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8-25-21

Joshua P. Cook, P.E.
NYS Department of Environmental Conservation
615 Erie Blvd West,
Syracuse, NY 13204-2400

RE: Harbor View Square, Site ID No. C738040

Mr. Cook;

The modifications to the Harbor View Square Reagent Injection Work Plan presented in your letter dated August 20, 2021 have been reviewed by the brownfield consultant team and found acceptable. Please let me know if you have any questions or need anything further.

Sincerely,

Kelly M. Sweet

Kelly M. Sweet
Senior Project Manager

1201 East Fayette Street, Syracuse, NY 13210
Office: (315) 472-3820 ▪ Fax: (315) 471-3921
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NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

Division of Environmental Remediation, Region 7
615 Erie Boulevard West, Syracuse, NY 13204-2400
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August 20, 2021

Kelly Sweet
Harbor View Square, LLC
c/o Housing Visions
1201 East Fayette Street, Suite 26
Syracuse, NY 13210

Re: Harbor View Square, Site ID No. C738040
City of Oswego, Oswego County
Pilot Scale Reagent Injection Work Plan

Dear Kelly Sweet:

The New York State Department of Environmental Conservation (Department) reviewed the Pilot Scale Reagent Injection Work Plan (work plan) for Harbor View Square (site), dated August 6, 2021, which was prepared by Synapse Risk Management and Holt Consulting (Synapse) on behalf of Harbor View Square, LLC (Volunteer). The work plan was supplemented by a Spill Contingency Plan, which was submitted to the Department on August 19, 2021. The work plan, along with the Spill Contingency Plan, is approved with the modifications set forth below.

1. Section 1.1.A – This section is modified as set forth below, to be generally consistent with the version of the work plan submitted July 8, 2021.

> "This Reagent Injection Work Plan provides the technical scope of work for installation of a bedrock injection well and four groundwater monitoring wells for the pilot study at the Harbor View Square site (Site), located at 68 West First Street, Oswego, New York, New York State Department of Environmental Conservation (NYSDEC) Site No. C738040. The Site location is shown in **Figure 1**. The work proposed herein is a pilot scale design, to gather additional information about the characteristics of the Site and to determine the parameters for a full-scale injection event to be conducted at a later date."

2. Section 1.8.B – At the end of this paragraph, "this guidance" is replaced with "NYSDEC DER-10".

3. Section 3.3.E – Depth to groundwater will also be monitored at the same locations.

4. Table 1 – A field duplicate will be collected for per- and polyfluoroalkyl substances (PFAS) analysis at a rate of one per 20 normal samples (5%).

5. Appendix G – The Spill Contingency Plan, which is attached to this letter and which was submitted to the Department on August 19, 2021, is hereby added to Appendix G.

6. The *3-D Microemulsion (3DMe) Installation Instructions* prepared by Regenesis which are attached to this letter and which had been included with the version of the work plan submitted July 8, 2021, are hereby appended to the work plan.

Pursuant to 6 NYCRR 375-1.6(d)(3), the Volunteer must respond in writing within 15 days whether the modifications to the work plan will be accepted. If accepted, the Volunteer's acceptance letter, this letter, and this letter's attachments must be attached to the front of all copies of the work plan and must be provided to all contractors, including all field staff, who will be implementing the work. Alternatives to accepting the modifications are set forth at 6 NYCRR 375-1.6(d)(3)(ii) and (iii).

The Volunteer must obtain and comply with any necessary State, local, or federal permits/approvals, including but not limited to any related to Underground Injection Control (UIC).

The Department requires notification at least seven days in advance of field work.

If you have any questions, please do not hesitate to contact me at 315-426-7411 or joshua.cook@dec.ny.gov.

Sincerely,

Joshua P. Cook, P.E.
Professional Engineer 1

Attachments

ec: Harper Stanfield (EPA UIC)
Caryn Bower (NYSDEC OGC)
Gary Priscott (NYSDEC)
Joshua Cook (NYSDEC)
Samantha Salotto (NYSDEC)
Heather Budzich (Parsons)
Scarlett McLaughlin (NYSDOH)
Sarita Wagh (NYSDOH)

Kelly Sweet (Harbor View Square)
Dale Desnoyers (Allen & Desnoyers)
Brian Macrae (Synapse)
Roger Creighton (Synapse)
Jeffrey Holt (Holt Consulting)
Maria Wright (D&B)
Matt Hoskins (D&B)

SPILL CONTINGENCY PLAN

This Spill Contingency Plan is part of the Work Plan for Reagent Injection at the Harbor View Square project, NYS BCP Site No. C738040. The Contractor will maintain appropriate containment, materials and equipment to prevent and control the spillage of any specific item during the reagent injection pilot study. None of the work areas shall be polluted with any manmade or natural harmful materials. Additional details on the prevention of accidents and Site control during construction and injection are provided in the Construction Health and Safety Plan (CHASP) which is provided as Appendix A in the Work Plan and will also be available on-Site during the work. The reagent being injected consists of 3-D Microemulsion, S-MZVI and BDI. Safety data sheets, material information sheets, application and material handling guidelines are provided as Appendices in the Work Plan.

Based on the size of the project and scope of work, the anticipated occurrence and possible extent of spills are minimal. Reagent compatible bulk granular absorbent materials, such as kitty litter with no saw dust, will be maintained on Site in sufficient quantity to control all on-site reagent at all times during the reagent injection pilot study in the event of any possible spillage.

Secondary containment will be constructed beneath all injection system equipment and associated piping. The secondary containment consists of a bermed and lined decontamination pad that will be on-site to clean all equipment, materials and supplies. All decontamination fluids recovered from any spill will be contained, properly characterized and disposed of off-site. Particular care will be taken to ensure that no spilled materials run onto unpaved surfaces or enter the any storm drains within the vicinity of the Site. All storm drains within a 20-foot radius

of the work area will be covered with boom or other effective barriers and/or storm drain mats in order to prevent spills from the injection work area

To protect against the occurrence of spills and accidents, as well as to minimize the potential for emergency events, all on-Site personnel shall:

1. Attend Spill Prevention Briefings, read this Spill Contingency Plan and CHASP prior to beginning of all on-Site activities. Spill Prevention Briefings shall highlight and describe known spill events or failures, malfunctioning components, and recently developed precautionary measures.
2. Field work will only be conducted during daylight hours.
3. No eating, drinking or smoking will be permitted within the work zone.
4. All personnel shall be knowledgeable in the use of first-aid equipment outlined in the CHASP.
5. Only authorized personnel will be allowed on within the work zone.
6. Monitor the injection system(s) on a frequent basis to check integrity of all lines and connections.
7. Monitor all pressure gauges to make sure pressure does not exceed 20 pounds per square inch (psi).

EMERGENCY RESPONSE

In the event of a spill, Harbor View Square, LLC and the New York State Department of Environmental Conservation (NYSDEC) will be notified immediately. Within a 24-hour period, the Contractor shall provide a written description of the event, corrective action taken, and plans for preventing a recurrence, as well as a written commitment of manpower, equipment, and

materials required to expedite control and removal of any harmful quantity of material released. The written description of the event will include the date and time, a map depicting the impacted area, cause of the release, a list of agencies contacts and third parties with potential claims and the impact on human health and the environment. If an injury associated with the spill requires medical assistance or if an emergency requires local authority notification a listing of emergency phone numbers is provided as follows:

AWT Environmental Services, Inc. Emergency Contacts

24-hour Hotline	(732) 613-1660
Project Manager – Baxter Duffy	(908) 451-7150
Roger Creighton (Synapse)	(315) 254-8547
Jeff Holt, P.E. (Holt Engineering)	(518) 505-9021
Joshua P. Cook (NYSDEC)	(315) 426-7411
Local Fire Department	911
Local Police Department	911
Local Rescue Service (EMS)	911
New York Poison Control	(800) 222-1222

Federal

National Response Center	(800) 424-8802
National Poison Control	(800) 928-1253

The Contractor shall also refer to Section 8.0 of the CHASP which provides a list of local emergency contact names and phone numbers.

CORRECTIVE ACTION

In the event of a significant release of the reagent to the surface, the Contractor will immediately attempt to contain the spill materials by deploying additional adsorbent booms or pads to create a spill enclosure and applying a compatible bulk granular absorbent material to the best of their ability to the impacted area. In addition, all incompatible and combustible materials will be removed from the area.

Once the solution is neutralized the recovered spill materials or fluids will be removed from the spill enclosure utilizing a bulk granular absorbent material. This material will be stored in a 55-gallon drum for proper off-site disposal. If warranted, a vacuum truck will be dispatched to the Site to excavate the neutralized fluids. If the release impacts native soils, the soil will be neutralized, excavated and temporarily stored on-site for proper off-site disposal.

For releasees of diluted reagent, the Contractor will immediately attempt to contain the solution by constructing berms of absorbent materials to the best of their ability. All incompatible and combustible materials will be removed from the area.

3-D MicroEmulsion™ HRC ADVANCED®

REGENESIS
Advanced Technologies for Groundwater Resources

3-D Microemulsion (3DMe)™

INSTALLATION INSTRUCTIONS

High-Volume, Wide-Area, Micro-Emulsion Application

Introduction

3-D Microemulsion (3DMe)™, a form of HRC Advanced®, should ONLY be applied as a high-volume, micro-emulsion. In this form it offers greater physical distribution of the 3DMe material across a larger potential radius from a single injection point. The production of a 3DMe emulsion involves the on-site, volumetric mixing of 10 parts water with 1 part delivered 3DMe concentrate to form the injection-ready 3DMe micro-emulsion. This micro-emulsion suspension can then be injected directly or further diluted to a predetermined ratio of 3DMe to water. The following instructions provide details in the production and installation of the 3DMe micro-emulsion.

Material Overview Handling and Safety

3DMe concentrate is shipped and delivered in 4.25-gallon buckets. Each bucket has a gross weight of approximately 32 pounds. Each bucket contains 30 pounds of 3DMe concentrate (net weight) and a nominal volume of 3.7 gallons. At room temperature, 3DMe concentrate is a liquid material with a viscosity of approximately 500 centipoise, roughly the equivalent of pancake syrup. The viscosity of 3DMe is not temperature sensitive above 50 ºF (10 ºC). However, below 50 ºF the viscosity may increase significantly. If the user plans to apply the product in cold weather, consideration should be given to heating the material to above 60 ºF so that it can be easily handled. 3DMe concentrate should be stored in a warm, dry place that is protected from direct sunlight. It is common for stored 3DMe concentrate to settle somewhat in the bucket, a quick pre-mix stir by a hand held drill with a paint or "jiffy mixer" attachment will rapidly re-homogenize the material. 3DMe concentrate is non-toxic, however field personnel should take precautions while handling and applying the material. Field personnel should use appropriate personal protection equipment (PPE) including eye protection. Gloves should be used as appropriate based on the exposure duration and field conditions. A Material Safety Data Sheet is provided with each shipment. Personnel who operate field equipment during the installation process should have appropriate training, supervision, and experience and should review the MSDS prior to site operations.

Micro-Emulsion Production 3DMe to Water Ratio

3DMe concentrate should be mixed with water on a volume to volume (v/v) basis to produce a micro-emulsion starting at 10 parts water: 1 part 3DMe. Although micro-emulsions can be easily produced using greater water volumes than 10 parts, e.g. 20 to 50 parts water to 1 part 3DMe, the initial micro-emulsion should never be produced below a ratio of less than 10 parts water: 1 part 3DMe v/v. **WARNING: Do not attempt to produce a micro-emulsion at less than 10 parts water to 1 part 3DMe ratio v/v. This will produce an undesirable and unstable solution.**

The field production of 3DMe micro-emulsion is a very simple procedure; however, it is critical that the user follow the mixing directions outlined below. Never attempt to add water to the 3DMe as this will produce an undesirable and unstable large emulsion. Always add the 3DMe to a large volume of water.

As indicated previously the 10:1 ratio of water to 3DMe v/v is the minimum water ratio that can be used, a greater ratio (more dilute solution) can easily be achieved and is governed by: A) the volume of 3DMe required to treat the estimated contaminant mass, B) the pore volume in which the material is applied, C) the time available for installation (gallons/pump rate), and C) the estimated volume of 3DMe micro-emulsion that the target zone will accept over the time period allocated for installation.

Conceptually, although a higher volume of water to volume of 3DMe will produce a larger volume of the suspension, it will lower the concentration of 3DMe per gallon of solution. Thus, the benefit of using a high water/3DMe v/v ratio in order to affect a greater pore volume of the subsurface aquifer is offset by the dilution of the 3DMe per unit volume of suspension as well as by the limitations of the subsurface hydraulic conductivity and effective porosity (capacity of the aquifer to accept the volume of 3DMe micro-emulsion).

It is important that the user plan in advance the v/v 3DMe/water ratio to be employed at a project site. The resulting volume of solution will dictate the site water requirements and the time required for injection, etc. If upon injection of greater than 10:1 3DMe micro-emulsion, the subsurface does not readily accept the volume of solution as designed, the user can adjust downward the v/v water to 3DMe ratio until a more concentrated suspension is produced (this solution should never drop below the required 10 parts water:1 part 3DMe v/v production ratio). For more information on designing a 3DMe/water ratios to meet specific site conditions, please contact Regenesis Technical Services.

Direct Push Application Requirements

One of the best methods to deliver the 3DMe micro-emulsion into the subsurface is to pressure inject the solution through direct-push rods using hydraulic equipment, or to pressure inject/gravity feed the micro-emulsion into the dedicated injection wells. The use of low cost push points or temporary injection points allows the applier to more cost effectively distribute the 3DMe material across shallow sites by employing multiple points per site. In the case of treating deep aquifer sites, the use of the micro-emulsion applied via dedicated injection wells is likely to be the most cost effective remediation approach. Please note that this set of instructions

is specific to direct-push equipment. Please contact Regenesis Technical Services to assist you with dedicated injection well applications.

In general, Regenesis strongly recommends application of the 3DMe micro-emulsion using an injection pump with a minimum delivery rate of three gallons per minute (gpm) and a pressure rating of between 150 to 200 pounds per square inch (psi). **Note: the injection pump requirements are different than the requirements of the mixing pump (see Mixing to Generate 3DMe Micro-emulsion).** High pressure, positive displacement pumps and progressive cavity pumps are appropriate for injecting 3DMe. For low permeability lithologies (clay, silt) higher pressure pumps (800-1600 psi) may be necessary, while for more permeable lithologies (gravel, sand) a lower pressure pump may be adequate. Examples of appropriate pumps are: Rupe Models 6-2200, 9-1500 and 9-1600 (positive displacement), Geoprobe® GS-2000 (positive displacement) and DP-800 (progressive cavity), Yamada (air diaphragm), Moyno (progressive cavity), and Wilden (air diaphragm). Delivery rate is a critical factor in managing installation time and costs. Generally, higher delivery rates (>6 gpm) are more cost effective for these types of applications but pump selection should be on a site specific basis and account for the volume of 3DMe solution and specific aquifer conditions present at the site.

The installation of the 3DMe micro-emulsion should span the entire vertical contaminated saturated thickness. If the vertical extent of the application is confined to a limited interval, then the micro-emulsion should be placed across a vertical zone extending a minimum of one-foot above and one-foot below the screened interval of monitoring wells that are being used to evaluate the performance of the project.

Producing the 3DMe Micro-Emulsion

The application of 3DMe requires the creation of a micro-emulsion. Technically the optimal suspension is an 3DMe-in-water suspension containing micro-emulsions. Before beginning the mixing procedure the user should have in mind the desired water to 3DMe ratio v/v desired.

It is critical that the micro-emulsion be produced using a high-shear apparatus such as a high speed centrifugal pump. The shearing provided by the vanes in these types of pumps is sufficient to form and maintain a homogeneous milky emulsion. **This pump will be a different pump than that used to inject the 3DMe micro-emulsion into the subsurface.** If the user is uncertain as to requirements for the pump or the applicability of a certain pump, please contact Regenesis Technical Services. Regenesis typically suggests using a water trailer/pump apparatus commonly found at equipment rental facilities. Regenesis recommends using a Magnum Products LLC model MWT500 or equivalent water trailer (fitted with centrifugal recirculation pump). This “trash pump” or transfer pump is an ideal high shear pump and the water tank (400 gallons) serves as an excellent mixing tank.

To ensure that proper micro-emulsion suspension is generated Regenesis suggests a two-step process that simply requires mixing at least 10 parts water to 1 part 3DMe concentrate using water at a temperature $\geq 60^{o}$F.

Step 1) Regenesis recommends that the 3DMe concentrate in each bucket be re-homogenized using a drill equipped with a paint or "jiffy" mixer attachment as minor settling may have occurred during shipment.

Step 2) to calculate the volume of water necessary to produce a 10:1 v/v micro-emulsion, each bucket of 3DMe concentrate containing 3.7 gallons of material should be mixed with 37 gallons of water.

Example: 6 buckets x 3.7 gallons 3DMe concentrate/bucket yields a total of 22.2 gallons of 3DMe concentrate. Thus, a 10:1 v/v solution will require 222 gallons of water (22.2 gallons 3DMe concentrate x 10 gallons water yields 222 gallons of water). A nominal total volume micro-emulsion would result from the summation of the 3DMe concentrate volume (22.2 gallons) and the water volume (222 gallons). This yields a total fluids delivery volume of approximately 244 gallons.

The previously calculated water volume (222 gallons) should be transferred into an appropriately sized mixing tank. The water should be circulated by the high shear centrifugal pump and each of the six 3DMe buckets slowly poured into the tank. Each bucket of 3DMe concentrate should be poured at a slow rate (approx. 1 minute per bucket) and the contents of the tank continually recirculated using the high hear centrifugal pump. A period of 1-2 minutes should be allowed between addition of each subsequent bucket of 3DMe concentrate to allow the centrifugal pump to continue to shear and mix the water/3DMe concentrate. Upon addition of the entire volume of 3DMe concentrate the pump should remain on to allow the solution mixture to recirulate. The recirculation of the 3DMe micro-emulsion should continue until the material is injected to maintain micro-emulsion consistency.

Application of Micro-Emulsion Using Direct-Push Methods

1) Prior to the installation of the micro-emulsion, any surface or overhead impediments should be identified as well as the location of all underground structures. Underground structures include but are not limited to: utility lines, tanks, distribution piping, sewers, drains, and landscape irrigation systems.

2) The planned installation locations should be adjusted to account for all impediments and obstacles.

3) Pre-mark the installation locations, noting any points that may have different vertical application requirements or total depth.

4) Set up the direct-push unit over each specific point and follow the manufacturer's standard operating procedures (SOP). Care should be taken to assure that probe holes remain vertical.

5) For most applications, Regenesis suggests using drive rods with an O.D. of at least 1.25-inches and an I.D. of at least 0.625-inches I.D (Geoprobe or equivalent). However, the lithologic conditions at some sites may warrant the use of larger 2.125-inch O.D./1.5-inch I.D. drive rods.

6) The most typical type of sub-assembly currently being used is designed for 1.25-inch direct-push rods and is manufactured by Geoprobe. Other brands of drive rods can also be used but require the fabrication of a sub-assembly that allows for a connection between the pump and drive rod.

7) For mixing large volumes of the micro-emulsion, Regenesis recommends using a Magnum Products LLC model MWT500 water trailer (fitted with centrifugal recirculation pump) or equivalent unit. However, single large volume poly tanks are adequate. We suggest filling the tank with an appropriate quantity (e.g. from the example above 222 gallons) of water before start of mixing operations. The tank should be configured so that both a hose and a fire hydrant or larger water tank can be connected to it simultaneously and filled with water quickly and easily. This will dramatically reduce the time needed to fill the tank with mixing water.

8) Regenesis highly recommends preparing the micro-emulsion before pushing any drive rods into the subsurface. NOTE: it is best if the micro-emulsion is produced a single day application volumes.

9) After the micro-emulsion mixing/shearing step has been completed as described above, the micro-emulsion is ready to be applied. Check to see if a hose has already been attached to the inlet side of the centrifugal pump. If this has not been done, do so now.

10) If a non-water trailer tank is being used for mixing the micro-emulsion a stand alone centrifugal pump and hose system should be used for the shearing and mixing operations.

11) Advance drive rods through the ground surface, as necessary, following SOP.

12) Push the drive rod assembly with an expendable tip to the desired maximum depth. Regenesis suggests pre-counting the number of drive rods needed to reach depth prior to starting injection activities to avoid any miscalculations.

13) After the drive rods have been pushed to the desired depth, the rod assembly should be withdrawn three to six inches. The expendable tip can be dropped from the drive rods, following SOP.

14) If an injection tool is used instead of a direct-push rod with an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.

15) In some cases, introduction of a large column of air may be problematic. This is particularly the case in deep injections (>50 ft) with large diameter rods (>1.5-inch O.D.). To prevent the injection of air into the aquifer during the application, fill the drive rods with 3DMe emulsion after they have been pushed to the desired depth and before the disposable tip has been dropped or before the injection tip is operational.

16) Transfer the appropriate quantity of the micro-emulsion from the water trailer to the working/application pump hopper or associated holding tank.

17) A volume check should be performed prior to the injection of the micro-emulsion. Determining the volume discharged per unit time/stroke using a graduated bucket and stopwatch or stroke counter.

18) Start the pump and use the graduated bucket to determine how many gallons of micro-emulsion are delivered each minute or stroke per unit volume.

19) Connect the 1.25-inch O.D., 1-inch I.D. delivery hose to the pump outlet and the appropriate sub-assembly. Circulate the micro-emulsion through the hose and the sub-assembly to displace any air present in the system.

20) Connect the sub-assembly to the drive rod. After confirming that all of the connections are secure, pump the micro-emulsion through the delivery system to displace any water or other fluids in the rods.

21) The pump engine RPM and hydraulic settings should remain constant throughout the day to maintain a constant discharge rate.

22) The material is now ready to be installed in the subsurface. Use the pumps discharge rate as calculated in step 18 to determine the withdrawal rate of the drive rods needed for the application.

23) Slowly withdraw the drive rods using Geoprobe Rod Grip or Pull Plate Assembly (Part AT1222-For 1.25-inch drive rods). While slowly withdrawing single lengths of drive rod (three or four feet), pump the pre-determined volume of micro-emulsion into the aquifer across the desired treatment interval.

24) Remove one or two sections of the drive rod at a time. The drive rod may contain some residual material so Regenesis suggests placing it in a clean, empty bucket and allowing the material to drain. Eventually, the material recovered in the bucket should be returned to the pump hopper for reuse.

25) Observe any indications of aquifer refusal such as “surfacing” around the injection rods or previously installed injection points. If aquifer acceptance appears to be low, allow enough time for the aquifer to equilibrate prior to removing the drive rod.

26) Repeat steps 19 through 25 until treatment of the entire contaminated vertical zone has been achieved.

27) Install an appropriate seal, such as bentonite, above the micro-emulsion injection zone. The seal should span across the entire vadose zone. Depending on soil conditions and local regulations, a bentonite seal using chips or pellets can be used. If the injection hole remains open more than three or four feet below the ground surface sand can be used to fill the hole and provide a base for the bentonite seal. The installation of an appropriate seal assures that

the micro-emulsion remains properly placed and prevents contaminant migration from the surface. If the micro-emulsion continues to "surface" up the direct-push borehole, an oversized disposable drive tip or wood plug/stake can be used to temporarily plug the hole until the aquifer equilibrates and the material stops surfacing.

28) Remove and clean the drive rods as necessary.

29) Finish the borehole at the surface as appropriate (concrete or asphalt cap, if necessary).

30) Periodically compare the pre- and post-injection discharge rates of the micro-emulsion in the pump hopper or holding tank using any pre-marked volume levels. If volume level indicators are not on the pumps hopper or holding tank use a pre-marked dipstick or alternatively temporary mark the hopper or holding tank with known quantities/volumes of water using a carpenter's grease pencil (Kiel crayon).

31) Move to the next probe point, repeating steps 11 through 29.

Helpful Hints

1) *Application in Cold Weather Settings*

As discussed in the Material Overview, Handling, and Safety section, cold weather tends to increase the viscosity of 3DMe as well as decrease the ease of micro-emulsion formation. To optimize an application in cold weather settings Regenesis recommends maintaining the 3DMe concentrate and the associated water at a temperature ≥60°F (16°C). The following procedures can be used to facilitate the production and installation of a 10:1 v/v 3DMe micro-emulsion.

- Raise and maintain the temperature of the HRC-A to at least 60°F (16°C) prior to mixing with water. A hot water bath can be used to heat up the 3DMe concentrate buckets. A Rubbermaid fiberglass Farm Trough Stock Tank (Model 4242-00-GRAY) has been used for this process. This trough can hold up to 16 buckets of 3DMe concentrate.
- Hot water (approximately 130-170°F or 54-77°C) should be added to the tank after the buckets of 3DMe have been placed inside. The hot water should be delivered from a heated pressure washer (Hotsy® Model No. 444 or equivalent) or steam cleaner unit.
- It is equally critical that a moderate water temperature (>60°F or 16°C) be used in the production of the micro-emulsion. If on-site water supply is below 60°F use a hot water or steam cleaner to generate a small volume (e.g. 5-10% of total water volume) of hot water (130–170°F/54-77°C). This small volume of hot water should be added to remaining cold water volume to raise the total volume temperature to >60°F. When the 3DMe concentrate and water each reach a minimum temperature of 60°F or 16°C the two materials are ready for mixing.
- Upon achieving a minimum temperature of 60°F or 16°C (approximately 10-20 minutes). When the 3DMe and the associated water volumes have reached a minimum temperature of 60°F or 16°C (approximately 10-20 minutes) they are ready for mixing.
- In exceptionally harsh winter temperature settings use of a separate insulated pump containment structure and insulated delivery hoses may be necessary.

- Use a pump with a heater unit.
- Periodically check the temperature of the material in the hopper.
- Re-circulate the 3DMe micro-emulsion through the pump and hose to maintain temperature adequate temperatures.
- Care should be taken to avoid the re-circulation of material volumes that exceed the volume of the pump hopper or holding tank.

Table 1: Equipment Volume and 3DMe Micro-Emulsion Weight per Unit Length of Hose (Feet)

Equipment	Volume	Product Weight
1-inch OD; 0.625-inch ID hose (10 feet)	0.2 gallon	1.6 lbs.
1.25-inch OD; 0.625-inch ID drive rod (3 feet):	0.05 gallon	0.4 lbs.
1.25-inch OD; 0.625-inch ID drive rod (4 feet):	0.06 gallon	0.5 lbs.

2) Pump Cleaning

For best results, use a heated pressure washer to clean equipment and rods periodically throughout the day. Internal pump mechanisms and hoses can be easily cleaned by re-circulating a solution of hot water and a biodegradable cleaner such as Simple Green through the pump and delivery hose. Further cleaning and decontamination (if necessary due to subsurface conditions) should be performed according to the equipment supplier's standard procedures and local regulatory requirements.

NOTE:

Before using the Rupe Pump, check the following:

- Fuel level prior to engaging in pumping activities (it would be best to start with a full tank)
- Remote control/pump stroke counter LCD display [if no display is present, the electronic counter will need to be replaced (Grainger Stock No. 2A540)]

Monitor pump strokes by observing the proximity switches (these are located on the top of the piston).

3) *Bedrock Applications*

When contaminants are present in competent bedrock aquifers, the use of direct-push technology as a delivery method is not possible. *Regenesis is in the process of developing methods for applying 3DMe via boreholes drilled using conventional rotary techniques.* To develop the best installation strategy for a particular bedrock site, it is critical that our customers call the Technical Services department at Regenesis early in the design process.

The micro-emulsion can be applied into a bedrock aquifer in cased and uncased boreholes. The micro-emulsion can be delivered by simply filling the borehole without pressure or by using a

single or straddle packer system to inject the material under pressure. Selection of the appropriate delivery method is predicated on site-specific conditions. The following issues should be considered in developing a delivery strategy:

- Is the aquifer's hydraulic conductivity controlled by fractures?
- Backfilling may be the better delivery method in massive, unfractured bedrock. This is particularly true in an aquifer setting with high permeability and little fracturing (such as that found in massive sandstone).
- Down-hole packer systems may be more advantageous in fractured bedrock aquifers.
    - In this case the fracture type, trends, and interconnections should be evaluated and identified.
- Are the injection wells and monitoring wells connected by the same fractures?
- Determine if it is likely that the injection zone is connected to the proposed monitoring points.
- If pressure injection via straddle packers is desired, consideration should be given to the well construction. Specific issues to be considered are:
    - Diameter of the uncased borehole (*will casing diameter allow a packer system to be used under high pressures*?).
    - Diameter of the casing (*same as above*).
    - Strength of the casing (*can it withstand the delivery pressures?*).
    - Length of screened interval (*screened intervals greater than 10 feet will require a straddle packer system*).

For further assistance or questions please contact Regenesis Technical Services at 949-366-8000.

WORK PLAN FOR
REAGENT INJECTION

HARBOR VIEW SQUARE
68 WEST FIRST STREET
OPERABLE UNIT NUMBER: 01
OSWEGO, NEW YORK
NYS BCP SITE NO. C738040

Prepared for:

NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

Prepared by:

SYNAPSE RISK MANAGEMENT
360 ERIE BOULEVARD EAST
SYRACUSE, NEW YORK 13202

AUGUST 2021

HARBOR VIEW SQUARE
NYS BCP SITE NO. C738040
OPERABLE UNIT NUMBER: 01
OSWEGO, NEW YORK

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1.0 GENERAL

1.1 Purpose

A. This Reagent Injection Work Plan provides the technical scope of work for installation of a bedrock injection well and four groundwater monitoring wells for the pilot study at the Harbor View Square site (Site), located at 68 West First Street, Oswego, New York, New York State Department of Environmental Conservation (NYSDEC) Site No. C738040, Operable Unit Number 01 (On-Site). The Site location is shown in Figure 1. This injection pilot study is being performed as part of the requirements set forth in the Record of Decision for the Site, issued by NYSDEC in November 2013.

1.2 Scope of Work

A. The Applicant, Harbor View Square, LLC., will conduct a reagent injection pilot study at the Site. The pilot study shall include the installation of one injection well and four monitoring wells and the injection of reagents including (3-D Microemulsion, S-MZVI and BDI Plus) as described in the below sections. The reagents shall be provided by Regensis.

B. All work shall be performed in accordance with all applicable federal, state and local laws, rules and regulations. Noise levels shall, at all times, be maintained within the limits of local noise ordinances.

C. All electrical work shall be in accordance with the standards and guidance of the National Electrical Code, the National Electrical Safety Code and with local codes which apply, including the requirements for hazardous locations.

D. On-site work shall be performed during the normal business hours of 7 am to 6 pm.

E. Materials brought to the Site shall be stored in accordance with manufacturer's instructions, with seals and labels intact and legible. Temperature and humidity shall be maintained within ranges required by manufacturer's instructions. Periodic inspections will be conducted of stored materials and equipment to assure that materials and equipment are maintained under specified conditions and free from damage or deterioration. The Contractor shall submit a plan prior to mobilization specifying how they will store the materials to comply with the manufacturer's recommendations.

F. All work on-site shall be performed in the presence of a Professional Engineer, or someone under the direct supervision of the Professional Engineer, Jeffrey Holt, P.E. The Engineering Certification is included as Appendix H.

G. All work will be performed pursuant to the Site's Health and Safety Plan, included as Appendix A.

H. The Site's Community Air Monitoring Plan, included as Appendix B, shall be implemented during all intrusive work at the Site.

I. In general, the overall work to be performed shall be as follows:

1. Constructing a decontamination pad;

2. Constructing a reagent storage area and implementing the spill contingency plan;

3. Decontaminating equipment and materials;

4. Drilling injection well(s) and monitoring well(s);

5. Development of injection well(s) and monitoring well(s);

6. Mixing the reagents per the manufacturer's recommendations;

7. Injecting the reagents via the newly-installed injection well(s);

8. Monitoring injection performance including injection pressure, formational acceptance and surface daylighting;

9. Site cleanup, restoration, and containment of cuttings/drillings, drilling fluid and well development water and disposal of cuttings, drilling fluid and well development water off-site;

10. Removing temporary decontamination facilities; and

11. Pre and post injection groundwater monitoring.

1.3 Schedule

A. The work will be performed two weeks after approval of the Work Plan in August 2021. Work will occur over a 10-day period followed by groundwater monitoring beginning in September 2021 as described in the sections below. The Construction Completion Report (CCR) will be submitted 90 days after the final sampling event.

1.4 Description of the Site

A. The Harbor View Square Site is a Brownfield Cleanup Program (BCP) Site located at 68 West First Street, Oswego, New York (see Figure 1). Operable Unit Number 01 is the On-Site area. The Site covers approximately 2.438 acres and consists of the block bounded by West First Street to the east, West Second Street to the west, West Schuyler Street to the south and Lake Street to the north (see Figure 2). The Site is owned by the Harbor View Square, LLC and is also referred to as the former Flexo Wire site.

B. The generally flat-lying Site slopes gently to the east toward the Oswego River, located approximately 390 feet to the east. The river flows north into Lake Ontario, which, at its nearest point, is located approximately 250 feet north of the Site. The area to the west of the Site is primarily residential. The area to the south contains a mixture of residential and commercial properties, and to the north there is a municipal parking area, a boat launch, a marina, a United States Coast Guard facility, and a marine museum located on property owned by the Oswego Port Authority. To the east and northeast are industrial properties, including a major oil storage facility, the City of Oswego West Side Excess Flow Management facility and a cement shipping terminal.

C. Contamination in the Site subsurface has been identified as chlorinated volatile organic compounds (VOCs) and metals. Prior site usage that has led to site contamination includes solvent usage and disposal, reportedly associated with the wire drawing operations; coal storage, usage and coal ash disposal; and metal working operations, including machining and annealing.

D. Through subsurface investigations performed at the Site, elevated concentrations of VOCs have been identified in groundwater up to 50 feet below ground surface. The highest concentrations of VOCs have been identified in groundwater between 15 and 30 feet below ground surface in the sandstone bedrock in the area of a former underground storage tank and process lines. Remedial excavation of surface soils in this area was completed in March 2019. The horizontal extent of these excavations is shown in Figure 2. Zones of potential injection were identified in the bedrock core logged during the installation of the existing bedrock well MW-1 (converted to a groundwater monitoring well from VA-RC-1) at approximately 13 and 25 feet below ground surface (bgs). The shallower zone (13 feet bgs) also corresponds to Hydrostratigraphic Unit 1 described in the report by Parsons (January 2021).

1.5 Reference to Standards and Regulations

A. The latest revisions of standards of AWWA and ASTM shall apply as referenced herein.

B. The Brownfield Cleanup Program, New York State Environmental Conservation Law, Article 27, Title 14.

C. 6 NYCRR Part 375 - Environmental Remediation Programs

D. NYSDEC DER-10 – Technical Guidance for Site Investigation and Remediation (May 2010);

1.6 Permits

A. Applicant shall obtain permits required for obtaining water and constructing the wells (e.g., road opening, DOT, etc.).

B. The Applicant has a UIC permit.

1.7 Utilities

A. New York one call (1-800-962-7962) and the appropriate utility company will be notified no less than 48 hours prior to any work.

B. All aboveground and buried utilities and structures will be identified and protected. As an added precaution, the first 5 feet below ground surface will be cleared using hand tools.

1.8 Environmental Protection

A. All work shall be scheduled and conducted in a manner that will prevent the erosion of soil and release of soil and water in the work area. Control measures shall be provided, such as diversion channels, berms, sedimentation or filtration systems, silt fences or other special surface treatments as required to prevent the release of soil and water, and silting, muddying and contamination of surface waters, drainage ways, storm water collection systems and recharge basins. It should be noted that all of the work is being performed in paved areas so erosion control is not a concern. All necessary control measures shall be in place prior to performing Work.

B. All necessary measures will be taken to prevent the migration of dust outside the pilot test injection area due to the work activities. No oil, calcium chloride or liquids other than liquids specifically approved by the Environmental Professional shall be used for dust control. An Environmental Professional is defined as a person, including a firm headed by such person, who possess sufficient specific education, training, and experience necessary to exercise professional judgement to develop opinions and conclusions regarding the presence of releases or threatened releases to the surface or subsurface of a site or off-site areas, sufficient to meet the objectives and performance factors of the areas of practice identified by this guidance.

C. All waste resulting from work activities shall be removed and disposed at an approved facility in accordance with all applicable federal, state and local laws and regulations.

D. Disposal in and adjacent to the work area of any debris, wastes, effluent, trash, garbage, oil, grease, chemicals, etc. resulting from the work will not be permitted.

E. All necessary measures shall be taken to control the release of odors and vapors.

1.9 Spill Control

A. Equipment and trained personnel will be within the pilot test injection area to perform emergency measures necessary to contain, remove and clean up all spills generated from the work.

B. In the event of a spill, immediate action will be taken in accordance with the Spill Contingency Plan, and federal, state and local laws and regulations. In addition, NYSDEC will be notified immediately of any spill and shall continuously inform NYSDEC of any and all actions implemented to comply with applicable requirements. The Spill Contingency Plan is included as Appendix G.

C. Chemicals are expected to be stored on the site for no more than 30 days.

1.10 Security

A. The Site will be secured with security fencing and a locking gate around the work area.

B. A Site Entrance/Exit Log will be maintained and shall contain signed entry and exit record for project personnel and visitors. The log shall record time of entry and exit and firm of the individual. Persons not associated with the project will not be admitted on site.

C. Appropriate warning signs will be hung from temporary fences. These fences will surround the work area and any breaks of gaps in the fences will be attended to immediately.

1.11 Health and Safety

A. A Site-Specific Health and Safety Plan for the Site is attached as Appendix A, and it shall be followed by all on-site personnel. All on-site personnel shall have completed OSHA training and medical monitoring requirements for work on hazardous waste sites.

B. A Community Air Monitoring Plan (CAMP) is attached as Appendix B that includes concentration-based action levels, will be implemented as part of well installation and injection program. The CAMP will be implemented during ground intrusive activities. The plan complies with the requirements of the New York State Department of Health Generic Community Air Monitoring Plan.

C. A Construction Health and Safety Plan (CHASP) will be prepared. Personnel performing remedial work will be required to read and comply with the requirements of the CHASP. The CHASP will be required to address all the appropriate federal, state and local regulatory requirements necessary to undertake and successfully complete implementation of the remedy. The CHASP will be prepared in accordance with 29 CFR 1910.120 and any other applicable laws, rules, and regulations and will include the following items:

1. Health and safety organization, including résumés of personnel responsible for health and safety;

2. Project description and hazard assessment;

3. Training requirements;

4. Medical surveillance requirements;

5. Project control procedures;

6. Standard operating procedures and engineering controls;

7. Personnel protective equipment requirements;

8. Personnel hygiene and decontamination protocols;

9. Equipment decontamination procedures;

10. Air monitoring requirements;

11. Emergency equipment/first aid requirements;

12. Emergency responses/contingency procedures;

13. Heat and cold stress procedures;

14. Record keeping requirements; and

15. Community protection plan.

1.12 Submittals

A. During drilling of each well, a complete log shall be maintained and submitted to NYSDEC as part of the construction completion report. The report shall include the following:

1. The reference point for all depth measurements.

2. The depth at which each change of formation occurs.

3. The identification of the material of which each stratum is composed.

4. The depth interval from and method which formation samples were taken.

5. The depth at which hole diameters (bit sizes) change.

6. Other pertinent data requested by the Engineer.

B. During drilling of each well, a detailed daily driller's report shall be maintained and submitted as requested by the Engineer. The report will give a complete description of all formations encountered, number of feet drilled, number of hours on the job, shutdown due to breakdown, materials used, feet of casing set, and other pertinent data.

C. During injection, a detailed daily report shall be maintained and submitted to the Engineer. The report shall include the following:

1. Time and injection rate (flow rate) shall be recorded at the beginning of injection and each time there is a change in the injection rate.

2. Injection pressure and injection totalizer (volume) shall be recorded at a frequency of 1 reading per 15 minutes of injection. Initial injection pressures should be within a range of between 10 and 20 pounds per square inch (PSI), to prevent the reagent to surface.

3. Time at which each tank is emptied including approximate volume injected from the tank as read from volume markings on the tank.

D. During the work, daily injection reports will be prepared that will include date; weather conditions, including wind direction; community air monitoring station locations; health and safety information, (e.g., personal protective equipment utilized, etc.); personnel on-site and tasks conducted; equipment on-site and tasks for which it was utilized; a summary of the volume of injectate mixed and injected; a photographic log; logs of deliveries; logs of loads of waste removed from the site with date, time, hauler name, license plate, destination, etc.; and any other pertinent information.

E. Final logs of all borings will be prepared.

1.13 Meetings

A. Following an initial pre-construction meeting, project meetings will be held once every week until it is agreed that the frequency can be changed. These meetings will be held virtually through a web-based meeting platform.

B. During implementation of the pilot study, the Environmental Professional will provide full-time on-site inspection of the work, engage in day-to-day communications with the Contractor and maintain records and prepare meeting minutes, as appropriate.

1.14 Handling of Materials

A. All equipment, parts and materials shall be properly protected so that no damage or deterioration will occur during a prolonged delay from time of shipment until installation is completed, and the units and equipment are ready for operation.

B. If water is used for drilling, potable water will be used and a waste storage tank or container for each well. The storage capacity shall be 50% greater than the anticipated drilling waste generated per borehole.

C. All spent cuttings, drillings, drilling fluids (if used), flushing water and development water will be stored in a leak proof container located near the well during well construction. No cuttings, fluids (if used) or water shall be allowed to flow on the site surface. All cuttings shall be contained in DOT-approved 55-gallon “ring top” drums or approved equal. Fluids and waters will be containerized in a temporary storage tank.

D. All waste generated will be containerized, sampled, characterized and disposed off-site in accordance with all applicable federal, state and local laws and regulations. This includes, but is not limited to, drill cuttings, used personal protective equipment, decontamination wastewater and disposable sampling equipment. Waste characterization will include analysis of samples needed to make a "contained-in" determination. All waste sampling shall be performed in accordance with the requirements of the selected disposal facility. All waste will be containerized in leak proof, vapor tight Department of Transportation (DOT) approved 55-gallon “ring top” drums, or approved equal. All waste will be transported by a Part 364 waste transporter and will be properly disposed of at a facility authorized to accept the waste.

1.15 Site Cleanup

A. Immediately upon completion of the work, all equipment, materials and supplies will be removed from the Site of the work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started.

1.16 Reporting

A. Upon completion of the final post-injection groundwater monitoring event (90 days), a Groundwater Construction Completion Report (CCR) will be prepared to document the pilot injection and present the data. It is anticipated that this CCR will also present the need for additional injections and/or additional monitoring.

2.0 MONITORING WELL AND INJECTION WELL INSTALLATION

2.1 Specifications of the Wells

A. Monitoring Wells

1. Four monitoring wells will be installed at 5, 10, 15 and 20 feet at cross gradient and downgradient locations from the injection well (see Figure 3). The final locations for the monitoring wells will be based on fracture zones identified in the rock core samples, which shall be collected from a minimum of three locations prior to the installation of the injection and monitoring wells. The monitoring wells shall be installed to a total depth of approximately 30 feet below ground surface.

   At each well location, a 10-inch diameter boring will be drilled through the overburden soils and extending three feet into bedrock. This boring will be lined with a 10-inch steel conductor pipe. A 6.625-inch outer diameter, 6.065-inch inner diameter Schedule 40 steel pipe will then be placed inside the 10-inch pipe. The 10-inch pipe will be removed and the annulus between the outer 6-inch pipe will be filled with grout using a tremie pipe from the bottom of the borehole to within 6 to 10 inches of the surrounding grade. If the 10-inch pipe cannot be removed it will be left in place. The annulus grout will be left to cure for at least 24 hours prior to drilling or coring the bedrock. A six-inch diameter boring with then be drilled to total depth before constructing the monitoring well per the specifications shown in Figure 4.

   For the wells that are cored, a hollow stem auger rig will be used to continuously core the hole with an NQ wireline core drilling system. The Driller will take necessary steps to ensure core integrity is maintained. Final monitoring well depth and screen length may vary based upon the Engineer's review of the rock core samples. After the cores have been reviewed, the Driller will ream out the borings to a six-inch diameter using an air rotary drill rig. Those wells that are not cored will be drilled with the air rotary drill rig. The following summarizes the specifications for each well.

Well ID	Well Inner Diameter (inches)	Approximate Well Depth (feet bgs)	Screen Length (feet)
MW-6	2	30	15
MW-7	2	30	15
MW-8	2	30	15
MW-9	2	30	15

B. Injection Well

1. The location of the injection well will be based on the fracture zones identified in the rock coring samples. The injection well shall be installed as shown on Figure 3 to a total depth of approximately 30 feet below ground surface using an air rotary drill rig. Driller will take necessary steps to ensure core integrity is maintained. The following summarizes the specifications for each well. Final injection well depth and screen length may vary based upon the Engineer's review of the rock coring samples.

Well ID	Well Inner Diameter (inches)	Approximate Well Depth (bgs)	Screen Length (feet)
IW-1	2	30	15

2.2 Well Construction

A. Monitoring well and injection well schematics are shown on Figure 4.

B. Clean equipment as per Section 2.9.

C. Construction of monitoring wells/injection well may include the removal and excavation of pavement or concrete prior to initiation of drilling.

D. Drill pipe lubrication if any shall be limited to vegetable shortening or approved equal.

E. Drilling fluid (if used) shall only consist of potable water approved by the Engineer. No other fluids or additives shall be used unless approved by the Engineer.

2.3 Boring Logs

A. Overburden and Bedrock

1. Digital photographs will be taken of each interval along with identifying information (location, date, interval) written on a white board or similar means, prior to disturbing the sample.

2. All sample intervals will be inspected and logged, and headspace screening will be performed on all intervals with a photoionization detector (PID).

3. The amount of visual contamination present in soil or bedrock will be noted (none, stain, sheen, blebs, stringers, saturated, pooled). The following definitions will be used to define contamination:

- None: No visual evidence of contamination is seen.
- Stain: Soil is discolored un-naturally, apparently from site contaminants.
- Sheen: No measurable contamination is observed, but the sample exhibits a silvery or rainbow sheen indicative of a non-aqueous phase liquid (NAPL) layer molecules thick.
- Blebs: Discontinuous droplets/spots of contamination are observed.
- Stringers: Continuous, discrete, contamination pathways are observed.
- Saturated: Contamination is infused within the entire soil matrix.
- Pooled: Contamination (e.g., NAPL) is observed at significant thicknesses, separate from the soil or bedrock matrix.

B. For overburden, continuous soil samples will be collected to the top of bedrock and visually classified. All soil cores collected will be described in writing as to: color (including the presence of mottling), grain size, sorting, cohesiveness, texture, moisture content/saturation, depth to water table, PID readings, presence of man-made objects such as brick fragments, metal scrap, or concrete, and the presence or absence of odors, staining, or other signs of contamination (e.g., coating on downhole tools, or lifting of contamination to the surface during sample recovery). If staining, discoloration, or contamination is noted along specific layers or other structures, the characteristics and stratigraphic position of these layers will be clearly noted.

C. Bedrock core logs will include the following information: time required to drill each run and the run length, an estimate of the volume of drilling water lost during each run, the drill type and size, depth to water, indications of fluid flow, lithology, texture, color, recovery, weathering, fractures and breaks with an assessment if they are natural or mechanical, rock quality designation (RQD), PID readings, presence or absence of odors, staining, or other signs of contamination (e.g., coating on downhole tools, or lifting of contamination to the surface during sample recovery). If staining, discoloration, or contamination is noted along specific structures or fractures, the characteristics and stratigraphic position of these layers will be clearly noted, and any other pertinent information.

2.4 Rock Coring

A. Advance a minimum of three, and up to five, borings using a 4.25-inch diameter hollow stem auger to the overburden/bedrock interface in order to verify that consistent fractures in similar zones. If the fractures are not consistent in the first three rock cores, then up to two additional rock cores will be obtained and analyzed. The boreholes will be cored using NQ wireline drilling to a depth of 30 feet BGS.

B. Upon recovery of the cores, each rock core shall be placed in wooden core boxes. The geologic characteristics shall be inspected and recorded. Each core box shall be labeled with the facility name, well I.D. and depth range.

C. Upon completion of the coring, the rock borehole shall be reamed to six inches in diameter using an air rotary drill rig to depth of approximately 30 feet.

2.5 Well Casing and Screen

A. Monitoring Wells

1. The well riser shall be 2-inch inner diameter (I.D.) Schedule 40 PVC pipe. The well riser will be installed below the ground surface as shown in Figure 4. When installed, the surface casing shall be flush with the ground surface. The surface casing shall be joined by welding or through the use of outside threaded couplings.

2. The 2-inch Schedule 40 PVC casing shall be flush threaded and joined by screwing the threaded joints together. No glue shall be used in the joining of casing sections. Well screens shall be new 2-inch diameter, Schedule 40 PVC, machine slotted, flush threaded on one end and sealed with a threaded PVC plug or sump on the other end. Slot size shall be 0.020-inch.

3. Screens shall be attached to the casing by screwing the threaded joints together. No glue shall be used to join the screen to the casing (riser pipe).

B. Injection Wells

1. The well riser shall be 2-inch inner diameter (I.D.) Schedule 40 PVC pipe. The well riser shall be installed below the ground surface as shown in Figure 4. When installed, the surface casing shall flush with the ground surface. The surface casing shall be joined by welding or through the use of outside threaded couplings.

2. The 2-inch Schedule 40 PVC casing shall be flush threaded and joined by screwing the threaded joints together. No glue shall be used in the joining of casing sections.

3. Well screens shall be new 2-inch diameter, Schedule 40 PVC, machine slotted, flush threaded on one end and sealed with a threaded PVC plug or sump on the other end. Slot size shall be 0.030-inch.

4. Screens shall be attached to the casing by screwing the threaded joints together. No glue shall be used to join the screen to the casing (riser pipe).

C. Casing and appurtenances shall be clean and free of all oil, grease and any other organic contamination. All casing will be contained in factory sealed,

individually wrapped packaging prior to use. Casing that is not packaged or is removed from damaged packing must be decontaminated on-site prior to installation. All persons handling screens shall wear clean, disposable latex gloves to prevent possible cross contamination.

D. Every effort shall be made to ensure casing plumbness and centralization within the borehole.

E. Centralizers may be employed as an optional method of ensuring centralization and plumbness.

2.6 Gravel Pack

A. A gravel pack will be placed around the outside of the screened section of the injection and monitoring wells.

B. Screen gravel pack shall be No. 2 well gravel pack, 100 percent passing the No. 8 sieve and less than 2 percent passing the No. 25 sieve, as supplied by the U.S. Silica Company, or approved equal. The No. 2 well gravel pack shall be clean, washed and graded silica sand supplied in sealed bags.

C. The pack shall be placed around the outside of the well screen by means of a tremie pipe or other method approved by the Environmental Professional to ensure that no bridging of the hole occurs and shall extend from the bottom of the borehole to a minimum of 2 feet above the top of the screen or as otherwise directed by the Environmental Professional.

2.7 Cement Bentonite Grout Mix

A. The bentonite utilized for the cement/bentonite grout needed to set the surface casing shall be sodium-based bentonite. The cement utilized for the cement/bentonite shall be Portland Cement Types I or II.

B. The cement bentonite grout mix ratio shall be 5 pounds bentonite, 94 pounds cement and 8.3 gallons of water. The target density is 13.9 pounds/gallon with an acceptable density range of 13.4 to 14.5 pounds/gallon.

C. All grout shall be allowed to cure for a minimum of 24 hours or as necessary to provide a proper cure prior to starting the next phase of work.

2.8 Bentonite Seal

A. The bentonite shall be ½ inch diameter with a dry bulk density of 82 lbs. per cubic foot and containing a minimum of 90 percent sodium montmorillonite. The pellets shall be capable of swelling to 10 to 15 times their dry volume when hydrated with potable water. The bentonite pallets shall be Volclay Tablets as manufactured by CETCO Drilling Products, or approved equal.

B. A bentonite seal shall be placed in the well by means of a tremie pipe or other method approved by the Engineer to ensure that no bridging of the hole occurs and shall extend from the top of the sand pack to a minimum of 2 feet above the sand pack, or as otherwise directed by the Engineer. In the event that bentonite pallets or chips are utilized for a bentonite seal above the water table, approved potable water shall be used for hydration.

C. The bentonite seal shall be allowed to hydrate for a minimum of 1 hour prior to grouting of the well annulus.

2.9 Well Caps and Protective Covers

A. Each well and well casing shall be protected from entry of foreign materials at all times and upon well completion fitted with a locking and flush mount steel road-box cover.

B. Temporary well guard and identifying flagging shall be provided and installed immediately upon well completion and prior to development and removal of the drill rig from the well site.

C. If the well is not complete at the end of the work day, the uncompleted borehole/well will be secured.

D. Upon completion of the well, a vented PVC "J" plug will be installed into the 2-inch PVC inner casing.

E. Upon completion of the well, a flushmount protective casing will be installed that can be secured with a lock.

F. Protective casings shall be furnished with drain holes to prevent collection of water inside the protective casing.

2.10 Cleaning Procedures

A. Sampling Equipment: All sampling equipment shall be, at a minimum, cleaned of all foreign matter, washed with a non-phosphate detergent, rinsed with potable water, then followed by a final rinse with distilled/deionized water in that order, or cleaned of foreign matter and steam cleaned at a temperature of 212°F and void of any external oils and greases prior to use in each well.

B. Contact Equipment: All contact equipment including sample pumps and hoses shall be cleaned and flushed between uses. This cleaning process will consist of steam cleaning of pump casing and cables followed by a 10-gallon flush of potable water through the pump. A new length of dedicated high-density polyethylene tubing shall be used for each well and disposed of after use. The pump, tubing and cables shall always be placed on clean high-density polyethylene sheeting to avoid contact with ground surface.

C. Drilling/Heavy Equipment: All drilling and heavy equipment including drill rigs, well casing and auger flights shall be cleaned after mobilization to and prior to demobilization from the project site and between individual locations on the site. The two options that are available and allowable to accomplish cleaning the heavy equipment include steam cleaning and manual scrub brushing and washing.

D. All equipment shall be stored aboveground in a clean manner as approved by the Engineer. All downhole equipment shall be stored in such a manner as to prevent contact with the ground surface.

E. Drilling fluid changes during borehole construction shall include cleaning of all drilling equipment in the manner described in this Section, in addition to the removal of drilling fluid in the borehole by flushing, bailing or air lift, as necessary to ensure clean fluid in the borehole.

F. All water used for drilling and cleaning must be potable.

G. A bermed and lined decontamination pad will be on-site on which to clean all equipment, materials and supplies. All decontamination fluids shall be contained, properly characterized, and disposed of off-site. The decontamination pad will be removed at the end of the drilling program.

2.11 Well Development

A. Each injection and monitoring well installed will be developed. Development shall be by airlift (in-line oil filter required), interrupted over-pumping with a submersible pump, surge block and bailer, or other methods approved by the Engineer. A minimum of five well volumes must be purged. Development shall continue until the well water is less than 50 NTUs as measured with a turbidity meter at minimum pumping rates of 5 gpm or until the Engineer approves cessation of development.

2.12 Well Acceptance Criteria

A. A well shall be developed to the point that it is producing water free of drilling fluid additives (if used) and is sediment-free. Sediment-free shall be defined as not more than 50 NTUs as measured with a turbidity meter. A minimum of 5 well volumes will be purged during well development.

B. In order to ensure that all wells are sufficiently straight a 1.5-inch diameter by 4-feet long dummy will be passed to the bottom of the PVC well screen to the bottom of the well.

3.0 REAGENT INJECTIONS

3.1 General

A. The injections shall be performed in one phase.

B. All wetted parts of the injection system shall be compatible with the reagent (i.e., 3-D Microemulsion, S-MZVI and BDI Plus) being injected. Material information sheets are provided in Appendix D.

C. The injection system components shall be sized to efficiently perform the injections without constantly stopping to mix additional reagents.

D. A secondary containment area lined with material that is resistant to the reagent being injected around the injection system and reagent storage area shall be constructed. The secondary containment area shall be capable of holding 110% of the total storage volume.

E. All lines feeding any mixing tanks (reagent lines, water lines, etc.) and all lines used for injecting the mixed reagent shall be metered so that the volume transferred can be accurately measured. Secondary containment shall be provided for all lines to contain all spills/leaks.

F. Potable water shall be used for chemical mixing and injection. Groundwater shall not be utilized as a water source.

G. All hoses, conveyance piping cam locks, pressure gauges, flow meters and backflow preventers shall be compatible with the reagents.

H. All fittings shall be leak proof and properly installed to prevent spills.

I. A ball valve, globe valve and pressure gauge shall be provided on the injection line immediately prior to the injection well. Hose fittings shall be equipped with the ability to disconnect the hoses without having to unthread parts.

J. The empty reagent containers shall be disposed of in accordance with all federal, state and local laws and regulations. At a minimum, at the completion of the reagent injection and prior to disposal off-site, the containers will be rinsed with 5 gallons of water and transfer the water to a mixing tank. The Contractor shall rinse each container 2 to 3 times. All rinsate shall be containerized and disposed of off-site in accordance with all applicable federal, state and local requirements.

3.2 Regenesis Reagent (3-D Microemulsion, S-MZVI, BDI Plus)

A. The reagent shall consist of 400 pounds of 3-D Microemulsion, 300 pounds of S-MZVI and 18 liters of BDI Plus as manufactured by Regenesis. Safety Data Sheets (SDS) for the 3-D Microemulsion and S-MZVI are provided in

Appendix C. The Regenesis Application Design Summary is provided in Appendix F.

B. The 3-D Microemulsion, S-MZVI and BDI Plus shall be mixed with mix water in accordance with the manufacturer's recommendations utilizing equipment recommended by the manufacturer. Please see Appendix E for application and handling guidelines.

C. The reagent mixture shall be injected at the location shown on Figure 3. The following table presents the application summary of 3-D Microemulsion, S-MZVI and BDI Plus, including field mixing ratios for the injection point:

No. of Injection Points	3DME concentrate per point (gals)	Mix water per point (gals)	S-MZVI volume per point (lbs)	BDI Plus volume per point (L)	BDI Plus mix water volume per point (gals)
1	48	1,869	20	18	180

Total Volume: 2,122 gals

D. When delivering anaerobic microbes such as BDI, a volume of deoxygenated water using an oxygen scavenger such as sodium ascorbate will be prepared. The BDI is delivered independently of the 3DMe and ZVI. The 3DMe and ZVI will be injected into the well and then the BDI will be injected into the well. The exact volume of deoxygenated water used to deliver the BDI will be determined once the lithology of the zone is evaluated.

3.3 Injection

A. The system will be tested with water prior to utilizing any reagents in the system. The initial startup will allow for system checking including any leaks in the piping, fittings, valves, flow meters or pumps. A leak check shall be conducted with a recirculating line set with restriction to gain pressure. Pressure will not exceed 20 pounds per square inch (psi). Leaks will be repaired before proceeding to reagent solution preparation and injection.

B. Following the completion of the initial startup and potable water injection to prime the system, field personnel shall mix the Regenesis reagents in accordance with the mixing ratios provided in the table above.

C. The mixed reagent will be pumped into the injection well. During the injection process, injection parameters to be monitored and recorded are flow rate, injection pressure and injection volume.

D. Injection will begin at a slow rate and increase the injection rate based upon the injection pressure and system response. The initial injection rate shall be within a

range of between 10 and 20 psi to prevent the reagent from daylighting. The reagent injection sequencing will be based on field conditions encountered after mobilization. The system shall be checked continuously for leaks and proper operation, and pressure shall be monitored with a pressure gauge at the injection well head. The pressure is expected to increase, but shall not exceed 50 psi.

E. During the reagent injection process groundwater will be monitored from two cross gradient monitoring wells, two downgradient monitoring wells and one existing upgradient FLUTe well. The monitoring wells will be monitored for field parameters such as a specific conductance, turbidity, pH, oxidation-reduction potential (ORP), and dissolved oxygen (DO). The intent of the parameter monitoring is to document any changes in specific conductance, turbidity and pH, that may be indicative of reagent communication in the upper groundwater unit in the cross-gradient and downgradient areas of the Site.

F. At the completion of the injection, the injection system tanks will be rinsed with approximately 15 - 25 gallons of water. This process shall be repeated approximately 2 to 3 times. All rinsate shall be containerized and disposed of off-site in accordance with all applicable federal, state and local requirements.

3.4 Pre-Injection Groundwater Monitoring

A. Groundwater samples will be collected from the injection well, four groundwater monitoring wells and existing well MW-4 (converted to a groundwater monitoring well from VA-RC-4). Groundwater sampling will not occur within seven days of well development. This monitoring will be performed by the Environmental Professional.

B. Prior to groundwater sampling, each well will be surveyed by a New York State licensed surveyor. Groundwater level measurements will be obtained from each of the wells to be sampled. All water level measurements will be made using a fixed reference point at each measurement location. Prior to collection of groundwater level measurements, the headspace of the well will be measured utilizing a PID as soon as the well cover is opened. Downhole instruments will be decontaminated between each measurement location. The static water level will be measured to the nearest 0.01 foot.

C. Groundwater samples from the wells to be sampled will be collected using low-flow sampling. Initially, the required purge volume will be calculated and once the minimum purge volume is removed the field quality indicator parameters (i.e. temperature, ORP, conductivity, pH, DO and turbidity) will be monitored. Indicator parameters will be monitored every 5 minutes or however long it takes to purge one flow cell volume, whichever is longer, and recorded in the field log. The well shall be considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings. If groundwater recovery is very slow, it may be necessary to wait several hours, or overnight, for sufficient volume to become available for the necessary sample

analyses. The groundwater sample from MW-4 (converted to a groundwater monitoring well from VA-RC-4) will be collected in a similar manner (monitoring parameters) and groundwater intervals as the March 2021 groundwater sampling event.

D. Collected groundwater samples will be submitted to Test America of Buffalo, New York for the following analysis:

- VOCs by USEPA Method 8260B;
- Metals by USEPA Method 6010/7410;
- Sulfate and Chloride by USEPA Method 300.1;
- Sulfide by USEPA Method 376.2;
- Nitrate and Nitrite by USEPA Method 353.2;
- Ferric Iron by USEPA Method 200.7;
- Ethene, Ethane, Methane, Acetylene by USEPA Method 5021A (RSK Method 175);
- Alkalinity by USEPA Method 310.2;
- Total organic carbon/dissolved carbon by USEPA Method 9060A;
- Total organic carbon by USEPA Method SM5310D; and
- Polyfluoroalkyl Substances (PFAS) by USEPA Method 537.1.

E. Test America of Buffalo, New York is a NYSDOH ELAP certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used to analyze samples collected during the site investigation. Upon receipt of shipped samples at the laboratory, the laboratory's sample custodian will inspect the samples for integrity and check the shipment against the chain-of-custody. Discrepancies are reported to the laboratory's project manager who contacts Synapse for resolution.

When the shipment and chain-of-custody are in agreement, the sample custodian will enter the samples into the Laboratory Information System and will assign each sample a unique laboratory number. This number will be affixed to each sample bottle. The sample custodian will then enter the sample and analysis information into the laboratory computer system.

The laboratory will implement the following standard operating procedures for laboratory/sample security within the laboratory facility:

- Samples are stored in a secure area;
- Access to the laboratory is through a monitored area;
- Visitors sign a visitor's log and are escorted while in the laboratory;
- Only the designated sample custodians have keys to the sample storage area(s); and,
- Transfers of samples in and out of storage are documented.

While in the laboratory, samples that require storage at 4°C +/- 2°C will be stored in a locked refrigerator unless they are being used for analysis. The laboratory's sample custodian will be responsible for sample storage and security to ensure that:

- Samples and extracts are stored for 60 days after the final analytical data report has been forwarded to Synapse. The samples, extracts, and sample digestion byproducts are then discarded in accordance with the Occupational Safety and Health Administration guidance; and

- Samples are not stored with standards or sample extracts.

F. Appropriate Quality Assurance/Quality Assurance (QA/QC) samples including Matrix Spike/Matrix Spike Duplicates (MS/MSD), trip blanks, field blanks and equipment blanks in accordance with NYSDEC DER-10 and NYSDEC guidance for the Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances will be collected. Analytical methods and the quality assurance summary is provided in Table 1.

G. All sampling will be performed in accordance with the requirements of NYSDEC DER-10 and NYSDEC guidance for the Sampling, Analysis and Assessment of Per- and Polyfluoroalkyl Substances will be collected and will be handled separately from other samples. The following guidelines will be observed during sampling events:

1. Ensure field clothing, including boots, does not contain Gore-Tex or Tyvek.

2. Gloves will be made of nitrile, no latex gloves will be worn.

3. All safety boots are constructed of polyurethane or polyvinyl chloride.

4. Field crews should avoid fabric softener use in clothing, cosmetics, moisturizers, hand cream, unauthorized sunscreen or insect repellent.

5. There should be no Teflon or LDPE containing materials int eh sampling train, use HDPE, stainless steel, acetate, silicon or polypropylene.

6. There will be no waterproof field books, plastic clipboards, binders or spiral hard cover notebooks on site.

7. Fill coolers with only regular ice, no chemical ice packs.

8. Sample containers and caps must be made of HDPE or polypropylene.

9. Use PFAS-free water for decontamination with Alconox or Liquinox.

10. Restrict food to water and hydrations drinks in the staging areas away from sample collection points.

11. Use a pen to clearly label each collected sample with the sample ID, sample source, and the time and date of collection for accurate identification. No permanent marker should be used.

H. Laboratory analytical reports will be provided to NYSDEC within 7 days of receipt from the laboratory.

I. Laboratory deliverables shall conform to the NYSDEC's Analytical Services Protocol (ASP) Category B deliverables and will include an electronic data deliverable (EDD). All groundwater data will be validated and uploaded to the EQuIS database.

3.5 Post Injection Groundwater Monitoring

A. A minimum of three consecutive rounds of groundwater monitoring occurring approximately 30, 60 and 90 days following the completion of the reagent injection program shall be completed.

B. Groundwater samples will be collected from the injection well, four groundwater monitoring wells and existing well MW-4 (converted to a groundwater monitoring well from VA-RC-4). This monitoring will be performed by the Engineer.

C. Prior to groundwater sampling, groundwater level measurements will be obtained from each of the newly installed wells. All water level measurements will be made using a fixed reference point at each measurement location. Prior to collection of groundwater level measurements, the headspace of the well will be measured utilizing a PID as soon as the well cover is opened. Downhole instruments will be decontaminated between each measurement location. The static water level will be measured to the nearest 0.01 foot.

D. Groundwater samples from the wells to be sampled will be collected using low-flow sampling. Initially, the required purge volume will be calculated and once the minimum purge volume is removed the field quality indicator parameters (i.e. temperature, ORP, conductivity, pH, DO and turbidity) will be monitored. Indicator parameters will be monitored every 5 minutes or however long it takes to purge one flow cell volume, whichever is longer, and recorded in the field log. The well shall be considered stabilized and ready for sample collection when the indicator parameters have stabilized for three consecutive readings. If groundwater recovery is very slow, it may be necessary to wait several hours, or overnight, for sufficient volume to become available for the necessary sample analyses. The groundwater sample from MW-4 (converted to a groundwater monitoring well from VA-RC-4) will be collected in a similar manner (monitoring parameters) and groundwater intervals as the March 2021 groundwater sampling event.

E. Sampling procedures and analytical requirements will be the same as specified in Section 3.4 of the Work Plan. Collected groundwater samples will be submitted to Test America of Buffalo, New York for the following analysis:

- VOCs by USEPA Method 8260B;
- Metals by USEPA Method 6010/7410;
- Sulfate and Chloride by USEPA Method 300.1;
- Sulfide by USEPA Method 376.2;
- Nitrate and Nitrite by USEPA Method 353.2;
- Ferric Iron by USEPA Method 200.7;
- Ethene, Ethane, Methane, Acetylene by USEPA Method 5021A (RSK Method 175);
- Alkalinity by USEPA Method 310.2;
- Total organic carbon/dissolved carbon by USEPA Method 9060A;
- Total organic carbon by USEPA Method SM5310D; and
- PFAS by USEPA Method 537.1.

The first round of samples collected from the new monitoring wells will be analyzed for PFAS. An assessment will be made based on the analytical results of those samples as to the need for additional PFAS analysis of samples from later sampling rounds. Samples analyzed for PFAS will be handled separately from other samples. The following guidelines will be observed during PFAS sampling events:

1. Ensure field clothing, including boots, does not contain Gore-Tex or Tyvek.
2. Gloves will be made of nitrile, no latex gloves will be worn.
3. All safety boots are constructed of polyurethane or polyvinyl chloride.
4. Field crews should avoid fabric softener use in clothing, cosmetics, moisturizers, hand cream, unauthorized sunscreen or insect repellent.
5. There should be no Teflon or LDPE containing materials int eh sampling train, use HDPE, stainless steel, acetate, silicon or polypropylene.

6. There will be no waterproof field books, plastic clipboards, binders or spiral hard cover notebooks on site.

7. Fill coolers with only regular ice, no chemical ice packs.

8. Sample containers and caps must be made of HDPE or polypropylene.

9. Use PFAS-free water for decontamination with Alconox or Liquinox.

10. Restrict food to water and hydrations drinks in the staging areas away from sample collection points.

11. Use a pen to clearly label each collected sample with the sample ID, sample source, and the time and date of collection for accurate identification. No permanent marker should be used.

F. Test America of Buffalo, New York is a NYSDOH ELAP certified laboratory meeting the requirements for sample custody procedures, including cleaning and handling sample containers and analytical equipment, will be used to analyze samples collected during the site investigation. Upon receipt of shipped samples at the laboratory, the laboratory's sample custodian will inspect the samples for integrity and check the shipment against the chain-of-custody. Discrepancies are reported to the laboratory's project manager who contacts Synapse for resolution.

When the shipment and chain-of-custody are in agreement, the sample custodian will enter the samples into the Laboratory Information System and will assign each sample a unique laboratory number. This number will be affixed to each sample bottle. The sample custodian will then enter the sample and analysis information into the laboratory computer system.

The laboratory will implement the following standard operating procedures for laboratory/sample security within the laboratory facility:

- Samples are stored in a secure area;
- Access to the laboratory is through a monitored area;
- Visitors sign a visitor's log and are escorted while in the laboratory;
- Only the designated sample custodians have keys to the sample storage area(s); and,
- Transfers of samples in and out of storage are documented.

While in the laboratory, samples that require storage at 4°C +/- 2°C will be stored in a locked refrigerator unless they are being used for analysis. The laboratory's sample custodian will be responsible for sample storage and security to ensure that:

- Samples and extracts are stored for 60 days after the final analytical data report has been forwarded to Synapse. The samples, extracts, and sample digestion byproducts are then discarded in accordance with the Occupational Safety and Health Administration guidance; and,

- Samples are not stored with standards or sample extracts.

G. Appropriate Quality Assurance/Quality Assurance (QA/QC) samples including Matrix Spike/Matrix Spike Duplicates (MS/MSD), trip blanks, field blanks and equipment blanks in accordance with NYSDEC DER-10. Analytical methods and the quality assurance summary is provided in Table 1.

H. All sampling will be performed by the Engineer in accordance with the requirements of NYSDEC DER-10.

I. Laboratory analytical reports will be provided to NYSDEC within 7 days of receipt from the laboratory.

J. Laboratory deliverables shall conform to the NYSDEC's Analytical Services Protocol (ASP) Category B deliverables and will include an electronic data deliverable (EDD). All groundwater data will be validated and uploaded to the EQuIS database.

FIGURES

SOURCE: USGS 7.5 MIN. TOPOGRAPHIC QUADRANGLES: OSWEGO WEST, N.Y., 1954, PHOTOREVISED 1978 AND OSWEGO EAST, N.Y., 1954, PHOTOREVISED 1978.

APPROXIMATE GRAPHIC SCALE:

0 2000' 4000'

P: EPA
5/18/17
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-SL3.DWG

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SYNAPSE PROPERTY RESOURCES
360 ERIE BLVD. EAST
SYRACUSE, NEW YORK 13202

HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

SITE LOCATION MAP

PROJECT NO.: HSGVIS-24-16-05

DATE: MAY 2017

FIGURE NO.: 1

APPROXIMATE SITE BOUNDARY

PROPOSED EXCAVATION AREA (APPROXIMATE)

ACTUAL EXCAVATION AREA (APPROXIMATE)

NOTES:

1. 2021 AERIAL PHOTOGRAPH FROM NYSGIS CLEARINGHOUSE WEBSITE.
2. ALL LOCATIONS ARE APPROXIMATE.

0 60' 120'

GRAPHIC SCALE

P: BL
4/19/21
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-B08.DWG

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SYRACUSE, NEW YORK 13202

HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

LIMITS OF REMEDIAL EXCAVATIONS

PROJECT NO.: HSGVIS-24-16-05
DATE: AUGUST 2021
FIGURE NO.: 2

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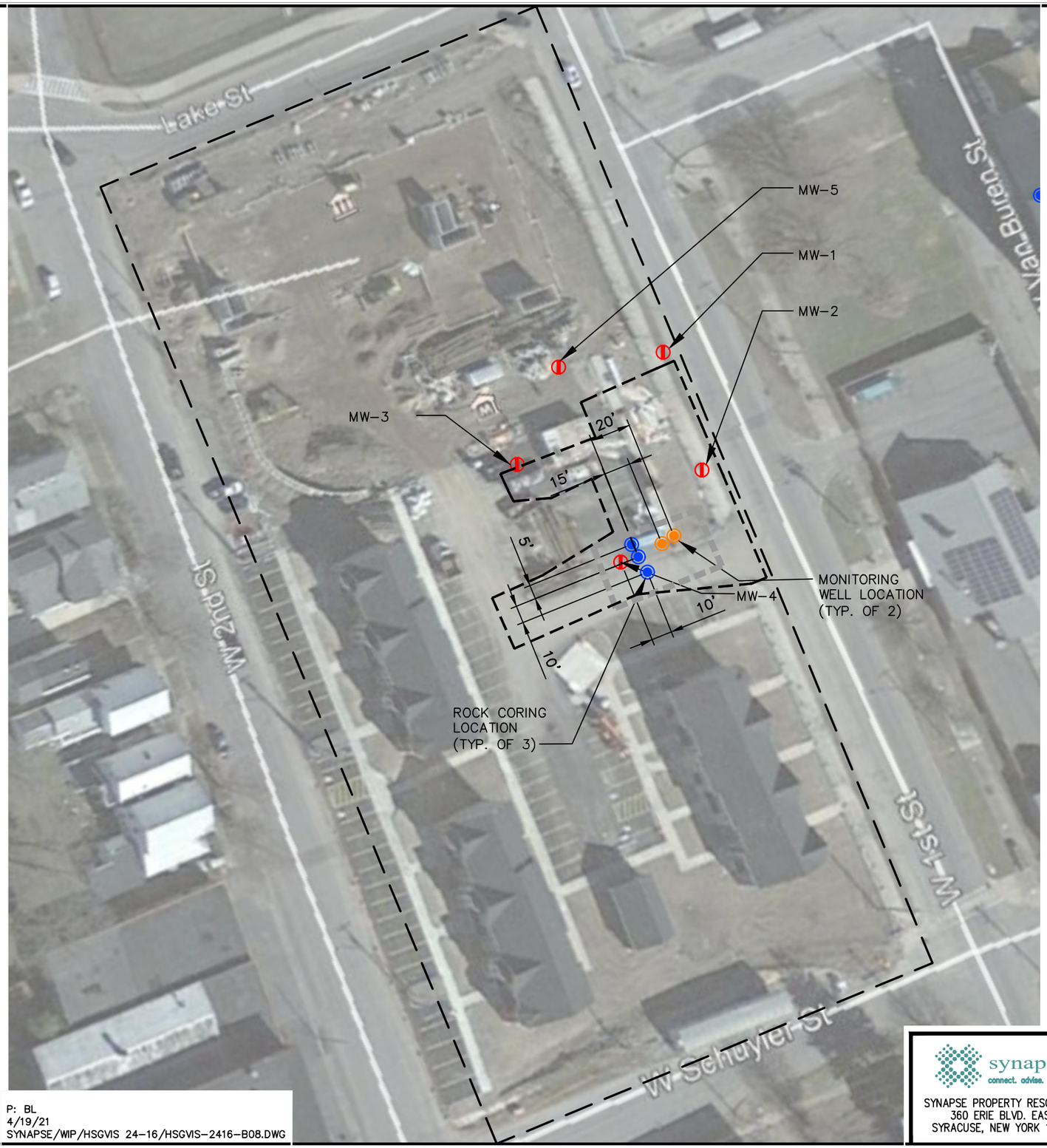

LEGEND

- APPROXIMATE SITE BOUNDARY
- ROCK CORING LOCATION
- MONITORING WELL LOCATION
- EXISTING WELLS
- ACTUAL EXCAVATION AREA (APPROXIMATE)
- APPROXIMATE WORK ZONE AREA

NOTES:

1. 2021 AERIAL PHOTOGRAPH FROM NYSGIS CLEARINGHOUSE WEBSITE.
2. ALL LOCATIONS ARE APPROXIMATE.
3. RESULTS OF ROCK CORINGS WILL BE USED TO SELECT FINAL INJECTION WELL AND MONITORING WELL LOCATIONS.
4. BASED ON THE RESULTS OF THE FIRST 3 ROCK ORINGS, UP TO 2 ADDITIONAL ROCK CORINGS MAY BE COMPLETED AT THE PROPOSED MONITORING WELL LOCATIONS.

0 60' 120'

GRAPHIC SCALE

P: BL
4/19/21
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-B08.DWG

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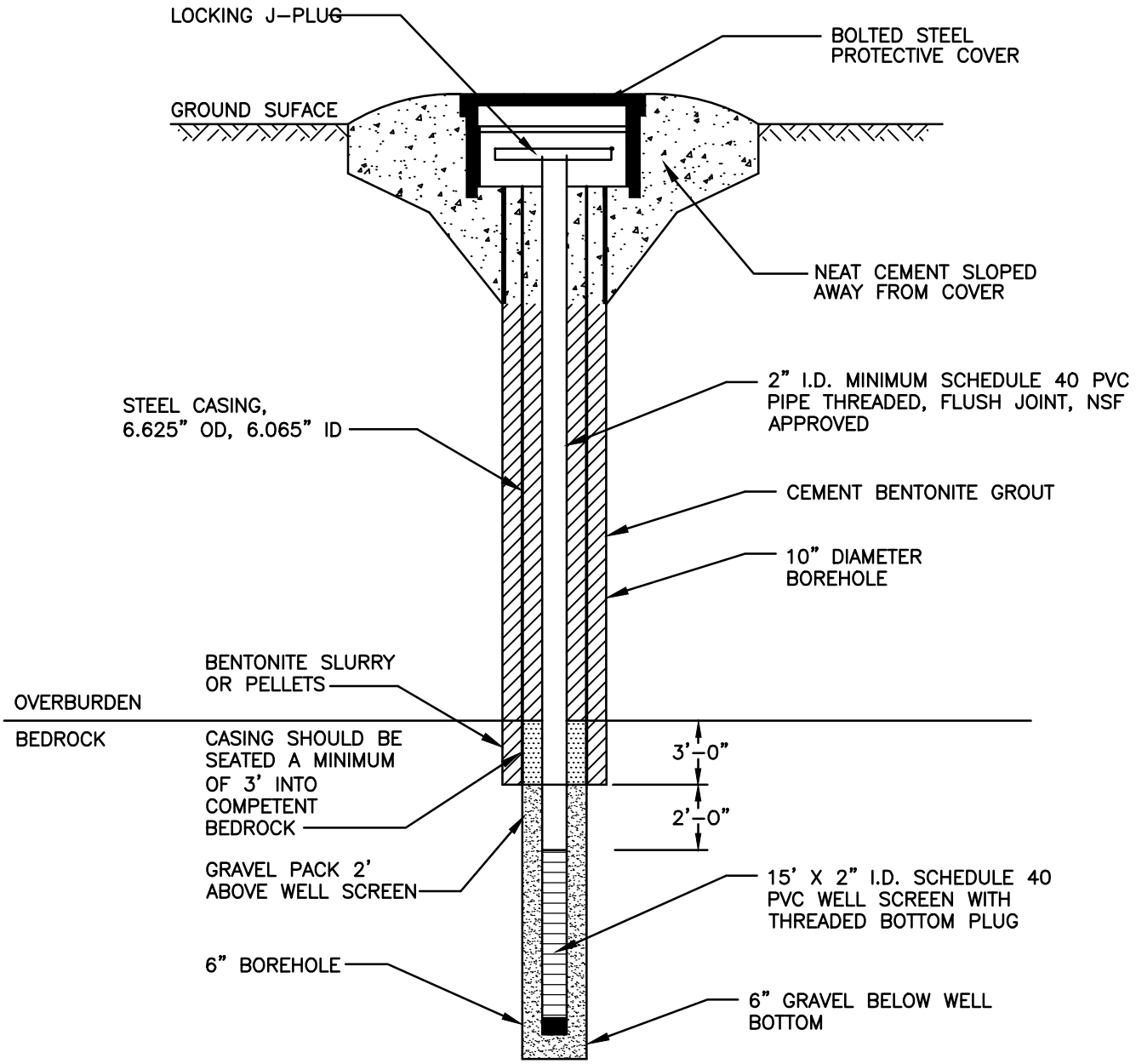
HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

PROPOSED WELL LOCATIONS

PROJECT NO.: HSGVIS-24-16-05
DATE: AUGUST 2021
FIGURE NO.: 3

F:\5277\dwg\5277-C-SP04_workplan.dwg, 8/5/2021 3:50:48 PM



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PLAN FOR CONSTRUCTION OF BEDROCK MONITORING/INJECTION WELLS

FIGURE 4

TABLES

TABLE 1

Analytical Methods/Quality Assurance Summary Table
Harbor View Square
68 West First Street
Oswego, New York
NYS BCP Site No. C738040

Sample Marix Type	Sample Frequency	Equipment Blank Frequency	Trip Blank Frequency	Analyitcal Parameters	Anaytical Method	Analytical Reporting Requirement	Reporting Limit	Matrix Spike Frequency	Field Duplicate Frequency	Sample Preservation	Sample Container Type and Volume	Method Hold Time
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	1 per cooler	VOCs	USEPA Method 8260C	Category B	1.00 ug/L	5%	5%	HCl	3 - 40 mL vials	14 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Metals	USEPA Method 6010C/7410	Category B	0.002-0.01 mg/L	5%	5%	NHO3	500 mL plastic	180 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Sulfate and Chloride	USEPA Method 300.1	Category B	2.00 and 0.50 mg/L	5%		None	60 mL plastic	28 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Sulfide	USEPA Method SM4500 S2	Category B	1.00 mg/L	5%		Zinc Acetate and NaOH	250 mL plastic	7 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Nitrate and Nitrite	USEPA Method 353.2	Category B	0.02 mg/L	5%		None	250 mL plastic	48 hours
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Ferric Iron	USEPA Method SM4500 FE	Category B	0.0075 mg/L	5%		None	125 mL plastic	IMMEDIATELY/180 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Ethene, Ethane, Methane, Acetylene	USEPA Method 5021A (RSK Method 175)	Category B	1.00-5.00 ug/L	5%		HCl	3-50 mL vials	14 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Total organic carbon/dissolved carbon	USEPA Method 9060A	Category B	1.00 mg/L	5%		HCl	2-40 mL vials	28 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	NA	NA	Total organic carbon	USEPA Method SM5310D	Category B	1.00 mg/L	5%		HCl	2-40 mL vials	28 days
Groundwater	MW-6, MW-7, MW-8, MW-9, VA-RC-4	1 per cooler	NA	Polyfluoroalkyl Substances (PFAS)	USEPA Method 537.1	Category B	2.00-5.00 ng/L	5%		None	(2) 250 mL polypropylene	14 days/40 days

APPENDIX A

HEALTH AND SAFETY PLAN

Site-Specific
Health and Safety Plan for

Harbor View Square
68 West First Street
Oswego, New York
NYS BCP Site No. C738040

Prepared by:

Synapse Property Resources
360 Erie Boulevard East
Syracuse, New York 13202

SYNAPSE
HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

CLIENT: Harbor View Square, LLC

SITE NAME: Harbor View Square

PROJECT NAME: Brownfield Cleanup Program Remediation

PROJECT NUMBER: *HSGV 24-16*

START DATE: April 15, 2017

END DATE: November 15, 2019

Roger R. cREIGHTON Project Manager	Signature:_____	Date:_____
Roger Creighton Synapse Health and Safety Coordinator	Signature:_____	Date:_____
Varies Site Health and Safety Officer	Signature:_____	Date:_____
Brian Macrae Managing Partner	Signature:_____	Date:_____

This Health and Safety Plan has been written for the use of Synapse Property Resources (*Synapse)* employees and approved *Synapse* subconsultants, subcontractors and clients.

Our work can be hazardous, and it is imperative that we never forget that! It is the intent of this document to address our risks. The health and safety guidelines in this Plan were prepared specifically for this site, its conditions, purposes, dates and personnel and must be amended if conditions change. This Plan must not be used on any other site without prior research by trained health and safety specialists.

Synapse claims no responsibility for its use by others for purposes unrelated to this project. This Plan will provide useful information to subcontractors and will assist them in developing their own HASP. Subcontractors and subconsultants should sign this plan (See Attachment 7) as an acknowledgement of hazard information and notice that they must ensure that the risks posed by work on this site are addressed. Synapse is readily available to assist subcontractors in identifying and addressing their employees' risks.

TABLE OF CONTENTS

ATTACHMENTS

1.0 Objectives and Goals of this HASP

The purpose of this HASP is to:

- **Document a proactive, scientific exposure assessment for this site and project that identifies and provides an understanding of health and safety risks.**
- **Document proactive precautions to avoid the risks and stay safe.**

Our goal of this HASP is to:

- **Complete site work described in the Remedial Work Plan without any incidents; no injuries, no illnesses, no impacts to the environment or to property and equipment. NONE! We have zero tolerance for incidents of any type. We expect all subcontractors and other project participants to share this goal.**
- **Comply with the provisions and requirements set forth by OSHA.**

2.0 Scope of Work

The Scope of Work includes the implementation of the Brownfield Cleanup Program Remedial Work Plan (RWP), which will consist of a series of plans. This HASP was prepared for the use of Synapse personnel and subcontractors while performing the following tasks:

Bedrock Drilling and Sampling

This task will include observation of the installation of five bedrock holes at the site, as described in the Pre-Design Investigation Work Plan (PDIWP).

Archeological Survey

This task will consist of observation of the archeological survey. Several exploration trenches will be advanced in the area of the former Fort Oswego, as shown in Attachment 1.

Contaminated Soil Excavation and Clean Fill Placement

This task includes the excavation of existing contaminated site soils in the area of the former UST, beneath the former process lines, and beneath Sump 1 and Sump 2. Upon removal of the soils, soil samples will be collected from the excavation base and sidewalls. The collected samples will be submitted for laboratory analysis under standard chain-of-custody protocols to confirm all contamination was successfully removed. Synapse anticipates the excavation to extend to bedrock, expected to be between two and five feet below ground surface (bgs). If additional contamination remains on the bedrock surface, a remediating compound will be applied to the base of the excavation. The excavation will then be backfilled with certified clean fill, mechanically compacted into place.

Bedrock Injections

This task includes observation of injections into the bedrock. This plan will be updated to include the scope of work for the injection progam when it has been defined.

3.0 Background Information on the Project Site

The Site is located at 68 West First Street in the City of Oswego, Oswego County. The Site covers approximately 2.438 acres and consists of the block bounded by West First Street to the east, West Second Street to the west, West Schuyler Street to the south and Lake Street to the north. The northwestern portion of the site is covered by a one-story concrete slab-on grade, steel-framed masonry building which covers approximately 20,900 square feet. The primary contaminants of concern (COCs) for the site include several chlorinated volatile organic compounds (CVOCs); specifically tetrachloroethene (PCE) and trichloroethene (TCE) and their degradation products, which include 1,1-dichloroethene (1,1-DCE), cis-1,2-dichloroethene (cis-1,2-DCE), trans-1,2-dichloroethene (trans-1,2-DCE), and vinyl chloride (VC). Other COCs of interest include; several metals, including lead, mercury and others, as well as polycyclic organic hydrocarbons (PAHs).

4.0 Property Owner Safety Procedures

Not applicable.

5.0 Site Plan

A site plan is included in **Attachment 1.**

6.0 Emergency Response

If an incident occurs, the following steps will be taken

- *The Site Health & Safety Officer (SHSO) will evaluate the incident and assess the need for assistance and/or evacuation.*
- *The SHSO will call for outside assistance as needed.*
- *The SHSO will act as liaison between the outside agencies and on-site personnel.*
- *The SHSO will ensure that the Project Manager (PM) and Synapse(HR) are notified of the incident; and*
- *The SHSO will take appropriate measure to stabilize the incident scene.*

The SHSO must be familiar with the directions to the hospital given in **Attachment 2.**

Injury or Illness

If an injury or illness occurs, take the following action:

- Determine if emergency response (fire/ambulance) support is necessary. If so, dial **911**. Provide the location of the injured person and other details as requested. If it makes sense to take an individual to the hospital, follow the directions in **Attachment 2.**

- Get First Aid for the person immediately. Utilize first aid kit in vehicle. Also utilize the bloodborne pathogens kit. *(Make sure you have both kits, or one combined kit).*

- Notify the SHSO immediately. The SHSO is responsible for preparing and submitting the Incident/Near Miss Investigation Report to Synapse's within 24 hours of the incident, as well as notifying the employee's supervisor and Project Manager. Use the Incident/Near Miss Investigation Report and Root Cause Analysis Flowchart in **Attachment 3**. Synapse phone is (315) 475-3700. ***(Note: All incidents must be reported to Synapse within 24 hours, but the actual investigation need not be completed within 24 hours.)***

- The SHSO will assume responsibility during a medical emergency until more qualified emergency response personnel arrive at the site.

First Aid Procedures for Minor Cuts, Scratches, Bruises, etc.

- Each occupational illness or injury shall be reported immediately by employees to SHSO. The SHSO will complete the Incident/Near Miss Investigation Report in **Attachment 4** and report the incident to Synapse.

Medical Cases Not Requiring Ambulance Service

- Medical cases normally not requiring ambulance services are injuries such as minor lacerations, minor sprains, etc.

- The SHSO will ensure prompt transportation of the injured person to a physician or hospital following the directions in **Attachment 2**.

- A representative of Synapse/sub-contractor should always drive the injured employee to the medical facility and remain at the facility until the employee is ready to return.

- If the driver of the vehicle is not familiar with directions to the hospital, a second person shall accompany the driver and the injured employee to the hospital

- If it is necessary for the SHSO to accompany the injured employee, provisions must be made to have another employee, properly trained and certified in first aid, to act as the temporary SHSO.

- If the injured employee is able to return to the jobsite the same day, he/she should bring with him/her a statement from the doctor containing such information as:

- Date
- Employee's name
- Diagnosis
- Date he/she is able to return to work, regular or light duty
- Date he/she is to return to doctor for follow-up appointment, if necessary
- Signature and address of doctor

If the injured employee is unable to return to the jobsite the same day, the employee who transported him should bring this information back to the jobsite and report it to Synapse at (315) 475-3700 and Synapse Health & Safety Coordinator, Roger Creighton at (315) 849-0905.

Emergency Cases Requiring Ambulance Services

♦ Medical cases requiring ambulance services would be such cases as severe head injuries, amputations, heart attacks, etc.

♦ Should ambulance service be necessary, the following procedures should be taken immediately.

- Contact necessary ambulance service and company emergency services by dialing **911** and notify the SHSO for the site.
- Administer first aid until ambulance service arrives.
- While the injured employee is being transported, the SHSO should contact the medical facility to be utilized.
- One designated representative should accompany the injured employee to the medical facility and remain at the facility until final diagnosis and other relevant information is obtained.

Death of an Individual or Hospitalization of Three or More Employees

The procedure as outlined in "First Aid and Medical Cases", above, should be followed. If the injured person dies, then SYNAPSE, local officials and coroner must be notified ***immediately***. Synapse will notify the **local OSHA office within 8 hours of the incident or fatality** in the event of fatality or hospitalization of three or more employees.

Response to Spills or Cut Lines

Prevent problems by documenting the location of underground lines (e.g., product, sewer, telephone, fiber optic) before starting site work. If a line or tank is drilled through, or another leak occurs, document the event as soon as possible using the Incident Investigation Report in **Attachment 3. Notification of the event must be made to Synapse immediately**. Include dates, times, actions taken, agreements reached, and names of people involved. Use additional pieces of paper to document the event completely. The SHSO, PM and client must be notified immediately. The PM will notify the regulatory authority or utility as necessary.

In the event of a spill/release, follow this plan:

1. Stay upwind of the spill/release.
2. Wear appropriate PPE.
3. Turn off equipment and other sources of ignition.
4. Turn off pumps and shut valves to stop the flow/leak.
5. Plug the leak or collect drippings, when possible.
6. Use sorbent pads to collect product and impede its flow, if possible.
7. Call Fire Department immediately if fire or emergency develops.
8. Inform Synapse Project Manager about the situation.
9. Determine if the client wants Synapse to repair the damage or if the client will use an emergency repair contractor.
10. Based on agreements, contact emergency spill contractor for containment of free product.
11. Advise the client of spill discharge notification requirements and determine who will complete and submit forms. *(Do not submit or report to agencies without the client's consent.)* Document each interaction with the client and regulators and note, in writing; name, title, authorizations, refusals, decisions, and commitments to any action.
12. Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soils / product may meet criteria for hazardous waste.
13. Do not sign manifests as generator of wastes; contact PM to discuss waste transportation.

Notifications – a spill/release requires completion of an Incident Investigation (II) as per Synapse's LPS program. **The PM must involve the client/generator in the Incident Investigation process. Synapse's incident investigation form must be completed (see Attachment 3) and submitted to Synapse within 24 hours. The client/generator is under obligation to report to the proper government agencies. If the spill extends into waterways, the Coast Guard and the National Response Center (800) 424-8802 must be notified immediately by the client or with his permission.**

All spills/releases must be reported to NYSDEC Hotline at (800) 457-7362 immediately after spill/release identification.

7.0 Contractor Emergency Action Plan

The SHSO will ensure that the Subcontractor/Contractor is capable of efficient evacuation/emergency response in the event of an emergency. Subcontractor/Contractor's employees will be trained by their employer in site-specific evacuation/emergency procedures, including alarm systems and evacuation plans and routes.

The Subcontractor/Contractor shall instruct its employees that in the event of an emergency such as a fire, release, or accident involving injuries, they are required to dial **911**. The reporting employee is to state the problem clearly and fully and remain on the line until dismissed by the operator.

Synapse staff and Subcontractor/Contractors working in an area where an emergency exists shall evacuate to a safe location, preferably upwind, away from the area and take attendance. The gathering location will be: **on the corner of West First and West Schuyler Streets**.

(If the emergency causes the route to a gate surrounding the site is closed, the Synapse staff and Subcontractor/Contractors shall move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (i.e., police, fire, ambulance, paramedics, etc.) to do otherwise.)

Subcontractor/Contractor has the responsibility to account for its own employees and to provide such information immediately to emergency response personnel upon request.

Synapse staff and Subcontractor/Contractor may not reenter the emergency site without specific approval from emergency response personnel.

In the event of fire ignition in close proximity to Synapse staff and Subcontractor/Contractor's employees, those persons shall evacuate the area and notify emergency personnel unless the fire is readily extinguished with portable dry chemical equipment on-hand. **When in doubt, emergency response personnel shall be notified.**

8.0 Local Emergency Contact Names and Phone Numbers

DIRECTIONS AND MAP TO THE HOSPITAL – SEE ATTACHMENT 2

EMERGENCY CONTACTS	NAME	TELEPHONE NO.
Hospital	Oswego Hospital	315-349-5511 (911)
Ambulance	Oswego County Ambulance	315-592-4145 (911)
Police	Oswego Police Department	315-343-1212 (911)
Fire	Oswego Fire Department	315-343-2161 (911)

9.0 Government Contact Names and Phone Numbers

AGENCY	NAME	TELEPHONE NO.
Utility Location	Dig Safe New York	(800) 526-0400
NYSDEC	NYSDEC Hotline	(800) 457-7362

10.0 Project Personnel and Relevant Information

A question about this project posed by neighbors, the press, or other interested parties should be directed immediately to:

Name: Matthew Hoskins **Company**: Synapse **Phone:** 315-475-3700

Subcontractors shall review and sign the form in **Attachment 7 ACKNOWLEDGMENT & AGREEMENT FORM**

PROJECT JOB TITLE	NAME	TELEPHONE NO.	GENERAL PROJECT RESPONSIBILITIES	TRAINING DATES	
				40 Hr HAZWOPER	8 Hr Refresher
Site Health and Safety Officer	Varies	Varies	Implementing this HASP. Has authority to stop work. Perform air quality tasks. Take charge of all incidents. Review subcontractor's HASP	Varies	varies
Project Manager	Roger Creighton	315-475-3700 315-254-8547cell	Overall financial and logistics. Contact client and subs to understand all hazards. Discuss with SHSO. Follow-up all incidents upon notice.	1995	2017
Project Staff	Varies	Varies	Conduct work in accordance with JSA and this HASP. Report all incidents and near misses immediately to Project Manager.	Varies	Varies
Subcontractor Cascade Environmental	Michael Jordan	802-229-1883 Office 802-498-3828 Cell	Responsible for coordination of the all bedrock cores and borings.	1996	2017
SYNAPSE Health & Safety Coordinator	Roger Creighton	315-475-3700 Office 315-254-8547 Cell	Respond with corporate resources to all incidents as appropriate. Assist in HASP review. Assist in incident investigation.	1996	2017
Synapse Managing Partner	Brian Macrae	315-475-3700 Office 315-254-8638 Cell	Assist with incident review, recordkeeping.	1994	2003

11.0 Maximum Concentrations of Contaminants Identified Onsite

Listed below are the maximum concentrations of primary contaminants of concern in the soil/groundwater that are expected to be encountered at the site.

Substance	**Date of Sample**	**Media**	**Sample Concentration** *(Note units of measure, ppm)*
PCE	2012	Soil	<25 mg/kg
TCE	2012	Soil	<25 mg/kg
1,1-DCE	2012	Groundwater	<25 mg/L
Cis-1,2-DCE	2012	Groundwater	<25 mg/L
Trans-1,2-DCE	2012	Groundwater	<25 mg/L

12.0 Potential Airborne Concerns

- ***A site specific Community Air Monitoring Plan has been prepared and is provided as Attachment 8, to be utilized in conjunction with this HASP and sets forth the following objectives:***

  1. ***Protect human health and the environment form exposure to site contaminants associated with the soil boring activities set forth in the* VCACWP*.***
  2. ***Minimize risk of exposure to offsite receptors to site contaminants potentially associated with the soil boring activities set forth in the* VCACWP*.***

13.0 Detailed Project Steps with Hazard Assessments and Precautions

Traffic Control Plan:

(Incidents on sites have shown the need for a well-thought out traffic control plan. This plan must consider:

- *Level of traffic activity on a site and provide for the safety of all workers on the site. E.g., a gasoline site that is open to the public should require sawhorse barricades to protect workers.*
- *Cones and caution tape have proven ineffective in a number of situations. Other traffic control precautions include candles, oversized cones with flags, placing vehicles between staff and the public, etc.*
- *We must cordon off as much space as is necessary to ensure our safety. This must be discussed with clients as it may mean closing down additional gasoline pumps or entrances to a factory, etc.*
- *Company and personal vehicles should be parked as far away from potential traffic as possible.*
- *How contractor heavy equipment, e.g., vacuum trucks, drill rigs, cranes, loader/diggers, etc will be parked and maneuvered around the site. All heavy equipment movements must be coordinated in advance to avoid incidents.*
- *Review local regulations for: formally developed traffic control plans signed by licensed individuals, police details, flagmen, hours of activity, closure of streets to move equipment, etc.)*

Work on this project will be conducted during the hours: 7 A.M. & 7 P.M.

Shutoff valves/switches for utilities and products:

To be determined on site

Jewelry safety: Jewelry can be dangerous. Large ear rings, long necklaces, loose-fitting bracelets, rings, watches, etc. can become entangled in machinery and cause removal of limbs, as well as be conductive of electricity. Use caution and avoid unnecessary hazards!

NOTE: Synapse staff and subcontractors are not to enter an excavation without first contacting Roger Creighton, Health & Safety Coordinator (315) 475-3700.

Bedrock Borings

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, and lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear boring locations.	Gather necessary PPE. PPE must include: reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work; Chemical resistance PPE to include: full-face respirator with organic vapor cartridges, appropriate gloves, and other PPE as needed.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Reference Overhead and Underground Utility Checklist. ● Coordinate with facility contact (or designee) to minimize potential conflicts. ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. ● Mark out the proposed excavation locations. ● Call underground utility locating service for public line location clearance, and get list of utilities being contacted. If necessary, coordinate private line locator for private property.
Cascade will set up necessary traffic control.	Reflective vest, steel toed and shank shoes, hard hat (if required by job site).	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. ● Address traffic issues, as required.
Set up exclusion zone(s), stockpile area and establish work areas/heavy equipment pathways.		Injury or exposure to public or other onsite personnel. Slip/fall hazards. Onsite vehicular accident with heavy equipment.	● Implement exclusion zone set-up instructions. ● Set up clear walking paths between work stations.
Hand digging/post-holing where necessary to expose	Steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection,	Damage to lines (and associated physical hazards or property	● Use hand tools whenever possible.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, and lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
and protect underground installations as needed.	reflective safety vest, and leather gloves for the non-chemical aspects of work.	damage). Back strain. Injury or vehicle damage from falling into holes.	● Use proper lifting techniques. ● Barricade/cover holes until job is complete.
Assist with set up of heavy equipment.	Wear reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection devices, and leather gloves.	Damage caused by heavy equipment while accessing set-up location. Struck by equipment.	● Verify clear pathway to boring locations. ● Provide as-needed hand signals and guidance to driver to place rig. ● Visually inspect equipment (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition). ● Maintain eye contact with operator.
Commence borings	Use PPE as follows: ➢ Level D (all the time): Safety glasses, hard hat, disposable ear plugs, long-sleeved shirts and pants, steel-toed boots. ▪ For contact with moist soil or liquid: **Gloves:** 0.008-inch gauge Nitrile gloves, leather work gloves **Boot Covers:** PVC, Neoprene or equivalent **Chemical resistant Suit:** Tyvek ➢ Upgrade to Level C (if necessary): Level D plus half-mask respirator with safety goggles or full face respirator ▪ **Cartridges:** Organic Vapor/HEPA ▪ **Gloves:** 0.008-inch gauge inner Nitrile gloves, with 0.11-inch gauge outer Nitrile gloves and leather work gloves ▪ **Boot Covers:** Neoprene ▪ **Chemical Resistant Suit:** PE Tyvek	Heat or cold exposure, exposure to chemical hazards, hitting an underground or overhead utility, flammable or oxygen-deficient atmosphere from accumulated vapors, trip and fall, side wall cave-in, equipment failure, noise.	● Monitor weather conditions and take breaks as needed for cold or hot weather. ● Keep work area clear of tripping or slipping hazards. Perform periodic visual inspections of heavy equipment and keep it at least 5' from excavation edge, or one foot away from the edge for every foot of depth if greater than 5' deep. ● Perform necessary soil classification.
Collect samples in accordance with sampling plan. (samples to be analyzed on site by Cascade)	Steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves.	Injury from heavy equipment. Exposure to site contaminants.	● Stay out of drill rig moving parts whenever possible. ● Use agreed-upon hand signals with heavy equipment operators. ● Monitor air around excavation in accordance with **Section 12**.
General			
Typical work	Steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work. If you suspect that equipment is contaminated, wear chemical resistant gloves during decontamination of equipment.	Weather related incidents: automobile accidents, slips and falls.	● Check weather reports daily. Project visits will not be performed during inclement weather. Sampling may be performed during light rain mist. Wear raincoats. ● Drive at speed limit or less as needed to keep safe distance from vehicle in front, avoid short stops.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, and lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
No eating, drinking, or smoking on-site. No contact lenses on-site.		Exposure to site contaminants	
A safety meeting will be held each day, even if there is only one person working on the project on any given day.			● Topics will always include the work scheduled for the day and restatement of the hazards and means to avoid them. Other topics may include sampling in general and advances in technology and how it may be applied to the project. Use **Attachment 6** for logging the topics discussed.

Excavation Oversight

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, and lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear excavation area.	Gather necessary PPE. PPE must include: reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work; Chemical resistance PPE to include safety glasses, appropriate gloves, and other PPE as needed.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	● Reference Overhead and Underground Utility Checklist. ● Coordinate with facility contact (or designee) to minimize potential conflicts. ● Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. ● Mark out the proposed excavation locations. ● Call underground utility locating service for public line location clearance, and get list of utilities being contacted. If necessary, coordinate private line locator for private property.
Excavation contractor will set up necessary traffic control.	Reflective vest, steel toed and shank shoes, hard hat (if required by job site).	Potentially can be struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement.	● Use buddy system for placing traffic control. ● Address traffic issues, as required.
Set up exclusion zone(s), in the work area.		Injury or exposure to public or other onsite personnel. Slip/fall hazards. Onsite vehicular accident with heavy equipment.	● Implement exclusion zone set-up instructions. ● Set up clear walking paths between work stations.
Set up CAMP equipment	Use PPE as follows: ➢ Level D (all the time): Safety glasses, hard hat, disposable ear plugs, long-sleeved shirts and pants, steel-toed boots.	Heat or cold exposure, exposure to chemical hazards, hitting an underground or overhead utility, flammable or oxygen-deficient atmosphere from accumulated vapors, equipment failure, noise.	● Monitor weather conditions and take breaks as needed for cold or hot weather. ● Keep work area clear of tripping or slipping hazards. Perform periodic visual inspections of heavy equipment and keep it at least 5' from test pit edge.
Clean site/demobilize	Steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work.	Traffic. Safety hazard left on site. Lifting hazards.	● Use buddy system as necessary to remove traffic control. ● Leave site clean of refuse and debris. ● Notify station personnel of departure. ● Use proper lifting techniques or use mechanical assistance.
Package and deliver samples to lab		Bottle breakage (if any), back strain.	● Handle and pack bottles carefully (bubble wrap bags are helpful). Use proper lifting techniques.
General			
Typical work	Steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work. If you suspect that equipment is contaminated, wear chemical resistant gloves	Weather related incidents: automobile accidents, slips and falls.	● Check weather reports daily. Project visits will not be performed during inclement weather. Sampling may be performed during light rain mist. Wear raincoats. ● Drive at speed limit or less as needed to keep safe distance from vehicle in front, avoid short stops.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each work day. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, and lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	during decontamination of equipment.		
No eating, drinking, or smoking on-site. No contact lenses on-site. No facial hair that would interfere with respirator fit.			
A safety meeting will be held each day, even if there is only one person working on the project on any given day.			● Topics will always include the work scheduled for the day and restatement of the hazards and means to avoid them. Other topics may include sampling in general and advances in technology and how it may be applied to the project. Use **Attachment 6** for logging the topics discussed.

14.0 Waste Characteristics

A. Waste Generation (Type(s)/Quantities Expected):

Anticipated (YES/NO): YES

Types: Liquid __X__ Solid __X__ Sludge _____ Other (describe)

Quantity (Expected Volume): 1 Drum

B. Characteristics (Expected):

Corrosive _____ Flammable/Ignitable _____ Radioactive _____ Toxic

Reactive _____ Unknown

Other (specify)

C. Packaging requirements for waste material (Expected):

- DOT-approved drums
- Baker tanks—water (possibly tankers if trucked off site)
- lined waste bins
- Excavated soil will be return to the excavation.

D. Disposal and/or Treatment Methods Proposed:

Attachment 1

SITE PLAN

LEGEND

APPROXIMATE SITE BOUNDARY

NOTES:

1. 2015 AERIAL PHOTOGRAPH FROM NYSGIS CLEARINGHOUSE WEBSITE.
2. ALL LOCATIONS ARE APPROXIMATE.

0 80' 160'

GRAPHIC SCALE

P: BL
5/18/17
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-B01.DWG

synapse
connect. advise. insure.

SYNAPSE PROPERTY RESOURCES
360 ERIE BLVD. EAST
SYRACUSE, NEW YORK 13202

HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

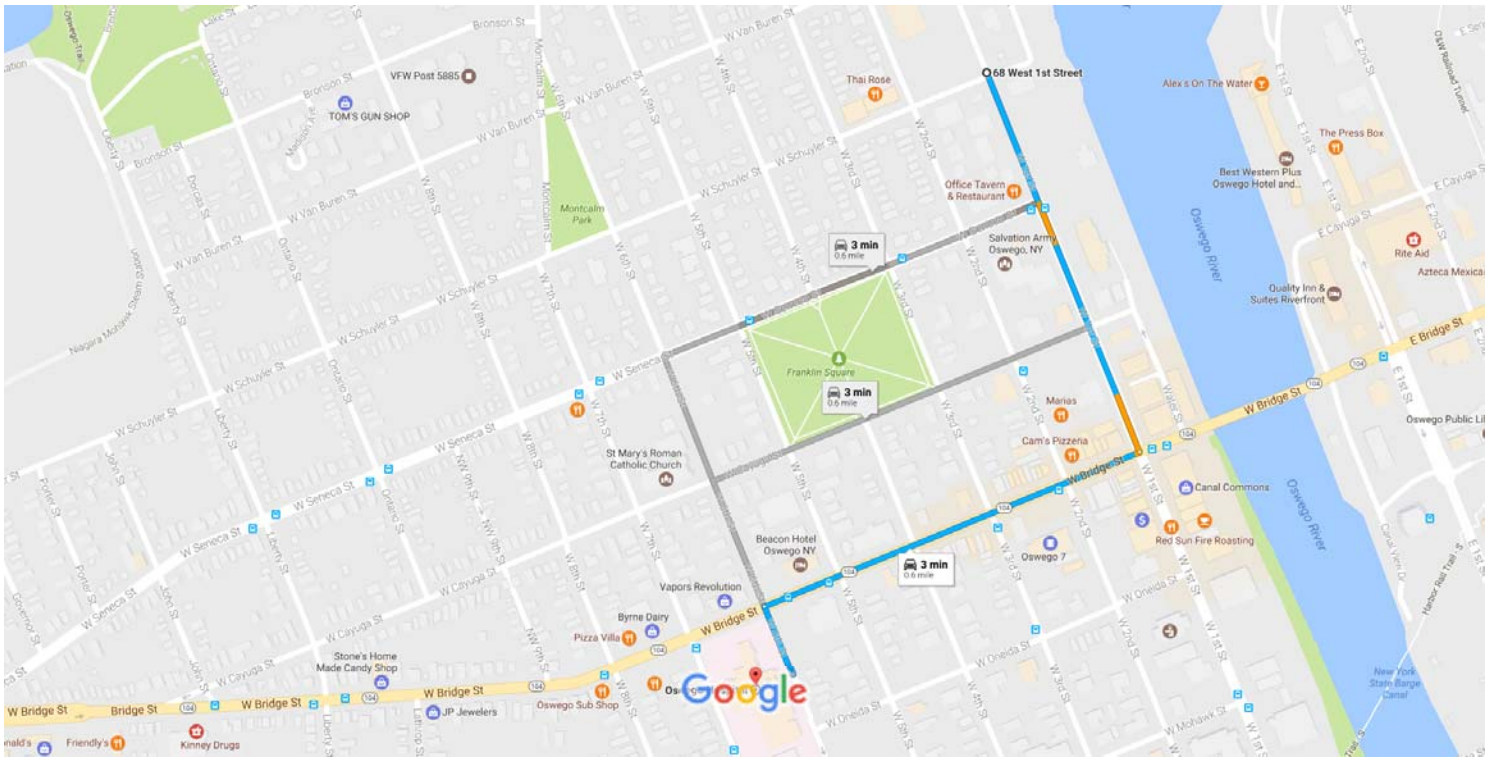
AERIAL PROPERTY PLAN

PROJECT NO.: HSGVIS-24-16-05
DATE: MAY 2017
FIGURE NO.: 2

Attachment 2

DIRECTIONS TO OSWEGO HOSPITAL

Google Maps 68 W 1st St, Oswego, NY 13126 to Oswego Hospital Drive 0.6 mile, 3 min



Map data ©2017 Google 200 ft

Incident Investigation/ Near-Miss Investigation Report

INCIDENT TYPE				Date of Incident:
☐ Fatality	☐ Industrial Non-Recordable	☐ Spill/Leak	☐ General Liability	
☐ Lost Workday	☐ Non-Industrial	☐ Product Integrity	☐ Criminal Activity	
☐ LW Restricted Duty	☐ Off-the-Job Injury	☐ Equipment	☐ Notice of Violation	
☐ OSHA Medical or Illness w/o LW	☐ MVA	☐ Business Interruption	☐ Near Miss	
☐ First Aid	☐ Fire	**(TO BE COMPLETED BY HR)**		

This report must be completed by the employee's supervisor or Site Health and Safety Officer immediately upon learning of the incident. The completed report must be reviewed and signed by the CEO and e-mailed or faxed to the Health & Safety Coordinator within 24 hours of the incident, even if employee is not available to review and sign. Employee or employee's doctor must submit a copy of the doctor's report to Synapse within 24 hours of the initial exam and any subsequent exams. Phone: 315-475-3700, Fax: 315-475-3780, E-Mail: vdemarchi@synapseriekmanagement.com. After hours or weekends, please call Roger Creighton Cell: 315-254-8547.

EMPLOYER

Company Name:					
Work Location Address where incident occurred:			Project Name:		

EMPLOYEE

Name:	SSN:	Birthdate:
Employment Status: ☐ Full-Time ☐ Part-Time ☐ Hourly-As-Needed	How long in present job?	

INJURY OR ILLNESS INFO

Where did incident / near miss occur? (number, street, city, state, zip):		
County:	On Employer's premises? ☐ Yes ☐ No	
Specific activity the employee was engaged in when the incident / near miss occurred:		
All equipment, materials, or chemicals the employee was using when the incident / near miss occurred (e.g., the machine employee struck against or which struck employee; the vapor inhaled or material swallowed; what the employee was lifting, pulling, etc.):		
Describe the specific injury or illness (e.g., cut, strain, fracture, skin rash, etc.):		
Body part(s) affected (e.g., back, left wrist, right eye, etc.):		
Name and address of Health Care Provider (e.g., physician or clinic):	Phone No.:	
If hospitalized, name and address of hospital:	Phone No.:	
Date of injury or onset of illness(MM/DD/YYYY) / /	Time of event or exposure: ☐ AM ☐ PM	
Time employee began work: ☐ AM ☐ PM	Did employee lose at least one full shift's work? ☐ No ☐ Yes, 1st date absent (MM/DD/YYYY) / /	
Has employee returned to work? ☐ Regular work ☐ Restricted work ☐ No, still off work ☐ Yes, date returned (MM/DD/YYYY) / /		
Did employee die? ☐ No ☐ Yes, date (MM/DD/YYYY) / /		
Date employer notified of incident / near miss: (MM/DD/YYYY) / /		
To whom reported:		
Other workers injured/made ill in this event? ☐ Yes ☐ No		

Description of Incident / Near Miss: (Describe fully the incident / near miss events. Tell what happened and how it happened.)

Motor Vehicle Accident (MVA)				Professional Driver? ☐ Yes ☐ No	
Total Years Driving:	Company Vehicle? ☐ Yes ☐ No		Operation Type:		Accident Situation:
Truck Transportation:	Years with Carrier:		Vehicle Type:		Equipment #:
Accident Location (street, city, state):					
Hazardous Material? ☐ Yes ☐ No	Recordable? ☐ Yes ☐ No		No. of Vehicles Towed	No. of Injuries:	No. of Fatalities:

Spill/Leak/Product Quality									
Product Name		Quantity		Product 2 Name		Quantity		Product 3 Name		Quantity	
Agency Notifications									
Cost of Incident	$								

Third Party Incidents					
Name of Owner		Address		Telephone	
Description of Damage:					
Witness Name		Address		Telephone	
Witness Name		Address		Telephone	

#	Root Cause and Contributing Factors: Conclusion (Describe in Detail Why Incident / Near Miss Occurred)
1	
2	
3	
4	
5	

Root Cause(s) Analysis (RCA):

1. Lack of skill or knowledge
2. Lack of or inadequate operational procedures or work standards
3. Inadequate communication of expectations regarding procedures or work standards
4. Inadequate tools or equipment
5. Correct way takes more time and/or requires more effort
6. Short-cutting standard procedures is positively reinforced or tolerated
7. Person thinks there is no personal benefit to always doing the job according to standards
8. Uncontrollable

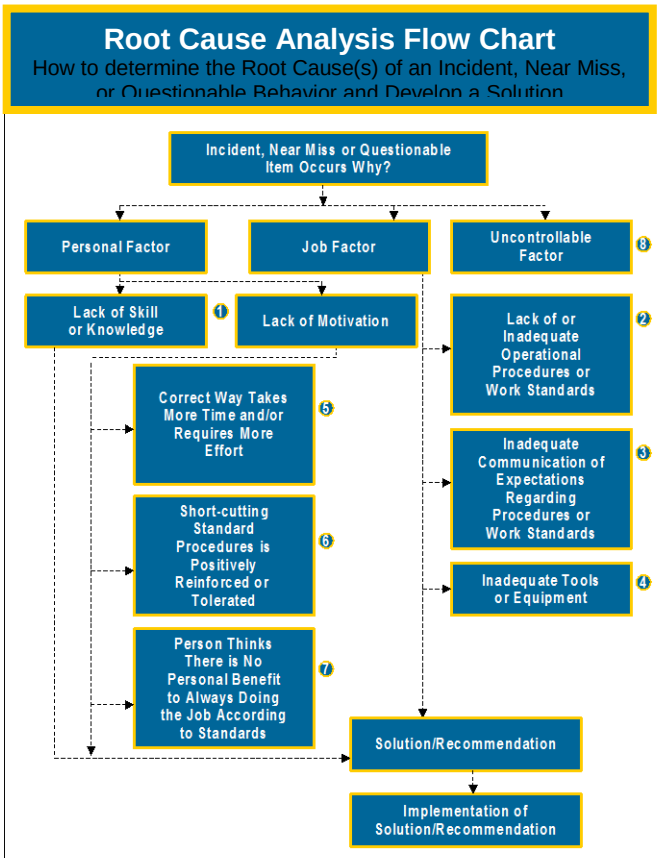
#	RCA #	Solution(s): How to Prevent Incident / Near Miss From Reoccurring	Person Responsible	Due Date	Closure Date

Investigation Team Members		
Name	Job Title	Date

Results of Solution Verification and Validation

Reviewed By		
Name	Job Title	Date
	First Line Supervisor	
	Other (name)	

Acknowledgment Signatures for Injuries/Illnesses		
Title	**Signature**	**Date**
Health & Safety Coordinator: Roger Creighton		
Project Managers:		
Brian Macrae		
Paul Fisher		
Scott Matthews		
Chief Executive Officer: Vita DeMarchi		



Attachment 4
UTILITY CLEARANCE LOGS

Project: Harbor View
Location: Oswego, New York Date

Instructions. This checklist has to be completed by *a Synapse* staff members and subcontractors as a safety measure to insure that all underground utility lines, other underground structures as well as above-ground power lines are clearly marked out in the area selected for boring or excavation. **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL (New Jersey One Call) HAS BEEN CONTACTED 72 HOURS PRIOR TO INVASIVE ACTIVITIES, FACILITY OPERATORS HAVE LOCATED UTILITIES WITHIN THE FACILITY, UTILITIES AND STRUCTURES ARE MARKED, AND THIS CHECKLIST HAS BEEN COMPLETED**. As a final measure to prevent hitting buried utilities during drilling, field personnel must hand auger or post hole dig a five-foot hole at the potential drilling location before commencing drilling. Alternate techniques such as vacuum excavation are acceptable provided they will not damage any buried utilities.

Assignment of Responsibility. *Synapse and Subcontractors* are responsible for having underground utilities and structures located and marked. Preferably, the utility companies themselves should mark out the lines.

Drilling or Excavation Sites. Attach a map of the property showing the drilling or excavation sites. If sites are widely separated, attach several map(s) indicating the area(s) checked for underground utilities or underground structures and the location of above-ground power lines.

Utilities and Structures

TYPE	NOT PRESENT	PRESENT	HOW MARKED[1]
Petroleum products line			
Natural gas line			
Steam line			
Water line			
Sewer line			
Storm drain			
Telephone cable			
Electric power line			
Product tank			
Septic tank/drain field			
Other			

[1]Flags, paint on pavement, wooden stakes, etc.

Client Approval (with attached map)			
	NAME	**COMPANY**	**PHONE**
Name and affiliation of person who marked out underground lines or structures.			
NAME	**COMPANY**		**PHONE**
Synapse Risk Management, LLC			
Field Team Leader		Date Completed	

SUBSURFACE CLEARANCE REVIEW
(To Be Used For ANY Invasive Work)

Site #: _____ Synapse Project #: _____ Date: _____

Borehole #s Reviewed: _____ Clearance Performed by: _____
(Consultant Rep)

Yes No Pre-Mobilization

☐ ☐ 1. Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?

☐ ☐ 2. Does each borehole location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast and operating the drill rig and all support equipment?

☐ ☐ 3. Are all of the proposed borehole locations and associated areas of pavement cutting at least 3 feet from any subsurface utilities shown on client's building plans? PM check here ☐ if plans not provided by client (therefore not applicable to this job).

☐ ☐ 4. Are all of the proposed borehole locations and associated areas of pavement cutting at least 3 feet from any subsurface utilities shown on public right-of-way street improvement or other public property plan or site map? PM check here ☐ if not applicable to this job.

☐ ☐ 5. Has the Facility Manager indicated no knowledge of any subsurface utilities within 3 feet of the proposed borehole locations? (Review locations with the Facility Manager).

☐ ☐ 6. Are all of the proposed borehole locations and associated areas of pavement cutting at least 3 feet from any subsurface utilities identified during a geophysical survey? PM to check here ☐ if applicable to this job.

☐ ☐ 7. Have all Utility Locating Service providers notified by the public line locator marked out their facilities in the vicinity of the borehole locations or otherwise notified us that they do not have any facilities near the proposed borehole locations?

☐ ☐ 8. Are all proposed borehole locations and associated areas of pavement cutting at least 3 feet from a visual line connecting two similar looking manhole covers?

☐ ☐ 9. Are all proposed borehole locations and associated areas of pavement cutting at least 3 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?

☐ ☐ 10. Are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?

☐ ☐ 11. Does the pavement lack signs of previous excavation (e.g. no pavement subsidence, no differences in pavement texture or relief, no pavement patching)? If there are signs, determine the purpose of the previous excavation and act accordingly.

☐ ☐ 12. Before drilling have you hand dug a hole to 5 feet below grade, if possible, and is the diameter of the hole greater than the outer diameter of the drilling auger? Note: a tile probe is a handy tool that can also assist you in clearing boreholes.

☐ ☐ 13. Does the soil you encountered in the hand-dug hole appear to be native material (i.e. free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?

☐ ☐ 14. You know that buildings require utilities. Have you made sure that you have identified all the expected utilities or have made sure that you can explain any missing utilities?

DO NOT DRILL if you answered "NO" to any of the above questions.

- Document the reason for a "NO" answer on the back of this form.
- Contact your supervisor for instructions and document instructed actions and results of actions on the back of this form.

Attachment 5a
AIR MONITORING EQUIPMENT CALIBRATION/CHECK LOG*

DATE	INSTRUMENT/ MODEL NO.	SERIAL NO.	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	LEAK CHECK	PERFORMED BY	COMMENTS

* Submit copies of logs to Health and Safety Coordinator, Roger Creighton within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (315) 475-3700 or via email at rcreighton@synapseriskmanagement.com

Attachment 5b
AIR MONITORING LOG

DATE	TIME	LOCATION	SOURCE/AREA/ BREATHING ZONE	INSTRUMENT	CONCENTRATION/UNITS	SAMPLED BY

* Submit copies of logs to the Health and Safety Coordinator, Roger Creighton within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (315) 475-3700 or via email at rcreighton@synapseriskamnagement.com

Attachment 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	
2.	
3.	
4.	
5.	
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	
Name (Site Health and Safety Officer)	**Signature**

DISCUSSION IDEAS FOR THE DAILY PRODUCTION H&S MEETING

- Emergency response plan, emergency vehicle (full of fuel) and muster point
- Route to medical aid (hospital or other facility)
- Work hours, is night work planned?
- Hand signals around heavy equipment
- Traffic control
- Pertinent Legislation and Regulations
- Above and below ground utilities (energized or de-energized)
- Material Data Sheets (MSDS)
- To who, what, why, and when to report an incident
- Fire extinguisher and first aid kit locations
- Excavations, trenching sloping and shoring
- Personal protective equipment (PPE) and training
- Safety equipment and training
- Emergency telephone and telephone numbers (may not be 911)
- Eye wash stations and washroom locations
- Energy lock-out/tag-out procedures. Location of “kill Switches” etc.
- Weather restrictions
- Site security. Site hazards. Is special waste present.
- Traffic and people movements
- Working around machinery (both static and mobile)
- Sources of ignition, static electricity etc.
- Stings, bites, large animals and other naturally related injuries
- Working above grade
- Working at isolated sites
- Decontamination procedures (both personnel and equipment)
- Falls, trips, sprains and lifting injuries (how to prevent)
- Right to refuse unsafe work
- Adjacent property issues (residence, business, school, day care center)

Attachment 7

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All *Synapse* and subcontractor personnel must sign.)

"Zero Tolerance for Incident of ANY Kind. Work Together to Ensure A SAFE and High Quality Project

This Health and Safety Plan has been developed for the purpose of informing Synapse employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Sub-contractors and other contractors at the site must develop their own Health and Safety Plan to address the hazards faced by their own employees. Synapse has provided a copy of this Plan to contractors in the interest of full disclosure of hazards of which we may be aware, and to satisfy Synapse's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, contractors are required to inform Synapse of any hazards of which they are aware or that the contractor's work on site might possibly pose to SYNAPSE employees, including (but not limited to) the Material Safety Data Sheets for chemicals the contractor may bring on-site. This plan should NOT be understood by contractors to provide information on all of the hazards to which a contractor's employees may be exposed as a result of their work.

I further certify that I have received training and medical surveillance according to the Health and Safety Plan and the OSHA Standard on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120):

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer. Your signature below confirms that you have read and understand the hazards discussed in this Plan, and understand that sub-contractors and contractors must develop their own Health and Safety Plan for their employees. You also understand you could be prohibited by the Site Health and Safety Officer or other *Synapse* personnel from working on this project for not complying with any aspect of this Health and Safety Plan.

Name	Title	Signature	Company	Date

APPENDIX B

COMMUNITY AIR MONITORING PLAN

Community Air Monitoring Plan

HARBOR VIEW SQUARE
68 West First Street
OSWEGO, NEW YORK

NYS BCP Site No. C738040

Prepared by:

Synapse Risk Management
360 Erie Boulevard East
Syracuse, New York 13202

July 2018

Table of Contents

LIST OF FIGURES

Disclaimer

This Community Air Monitoring Plan (CAMP) was prepared by Synapse Risk Management (Synapse) for Housing Visions and is intended to be used during the implementation of the Pre-design Investigation at 68 West First Street in Oswego, New York. Any changes in project conditions and/or the scope of work will require a review and modification to this CAMP. Such changes will be completed in the form of an addendum to this plan or a revision of the plan.

The provisions of this plan are mandatory for all personnel assigned to the project. All visitors to the project site must also abide by the requirements of the plan. It should be acknowledged that the personnel of other consulting and/or contracted companies shall work in accordance with their own independent task-specific HASPs. The policies and procedures presented in this document shall not be construed to supercede any federal, state, or local regulations, and do not relieve any employer, agent, or invitee involved in the project from complying with applicable federal, state, and local regulations.

This CAMP is not intended or represented to be suitable for reuse by others on extensions of this or any other project. Any reuse without prior written approval or adaptation by Synapse will be at the user's sole risk and without liability and legal exposure to Synapse.

1 Introduction

This plan presents the Community Air Monitoring Plan (CAMP), which was prepared by Synapse Risk Management (Synapse) to protect the community from any potential airborne releases that could result during field work associated with the Harbor View Square Brownfield Cleanup Program (BCP).

This plan is consistent with requirements set forth in the New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation, *Technical Guidance for Site Investigation and Remediation*, May 2010 (DER-10).

1.1 Objective

This CAMP identifies the air monitoring activities to be performed at the site during implementation of both non-intrusive and intrusive activities. The overall objectives of this CAMP are as follows:

- Prevent exposures to the public during the implementation of work activities over the course of the Harbor View Square BCP;
- Set forth the monitoring requirement and associated documentation; and
- Set forth guidance for potential contingency situations that may arise.

2 Air Monitoring

Air monitoring during the implementation of various work activities will include volatile organic compounds (VOCs) and particulate monitoring utilizing specialized instruments, visual observations for fugitive dust and documenting meteorological conditions on a daily basis. The monitoring locations, frequency and methods for monitoring VOCs and particulate are discussed in the following sections of this CAMP.

2.1 VOC Monitoring

Real time VOC monitoring will be conducted during non-invasive and invasive work activities conducted during various aspects of the BCP. The locations will be based on wind direction and frequency of the monitoring will be based the type of work being conducted. Below is breakdown of work activities that require continuous versus. periodic VOC monitoring.

Monitoring Type	Work Activities
Continuous	▪ Soil Borings or Monitoring Well Installation; ▪ Soil Excavation; ▪ Soil Loading ▪ Test pits; and ▪ Demolition of contaminated structures.
Periodic	▪ Groundwater sampling

The upwind location will be determined at the beginning of each work day with an initial VOC recording. If the wind direction changes during the course of the work, another VOC reading will be recorded at the new upwind location to establish baseline conditions. The downwind measurements will be recorded at the downwind perimeter of the work area. If the work activities are determined ort considered invasive then continuous monitoring will be conducted. If the work activities are considered non-invasive, then periodic monitoring for VOC will be sufficient.

Locations	Frequency
Upwind perimeter	▪ Start of work day; and ▪ New background measurements based on wind direction change.
Downwind perimeter	▪ Continuous for invasive work; and ▪ Periodic for non-invasive work.

The VOC recording will be performed utilizing a photoionization detector (PID) that should be calibrated on a daily basis. The PID shall be adjusted to provide continuous

monitoring and integrating a 15-minute running average through the course of the work day.

2.2 Particulate Monitoring

The particulate monitoring will be conducted on a continuous basis and at varying locations based on wind direction. The upwind location will be determined at the beginning of each workday. If the wind direction changes through the course of the day a new upwind location will be established for baseline conditions.

Locations	**Frequency**
Upwind perimeter	Continuous
Downwind perimeter	Continuous

The particulate recordings will be conducted utilizing an instrument that can measure particles less than 10 micrometers (um) in size (PM-10). The particulate monitor should be programed to record in real time and set to have an alarm notification if an action level for particulate is exceeded during work activities (0.150 mg/m^3).

2.3 Regional Meteorological Monitoring

Meteorological monitoring should be documented daily through the course of the work activities. Daily temperature, wind direction and general atmospheric conditions, such as clear / cloudy and rain / snow should be recorded

3 Response and Action Levels

3.1 VOCs

The real-time monitoring data (15-minute averages) will dictate specific work procedures and locations. The air monitoring devices to be used include:

- Photoionization Detector (PID) with a 10.6 millivolt lamp;
- MIE DATARAM 4000 to monitor particulate levels.

Levels	Actions
Total VOCs at downwind perimeter exceed background by 5 parts per million (ppm) (15-Min Average)	▪ Stop work activities & continue monitoring. ▪ Work activities can resume when levels reduce below 5 ppm.
Total VOCs at downwind perimeter exceed background levels between 5 ppm & 25 ppm (15-Min Average)	▪ Stop work activities & identify the source of the VOC exceedance & correct, continue monitoring. ▪ Continue work activities if VOCs 200 feet downwind of the site perimeter or ½ distance to the nearest structure is below 5 ppm (15-Min Average). Should not be less that 20-feet.
Total VOCs at the perimeter work area exceed 25 ppm (15-Min Average)	▪ Stop all work activities.

3.2 Particulate Monitoring

Real time particulate monitoring will be conducted by Synapse at the site perimeter. Particulate monitoring will be conducted utilizing a MIE DATARAM 4000 at a minimum frequency of once per hour consistent with TAGM 4031. The continuous particulate monitoring will be integrated over a 15-minute running average.

Levels	Actions
Particulate level at the downwind perimeter 0.1 milligrams per cubic meter (mg/m^3) greater than the up-wind location (15 min period).	▪ Implement dust suppression measures.
Visible dust observed leaving the perimeter.	▪ Implement dust suppression measures.
After implementation of dust suppression measures, particulate levels at downwind perimeter greater than 0.150 mg/m^3 action level.	▪ Stop all work. ▪ Work activities can only resume if 0.150 mg/m^3 action level are below at the downwind location and no visible dust.

4 Documentation

The following data will be recorded and documented daily when the CAMP is implemented:

- Daily calibration logs to document that instruments are working within the limits per the manufacturer;
- Weather conditions including temperature, wind direction, wind speed, other atmospheric condition, date and time;
- Logs of VOCs on a 15-minute average;
- Logs of continuous Particulate monitoring; and

5 References

This CAMP complies with applicable Occupational Safety and Health Administration (OSHA) regulations, United States Environmental Protection Agency (USEPA) regulations, and Synapse Health and Safety policies and procedures. This plan follows the guidelines established in the following:

- NYSDEC DER-10.
- NYSDEC Technical and Administrative Guidance Memorandum (TAGM) MWR-89-4031 entitled “Fugitive Dust Suppression and Particulate Monitoring Program and Inactive Hazardous Waste Site,” dated October 27, 1989 (TAGM 4031).
- Standard Operating Safety Guides, EPA (Publication 9285.1-03, June 1992).
- Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH, OSHA, USCG, EPA (86-116, October 1985).
- Title 29 of the Code of Federal Regulations (CFR), Part 1910.120.
- Title 29 of the Code of Federal Regulations (CFR), Part 1926.
- Pocket Guide to Chemical Hazards, DHHS, PHS, CDC, NIOSH, (2010).
- Threshold Limit Values and Biological Exposure Indices, ACGIH, (2013)
    - Documentation of any exceedance and corrective response.

FIGURES

Community Air Monitoring Plan
Harbor View Square
68 West First Street
Oswego, New York

July 2018

Figure 1 – Property Location Plan
Figure 2 – Aerial Property Plan

SOURCE: USGS 7.5 MIN. TOPOGRAPHIC QUADRANGLES: OSWEGO WEST, N.Y., 1954, PHOTOREVISED 1978 AND OSWEGO EAST, N.Y., 1954, PHOTOREVISED 1978.

APPROXIMATE GRAPHIC SCALE:

0 2000' 4000'

P: EPA
5/18/17
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-SL3.DWG

synapse
connect. advise. insure.

SYNAPSE PROPERTY RESOURCES
360 ERIE BLVD. EAST
SYRACUSE, NEW YORK 13202

HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

PROPERTY LOCATION PLAN

PROJECT NO.: HSGVIS-24-16-05

DATE: MAY 2017

FIGURE NO.: 1

LEGEND

APPROXIMATE SITE BOUNDARY

NOTES:

1. 2015 AERIAL PHOTOGRAPH FROM NYSGIS CLEARINGHOUSE WEBSITE.
2. ALL LOCATIONS ARE APPROXIMATE.

0 80' 160'

GRAPHIC SCALE

P: BL
5/18/17
SYNAPSE/WIP/HSGVIS 24-16/HSGVIS-2416-B01.DWG

synapse
connect. advise. insure.

SYNAPSE PROPERTY RESOURCES
360 ERIE BLVD. EAST
SYRACUSE, NEW YORK 13202

HARBOR VIEW SQUARE
NYSBCP SITE NO. C738040
68 WEST FIRST STREET
OSWEGO, NEW YORK

AERIAL PROPERTY PLAN

PROJECT NO.: HSGVIS-24-16-05
DATE: MAY 2017
FIGURE NO.: 2

APPENDIX C

SAFETY DATA SHEETS

REGENESIS

Technology-Based Solutions for the Environment

SAFETY DATA SHEET

1. Identification

Product identifier **3-D Microemulsion® Factory Emulsified**

Other means of identification None.

Recommended use Remediation of soils and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Regenesis

Address 1011 Calle Sombra
San Clemente, CA 92673

Telephone 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number CHEMTREC® at 1-800-424-9300 (International)

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards

Skin corrosion/irritation	Category 2
Serious eye damage/eye irritation	Category 1

OSHA defined hazards Not classified.

Label elements

Signal word Danger

Hazard statement Causes skin irritation. Causes serious eye damage.

Precautionary statement

Prevention Wash thoroughly after handling. Wear protective gloves. Wear eye/face protection.

Response If on skin: Wash with plenty of water. If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a poison center/doctor. If skin irritation occurs: Get medical advice/attention. Take off contaminated clothing and wash before reuse.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
HRC-PED	823190-10-9	50-51
Water	7732-18-5	35-36
Sodium lactate	72-17-3	13-14

Composition comments All concentrations are in percent by weight unless otherwise indicated.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact	Remove contaminated clothing. Wash with plenty of soap and water. If skin irritation occurs: Get medical advice/attention. Wash contaminated clothing before reuse.
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Get medical attention immediately.
Ingestion	Rinse mouth. Never give anything by mouth to a victim who is unconscious or is having convulsions. Do not induce vomiting without advice from poison control center. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain.
Indication of immediate medical attention and special treatment needed	Provide general supportive measures and treat symptomatically. Keep victim under observation. Symptoms may be delayed.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water spray. Carbon dioxide (CO2). Dry chemical powder. Foam.
Unsuitable extinguishing media	Do not use water jet as an extinguisher, as this will spread the fire.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, phosphorus compounds and metal oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk. Water spray should be used to cool containers.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	No unusual fire or explosion hazards noted.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. Keep people away from and upwind of spill/leak. Surfaces may become slippery after spillage. Wear appropriate protective equipment and clothing during clean-up. Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Ensure adequate ventilation. Local authorities should be advised if significant spillages cannot be contained. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Spilled product may create a slipping hazard. Large Spills: Stop the flow of material, if this is without risk. Use water spray to reduce vapors or divert vapor cloud drift. Dike the spilled material, where this is possible. Cover with plastic sheet to prevent spreading. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Flush area clean with lots of water. Be aware of potential for surfaces to become slippery. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Do not get this material in contact with eyes. Avoid contact with eyes, skin, and clothing. Provide adequate ventilation. Wear appropriate personal protective equipment. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store in a cool, dry, well-ventilated place. Store away from incompatible materials (see Section 10 of the SDS). Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass.

8. Exposure controls/personal protection

Occupational exposure limits	No exposure limits noted for ingredient(s).
Biological limit values	No biological exposure limits noted for the ingredient(s).

Appropriate engineering controls	Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level. Eye wash facilities and emergency shower must be available when handling this product.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear approved, tight fitting indirect vented or non-vented safety goggles where splashing is probable. Face shield is recommended.
Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Rubber or vinyl-coated gloves are recommended.
Other	Wear appropriate chemical resistant clothing.
Respiratory protection	If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance

Physical state	Liquid.
Form	Emulsion.
Color	White.
Odor	Odorless.
Odor threshold	Not available.
pH	Not available.
Melting point/freezing point	Not available.
Initial boiling point and boiling range	212 °F (100 °C)
Flash point	> 199.9 °F (> 93.3 °C) Closed Cup
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.

Upper/lower flammability or explosive limits

Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Explosive limit - lower (%)	Not available.
Explosive limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	1 - 1.2

Solubility(ies)

Solubility (water)	Soluble.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	Not available.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Undergoes hydrolysis in water to form lactic acid and soybean oil.

Possibility of hazardous reactions	No dangerous reaction known under conditions of normal use.
Conditions to avoid	Avoid temperatures exceeding the flash point. Contact with incompatible materials.
Incompatible materials	Strong oxidizing agents. Bases. Acids.
Hazardous decomposition products	Thermal decomposition or combustion may produce: carbon oxides, phosphorus compounds, metal oxides.

11. Toxicological information

Information on likely routes of exposure

Inhalation	May cause irritation to the respiratory system.
Skin contact	Causes skin irritation.
Eye contact	Causes serious eye damage.
Ingestion	Ingestion may cause irritation and malaise.
Symptoms related to the physical, chemical and toxicological characteristics	Severe eye irritation. Symptoms may include stinging, tearing, redness, swelling, and blurred vision. Permanent eye damage including blindness could result. Skin irritation. May cause redness and pain.

Information on toxicological effects

Acute toxicity	Not available.
Skin corrosion/irritation	Causes skin irritation.
Serious eye damage/eye irritation	Causes serious eye damage.

Respiratory or skin sensitization

Respiratory sensitization	Not a respiratory sensitizer.
Skin sensitization	This product is not expected to cause skin sensitization.
Germ cell mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

Reproductive toxicity	This product is not expected to cause reproductive or developmental effects.
Specific target organ toxicity - single exposure	Not classified.
Specific target organ toxicity - repeated exposure	Not classified.
Aspiration hazard	Not an aspiration hazard.

12. Ecological information

Ecotoxicity	The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.
Persistence and degradability	Material is readily degradable and undergoes hydrolysis in several hours.
Bioaccumulative potential	No data available.
Mobility in soil	Not available.
Other adverse effects	None known.

13. Disposal considerations

Disposal instructions	Collect and reclaim or dispose in sealed containers at licensed waste disposal site. Dispose of contents/container in accordance with local/regional/national/international regulations.
Local disposal regulations	Dispose in accordance with all applicable regulations.
Hazardous waste code	The waste code should be assigned in discussion between the user, the producer and the waste disposal company.
Waste from residues / unused products	Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).
Contaminated packaging	Empty containers should be taken to an approved waste handling site for recycling or disposal. Since emptied containers may retain product residue, follow label warnings even after container is emptied.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.
One or more components are not listed on TSCA.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1050)

Not listed.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Hazard categories Immediate Hazard - Yes
Delayed Hazard - No
Fire Hazard - No
Pressure Hazard - No
Reactivity Hazard - No

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical Yes

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

US state regulations

US. Massachusetts RTK - Substance List

Not regulated.

US. New Jersey Worker and Community Right-to-Know Act

Not listed.

US. Pennsylvania Worker and Community Right-to-Know Law

Not listed.

US. Rhode Island RTK

Not regulated.

US. California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins.

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes

Country(s) or region	Inventory name	On inventory (yes/no)*
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	Yes
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 09-April-2015

Revision date -

Version # 01

Further information HMIS® is a registered trade and service mark of the American Coatings Association (ACA).

HMIS® ratings
Health: 3
Flammability: 1
Physical hazard: 0

NFPA ratings

Disclaimer Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

SAFETY DATA SHEET

1. Identification

Product identifier **S-MicroZVI or S-MZVI**

Other means of identification None.

Recommended use Remediation of contaminants in soil and groundwater.

Recommended restrictions None known.

Manufacturer/Importer/Supplier/Distributor information

Company Name Regenesis

Address 1011 Calle Sombra
San Clemente, CA 92673 USA

General information 949-366-8000

E-mail CustomerService@regenesis.com

Emergency phone number For Hazardous Materials Incidents ONLY (spill, leak, fire, exposure or accident), call CHEMTREC 24/7 at:

USA, Canada, Mexico 1-800-424-9300

International 1-703-527-3887

2. Hazard(s) identification

Physical hazards Not classified.

Health hazards Not classified.

OSHA defined hazards Not classified.

Label elements

Hazard symbol None.

Signal word None.

Hazard statement The mixture does not meet the criteria for classification.

Precautionary statement

Prevention Observe good industrial hygiene practices.

Response Wash hands after handling.

Storage Store away from incompatible materials.

Disposal Dispose of waste and residues in accordance with local authority requirements.

Hazard(s) not otherwise classified (HNOC) None known.

Supplemental information Contact with acids liberates very toxic gas.

3. Composition/information on ingredients

Mixtures

Chemical name	CAS number	%
Glycerol	56-81-5	40 - 50
Zero valent iron	7439-89-6	30 - 50
Iron(II) sulfide	1317-37-9	1 - 4

Composition comments All concentrations are in percent by weight unless otherwise indicated.
Components not listed are either non-hazardous or are below reportable limits.

4. First-aid measures

Inhalation Move to fresh air. Call a physician if symptoms develop or persist.

Skin contact Wash off with soap and water. Get medical attention if irritation develops and persists.

Eye contact	Rinse with water. Get medical attention if irritation develops and persists.
Ingestion	Rinse mouth. Get medical attention if symptoms occur.
Most important symptoms/effects, acute and delayed	Direct contact with eyes may cause temporary irritation.
Indication of immediate medical attention and special treatment needed	Treat symptomatically.
General information	Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

5. Fire-fighting measures

Suitable extinguishing media	Water fog. Foam. Dry chemical powder. Carbon dioxide (CO2).
Unsuitable extinguishing media	None known.
Specific hazards arising from the chemical	During fire, gases hazardous to health may be formed. Combustion products may include: carbon oxides, iron oxides.
Special protective equipment and precautions for firefighters	Self-contained breathing apparatus and full protective clothing must be worn in case of fire.
Fire fighting equipment/instructions	Move containers from fire area if you can do so without risk.
Specific methods	Use standard firefighting procedures and consider the hazards of other involved materials.
General fire hazards	This material will not burn until the water has evaporated. Residue can burn. When dry may form combustible dust concentrations in air.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures	Keep unnecessary personnel away. For personal protection, see section 8 of the SDS.
Methods and materials for containment and cleaning up	Large Spills: Stop the flow of material, if this is without risk. Dike the spilled material, where this is possible. Absorb in vermiculite, dry sand or earth and place into containers. Following product recovery, flush area with water. Small Spills: Wipe up with absorbent material (e.g. cloth, fleece). Clean surface thoroughly to remove residual contamination. Never return spills to original containers for re-use. For waste disposal, see section 13 of the SDS.
Environmental precautions	Avoid discharge into drains, water courses or onto the ground.

7. Handling and storage

Precautions for safe handling	Avoid prolonged exposure. Observe good industrial hygiene practices.
Conditions for safe storage, including any incompatibilities	Store in original tightly closed container. Store away from incompatible materials (see Section 10 of the SDS).

8. Exposure controls/personal protection

Occupational exposure limits

US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000)

Components	Type	Value	Form
Glycerol (CAS 56-81-5)	PEL	5 mg/m3	Respirable fraction.
		15 mg/m3	Total dust.

Biological limit values	No biological exposure limits noted for the ingredient(s).
Appropriate engineering controls	Good general ventilation should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).

Skin protection	
Hand protection	Wear appropriate chemical resistant gloves. Suitable gloves can be recommended by the glove supplier.
Skin protection	
Other	Wear suitable protective clothing.
Respiratory protection	In case of insufficient ventilation, wear suitable respiratory equipment.
Thermal hazards	Wear appropriate thermal protective clothing, when necessary.
General hygiene considerations	Always observe good personal hygiene measures, such as washing after handling the material and before eating, drinking, and/or smoking. Routinely wash work clothing and protective equipment to remove contaminants.

9. Physical and chemical properties

Appearance	
Physical state	Liquid.
Form	Viscous metallic suspension.
Color	Dark gray
Odor	Slight.
Odor threshold	Not available.
pH	7 - 8 (When mixed with water) 10 (As shipped)
Melting point/freezing point	Not available.
Initial boiling point and boiling range	Not available.
Flash point	Not available.
Evaporation rate	Not available.
Flammability (solid, gas)	Not applicable.
Upper/lower flammability or explosive limits	
Flammability limit - lower (%)	Not available.
Flammability limit - upper (%)	Not available.
Vapor pressure	Not available.
Vapor density	Not available.
Relative density	Not available.
Solubility(ies)	
Solubility (water)	Not available.
Partition coefficient (n-octanol/water)	Not available.
Auto-ignition temperature	Not available.
Decomposition temperature	Not available.
Viscosity	3000 cP (77 °F (25 °C))
Other information	
Explosive properties	Not explosive.
Oxidizing properties	Not oxidizing.

10. Stability and reactivity

Reactivity	The product is stable and non-reactive under normal conditions of use, storage and transport.
Chemical stability	Material is stable under normal conditions.
Possibility of hazardous reactions	Contact with acids will release highly flammable and highly toxic hydrogen sulfide gas. Can react with some acids with the evolution of hydrogen.
Conditions to avoid	Contact with incompatible materials. Avoid drying out product. May generate combustible dust if material dries.
Incompatible materials	Strong oxidizing agents. Acids.

Hazardous decomposition products No hazardous decomposition products are known.

11. Toxicological information

Information on likely routes of exposure

Inhalation Spray mist may irritate the respiratory system. For dry material: Dust may irritate respiratory system.

Skin contact Prolonged or repeated exposure may cause minor irritation.

Eye contact Direct contact with eyes may cause temporary irritation.

Ingestion May cause discomfort if swallowed.

Symptoms related to the physical, chemical and toxicological characteristics Direct contact with eyes may cause temporary irritation.

Information on toxicological effects

Acute toxicity Not expected to be acutely toxic.

Components	Species	Test Results
Glycerol (CAS 56-81-5)		
Acute		
Dermal		
LD50	Rabbit	> 18700 mg/kg
Oral		
LD50	Rat	27200 mg/kg

Skin corrosion/irritation Prolonged skin contact may cause temporary irritation.

Serious eye damage/eye irritation Direct contact with eyes may cause temporary irritation.

Respiratory or skin sensitization

Respiratory sensitization Not a respiratory sensitizer.

Skin sensitization This product is not expected to cause skin sensitization.

Germ cell mutagenicity No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.

Carcinogenicity Not classifiable as to carcinogenicity to humans.

IARC Monographs. Overall Evaluation of Carcinogenicity

Not listed.

NTP Report on Carcinogens

Not listed.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Reproductive toxicity This product is not expected to cause reproductive or developmental effects.

Specific target organ toxicity - single exposure Not classified.

Specific target organ toxicity - repeated exposure Not classified.

Aspiration hazard Not an aspiration hazard.

Further information Contains an ingredient known to produce adverse effects in a small percentage of hypersensitive individuals exhibited as respiratory distress and allergic skin reactions.

12. Ecological information

Ecotoxicity The product is not classified as environmentally hazardous. However, this does not exclude the possibility that large or frequent spills can have a harmful or damaging effect on the environment.

Components		Species	Test Results
Glycerol (CAS 56-81-5)			
Aquatic			
Acute			
Crustacea	EC50	Daphnia magna	> 10000 mg/l, 24 Hours

Persistence and degradability No data is available on the degradability of this product.

Bioaccumulative potential No data available.

Partition coefficient n-octanol / water (log Kow)

Glycerol (CAS 56-81-5)	-1.76

Mobility in soil No data available.

Other adverse effects None known.

13. Disposal considerations

Disposal instructions Collect and reclaim or dispose in sealed containers at licensed waste disposal site.

Local disposal regulations Dispose in accordance with all applicable regulations.

Hazardous waste code The waste code should be assigned in discussion between the user, the producer and the waste disposal company.

Waste from residues / unused products Dispose of in accordance with local regulations. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe manner (see: Disposal instructions).

Contaminated packaging Since emptied containers may retain product residue, follow label warnings even after container is emptied. Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. Transport information

DOT

Not regulated as dangerous goods.

IATA

Not regulated as dangerous goods.

IMDG

Not regulated as dangerous goods.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code Not established.

15. Regulatory information

US federal regulations This product is not known to be a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

TSCA Section 12(b) Export Notification (40 CFR 707, Subpt. D)

Not regulated.

CERCLA Hazardous Substance List (40 CFR 302.4)

Not listed.

SARA 304 Emergency release notification

Not regulated.

OSHA Specifically Regulated Substances (29 CFR 1910.1001-1053)

Not regulated.

Superfund Amendments and Reauthorization Act of 1986 (SARA)

SARA 302 Extremely hazardous substance

Not listed.

SARA 311/312 Hazardous chemical No

SARA 313 (TRI reporting)

Not regulated.

Other federal regulations

Clean Air Act (CAA) Section 112 Hazardous Air Pollutants (HAPs) List

Not regulated.

Clean Air Act (CAA) Section 112(r) Accidental Release Prevention (40 CFR 68.130)

Not regulated.

Safe Drinking Water Act (SDWA) Not regulated.

FEMA Priority Substances Respiratory Health and Safety in the Flavor Manufacturing Workplace

Glycerol (CAS 56-81-5)	Other Flavoring Substances with OSHA PEL's

US state regulations

US. Massachusetts RTK - Substance List

Glycerol (CAS 56-81-5)

US. New Jersey Worker and Community Right-to-Know Act

Glycerol (CAS 56-81-5)

US. Pennsylvania Worker and Community Right-to-Know Law

Glycerol (CAS 56-81-5)

US. Rhode Island RTK

Glycerol (CAS 56-81-5)

California Proposition 65

California Safe Drinking Water and Toxic Enforcement Act of 2016 (Proposition 65): This material is not known to contain any chemicals currently listed as carcinogens or reproductive toxins. For more information go to www.P65Warnings.ca.gov.

US. California. Candidate Chemicals List. Safer Consumer Products Regulations (Cal. Code Regs, tit. 22, 69502.3, subd. (a))

Zero valent iron (CAS 7439-89-6)

International Inventories

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of Existing Commercial Chemical Substances (EINECS)	No
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	Yes
New Zealand	New Zealand Inventory	Yes
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
Taiwan	Taiwan Chemical Substance Inventory (TCSI)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

*A "Yes" indicates this product complies with the inventory requirements administered by the governing country(s).
A "No" indicates that one or more components of the product are not listed or exempt from listing on the inventory administered by the governing country(s).

16. Other information, including date of preparation or last revision

Issue date 27-December-2018

Revision date -

Version # 01

HMIS® ratings Health: 1
Flammability: 1
Physical hazard: 0

NFPA ratings

Disclaimer Regenesis cannot anticipate all conditions under which this information and its product, or the products of other manufacturers in combination with its product, may be used. It is the user's responsibility to ensure safe conditions for handling, storage and disposal of the product, and to assume liability for loss, injury, damage or expense due to improper use. The information in the sheet was written based on the best knowledge and experience currently available.

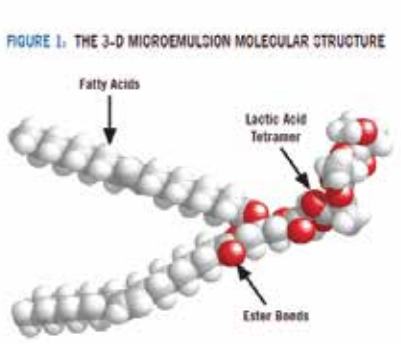
APPENDIX D

MATERIAL INFORMATION SHEETS

3-D Microemulsion® Factory Emulsified Technical Description

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

Example of 3-D Microemulsion



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

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

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

Chemical Composition

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

3-D Microemulsion® Factory Emulsified Technical Description

Properties

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

Storage and Handling Guidelines

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

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

Applications

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

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

Health and Safety

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

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S-MicroZVI Specification Sheet

S-MicroZVI Technical Description

S-MicroZVI™ is an *In Situ* Chemical Reduction (ISCR) reagent that promotes the destruction of many organic pollutants and is most commonly used with chlorinated hydrocarbons. It is engineered to provide an optimal source of micro-scale zero valent iron (ZVI) that is both easy to use and delivers enhanced reactivity with the target contaminants via multiple pathways. S-MicroZVI can destroy many chlorinated contaminants through a direct chemical reaction (**see Figure 1**). S-MicroZVI will also stimulate anaerobic biological degradation by rapidly creating a reducing environment that is favorable for reductive dechlorination.

S-MicroZVI is Best in Class For

- ☑ Longevity
- ☑ Kinetics
- ☑ Transport

Sulfidated ZVI

S-MicroZVI is composed of colloidal, sulfidated zero-valent iron particles suspended in glycerol using proprietary environmentally acceptable dispersants. The passivation technique of sulfidation, completed using proprietary processing methods, provides unparalleled reactivity with chlorinated hydrocarbons like PCE and TCE and increases its stability and longevity by minimizing undesirable side reactions. In addition to superior reactivity, S-MicroZVI is designed for easy handling that is unmatched by any ZVI product on the market. Shipped as a liquid suspension, S-MicroZVI requires no powder feeders, no thickening with guar, and pneumatic or hydraulic fracturing is not mandatory. When diluted with water prior to application, the resulting suspension is easy to inject using either direct push or permanent injection wells.

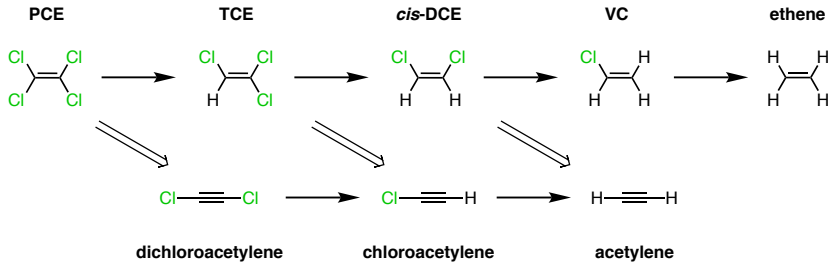

Figure 1: *Chlorinated ethene degradation pathways and products. The top pathway with single line arrows represent the reductive dechlorination (hydrogenolysis) pathway. The lower pathway with downward facing double line arrows represent the beta-elimination pathway.*

To see a list of treatable contaminants, view the S-MicroZVI treatable contaminants guide.

S-MicroZVI
Sulfidated Zero-Valent Iron

S-MicroZVI Specification Sheet

Chemical Composition

Iron, powders CAS 7439-89-6
Iron (II) sulfide CAS 1317-37-9
Glycerol CAS 56-81-8

Properties

Physical State: Liquid
Form: Viscous metallic suspension
Color: Dark gray
Odor: Slight
pH: Typically 7-9 as applied
Density: 15 lb/gal

Storage and Handling Guidelines

Storage:

- Use within four weeks of delivery
- Store in original containers
- Store at temperatures below 95F°
- Store away from incompatible materials

Handling:

- Never mix with oxidants or acids
- Wear appropriate personal protective equipment
- Do not taste or swallow
- Observe good industrial hygiene practices

Applications

S-MicroZVI is diluted with water on site and easily applied into the subsurface through low-pressure injections. S-MicroZVI can also be mixed with products like 3-D Microemulsion® or PlumeStop® prior to injection.

Health and Safety

The material is relatively safe to handle; however, avoid contact with eyes, skin and clothing. OSHA Level D personal protection equipment including: vinyl or rubber gloves and eye protection are recommended when handling this product. Please review the Safety Data Sheet for additional storage, and handling requirements here: S-MicroZVI SDS.

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BDI PLUS® Technical Description

Bio-Dechlor INOCULUM Plus (BDI PLUS®) is an enriched natural consortium containing species of Dehalococcoides sp. (DHC). BDI PLUS has been shown to simulate the rapid and complete dechlorination of chlorinated solvents such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE) and vinyl chloride (VC) to non-toxic end products, ethene, carbon dioxide and water.

The culture also contains microbes capable of dehalogenating halomethanes (e.g., carbon tetrachloride and chloroform) and haloethanes (e.g., 1,1,1-TCA and 1,1-DCA) as well as mixtures of these contaminants.

Species of Dehalococcoides sp. (DHC)

For a list of treatable contaminants with the use of BDI PLUS, view the Range of Treatable Contaminants Guide

Chemical Composition

- Non-hazardous, naturally-occurring, non-altered anaerobic microbes and enzymes in a water-based medium.

Properties

- Appearance – Murky, yellow to grey water
- Odor – Musty
- pH 6.0 to 8.0
- Density – Approximately 1.0 grams per cubic centimeter (0.9 to 1.1 g/cc)
- Solubility – Soluble in Water
- Vapor Pressure – None
- Non-hazardous

Storage and Handling Guidelines

Storage
Store in original tightly closed container
Store away from incompatible materials
Recommended storage containers: plastic lined steel, plastic, glass, aluminum, stainless steel, or reinforced fiberglass
Store in a cool, dry area at 4-5°C (39 - 41°F)
Material may be stored for up to 3 weeks at 2-4°C without aeration

Handling
Avoid prolonged exposure
Observe good industrial hygiene practices
Wear appropriate personal protective equipment

BDI PLUS® Technical Description

Applications

- BDI PLUS is delivered to the site in liquid form and is designed to be injected directly into the saturated zone requiring treatment.
- Most often diluted with de-oxygenated water prior to injection into either hydraulic push injection points or properly constructed injection wells.
- The typical dilution rate of the injected culture is 10 gallons of deoxygenated water to 1 liter of standard BDI PLUS culture.

Application instructions for this product are contained here BDI PLUS Application Instructions.

Health and Safety

Material is non-hazardous and relatively safe to handle; however avoid contact with eyes and prolonged contact with skin. OSHA Level D personal protection equipment including: vinyl or rubber gloves and safety goggles or a splash shield are recommended when handling this product. An eyewash station is recommended. Please review the Material Safety Data Sheet for additional storage, usage, and handling requirements here: BDI PLUS SDS.

REGENESIS

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APPENDIX E

REGENESIS APPLICATION AND MATERIAL HANDLING GUIDELINES

BIO-DECHLOR INOCULUM

Bio-Dechlor INOCULUM PLUS (BDI PLUS®) Installation Instructions:

General Guidelines

Bio-Dechlor INOCULUM PLUS (BDI PLUS®) is an enriched natural microbial consortium containing species of Dehalococcoides. This microbial consortium has since been enriched to increase its ability to rapidly dechlorinate contaminants during *in situ* bioremediation processes. BDI PLUS has been shown to stimulate the rapid and complete dechlorination of compounds such as tetrachloroethene (PCE), trichloroethene (TCE), dichloroethene (DCE), and vinyl chloride (VC). BDI PLUS also contains microorganisms capable of degrading chloromethanes (carbon tetrachloride and chloroform) as well as chloroethanes like trichloroethane (TCA).

Recent trends in engineered bioremediation indicate that the treatment of chlorinated solvent contamination sometimes results in slow or incomplete degradation of the intermediate compounds. When faced with this circumstance, bioaugmentation with a microbial consortium such as BDI PLUS offers a solution to accelerate or simply make possible the complete dechlorination of these otherwise recalcitrant compounds.

REGENESIS® believes that the best approach to install BDI PLUS into the subsurface is by direct-push methods. This allows for the BDI PLUS solution to be applied directly into the aquifer material and provides greater coverage/treatment over the life of the project. As a minimum, the following equipment will be needed to perform this type of installation:

- Direct-push drilling unit
- Grout pump (e.g. Geoprobe GS 2000)
- Appropriate hose assembly including a fitting that links a hose from the grout pump to the direct-push rods (provided by REGENESIS with shipment)
- One or more 55+ gallon water drums, fitted with an appropriate lid that has at least one bung hole (number of drums depends on size of application)
- Rotary transfer pump (or equivalent) with appropriate amount of hose to connect from 55-gal drum to hopper of grout pump (similar to Grainger No. 1P893, Fill-Rite model #FR112GR)
- Compressed Nitrogen gas tank with appropriate regulator (0 to 15 pounds per square inch (psi). A 300-ft^3 tank should be sufficient for discharge of concentrated or non-concentrated kegs and for nitrogen sparging to deoxygenate batch water.
- Pressure washer (or equivalent) for cleaning

Material Packaging and Safety

BDI PLUS is a mixture of living bacteria including members of the Dehalococcoides genus that are capable of anaerobically degrading chlorinated contaminants. The culture has been tested to ensure that it is free of the most common pathogenic bacteria, but like all living cultures it should be handled with due care to prevent contamination of work surfaces or field personnel.

During installation activities, REGENESIS recommends that field personnel use at least level “D” personal protection equipment (PPE). A Materials Safety Data Sheet (MSDS) is sent with each shipment and should be reviewed before proceeding with installation activities.

BIO-DECHLOR INOCULUM

Warning

- The BDI PLUS container is pressurized to 10 to 15 psi with nitrogen before shipping
- Wear suitable eye protection, gloves, respirator and protective clothing
- Gas cylinders used to dispense culture MUST be equipped with a proper pressure regulator
- During operation DO NOT exceed the containers maximum working pressure of 15 psi

Unpacking

1. Carefully remove the container from shipping cooler and stand upright. DO NOT use the plastic sight tube as a handle.
2. Carefully check the container, connectors, valves and tubing for any damage or defects. If defects or damage is observed, do not use. Report any damage to REGENESIS at 949.366.8000. A back up set of quick connects is provided in the packaging material.
3. Check and ensure that all valves are in the CLOSED position.

Storage

If the schedule of bacteria application requires adding the bacteria over a period of more than one day, the keg(s) should be stored at a temperature 2-4 °C, but freezing must be avoided. This can normally be achieved by storing the kegs under ice in the provided coolers. Keg should be pressurized with Nitrogen to pressure 10- 15 psi. before storing to ensure a tight seal on the keg cap.

Culture Keg in Cooler

Shipping

After completion of operation, please, ship cooler with keg and all attachments back to the following address:

Shaw Environmental, Inc.
17 Princess Road, Lawrenceville, NJ 08648

Specific Installation Procedures

1. The BDI PLUS must be added to the previously prepared “oxygen-free” water before it is installed in the subsurface. The desired amount of BDI PLUS should be carefully discharged into the 55-gal drum containing the appropriate amount of “oxygen free” water. The tables provided below indicates the amount of water that a given amount of BDI PLUS should be mixed with.
   The BDI PLUS must be added to “oxygen-free” water before it is installed in the subsurface. To ensure that the water has reached the desired anoxic state prior to mixing with BDI PLUS an appropriate amount of nitrogen sparging into the 55-gal drum containing a given amount of water at least one hour prior to adding the BDI PLUS. To ensure that a sufficient quantity of “oxygen free” water is available throughout the day, a large trough of “nitrogen sparged” water can be prepared and additional 55-gal drums can be filled from this trough. The water in the trough can be transferred to the 55-gal drums where the BDI is mixed with the water using a primed transfer pump.

Nitrogen sparging is accomplished by a gas sparging device equivalent to a fish tank aerator. Adjust the 300ft^3 nitrogen tank pressure regulator to 3-5 psi and immerse the gas sparger to the bottom of the drum or trough. By internal convection and oxygen stripping processes, the oxygen levels should diminish within an hour. Be careful to not consume too much gas and not have nitrogen to empty the kegs. Keeping an eye on tank pressure loss and dissolved oxygen level will indicate when one can trim down on the sparge pressure and conserve the nitrogen.

BDI PLUS Dilution Chart

Volume of BDI PLUS	Volume of Water
5 liters	50 gal
1 liter	10 gal

Volume of BDI PLUS Concentrate	Volume of Water
0.5 liters	50 gal
0.1 liter	10 gal

2. The drive rod assembly should be fitted with a disposable tip on the first drive rod and pushed down to the desired depth. This process should be done in accordance with the manufacturer's standard operating procedure (SOP).
3. A sub-assembly connecting the delivery hose to the drive rods and pump should be used. The sub-assembly should be constructed in a manner that allows for the drive rods to be withdrawn while the material is being pumped.
4. Prior to connecting the hose to the sub-assembly a volume check should be completed to determine the volume and weight of product displaced with each pump stroke.
5. After the drive rods have been pushed to the desired depth, the rod assembly should be with drawn three to six inches so that the disposable tip has room to be dropped.
   a. If an injection tool is used instead of an expendable tip, the application of material can take place without any preliminary withdrawal of the rods.
6. Fill the annular space of the drive rods with water. This will minimize the amount of air introduced to the system.
7. Insert the telescoping suction pipe on the rotary transfer pump into a bung hole on the lid of the 55-gal drum and make sure that the pipe reaches the bottom of the drum. If possible, attach the suction pipe to the bung hole with the 2" bung adapter to ensure that the pump remains securely in place while pumping the Bio-Dechlor INOCULUM mixture from the drum to the pump hopper.
8. Attach the hose to the outlet of the rotary transfer pump making sure that the opposite end of the hose reaches the pump hopper. Open the opposite bung hole on the drum lid to prevent a vacuum then pump the desired amount of BDI PLUS solution into the hopper of the pump.
9. Connect the hose from the grout pump to the drive rod assembly.
10. Start pumping the BDI PLUS product solution.
11. The initial volume of BDI PLUS solution pumped should only be enough to displace the water within the drive rods. Once this is done the actual injection can start.
12. Begin withdrawing the drive rods, in accordance with the manufacturer's SOP, and start pumping the BDI PLUS solution simultaneously. The dosage should be 0.1 liter per vertical foot or 1 gallon per vertical foot if prepared using the BDI dilution chart. The withdrawal rate should be such that it allows theappropriate quantity of material to be injected into each vertical foot of aquifer being

treated. The withdrawal rate should be slow to avoid creating a vacuum. This vacuum can potentially pull a small volume of material to the surface if the drive rods are withdrawn too quickly.

13. In less permeable soils such as clays and silts, there may be difficulty accepting the volume of estimated material. In this case REGENESIS recommends using a "step-wise" application approach. For this approach we suggest withdrawing the drive rods in one-foot increments and then injecting the quantity of material required per vertical foot.
14. Look for any indications of aquifer refusal such as:
    - Excessive pump noise or application pressure spikes (e.g. squealing)
    - Surfacing of material through the injection point ("blow-by") If acceptance appears to be an issue it is critical that the aquifer is given enough time to equilibrate before breaking down the drive rods and/or removing the hose. The failure to do this can lead to excessive back flow of the BDI PLUS material on personnel, equipment, and the ground surface.
15. If BDI PLUS solution continues to "surface" after the drive rods have been completely removed from the borehole a plug may be necessary. Large diameter disposable tips or wood stakes have been used successfully for this purpose.
16. Drive rods should be disconnected after one rod (typically 4 feet in length) has been withdrawn. The drive rods should be placed in a bucket (or equivalent) after they have been disconnected.
17. Complete the installation of the BDI PLUS solution at the designated application rate across the entire targeted vertical interval.
18. After the injection is completed, an appropriate seal should be installed above the vertical interval where the BDI PLUS solution has been placed to prevent contaminant migration. Typically, bentonite powder or chips are used to create this seal. However, consultants should review local regulations before beginning field installation activities to confirm that this approach can be used.
19. Complete the borehole at the surface as appropriate using concrete or asphalt.
20. Repeat steps 7 through 19 until the entire application has been completed. If additional drums of de-oxygenated water are required, prepare as suggested in Step 1.
21. Prior to the installation of BDI PLUS, all surface and overhead impediments should be identified as well as the location(s) of any underground structure(s). Underground structures include but are not limited to: utility lines (gas, electrical, sewer, etc), drain piping, and landscape irrigation systems.
22. The planned injection locations should be adjusted in the field to account for impediments and obstacles.
23. The actual injection locations should be marked prior to the start of installation activities to facilitate the application process.
24. Using an appropriate pump to install the BDI PLUS product is very critical to the success of the application as well as the overall success of the project. Based on our experience in the field, REGENESIS strongly recommends using a pump that has a pressure rating of at least 1,000 psi and a delivery rate of at least 3 gallons per minute. If the application involves both HRC and BDI PLUS, two separate pumps may be required to facilitate the process. The pump used to deliver HRC to the subsurface should be in accordance with the specifications outlined in the General Guidelines section of the HRC Installation Instructions.

Additional Information

The internal workings of the grout pump can be cleaned easily by recirculating a solution of hot water and a biodegradable cleaner (e.g. Simple Green) through the pump and delivery hose(s). If additional cleaning and decontamination is required it should be conducted in accordance with the manufacturer's SOP and local regulatory requirements.

Note: REGENESIS assumes that all of the material (microorganisms) sent to a site for installation purposes will be used for that particular project and that no material (microorganisms) will be left over at the conclusion of the installation activities.

APPENDIX F

REGENESIS APPLICATION DESIGN SUMMARY

REGENESIS

Project Information		
Harbor view		
Oswego		
Pilot bedrock		
Prepared For:		
Synapse		
Target Treatment Zone (TTZ) Info	**Unit**	**Value**
Areal Extent	sq ft	900
Top Treat Depth	ft	15.0
Bot Treat Depth	ft	30.0
Vertical Treatment Interval	ft	15.0
Treatment Zone Volume	ft^3	13,500
Treatment Zone Volume	cy	500
Soil Type	---	bedrock
Porosity	cm^3/cm^3	0.07
Effective Porosity	cm^3/cm^3	0.05
Treatment Zone Pore Volume	gals	7,069
Treatment Zone Effective Pore Volume	gals	5,049
Fraction Organic Carbon (foc)	g/g	0.005
Soil Density	g/cm^3	2.6
Soil Density	lb/ft^3	162
Soil Weight	lbs	2.2E+06
Hydraulic Conductivity	ft/day	2.0
Hydraulic Conductivity	cm/sec	7.06E-04
Hydraulic Gradient	ft/ft	0.005
GW Velocity	ft/day	0.20
GW Velocity	ft/yr	73
Contaminant Mass	**Unit**	**Value**
Dissolved Phase Contaminant Mass	lbs	0.14
Sorbed Phase Contaminant Mass	lbs	2.82
Competing Electron Acceptor Mass	lbs	5.31
Total Mass Contributing to H2 Demand	**lbs**	**8.26**
Mass Flux and 3DME Demand	**Unit**	**Value**
Groundwater Flux	L/day	127
Stoichiometric 3DME Demand	lbs	30
Total Mass Flux 3DME Demand	lbs	31
Total 3DME Demand	**lbs**	**62**
Application Dosing		
3-D Microemulsion to be Applied	**lbs**	**400**
S-MZVI to be Applied	**lbs**	**300**
BDI Plus to be Applied	**liters**	**18**

3-D Microemulsion®, S-MZVI®, CRS®, BDI® Plus Application Design Summary

Pilot bedrock		
Treatment Type	**Grid**	Input special application instructions here as needed.
Treatment Areal Extent (sq ft)	900	
Spacing Within Rows (ft)	30	
Spacing Between Rows (ft)	30	
DPT Injection Points	1	
Top Application Depth (ft bgs)	15	**Field Mixing Ratios**
Bottom Application Depth (ft bgs)	30	3DME Concentrate per Pt (gals)
3DME to be Applied (lbs)	**400**	48
3DME to be Applied (gals)	48	Mix Water per Pt (gals)
3DME Mix %	3%	1869
Volume Water (gals)	**1,869**	3DME Mix Volume per Pt (gals)
3DME Mix Volume (gals)	1,917	1917
S-MZVI to be Applied (lbs)	**300**	S-MZVI Volume per Pt (gals)
S-MZVI Volume (gals)	20	20
BDI Plus to be Applied (L)	**18**	BDI Volume per Pt (L)
BDI Plus Mix Water Volume (gals)	180	18.0
Total Application Volume (gals)	**2,122**	Volume per pt (gals)
Estimated Radius of Injection (ft)	14.8	2122
Prepared by: Alana Miller		Volume per vertical ft (gals)
Date: 8/5/2021		141

Technical Notes/Discussion

Assumptions/Qualifications

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

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

APPENDIX G

SPILL CONTINGENCY PLAN

General Spill Containment Procedures
for
Remedial Material Injection

The remedial materials will be delivered to the site in totes and drums. The procurement, delivery, unloading and storage of these remedial materials will be performed by others.

The concentrated solution will be transferred from the storage area to a dilution tank and blended with dilution water from an onsite source. A liner will be placed at the customer's remedial material storage area upon which transfer of liquids to the mix system dilution tank will occur. Potable water will be draw from the onsite source and stored in a temporary holding tank and metered into the dilution system as needed. The dilution, delivery tanks, and AWT's dilution system will be spotted near the injection area for the duration of the delivery event. An enclosed trailer will house all remedial material handling and dilution equipment. Potable water and remedial material storage will be available to AWT from a source within 150' of the setup area for the delivery system.

The system would be mobilized and set in place on a containment liner with a perimeter berm. Where required, electric generators and a diesel air compressors would be staged with in the containment liner. During mobilization, all system components will be set up and made operational and a complete checkout of all system components run with potable water for a shakedown test to confirm system readiness.

The trailer would also be equipped with lighting for interior and adjacent operations as well as housing an eye wash station and safety shower facility.

Where lines are run out of the mix area to delivery locations, drip pans or five gallon buckets will be used to contain drips occurring during connection and disconnection of the lines to the injection locations.

At the end of each shift all injection gear will be rinsed down and rinse water will be contained as instructed by the customer. The appurtenant equipment will be removed from the work area and stowed in the injection trailer overnight. At the end of the project, all rinse water will be disposed of off-site in accordance with all applicable federal, state and local requirements.

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APPENDIX H

ENGINEERING CERTIFICATION

ENGINEERING CERTIFICATION

I, Jeffrey R. Holt, P.E., certify that I am currently a NYS registered professional engineer as defined in 6 NYCRR Part 375 and that this Work Plan for Pilot Scale Reagent Injection was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigations and Remediation (DER-10).

HOLT CONSULTING

JEFFREY R. HOLT, P.E.