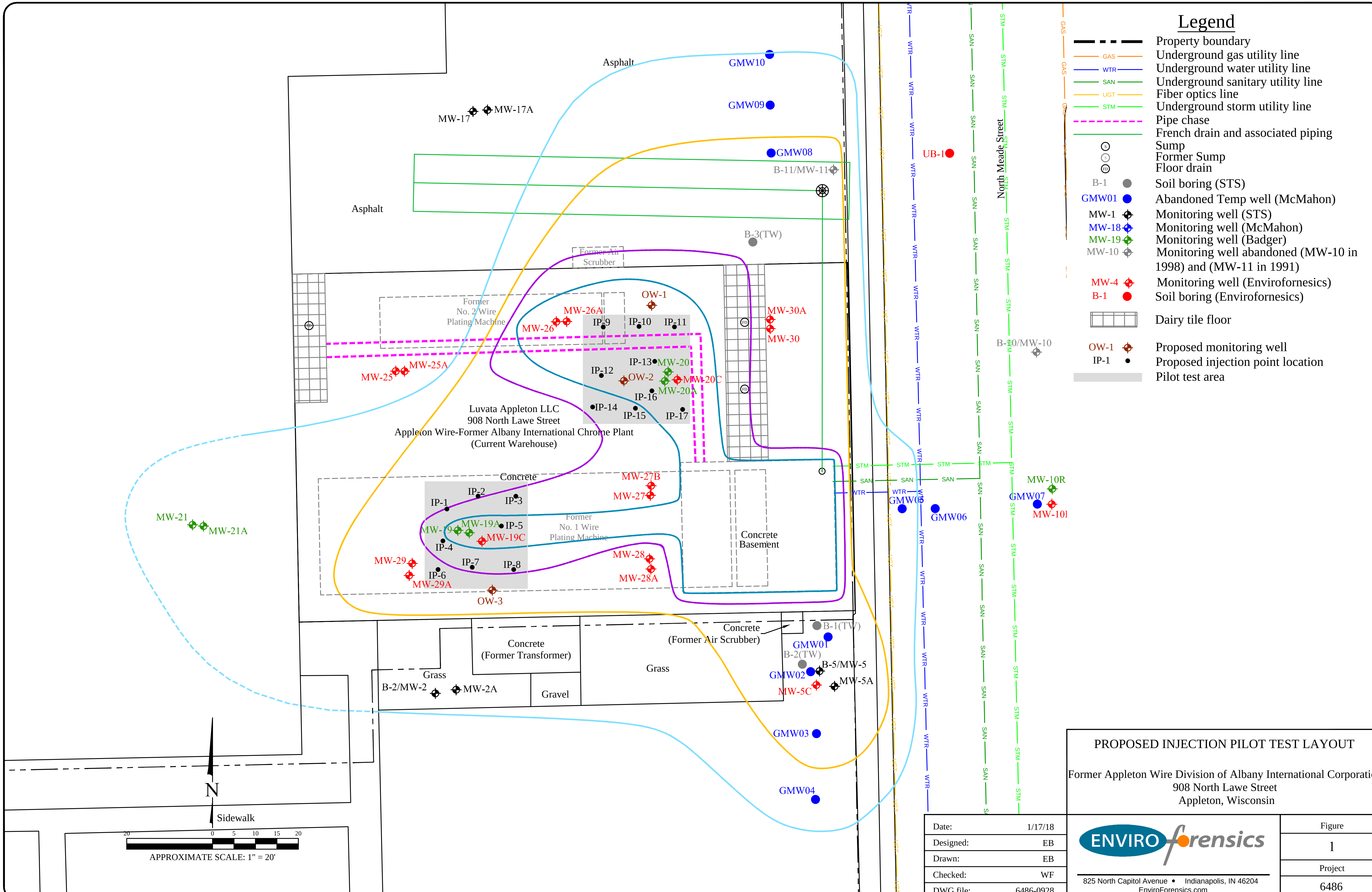
I, Brian Kappen, hereby certify that I am a hydrogeologist as that term is defined in s. NR 712.03 (1), Wis. Adm. Code, am registered in accordance with the requirements of ch. GHSS 2, Wis. Adm. Code, or licensed in accordance with the requirements of ch. GHSS 3, Wis. Adm. Code, and that, to the best of my knowledge, all of the information contained in this document is correct and the document was prepared in compliance with all applicable requirements in chs. NR 700 to 726, Wis. Adm. Code.

Project Manager

Signature and title

1/24/2018

Date



PROPOSED INJECTION PILOT TEST LAYOUT

Former Appleton Wire Division of Albany International Corporation
908 North Lawe Street
Appleton, Wisconsin

Date:	1/17/18
Designed:	EB
Drawn:	EB
Checked:	WF
DWG file:	6486-0928

ENVIRO forensics
825 North Capitol Avenue • Indianapolis, IN 46204
EnviroForensics.com

Figure 1

Project 6486

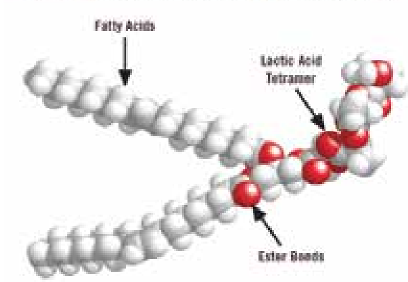
Attachment 1

3-D Microemulsion® Factory Emulsified Technical Description

Example of 3-D Microemulsion

3-D Microemulsion (3DME®) is comprised of a patented molecular structure containing oleic acids (i.e., oil component) and lactates/polylactates, which are molecularly bound to one another (figure 1). The 3DME molecule contains both a soluble (hydrophilic) and in-soluble (lipophilic) region. These two regions of the molecule are designed to be balanced in size and relative strength. The balanced hydrophilic/lipophilic regions of 3DME result in an electron donor with physical properties allowing it to initially adsorb to the aquifer material in the area of application, then slowly redistribute via very small 3DME “bundles” called micelles. These 3DME micelles spontaneously form within sections of the aquifer where concentrations of 3DME reach several hundred parts per million. The micelles’ small size and mobility allow it to move with groundwater flow through the aquifer matrix, passing easily through the pore throats in between soil grains resulting in the further redistribution of 3DME within the aquifer. This allows for advective distribution of the oleic acids which are otherwise insoluble and unable to distribute in this manner, allowing for increased persistence of the lactate/polylactates component due to their initial attachment to the oleic acids.

FIGURE 1: THE 3-D MICROEMULSION MOLECULAR STRUCTURE



Due to its patented molecular structure, 3DME offers far greater transport when compared to blended emulsified vegetable oil (EVO) products, which fail to distribute beyond the limits of pumping. 3DME also provides greater persistence when compared to soluble substrates such as lactates or simple sugars. The 3DME molecular structures capitalize on the best features of the two electron-donor types while at the same time, minimize their limitations. 3DME is delivered to the site as a ready-to-apply emulsion that is simply diluted with water to generate a large volume of a 3DME colloidal suspension.

Suspension of 3DME generated by this mixing range from micelles on the order of .02 microns to .05 microns in diameter, to “swollen” micelles, (termed “microemulsions”) which are on the order of .05 to 5 microns in diameter. Once injected into the subsurface in high volumes, the colloidal suspension mixes and dilutes in existing pore waters. The micelles/microemulsions on the injection front will then begin to sorb onto the surfaces of soils as a result of zeta potential attraction and organic matter within the soils themselves. As the sorption continues, the 3DME will “coat” pore surfaces developing a layer of molecules and in some cases a bilayer. This sorption process continues as the micelles/microemulsion moves outward and disassociates into their hydrophilic/hydrophobic components. The specialized chemistry of 3DME results in a staged release of electron donors: free lactate (immediate); polylactate esters (mid-range) and free fatty acids & fatty acid esters (long-term). Material longevity of three years or greater has been seen at most sites as determined from biogeochemical analyses.

For a list of treatable contaminants with the use of 3DME, view the Range of Treatable Contaminants Guide

Chemical Composition

- Hydrogen Release Compound Partitioning Electron Donor – CAS #823190-10-9
- Sodium Lactate – CAS# 72-17-3
- Water – CAS# – 7732-18-5

Attachment 1

3-D MICROEMULSION
Factory Emulsified

3-D Microemulsion® Factory Emulsified Technical Description

Properties

- Density – Approximately 1.0 grams per cubic centimeter (relative to water)
- pH – Neutral (approximately 6.5 to 7.5 standard units)
- Solubility – Soluble in Water
- Appearance – White emulsion
- Odor – Not detectable
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store in a cool, dry, well-ventilated place
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass

Handling
Avoid contact with eyes, skin, and clothing
Provide adequate ventilation
Wear appropriate personal protective equipment
Observe good industrial hygiene practices

Applications

- 3DME is diluted with water prior to application. Resulting emulsion has viscosity similar to water.
- Easily injects into formation through direct push injection points, injection wells or other injection delivery systems.

Application instructions for this product are contained here 3DME FE Application Instructions.

Health and Safety

Material is food grade and relatively safe to handle. We recommend avoiding contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including vinyl or rubber gloves, and eye protection are recommended when handling this product. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: SDS-3DME FE.

REGENESIS

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

Attachment 1

CRS® Technical Description


Example of CRS

CRS® (Chemical Reducing Solution) is an iron-based reagent that facilitates biogeochemical *in situ* chemical reduction (ISCR) of halogenated contaminants such as chlorinated ethenes and ethanes. CRS is a pH neutral, liquid iron solution that is easily mixed with 3-D Microemulsion® Factory Emulsified before injection into a contaminated aquifer. CRS provides a soluble, food-grade source of ferrous iron (Fe^{2+}), designed to precipitate as reduced iron sulfides, oxides, and/or hydroxides. These Fe^{2+} minerals are capable of destroying chlorinated solvents via chemical reduction pathways, thus improving the efficiency of the overall reductive dechlorination process by providing multiple pathways for contaminant degradation in groundwater.

For a list of treatable contaminants with the use of CRS, view the Range of Treatable Contaminants Guide.

Chemical Composition

• Water	7732-18-5
• Ferrous Gluconate	299-29-6

Properties

- Appearance – Dark green to black
- Odor – Odorless
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Miscible
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic-lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry, well-ventilated place
Keep away from extreme heat and strong oxidizing agents

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment
Avoid contact with eyes, skin, and clothing
Avoid breathing spray mist
Use with adequate ventilation

Attachment 1

CHEMICAL
REDUCING
SOLUTION

CRS® Technical Description

Applications

- Permanent injection wells
- Direct-push injection points

Application instructions for this product are contained in the CRS Application Instructions.

Health and Safety

The manufacturer lists no ingredients as hazardous according to OSHA 29 CFR 1910.1200. Observe good industrial hygiene practices. Wash hands after handling. Store away from incompatible materials. Dispose of waste and residues in accordance with local authority requirements. Please review the CRS PLUS Material Safety Data Sheet for additional storage, usage, and handling requirements.

REGENESIS®

www.regenesis.com
1011 Calle Sombra, San Clemente CA 92673
949.366.8000

PROVECT-IRM®

Solid, Antimethanogenic Reagent for ISCR and Heavy Metal Stabilization

Provect-IRM® (US patents 7,129,388; 7,531,709; 7,828,974; 8,147,694; 9,221,699; 9,637,731; patents pending) employs our proven ISCR technology to facilitate adsorption and precipitation reactions for heavy metal immobilization. It is composed of multiple reagents in a single product, potentially including:

- Multiple, hydrophilic, nutrient rich organic carbon sources (plant materials, kelp, calcium propionate) → 390 g H /lb product.
- Specifically selected Zero Valent Iron (ZVI) of various size and geometry
- Chemical oxygen scavengers to help maintain reduced conditions during mixing
- Integrated vitamins, minerals mineral sources (yeast extracts) specially selected for the growth and development of anaerobes
- Potassium magnesium sulfate to help promote formation of iron-sulfide mineral complexes, where needed; and/or
- Powdered activated carbon (PAC) to help sequester organo-metal complexes

Critically, Provect-IRM uniquely combines antimethanogenic reagents (AMR technology) such as a source of Monacolin K and other natural statins or essential plant oils to manage the growth and proliferation of Archaea (*i.e.*, methanogens). This reduces the biosynthesis of highly toxic, mobile methylated (organo) metals, which can have very negative consequences since methylated metals are often more mobile and more toxic than their inorganic counterparts. As such, targeted metal species (*e.g.*, arsenic, chromium, mercury, etc) are quickly sequestered for safe, long-term, stable immobilization.

POTENTIAL ADVANTAGES OF USING PROVECT-IRM® ANTIMETHANOGENIC ISCR TECHNOLOGY

The distinctive combination of reagents promotes ISCR conditions for fast and effective destruction of targeted COIs while managing the production of methane during the requisite carbon fermentation processes. This promotes more efficient use of the hydrogen donor while avoiding negative issues associated with elevated methane in groundwater, soil gas and indoor air (induced vapor migration, plume expansion, other potential health & safety issues).

www.ProvectusEnvironmental.com • tel: (815) 650-2230 • fax: (815) 650-2232 • email: info@provectusenvironmental.com

- More Efficient: Increased efficiency is the main benefit. Hydrogen yield calculations have shown that by minimizing waste of hydrogen by controlling excessive methanogenesis one can elicit the same response by using ca. 30% less organic amendment. Since it takes less time and resource to inject less amendment this can significantly lower overall project cost.
- More Effective: ISCR reactions avoid accumulation of dead-end catabolic intermediates as a function of substrate addition (as is common with [emulsified] oils and sources of carbon only).
    - Does not rely on physical sorption/sequestration as a major "removal" mechanism (as is common with oils).
    - Inherently buffered for pH control – will not acidify an aquifer and liberate heavy metals as potential secondary COIs.
- Safer: Fewer health and safety concerns as compared with use of traditional ERD or ISCR reagents; Avoid issues associated with new and emerging methane regulations.
- Ease of Use: Green and sustainable. All components integrated in a single package. Logistics with no surprises. Provect-IR is easily and quickly injected using conventional construction technologies.
- Longevity: Engineered profile of carbon sources for multi-year longevity estimated at 3 to 7 years based on site-specific hydrogeology; ZVI reactivity can persist >10 years.
- Minimizes Rebound: Reagent will stay in place and remain active for an extended period of time which manages and prevents COI rebound.
- Predictable Performance: More efficient use of hydrogen donors (does not get wasted as methane).
- Simultaneous Immobilization of Heavy Metals: Will not mobilize or methylate arsenic or other heavy metals yielding secondary plumes (as is common with [emulsified] oils and sources of carbon only). Can be formulated to manage environments that are co-impacted by various inorganic contaminants (*e.g.*, As, [Hg], Ni, Pb, Zn) while simultaneously mineralizing the organic compounds.
- Inherent Buffering: Presence of ZVI offers substantial pH buffering capacity
- Range of Applicability: ISCR demonstrated effective on a wide range of COIs, including chlorinated / halogenated solvents, Freon, pesticides, perchlorate and other energetic compounds (explosives).
- Supports Natural Attenuation: For all the reasons summarized above, Provect-IR enhances natural biological processes.
- Patented Technology: Fully covered under numerous patents (7,129,388; 7,531,709; 7,828,974; 8,147,694; 9,221,669; 9,637,731; multiple patents pending) that indemnify you and your client from patent infringement.

HEAVY METAL CONTAMINANTS

Trace metals constitute a significant class of groundwater contaminants originating from mining effluents, industrial wastewater, landfill leachate, agricultural wastes and fertilizers, and fossil fuels. They are very common class of contaminant, but the remedial strategies and technologies are often limited. Based on the chemical properties of dissolved species trace metals can be divided into two distinctive groups: i) reducible metals and metalloids, which are present in natural waters as anions and oxyanions (*e.g.;* Cr, As, Se, Mo, U), and ii) metal cations, which occur in aqueous environment as divalent cations (*e.g.*; Cu, Zn, Cd, Pb, Hg, Ni). Depending on their aqueous form (**Appendix A**), the mobility of trace metals in groundwater is affected by various chemical reactions, including dissolution-precipitation, oxidation-reduction, adsorption-desorption and complexation (Domenico, 1998; Drever, 1997).

WHAT IS THE PROBLEM WITH METHANE PRODUCTION DURING ISCR REACTIONS?

As a result of microbial fermentation process, methane will be produced in most situations following the addition of any conventional ERD or ISCR amendment. There are recognized benefits to methanogens and of limited methanogenesis. For example, i) methanogens are known to play important roles in synergistic microbial ecology, ii) their metabolic activity can help maintain anoxic conditions in treatment zones (through seasonal changes), and iii) the activity of methane mono-oxygenases and other enzymes can stimulate co-metabolic activity of TCE/DCE/VC in redox-recovery zones. Hence, limited production of methane is part of a healthy ERD/ISCR application. However, excessive methane production can be dangerous and represents a costly waste of amendment.

- Cost and Efficiency Issues: Production of methane is a direct indication that hydrogen generated from the electron donor amendments was used by methanogens instead of the target microbes (*e.g., Dehalococcoides spp.*), substantially reducing application efficiency. For example, generating just 20 mg/L of methane can represent greater than 33% of the total amendment consumption based on moles of H2 (Mueller *et al*, 2014).

- Potential Health and Safety Issues: Methane is considered to be a major greenhouse gas. It is explosive, with an LEL of 5% and an UEL of 15%. Excessive and extended production of methane can result in elevated in groundwater concentrations (as high as 1,000 ppm have been reported) which can lead to accumulation in soil gas subsequently impacting indoor air. While this is perhaps more relevant in urban settings where methane can accumulate in basements, under slabs/foundations and/or migrate along utility corridors, excessive methane production has also been observed in more rural settings and other open spaces.

- New and Emerging Regulatory Issues: State specific regulations for methane in groundwater have been promulgated, with others pending for soil gas and indoor air. For example, current regulations for methane in groundwater vary from *ca*. 10 to 28 mg CH_4/L (Indiana Department of Environmental Management, 2014). As a result, many remedial practitioners proactively design contingencies for conventional ERD/ISCR implementation in the event that methane exceeds a threshold level ranging from 1 to 10 ppm groundwater. These contingencies often entail expensive and extensive systems for treating methane in soil gas/vapor captured via SVE systems.

SPECIFICALLY - HOW DOES METHANE PRODUCTION IMPACT HEAVY METAL IMMOBILIZATION?

With the possible exception of lead (Pb) almost all Group IV, V and VI elements can be biomethylated (Bentley and Chasteen, 2002). As such a wide variety of methylated metalloids and metals can be found in the environment. These methylmetal(loids) are usually volatile and, with few exceptions, they are more toxic than their inorganic counterparts due to increased water solubility and hydrophobicity. For example, methylmercury is one of the most potent toxins known to man. And the biosynthesis of organo-arsenic (**Figure 1**) is a common problem making it often difficult to meet remedial action objectives of <10 ppb dissolved arsenic.

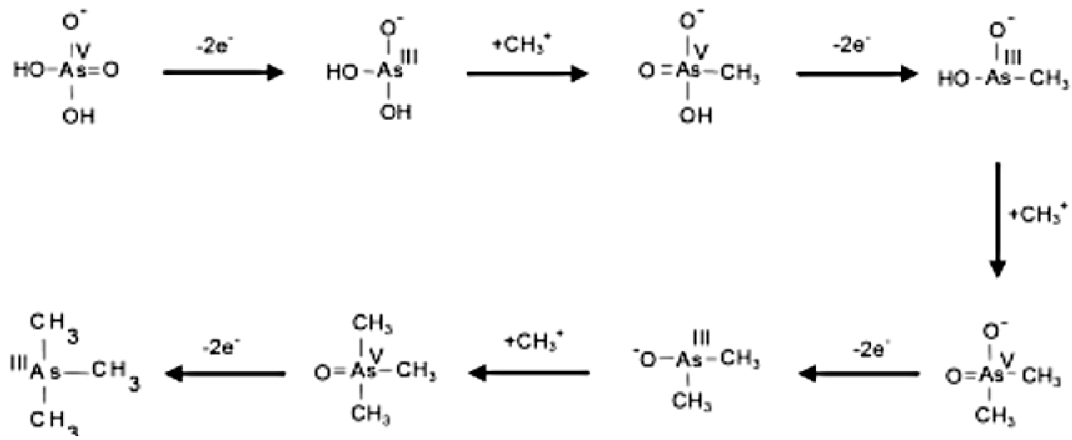
It is long understood that microorganisms are primarily responsible for the biosynthesis of organo-metals (Challenger, 1945), and the activity of methanogens is a main source of their production. As summarized in **Table 1,** a large number of methanogens have been shown to methylate a variety of metals (Michalke, *et al*., 2006). By using Provect-IRM to induce ISCR conditions, the number and activity of methanogens are limited hence the targeted metal contaminants are more able to participate in the desired stabilization reactions. Moreover, the overall toxicity of the site is not increased via the generation of methylmetal(loids) as a consequence of the treatment process (see **Figure 1** example – biomethylation of arsenate).

TABLE 1. Volatile Methylmetal(loids) produced by Growing Cultures of Methanogens (Archaea)

	Metal/metalloid					
	As	Bi	Se	Te	Sb	Reference
Methanobacterium formicicum	AsH_3, CH_3AsH_2, $(CH_3)_2AsH$, $(CH_3)_3As$, X	BiH_3, CH_3BiH_2, $(CH_3)_2BiH$, $(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2Se_2$	$(CH_3)_2Te$	SbH_3, CH_3SbH_2, $(CH_3)_2SbH$, $(CH_3)_3Sb$	Michalke et al., 2000
Methanobrevibacter smithii	CH_3AsH_2, $(CH_3)_2AsH$, $(CH_3)_3As$	CH_3BiH_2, $(CH_3)_2BiH$, $(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2SeS$, $(CH_3)_2Se_2$, X	$(CH_3)_2Te$	$(CH_3)_3Sb$	This Study
Methanococcus vanielli	CH_3AsH_2, $(CH_3)_2AsH$, $(CH_3)_3As$, X	CH_3BiH_2 $(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2SeS$	$(CH_3)_2Te$	$(CH_3)_3Sb$	This Study
Methanolacinia paynteri	n.d.	$(CH_3)_2BiH$, $(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2SeS$, $(CH_3)_2Se_2$, X	$(CH_3)_2Te$	$(CH_3)_3Sb$	This Study
Methanolobus tindarius	n.d.	$(CH_3)_3Bi$	$(CH_3)_2Se$, X	$(CH_3)_2Te$	CH_3SbH_2, $(CH_3)_3Sb$	This Study
Methanoplanus limicola	$(CH_3)_3As$	$(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2SeS$, $(CH_3)_2Se_2$, X	$(CH_3)_2Te$, X	$(CH_3)_3Sb$	This Study
Methanosarcina barkeri	AsH_3, X	$(CH_3)_3Bi$*	$(CH_3)_2Se$, $(CH_3)_2Se_2$	n.d.	$(CH_3)_3Sb$	Michalke et al., 2000
Methanosarcina mazei	$(CH_3)_3As$	$(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2Se_2$	(CH3)2Te	$(CH_3)_3Sb$	This Study
Methanosphaera stadtmanae	$(CH_3)_2AsH$, $(CH_3)_3As$	CH_3BiH_2, $(CH_3)_2BiH$, $(CH_3)_3Bi$	$(CH_3)_2Se$, $(CH_3)_2SeS$, $(CH_3)_2Se_2$, X	$(CH_3)_2Te$	$(CH_3)_3Sb$	This Study
Methanothermobacter thermautotrophicus	AsH_3	n.d.	n.d.	n.d.	$(CH_3)_3Sb$	Michalke et al., 2000

X, unidentified volatile metal(loids); n.d., not detected; *mediated by addition of octamethylcyclotetrasiloxane and the ionophores lasalocide and monensin.

Figure 1. Challenger mechanisms for biosynthesis or Arsenate (Challenger, 1945)



MODE OF ACTION – HOW DOES IT WORK?

By using Provect-IRM to induce ISCR conditions while simultaneously inhibiting biomethylation of heavy metals by methanogens, the established reaction mechanisms for immobilization of various heavy metals under ISCR conditions will be more effectively undertaken (**Table 2**). Moreover, the overall toxicity of the site is not increased via the generation of methylmetal(loids) as a consequence of the treatment process.

Table 2. Overview of Heavy Metal Immobilization Reactions induced by Provect-IRM ISCR Treatment

DISSOLVED METAL	STABILIZATION / IMMOBILIZATION MECHANISMS	REFERENCE
As (III, V)	Reductive precipitation with oxidized iron minerals. Precipitation as As sulfide and mixed Fe-As sulfide.	*Blowes et al., 2000; Manning et al.,2002; Craw et al., 2003*
Cr(VI), Mo(VI), Se(IV,VI), U(VI)	Reductive precipitation with oxidized iron minerals adsorption to iron oxides.	*Blowes et al., 2000;,8*
Me^{2+} (Cu, Zn, Pb, Cd, Ni)	Organic carbon source stimulates heterotrophic microbial sulfate reduction to sulfide and metal cations precipitate as sulfides. Also strong adsorption to iron corrosion products (e.g. iron oxides and oxyhydroxides).	*Blowes et al., 2000;* Dzombak and Morel,1990
Hg^{2+}	Mercury is commonly converted by microorganisms to monomethyl mercury (CH_3Hg) and dimethyl mercury [$(CH_3)_2Hg$)]. If not organically complexed, mercury can reductively precipitate as mercury sulfide. Also strong adsorption to iron corrosion products (e.g.; iron oxides and oxyhydroxides).	*Blowes et al., 2000;* Dzombak and Morel,1990

For example, metal cations such as Cu, Zn, Hg, Pb, Cd, and Ni will precipitate as metal sulfides following microbial mediated reduction of sulfate present in the groundwater. The internal source of sulfate in Provect-IRM formulations for such environments enables metal immobilization in groundwater depleted in dissolved sulfate. The biodegradation carbon stimulates sulfate-reducing bacteria and the process can be represented by the following equations:

$$2CH_2O_{(s)} + SO_4^{2-} + 2H^+_{(aq)} \rightarrow H_2S + 2CO_{2(aq)} + H_2O$$

$$Me^{2+}_{(aq)} + H_2S_{(aq)} \rightarrow MeS_{(s)} + 2H^+_{(aq)}$$

Where CH_2O represents organic carbon and Me^{2+} represents a divalent metal cation. Another important mechanism for metal cation removal in the presence of corroding ZVI is the adsorption onto iron corrosion products, like iron oxyhydroxides.

PHYSICAL PROPERTIES:

- Particle Size: ranges from ca. <5 to 100 micron (can be manufactured to specifications).
- Dry Density: ranges from 0.35 to 0.45 g/cm3
- 29% Aqueous Slurry Density: ranges from 0.8 to 1.0 g/cm3
- 29% Aqueous Slurry Viscosity: ranges from 400 to 1,300 cP

SLURRY PREPARATION GUIDELINES:

Provect-IRM can be used to create permeable reactive barriers (PRB) for plume control, plume treatment, or source area mass reduction. Installation methods include direct injection, hydraulic fracturing, pneumatic fracturing, soil mixing, and direct emplacement in trenches and excavations. The materials are as dry powders in 50-lb bags or 2,000 lb supersacs and mixed with water on site into a slurry. Typical application rates range from 0.25 to 1% (soil mass basis).

Percent Solids Content	Mass of Provect-IR	Volume of Water (US gallons)
10%	25 lb	27
20%	25 lb	12
30%	25 lb	7

LITERATURE CITED:

Blowes, D.W., Ptacek, C.J., Benner, S.G., McRae, C.W.T., Bennett, T.A. and Puls, R.W., 2000. Treatment of inorganic contaminants using permeable reactive barriers. Journal of Contaminant Hydrology, Vol. 45, pp.123-137.

Brown, R., J. Mueller, A. Seech, J. Henderson and J. Wilson. 2009. Interactions between Biological and Abiotic Pathways in the Reduction of Chlorinated Solvents. Remediation Journal Winter 2009, pages 9-20.

Challenger, F. 1945. Biological methylation. Chem. Rev. 36:315-318.

Craw D., Falconer D., and Youngson J.H., 2003. Environmental arsenopyrite stability and dissolution: theory, experiment, and field observations. Chemical Geology Vol. 199, pp. 71-78.

Dolfing, J., M. Van Eekert, A. Seech, J. Vogan and J. Mueller. 2008. *In Situ* Chemical Reduction (ISCR) Technologies – Significance of Low Eh Reactions. International Journal Soil & Sediment Contamination 17 (1): 63-74.

Domenico, P.A. and Schwartz, F.W. 1998. Physical and Chemical Hydrogeology. Wiley and Sons, New York, NY, pp. 506.

Drever, J.I., 1997. The Geochemistry of Natural Waters. Surface and Groundwater Environments. 3rd Ed., Prentice Hall, NJ, pp. 436.

Dzombak, D.A. and Morel, F.M.M., 1990. Surface complexation modeling: hydrous ferric oxide. New York: Willey Science.

Manning, B.A., Hunt, M.L., Amrhein, C. and Yarmoff, J.A., 2002. Arsenic(III) and arsenic(V) reactions with zerovalent iron corrosion products. Environ. Sci. Technol., Vol. 36, pp. 5455-5465.

Michalke, K., Meyer, J. and Hensel, R. 2006. Methylation of Metal(loid)s By Methanoarchaea: Production of Volatile Derivatives With High Ecotoxicological Impact and Health Concern, in Archaea: Evolution, Physiology, and Molecular Biology (eds R. A. Garrett and H.-P. Klenk), Blackwell Publishing Ltd, Malden, MA, USA. doi: 10.1002/9780470750865.ch25

Mueller, J., A. Karachalios and T. Fowler. (2014). Controlling Methane Production during ERD and ISCR Applications. Poll. Eng. October (in press).

Scalzi, M. and A. Karachalios. 2013 and 2014. Inhibition of Methane Production during Anaerobic Reductive Dechlorination. US PTO 13/ 785,840 and CIP 14/268,637

CONTACT US FOR A COMPLIMENTARY SITE EVALUATION

PROVECTUS ENVIRONMENTAL PRODUCTS, INC.

2871 West Forest Road, Suite 2 | Freeport, IL 61032

Tel: (815) 650-2230 | Fax: (815) 650-2232 | Info@Provectusenv.com

Multiple remedial contracting options available via strategic providers

Turn-Key, Risk-Reward, Pay-for Performance, Remedial Guarantees/Warranties

APPENDIX A: Aqueous Forms of Metals under Varying pH and Eh Potentials.

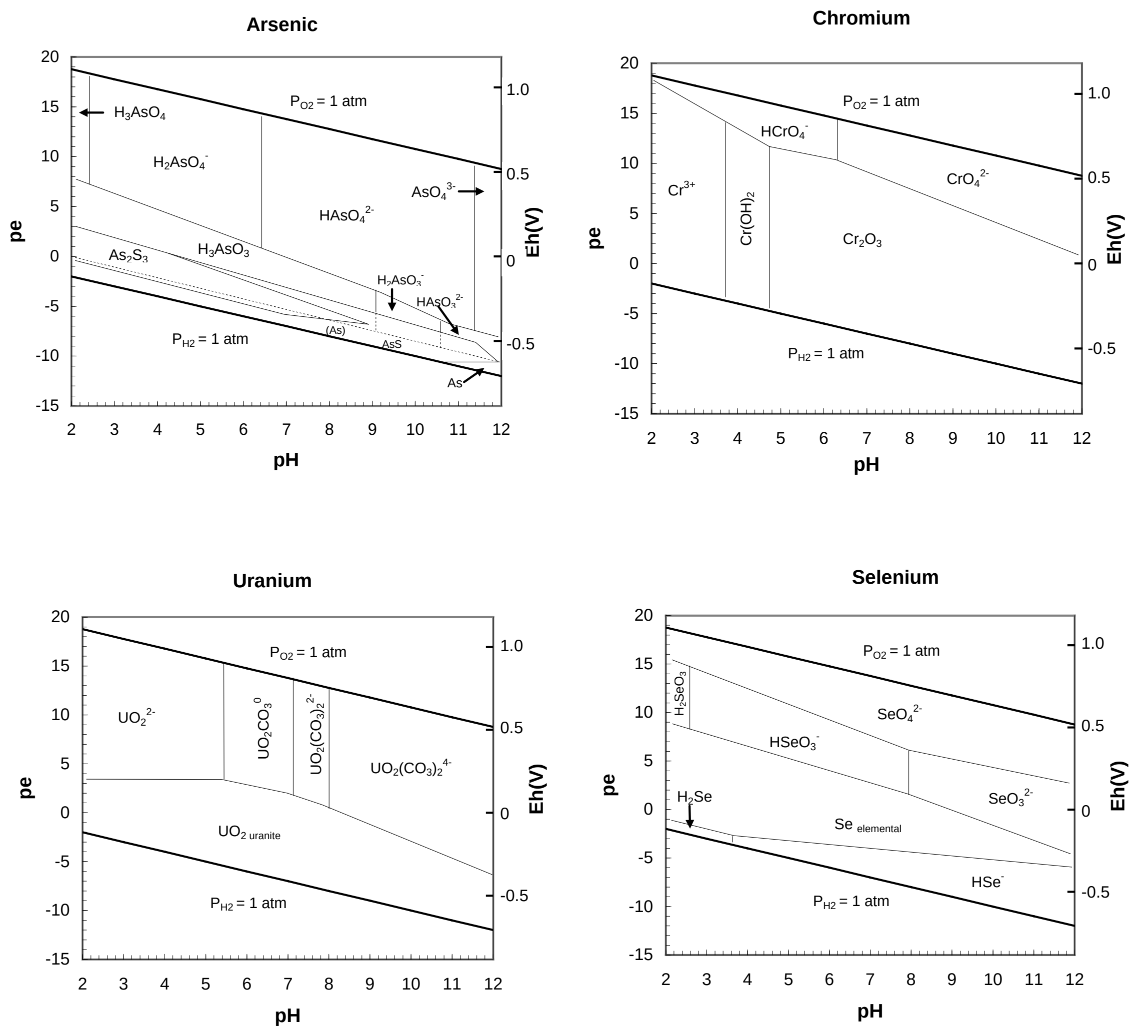


Figure 1. Simplified Eh-pH diagrams for metals that occur as anions and oxyanions in an aquifer. Solid lines are solubilities in the presence of sulfur: dashed lines are solubilities of carbonates in the absence of sulfur species.

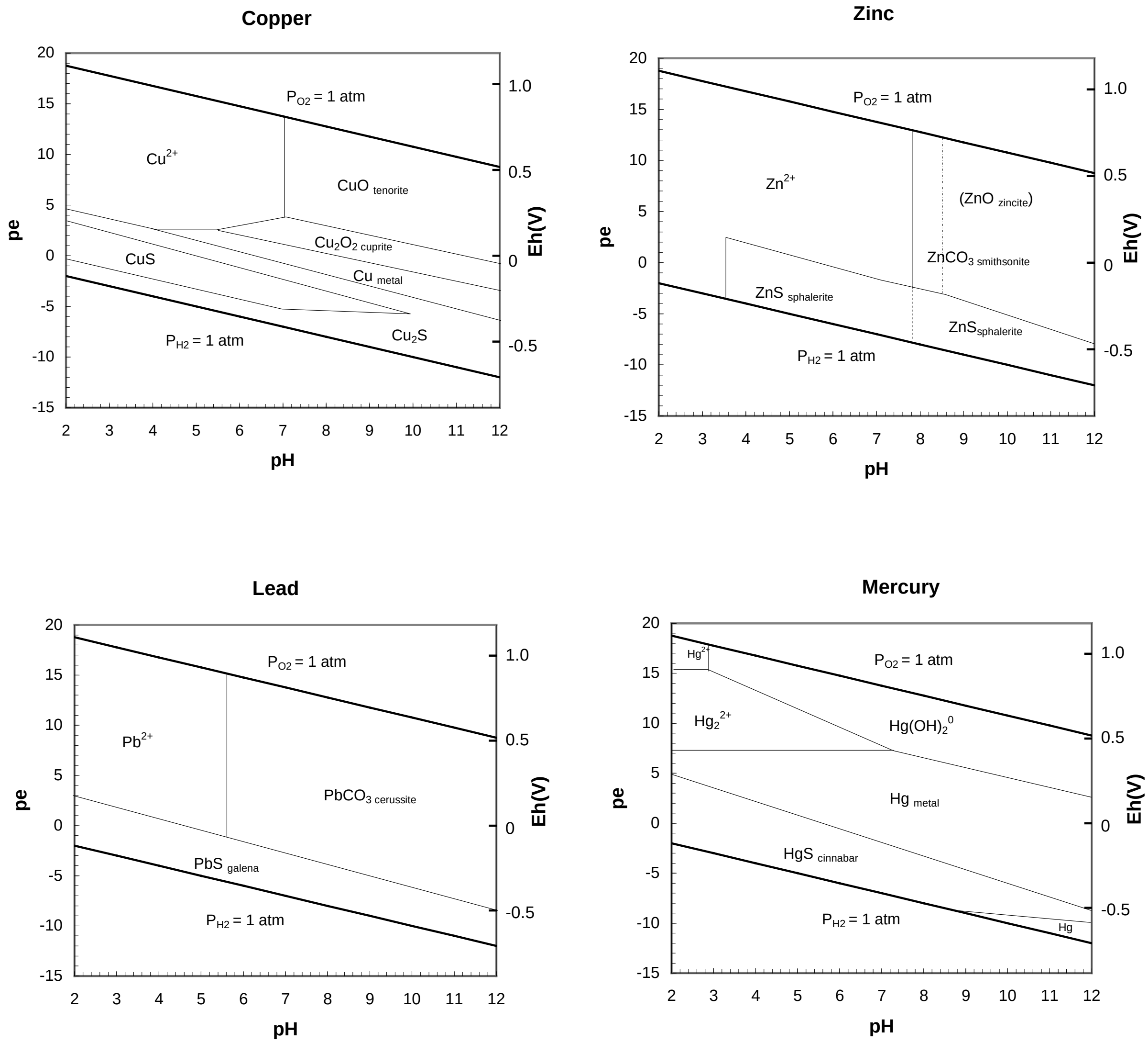


Figure 1 continued. Simplified Eh-pH diagrams for metals that occur as divalent cations in an aquifer. Solid lines are solubilities in the presence of sulfur: dashed lines are solubilities of carbonates in the absence of sulfur species.

Attachment 2

REGENESIS

Project Information

Albany Chrome

Appleton, WI

Dissolved Phase, Saturated Soil

Prepared For:

EFI - Wayne Fassbender

Target Treatment Zone (TTZ) Info	Unit	Value
Treatment Area	ft^2	625
Top Treat Depth	ft	10.0
Bot Treat Depth	ft	20.0
Vertical Treatment Interval	ft	10.0
Treatment Zone Volume	ft^3	6,250
Treatment Zone Volume	cy	231
Soil Type	---	clay
Porosity	cm^3/cm^3	0.45
Effective Porosity	cm^3/cm^3	0.10
Treatment Zone Pore Volume	gals	21,039
Treatment Zone Effective Pore Volume	gals	4,675
Fraction Organic Carbon (foc)	g/g	0.010
Soil Density	g/cm^3	1.5
Soil Density	lb/ft^3	94
Soil Weight	lbs	5.9E+05
Hydraulic Conductivity	ft/day	0.0
Hydraulic Conductivity	cm/sec	3.53E-07
Hydraulic Gradient	ft/ft	0.100
GW Velocity	ft/day	0.00
GW Velocity	ft/yr	0

Application Dosing

3-D Microemulsion to be Applied	**lbs**	**1,600**
CRS to be Applied	**lbs**	**800**

3-D Microemulsion® and CRS® Application Design Summary

Dissolved Phase, Saturated Soil		Field App. Instructions
Application Method	**Direct Push**	
Spacing Within Rows (ft)	9	
Spacing Between Rows (ft)	9	
Application Points	**8**	
Areal Extent (square ft)	625	
Top Application Depth (ft bgs)	10	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	20	3DME Concentrate per Pt (lbs)
3DME to be Applied (lbs)	**1,600**	200
3DME to be Applied (gals)	192	Mix Water per Pt (gals)
3DME Mix %	10%	216
Volume Water (gals)	**1,726**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	1,917	240
CRS to be Applied (lbs)	**800**	CRS Volume per Pt (gals)
CRS Volume (gals)	91	11
Total Application Volume (gals)	**2,009**	Volume per pt (gals)
Estimated Radius of Injection (ft)	3.9	251
Prepared by: Owen Miller - Design Specialist		Volume per vertical ft (gals)
Date: 12/20/2017		25

Technical Notes/Discussion

Assumptions/Qualifications

In generating this preliminary estimate, Regenesis relied upon professional judgment and site specific information provided by others. Using this information as input, we performed calculations based upon known chemical and geologic relationships to generate an estimate of the mass of product and subsurface placement required to affect remediation of the site.

REGENESIS developed this Scope of Work in reliance upon the data and professional judgments provided by those whom completed the earlier environmental site assessment(s). The fees and charges associated with the Scope of Work were generated through REGENESIS' proprietary formulas and thus may not conform to billing guidelines, constraints or other limits on fees. REGENESIS does not seek reimbursement directly from any government agency or any governmental reimbursement fund (the "Government"). In any circumstance where REGENESIS may serve as a supplier or subcontractor to an entity which seeks reimbursement from the Government for all or part of the services performed or products provided by REGENESIS, it is the sole responsibility of the entity seeking reimbursement to ensure the Scope of Work and associated charges are in compliance with and acceptable to the Government prior to submission. When serving as a supplier or subcontractor to an entity which seeks reimbursement from the Government, REGENESIS does not knowingly present or cause to be presented any claim for payment to the Government.

2871 West Forest Road - Suite 2
Freeport, Illinois 61032
(815) 650-2230

FIELD-SCALE PILOT TESTING - CONCEPTUAL REMEDIAL DESIGN

Provect-IRM will be injected throughout an area measuring *ca*. 20 ft long x 30 ft wide x 15 ft deep (from 8 to 23 ft bgs). The site-specific Provect-IRM formulation containing (weight basis) 50% basis ZVI (mixed grades) plus 2% guar and other select components will be applied at a minimal average loading rate of 0.2% to soil mass. This yields a requisite 2,100 lb of Provect-IRM (**Table 2**). The slurried amendment can be applied via an estimated 9 injection points spaced *ca*. 8 feet apart. The presence of any existing buildings, infrastructure or wells may need to be considered during grid-type injections.

Table 2: Provect-IRM50 mass requirements and injection details

	Value	Unit
Treatment Area Dimensions:		
Length of treatment zone	20	ft
Width of treatment zone	30	ft
Depth to top of treatment zone	8	ft
Depth to bottom of treatment zone	23	ft
Treatment zone thickness	15	ft
Treatment zone volume	9,000	ft3
Mass of soil in treatment zone	518	U.S. tons
Estimated total porosity	30%	
Volume pore space	2,744	ft3
Provect-IRM mass calculations:		
Percentage Provect-IRM by soil mass	0.20%	
Mass of Provect-IRM required	2,100	lbs
Preparation of Provect-IRM Slurry:		
Percent solids in slurry (can be altered)	23%	
Volume water required	844	U.S. gallons
Slurry volume to inject	1,087	U.S. gallons
Injection details:		
Injection spacing	8	ft
Number of injection points	9	points
Mass Provect-IRM per point	233	lbs
Water volume per point	94	U.S. gallons
Slurry volume per point	121	U.S. gallons
Mass Provect-IRM vertical distribution	16	lbs/ vertical ft
Slurry volume to pore space volume	5.3%	
Provect-IRM concentration in groundwater	0.8	lbs/ft3

TABLE 2 NOTES: If the estimated amount of slurry per point is problematic, the dimensions, mass requirements, mixing and other injection details presented above can be readily modified in the field based on site specific conditions (for example, the density of the slurry can be changed to modify the total injection volume or the injection layout/number of injection points could be altered depending on recommendations from the contractor).

Date Received___________________________
(Leave blank)

Request for Coverage Under
Wisconsin Pollutant Discharge Elimination System (WPDES) Wastewater Discharge Permit (WI-0046566-06) for Contaminated Groundwater from Remedial Action Operations

(Revised 8 / 2012)

Please type or print required information, except for the signature.

I. GENERAL INFORMATION

A: FACILITY LOCATION INFORMATION	
Name of Facility / Project Former Albany International Chrome Plant	Official Representative Onsite / Title See Information under Consulting Firm
(Address or Highway / Road with Distance and Direction from nearest City) 908 N. Lawe Street	Telephone No.: / Fax #
City, State, Zip Code Appleton, Wisconsin 54911	County Outagamie / Email Address

B: Individual, parent company, or organization with direct control over the facility. Enter full official legal name of the owner or parent company, if there is one, the mailing address, and the name and title of the official representative (responsible party) signing this application if he/she is located at address of parent company.	
Parent Company/Owner Albany International Corp.	Company Contact: Joseph Gaug / Title: Associate General Counsel
Mailing Address - PO Box, Street, or Route P.O. Box 1907	Telephone No.: 518-445-2273 / Fax #: 518-935-9316
City, State, Zip Code Albany, NY 12201	Email Address Joseph.gaug@albint.com

C: Consulting Firm for Groundwater	
Company Name EnviroForensics, LLC	Company Contact: Brian Kappen / Title: Project Manager
Mailing Address - PO Box, Street, or Route N16 W23390 Stone Ridge Drive	Telephone No.: 262-290-4001 / Fax #: 317-972-7875
City, State, Zip Code Waukesha, Wisconsin 53188	Email Address bkappen@enviroforensics.com

D. **Name of Person to Receive Discharge Monitoring Report Forms** from Department:

Brian Kappen

E. **Any Other Necessary Contact Person** (name, phone, email)

Wayne Fassbender, 414-982-3988, wfassbender@enviroforensics.com

F. **DNR Environmental Response & Repair Project Number, and DNR Project Manager name:**

BRRTS# 02-45-000015, DNR project manager Jennifer Borski

II. SPECIFIC INFORMATION ON PROJECT

A. Pollutants

1. The suspected **sources of the pollutants** (estimate of material release quantity and contributing activities)

The primary pollutant is chromium associated with releases from past chrome plating operations utilizing chromic acid with chromium in the hexavalent ionic state. Secondary pollutants include sparsely distributed and relatively low concentrations of the volatile organic compounds (VOCs) tetrachloroethene (PCE) and associated products of natural degradation including: trichloroethene, dichloroethene, and vinyl chloride.

2. Check **all fuel and waste types** suspected in the contamination at this site:

☐ Unleaded Gasoline ☐ Jet Fuel ☐ Pesticides
☐ Leaded Gasoline ☐ Waste Oil ☐ Fertilizers
☐ Diesel Fuel ☐ Solvents
☐ Heating Oil ☐ Other:

3. Check **all pollutants identified at this site**:

☐ BETX (Benzene, Ethylbenzene, Toluene, Xylene) ☐ Pesticides/Fertilizers
☐ PAHs (Polynuclear aromatic hydrocarbons) ☐ Total Recoverable Lead *
☒ VOCs (Volatile Organic Chemicals) ☒ Other__Hexavalent Chromium

* Include upstream receiving water hardness analysis if lead is detected.

B. Treatment

1. **Describe the existing treatment system**:

Injection of amendments to reduce hexavalent chromium to trivalent chromium within the subsurface is proposed. The end result is the formation of insoluble and immobile trivalent chromium precipitates. The injected compounds also contain a food source for enhancing natural microbial populations which will result in sustained reducing conditions and act to accelerate the natural reductive de-chlorination of the detected VOCs.

Treatment Techniques Used

☐ Pump & Treat
  ☐ Air stripping
  ☐ GAC (Granular Activated Carbon)
☒ Augmented Insitu Bioremediation (with chemicals or nutrient addition)
☐ Other (describe)

2. **If any cleaning, softening or descaling of the treatment system**

a. <u>Identify any additives</u> that are proposed or being used for cleaning, softening, or descaling of the treatment system. Provide Material Safety Data Sheets, and describe dosage.

None. The treatment proposed is injection only of products to promote reducing conditions in groundwater.

b. <u>Describe what is done</u> to clean, soften or descale, and <u>how often</u> it is done.

c. <u>Where is the reject water</u> from cleaning and descaling <u>discharged</u>?

☐ same discharge point as treated effluent ☐ sanitary sewer ☐ other (please describe)

3. **Anticipated operating schedule** during the new permit term (2012 – 2017)

2018-2020, with the objective of conducting pilot testing during February 2018.

4. **Anticipated flowrate** (in gpm), and total volume of treated water to be discharged per month:

The treatment proposed is injection of remediation products only. No groundwater will be discharged.

5. **Effluent discharge point location**:

The treatment proposed is injection of remediation products only. No groundwater will be discharged.

6. Is an **air permit** from the DNR air management program required? If not, why not

No. There are no air emissions associated with the proposed treatment.

III. DISCHARGE MANAGEMENT PLAN UPDATE

Include the following information:

1. A **summary** of analytical results for contaminants **detected** at the site.

   Chromium is present in Site groundwater at concentrations up to 330 mg/L. Tetachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene, and vinyl chloride have been detected in one or more monitoring wells at concentrations above WDNR standards.

2. Results from the most recent **volatile organic compounds (VOC) scan**, including methods used and detection levels.

   The most recent analysis was performed in August 2017. PCE concentrations in the proposed injection area ranged from 0.002 to 0.02 mg/L. EPA Test Method 8260B with detection limits of 0.005 mg/L.

3. Results from an analysis of the **poly-nuclear aromatic hydrocarbons (PAHs)** shown on the right, including methods used and detection levels (unless PAH data are already submitted)

   The lab needs to reach the lowest detection level achievable for each parameter because of the low limit for total PAHs. EPA test method SW-846 8310 is recommended.

benzo(a)anthracene	dibenzo(a,h)anthracene
benzo(a)pyrene	fluoranthene
benzo(b)fluoranthene	indeno(1,2,3-cd)pyrene
benzo(g,h,i)perylene	naphthalene
benzo(k)fluoranthene	phenanthrene
chrysene	pyrene

   Analysis of PAHs has not been performed. There is no reason to suspect PAH impacts in Site groundwater.

4. **Contaminants proposed for periodic monitoring** and demonstration of why any monitoring required in the permit should be exempted due to low level of contaminants in the wastewater discharge.

   The treatment proposed is injection of remediation products only. No groundwater will be discharged.

5. **Information to support request for any alternate effluent limit** for discharges to groundwater (Part 5 of permit) or request for temporary exemption for in-situ discharges (Part 6 of permit).

   The in-situ treatment of chromium may result in temporary increases in the concentration of certain substances. Specifically, the concentrations of iron and manganese may increase above the public welfare groundwater quality standards listed in s. NR 140.12 Table 2 when chemically reducing conditions are created in the subsurface. The concentrations are expected to decrease and stabilize once the hexavalent chromium has been reduced and immobilized. The shallow water bearing zone at the Site is not used as a resource and groundwater movement is less than 1.6 feet per year. There is no risk of exposure to groundwater with temporarily elevated concentrations of iron and/or manganese resulting from pilot test activities.

6. **Plans and specifications for the proposed treatment system** identifying sampling points. For supplier furnished package treatment units, only a flow diagram, design summary, and unit sizing calculations are required.

   The following products will be injected. All products are manufactured and distributed by REGENESIS, San Clemente, California; www. Regenesis.com; or Provectus Environmental Products, Inc, Freeport, IL; http://www.provectusenvironmental.com/. All products are non-hazardous and non-reactive. Product brochures are submitted with this application.

   - 3-D Microemulsion®, an electron donor emulsion for enhanced biodegradation;
   - Chemical Reducing Solution (CRS®), a food-grade liquid iron based-reagent; and
   - Provect-IRM, an in-situ chemical reduction reagent.

   The products will be mixed with potable water to achieve the desired solution concentrations. The products will be injected through direct-push tooling below the water table, which is encountered at 5 feet below ground surface. Two (2) pilot tests are designed as follows:

   - Mix 3-D Microemulsion® and CRS® together in one solution and inject 250 gallons into injection points IP-1 through IP-8 (2,000 gallons total) shown on Figure 1 (attached).
   - Mix Provect-IRM in a separate solution and inject 135 gallons into injection points IP-9 through IP-16 (1,080 gallons total) shown on Figure 1.

7. **General description of operations**, identifying operational tasks, who is responsible to do that task, and how frequently the task is done (particularly needed at pump & treat systems).

   EnviroForensics personnel will direct drilling and mixing contractor(s) to perform all of the product mixing and injection activities at the Site.

8. A **site plan** that identifies general land uses, underground storage tanks and pipelines, groundwater monitoring and recovery wells, contaminant plume definition and zone of influence, other known spills in the area, septic tanks and drain fields, separation distances to potable water supply wells and residences, and other pertinent information.

   A site plan depicting the proposed injection point locations relative to site contaminants is attached. All injections will be performed below the water table which is encountered at a depth of 5 feet. Monitoring wells will be used to evaluate pilot test performance. There are no storage tanks, septic tanks, or drain fields, and no potable water supply wells within 1,000 feet of the site. The site is industrial with nearby residential. Currently groundwater flow is contained on site by a groundwater pumping and treatment system. Site soil is clay having very low permeability and groundwater movement is less than 1.6 feet per year.

9. A **detailed map** of the discharge location, showing if discharge is direct or via a storm sewer or other conveyance. Indicate distance from site to discharge location and other impacted water bodies or wetlands.

   - If a city storm sewer is used, approval from the municipality is required.
   - If a new outfall structure is proposed, the plans should identify the outfall and incorporate appropriate erosion control methods. A permit for riprap projects (available at most DNR offices) should be obtained.
   - Wetland discharges are not allowed unless they meet wetland protection requirements of Ch. NR 103, Wis. Admin. Code.

   The treatment proposed is injection of remediation products only. No groundwater will be discharged.

III. SIGNATURES

A. Signature of person completing the form, attesting to the accuracy and completeness of the statements made.
B.

Name	Project Manager	1/17/2018
Name	Title	Date Signed
N16W23390 Stone Ridge Drive, Suite G, Waukesha, WI 53188	bkappen@enviroforensics.com	262-290-4001
Address	Email	Telephone Number

B. This application must be signed by the official representative of the permitted facility (responsible party) who is: the owner, the sole proprietor for a sole proprietorship, a general partner for a partnership, or by a ranking elected official or other duly authorized representative for a unit of government, or an executive officer of at least the level of vice president for a corporation, having overall responsibility for the operation of the facility. If the application is not signed, or is found to be incomplete, it will be returned.

Joseph M. Gaug
Associate General Counsel
& Assistant Secretary

Typed or Printed Name of Official Representative   Title

Signature of Official Representative   1/17/18
Date Signed

Submit this General Permit Request for Coverage:

Department of Natural Resources,
Water Permits Central Intake - WT/3,
P.O. Box 7185,
Madison, WI 53707-7185.

The decision on whether to cover this discharge under the remediation general permit will be made by regional DNR wastewater staff. Upon receipt in Madison, this application will be forwarded to the appropriate regional staff person.

A copy of the submittal should also be sent to the Department Remediation & Redevelopment Project Manager.
Watershed Central:\General Permits\Reissue Docs\Grw Remediation\Request For Coverage 2012.doc