B&L Woodwaste Site

Phase 3 In Situ Treatment Work Plan

Prepared for

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LIMITATIONS

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
bgs	Below ground surface
CAP	Cleanup Action Plan
Decree	Consent Decree No. 08-210610-7
DOC	Dissolved organic carbon
Ecology	Washington State Department of Ecology
HASP	Health and Safety Plan
lb	Pound
µg/L	Micrograms per liter
mg/L	Milligrams per liter
mV	Millivolt
OMMP	Operations, Monitoring, and Maintenance Plan
ORP	Oxygen-reduction potential
PRB	Permeable reactive barrier
QA	Quality assurance
QC	Quality control
Site	B&L Woodwaste Site
SR-167	State Route 167
UIC	Underground Injection Control
Work Plan	In Situ Treatment Work Plan
WSDOT	Washington State Department of Transportation
ZVI	Zero valent iron

1.0 Groundwater Treatment Objectives

This *Phase 3 In Situ Treatment Work Plan* (Work Plan) has been prepared to support implementation of the 2008 Final Cleanup Action Plan (CAP) for the B&L Woodwaste Site (Site). The CAP is being implemented pursuant to Consent Decree No. 08-210610-7 (Decree). This Work Plan is for in situ remediation of specific areas of the groundwater plume downgradient of the B&L Woodwaste Landfill, shown on Figure 1.1.

Phase 3 in situ treatment is being implemented as part of the adaptively managed remedy for the groundwater arsenic plume consistent with the CAP and the Decree, as amended in 2013. As described in the Scope of Work (Exhibit B to the Decree), the CAP is being implemented in three major phases. The first two phases of cleanup, which included construction of a subsurface barrier wall, in situ treatment permeable reactive barriers (PRBs), groundwater recovery network and treatment plant, and ditch sediment excavation, were completed in 2013 (Floyd|Snider and AMEC 2014a). As described in the Phase 3 Scope of Work and Schedule (Exhibit 1: First Amendment to Exhibit B to the Decree), Phase 3 consists of routine operations and maintenance and monitoring, and adaptive management of groundwater remediation.

As part of ongoing Phase 3 adaptive management of groundwater remediation, attaining the remedial objective of protecting Hylebos Creek from arsenic contamination involves consideration of the State Route 167 (SR-167) extension project. This project is expected to relocate a section of Hylebos Creek closer to the Site and construct riparian wetlands habitat in the agricultural field. To accelerate cleanup of the areas of contamination closest to the SR-167 project, the Washington State Department of Ecology- (Ecology-) approved addition of two other groundwater recovery wells (R-22 and R-23) in the Agricultural Field Plume in 2016.

Ecology decided in 2017 to further accelerate cleanup of the Agricultural Field Plume and the PD141 Treatment Area of the Wetlands Plume, through in situ treatment of arsenic. This change will also involve stopping recovery of groundwater from the Agricultural Field Plume. In situ treatment using reductive precipitation has been demonstrated to be effective in decreasing arsenic concentrations in groundwater in PRB configuration and through area treatment, based on the Phase 2 Pilot Study (Floyd|Snider and AMEC 2014b).

The remainder of this work plan is organized in the following manner:

- The basis of remedial design, including treatment goals, areas, and baseline conditions, review of treatment technologies, and design parameters, are provided in Section 2.0.
- The plan for implementation is provided in Section 3.0.
- The references for this report are provided in Section 4.0.

2.0 Groundwater Treatment Design

2.1 TREATMENT GOALS AND BASELINE CONDITIONS

Two areas of elevated groundwater arsenic are targeted for Phase 3 in situ treatment: the Agricultural Field Treatment Area and the PD-141 Treatment Area. These areas, shown on Figure 2.1, were selected in coordination with Ecology as the focus of treatment because of their proximity to the upcoming SR-167 extension project, which is expected to relocate a section of Hylebos Creek in the agricultural fields and wetlands adjacent to the Site, and construct riparian wetlands habitat in the Agricultural Field.

Treatment of these areas is intended to reduce the risk of migration of arsenic in groundwater from reaching the relocated creek and constructed wetlands, in addition to other cleanup goals identified in the CAP. The specific treatment goal is a 75-percent or greater reduction in groundwater arsenic concentration, which is considered a suitably protective and feasible level of risk reduction based on the groundwater arsenic concentrations, the anticipated distance from the plume edge to the relocated creek of approximately 200 feet or greater, and the area treatment results of the Phase 2 Pilot Study.

Groundwater sampling and analysis completed in conjunction with semiannual compliance monitoring in April 2017 provide baseline arsenic data for use in planning in situ treatment. These results are illustrated on Figure 2.1. Selected groundwater geochemical parameters from prior sampling is discussed in Section 2.1.3.

2.1.1 Agricultural Field Treatment Area

The Agricultural Field Treatment Area consists of the triangular portion of the Agricultural Field Plume located between sections of drainage ditch alongside the west edge of the landfill and along the south side of the Interurban Trail. The area of groundwater with concentrations greater than the cleanup level of 5 micrograms per liter (µg/L) is defined by a direct-push delineation (Floyd|Snider and AMEC Geomatrix 2008) updated with recent monitoring well and recovery well sampling results. The small area of the Agricultural Field Plume north of the ditch along the Interurban Trail was treated with an injected EHC-M® PRB in 2009, with a supplemental maintenance injection in 2011. As shown on Figure 2.1, the Agricultural Field Treatment Area has been divided into two sub-areas that correspond to the inferred 200 µg/L arsenic isoconcentration contour, referred to as the Agricultural Field Treatment Area Hotspot and the Agricultural Field Treatment Area <200 µg/L.

The maximum arsenic concentration measured in the Agricultural Field Plume during the April 2017 monitoring was 388 µg/L. Arsenic concentrations greater than 100 µg/L are limited to a hotspot area generally located between R-14 and MW-33. Attainment of the treatment goal for the Agricultural Field Plume would reduce the maximum arsenic concentration to between 50 and 100 µg/L, and reduce the arsenic concentration throughout a large area of the plume to less than the 5 µg/L cleanup level.

2.1.2 PD-141 Treatment Area

The PD-141 Treatment Area consists of an area of focus for treatment in the Wetlands Plume, based on inferred concentration contours in the vicinity of monitoring well PD-141. This monitoring well was installed as part of the Phase 2 Pilot Study to measure the effects of an experimental in situ treatment reagent that was not effective. Arsenic concentrations at PD-141 demonstrated a generally increasing trend between 2011 and 2016, reaching a maximum of 451 µg/L in October 2016.

The concentration of arsenic measured in groundwater at PD-141 in April 2017 was 324 µg/L. Attainment of the treatment goal for the PD-141 Treatment Area would reduce the maximum arsenic concentration in this area, the greatest-concentration areas remaining in the Wetlands Plume, to between 50 and 100 µg/L.

2.1.3 Groundwater Geochemistry

Geochemical parameters in groundwater in the vicinity of the treatment areas relevant for treatment evaluation and design have been measured as part of prior studies (Floyd|Snider and AMEC 2014b, Floyd|Snider and AMEC Geomatrix 2011a). As previously reported, groundwater in the treatment areas is generally mildly reducing, with oxygen-reduction potential (ORP) measurements typically in the range of 0 to -200 millivolts (mV), and arsenic present predominantly in the reduced form, arsenite (As(III)). Groundwater pH is neutral, in the range of 6 to 7 pH units. Untreated groundwater typically contains dissolved iron in the range of 10 to 80 milligrams per liter (mg/L), dissolved organic carbon (DOC) in the range of 10 to 60 mg/L, and sulfate in the range of 0.5 to 4 mg/L. Treatment with a reductive precipitation reagent has generally been most successful in decreasing arsenic concentrations at the Site in monitoring wells where treatment has also lowered ORP, and increased sulfate, iron, and DOC concentrations.

2.2 REVIEW OF IN SITU TREATMENT AMENDMENT OPTIONS

In this section, a review of in situ treatment options for groundwater arsenic is summarized as a basis for a recommendation. Based on previous pilot studies at the Site, it was determined with Ecology that no further pilot study was appropriate for Phase 3 in situ treatment.

In situ treatment of arsenic at the Site has utilized reagents that induce removal of arsenic through reductive precipitation. Reductive precipitation removes arsenic from solution by precipitation of metal sulfides, which incorporate arsenic into the solid phase through co-precipitation and adsorption. Of the available in situ treatment options for arsenic in groundwater, amendments that rely on reducing conditions are considered the most consistent with the natural reducing conditions in groundwater beneath the majority of the Site and with long-term stability of the sequestered arsenic.

Treatment has been successfully implemented at the Site through subsurface injection of EHC-M, a commercially available remediation product that utilizes reductive precipitation (Floyd|Snider

and AMEC Geomatrix 2011b, Floyd|Snider and AMEC 2014b). Other remedial technologies have been evaluated at the Site. Metals Remediation Compound (MRC) was evaluated during Phase 1, and was not found to be successful during a bench study. During the Phase 2 Pilot Study, an experimental amendment was injected that provided organic carbon, sulfate, and iron, but was not found to be successful in groundwater arsenic remediation relative to EHC-M. Additional reductive precipitation remediation products that have emerged since the Phase 2 Pilot Study, and have been evaluated as part of this review, include Metafix® and FerroBlack®.

2.2.1 EHC-M

EHC-M consists of a mixture of a hydrophilic organic carbon source, micro-scale zero valent iron (ZVI), and both magnesium and potassium sulfate. It removes arsenic from groundwater by distributing ferrous iron throughout a treatment zone while depressing redox potential and providing sulfate as an electron acceptor for microbial sulfate reduction, resulting in precipitation of iron sulfides and iron oxyhydroxides, which adsorb and co-precipitate with arsenic. In addition to releasing dissolved iron, corrosion of ZVI provides a secondary mechanism for decreasing redox potential by releasing hydrogen gas into groundwater. ZVI also acts to maintain neutral pH that would otherwise be depressed by the creation of organic acids generated by microbial activity during anaerobic degradation of the organic substrate.

EHC-M was successfully used in two PRBs at the Site to intercept groundwater arsenic at a moderate-to-high concentration of 0.3 percent by soil weight. It was also successfully used in the Phase 2 Pilot Study to test area treatment in two treatment cells: Cell A at 0.2 percent by soil weight and Cell B at 0.1 percent by soil weight. Because it was intended as a test for expanding in situ treatment throughout the plume, the Phase 2 Pilot Study evaluated the low end of the concentration range recommended by the manufacturer. Based on recent groundwater sampling, the results for Cell A were reduction in arsenic from 86 to 22 µg/L, and the results for Cell B were reduction of arsenic from 22 µg/L to 6 µg/L.

Because EHC-M contains insoluble microscale ZVI, it must be injected as a slurry, which necessitates a direct-push drill rig and typically requires a larger number of borings for injection than a liquid would, because the volume of slurry that can be injected per boring is limited. In the shallow treatment zone at the site, previous injections indicate that the limit per boring is approximately 200 gallons of slurry, or about 500 pounds (lbs) of EHC-M. The cost quoted for EHC-M is $1.60 per pound plus delivery.

2.2.2 Metafix

Metafix is a newer product developed by PeroxyChem, the same manufacturer of EHC-M, who now markets EHC-M as part of a suite of products under the Metafix name. Originally developed to remediate plumes where acute toxicity from extreme metals concentrations, pH, or salinity inhibits sulfate-reducing bacteria, the Metafix suite consists of different combinations of iron sulfide and iron oxyhydroxide precipitates, ZVI, activated carbon, adsorbents such as zoolites, and, in the case of the EHC-M variant, magnesium and potassium sulfate, and a hydrophilic carbon source.

PeroxyChem offers a recommended Metafix mixture and dose for a given site based on a basic 3 week jar test using site soil and groundwater. However, in discussions with the developers of the product, they indicated that they consider EHC-M to be more effective for plume treatment, especially where no acute toxicity to microbes is present. PeroxyChem indicated that EHC-M would be their recommended Metafix mixture for the Site, and did not recommend a jar test for further evaluation.

2.2.3 FerroBlack

FerroBlack consists primarily of synthesized iron sulfide (mackinawite, [FeS]) and sodium sulfide that are injected as a liquid suspension to remove arsenic through adsorption and co-precipitation. Particle size for the injected minerals ranges from 0.45 micrometers (µm) to greater than 1 µm in size. The suspension typically has an ORP in the range of -500 to -1,200 mV. Variations of the product are available, and the composition is typically determined based on a jar test performed by the vendor, Redox Solutions. Injected concentrations typically range from 1 to 4 percent by weight (weight of treatment solution as a percentage of weight of impacted groundwater).

Based on a summary of basic site conditions and the scope of work for Phase 3 in situ treatment, Redox Solutions suggested a potential treatment dose of 2 percent might be appropriate, though they recommended a basic jar test using site soil and groundwater to confirm dosing. The cost for the material is $1,275 per 300 gallon tote delivered.

FerroBlack is injected using direct-push methods as a liquid suspension, with a typical spacing of 15 feet between borings in conditions thought to be similar to the Site. Because the adsorption and co-precipitation reactions occur at the surface of the FeS particles, the effectiveness of the treatment is not expected to extend beyond the injection radius.

2.2.4 Comparison and Recommendation

Based on preliminary design assumptions for injection spacing and treatment concentration, the estimated number of borings anticipated to achieve remediation goals, approximately 140 to 150 borings, is similar for both FerroBlack and EHC-M. Thus, the estimated drilling and field oversight cost is similar for both.

At the assumed application rates, the projected cost for treatment reagent product is slightly lower for FerroBlack at a dose of 2 percent (approximately $83,000 for 20,000 gallons) than for EHC-M at a dose of 0.1 to 0.2 percent of soil weight (approximately $121,000 for 65,000 lbs). However, there is greater uncertainty in the treatment dosage of 2 percent assumed for FerroBlack than in the treatment dosage of 0.1 to 0.2 percent assumed for EHC-M, which have both been successfully applied at the Site. A dosage of 3 percent would increase the FerroBlack cost to a comparable cost, $123,000, and a dosage of 4 percent would double the cost, raising it to $166,000. Confirmation of the effectiveness of the 2-percent dosage of FerroBlack would require additional costs to collect soil and groundwater for a jar test to be completed by the manufacturer.

While site data demonstrate the long-term effectiveness of EHC-M, the long-term effectiveness of FerroBlack at the Site is not known. Arsenic concentrations in areas treated with EHC-M in 2009 and 2011 remain at reduced concentrations based on April 2017 sampling. Mechanisms for continued arsenic treatment by EHC-M are understood to include a variety of adsorption sites on iron corrosion products and iron sulfides, continued corrosion of ZVI to release reactive ferrous iron, supported by continued redox depression from ZVI and slow release of organic carbon substrate. The mechanisms of continued arsenic treatment by FerroBlack are understood to include available adsorption sites on iron sulfides and iron oxyhydroxides. It is not clear that FerroBlack contains a mechanism to maintain the low redox conditions in the suspension once it is injected, or to provide for continued release of reactive constituents in the dissolved phase. For these reasons, a pilot study may be appropriate to assess the longevity of FerroBlack treatment.

Based on these factors, our recommendation is use of EHC-M for Phase 3 in situ treatment.

2.3 TREATMENT CONCENTRATION AND INJECTION SPACING

Treatment design parameters for EHC-M are summarized in Table 2.1 and the treatment injection boring layout is illustrated on Figure 2.1.

The Upper Sand Aquifer being treated typically extends 15 to 16 feet below ground surface (bgs), and the depth targeted for treatment is the lower 10 feet of the aquifer, which makes up all or nearly all of the saturated thickness during dry season conditions. The treatment design is divided into three areas: the Agricultural Field Treatment Area Hotspot (9,800 square feet), the Agricultural Field Treatment Area <200 µg/L (28,300 square feet), and the PD-141 Treatment Area (5,600 square feet). To increase the cost-effectiveness of treatment, a treatment application rate of 0.2 percent of soil weight will be applied to the two greater-concentration areas, the Agricultural Field Treatment Area Hotspot and the PD-141 Treatment Area, while a lower application rate of 0.1 percent of soil weight will be applied to the lesser-concentration area of the Agricultural Field Treatment Area <200 µg/L.

As shown in Table 2.1, the spacing of injection borings for each area is a function of the application rate. The mass of EHC-M that can be injected in each boring is limited to approximately 500 lbs. To add 0.2 percent of soil weight EHC-M while keeping within this limit, borings are spaced 15 feet apart. To add 0.1 percent of soil weight EHC-M, borings are spaced 20 feet apart. Based on these parameters, a total of 140 borings are planned to inject approximately 65,000 lbs of EHC-M as approximately 24,000 gallons of slurry.

3.0 Implementation Plan

The plan for implementing groundwater treatment is described in this section.

3.1 PERMITTING REQUIREMENTS

Phase 3 in situ treatment is part of a cleanup action being conducted under an Ecology Consent Decree and, therefore, is exempt from certain procedural and permitting requirements of certain Washington laws and regulations and all local permits (Washington Administrative Code 173-340-710(9)(a)); however, implementation of the cleanup action must comply with the substantive requirements of these laws and permits. The treatment will meet the substantive requirements for applicable regulations and standards, and will fully comply with all action-, chemical-, and location-specific Applicable or Relevant and Appropriate Requirements (ARARs), as described in the 2008 CAP.

The permitting exemption does not apply to permits required under federal programs or some state-administered federal permitting programs. Because the work addressed by this Work Plan will not impact jurisdictional wetlands, the U.S. Army Corps of Engineers-administered wetland permitting program does not apply to the current work; therefore, no federal permits are required to implement the work addressed in this Work Plan.

For Washington State-administered federal programs, only permits for stormwater or wastewater discharge are required when cleanup work is implemented under a Model Toxics Control Act Consent Decree. Treatment has been designed for zero discharge of stormwater; stormwater runoff quality from the Agricultural Field Treatment Area, Interurban Trail, and the PD-141 Treatment Area during the planned implementation work will be no different than at present. The design includes no disturbed areas or exposed contamination that would impact run-on, runoff, or adjacent surface water or wetlands; therefore, no construction stormwater permit or stormwater pollution prevention plan is needed for this work.

A State Environmental Policy Act checklist was done as part of the 2008 CAP public review process. As the lead agency, Ecology made a determination of non-significance for the activities identified in the CAP. The work being done under this Work Plan was specified under the 2008 CAP and therefore is covered under that determination.

The local permitting requirements for the planned work under this Work Plan fall within the jurisdiction of Pierce County and the City of Milton, as the wetlands area north of the Interurban Trail is within unincorporated Pierce County, and the City of Milton is the owner of the Interurban Trail. Pierce County will not require permitting for the planned work. The City of Milton may require a street work permit for work in the Interurban Trail, and a water use permit for use of a hydrant, both of which will be obtained for the planned work if necessary.

It has been determined that the pilot study design will comply with the substantive requirements of the Ecology-administered Underground Injection Control (UIC) program and no permit is needed. In situ injections will be registered with UIC and rule-authorized. Documentation will be

provided in conjunction with reporting (refer to Section 3.6). It has also been determined that the pilot study design will comply with the substantive requirements of the Ecology-administered water well program. The injection borings must follow standard procedures for well installation.

3.2 GROUNDWATER TREATMENT IMPLEMENTATION

Access, site preparations, groundwater treatment, and site restoration activities are described in this section.

3.2.1 Property Access

Treatment will be implemented on the agricultural field owned by the Washington State Department of Transportation (WSDOT) and wetlands north of the Interurban Trail owned by M-F Associates (a.k.a., Berry Farms Associates). Treatment will require access via the Interurban Trail right-of-way, owned by the City of Milton. A current permit to enter agreement is in place with WSDOT for the affected parcels that applies to the planned groundwater treatment activities. The access agreement with Berry Farms Associates expired on December 31, 2016. The B&L Woodwaste Custodial Trust was engaged in talks in 2017 with Berry Farms Associates concerning continued access. Notification of groundwater treatment will be provided to Berry Farms Associates as needed and consistent with these discussions. A street work permit and coordination with the Milton Public Works Department will address requirements for permission from the City of Milton for access to the Interurban Trail.

3.2.2 Site Preparation

The following tasks are among those expected to be needed to prepare for groundwater treatment:

Brush clearing and wetlands pathway improvement. Trees and brush have become established in portions of the Agricultural Field Treatment Area and PD-141 Treatment Area, which must be cleared to allow access for injection probe rigs. The trees and brush will be cut and chipped in place. If needed, wood chips will be used to provide an access route for a limited-access probe rig over soft ground in the vicinity of the PD-141 Treatment Area.

Water source. The source for the expected 20,000 gallons of water needed for the slurry injections is expected to be one of the following: the potable supply at the groundwater treatment plant, the City of Milton hydrant on Fife Way East, or a well on the agricultural field property. If a City of Milton hydrant is used, a backflow preventer must be installed per City of Milton requirements. In addition, to prevent added cost and time from use of a water truck, a hose must be run from the hydrant across the landfill property to the work area.

Injection locations and utility locate. Locations will be marked in the field with flags using a hand-held global positioning system (GPS) instrument. Standard utility locate services will be performed, including locating the groundwater treatment plant high-density polyethylene (HDPE) piping in the Agricultural Field Treatment Area.

Receipt of reagent delivery. EHC-M will be delivered to the groundwater treatment plant, where it will need to be received and stored in the secured area. The injection contractor will resupply from the reagent stored on-site.

Temporary staging areas. It is expected that the drilling contractor will use a portion of the Agricultural Field as a temporary staging and storage area. The contractor may also use the shoulder of the Interurban Trail for temporary staging of vehicles and equipment as allowed by the City of Milton. If necessary, the contractor will coordinate with the groundwater treatment plant operator to use available space east of the Landfill for staging and storage areas.

Agricultural Field Plume groundwater recovery. Prior to injection, pumps in recovery wells R14, R-15, R-22, and R-23 will be turned off to avoid disruption to in situ treatment or the groundwater treatment plant.

3.2.3 Baseline Groundwater Sampling

Baseline groundwater sampling was completed in April 2017. Groundwater data from additional monitoring and recovery wells are available from the October 2016 monitoring event.

3.2.4 In Situ Injection

The sequence of injection will be influenced by the condition of agricultural field and wetlands areas, which can be soft and prone to flooding. It is expected that the Agricultural Field Treatment Area will be dry enough for vehicle access before the PD-141 Treatment Area is accessible.

A drilling contractor with experience injecting EHC-M and liquid reagents will be employed for the injection. Injection will proceed in marked locations according to standard procedure, as summarized in this section. The EHC-M product will be mixed into potable water on site using a mixing tank with a mechanical agitator. EHC-M powder will be mixed with potable water in accordance with the manufacturer's recommendation to prepare a slurry of approximately 29 to 30 percent solids (mass of dry EHC-M divided by total mass of slurry). It is expected that slurry will be mixed in batches to maintain consistency. After mixing, the slurry will be injected through a direct-push boring using an injection tip that directs the slurry horizontally and a pump suitable for injecting slurry (piston, grout pump, or similar). The volume of slurry injected will be monitored using a graduated tank or a flow meter.

Injection will be maintained at a pressure suitable for injecting the slurry into the subsurface. Based on previous results, this pressure is anticipated to be approximately 50 to 150 pounds per square inch (psi) for the EHC-M slurry. Higher pressures may be needed to initiate injection. At the completion of each injection, the borehole will be backfilled with bentonite in accordance with state regulations.

If the aquifer is unable to accept the targeted quantity of slurry or liquid in the planned injection point, as evidenced by excessive buildup of pressure and/or surfacing of material through the injection point, the injection in the given boring will be paused or halted. Injection will resume at

the location at a later time, or additional boreholes will be advanced nearby to introduce the planned quantity of treatment reagent into the treatment zone.

Specifications for EHC-M injection are provided in Table 2.1 and summarized below.

For each boring, drive rods will be advanced to 5 feet bgs in the PD-141 Treatment Area and to 6 feet bgs in the Agricultural Field Treatment Area. Pumping will then begin and injection will proceed by injecting the specified slurry volume at intervals of 2 feet, until the boring is advanced downward to the base of the Upper Sand Aquifer at approximately 15 or 16 feet bgs.

EHC-M will be injected at an application rate of 0.2 percent, measured by dry mass of reagent to mass of soil in the treatment cell, in the Agricultural Field Treatment Area Hotspot and the PD-141 Treatment Area. The total volume injected in the Agricultural Field Treatment Area Hotspot will be approximately 7,878 gallons of slurry (21,600 lbs of dry EHC-M), with 179 gallons injected per boring in 44 borings spaced 15 feet apart. In the PD-141 Treatment Area, the total volume injected will be approximately 4,504 gallons of slurry (12,350 lbs of dry EHC-M), with 180 gallons injected per boring in 25 borings spaced 15 feet apart.

EHC-M will be injected at an application rate of 0.1 percent in the Agricultural Field Treatment Area <200 µg/L. The total volume injected in the Agricultural Field Treatment Area <200 µg/L will be will be approximately 11,360 gallons of slurry (31,150 lbs of dry EHC-M), with 160 gallons injected per boring in 71 borings spaced 20 feet apart.

If necessary, additional potable water will be injected to clear the injection tooling of EHC-M slurry following the completion of each boring.

3.2.5 Site Restoration

Site restoration activities will be completed after completion of the injections and backfilling of the injection borings. Any waste or debris from the implementation will be removed from the Site and managed in accordance with applicable regulations and standards. Decontamination water will be containerized and will be disposed of off-site, treated on-site and discharged, or discharged to the ground surface if concentrations are less than Site cleanup levels, in accordance with the Compliance Monitoring Plan Sampling and Analysis Plan/Quality Assurance Project Plan included with the *Operations, Monitoring, and Maintenance Plan* (OMMP; Floyd|Snider and AMEC 2013)

3.3 QUALITY ASSURANCE AND CONTROL

In order to install the treatment reagents to the specified design requirements, quality control (QC) will be conducted by the field oversight staff. The details of implementation quality assurance (QA) and QC are provided in this section.

3.3.1 In Situ Injection Quality Assurance/Quality Control

Injection procedures will be continuously observed by field oversight staff for QC. The elements of QA and QC include: treatment reagent material, slurry mix, injection depth, daylighting of injected amendment, and injection volume.

The lot number of the EHC-M product will be recorded prior to use. The condition of the treatment reagent will be routinely inspected prior to injection and material with abnormal characteristics will be rejected. The slurry mixture will be monitored based on observation and documentation of the mass of dry product and volume of water applied for each batch of slurry mixed in the field.

Depth to each injection layer in each injection boring will be monitored by field staff and recorded to the nearest 0.5 foot. The volume of injected slurry and cleanout water will be monitored and recorded for each injection layer. The borehole location and adjacent areas will be visually inspected during injection to identify any surface flows that may occur. System pressure will be periodically monitored and recorded.

3.3.2 Documentation

The injection work, including QA/QC monitoring and resolution of problems, will be documented in field logbooks and on injection QC forms. The field log books will document the following:

- Daily safety meetings
- Description of injection activities
- Equipment and personnel involved
- Problems encountered and corrective measures
- Record of delivery of materials

Injection QC forms are included as Appendix A. The injection QC form will document the following:

- Injection boring ID and location
- Field conditions (weather, surface condition, and surface water condition)
- Treatment application dosage
- Lot number and field mix batch parameters, including quantity of product and water used
- Depth of injection layers, volume of slurry and water injected, and injection pressure
- Visual observation of injection procedures and other QC observations

3.4 HEALTH AND SAFETY

The project work described in this addendum will comply with the health and safety standards prescribed by the Occupational Safety and Health Act (OSHA) and the Washington Department of Occupational Safety and Health. A project-specific Health and Safety Plan (HASP) covering the work to be done is included in the OMMP (Floyd|Snider and AMEC 2013). The contractor will prepare a HASP for their activities prior to mobilization. The two HASPs will establish protection standards and mandatory safe practices and procedures for all contractor employees, subcontractors, owner's representatives, oversight personnel, and all other persons involved with the field work activities addressed by this Work Plan. The HASPs also assign responsibilities, establish standard operating procedures, and provide for contingencies that may occur during field work activities. Emergency contact information will be provided in the HASPs. Copies of the HASPs will be on site at all times, and visitors entering the work area will be required to review and sign the project-specific HASP.

Chemical exposure hazards are identified as exposure to arsenic-contaminated groundwater and surface water. Potential routes of exposure include ingestion, dermal contact, and eye contact. Physical hazards and recommended preventative measures are identified in the HASP including leaks due to high injection pressures, falling, lifting, electrical and mechanical hazards, noise, heat stress, cold stress, sunburn, biohazards, and traffic hazards. A safety data sheet (SDS) for EHC-M is included as Appendix B. As noted in the SDS, EHC-M does not contain hazardous materials with occupational exposure limits.

All work involving heavy equipment, including injection boring advancement and clearing and grubbing, if applicable, will proceed in modified Level D personal protective equipment, including hard hat, steel-toed boots, hearing protection, eye protection, gloves, and protective work clothing. If uncontrolled dust, including from EHC-M, occurs in a worker's breathing zone, workers will wear approved dust masks or respirators as appropriate. The level of protection will be upgraded accordingly by the Site Health and Safety Officer whenever warranted by conditions present in the work area.

Decontamination procedures will be strictly followed to prevent spread of arsenic-contaminated water. Appropriate site control measures will be maintained in all work areas to limit access during and after work hours. These measures may include temporarily blocking the Interurban Trail during injection in this treatment zone. Appropriate measures will be taken in consultation with the City of Milton to ensure the safety of pedestrians and cyclists using the Interurban Trail during injection activities. Emergency response and administrative requirements are described in the project-specific HASP. All construction equipment will be decontaminated prior to leaving the Site.

3.5 PERFORMANCE MONITORING

Performance monitoring for Phase 3 in situ treatment will consist of groundwater sampling and analysis activities performed as part of regular semiannual compliance monitoring, supplemented with selected additional sampling locations and quarterly events.

Additional sampling locations to be added to the regular compliance monitoring locations for the October 2017 monitoring event, include those added for the April 2017 event (W-2, MW-34, and PD214) plus recovery wells R-14, R-15, R-22, and R-23.

Two quarterly events will be added as part of 2018 compliance monitoring, in January and July. Wells sampled for performance monitoring as part of these events will include D-8A, PD-214, MW-33, MW-34, W-1, W-2, R-14, R-15, R-22, R-23, and PD-141.

Subsequent performance monitoring will be integrated into regular semiannual compliance monitoring.

Monitoring will consist of measurement of water levels, field parameters, and sampling and analysis for total arsenic in accordance with the analytical methods, reporting limits, sample collection and preservation requirements, and data validation procedures described in the Sampling and Analysis Plan/Quality Assurance Project Plan contained in the OMMP (Floyd|Snider and AMEC 2013).

3.6 REPORTING

Reporting will consist of submittal to Ecology of a notification that the work was completed, a brief summary of any significant deviations from the Work Plan, injection QC documentation forms, and UIC permitting documentation.

3.7 SCHEDULE

The proposed general schedule for Phase 3 in situ treatment is summarized below:

Item	Date
Permitting	June 19–July 7
Site preparations	July 10–August 4
Contractor mobilization, injections, and site restoration	August 8–29
Submit injection documentation	September 22
Performance Monitoring Event 1	October 2017
Performance Monitoring Event 2	January 2018
Performance Monitoring Event 3	April 2018
Performance Monitoring Event 4	July 2018

4.0 References

Floyd|Snider and AMEC. 2013. *B&L Woodwaste Site, Operations, Monitoring, and Maintenance Plan*. Prepared for B&L Woodwaste Custodial Trust. May.

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B&L Woodwaste Site

Phase 3 In Situ Treatment Work Plan

Table

Table 2.1
EHC-M Injection Parameters

Parameters	Agricultural Field Treatment Area		PD-141 Treatment Area	Units	Assumptions
	Agricultural Field <200 µg/L	Agricultural Field Hot Spot			
Hydrogeologic Parameters					
Hydraulic gradient (dh/dL)	0.0005	0.0005	0.0005	ft/ft	Based on gradients in treatment zones from 2008 to 2011 water level measurements.
Hydraulic conductivity (Kh)	100	100	100	ft/day	From 2008 aquifer testing.
Effective porosity (ne)	0.25	0.25	0.25		Estimated based on soil type.
Average linear (seepage) velocity (Vs)	0.2	0.2	0.2	ft/day	
Maximum arsenic concentrations	200	388	324	µg/L	April 2017 monitoring well sampling.
Treatment Area Dimensions					
Treatment cell area	28,300	9,800	5,600	ft^2	Agricultural Field Plume hotspot to 100 µg/L is 17,100 square feet.
Depth to top of treatment cell	6	6	5	ft	
Depth to bottom of treatment cell	16	16	15	ft	
Treatment cell thickness	10	10	10	ft	
Treatment cell volume	283,000	98,000	56,000	ft^3	
Mass of soil in treatment cell	31,130,000	10,780,000	6,160,000	lbs	
Estimated porosity	34%	34%	34%		Estimated based on soil type.
Pore volume	96,220	33,320	19,040	ft^3	
Preparation of EHC-M Slurry					
Percentage of dry reagent by soil mass	0.001	0.002	0.002		Application rate based on Phase 2 Pilot Study, Cell A 0.2%, Cell B 0.1%. Both are at the low end of the recommended rate by PeroxyChem. Site-specific data: Cell B, 0.1%, treated arsenic at 21.7 µg/L to 6 µg/L. Cell A, 0.2%, treated arsenic at 86 µg/L to 22 µg/L.
Mass of dry reagent required	31,150	21,600	12,350	lbs	Rounded up to nearest bag size (50 lbs).
Cost of reagent	$58,064	$40,262	$23,020		2017 cost is $1.72/lb delivered ($1.60/lb plus estimated $5,000 delivery per 40,000 lb truckload) plus tax.
	$121,346				
Percentage of solids in slurry	0.3	0.3	0.3		PeroxyChem recommended mixture (mass of dry EHC-M)/(mass of water + mass of dry EHC-M).
Mass of water required	72,683	50,400	28,817	lbs	
Volume of water required	8,710	6,040	3,453	gal	
Slurry volume	11,360	7,878	4,504	gal	1 lb EHC-M = 0.3647 gal slurry at 28.53% solids.
	1,519	1,053	602	ft^3	1 ft^3 = 7.48 gal.
Slurry as fraction of pore volume	0.02	0.03	0.03		
Injection Details					
Injection spacing (grid)	20	15	15	ft	Spacing based on PeroxyChem recommendations, and adjusted to reduce mass of EHC-M per boring to <500 lbs.
Total number of injection points	71	44	25	points	Injection boring locations and quantities may be adjusted based on field conditions, provided the total mass of reagent is injected within the specified zone and suitably distributed.
Mass EHC-M per point	439	491	494	lbs	PeroxyChem recommends 250 to 500 lbs EHC-M per point to avoid daylighting, particularly with shallow injection depths. Previously able to inject 500 lbs per boring at 50 lbs per foot in permeable reactive barrier injections, with some daylighting, and up to 584 lbs per boring in Phase 2 Pilot Study, with some daylighting. Daylighting was also an issue at 292 lbs per boring.
Water volume per point	123	137	138	gal	
Slurry volume per point	160	179	180	gal	
Number of layers per point	5	5	5	layers	Injection will proceed in layers at 2-foot intervals .
Mass EHC-M per layer	88	98	99	lbs	Previous experience suggests, and PeroxyChem recommends, no more than 50 lbs EHC-M per vertical foot (100 lbs per 2-foot layer).
Water volume per layer	25	27	28	gal	
Slurry volume per layer	32	36	36	gal	

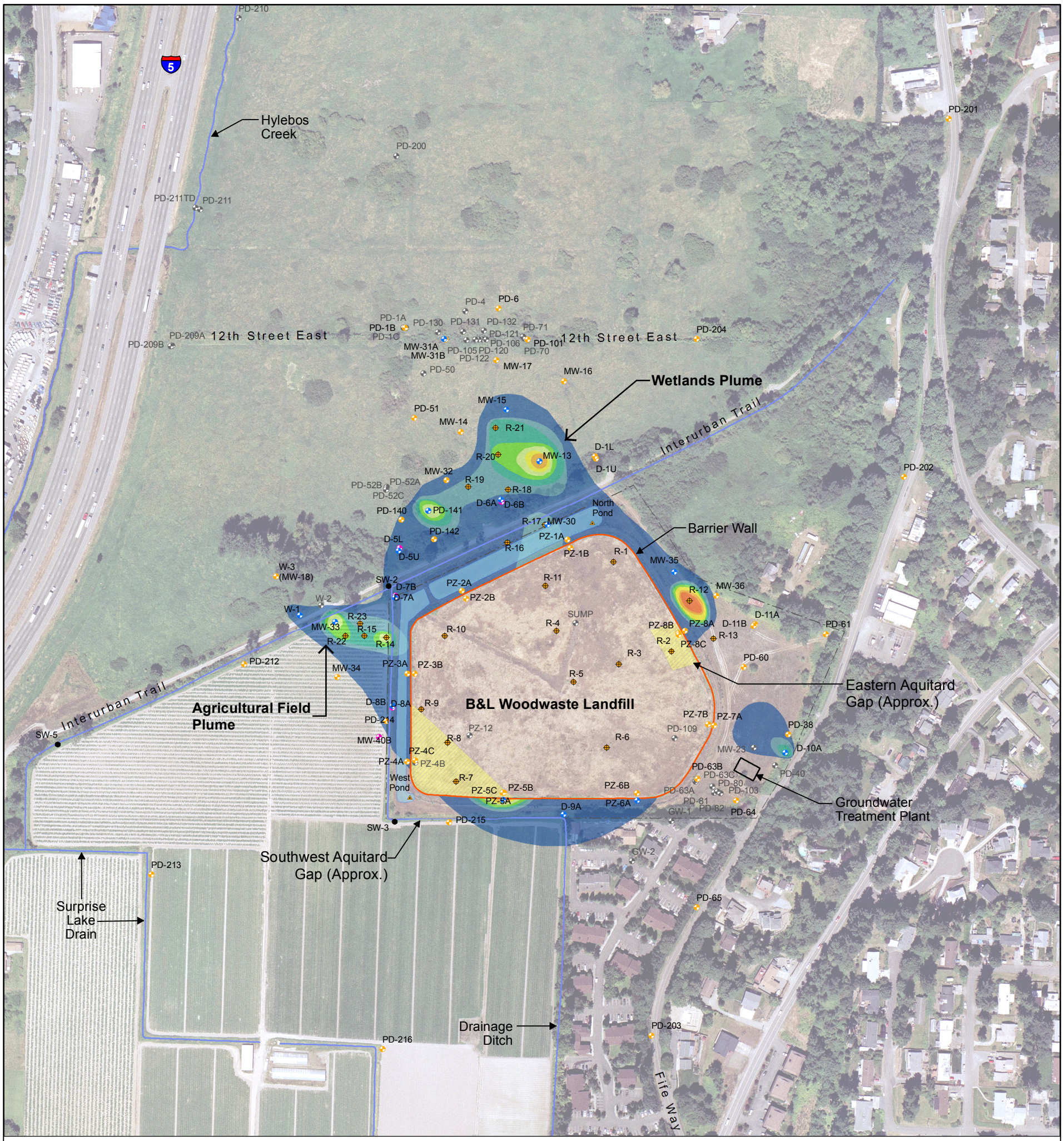
Abbreviations:

ft^3	Cubic feet	gal	Gallon
ft/day	Feet per day	lb	Pound
ft/ft	Feet per foot	µg/L	Micrograms per liter

B&L Woodwaste Site

Phase 3 In Situ Treatment Work Plan

Figures



Legend

- W-1 — Upper Sand Aquifer Monitoring Location
- D-7B — Lower Sand Aquifer Monitoring Location
- SW-5 — Compliance Surface Water Monitoring Location
- W-3 — Groundwater Elevation Monitoring Location
- PD-216 — Monitoring Well or Piezometer
- R-10 — Recovery Well Location
- West Pond — Pond Staff Gage Location
- Conditional Point of Compliance (Barrier Wall)
- Property Boundary from Tax Parcel Data
- Stormwater Pond
- Surface Drainage Feature
- Aquitard Gaps

Inferred Arsenic Concentration, Upper Sand Aquifer in µg/L **(October 2016)**

- 5–100
- 101–200
- 201–300
- 301–400
- 401–500
- 501–600
- 601–700
- 701–800
- 801–900
- 901–1,000

Notes:
- Orthoimage provided by USGS and dated June–July 2005.
- Hylebos Creek and other surface drainage feature locations shown were digitized from the 2005 orthoimage cited above.
- Black and white reproduction of this color figure may affect interpretation of the results.

Abbreviation:
µg/L = Micrograms per liter

N

0 300 600

Scale in Feet

1 inch = 300 feet

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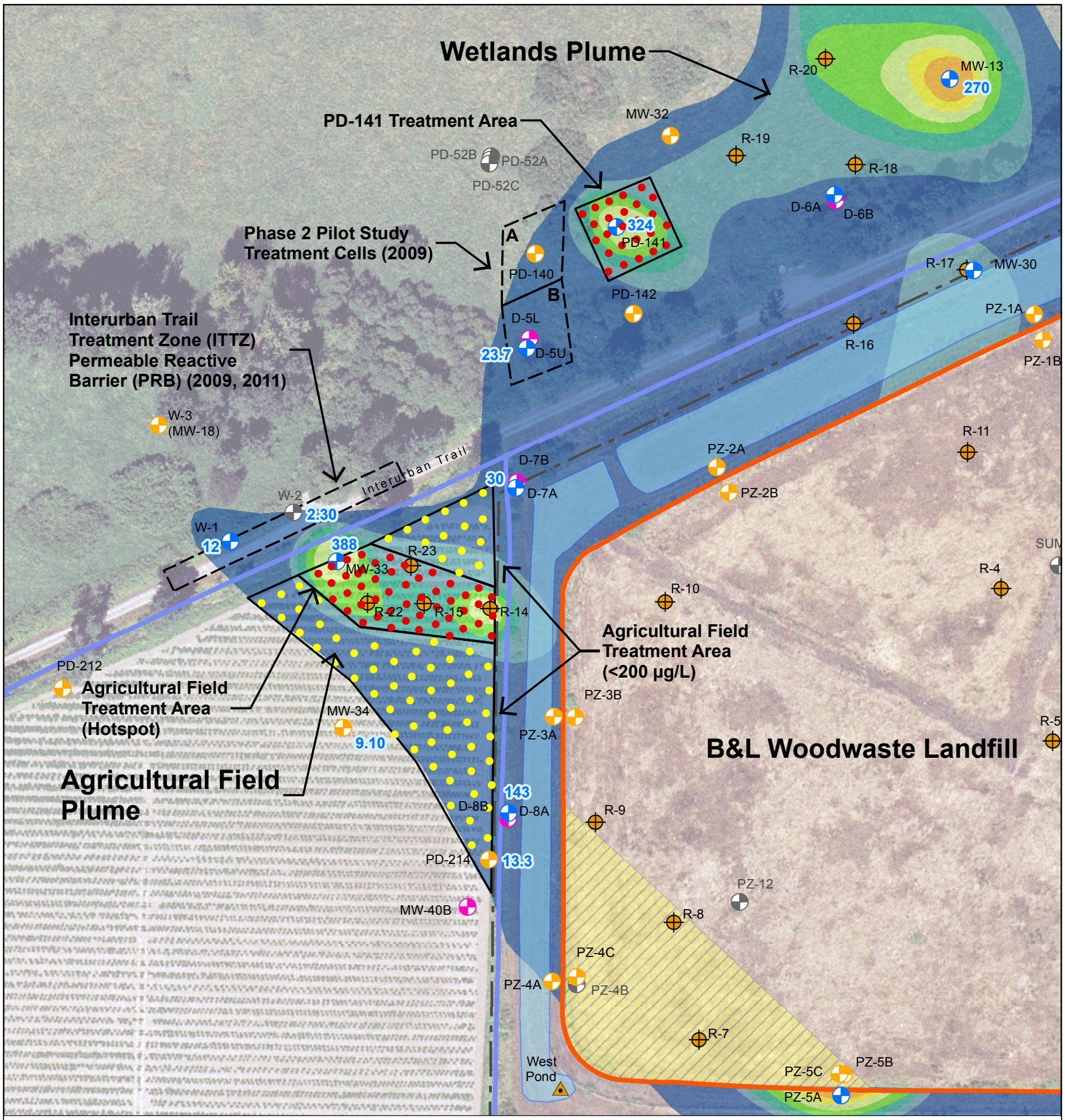
Phase 3 In Situ Treatment Work Plan
B&L Woodwaste Site
Pierce County, Washington

Figure 1.1
Site Map

Path: I:\GIS\Projects\B&L-O&M\MXD\Phase 3 In Situ Treatment WP\Figure 1.1 Site Map.mxd
Date: 6/22/2017



Legend

- Proposed Boring Location, 15-foot spacing
- Proposed Boring Location, 20-foot spacing
- W-1 — Upper Sand Aquifer Monitoring Location
- D-7B — Lower Sand Aquifer Monitoring Location
- W-3 — Groundwater Elevation Monitoring Location
- PD-216 — Monitoring Well or Piezometer
- R-10 — Recovery Well Location
- West Pond — Pond Staff Gage Location
- Conditional Point of Compliance (Barrier Wall)
- Property Boundary from Tax Parcel Data
- Stormwater Pond
- Surface Drainage Feature
- Aquitard Gaps
- Phase 3 In Situ Treatment Area or Sub-Area
- Previous In Situ Treatment Area

Inferred Arsenic Concentration,
Upper Sand Aquifer in µg/L **(October 2016)**

- 5–100
- 101–200
- 201–300
- 301–400
- 401–500
- 501–600
- 601–700
- 701–800
- 801–900
- 901–1,000

23.4 Total Arsenic Concentation, Upper Aquifer (April, 2017)

Notes:
- Orthoimage provided by USGS and dated June–July 2005.
- Hylebos Creek and other surface drainage feature locations shown were digitized from the 2005 orthoimage cited above.
- Black and white reproduction of this color figure may affect interpretation of the results.

Abbreviation:
µg/L = Micrograms per liter

N

0 100 200

Scale in Feet

1 inch = 100 feet

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Phase 3 In Situ Treatment Work Plan
B&L Woodwaste Site
Pierce County, Washington

Figure 2.1
Groundwater Treatment Areas
and Proposed Boring Locations

Path: I:\GIS\Projects\B&L-O&M\MXD\Phase 3 In Situ Treatment WP\Figure 2.1 Groundwater Treatment Areas and Proposed Boring Locations.mxd
Date: 6/22/2017

B&L Woodwaste Site

Phase 3 In Situ Treatment Work Plan

Appendix A
In Situ Treatment QC Field Form

B&L WOODWASTE IN-SITU TREATMENT QC FIELD FORM

Project Name:_____ Date: _____

Field Personnel:_____ Injected Material: _____

Driller:_____ Location Zone: _____

Drilling Method:_____ Injection Point ID: _____

Injection Method_____ Description of Point: _____

Weather:_____ Total Depth of Point: _____

Preparation of EHC-M Slurry

Treatment Application Dosage::_____ Percent solids:_____Lot#_____

Amendment condition (visual inspection):

Mix Batch #	Mass of Product (lbs))	Water Volume (gals)	Slurry Volume (gals)	Comments/Observations

Injection Details

Vertical thickness of treatment zone:

Total volume of slurry to be inject for boring (gals):

Slurry volume to be injected per vertical foot:

Mass EHC-M to be injected per vertical foot:

Depth (bgs)	Mix Batch #/	Slurry Volume (gal)	Pressure (psi)	Additional water volume (gal)	Comments/Observations: pauses, surface flows

Other Observations

Comments:

Water Level Mounding

Nearby well IDs:

Time								Comment

B&L Woodwaste Site

Phase 3 In Situ Treatment Work Plan

Appendix B
EHC-M Safety Data Sheet

SAFETY DATA SHEET
EHC® Metals Reagent

SDS # : EHCM-C
Revision date: 2016-02-18
Format: NA
Version 1

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name EHC® Metals Reagent

Other means of identification

Alternate Commercial Name EHC®-M

Recommended use of the chemical and restrictions on use

Recommended Use: For the remediation of contaminated groundwater

Restrictions on Use: Not for drinking water purification treatment.

Manufacturer/Supplier

PeroxyChem LLC
2005 Market Street
Suite 3200
Philadelphia, PA 19103
Phone: +1 267/ 422-2400 (General Information)
E-Mail: sdsinfo@peroxychem.com

Emergency telephone number

For leak, fire, spill or accident emergencies, call:
1 800 / 424 9300 (CHEMTREC - U.S.A.)
1 703 / 527 3887 (CHEMTREC - Collect - All Other Countries)
1 303/ 389-1409 (Medical - U.S. - Call Collect)

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Combustible dust

GHS Label elements, including precautionary statements

EMERGENCY OVERVIEW

Warning

Hazard Statements
May form combustible dust concentrations in air

Precautionary Statements - Prevention
Dry or powdered ingredients are combustible. Dispersal of finely divided dust from products into air may form mixtures that are ignitable or explosive. Minimize airborne dust generation and eliminate sources of ignition.

Hazards not otherwise classified (HNOC)
No hazards not otherwise classified were identified.

Other Information
CONTAINMENT HAZARD: Any vessel that contains wet EHC must be vented due to potential pressure build up from fermentation gases

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS-No	Weight %
Potassium Magnesium Sulfate	14977-37-8	25-35
Iron	7439-89-6	25-35
Organic amendment	Proprietary	25-35
Viscosity modifier	Proprietary	0 - 10%

Synonyms are provided in Section 1.

4. FIRST AID MEASURES

Eye Contact — In case of contact, immediately flush skin with plenty of water. Get medical attention if irritation develops and persists.

Skin Contact — Wash off with soap and water.

Inhalation — Remove person to fresh air. If signs/symptoms continue, get medical attention.

Ingestion — Rinse mouth with water and afterwards drink plenty of water or milk. Call a poison control center or doctor immediately for treatment advice. Never give anything by mouth to an unconscious person.

Most important symptoms and effects, both acute and delayed — Inhalation of dust in high concentration may cause irritation of respiratory system

Indication of immediate medical attention and special treatment needed, if necessary — Treat symptomatically

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media — Dry chemical, CO2, sand, earth, water spray or regular foam.

Unsuitable extinguishing media — Do not use a solid water stream as it may scatter and spread fire.

Specific Hazards Arising from the Chemical — Avoid generating dust; fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard. Combustible material

Explosion data
Sensitivity to Mechanical Impact — Not sensitive.
Sensitivity to Static Discharge — Not sensitive.

Protective equipment and precautions for firefighters — As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions Avoid dust formation. Avoid dispersal of dust in the air (i.e., cleaning dust surfaces with compressed air.). For personal protection see Section 8.

Other Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Use only non-sparking tools.

Environmental Precautions Recover the product in solid form, if possible. Do not flush into surface water or sanitary sewer system.

Methods for Containment Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up Sweep or vacuum up spillage and return to container. The waste may be recovered and recycled.

7. HANDLING AND STORAGE

Handling Minimize dust generation and accumulation. Keep away from open flames, hot surfaces and sources of ignition. Refer to Section 8.

Storage Keep tightly closed in a dry and cool place. Keep away from open flames, hot surfaces and sources of ignition. Any vessel that contains wet EHC must be vented due to potential pressure build up from fermentation gases.

Incompatible products Oxidizing agents. Strong acids.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines This product, as supplied, does not contain any hazardous materials with occupational exposure limits established by the region specific regulatory bodies. Local nuisance dust standards apply.

Appropriate engineering controls

Engineering measures It is recommended that all dust control equipment such as local exhaust ventilation and material transport systems involved in the handling of this product contain explosion relief vents or an explosion suppression or an oxygen-deficient environment. Ensure that dust-handling systems (such as exhaust ducts, dust collectors, vessels, and processing equipment) are designed in a manner to prevent the escape of dust into the work area (i.e., there is no leakage from the equipment). Use only appropriately classified electrical equipment and powered industrial trucks.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Safety glasses with side-shields.

Skin and Body Protection Wear suitable protective clothing. Protective shoes or boots.

Hand Protection Use gloves if extended exposure is anticipated

Respiratory Protection Whenever dust in the worker's breathing zone cannot be controlled with ventilation or other engineering means, workers should wear respirators or dust masks approved by NIOSH/MSHA, EU CEN or comparable organization to protect against airborne dust.

Hygiene measures Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and immediately after handling the product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance	Light-tan powder
Physical State	Solid
Color	Light tan
Odor	odorless
Odor threshold	Not applicable
pH	5.6 (as aqueous solution)
Melting point/freezing point	Not applicable
Boiling Point/Range	No information available
Flash point	No information available
Evaporation Rate	No information available
Flammability (solid, gas)	Some of these materials will burn with intense heat
Flammability Limit in Air	
Upper flammability limit:	46.0
Lower flammability limit:	3.3
Vapor pressure	No information available
Vapor density	No information available
Density	1.03 g/mL
Specific gravity	No information available
Water solubility	practically insoluble
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	248 - 266 °C
Decomposition temperature	No information available
Viscosity, kinematic	No information available (Solid)
Viscosity, dynamic	No information available
Explosive properties	Low level dust explosion hazard
K_{st}	8 bar-m/sec: St1 Class dust
Oxidizing properties	No information available
Molecular weight	No information available
Bulk density	Not applicable

10. STABILITY AND REACTIVITY

Reactivity None under normal use conditions

Chemical Stability Stable.

Possibility of Hazardous Reactions None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat, flames and sparks.

Incompatible materials Strong acids. Oxidizing agents.

Hazardous Decomposition Products None known.

11. TOXICOLOGICAL INFORMATION

Product Information

LD50 Oral	Iron: 98.6 g/kg (rat)
LD50 Dermal	No information available
LC50 Inhalation	Iron: > 100 mg/m^3 6 hr (rat)

Sensitization As a precaution the product should be treated as a sensitizer.

Information on toxicological effects

Symptoms No information available.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Irritation Not expected to be irritating based on the components.
corrosivity Not applicable.
Chronic toxicity No known chronic effects of components present at greater than 1%.

Carcinogenicity Contains no ingredient listed as a carcinogen.

Mutagenicity This product is not recognized as mutagenic by Research Agencies

Neurological effects None known

Reproductive toxicity This product is not recognized as reprotox by Research Agencies.

STOT - single exposure No information available.
STOT - repeated exposure No information available.

Target organ effects No known effects under normal use conditions.

Aspiration hazard No information available.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Contains no substances known to be hazardous to the environment or that are not degradable in waste water treatment plants

Chemical name	Toxicity to algae	Toxicity to fish	Toxicity to Microorganisms	Toxicity to daphnia and other aquatic invertebrates
Iron		96 h LC50: = 13.6 mg/L (Morone saxatilis) static		
Sodium chloride		96 h LC50: 5560 - 6080 mg/L (Lepomis macrochirus) flow-through 96 h LC50: = 12946 mg/L (Lepomis macrochirus) static 96 h LC50: 6020 - 7070 mg/L (Pimephales promelas) static 96 h LC50: 6420 - 6700 mg/L (Pimephales promelas) static 96 h LC50: 4747 - 7824 mg/L (Oncorhynchus mykiss) flow-through 96 h LC50: = 7050 mg/L (Pimephales promelas) semi-static		48h EC50: 1000 mg/l Daphnia magna; 48h EC50: 340.7 - 469.2 Daphnia magna Static

Persistence and degradability The organic components are biodegradable and can be expected to contribute to BOD.

Bioaccumulation Bioaccumulation is unlikely.

Mobility Is not likely mobile in the environment due its low water solubility.

Other Adverse Effects None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods It must undergo special treatment, e.g. at suitable disposal site, to comply with local regulations.

Contaminated Packaging Empty containers should be taken to an approved waste handling site for recycling or disposal.

14. TRANSPORT INFORMATION

DOT NOT REGULATED

15. REGULATORY INFORMATION

U.S. Federal Regulations

SARA 313
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	No
Chronic health hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

Clean Water Act
This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA/EPCRA
This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

International Inventories

Component	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Iron 7439-89-6 (25-35)	X	X	X		X	X	X	X	X
Organic amendment (25-35)		X	X		X		X	X	X
Viscosity modifier (NF)	X	X	X	X	X	X	X	X	X

Mexico - Grade Slight risk, Grade 1

CANADA

WHMIS Statement
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations (CPR) and the SDS contains all the information required by the CPR.

WHMIS Hazard Class Non-controlled

16. OTHER INFORMATION

NFPA	**Health Hazards** 1	**Flammability** 1	**Stability** 0	**Special Hazards** -
HMIS	**Health Hazards** 1	**Flammability** 1	**Physical hazard** 0	**Personal Protection** -

NFPA/HMIS Ratings Legend Severe = 4; Serious = 3; Moderate = 2; Slight = 1; Minimal = 0

References Refer to NFPA 654, *Standard for the Prevention of Fire and Dust Explosions from the Manufacturing, Processing, and Handling of Combustible Particulate Solids* , for safe handling.

Revision date: 2016-02-18
Revision note Initial Release
Issuing Date: 2015-07-14

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Prepared By:

PeroxyChem

End of Safety Data Sheet