NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 8
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October 11, 2023

Dr. Seanelle Hawkins
Urban League of Rochester
265 North Clinton Avenue
Rochester, NY 14605

Re: Corrective Measures Work Plan
Former Michelsen Furniture Co.
Site No.: C828189
Rochester (C), Monroe (C)

Dear Dr. Hawkins:

The New York State Department of Environmental Conservation (Department) in conjunction with New York State Department of Health (NYSDOH) have completed a review of the Corrective Measures Work Plan (Work Plan) dated April 20, 2023, and subsequent information submittal dated July 14, 2023, for the Former Michelsen Furniture Co. Site (Site) located at 182 Avenue D & 374 Conkey Avenue, City of Rochester, New York. Based on the information presented in the Work Plan and subsequent submittals, the Work Plan is conditionally approved based on the clarifications, and modifications presented below.

1. For all future submittals, please include the correct Site number C828189.

2. The Certification section of the Site Management Plan (SMP) has not been complete. The SMP must be stamped, signed, and dated as soon as possible.

3. Section 1.1: The Department understands that the site acreage is 0.63 acres as per the environmental easement.

4. The executive summary of the SMP for groundwater monitoring has GPMW-36 but in Section 4.0 Table D has GPMW-26. This needs to be corrected in the SMP executive summary. In addition, the SMP does not have a PE stamp or signature on the certification page. This needs to be completed and submitted to the Department.

5. The proposed injections may proceed forward. Depending on the groundwater analytical results post-injections, the Department may require additional measures to address the residual groundwater contamination at the Site.

6. The Work Plan provides no details on the source of the water to be used to make up the slurry. The Department understands that a base line laboratory analysis of the water's makeup will need to be provided if the makeup water is not City of Rochester water.

7. A seven-day advance notice for any field work to be conduct on site must be provided to the Department so that appropriate fieldwork oversight can be provided.

8. If any form of ground intrusive activity is to take place, then a Special Community Air Monitoring Plan (CAMP) must be required on site for the duration of ground activity. Please note that the proper guidelines for a Special CAMP have been attached.

9. The Department understands that the post-injection groundwater sampling event will occur 90 days after the injections have been completed.

10. The Department understands that the injections will take approximately 1-2 weeks to complete.

11. The Department also understands that the injectant will be stored in a secure and dry location.

12. The Department also understands that precautions will be taken to prevent pedestrian and vehicular traffic during injection events.

13. The Department understands that the USEPA UIC notification will be provided to the Department prior to the start of any fieldwork activities.

14. The Department understands that a detailed account of the injection activities will be provided in the subsequent Periodic Review Report.

15. The Department understands that the injections will be completed in the fall of 2023.

Within fifteen (15) days of the date of this letter and prior to any fieldwork activities associated with remedy implementation, the Applicant must elect in writing (electronic notification is acceptable) one of the following options:

- Option A: Accept the modified work plan;
- Option B: Invoke dispute resolution as set forth in 6 NYCRR Part 35-1.5(b)(2); or
- Option C: Terminate the Brownfield Cleanup Agreement in accordance with 6 NYCRR Part 375-3.5.

If the Applicant chooses to accept Option A then this letter becomes part of the approved Corrective Measures Work Plan (Work Plan) dated February 24, 2023. Also, if Option A is chosen then a copy of the approved Interim Remedial Measures Work Plan Cover System (Work Plan) dated April 20, 2023, along with this letter attached must be placed in the document repository within 1 week of accepting Option A and prior to any fieldwork activities associated with remedy implementation. Please provide notification to the Department that Interim Remedial Measures Work Plan Cover System (Work Plan) dated February 24, 2023, and a copy of this letter have been placed in the document repository (electronic notification is acceptable).

The State seeks to resolve the outstanding differences in a mutually agreeable manner, which addresses the requirements of the Brownfield Cleanup Agreement, the Certificate of Completion, and associated Site plans. If you have any questions or concerns regarding this letter or need further assistance with the Site, please feel free to contact me at (585) 226-5349 or via e-mail Joshua.Ramsey@dec.ny.gov.

Sincerely,

Joshua J. Ramsey
Project Manager

ec:
Josh Haley (Homeleasing)
Alex Brett (LaBella)
Dan Noll (LaBella)
Starr O'Neil (MCHD)
Justin Deming (NYSDOH)
Sarita Wagh (NYSDOH)
David Pratt (NYSDEC)
Charlotte Theobald (NYSDEC)

CAMP Special Requirements

Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.

- If total particulate concentrations opposite the walls of occupied structures or next to intake vents exceed 150 mcg/m^3, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 mcg/m^3 or less at the monitoring point.

- Depending upon the nature of contamination and remedial activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary, for each site.

Special Requirements for Indoor Work With Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

Corrective Measures Plan
NYSDEC BCP Site No. 828189

Location:

Former Michelsen Furniture Co.
182 Avenue D & 374 Conkey Ave
Rochester, New York

Prepared for:

Mills and Michelsen LLC
312 State Street
Rochester, NY 14614

LaBella Project No. 2161282

April 20, 2023

LaBella
Powered by partnership.

300 State Street, Suite 201 | Rochester, NY 14614 | p 585-454-6110 | f 585-454-3066

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APPENDIX

1.0 INTRODUCTION AND BACKGROUND

LaBella Associates, D.P.C. ("LaBella") on behalf of Mills & Michelsen LLC is pleased to submit this Corrective Measures Plan (CMP) for the Former Michelsen Furniture Co. located at 182 Avenue D & 374 Conkey Ave, in the City of Rochester, Monroe County, New York, hereinafter referred to as the "Site" (see Figure 1).

1.1 Site Description

The Site is identified as Section 091.770 Block 0002 and Lot 031 on the City of Rochester Tax Map and consists of two parcels encompassing approximately 0.62 acres and is located in a primarily residential urban neighborhood. The property is bounded by residential property to the north, Avenue D to the south, the City of Rochester Avenue D Recreation Center to the east, and Conkey Avenue to the west. The Site is developed with a 40 unit residential apartment building, asphalt paved parking lot and landscaped areas.

1.2 Site History

A Phase I Environmental Site Assessment (ESA) by LaBella dated September 2011 identified dry cleaning operations historically occupied the east adjacent property in the 1930's and west adjacent property in the late 1940's. Additionally, the potential for orphan USTs was identified in early investigations based on Site records. A Phase II ESA by LaBella dated November 2012 included the installation of borings and wells and findings identified petroleum impacts near the north property boundary and chlorinated solvents in soil and groundwater. An additional subsurface investigation by LaBella dated January & March 2014 included advancement of additional borings, test pits and monitoring wells which further identified petroleum related VOCs and SVOC in soil as well as CVOCs in overburden and bedrock groundwater.

The Site was entered into the Brownfield Cleanup Program (BCP) on September 30, 2014, amended in May 20, 2015 designated as NYSDEC Site #C828189. The Remedial Investigation Report by LaBella, dated September 2015, further delineated impacts and identified four areas of concern (AOCs) at the site which included AOC #1 - subsurface soils impacted with CVOCs, AOC #2 - groundwater impacted with CVOCs, AOC #3 - potential vapor intrusion concern, and AOC #4 - SVOCs in subsurface soil.

Interim Remedial Measures (IRMs) were completed at the Site to address contaminants during Site redevelopment. Two (2) 3,000 gallon heating oil USTs were removed, decommissioned and disposed and approximately 550 gallons of residual heating oil was removed and disposed of. A total of 1,917.06 tons of soil was characterized and disposed of as non-hazardous waste in a NYSDEC approved and permitted landfill. Lastly a sub-slab depressurization system (SSDS) was installed in the Site building during redevelopment.

In accordance with the NYSDEC Decision Document (DD), a Site cover system was installed consisting of asphalt pavement, sidewalks, concrete and greenspace. Additionally, six (6) injection wells were installed between the Site building and the concrete ramp to the basement. Each of the wells straddled the bedrock/overburden interface. A total of 13,200 pounds (lbs) of sodium permanganate was pumped at an approximately 10% concentration, totaling approximately 6,000-

gallons, into the 6 injection wells as well as monitoring wells BW-02, BW-03, BW-04, GPMW-34 and GPMW-26.

Groundwater sampling events in 2021 indicated increasing trends in CVOCs in several wells. The increases in concentration generally were due to breakdown products (e.g., cis-1,2-dichloroethene and vinyl chloride) and based on this it appears that contaminants are degrading naturally over time. Groundwater flow generally is to the north. A residential home is located north of the Site approximately 30-ft. north of bedrock well BW-02. The concentration of CVOCs in BW-02 have slightly increased in comparison to the post-remediation groundwater sampling (2017 and 2018 sampling data); however, the concentrations are still below the pre-remediation sampling data (2016) and thus do not appear to raise a significant concern at this time. BW-03 is slightly east of the residence and has shown a decrease in TCE concentrations and some increase in the breakdown products. BW-04 has identified the highest increase in CVOCs and this well is in the northeast corner of the Site. There are no residential structures north or northeast of BW-4 for approximately 450 ft.

Due to the increasing concentrations of CVOCs along the northern property line (particularly in BW-4), NYSDEC requested that a CMP be developed,

1.3 Objective

The objective of this CMP is to conduct additional remedial measures to reduce the concentrations of CVOCs along the northern property line.

2.0 CORRECTIVE MEASURES PLAN

The corrective measures approach for the Site will involve the design and implementation of an injection plan to reduce the concentration of CVOCs along the northern border of the Site.

2.1 In-Situ Chemical Reduction

The proposed method for control of CVOCs at the Site is using in-situ chemical reduction (ISCR) via injections to reduce the concentration of CVOCs in bedrock groundwater. Reducing chemicals will be injected via existing wells along the northern border of the Site as well as at two upgradient locations. Although the prior remedial work utilized a chemical oxidant, the NYSDEC Decision Document for the Site (dated September 2015) indicated that future injections could utilize a chemical reductant.

Three existing bedrock wells, designated as BW-02, BW-03 and BW-04 are planned to be utilized as the locations for injections along the northern Site border and interface wells IW-2 and IW-3 are planned for injection as the two upgradient locations. The existing bedrock wells are positioned to be able to treat impacts at the locations where impacts were identified. It should be noted that utilizing these wells for injection work is consistent with the remedial work previously completed. The original remedial treatment, as documented in the Final Engineering Report (FER) for the Site dated, December 2015, included injection into BW-02, BW-03 and BW-04. The bedrock wells were constructed prior to the original injections completed in 2015 at the Site and consist of steel casing grouted into bedrock with an approximately 10-ft bore hole reamed into bedrock. PVC well screen and appropriate amount of PVC riser were placed in the bedrock boring hole with filter sand

surrounding the PVC. Interface wells were constructed by reaming out approximately 5-ft of rock and installing a 2-inch PVC well screened to be approximately 5-ft in bedrock and 5-ft in the overburden soils above the bedrock.

ISCR injections are proposed to consist of a reducing agent to reduce CVOC concentrations in bedrock groundwater. As part of this approach, it is proposed to include enhanced bio-stimulation to promote biological reductive dichlorination with microorganisms which are able to degrade chlorinated ethenes. Injections planned in the northern portion of the Site (i.e., BW-02, BW-03 and BW-04) are located hydraulically downgradient of the former source area of impacts based on groundwater flow directions to be able to intercept residual dissolved phase impacts that may travel in the direction of groundwater movement.

2.2 Treatment Chemicals

The products planned for use in for the injections include Provect-ERD for enhanced reductive dichlorination which will be supplemented with Dual Valent Iron (DVI). Provect-ERD is an emulsified liquid electron donor used to create enhanced reductive dichlorination conditions in groundwater for anaerobic bioremediation of chlorinated solvents and contains a fermentable carbon source. The product is completely soluble in water. The DVI supports direct chemical dichlorination and supports the formation of in situ reactive ferrous minerals and in the presence of a sulfur source, reactive iron sulfides to yield abiotic reductive dichlorination. In addition, injections will be bioaugmented with KB-1, a naturally occurring, non-pathogenic microbiral culture that contains Dehalococcoides (DHC). DHC microorganisms enhance breakdown of chlorinated solvents and are able to completely degrade chlorinated ethenes to ethene.

It is anticipated that approximately 25 gallons of Provect-ERD will be injected into each well with approximately 11-lbs of DVI for each well. This will be followed by 25 gallons of anerobic chase water mixed with 1 Liter of DHC for each well. Approximately 0.75 lbs of sodium sulfite will be mixed with 25 gallons of potable water to create the anerobic water. Quantities injected are dependent on how much material the formation can readily accept at the time of injections. Treatment product data sheets are included as Appendix 1.

2.3 Injection Methods

Provect-ERD will be injected in the form of a slurry/solution with a percentage of water per the manufacturer's recommendations. DVI will be mixed directly with the ERD in the field prior to injection per manufacturer specifications. Pumps will be used to directly pump the slurry into the wells using appropriately sized pumps, hoses, piping and fittings capable of pumping thicker substances. Following application of the ERD and DVI, DCH will be applied with anerobic chase water. Anerobic water for use during application of the DCH will be created by mixing a reagent (sodium sulfite) provided with water in a separate tank. The reaction removes oxygen from the water. Anerobic conditions will be confirmed prior to injection. DHC and the anerobic water will then be mixed in a tank and injected into each well. Application of the ISCR will be performed by properly trained personnel and overseen by a Qualified Environmental Professional or someone under the direct supervision of a Professional Engineer. Detailed records will be made and maintained regarding each injection location including but not limited to the following:

- General field notes (i.e., time on/off site, weather conditions, personnel)
- General injection pressures will be recorded

- Injection quantities
- Approximate injection rate
- An individual injection log for each location.
- Issues encountered such as daylighting of material. Material will be cleaned up in accordance with applicable recommendations by the ISCR supplier.

Refer to Appendix 2 for a blank injection log form. Refer to Appendix 3 for injection guidance information.

At least 30-days prior to initiation of chemical injection work, an EPA Inventory of Injection Wells form will be completed and sent to the EPA. A copy of the EPA approval will be sent to the NYSDEC prior to implementation.

2.4 Reporting

All activities completed will be documented in the next Period Review Report (PRR) for the Site. In additional to the typical information included in the reports, the report will include at a minimum a summary of the fieldwork activities completed, injection quantities, maps showing the injection locations and a materials handling summary.

3.0 COMMUNITY AIR MONITORING

Community Air Monitoring is not planned to be included as part of the corrective measures injection work because no digging, excavation or removal of soil and/or groundwater will be required as part of the injection work. However, a photoionization detector (PID) capable of measuring total VOCs will be at the Site, calibrated and be used to monitor the work zone area. In the event that any PID readings above background levels are noted in the work zone, all work will cease until full community air monitoring (up/down gradient VOC and dust monitoring) is implemented. The NYSDOH Generic Community Air Monitoring Plan (CAMP) from NYSDEC DER-10 Appendix 1A (VOCs) and 1B (Dust) will be utilized. The NYDOH Generic CAMP appendices 1A and 1B are included in Appendix 4 of this CMP.

4.0 QUALITY CONTROL PLAN

LaBella's Quality Control Plan (QCP) used during the Remedial Investigation will be followed during the implementation of this CMP.

5.0 HEALTH AND SAFTEY PLAN

The Health and Safety Plan (HASP) included as Appendix 5 will be implemented for this work.

6.0 SCHEDULE

Injection work is scheduled to be completed in the spring of 2023, pending NYSDEC approval of the CMP.

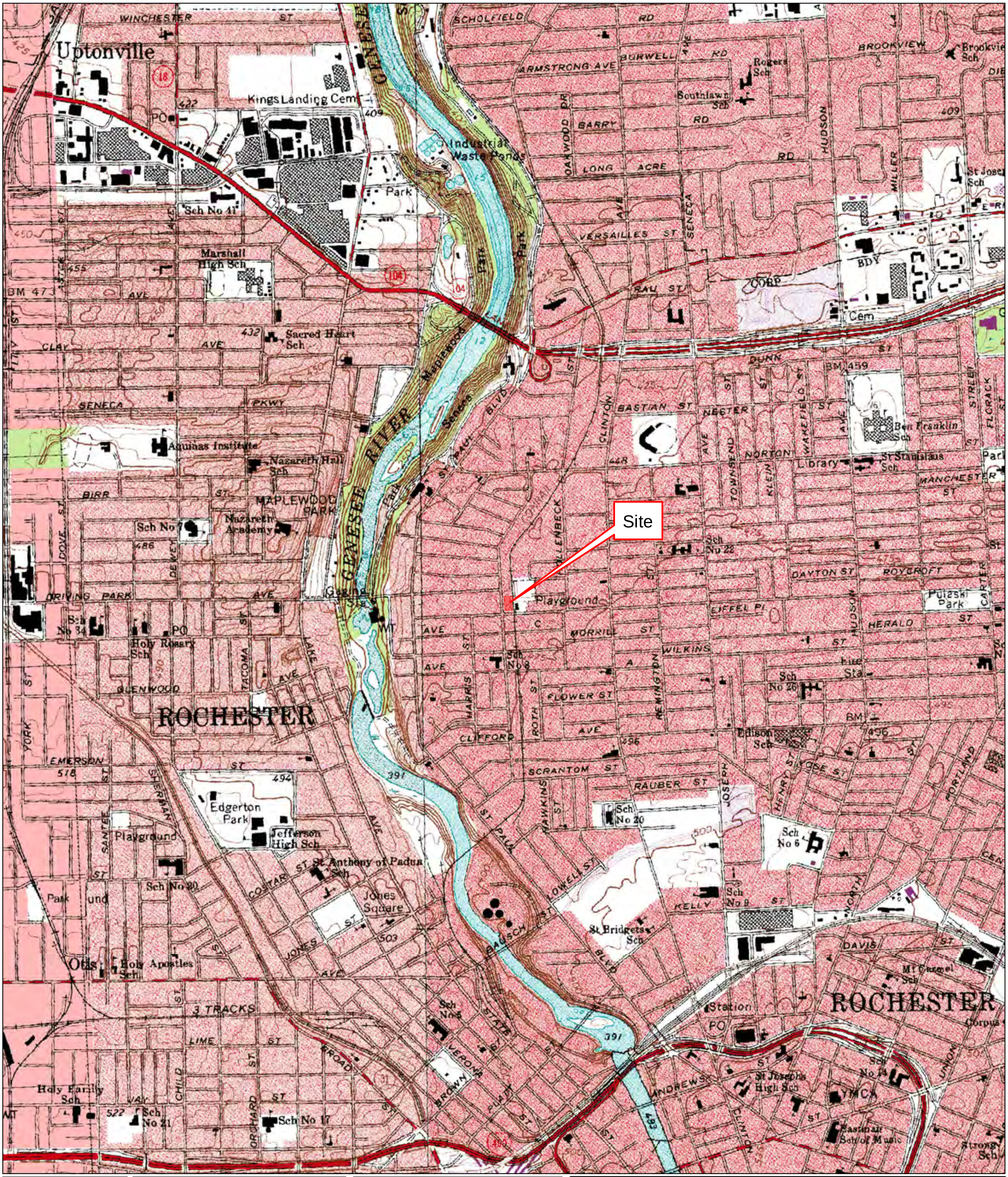
7.0 CERTIFICATION

I Daniel P. Noll certify that I am currently a New York State Licensed Professional Engineer as defined in 6 NYCRR Part 375 and that this Corrective Measures Plan report was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

Daniel P. Noll, PE
Vice President

I:\HOME LEASING, LLC\2231721 - MICHELSEN CMP DEV. 182 AVE D\11_REPORTS\MICHELSEN CMPV4_.DOCX

FIGURES



PROJECT/DRAWING NUMBER

2161282

FIGURE 1

DRAWING TITLE

SITE LOCATION MAP

PROJECT/CLIENT

Corrective Measures Plan

Former Michelsen Furniture Co. Site
182 Avenue D & 374 Conkey Ave.
Rochester, New York

Client: M+M Housing Development Fund Corp. as Nominee for Mills and Michelsen LLC

LaBella
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300 STATE STREET
ROCHESTER, NY 14614
P: (585) 454-6110
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www.labellapc.com

Path: J:\Urban League of Rochester Economic Development\214539 - Michelson BCP Site RI & Remediation\Drawings\SMP\Fig. 1 - Site location.mxd

User: dengert

Legend

- 2015 RIWP Monitoring Well
- 2015 RIWP Interface Well
- 2015 RIWP Bedrock Well
- Previous Monitoring Well Locations
- SiteBoundary

Notes:
1. Site Boundary determined using 2011 City of Rochester Tax Parcel data.
2. 2009 Aerial photograph obtained from NYS GIS Clearinghouse.

LaBella
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Corrective Measures Plan

Former Michelsen Furniture Co. Site

182 Avenue D & 374 Conkey Avenue Rochester, New York

Urban League of Rochester Economic Develoment Corporation

Title:

Proposed Injection Locations

N W E S

0 15 30 Feet

1 inch = 30 feet

214539

Figure 2

Path: P:\Proposals\F-J\Home Leasing\P2301402 - Michelsen CMP Development and Implementation\CMP\Appendices\Fig 2 - Injection Locations.mxd

APPENDIX 1

Treatment Product Data Sheets

Provect-ERD-CH4 Advanced contains proprietary fermentable carbon sources plus water-soluble, dual-valent iron (DVI) and - where appropriate - Antimethanogenic Reagent (AMR) technology to yield the industries' only liquid ISCR amendment to enhance the removal of chlorinated volatile organic compounds (CVOCs) from soil and groundwater. As outlined herein, this technical approach makes use of screened wells and offers the benefits of:

- Can be applied via screened wells
- Ease of use (can self-perform)
- Increased reliability and improved performance beyond ERD alone
- *In situ* formation (for FREE!) of mackinawite and other iron sulfides
- Extended longevity (remedial action persists for many years),
- Reduced risk of regulatory exceedances for methane, and
- Avoidance of possible health and safety issues (vapor intrusion, induced plume migration)
- Custom formulations available

PROVECTUS ERD-CH4+ TECHNOLOGY BACKGROUND

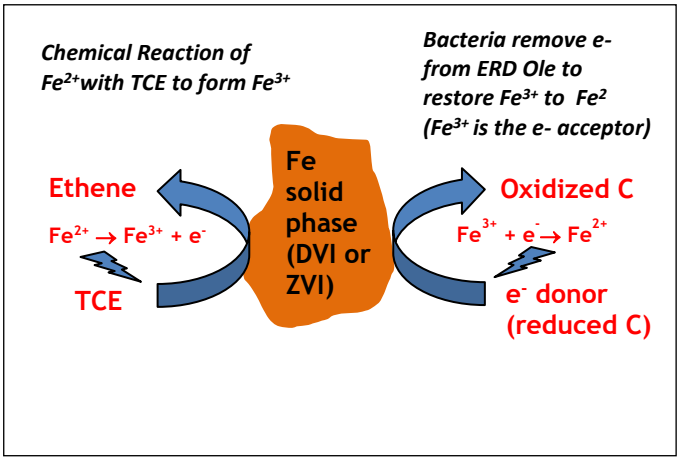
Provectus' ERD-CH4 technology represents a significant advancement in environmental biotechnology by combining the proven biochemistry of ERD with the power of the Provect-CH4® methanogen inhibitors to yield a truly unique liquid, antimethanogenic ERD reagent.

Fermentable Carbon Source: The amendment is manufactured and shipped as a prepared mixture that contains 60 - 85% fermentable carbon (FC) and:

- Optional Provect-CH4® AMR (two types typically at 4% to 8% weight of FC)
- Glycerin as fast-release H donors
- Soluble lactic acid as mid-release H donors
- Ethyl lactate as a green solvent and H donor
- Dissolved Fatty acids as long-term release H donors
- Dipotassium phosphate for micronutrients and pH buffering
- Potash or bicarbonate for pH control
- Custom formulations available

Antimethanogenic Reagents (AMR) to control of Excessive Methanogenesis: Provect-CH4® is a food-grade, natural source of Monacolin K (otherwise known as Lovastatin) and other statin compounds and/or essential plant oils with a demonstrated ability to prevent excessive methane

(CH_4) production by inhibiting the growth and proliferation of methanogenic Archaea. In environmental remediation applications, it can be used as an additive to conventional ERD and *in situ* chemical reduction (ISCR) amendments to control excessive methanogenesis thereby rendering them safer, more effective and more cost efficient.



Dual valent Iron (DVI): Provect-ERD-CH4**+** is supplemented with a source of a soluble, reduced iron (*i.e.,* present as ferrous [Fe^{2+}] iron). The DVI supports direct chemical dechlorination via *alpha*-elimination pathways, and it supported the formation *in situ* of reactive ferrous minerals (*e.g.,* magnetite) and – in the presence of a sulfur source – reactive iron sulfides (*e.g.,* mackinawite) to yield abiotic reductive dechlorination. These abiotic pathways often result in complete dechlorination (Weber *et al*., 2006) and can persist for many years (if an electron donor is available) being catalyzed by indigenous iron-reducing bacteria. Notably, biotransformation of Fe^{2+} does not require direct contact with the iron solid phase as a variety of naturally-occurring biological molecules, such as humic acids, can facilitate electron shuttle dynamics.

ADVANTAGES OF USING PROVECT- CH4 METHANE CONTROL TECHNOLOGY

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 create and 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 represents a costly waste of the amendment since the hydrogen released as methane was not utilized by the targeted microbes, such as *Dehalococcoides* spp., *Dehalobacter* spp., or other related bacteria. In addition, excessive methanogenesis can pose significant safety issues (methane is explosive), it will induce vapor migration and it can lead to exceedances of new and emerging regulatory guidelines. Moreover, uncontrolled methanogenesis can be interpreted (by some) to represent an avoidable contribution

to greenhouse gas emissions, hence its active control can have a positive impact on one's overall sustainability index.

PROVECT- ERD-CH4+ PRIMARY FEATURES

Because Provect-ERD-CH4**+** provides both fermentable carbon and supplemental DVI, the Fe^{+2} ions donate electrons and are oxidized to Fe^{+3} for an extended period (years). Where needed (*i.e.*, in the presence of low sulfate), additional source of sulfur is included in the product formulation. General physical parameters are as follows:

- Viscosity = 10 to 15 cP at 20 C
- Specific Gravity = 1.00 to 1.2
- Density 7.75 to 8.36 lbs/USG
- Hydrogen Yield= 0.2 g to 0.4 H_2/g ERD-CH4
- Fermentable carbon @ 65 to 90% weight basis
- AMR 4% to 8% of the FC content
- Soluble organic Fe content 5 to 10% weight basis

Provect ERD-CH4**+** is the only ERD Reagent that includes Provect-CH4® AMR technology in an engineered, pre-mixture formulation to rapidly improve remedial performance while simultaneously minimizing the production of methane. The benefits are notable:

- More Efficient = More Cost Effective: Production of methane is a direct indication that the hydrogen generated from the organic carbon amendments was used by methanogens and the amendment has been wasted because it was not utilized by acetogens or dehalorespiration. By inhibiting the growth and proliferation of methane producing Archaea, chlororespiring bacteria can become the more dominant bacterial populations and at least 15 to >30% less ERD amendment can be applied.
- Safer: Production of methane will result from the addition of any conventional ERD or ISCR amendment: 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. State specific regulations for methane in groundwater have been promulgated, with others pending for soil gas and indoor air.
- Green and Sustainable Technology: Formulated with byproducts from "green" energy processes, so it is better for the environment.
- Patented Technologies: Technology end users and their clients are fully protected from all Patent and other legal issues.
- Ease of Use:

- Completely soluble in water hence no need for extensive and time consuming "water chase".
- No need to emulsify the product with specialize tooling and equipment
- No laborious material transfers and dilutions
- No worry about an emulsion breaking.
- Lower injection pressures
- No soap formation from bringing pH up too high
- ERD-CH4 is formulated for each site-specific application
- Avoids cost and need for secondary treatment to manage excessive methane production (SVE/AS plus off gas treatment)

- Carbon Longevity (> 2 years): Contains C14 to C18 fatty acids that have been shown in the field to last for over two years. Emulsified oils eventually break down into bioavailable C18 fatty acids through hydrolysis, so we are essentially using the same long-lived components of emulsified oils without having to emulsify or wait for hydrolysis to occur.
- Natural Co-Solvent: includes ethyl lactate which is a "green" co-solvent. This helps dissolve fatty acids, and it also aids desorption of bound COIs to accelerate treatment.
- Cost Competitive: Standard formulations containing 80% fermentable carbon + 5% (FC weight basis) AMR methane inhibitor + 6.5% weight basis DVI is the most cost efficient way of procuring the combined technologies.

OPTIONAL INOCULANTS FOR ERD TREATMENT

If aquifer conditions are not optimal for ERD/ISCR, then the indigenous microbial population may catabolically limited and any ERD remedial process will benefit from the addition of inoculants with known abilities to rapidly biodegrade DCE and related compounds. Once favorable redox conditions (ca. ORP < -100 mV, DO <1 mg/L, pH between 6.5 and 7.5) have been attained DHC cultures can be added to enhance complete mineralization and minimize DCE stalls. The DHC inoculant should contain at least 1x10E11 cfu/L of live bacteria including high numbers of *Dehalococcoides* species with known abilities to biodegrade DCE. The target density of DHC cells in the treated aquifer area should be >1x10E6 cfu/L.

OPTIONAL USE OF BUFFERING AGENTS

For ERD and ISCR to be most effective, aquifer pH should be near neutral or between 6 and 8. The aquifer pH is acidic and an alkaline buffering agent such as $CaCO_3$-based solid materials (*e.g.*, pulverized limestone or dolomite powders) or liquid buffer such as solutions of $Ca(OH)_2$, $Mg(OH)_2$, or $NaHCO_3$ will be applied.

KB-1®

Bioaugmentation Culture

For bioaugmentation of chlorinated ethene contaminated sites

Contact SiREM for a quotation or more information on our line of leading bioaugmentation cultures

toll free: 1-866-251-1747
phone: (519) 822-2265

KB-1® is a naturally occurring, non-pathogenic microbial culture that contains *Dehalococcoides* (*Dhc*), the only group of microorganisms documented to promote the complete dechlorination of chlorinated ethenes to non-toxic ethene. Although *Dhc* are found in the environment, research indicates these microorganisms are not ubiquitous and not all Dhc are capable of complete dechlorination of chlorinated ethenes. At sites where *Dehalococcoides* are absent, tetrachloroethene (PCE) and trichloroethene (TCE) dechlorination typically stalls at cis-1,2-dichloroethene (cDCE), despite ample electron donor availability. KB-1® is used to establish complete dechlorination at sites that do not contain *Dhc* (or the right *Dhc*), and to accelerate dechlorination rates to achieve treatment goals. Bioaugmentation of aquifer systems with KB-1® provides an active microbial community capable of complete reductive dechlorination, ensuring that PCE, TCE, cDCE and vinyl chloride (VC) are completely dechlorinated to ethene, without undue acclimation periods, and at rates that are suitable for achieving remedial goals.

KB-1® is the most field-demonstrated culture of its type, and its robustness has been demonstrated for both source area and plume remediation in both porous media and fractured bedrock environments.

Benefits of KB-1® Include:

- Low cost: single application
- Works with all commonly used electron donors
- Natural microbial culture (not genetically modified or engineered)
- Certified to be free of known human pathogens
- Rigorous quality control procedures ensure each shipment is of the highest quality, stable, safe, effective and free of chlorinated volatile organic compounds
- Shipped overnight in specially designed stainless steel vessels that prevent exposure to air and which are safe and easy to handle

All KB-1® purchases include:

- Technical support from an experienced SiREM field technician to support successful application to your site
- Complimentary Gene-Trac® *Dehalococcoides* tests to verify the successful delivery and persistence of KB-1® in site groundwater
- KB-1® guarantee - complete dechlorination to ethene*

**Some conditions apply*

KB-1® plus

Bioaugmentation Culture

Overcome Inhibition at Mixed Chlorinated Solvent Sites

KB-1® Plus are custom-blended microbial culture formulations for bioaugmentation of sites with inhibitory concentrations of chlorinated ethanes and chlorinated methanes, which are often comingled with chlorinated ethenes. KB-1® Plus has been demonstrated to dechlorinate in excess of 200 milligrams per liter (mg/L) of 1,1,1-trichloroethane (1,1,1-TCA) to chloroethane and carbon tetrachloride, chloroform to dichloromethane (DCM) to non-chlorinated end products. Chloroethane can be further degraded under aerobic conditions. These cultures have been developed by SiREM in collaboration with the University of Toronto[1,2] and the United States Geological Survey[3].

Benefits of KB-1® Plus include:

- Overcome inhibition of chloroethene dechlorination caused by 1,1,1-TCA and chloroform
- Only a single application required
- Works with all commonly used electron donors
- Natural microbial culture (not genetically modified)
- Pathogen free
- Rigorous quality control ensures each shipment is effective, stable and safe
- Shipped overnight in specially designed stainless-steel vessels that prevent exposure to air and are safe and easy to handle

All KB-1® Plus purchases include:

- KB-1® Plus Guarantee*
- Technical support to ensure a successful application to your site
- Complimentary Gene-Trac® *Dehalococcoides* and *Dehalobacter* tests to verify the successful delivery, growth and persistence of KB-1® Plus microbes in site groundwater

Contact SiREM for a quotation or more information on our line of leading bioaugmentation products.

toll free: 1-866-251-1747
phone: (519) 822-2265

References

[1]Grostern, A. and E. A. Edwards. 2006. Growth of *Dehalobacter* and *Dehalococcoides* spp. during Degradation of Chlorinated Ethanes. *Appl. Environ. Microbiol*. 72: 428–436.

[2]Grostern, A., M. Duhamel, S. Dworatzek and E. A. Edwards. 2010. Chloroform respiration to dichloromethane by a *Dehalobacter* population. *Environmental Microbiology*. 12: 1053–1060.

[3]Jones E. J. P., M. A. Voytek, M.M. Lorah, J. D. Kirshtein. 2006. Characterization of a Microbial Consortium Capable of Rapid and Simultaneous Dechlorination of 1,1,2,2-Tetrachloroethane and Chlorinated Ethane and Ethene Intermediates. *Bioremediation Journal,* Volume 10: 153-168.

**Some conditions apply*

SODIUM SULFITE TECH GRADE DATA PACKAGE DOCUMENTS

PRODUCT SPECIFICATIONS

SODIUM SULFITE

TECHNICAL GRADE

CODE: 1NS01E
EFFECTIVE: 01/01/2022

PARAMETERS & SPECIFICATIONS

Sodium Sulfite (Na_2SO_3)	97.0 – 100.0 %
Alkalinity (Na_2CO_3)	0.0 – 0.5 %
Heavy Metals (as Pb)	0.0 – 0.002 %
Iron (Fe)	0.0 – 0.0015 %
Sodium Chloride (NaCl)	0.0 – 0.02 %
Sodium Sulfate (Na_2SO_4)	0.0 – 2.5 %
Water Insolubles	0.0 – 100.0 ppm
pH (1 % solution)	9.7 – 10.3
Appearance	White to Pale Yellow

REMARKS

Esseco USA LLC
4 Gatehall Drive
Parsippany, NJ 07054

SODIUM SULFITE TECH GRADE STATEMENTS

Manufacturing Site

The sodium sulfite technical grade(1NS01E) sold by Esseco USA has been manufactured by Esseco Srl at the following address:

Esseco Srl
Via San Cassiano 99
San Martino di Trecate, Novara 28069
Italy

Animal Testing

The sodium sulfite sold by Esseco USA and produced by Esseco Srl in Trecate, Italy has not been tested on animals.

Composition

The technical grade of sodium sulfite sold by Esseco USA has the following composition:

Component	Percent	CAS Number
Sodium Sulfite	98.9	7757-83-7
Sodium Sulfate	1.1	7757-82-6
Total:	100.0	

Shelf Life

The sodium sulfite sold by Esseco USA has a 3 year shelf life when stored in the original container. The original container should also be stored in a cool and dry indoor location when possible(humidity and dampness promote oxidation).

January 1, 2022

TECHNICAL SERVICE
Phone: 973 267 3330
Fax: 973 267 8299

CISQ is a member of

IQNet

THE INTERNATIONAL CERTIFICATION NETWORK

www.iqnet-certification.com

IQNet, the association of the world's first class certification bodies, is the largest provider of management System Certification in the world. IQNet is composed of more than 30 bodies and counts over 150 subsidiaries all over the globe.

CERTIFICATO n. / *CERTIFICATE No* **158**

SI CERTIFICA CHE L'ORGANIZZAZIONE
WE HEREBY CERTIFY THAT THE ORGANIZATION

ESSECO S.r.l.

For information concerning the validity of the certificate, you can visit the site www.certiquality.it

The validity this certificate depends on annual audit and on a complete review every three years of the Management System.

IT - 28069 SAN MARTINO DI TRECATE (NO) - VIA SAN CASSIANO 99

NELLE SEGUENTI UNITA' OPERATIVE / *IN THE FOLLOWING OPERATIVE UNITS*

IT - 28069 SAN MARTINO DI TRECATE (NO) - VIA SAN CASSIANO 99
IT - 37060 LUGAGNANO DI SONA (VR) - VIA DELL'INDUSTRIA 18

HA ATTUATO E MANTIENE UN SISTEMA DI GESTIONE QUALITA' CHE E' CONFORME ALLA NORMA
HAS IMPLEMENTED AND MAINTAINS A QUALITY MANAGEMENT SYSTEM WHICH COMPLIES WITH THE FOLLOWING STANDARD

UNI EN ISO 9001:2015

PER LE SEGUENTI ATTIVITA' / *FOR THE FOLLOWING ACTIVITIES* SETTORE / *CODE* **IAF 12, 3**

Sviluppo, produzione e vendita di: prodotti chimici per l'industria e per l'agricoltura; additivi e coadiuvanti per il settore enologico e per l'industria alimentare. Produzione, stoccaggio e vendita deicer (sghiacciante per pista aereoporti) e sodio idrosolfito.
Development, production and sale of: chemicals for agriculture and industry; additives and adjuvants for the wine and food industry.
Production, stocking and sale of de-icers (for airport runways) and sodium dithionite.

IL PRESENTE CERTIFICATO E' SOGGETTO AL RISPETTO DEL REGOLAMENTO PER LA CERTIFICAZIONE DEI SISTEMI DI GESTIONE
THE USE AND THE VALIDITY OF THE CERTIFICATE SHALL SATISFY THE REQUIREMENTS OF THE RULES FOR THE CERTIFICATION OF MANAGEMENT SYSTEMS

PRIMA EMISSIONE / *FIRST ISSUE*	*10/06/1994*
DATA DELIBERA / *DECISION DATE*	*09/06/2020*
DATA SCADENZA / *EXPIRY DATE*	*09/06/2023*
EMISSIONE CORRENTE / ISSUE DATE	*09/06/2020*

CERTIQUALITY S.r.l. - IL PRESIDENTE
Via G. Giardino 4 - 20123 MILANO (MI) - ITALY

ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO
SGQ n. 008 A
Membro degli Accordi di Mutuo riconoscimento EA, IAF e ILAC.
Signatory of EA, IAF and ILAC Mutual Recognition Agreements.

FEDERAZIONE CISQ
www.cisq.com
CISQ è la Federazione Italiana di Organismi di Certificazione dei sistemi di gestione aziendale.
CISQ is the Italian Federation of management system Certification Bodies.

C02 ED 01 010616

THE INTERNATIONAL CERTIFICATION NETWORK

CERTIFICATE

CISQ/CERTIQUALITY S.r.l.
has issued an IQNet recognised certificate that the organization:

ESSECO S.r.l.

IT - 28069 SAN MARTINO DI TRECATE (NO) - VIA SAN CASSIANO 99
for the following scope

Development, production and sale of: chemicals for agriculture and industry;
additives and adjuvants for the wine and food industry.
Production, stocking and sale of de-icers (for airport runways) and sodium dithionite.

has implemented and maintains a
Quality Management System
which fulfills the requirements of the following standard
ISO 9001:2015

Issued on:	**2020-06-09**
First issued on:	**1994-06-10**
Expires on:	**2023-06-09**

This attestation is directly linked to the IQNet Partner's original certificate and shall not be used as a stand-alone document

Registration number: **IT-1637**

Alex Stoichitoiu
President of IQNET

Ing. Mario Romersi
President of CISQ

IQNet Partners*:
AENOR *Spain* AFNOR Certification *France* APCER *Portugal* CCC *Cyprus* CISQ *Italy*
CQC *China* CQM *China* CQS *Czech Republic* Cro Cert *Croatia* DQS Holding GmbH *Germany* EAGLE Certification Group *USA*
FCAV *Brazil* FONDONORMA *Venezuela* ICONTEC *Colombia* Inspecta Sertifiointi Oy *Finland* INTECO *Costa Rica*
IRAM *Argentina* JQA *Japan* KFQ *Korea* MIRTEC *Greece* MSZT *Hungary* Nemko AS *Norway* NSAI *Ireland*
NYCE-SIGE *México* PCBC *Poland* Quality Austria *Austria* RR *Russia* SII *Israel* SIQ *Slovenia*
SIRIM QAS International *Malaysia* SQS *Switzerland* SRAC *Romania* TEST St Petersburg *Russia* TSE *Turkey* YUQS *Serbia*

* The list of IQNet partners is valid at the time of issue of this certificate. Updated information is available under www.iqnet-certification.com

FLOW CHART

The sodium sulfite sold by Esseco USA is manufactured by the following process phases:

FLOW CHART

Raw Material Charge (Phase 1)

↓

SO2 Absorption (Phase 2)

↓ Solution

Crystallization (Phase 3)

↓

Centrifuge (Phase 4)

↓

Drying (Phase 5)

↓

Packaging (Phase 6)

↓

Analysis (Phase 7)

↓

Sales

January 1, 2022

TECHNICAL SERVICE
Phone: 973 267 3330
Fax: 973 267 8299

260 mm

230 mm

550 mm

ESSECO USA

22.7kg

SULFITE DE SODIUM

TECHNICAL GRADE

CONTIENT SULFITE DE SODIUM CAS 7757-83-7 - Code 1NS01E-0050LB

CE PRODUIT EST NON DANGEREUX PAR HAZCOM 2012 ET WHMIS 2015

AVERTISSEMENT

CE PRODUIT EST CLASSÉ COMME NON-DANGEREUX SELON LES RÉGLEMENTATIONS EN VIGUEUR AUX ÉTATS-UNIS ET AU CANADA. CEPENDANT, LE CONTACT AVEC LES YEUX, LA PEAU ET LES VOIES RESPIRATOIRES DOIT ÊTRE ÉVITÉ. DE PLUS, L'INGESTION PEUT PROVOQUER UNE RÉACTION ALLERGIQUE CHEZ CERTAINS ASTHMATIQUES ET CHEZ LES PERSONNES SENSIBLES AUX SULFITES.

PREMIERS SOINS

EN CAS DE CONTACT AVEC LES YEUX, RINCER IMMÉDIATEMENT À GRANDE EAU PENDANT 15 MINUTES AU MOINS. E CAS DE CONTACT AVEC LA PEAU, LAVER IMMÉDIATEMENT À GRANDE EAU. EN CAS D'INGESTION, FAIRE BOIRE 2 À 4 VERRES D'EAU SI LA VICTIME EST COSCIENTE ET FAIRE VOMIR SOUS LA DIRECTION D'UN MÉDECIN. EN CAS D'INHALATION, PLACER LA VICTIME À L'AIR FRAIS. CONSULTER UN MÉDECIN EN CAS D'IRRITATION, INGESTION OU MALAISE SUITE À L'INHALATION.

EN CAS DE FUITE OU DE DÉVERSEMENT

PORTER L'EQUIPEMENT PROTECTEUR VOULU. RECEUILLIR LE PRODUIT SOLIDE ET PLACER DANS DES CONTENANTS VIDES PUIS FERMER. RINCER AVEC PRÉCAUTION LES RÉSIDUS À GRANDE EAU.

ENTREPOSAGE ET MANIPULATION

PORTER L'ÉQUIPEMENT PROTECTEUR VOULU DURANT LA MANIPOLATION. ENTREPOSER DANS UN LIEU SEC ET FRAIS, BIEN AERÉ, À L'ABRI DES ACIDES ET DES MATIÈRES COMBURANTES. CONSERVER DANS DES CONTENANTS FERMÉS. LES CONTENANS VIDES PEUVENT CONTENIR DES RÉSIDUS. TOUTES LES MESURES DE PRÉCAUTIONS INDIQUÉES SUR LES ÉTIQUETTES S'APPLIQUENT AUSSI AUX CONTENANTS VIDES. ÉLIMINER LE CONTENU ET RECIPIENT DANS CONFORMÉMENT À LA RÉGLEMENTATION LOCALE, RÉGIONALE ET NATIONALE.

POUR UNE URGENCE AUX ÉTATS-UNIS ET CANADA, APPELEZ CHEMTREC 800-424-9300

EXCLUSIVEMENT POUR USAGE PROFESSIONEL

AVANT D'UTILISER, CONSULTER LA FICHE DE DONNÉES DE SÉCURITÉ

CONTENU FABRIQUÉ EN ITALIE

PIM161 (R3-0619)

ESSECO USA LLC - 4 Gatehall Drive - Parsippany, NJ 07054- Tel 973-267-3330

50lbs

SODIUM SULFITE

TECHNICAL GRADE

NSF

ESSECO USA

ESSECO USA

50lbs

SODIUM SULFITE

TECHNICAL GRADE

CONTAINS SODIUM SULFITE CAS 7757-83-7 - Code 1NS01E-0050LB

THIS PRODUCT IS NON-HAZARDOUS PER HAZCOM 2012 AND WHMIS 2015

ATTENTION

THIS PRODUCT IS CLASSIFIED AS NON-HAZARDOUS UNDER EXISTING UNITED STATES AND CANADIAN REGULATIONS. HOWEVER, CONTACT WITH EYES, SKIN, AND RESPIRATORY TRACT SHOULD BE AVOIDED. IN ADDITION, INGESTION MAY CAUSE AN ALLERGIC REACTION IN SOME ASTHMATICS AND SULFITE SENSITIVE INDIVIDUALS.

FIRST AID

IF IN CONTACT WITH EYES, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. IF IN CONTACT WITH SKIN, FLUSH WITH PLENTY OF WATER.
IF SWALLOWED AND IF CONSCIOUS, IMMEDIATELY GIVE VICTIM 2 TO 4 GLASSES OF WATER AND INDUCE VOMITING UNDER MEDICAL SUPERVISION.
IF INHALED, MOVE VICTIM TO FRESH AIR.
GET MEDICAL ATTENTION FOR IRRITATION, INGESTION OR DISCOMFORT FROM INHALATION.

IN CASE OF SPILL

WEAR PROPER PROTECTIVE EQUIPMENT. SHOVEL UP DRY CHEMICAL INTO EMPTY CONTAINER AND COVER.
CAUTIOUSLY SPRAY RESIDUE WITH WATER.

STORAGE AND HANDLING

WEAR PROPER PROTECTIVE CLOTHING WHEN HANDLING PRODUCT. STORE IN COOL, DRY PLACE, AWAY FROM ACIDS AND OXIDIZERS.
KEEP CONTAINER CLOSED.
EMPTY CONTAINER MAY CONTAIN PRODUCT RESIDUE. ALL LABEL WARNINGS APPLY TO EMPTY CONTAINER.
DISPOSE OF CONTENTS AND CONTAINER IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

IN CASE OF AN EMERGENCY INVOLVING THIS PRODUCT IN THE UNITED STATES OR CANADA CONTACT CHEMTREC 800-424-9300

FOR PROFESSIONAL USE ONLY

BEFORE USING, READ THE SAFETY DATA SHEET FOR THIS CHEMICAL

CONTENTS MADE IN ITALY

ESSECO USA LLC - 4 Gatehall Drive - Parsippany, NJ 07054- Tel 973-267-3330 PIM161 R3-0619

ESSECO USA

NSF

SULFITE DE SODIUM

TECHNICAL GRADE

22.7kg

ESSECO USA

22.7kg

SULFITE DE SODIUM

TECHNICAL GRADE

CONTIENT SULFITE DE SODIUM CAS 7757-83-7 - Code 1NS01E-0050LB

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CONTENU FABRIQUÉ EN ITALIE

PIM161 (R3-0619)

ESSECO USA LLC - 4 Gatehall Drive - Parsippany, NJ 07054- Tel 973-267-3330

50lbs

SODIUM SULFITE

TECHNICAL GRADE

NSF

ESSECO USA

ESSECO USA

50lbs

SODIUM SULFITE

TECHNICAL GRADE

CONTAINS SODIUM SULFITE CAS 7757-83-7 - Code 1NS01E-0050LB

THIS PRODUCT IS NON-HAZARDOUS PER HAZCOM 2012 AND WHMIS 2015

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FOR PROFESSIONAL USE ONLY

BEFORE USING, READ THE SAFETY DATA SHEET FOR THIS CHEMICAL

CONTENTS MADE IN ITALY

ESSECO USA LLC - 4 Gatehall Drive - Parsippany, NJ 07054- Tel 973-267-3330 PIM161 R3-0619

ESSECO USA

NSF

SULFITE DE SODIUM

TECHNICAL GRADE

22.7kg

290 mm 80 mm 290 mm 80 mm

APPENDIX 2

Injection Log

LaBella
Powered by partnership.

300 STATE STREET, ROCHESTER, NY
ENVIRONMENTAL ENGINEERING CONSULTANTS

PROJECT NAME

INJECTION POINT:
SHEET:
CHKD BY:
DATE:

CONTRACTOR:
DRILLER:
LABELLA REPRESENTATIVE:

LOCATION DESC.:
GROUND SURFACE ELEVATION:
START DATE: END DATE:

TIME:
DATUM:
WEATHER:

TYPE OF DRILL RIG:
AUGER SIZE AND TYPE:

INJECTION COMPOUND:
DEPTH OF WELL (ft bgs):

ELAPSED TIME	INJECTION INTERVAL NO.	INJECTION INTERVAL (ft bgs/fmsl)	QTY WATER (gallons)	REAGENT COMPOUND QUANTITY (lb.)	% SLURRY	FLOW RATE (GPM)	INJ. INTERVAL TOTAL QTY. (gal.)	INJECTION PRESSURES	NOTES/OBSERVATIONS

FINAL INJECTION POINT SUMMARY

INJECTION INTERV. TOTAL DEPTH	TOTAL QTY. COMPOUND (lb.)	TOTAL VOLUME INJECTED (gal.)	TOTAL ELAPSED TIME	GENERAL NOTES

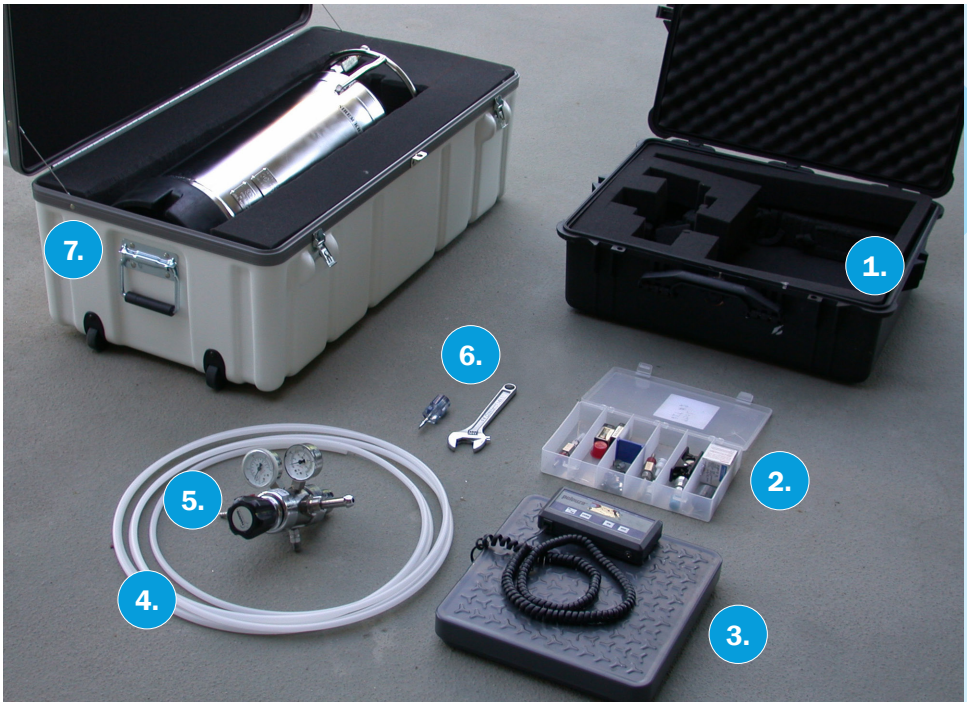
GENERAL NOTES:
1. "Injection Interval Total Quantity" is a running total of the volume injected.

APPENDIX 3

Treatment Product Injection Guidance

SiREM

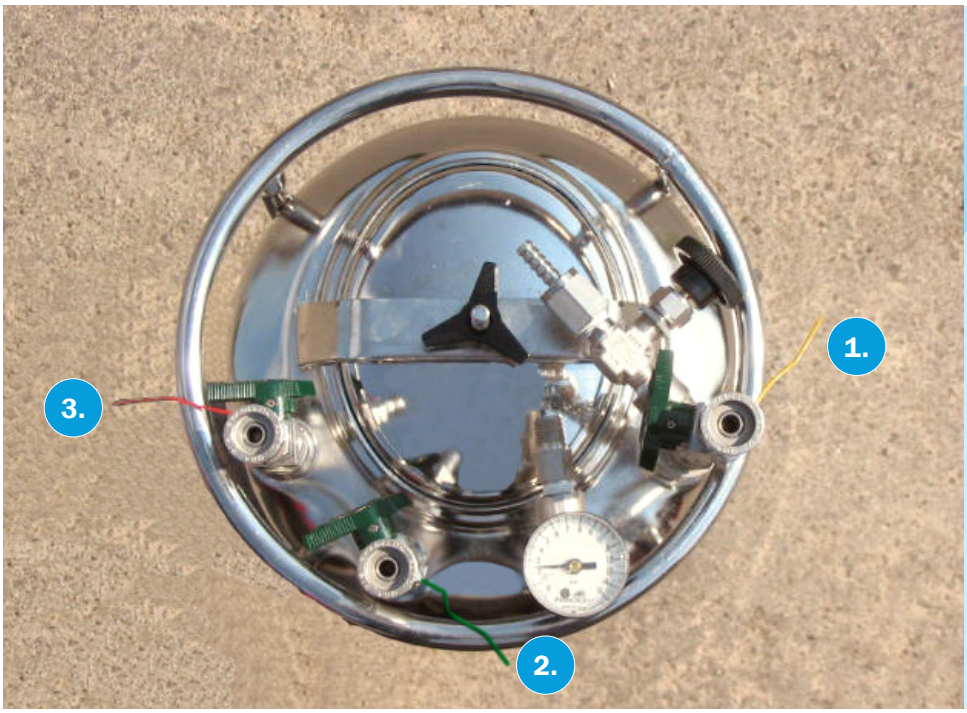
KB-1® Injection Summary



TOOL KIT CONTENTS

1. Toolkit Case
2. Quick Connect Fittings
3. Scale
4. Tubing
5. Regulator
6. Tools
7. KB-1® Vessel in Overpack Case

*Please note that the nitrogen/argon gas cylinder is not included with the culture shipment. Gas can be obtained from a local gas supplier.



VESSEL PORT FUNCTIONS

1. **Inoculation Port (YELLOW)**
   To allow KB-1® to flow out of the vessel.
2. **Purge Port (GREEN)**
   To purge tubing with inert gas.
3. **Pressurization Port (RED)**
   To pressurize KB-1® vessel.

SiREM

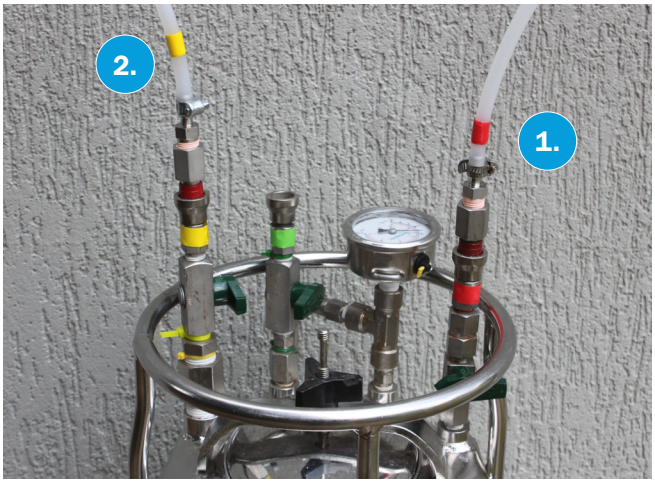
KB-1® Injection Summary

SETUP TO PURGE INJECTION TUBING

1. Gas In: The inert gas tubing remains in the pressurization port **(RED)** for the duration of the injection.

2. Gas Out: Initially the tubing used to inject the KB-1® will be connected to the purge port **(GREEN).**

SETUP TO INJECT KB-1®



1. Gas In: The pressurization port **(RED)** remains in the open position for the duration of the injection.

2. KB-1® Out: The KB-1® injection tubing is moved from the purge port **(GREEN)** to the KB-1® inoculation port **(YELLOW)**.

USING THE SCALE

Turn scale on by pressing the lbs/kg button and ON buttons simultaneously

Change the units to kg by pressing lbs/kg button

Press Zero/Hold to tare scale

Place KB-1® vessel on scale and record the weight

Weight will decrease with each injection of KB-1®

SiREM

KB-1® Injection Summary

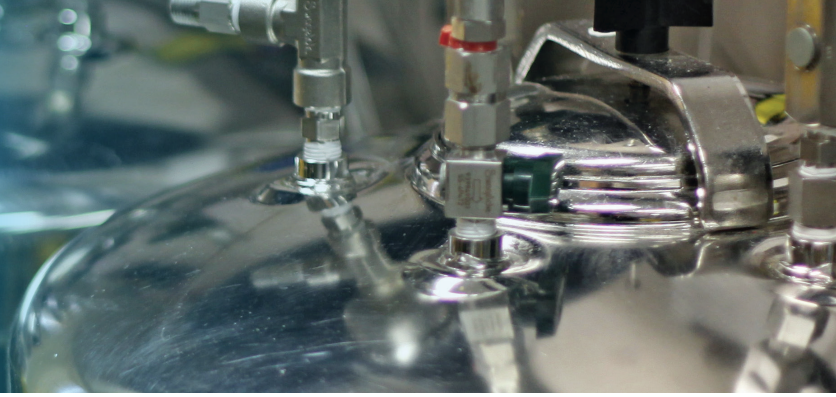
ANAEROBIC WATER DRIVEN KB-1® INJECTION SETUP

1. Gas Tubing
2. KB-1® Injection Tubing
3. Female Quick Connect (1/4" Male NPT)
4. Ball Valve with ¼" Female NPT Fitting*
5. T-Fitting*
6. Ball Valve*
7. Anaerobic water line

*not included with shipment

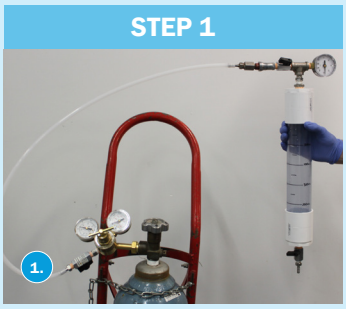
SiREM

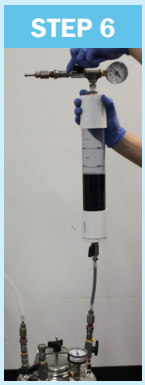
KB-1® Injection Summary



KB-1® INJECTION DISPENSER OPERATION

1. **Gas Line**
2. **Female Quick Connect**
   (item #3 as shown in anaerobic water driven KB-1 injection set-up)





Step 1: Cut the length of tubing that will span from the gas cylinder to the culture vessel (5-10' should be sufficient). Attach one end to the hosebarb on the regulator and the other to the hosebarb on a quick connect. Connect the quick connect to the top port of the injection dispenser.

Step 2: Cut the length of tubing that will span from the injection dispenser to the injection location (5-10' should be sufficient). Attach one end to the hosebarb on the injection dispenser and the other to the hosebarb on a quick connect. Open the valve on the gas cylinder, followed by the regulator, the top of the injection dispenser and finally the bottom of the injection dispenser. Push on the bottom of the quick connect to allow gas to flow through the injection equipment.

Step 3: Close the bottom port on the injection dispenser and allow pressure to build to 5 psi in the dispenser. Close the top port of the injection dispenser.

Step 4: Connect the bottom quick connect into the inoculation port **(YELLOW)**. Move the gas line from the top of the injection dispenser to the pressurization port **(RED)** on the culture vessel. Connect a quick connect into the top port of the injection dispenser.

Step 5: Open the inoculation port **(YELLOW)** and allow KB-1® to flow into the injection dispenser to the desired volume.

Step 6: Pressure will increase as the injection dispenser fills. Release the pressure by opening the top port. Close the top port before the target volume is reached, this will ensure that there is always pressure in the dispenser.

Step 7: Once the target volume is reached close the bottom port and remove the quick connect from the top port.

Step 8: Move the injection dispenser from the inoculation port **(YELLOW)** to the port on the anaerobic water line set up. Connect the gas line to the top of the injection dispenser. Open the top port followed by the bottom port of the injection dispenser. Once the culture has been injected, close the bottom port followed by the top port to keep pressure in the injection dispenser.

Step 9: Repeat steps 4-8 until all injections are complete.

Step 10: Once the injections are complete, pack the vessel(s) in the white over pack(s) & place all tools into the tool kit. Contact Corey Scales at 519-515-0848 for return shipping instructions and paperwork.

For additional information refer to the Culture safety data sheet (SDS)
Contact SiREM for Customer Support
Toll free: 1-866-251-1747
Bioaugmentation Coordinator, Corey Scales: (519) 515-0848

APPENDIX 4

Community Air Monitoring Plan (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

Appendix 1B
Fugitive Dust and Particulate Monitoring

A program for suppressing fugitive dust and particulate matter monitoring at hazardous waste sites is a responsibility on the remedial party performing the work. These procedures must be incorporated into appropriate intrusive work plans. The following fugitive dust suppression and particulate monitoring program should be employed at sites during construction and other intrusive activities which warrant its use:

1. Reasonable fugitive dust suppression techniques must be employed during all site activities which may generate fugitive dust.

2. Particulate monitoring must be employed during the handling of waste or contaminated soil or when activities on site may generate fugitive dust from exposed waste or contaminated soil. Remedial activities may also include the excavation, grading, or placement of clean fill. These control measures should not be considered necessary for these activities.

3. Particulate monitoring must be performed using real-time particulate monitors and shall monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

(a) Objects to be measured: Dust, mists or aerosols;
(b) Measurement Ranges: 0.001 to 400 mg/m3 (1 to 400,000 :ug/m3);
(c) Precision (2-sigma) at constant temperature: +/- 10 :g/m3 for one second averaging; and +/- 1.5 g/m3 for sixty second averaging;
(d) Accuracy: +/- 5% of reading +/- precision (Referred to gravimetric calibration with SAE fine test dust (mmd= 2 to 3 :m, g= 2.5, as aerosolized);
(e) Resolution: 0.1% of reading or 1g/m3, whichever is larger;
(f) Particle Size Range of Maximum Response: 0.1-10;
(g) Total Number of Data Points in Memory: 10,000;
(h) Logged Data: Each data point with average concentration, time/date and data point number
(i) Run Summary: overall average, maximum concentrations, time/date of maximum, total number of logged points, start time/date, total elapsed time (run duration), STEL concentration and time/date occurrence, averaging (logging) period, calibration factor, and tag number;
(j) Alarm Averaging Time (user selectable): real-time (1-60 seconds) or STEL (15 minutes), alarms required;
(k) Operating Time: 48 hours (fully charged NiCd battery); continuously with charger;
(l) Operating Temperature: -10 to 50^{o} C (14 to 122^{o} F);
(m) Particulate levels will be monitored upwind and immediately downwind at the working site and integrated over a period not to exceed 15 minutes.

4. In order to ensure the validity of the fugitive dust measurements performed, there must be appropriate Quality Assurance/Quality Control (QA/QC). It is the responsibility of the remedial party to adequately supplement QA/QC Plans to include the following critical features: periodic instrument calibration, operator training, daily instrument performance (span) checks, and a record keeping plan.

5. The action level will be established at 150 ug/m3 (15 minutes average). While conservative,

this short-term interval will provide a real-time assessment of on-site air quality to assure both health and safety. If particulate levels are detected in excess of 150 ug/m3, the upwind background level must be confirmed immediately. If the working site particulate measurement is greater than 100 ug/m3 above the background level, additional dust suppression techniques must be implemented to reduce the generation of fugitive dust and corrective action taken to protect site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection for on-site personnel and implementing additional dust suppression techniques (see paragraph 7). Should the action level of 150 ug/m3 continue to be exceeded work must stop and DER must be notified as provided in the site design or remedial work plan. The notification shall include a description of the control measures implemented to prevent further exceedances.

6. It must be recognized that the generation of dust from waste or contaminated soil that migrates off-site, has the potential for transporting contaminants off-site. There may be situations when dust is being generated and leaving the site and the monitoring equipment does not measure PM10 at or above the action level. Since this situation has the potential to allow for the migration of contaminants off-site, it is unacceptable. While it is not practical to quantify total suspended particulates on a real-time basis, it is appropriate to rely on visual observation. If dust is observed leaving the working site, additional dust suppression techniques must be employed. Activities that have a high dusting potential--such as solidification and treatment involving materials like kiln dust and lime--will require the need for special measures to be considered.

7. The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

(a) Applying water on haul roads;
(b) Wetting equipment and excavation faces;
(c) Spraying water on buckets during excavation and dumping;
(d) Hauling materials in properly tarped or watertight containers;
(e) Restricting vehicle speeds to 10 mph;
(f) Covering excavated areas and material after excavation activity ceases; and
(g) Reducing the excavation size and/or number of excavations.

Experience has shown that the chance of exceeding the 150ug/m3 action level is remote when the above-mentioned techniques are used. When techniques involving water application are used, care must be taken not to use excess water, which can result in unacceptably wet conditions. Using atomizing sprays will prevent overly wet conditions, conserve water, and provide an effective means of suppressing the fugitive dust.

8. The evaluation of weather conditions is necessary for proper fugitive dust control. When extreme wind conditions make dust control ineffective, as a last resort remedial actions may need to be suspended. There may be situations that require fugitive dust suppression and particulate monitoring requirements with action levels more stringent than those provided above. Under some circumstances, the contaminant concentration and/or toxicity may require additional monitoring to protect site personnel and the public. Additional integrated sampling and chemical analysis of the dust may also be in order. This must be evaluated when a health and safety plan is developed and when appropriate suppression and monitoring requirements are established for protection of health and the environment.

APPENDIX 5

Health & Safety Plan (HASP)

Health and Safety Plan

Location:

Former Michelsen Furniture Co.
182 Avenue D & 374 Conkey Ave
Rochester, New York

LaBella Project No. 2161282

February 1, 2023

LaBella
Powered by partnership.

300 State Street, Suite 201 | Rochester, NY 14614 | p 585-454-6110 | f 585-454-3066

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Tables

Appendix

SITE HEALTH AND SAFETY PLAN

Project Title:	EMP – Various Properties on Clifford and Joseph Avenue
Project Number:	2210038
Project Location (Site):	182 Avenue D and 374 Conkey Ave, Rochester, NY
Environmental Director:	Gregory Senecal, CHMM
Project Manager:	Alex Brett
Site Safety Supervisor:	To Be Determined
Site Contact:	To Be Determined
Safety Director:	Dave Engert, LaBella Associates, DPC
Proposed Date(s) of Field Activities:	To Be Determined
Site Conditions:	0.62 acres; generally level land covered primarily by asphalt parking lots small grass cover areas and one(1) Site building.
Site Environmental Information Provided By:	• Phase I Environmental Site Assessment, LaBella, 2011 • Phase II ESA, LaBella, 2012 • Follow Up Subsurface Investigation Activities, LaBella, 2014 • Remedial Investigation Report, LaBella 2015 • Final Engineering Report, LaBella 2015 • Site Management Plan, LaBella 2015 • Periodic Review Reports, LaBella 2016 - 2021
Air Monitoring Provided By:	LaBella Associates, D.P.C.
Site Control Provided By:	LaBella Associates, D.P.C.

EMERGENCY CONTACTS

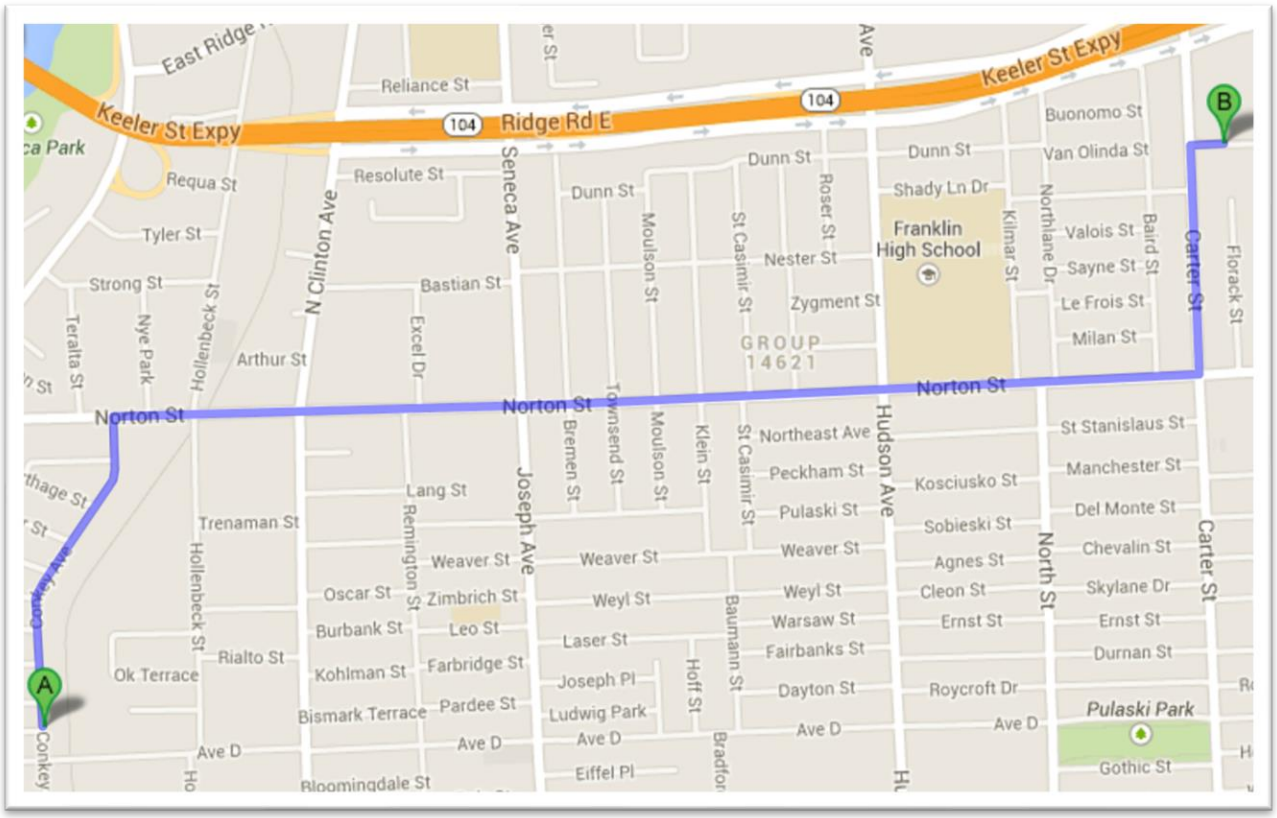
	Name	Phone Number
Ambulance:	As Per Emergency Service	911
Hospital Emergency:	Rochester General Hospital	585-922-4000
Poison Control Center:	Finger Lakes Poison Control	585-273-4621
Police (local, state):	City of Rochester	911
Fire Department:	City of Rochester	911
Site Contact:	To Be determined	
Agency Contact:	NYSDEC -	
	Finger Lakes Poison Control	
Environmental Director:	Greg Senecal, CHMM	Direct: 585-295-6243
Project Manager:	Alex Brett.	Direct: 585-770-2552
Site Safety Supervisor:	To Be Determined	
Safety Director	Dave Engert	Direct: 585-295-6648 Cell: 585-737-3293

MAP AND DIRECTIONS TO THE MEDICAL FACILITY
ROCHESTER GENERAL HOSPITAL

Total Time: 6 minutes
Total Distance: 2.1 miles

Directions:

1. Turn Right onto Conkey Avenue, travel north 0.4 miles
2. Turn Right onto Norton Street, travel east 1.3 miles
3. Turn Left onto Carter Street, travel north 0.3 miles
4. Turn Right into Rochester General Hospital



1.0 INTRODUCTION

The purpose of this Health and Safety Plan (HASP) it to provide guidelines for responding to potential health and safety issues that may be encountered during the implementation of the Corrective Measures Plan (CMP) at 182 Avenue D and 374 Conkey Ave in Rochester, NY herein after referred to as the "Site." This HASP only reflects the policies of LaBella Associates D.P.C. The requirements of this HASP are applicable to all approved LaBella personnel at the work site. This document's project specifications are to be consulted for guidance in preventing and quickly abating any threat to human safety or the environment. The provisions of the HASP were developed in general accordance with 29 CFR 1910 and 29 CFR 1926 and do not replace or supersede any regulatory requirements of the USEPA, NYSDEC, OSHA or and other regulatory body.

2.0 RESPONSIBILITIES

This HASP presents guidelines to minimize the risk of injury to project personnel, and to provide rapid response in the event of injury. The HASP is applicable only to activities of approved LaBella personnel and their authorized visitors. The Project Manager shall implement the provisions of this HASP for the duration of the project. It is the responsibility of LaBella employees to follow the requirements of this HASP, and all applicable company safety procedures.

3.0 ACTIVITIES COVERED

The activities covered under this HASP are limited to the following:

- Management of environmental remediation activities
- Environmental Monitoring
- Collection of samples

4.0 WORK AREA ACCESS AND SITE CONTROL

The contractor(s) will have primary responsibility for work area access and site control. However, a minimum requirement for work area designation and control will consist of:

- Injections – Orange cones to establish at least a 10-foot by 10-foot work area
- Groundwater or soil sampling - Orange cones to establish at least a 10-foot by 10-foot work area

5.0 POTENTIAL HEALTH AND SAFETY HAZARDS

This section lists some potential health and safety hazards that project personnel may encounter at the project site and some actions to be implemented by approved personnel to control and reduce the associated risk to health and safety. This is not intended to be a complete listing of any and all potential health and safety hazards. New or different hazards may be encountered as site environmental and site work conditions change. The suggested actions to be taken under this plan are not to be substituted for good judgment on the part of project personnel. At all times, the Site Safety Officer has responsibility for site safety and his or her instructions must be followed.

5.1 Hazards Due to Heavy Machinery

Potential Hazard:
Heavy machinery including trucks, excavators, backhoes, drill rigs etc. will be in operation at the site. The presence of such equipment presents the danger of being struck or crushed. Use caution when working near heavy machinery.

Protective Action:
Make sure that operators are aware of your activities, and heed operator's instructions and warnings. Wear bright colored clothing and walk safe distances from heavy equipment. A hard hat, safety glasses and steel toe shoes are required.

5.2 Excavation Hazards

Potential Hazard:
Excavations and trenches can collapse, causing injury or death. Edges of excavations can be unstable and collapse. Toxic and asphyxiant gases can accumulate in confined spaces and trenches. Excavations that require working within the excavation will require air monitoring in the breathing zone (refer to Section 9.0).

Excavations left open create a fall hazard which can cause injury or death.

Protective Action:
Personnel must receive approval from the Project Manager to enter an excavation for any reason. Subsequently, approved personnel are to receive authorization for entry from the Site Safety Officer. Approved personnel are not to enter excavations over 4 feet in depth unless excavations are adequately sloped. Additional personal protective equipment may be required based on the air monitoring.

Personnel should exercise caution near all excavations at the site as it is expected that excavation sidewalls will be unstable. All excavations will be backfilled by the end of each day. Additionally, no test pit will be left unattended during the day.

Fencing and/or barriers accompanied by "no trespassing" signs should be placed around all excavations when left open for any period of time when work is not being conducted.

5.3 *Cuts, Punctures and Other Injuries*

Potential Hazard:
In any excavation or construction, work site there is the potential for the presence of sharp or jagged edges on rock, metal materials, and other sharp objects. Serious cuts and punctures can result in loss of blood and infection.

Protective Action:
The Project Manager is responsible for making First Aid supplies available at the work site to treat minor injuries. The Site Safety Officer is responsible for arranging the transportation of authorized on-site personnel to medical facilities when First Aid treatment in not sufficient. Do not move seriously injured workers. All injuries requiring treatment are to be reported to the Project Manager. Serious injuries are to be reported immediately to the Site Safety Officer

5.4 *Injury Due to Exposure of Chemical Hazards*

Potential Hazards:
Volatile organic vapors from petroleum products, chlorinated solvents or other chemicals may be encountered during excavation activities at the project work site. Inhalation of high concentrations of organic vapors can cause headache, stupor, drowsiness, confusion and other health effects. Skin contact can cause irritation, chemical burn, or dermatitis. Exposure to injection products such as Provect ERD with DVI and DHC can cause mild ski and eye irritation.

Protective Action:
The presence of organic vapors may be detected by their odor and by monitoring instrumentation. Approved employees will not work in environments where hazardous concentrations of organic vapors are present. Air monitoring (refer to Section 9.0) of the work area will be performed at least every 60 minutes or more often using a Photoionization Detector (PID). Personnel are to leave the work area whenever PID measurements of ambient air exceed 25 ppm consistently for a 5 minute period. In the event that sustained total volatile organic compound (VOC) readings of 25 ppm is encountered personnel should upgrade personal protective equipment to Level C (refer to Section 8.0) and an Exclusion Zone should be established around the work area to limit and monitor access to this area (refer to Section 6.0). For handling environmental media and injection products protective gloves and safety glasses will be worn. Containers of Provect ERD plus DVI and DHC will be kept tightly closed when not in use and kept dry.

5.5 *Injuries Due to Extreme Hot or Cold Weather Conditions*

Potential Hazards:
Extreme hot weather conditions can cause heat exhaustion, heat stress and heat stroke or extreme cold weather conditions can cause hypothermia.

Protective Action:
Precaution measures should be taken such as dress appropriately for the weather conditions and drink plenty of fluid. If personnel should suffer from any of the above conditions, proper techniques should be taken to cool down or heat up the body and taken to the nearest hospital if needed.

6.0 WORK ZONES

In the event that conditions warrant establishing various work zones (i.e., based on hazards - Section 5.4), the following work zones should be established:

Exclusion Zone (EZ):
The EZ will be established in the immediate vicinity and adjacent downwind direction of site activities that elevate breathing zone VOC concentrations to unacceptable levels based on field screening. These site activities include contaminated soil excavation and soil sampling activities. If access to the site is required to accommodate non-project related personnel then an EZ will be established by constructing a barrier around the work area (yellow caution tape and/or construction fencing). The EZ barrier shall encompass the work area and any equipment staging/soil staging areas necessary to perform the associated work. The contractor(s) will be responsible for establishing the EZ and limiting access to approved personnel. Depending on the condition for establishing the EZ, access to the EZ may require adequate PPE (e.g., Level C).

Contaminant Reduction Zone (CRZ):
The CRZ will be the area where personnel entering the EZ will don proper PPE prior to entering the EZ and the area where PPE may be removed. The CRZ will also be the area where decontamination of equipment and personnel will be conducted as necessary.

7.0 DECONTAMINATION PROCEDRUES

Upon leaving the work area, approved personnel shall decontaminate footwear as needed. Under normal work conditions, detailed personal decontamination procedures will not be necessary. Work clothing may become contaminated in the event of an unexpected splash or spill or contact with a contaminated substance. Minor splashes on clothing and footwear can be rinsed with clean water. Heavily contaminated clothing should be removed if it cannot be rinsed with water. Personnel assigned to this project should be prepared with a change of clothing whenever on site.

Personnel will use the contractor's disposal container for disposal of PPE.

8.0 PERSONAL PROTECTECTIVE EQUIPMENT (PPE)

Generally, site conditions at this work site require level of protection of Level D or modified Level D. However, air monitoring will be conducted to determine if up-grading to Level C PPE is required (refer to Section 9.0). Descriptions of the typical safety equipment associated with Level D and Level C are provided below:

Level D:
Hard hat, safety glasses, rubber nitrile sampling gloves, steel toe construction grade boots, etc.

Level C:
Level D PPE and full or ½-face respirator and tyvek suit (if necessary). [*Note: Organic vapor cartridges are to be changed after each 8-hours of use or more frequently.*]

9.0 AIR MONITORING

According to 29 CFR 1910.120(h), air monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection required for personnel working onsite. Air monitoring identified in this HASP is only intended to monitor air for workers involved with the CMP.

The Air Monitor will utilize a photoionization Detector (PID) to screen the ambient air in the work areas for total Volatile Organic Compounds (VOCs). Air monitoring of the work areas will be performed at least every 15 minutes or more often using a PID.

If sustained PID readings of greater than 10 ppm are recorded in the breathing zone, then either personnel are to leave the work area until satisfactory readings are obtained or approved personnel may re-enter the work areas wearing at a minimum a ½ face respirator with organic vapor cartridges for an 8-hour duration (i.e., upgrade to Level C PPE). Organic vapor cartridges are to be changed after each 8-hours of use or more frequently, if necessary. If PID readings are sustained, in the work area, at levels above 10 ppm for a 5 minute average, work will be stopped immediately until safe levels of VOCs are encountered or additional PPE will be required (i.e., Level B).

10.0 EMERGENCY ACTION PLAN

In the event of an emergency, employees are to turn off and shut down all powered equipment and leave the work areas immediately. Employees are to walk or drive out of the Site as quickly as possible and wait at the assigned 'safe area'. Follow the instructions of the Site Safety Officer.

Employees are not authorized or trained to provide rescue and medical efforts. Rescue and medical efforts will be provided by local authorities.

11.0 MEDICAL SURVEILLANCE

Medical surveillance will be provided to all employees who are injured due to overexposure from an emergency incident involving hazardous substances at this site.

12.0 EMPLOYEE TRAINING

Personnel who are not familiar with this site plan will receive training on its entire content and organization before working at the Site.

Individuals involved with the remedial investigation must be 40-hour OSHA HAZWOPER trained with current 8-hour refresher certification.

Table 1
Exposure Limits and Recognition Qualities

Compound	PEL-TWA (ppm)(b)(d)	TLV-TWA (ppm)(c)(d)	STEL	LEL (%)(e)	UEL (%)(f)	IDLH (ppm)(g)(d)	Odor	Odor Threshold (ppm)	Ionization Potential	^{232}Thorium Action Level
Acetone	750	500	NA	2.15	13.2	20,000	Sweet	4.58	9.69	NA
Anthracene	0.2	0.2	NA	NA	NA	NA	Faint aromatic	NA	NA	NA
Benzene	1	0.5	5	1.3	7.9	3000	Pleasant	8.65	9.24	NA
Benzo (a) pyrene (coal tar pitch volatiles)	0.2	0.1	NA	NA	NA	700	NA	NA	NA	NA
Benzo (a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (b) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo (k) Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bromodichloromethane	NA	NA	NA	NA	NA	NA	NA	NA	10.88	NA
Carbon Disulfide	20	1	NA	1.3	50	500	Odorless or strong garlic type	0.096	10.07	NA
Chlorobenzene	75	10	NA	1.3	9.6	2,400	Faint almond	0.741	9.07	NA
Chloroform	50	2	NA	NA	NA	1,000	ethereal odor	11.7	11.42	NA
Chrysene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2-Dichloroethylene	200	200	NA	9.7	12.8	400	Acrid	NA	9.65	NA
1,2-Dichlorobenzene	50	25	NA	2.2	9.2		Pleasant		9.07	NA
Ethylbenzene	100	100	NA	1	6.7	2,000	Ether	2.3	8.76	NA
Fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	500	50	NA	12	23	5,000	Chloroform-like	10.2	11.35	NA
Naphthalene	10, Skin	10	NA	0.9	5.9	250	Moth Balls	0.3	8.12	NA
n-propylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
p-Isopropylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
sec-Butylbenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethane	NA	NA	NA	NA	NA	NA	Sweet	NA	NA	NA
Toluene	100	100	NA	0.9	9.5	2,000	Sweet	2.1	8.82	NA
Trichloroethylene	100	50	NA	8	12.5	1,000	Chloroform	1.36	9.45	NA
1,2,4-Trimethylbenzene	NA	25	NA	0.9	6.4	NA	Distinct	2.4	NA	NA
1,3,5-Trimethylbenzene	NA	25	NA	NA	NA	NA	Distinct	2.4	NA	NA
Vinyl Chloride	1	1	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes (o,m,p)	100	100	NA	1	7	1,000	Sweet	1.1	8.56	NA
Metals										
Arsenic	0.01	0.2	NA	NA	NA	100, Ca	Almond	NA	NA	NA
Cadmium	0.2	0.5	NA	NA	NA	NA	NA	NA	NA	NA
Chromium	1	0.5	NA	NA	NA	NA	NA	NA	NA	NA
Lead	0.05	0.15	NA	NA	NA	700	NA	NA	NA	NA
Mercury	0.05	0.05	NA	NA	NA	28	Odorless	NA	NA	NA
Selenium	0.2	0.02	NA	NA	NA	Unknown	NA	NA	NA	NA
Other										
Asbestos	0.1 (f/cc)	NA	1.0 (f/cc)	NA	NA	NA	NA	NA	NA	NA

(a) Skin = Skin Absorption
(b) OSHA-PEL Permissible Exposure Limit (flame weighted average, 8-hour): NIOSH Guide, June 1990
(c) ACGIH – 8 hour time weighted average from Threshold Limit Values and Biological Exposure Indices for 2003.
(e) Lower Exposure Limit (%)
(f) Upper Exposure Limit (%)
(g) Immediately Dangerous to Life or Health Level: NIOSH Guide, June 1990.

Notes:
1. All values are given in parts per million (PPM) unless otherwise indicated.
2. Ca = Possible Human Carcinogen, no IDLH information.

APPENDIX 1

Safety Data Sheets

SAFETY DATA SHEET
(Antimethanogenic) Anaerobic Biostimulant
ERD-CH4™: ERD-CH4™ (+DVI optional)

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **ERD-CH4™: ERD-CH4™ (+DVI)**
GENERAL USE: **Bioremediation of halogenated organics and metals**

MANUFACTURER:

Provectus Environmental Products, Inc
2871 W. Forest Rd. #2
Freeport, IL 61032
(815) 650-2230

EMERGENCY TELEPHONE:

Within USA and Canada: 1-800-424-9300
+1 703-527-3887 (collect calls accepted)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Product is generally recognized as safe. May cause irritation exposure to eyes. Long term contact to skin may cause some drying and minor irritation.

3. COMPOSITION INFORMATION ON INGREDIENTS

Proprietary mixture of fatty acids, glycerol, vegetable oils, garlic*, yeast extracts*, organic iron* and emulsifying agent.

INGREDIENT:	CAS NO.	% WT	% VOL	Toxic Release Inventory (TRI) Listed Chemicals
Iron (Fe)(*)	7439-89-6	0 – 20	NA	NA
Glycerol	56-81-5	2 – 10	NA	NA
Oleic Acid	112-80-1	20 – 50	NA	NA
Food Grade Veg Oil	8001-22-7	10 – 50	NA	NA
Potable Water	7732-18-5	10 – 40	NA	NA
Yeast Extracts(*)	8013-01-2	0 – <5	NA	NA
Garlic(*)	539-86-6	0 – <10	NA	NA

***(some formulations contain these materials)**

4. FIRST AID MEASURES

EYES: Immediately flush with water for up to 15 minutes. If irritation persists, seek medical attention.

SKIN: Rinse with water. Irritation is unlikely, but if irritation occurs or persists, seek medical attention.

INGESTION: Generally safe to ingest but not recommended.

INHALATION: No first aid required.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Deluge with water

FIRE/EXPLOSION HAZARDS: Product is combustible only at temperatures above 600C

FIRE FIGHTING PROCEDURES: Use flooding with plenty of water, carbon dioxide or other inert gasses. Wear full protective clothing and self-contained breathing apparatus. Deluging with water is the best method to control combustion of the product.

FLAMMABILITY LIMITS: non-combustible

SENSITIVITY TO IMPACT: non-sensitive

SENSITIVITY TO STATIC DISCHARGE: non-sensitive

6. ACCIDENTAL RELEASE MEASURES

Confine and collect spill. Transfer to an approved DOT container and properly dispose. Do not dispose of or rinse material into sewer, stormwater or surface water. Discharge of product to surface water could result in depressed dissolved oxygen levels and subsequent biological impacts.

7. HANDLING AND STORAGE

HANDLING: Protective gloves and safety glasses are recommended.

STORAGE: Keep dry. Use first in, first out storage system. Keep container tightly closed when not in use. Avoid contamination of opened product. Avoid contact with reducing agents.

8. EXPOSURE CONTROLS – PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
ERD-CH4	**NA**	**NA**	**NA**

ENGINEERING CONTROLS: None are required

PERSONAL PROTECTIVE EQUIPMENT

EYES and FACE: Safety glasses recommended
RESPIRATOR: none necessary
PROTECTIVE CLOTHING: None necessary
GLOVES: rubber, latex or neoprene recommended but not required

9. PHYSICAL AND CHEMICAL PROPERTIES

Odor:	none to mild pleasant organic odor
Appearance:	milky
Auto-ignition Temperature	Non-combustible
Boiling Point	>600 C
Melting Point	NA
Density	0.90 - 1.02 gram/cc
Solubility	infinite
pH	7-9

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID: Do not contact with strong oxidizers
STABILITY: product is stable
POLYMERIZATION: will not occur
INCOMPATIBLE MATERIALS: strong oxidizers
HAZARDOUS DECOMPOSITION PRODUCTS:

11. TOXICOLOGICAL INFORMATION

Acute Toxicity
A: General Product Information
Acute exposure may cause mild skin and eye irritation.
B: Component Analysis - LD50/LC50

No information available.

B: Component Analysis - TDLo/LDLo
TDLo (Oral-Man) none

Carcinogenicity
A: General Product Information
No information available.
B: Component Carcinogenicity
Product is not listed by ACGIH, IARC, OSHA, NIOSH, or NTP.

Epidemiology
No information available.

Neurotoxicity
No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity
Discharge to water may cause depressed dissolved oxygen and subsequent ecological stresses

Environmental Fate
No potential for food chain concentration

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Material is not considered hazardous, but consult with local, state and federal agencies prior to disposal to ensure all applicable laws are met.

14. TRANSPORT INFORMATION

NOTE: The shipping classification information in this section (Section 14) is meant as a guide to the overall classification of the product. However, transportation classifications may be subject to change with changes in package size. Consult shipper requirements under I.M.O., I.C.A.O. (I.A.T.A.) and 49 CFR to assure regulatory compliance.

US DOT Information
Shipping Name: Not Regulated
Hazard Class: Not Classified
UN/NA #: Not Classified
Packing Group: None
Required Label(s):None

50thEdition International Air Transport Association (IATA):
Not hazardous and not regulated

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

Material is not regulated under IMDG

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III

SECTION 311 No Hazard for Immediate health Hazard
SECTION 312 No Threshold Quantity
SECTION 313 Not listed

CERCLA NOT REGULATED UNDER CERCLA

TSCA NOT REGULATED UNDER TSCA

CANADA (WHIMS): NOT REGULATED

16. OTHER INFORMATION

HMIS:

Health	0
Flammability	0
Physical Hazard	0
Personal Protection	E

E: Safety Glasses, gloves

SAFETY DATA SHEET

1. CHEMICAL IDENTIFICATION AND COMPANY INFORMATION

Product Name: **KB-1®**

Company Info:
SiREM
130 Stone Rd. W., Guelph, Ontario, Canada, N1G 3Z2
Phone: 519-822-2265
Toll Free, North America: 1-866-251-1747
Fax: 888-635-3470
www.siremlab.com

Emergency Phone Number: 519-822-2265 (for 24/7 assistance, contact poison center hotline in your jurisdiction).

Description: Microbial inoculum (non-pathogenic, non-hazardous) in growth media consisting of a dilute aqueous solution of mineral salts and nutrients.

Recommended Use: Bioremediation of contaminated groundwater.

Restrictions on Use: KB-1® product intended for laboratory research and field applications for cleanup of contaminated groundwater. Products are not intended to be used as human or animal therapeutics, cosmetics, agricultural or pesticide products, food additives, or as household chemicals.

2. HAZARDS IDENTIFICATION

GHS Classification: Not classified as “hazardous” per OSHA 29 CFR 1910.1200, “Hazard Communication”.

GHS Label elements, including hazard and precautionary statements: Not Applicable.

HMIS Rating:	**Health**	**Flammability**	**Physical Hazard**	**Personal Protection**
	1	0	0	B*
NFPA Rating:	**Health**	**Flammability**	**Reactivity**	**Special Hazard**
	1	0	0	N/A

* B = Safety Glasses, Gloves.

A review of available data indicates minimal potential for health effects related to normal use of this product. Microbial components are non-pathogenic. The product is not expected to be a health hazard as a result of inhalation of mists, ingestion or skin contact. Eye contact may result in mild irritation/redness. Normal hygiene precautions should be observed, including eye protection, skin protection, and hand washing. The potential exists for individuals with hypersensitivity to biological materials to exhibit allergic sensitivity to biological components of this product (see Section 4, “First Aid Measures”).

3. COMPOSITION/INFORMATION ON INGREDIENTS

KB-1® is a microbial culture grown in an aqueous dilute solution of mineral salts and nutrients classified as non-hazardous in accordance with provisions of OSHA 29 CFR 1910.1200, "Hazard Communication."

The microbial composition of KB-1®, as determined by phylogenetic analysis, includes:

Dehalococcoides sp.
Geobacter sp.
Methanomethylovorans sp.

Identification of organisms was obtained by matching 16S rRNA gene sequence of organisms in KB-1® to other known organisms. The characteristics of related organisms can be used to identify potential or likely characteristics of organisms in KB-1®.

4. FIRST AID MEASURES

Avoid direct contact with skin and eyes. In any case of any exposure which elicits a response, a physician should be consulted immediately.

Route of Entry	Symptoms	First Aid Procedures
Ingestion	Upset stomach, irritation of digestive tract.	Do not induce vomiting. Drink several cups of water. Seek medical attention.
Skin contact	Skin irritation – reddening, itching or inflammation.	Remove contaminated clothes. Wash skin with plenty of water and soap. Seek medical attention if irritation develops or open wounds are present.
Eye contact	Eye irritation – redness, tearing, blurred vision.	Rinse immediately with plenty of water for 15 – 20 minutes, lifting lower and upper eyelids occasionally (remove contact lenses if easily possible). Seek medical attention if undue irritation or redness occurs.
Inhalation of mist	Respiratory irritation, coughing, breathing difficulty.	Remove victim to fresh air. Administer first aid as appropriate for symptoms. Seek medical attention if serious symptoms occur.

5. FIRE FIGHTING MEASURES

General:	This material is non-flammable, consisting primarily of water, and poses no special hazards if involved in a fire situation.
Suitable extinguishing media:	If material is involved in fire situation, use extinguishing media suitable for surrounding fire.
Special protective equipment and precautions for firefighters:	No special equipment necessary; use equipment appropriate for surrounding fire.
Hazardous combustion products:	Not applicable.
Toxic gases produced:	Not applicable.
Shock/impact sensitivity:	Not shock sensitive.

6. ACCIDENTAL RELEASE MEASURES

Method of containment and cleanup:	Spilled KB-1® should be soaked up with sorbent and saturated with a 10% bleach solution (prepared by making a one in ten dilution of diluted standard bleach [normally sold at a strength of 5.25% sodium hypochlorite] to disinfect affected surfaces. Sorbent should be double bagged and disposed of as indicated in Section 13. After removal of sorbent, area should be washed with 10% bleach solution to disinfect. If liquid from the culture vessel is present on the fittings, non-designated tubing or exterior of the stainless steel pressure vessel liquid should be wiped off and the area washed with 10% bleach solution.
Ventilation:	No special ventilation is required in the event of the spill, as the material consists of water and non-volatile constituents. If the potential for generation of mist exists, open windows and provide adequate ventilation. If high levels of mist are encountered, use personal protective equipment indicated below.
Eye/skin protection:	Have eye-washing facilities readily available where eye contact can occur. Wash skin with soap and water. Use appropriate protective gloves when handling. Showering and changing into street clothes after work is recommended.
Protective equipment for airborne mist:	A NIOSH/MSHA approved dust mask or air purifying respirator with dust/mist filter is recommended where elevated concentrations of airborne mist are expected.

7. HANDLING AND STORAGE

Handling and storage precautions:	Use personal protective equipment (eye & skin protection) and hygiene measures (hand washing) to minimize contact with the material. KB-1® is shipped in stainless steel pressure vessels and connected to injection lines and inert gas is used to pressurize the vessel to displace the contents. KB-1® should be handled with care to avoid any spillage. Vessels are shipped with 1 to 5 pound per square inch (psi) pressure; valves should not be opened until connections to appropriate lines for subsurface injection are in place. During storage, avoid exposing stainless steel pressure vessels to undue temperature extremes (i.e., temperatures less than 0°C or greater than 30°C may result in harm to the microbial cultures and damage to the vessels). All valves should be in the closed position when the vessel is not pressurized to prevent the escape of gases and to maintain anaerobic conditions in the vessel.
Incompatibilities:	Avoid exposure of the culture to air as the presence of oxygen will kill the microbes.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OSHA Permissible Exposure Limits (PELs): ACHIH Threshold Limit Values (TLVs):	No occupational exposure limits are established for microbial constituents. Mixture is not classified as "hazardous" in accordance with 29 CFR 1910.1200 "Hazard Communication," exceedance of exposure limits is not anticipated either under normal conditions of use, or as the result of an accidental release.
Engineering controls:	Generally not required under normal conditions of use. If method of use will result in significant mist generation, use under conditions of adequate ventilation.
Work practices:	Use good hygiene practices, avoid mist generation, and minimize contact with the material as a general precautionary measure.
Personal protective equipment:	Under normal conditions of use, wear safety glasses, protective gloves (latex, vinyl or nitrile) and steel toed footwear as general precautionary measures, particularly when opening pressure vessel valves or when pressurizing vessels to inject contents into the subsurface environment. For laboratory use, also wear lab coat. For higher risk of eye contact, wear safety goggles or face shield, as appropriate. Respiratory protection is not required under normal conditions of use (see Section 6, "Accidental Release Measures."

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance, physical state:	Aqueous liquid, dark grey, slightly turbid under anaerobic conditions, pink if exposed to air (oxygen).
Odor:	Pungent ("skunky") odor.
Solubility:	Soluble in water.
pH:	6.5 – 7.5
Melting range	Not determined, approximately equivalent to water.
Vapor density:	Not determined, approximately equivalent to water.
Vapor pressure:	Not determined, approximately equivalent to water.
Relative density:	Not determined, approximately equivalent to water.
Evaporation rate:	Not determined, approximately equivalent to water.
Initial Boiling point, boiling range	Not determined, approximately equivalent to water.
Flammability	Not flammable.
Partition coefficient	Not applicable
Auto-ignition temperature	Not applicable
Decomposition temperature:	No data, bacterial contents will decompose by heating.
Flash point	N/A

10. STABILITY AND REACTIVITY

Chemical stability and reactivity:	Stable and non-reactive.
Possibility of hazardous reactions:	Stable. Spontaneous hazardous chemical reactions / decomposition will not occur.
Conditions to avoid:	Maintain under anaerobic conditions to preserve product integrity (exposure to air/oxygen will kill microbes).
Incompatible materials:	Strong oxidizers, acids, water reactive materials.
Hazardous decomposition products:	Not applicable.
Shock sensitivity:	Not shock sensitive; will not decompose and form shock sensitive compounds.

11. TOXICOLOGICAL INFORMATION

Potential for pathogenicity: KB-1® has tested **negative** (i.e., the organisms are not present) for a variety of pathogenic organisms indicated below:

Pathogenic Organisms	Disease(s) Caused	Test Results
Salmonella sp.	*Typhoid fever, gastroenteritis*	Not Detected
Listeria monocytogenes	*Listerioses*	"
Vibrio sp.,	*Cholera, gastroenteritis*	"
Campylobacter sp.,	*Bacterial diarrhea*	"
Clostridia sp.,	*Food poisoning, botulism, tetanus, gas gangrene*	"
Bacillus anthracis	*Anthrax*	"
Pseudomonas aeruginosa	*Wound infection*	"
Yersinia sp.,	*Bubonic plague, intestinal infection*	"
Yeast and Mold	*Candidiasis, yeast infection etc.*	"
Fecal coliforms	*Indicator organisms for many human pathogens diarrhea, urinary tract infections*	"
Enterococci	*Various opportunistic infections*	"

While there is no evidence that virulent pathogenic organisms are present in KB-1®, there is potential that certain organisms in KB-1® may have the potential to act as opportunistic (mild) pathogens, particularly in individuals with open wounds and/or compromised immune systems. For this reason standard hygienic procedures such as hand washing after use should be observed.

12. ECOLOGICAL INFORMATION

This product is not rated as “hazardous” as either an acute or chronic ecological hazard, in accordance with the OSHA Hazard Communication standard, 29 CFR 1910.1200.

13. DISPOSAL CONSIDERATION

Material must be disinfected or sterilized prior to disposal. Consult local regulations prior to disposal.

14. TRANSPORT INFORMATION

U.S. (D.O.T.):	Proper Shipping Name:	Culture of Micro-organisms
	Hazard Class:	Not applicable
	UN/NA:	Not applicable
	Labels:	Not applicable
Canada (T.D.G.)	Proper Shipping Name:	Culture of Micro-organisms
	Hazard Class:	Not applicable
	UN/NA:	Not applicable
	Labels:	Not applicable
International: IMDG:	Proper Shipping Name:	Culture of Micro-organisms
	Hazard Class:	Not applicable
	UN/NA:	Not applicable
	Labels:	Not applicable
IATA:	Proper Shipping Name:	Culture of Micro-organisms
	Hazard Class:	Not applicable
	UN/NA:	Not applicable
	Labels:	Not applicable

15. REGULATORY INFORMATION

TSCA:	No
SARA TITLE III	
Section 302 (EHS) Ingredients:	No
Section 313 Ingredients:	No
Section 304 (EHS/CERCLA) Ingredients:	No
SARA TITLE III NOTIFICATION INFORMATION	
Acute Health Hazard:	No
Chronic Health Hazard:	No
Fire Hazard:	No
Sudden Release of Pressure Hazard:	No

16. OTHER INFORMATION

SiREM provides the information contained herein for hazard communication and safety planning purposes, based on existing information on each of the product components available in the literature; no independent testing was conducted on the final product. The above information is intended to be used only as a guide to the appropriate precautionary handling of this material by a properly trained person.

SAFETY DATA SHEET

SDS NUMBER: EUSA-150
CURRENT ISSUE DATE:
December, 2013

SODIUM SULFITE

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Sodium Sulfite

OTHER/GENERIC NAMES: Sodium Sulfite

PRODUCT USE AND RESTRICTIONS ON USE: Paper manufacture, food additive, water treatment, waste treatment, other industrial processes.

SUPPLIER:
Esseco USA LLC
Gatehall IV
4 Gatehall Drive
Parsippany, NJ 07054

DISTRIBUTED BY:
BONDED CHEMICALS, INC.
2645 CHARTER STREET
COLUMBUS, OHIO 43228
PHE: 614-771-4134

FOR MORE INFORMATION CALL: 973-267-3330
(Monday-Friday, 9:00am-4:30pm)
FOR EMERGENCY IN USA, CALL CHEMTREC: 800-424-9300
(24 Hours/Day, 7 Days/Week)

2. HAZARDS IDENTIFICATION

GHS Classification

Not Classified as Hazardous

Label Elements:

None Required

3. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Sodium sulfite	7757-83-7	97
Sodium sulfate	7757-82-6	<3

Trace impurities and additional material names not listed above may appear in Section 15 of this SDS. These materials may be listed for local "Right-To-Know" compliance and for other reasons. The exact concentrations are a trade secret.

4. FIRST AID MEASURES

SKIN: Immediately wash skin with plenty of soap and water. Remove contaminated clothing and launder before reuse. Get medical attention if irritation persists.

EYES: Flush eyes immediately with water for at least 15 minutes. Remove contact lenses if present after the first 5 minutes if you can do so easily and continue flushing. Get medical attention if irritation occurs and persists.

INHALATION:	Promptly remove to fresh air. Get immediate medical attention if signs of suffocation, irritation or other symptoms develop.
INGESTION:	If conscious, immediately rinse mouth with water and give 1 glass of water to drink. Do not induce vomiting unless directed to do so be medical personnel. Get immediate medical attention.
MOST IMPORTANT SYMPTOMS/EFFECTS, ACUTE AND DELAYED:	May irritate the skin. May cause irritation to the eyes. Harmful if swallowed or inhaled. May cause severe and possibly fatal allergic reactions if inhaled or swallowed by some asthmatics and other 'sulfite-sensitive' individuals. Reacts with acids to form toxic and irritating sulfur dioxide gas.
INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT, IF NEEDED:	Treat symptomatically. Note potential for anaphylactic shock with allergic individuals.

5. FIRE FIGHTING MEASURES

SUITABLE (AND UNSUITABLE) EXTINGUISHING MEDIA:
Material is not flammable. Use extinguishing media appropriate for material in surrounding fire.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL:
Releases toxic and irritating sulfur dioxide at fire temperatures.

SPECIAL PROTECTIVE EQUIPMENT AND PRECAUTIONS FOR FIRE-FIGHTING:
Wear NIOSH-approved self-contained breathing apparatus. Use water-spray to keep containers cool, and to knock down vapors or gases.

6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS, PROTECTIVE EQUIPMENT, AND EMERGENCY PROCEDURES: Provide ventilation to clear sulfur dioxide fumes which may be generated by contact with water. Wear appropriate personal protective equipment.

ENVIRONMENTAL PRECAUTIONS: Spills and releases may have to be reported to Federal and/or local authorities. See Section 15 regarding reporting requirements.

METHODS AND MATERIALS FOR CONTAINMENT AND CLEANING UP: Promptly sweep up material with minimum dusting and shovel into an empty container with a cover. Rinse spill area with plenty of water.

7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: (See section 8 for recommended personal protective equipment.)
Avoid contact with skin, eyes and clothing. Do not breathe dust. Do not eat or drink in the work area. Use normal personal hygiene and housekeeping. Keep away from acids and oxidizing agents.

CONDITIONS FOR SAFE STORAGE, INCLUDING ANY INCOMPATIBILITIES:
Store in a cool, dry, well-ventilated area away from acids and oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Sodium sulfite	None	None	None
Sodium sulfate	None	None	None

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS:

Sulfur dioxide: OSHA TWA = 5 ppm
ACGIH STEL = 0.25 ppm

APPROPRIATE ENGINEERING CONTROLS:

Local exhaust if dusty conditions exist or if there is a release of sulfur dioxide gas. Do not use in unventilated spaces, e.g., the holds of fishing boats, walk-in coolers or confined spaces.

INDIVIDUAL PROTECTION MEASURES, SUCH AS PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION: For handling dry material, wear rubber gloves and full work clothing, including long-sleeved shirt and trousers. When handling solutions and there is prolonged or repeated contact, wear impervious gloves, clothing and boots.

EYE PROTECTION: Wear chemical safety goggles.

RESPIRATORY PROTECTION: Where required, use a NIOSH-approved respirator for dust, mist and/or sulfur dioxide gas, as conditions indicate. Some exposures may require a NIOSH-approved self-contained breathing apparatus or supplied-air respirator. Equipment selection depends on contaminant type and concentration. Select in accordance with 29 CFR 1910.134 and good industrial hygiene practice.

ADDITIONAL RECOMMENDATIONS: Eyewash and safety shower are recommended.

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	White to pale yellow crystals or powder.
PHYSICAL STATE:	Solid.
ODOR:	Odorless.
ODOR THRESOLD:	Not determined.
MOLECULAR WEIGHT:	126.04
CHEMICAL FORMULA:	Na_2SO_3
RELATIVE DENSITY (water = 1.0):	2.63
SOLUBILITY IN WATER (weight %):	17% at 10C; 28% at 33.3C
pH:	5% solution – 9.8
INITIAL BOILING POINT/RANGE:	Not applicable.
MELTING/FREEZING POINT:	Decomposes at 900C
VAPOR PRESSURE:	Not applicable.
VAPOR DENSITY (air = 1.0):	Not applicable.

EVAPORATION RATE:	Not applicable.	**COMPARED TO:**	Not applicable.
% VOLATILES:	Not applicable.		
PARTITION COEFFICIENT (N-OCTANOL/WATER):	Not determined.		
VISCOSITY:	Not applicable.		
FLASH POINT:	Not flammable.		
FLASH POINT METHOD:	Not applicable.		
AUTOIGNITION TEMPERATURE:	Not applicable.		
UPPER FLAME LIMIT (volume % in air):	Not applicable.		
LOWER FLAME LIMIT (volume % in air):	Not applicable.		
DECOMPOSITION TEMPERATURE:	Not determined.		
FLAMMABILITY (SOLID, GAS)	Not flammable.		
OSHA FLAMMABILITY CLASS:	Not applicable.		

10.STABILITY AND REACTIVITY

REACTIVITY:
Not normally reactive

CHEMICAL STABILITY:
Normally stable.

POSSIBILITY OF HAZARDOUS REACTIONS:
Reacts with acids to form toxic and irritating sulfur dioxide gas.

CONDITIONS TO AVOID:
Avoid elevated temperatures. Temperatures above 900C cause the rapid evolution of toxic and corrosive sulfur dioxide gas and hazardous residue.

INCOMPATIBILITIES:
Oxidizers: may cause strong exothermic reactions.
Acids: releases sulfur dioxide gas.

HAZARDOUS DECOMPOSITION PRODUCTS:
Sulfur dioxide and sodium sulfide residue. Sodium sulfide is flammable, a dangerous fire risk, a strong irritant to skin and tissue, and is incompatible with acids.

11.TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH HAZARDS

ACUTE EFFECTS OF EXPOSURE:

SKIN:	Repeated or prolonged contact with dust may cause irritation. Contact with solutions will cause skin irritation.
EYES:	Dust or mist may irritate the eyes. Solutions will irritate or burn.

INHALATION: Inhalation of dust or mist can irritate the respiratory tract. May cause severe or deadly allergic reactions in some asthmatics and sulfite sensitive individuals. Possible signs and symptoms of allergic reactions include bronchoconstriction, sweating, flushing, hives, rapid heart rate, decreased blood pressure, and anaphylaxis. Contact with acids releases sulfur dioxide gas which may be harmful or deadly if inhaled.

INGESTION: May irritate the gastrointestinal tract. May cause severe or deadly allergic reactions in some asthmatics and sulfite sensitive individuals Large doses may cause violent colic and diarrhea, circulatory disturbances, central nervous system depression, and even death.

CHRONIC EFFECTS: None known.

Ingredients found on one of the three OSHA designated carcinogen lists are listed below.

INGREDIENT NAME	NTP STATUS	IARC STATUS	OSHA LIST
No ingredients listed in this section.	----	----	----

NUMERICAL MEASURES OF TOXICITY:

Immediate (Acute) Effects:

Sodium sulfite –LD_{50} (oral, rat) = 2610-6400 mg/kg; LC_{50} (inhalation, rat) >5.5 mg/L/4 hr.; LC_{50} (inhalation, rat) >22 mg/L/1 hr.

Sodium sulfate – LD_{50} (oral, rat) >10,000 mg/kg

Delayed (Subchronic and Chronic) Effects:

Sodium sulfite has been demonstrated to be mutagenic in microbial systems; however, it is not mutagenic in studies involving insects and is not considered to present a mutagenic threat to multi-cell organisms.

Other Data:

None

12.ECOLOGICAL INFORMATION

ECOTOXICITY:

The following ecotoxicity data is available for Sodium sulfite:

Daphnia magna LC50 48 hrs	440 mg/L
Western Mosquitofish 96hrs LC50	460 mg/L
Biological Oxygen Demand (BOD)	0.12 lb/lb, instantaneous

The following ecotoxicity data is available for Sodium sulfate:

Daphnia magna LC50 48hrs	2,564 mg/L
Western Mosquitofish 96hrs LC50	3,710 mg/L

PERSISTENCE AND DEGRADBILITY:

No data available

BIOACCUMULATIVE POTENTIAL:

No data available

MOBILITY IN SOIL:

No data available

OTHER ADVERSE EFFECTS:
No data available.

13.DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? No

If yes, the RCRA ID number is: Not applicable.

OTHER DISPOSAL CONSIDERATIONS:
Dispose of in accordance with applicable Federal, State and Local regulations.

The information offered in section 13 is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14.TRANSPORT INFORMATION

US DOT HAZARD CLASS: Not regulated.
US DOT ID NUMBER: Not applicable.
PROPER SHIPPING NAME: Not applicable.

For additional information on shipping regulations affecting this material, contact the information number found in Section 1.

15.REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: All components are listed on TSCA Inventory of Chemical Substances.
OTHER TSCA ISSUES: None.

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	SARA/CERCLA RQ (lb)	SARA EHS TPQ (lb)
No ingredients listed in this section.	----	----

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802] and to your Local Emergency Planning Committee. Many states have more stringent regulations. Report all spills in accordance with local, state and federal regulations.

SECTION 311 HAZARD CLASS: Not Hazardous

SARA 313 TOXIC CHEMICALS:

SODIUM SULFITE

The following ingredients are SARA 313 "Toxic Chemicals" and may be subject to annual reporting requirements. CAS numbers and weight percents are found in Section 2.

INGREDIENT NAME	COMMENT
No ingredients listed in this section.	----

STATE RIGHT-TO-KNOW

In addition to the ingredients found in Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT %	COMMENT
No ingredients listed in this section.	----	----

CALIFORNIA PROPOSITION 65

This product does not contain any ingredients known to the State of California to cause cancer and/or reproductive harm.

ADDITIONAL REGULATORY INFORMATION:

None

WHMIS CLASSIFICATION (CANADA):

D2B

FOREIGN CHEMICAL CONTROL INVENTORY STATUS:

Listed on Canadian DSL, Australian AICS, Philippines PICCS, Chinese IECSC, Japanese MITI, Korean KECL, and EU EINECS.

16.OTHER INFORMATION

CURRENT ISSUE DATE: December, 2013
PREVIOUS ISSUE DATE: October, 2010

CHANGES TO SDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:
Updated format for HazCom 2012.

OTHER INFORMATION: This product is not for drug use. Only Food Grade material is for use as a food additive.