Remedial Design Report

for the

Superlon Plastics Site
Tacoma, Washington

Prepared for:

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2116 Taylor Way
Tacoma, WA 98401

and

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Acronyms and Abbreviations

Acronym/Abbreviation	Explanation
ARAR	Applicable or Relevant and Appropriate Requirement
CAR	Cleanup Action Report
Chemours	Chemours Company FC, LLC
CL	Cleanup Level
COCs	Constituents of Concern
Companies	Chemours and White Birch
CQA	Construction Quality Assurance
CQC	Construction Quality Control
CRZ	Contamination Reduction Zone
CY	Cubic Yards
Ecology	Washington State Department of Ecology
EIM	Environmental Information Management
FS	Feasibility Study
FS-OSP	Feasibility Study for on-Property Soil and Perched Water
GPS	Global Positioning System
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
mil	Thousandth of an inch
MTCA	Model Toxics Control Act
OSP	On-Property Soil and Perched Water
OUs	Operable Units
PERC	Pacific Environmental & Redevelopment Corporation
PIONEER	PIONEER Technologies Corporation
PM	Project Manager
PMT	Project Management Team
PPE	Personal Protective Equipment
Project	Superlon Plastics Project

Acronym/Abbreviation	Explanation
Property	Superlon Plastics Property
PW	Perched Water
QA	Quality Assurance
QC	Quality Control
RAMP	Remedial Action Management Plan
RAU	Remedial Action Units
RD	Remedial Design
RDR	Remedial Design Report
REL	Remediation Level
RI	Remedial Investigation
Site	Superlon Plastics Site
Superlon	Superlon Plastics Company
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxicity Characteristic Leaching Procedure
TESC	Temporary Erosion and Sedimentation Control
TPCHD	Tacoma Pierce County Health Department
WAC	Washington Administrative Code
White Birch	White Birch Group, LLC
XRF	X-Ray Fluorescence

1. Introduction

Remediation of soil and perched water (PW) is planned to begin at the Superlon Plastics Property (Property) in third quarter 2017. The purpose of this remedial design report (RDR) is to present the preparatory tasks, construction methods, compliance monitoring, and reporting to be completed as part of the remediation of the on-Property soils and perched water (PW) located on the Superlon Plastics Site (Site).

This report was prepared on behalf of the White Birch Group, LLC (White Birch) and the Chemours Company FC, LLC (Chemours), hereafter referred to as the "Companies."

The Companies are working with the Washington State Department of Ecology (Ecology), Pacific Environmental & Redevelopment Corporation (PERC), and PIONEER Technologies Corporation (PIONEER) to complete the remediation work. Ecology is responsible for oversight all tasks complete during this project. PERC and PIONEER are the Companies' on-Property agent(s) and will oversee all remedial design tasks. TestAmerica of Tacoma, Washington has been selected as the Project laboratory and a remediation contractor will be selected to conduct the tasks.

All work described in this report will be conducted in accordance with the Model Toxics Control Act (MTCA) Chapter 173-340 of the Washington Administrative Code (WAC) under Agreed Order No. DE 5940.

1.1 Property Location and Description

The Property is located at 2116 Taylor Way, Tacoma, Washington in a highly industrial area of the Tacoma Tidal Flats between the Blair and Hylebos Waterways (see Figure 1-1). In general, the Property is bordered by the following (see Figure 1-2):

- A curved railroad right-of-way (owned by the City of Tacoma Public Works), and a warehouse operation to the northeast;
- Property leased and operated by Gardner-Fields Products,
- An industrial stormwater ditch, and the former Holbrook Log Yard to the southwest;
- Taylor Way to the northeast; and
- Lincoln Avenue to the northwest.

1.2 Background

A Remedial Investigation (RI) and a Feasibility Study (FS) for on-Property Soils and PW (OSP) were conducted as part of the site investigation (PERC/PIONEER 2013, 2014). Approximately 1,300 soil samples were evaluated in the RI. Soil remediation levels (RELs) and PW cleanup levels (CLs) were determined in the FS-OSP, and arsenic and lead were identified as constituents of concern (COCs) for the Property (PERC/PIONEER 2014). A preferred cleanup alternative for remediating arsenic and lead in soils and PW was presented in the FS-OSP and approved by Ecology on January 26, 2015 (Ecology 2015).

Bench-scale and field pilot studies were performed in 2016 and 2017 in order to refine the remedial approach. The findings of the pilot studies were used to develop the RDR.

1.3 Remedial Objective

The remedial objective for the remediation described in this report is to protect people and the environment from risks associated with hazardous constituents in on-Property soil and PW. To achieve the remedial objective, soil and PW will be remediated to meet site-specific RELs and CLs and a 3 to 4 inch gravel or asphalt layer (cap) will be installed property-wide to eliminate the direct contact pathway.

1.4 Report Organization

This RDR is organized as follows:

- Section 2: Property Background
- Section 3: Pre-Remediation Preparation
- Section 4: Soil Excavation, Stockpiling, and Monitoring
- Section 5: Limitations and Constraints
- Section 6: Safety
- Section 7: Roles and Responsibilities
- Section 8: General Restrictions for On-Property Operations
- Section 9: Agency Notifications and Communications
- Section 10: Environmental Compliance
- Section 11: Preliminary Construction Schedule
- Section 12: Cleanup Action Reporting
- Section 13: References

2. Remediation Background Information

Extensive investigations have been conducted for the OSP. Property-specific information from these investigations was incorporated into the Remedial Design (RD). The following Property-specific information is summarized in this section:

- Waste types;
- Operable units (OUs);
- Soil RELs and non-potable groundwater CLs;
- Remedial action units (RAUs);
- Volume of Soils requiring remediation; and
- Permitting and Applicable or Relevant and Appropriate Requirements (ARARs).

2.1 Waste Types

Due to the Property's manufacturing and filling history, COCs occur at different concentration ratios, and have been co-mingled in different material types, at various locations on the Property. It is possible to identify five main groups of COC-bearing materials from the RI.

- Soil impacted with COCs associated with lead arsenate and calcium arsenate pesticides manufacturing.
- A small amount of wastewater treatment sludge in the southern corner of the Property, along the Property boundary.
- Soil overlaid with a thick (up to 8 feet) cover of hydrated lime. The hydrated lime-like material, believed to be a gypsum manufacturing byproduct, contains typical construction debris. The impacted soil is co-mingled within and below the bottom few feet of the hydrated lime.
- Soils containing black, spherical particles believed to be "shot," which likely originated from the adjacent former US Gypsum Site, which was located at 2301 Taylor Way. This material was identified in two locations on the Property: in the far eastern corner of the Property and in the general vicinity of Building D (see Figure 1.2).
- General fill/waste: This fill consists of soil (fine sands and gravel) co-mingled with many types of materials, including brick, rock, creosote-covered wood, construction debris, and mixed metal.

2.2 Operable Units

Six discrete OUs were identified on the Property to address residual contamination and determine the soil and PW remediation volumes. The OU boundaries were defined based on potential on-Property sources identified in the RI-OSP and areas with similar waste types. The names and descriptions of the OUs are provided in the following table.

OU	Location (Size)	Waste Type
OU1 - Building B	Located within the footprint of the former Building B foundation (approximately 15,454 square feet; average of five feet thick)	▪ Clay-rich silt intermixed with construction debris. ▪ COC are related to lead arsenate and calcium arsenate pesticides manufacturing.
OU2 – Building A	Located under Building A (approximately 7,344 square feet in size and an average of five feet thick)	▪ Clay-rich silt intermixed with construction debris. ▪ COC are related to lead arsenate and calcium arsenate pesticides manufacturing.
OU3 – Mixed Waste with White, Gypsum/Lime Material	Located below the parking lot of the Property north of Building A (approximately 35,090 square feet in size and ranges from 2 to 10 feet thick)	▪ An up to 6-foot thick layer of white, hydrate lime-like material co-mingled with typical construction debris.
OU4 – General Mixed Waste	Located in the southwest half and southeast eighth of the Property behind the former building B footprint and behind Building C (approximately 45,527 square feet in size and ranges from one to 13 feet thick)	Many types of typical construction materials, including creosote-covered wood, discarded oil containers, various types of metal (e.g., lead pipe), and debris intermixed with fine sands and silty clay
OU6 – Shot Area 2	Located in the general vicinity of Building D (approximately 10,073 square feet in size and an average of five feet thick)	Black spherical crystalline particles believed to be “shot,” which likely originated from the adjacent former US Gypsum rock wool production facility

OU5 – Shot Area 1 is located in the extreme eastern corner of the Property along the property boundary with Garner Fields. It is approximately 1,931 square feet in size and the waste associated with this OU is an average of five feet thick. The waste type in this OU consists of black spherical crystalline particles believed to be “shot”, likely originating from the former adjacent US Gypsum rock wool production facility, located at 2301 Taylor Way. This area is excluded from the on-property soil remediation program and has been assigned to the Garner Fields Site for remediation. As such it will not be remediated during the remediation of on-Property soils and perched water.

2.3 Soil Remediation Levels and Non-Potable Groundwater Cleanup Levels

The waste-types present in each OU exhibit different chemical characteristics, and require different handling to be successfully remediated. As such, each OU has distinct RELs. The following soil and groundwater RELs were approved by Ecology for use at the Property (see Figure 2-1).

Soil RELs

Operable Unit	Arsenic (mg/kg)	Lead (mg/kg)
1	242	679
2	91	5,610
3	114	2,121
4	761	2,396
5	8,587	23,685
6	1,388	7,013

Non-Potable Groundwater CLs

Constituent	(µg/L)
Arsenic	666
Cadmium	1,050
cis-1,2-dichloroethylene	7,802
Lead	1,650
Mercury	873
Pentachlorophenol	32
TPH-HO	500
Trichloroethylene	1,165
Vinyl Chloride	251

2.4 Remedial Action Units

The Property was divided into Remedial Action Units (RAUs) to aid in the delineation of on-Property soils that require remediation (see Figure 2-2). Soil boring data from the RI and subsequent soil sampling events were used to determine RAUs and the boring on which each RAU was determined was typically located in the center of the RAU (PERC/PIONEER 2017). The RAU boring locations were based on the property wide 37.5 foot sampling grid. Physical constraints (e.g., location of existing buildings and setbacks) were also considered in the determination of the actual size of the RAU. Generally, the RAUs were 37.5 feet by 37.5 feet in size.

2.5 Soil Remediation Volumes

In total there are 53 RAUs, containing a total of approximately 12,000 cubic yards (CY) of soil requiring remediation. Approximately 8,567 CY of the soil is characteristically-hazardous and approximately 3,433 CY is not characteristically hazardous but contain COC concentrations greater than the OU-specific REL. The volume and tonnage of soil requiring remediation in each OU is presented in the following table.

Operable Unit	Cubic Yards			Tons		
	Waste Total	Non-Hazardous	Hazardous	Waste Total	Non-Hazardous	Hazardous
1	3,317	143	3,173	5,473	236	5,236
2	819	85	734	1,351	140	1,211
3	2,748	2,080	668	4,534	3,432	1,102
4	3,715	724	2,991	6,129	1,194	4,935
6	1,402	401	1,001	2,314	662	1,652
Total	**12,001**	**3,433**	**8,567**	**19,801**	**5,664**	**14,136**

2.6 Soil Types and Segregation

A sufficient amount of soil analytical data were collected during the RI to determine the depth and extent of soils that contain COC concentrations above the REL, for each RAU. These soils will be hereafter referred to as "impacted soil" and will be segregated into two sub-designations:

1. **Non-Hazardous Soil**: Defined as impacted soils that contain COC concentrations that are not characteristically hazardous (i.e. "passes" the Toxicity characteristic leaching procedure {TCLP}) but contain COC concentrations above the Direct Contact (DC) REL; and,
2. **Hazardous Soil:** Defined as impacted soils that contain COC concentrations that are characteristically hazardous (i.e. the Toxicity Leaching Characteristic Protocol (TCLP) concentrations exceed waste disposal criteria).

These soils occur as "layers" within each RAU and are not always continuous. Each layer will be treated differently depending on their designation, and segregated and managed accordingly.

Soils with COC concentrations below the applicable REL will be referred to as "overburden". Overburden, whether it is at the surface or between Impacted Soil layers, will be stockpiled and then re-used as excavation backfill.

2.7 Permitting and Applicable or Relevant and Appropriate Requirements

ARARs were evaluated in the FS-OSP. Based on ARARs, only one permit was required to complete this Project. A Construction Storm Water Pollution Prevention Plan (SWPPP) permit will be required from the Water Quality Program at Ecology with concurrence from the City of Tacoma. This permit was obtained in September of 2017.

Remedial actions conducted under Ecology's oversight must comply with the substantive requirements of the ARARs and are exempt from procedural requirements (e.g., obtaining permits and approvals; WAC 173-340-710(9)). Specifically, this exemption applies to requirements under the Washington State Water Pollution Control Act, Solid Waste Management Act, Hazardous Waste Management Act, Clean Air Act, State Fisheries Code, and Shoreline Management Act. This exemption also applies to local laws requiring permits or approvals. Thus, a grading permit is not required from the City of Tacoma.

3. Pre-Remediation Preparation

Prior to the start of remediation the following tasks will occur:

- Development of a remedial action management plan;
- Monitoring well decommissioning;
- Site preparation;
- Construction of soil treatment/stockpile areas; and,
- Receipt of materials and treatment additive.

3.1 Remedial Action Management Plan (RAMP)

The RAMP for the Project will include the following:

- A project- and task-specific Health and Safety Plan (HASP) in which the processes and procedures to be used to ensure a safe and secure working environment are described;
- A SWPPP in which erosion, sedimentation, and storm water controls during construction are addressed; and
- A Contingency Plan in which environmental protection (e.g., controlling and preventing hazardous materials spills) are addressed.

3.2 Equipment Mobilization

An overview of the equipment to be used for the first phase of remediation is presented in this section. The equipment will be delivered to the Property prior to the start of each remediation field season (section 8.1). Additional equipment may be mobilized to the Property if Project conditions change.

3.2.1. Equipment Currently On-Property

The following Chemours-owned equipment is currently on Property and will be used during the remediation process:

- Read Screen-All D90 Vibrating Screen with a 3-inch grid/screen (see Photo No. 1).
- An Alpine D20 Mixing Head attachment (see Photo No. 2).

3.2.2. Equipment to be Supplied/Delivered on Property

Equipment will be delivered to the Property prior to the start of each remediation field season (section 8.1). The equipment delivered to the Property will be restricted to the following sizes:

- A John Deere 644J Loader (or equivalent; see Photo No. 3);
- A Hitachi EX 200 Excavator (or equivalent) equipped with a TOPCON- GR3 / TOPCON X-53 Excavator and a base station with tolerance of X & Y: 0.015 feet and Z: 0.035 feet GPS depth measurement unit (see Photo No. 4);
- A Cat 420 Backhoe (or equivalent; see Photo No. 5); and
- Gravel bedding box (or equivalent; see Photo No. 6).

The equipment sizes are limited due to equipment-generated vibrations. Vibrating resulting from the use of heavy equipment at the Property may be intensified due to the high silt/clay content of the underlying soils. The increased vibrations may impact Superlon operations and be a concern for possible impacts to the buildings on the Property.

3.3 Property Preparation

Property preparation will begin two weeks prior to the start of remediation to create a safe working environment. Preparation of the Property will include the following:

- Demarcating and temporarily fencing the health and safety zones (Exclusion, Contamination Reduction, and Support Zones).
- Constructing the storm water management controls.
- Identifying traffic flow patterns to ensure safe and efficient operations.
- Removing all stored materials (e.g., pipes and physical debris) from the excavation areas. Any surplus materials will also be staged for disposal or recycling.
- Eliminating physical hazards from the work area to the extent practicable, including:
    - Ignition sources in flammable hazard areas;
    - Exposed or ungrounded electrical wiring, and low overhead wiring that may entangle equipment;
    - Sharp or protruding edges (e.g., glass, nails, and torn metal), which can puncture protective clothing and equipment and inflict puncture wounds;
    - Debris, holes, loose steps or flooring, protruding objects, slippery surfaces, or unsecured railings, which can cause slips, trips, and falls;
    - Unsecured objects (e.g., bricks and gas cylinders);
    - Objects near the edges of the areas to be excavated;
    - Debris and weeds that obstruct visibility; and
    - Superlon products stored in the work area.

3.4 Soil Treatment/Stockpile Area Construction

Six stockpile areas (cells) will be constructed using stacked Ecology Blocks in the manner shown on Photograph 7. All of the cells will be built on the asphalt pad (Figure 1-2). There is a sufficient number of Ecology blocks currently on-property to construct the cells but the Remediation Contractor should include the unit cost of Ecology Blocks on their bid. Cell 1 will remain the same dimensions as listed below. Cells 2 through 5 will be constructed to a size and configuration necessary for each phase of work. For this phase of work the cells will be of the following dimensions.

- Cell 1 - The Hazardous Waste Treatment Cell: This cell will be three ecology blocks high and will be 24 feet wide and 30 feet deep. Its usable volume is 53 CY (88 tons) as the soils to be treated will be restricted to less than two feet in thickness. This cell will be covered with an enclosure so that dust can be controlled during mixing.

- Cell 2 – The additive mixing cell: This cell will be three ecology blocks high and will be approximately 10 feet wide and 24 feet deep. This cell will be covered with an enclosure so that dust can be controlled during mixing.
- Cell 3 - The Hazardous Debris Storage Cell: This cell will be three ecology blocks high and will be 10 feet wide and 24 feet deep. This cell will have a capacity of 53 cubic yards (CY) or approximately 87 tons.
- Cell 4 - The Hazardous Lead Soil Storage Cell: This cell will be three ecology blocks high and will be 10 feet wide and 24 feet deep. This cell will have a capacity of 53 cubic yards (CY) or approximately 87 tons.
- Cell 5 - The Non-Hazardous Waste Storage Cell: This cell will be three ecology blocks high and will be 50 feet wide and 30 feet deep. This cell will have a capacity of 334 cubic yards (CY) or approximately 550 tons.
- Cell 6 - The Treated Hazardous Waste Storage Cell: This cell will be three ecology blocks high and will be 50 feet wide and 30 feet deep. This cell will have a capacity of 334 cubic yards (CY) or approximately 550 tons.

Each storage and treatment cell will be constructed of stacked ecology blocks underlain by an asphalt pad (see Photo No. 7 in the Photographic Log and Figure 3-1). The asphalt is currently at a minimum 0.5% slope toward the infiltration point to control storm water flow. Straw bales will be placed along the downslope sides and downslope base of the stockpile area to control sediment transfer. This stockpile construction method has been effective for containing waste, preventing contaminated soil from contacting underlying soils, loading of waste for disposal, and controlling rain water infiltration into the waste. A 20-mil plastic tarp will cover each stockpile at night, when not in use, or during the winter months when remediation is not being conducted (see section 5.3).

3.5 Receipt of Materials and Treatment Additive

Due to lack of storage space on the Property, the delivery of all materials will be scheduled on an "as-needed" basis throughout the Project.

3.5.1. Receipt of Imported Backfills and Other Materials

On-going Deliveries: During each disposal phase of work, enough (plus 20%) imported backfill, quarry spalls and pond-liner-grade clay will be delivered to the Property to complete the next phase of work.

3.5.2. Receipt of Treatment Additive

Initial Delivery: Prior to the start of each remediation season (section 8.1) 21 1-ton "super sacks" will be delivered to the Property and stored. Premier Magnesia will supply the treatment additive for characteristically hazardous soil. Free Flow Technologies will supply the PW treatment additive.

On-going Deliveries: Additional additive will be delivered to the Property in "as close to" 21 ton loads as possible. This method should ensure that enough additive to treat the expected volume of soil in the next phase of work plus 20 percent is available. The amount of each additive will be calculated two weeks prior to the required delivery date.

4. Soil Excavation, Stockpiling and Monitoring

The tasks for completing excavation, stockpiling, and monitoring of soil during the remediation of on Property soils and perched water are summarized in this section. They include:

- Constructing stormwater controls, as needed;
- Delineating RAU boundaries;
- The Use of Trench Boxes;
- Managing overburden;
- Excavating non-hazardous soil and debris;
- Screening and treating hazardous soil and debris;
- Treating hazardous soil;
- Sampling and over-excavation;
- Dewatering soil;
- Treating PW;
- Backfilling excavations;
- Managing wastes;
- Disposing excavated soil off-Property;
- Decontaminating construction equipment; and
- Restoring the Property.

4.1 Constructing Stormwater Controls

Stormwater controls will be necessary for each phase of work. Stormwater controls will range from trenching and installation of catch basins to fencing.

4.2 Delineating RAU Boundaries

Prior to the start of work, the edges of each RAU will be delineated and marked using a tape measure and the excavator Global Positioning System (GPS). RAUs that need to be excavated at depths greater than 6 feet (the depth at which sidewall caving typically occurs) will be subdivided into manageable sections (in most cases approximately 6 feet by 12 feet). Subdividing the RAUs allows for safe hauling of soils, will reduce the potential for sidewall caving and/or the use of trench boxes to prevent excavation sidewall caving (see section 4.3). Each RAU could be sub-divided into up to 20 sub-units.

4.3 Excavation Trench Boxes and Plating

In some cases excavation trench boxes may be required, due to insufficient soil stability, whenever excavation depths are greater than six feet and/or PW is present. Once an excavation is completed, steel plates (currently on the Property) will be placed along the leading edge(s) of the excavation to identify the excavation extent. The steel plates will be driven into, or placed at, the excavation sidewall before backfilling the excavation.

4.4 Managing Overburden

Overburden will be excavated from the surface of the excavations and between impacted soil layers, and stockpiled separately from impacted soils. The overburden will be field-screened, if necessary, using an X-ray Fluorescence (XRF) to determine if arsenic and lead concentrations are less than RELs and can be used as backfill. The XRF screening is particularly important at sections of the Property where a geotextile barrier has not been installed at the overburden/impacted soil interface during previous interim action programs. The overburden soil will be stockpiled adjacent to the excavation so that it can be used to backfill the completed excavation.

4.5 Excavating Non-Hazardous Soil and Debris

4.5.1. Non-Hazardous Soil

Non-hazardous soil will be excavated and transported to the stockpile storage cell for de-watering and subsequent off-Property disposal. Non-hazardous soil will be sampled prior to disposal to ensure that it meets non-hazardous disposal criteria. Once stockpiled the non-hazardous soil will be sampled (at a rate of equivalent to the requirements of the LRI Landfill (see section 4.6.3) and analyzed using the on-Property Innov-X Delta XRF (XRF) to determine the total COC concentration in the sample. If the total concentration is equal to or greater than the concentration expected to be characteristically hazardous, the sample will be delivered to the Project laboratory for Toxicity Characteristic Leaching Procedure (TCLP) analysis. The results of the TCLP analysis will determine if the soil can be disposed of as non-hazardous waste. If the soil has a total COC concentration significantly greater than the concentration expected to be characteristically hazardous, or fails TCLP analysis, it will be added to hazardous waste soil stockpile for treatment. All stockpiles will be covered with 20-mil plastic when not in use, at night, and during times of heavy rainfall.

4.5.2. Non-Hazardous Debris

Non-hazardous debris (e.g., concrete floor slabs, broken concrete, wood piles, pipes, and construction materials) will likely be encountered during the excavation of non-hazardous soil. Non-hazardous debris will only be removed to access contaminated soil, and, if necessary, will be broken or cut as needed so that it can be removed and stockpiled. Soil stockpiles cannot contain material longer than six feet; therefore, non-hazardous debris longer than six feet will be segregated and stockpiled until it can be broken with the excavator to less than six feet long.

The anticipated percentage of debris found in excavation material throughout the Property during the field pilot study ranged between 10% and 40% and is listed in the table below and presented in Figure 4-1.

Property Area	Estimated Percent of Debris in the Excavated Material
Former Production Area	40%
Former Building A Area	20%
Northern Area	15%
Remainder of the Property	10%

4.6 Screening and Transporting Hazardous Soil and Debris

Excavated hazardous soils will be transported, using the loader, to the soil screening plant for size separation, stabilization treatment, and stockpiling prior to disposal.

4.6.1. Screening Hazardous Soil and Debris

Hazardous soil screening will be conducted to separate oversized debris and rock from the soil and remove hazardous debris (e.g., wood and construction debris). Screening will also reduce the soil particle size which will allow for the soil to be effectively mixed with the treatment additive.

The Read Screen All screening plant will be used to screen the hazardous soil and debris. The screen pitch may be adjusted periodically to allow for greater or lesser residence time on the screen depending on the particular soil/debris being screened. The excavated hazardous soil and debris will be transported to the screen using a John Deere 644J loader (or equivalent). The loader will load the top end of the screen from the bottom/down end of the screen.

4.6.2. Transporting Hazardous Soil

The screened hazardous soil (3-inch minus soil) will be collected below the screen and transported by the loader from the screen to the hazardous waste treatment cell.

4.6.3. Transporting Hazardous Debris

The screened 3-inch plus rock and debris will be transported, by the loader, to the hazardous waste disposal storage cell for analysis and storage. The stockpiled debris will be sampled (at a rate of 1 sample per 100 CY) and analyzed using the XRF to determine the total COC concentration in the sample. If the total concentration is equal to or greater than the concentration expected to be characteristically hazardous, the sample will be delivered to the Project laboratory for Toxicity Characteristic Leaching Procedure (TCLP) analysis. The results of the TCLP analysis will determine if the debris can or cannot be disposed of as non-hazardous waste. If the debris has a total COC concentration significantly greater than the concentration expected to be characteristically hazardous, or fails TCLP analysis, it will be staged in the stockpile for disposal at the US Ecology Landfill in Grandview, Idaho.

4.7 Treating Hazardous Soil

Hazardous soil will be treated with a stabilization additive to decrease arsenic and lead leachability so they can be disposed of as non-hazardous waste. The results of the laboratory bench-scale and field pilot studies demonstrated that mixing hazardous soil with an appropriate dose of an additive resulted in TCLP concentrations below the criteria (i.e., the soil is not considered hazardous). Hazardous soil will be covered with 20-mil plastic when not in use, at night, and during heavy rainfall.

4.7.1. Additive Mixing Process

The hazardous soil treatment additive is delivered in two separate sacks. The sacks of treatment additive must be blended to create the correct mix before it is added to the soil for treatment. The blending will be performed in gravel bedding boxes (or equivalent) using the Alpine Mix Head attached to an excavator.

4.7.2. Hazardous Soil Treatment Process

The hazardous soil treatment process will be conducted as follows:

- Screened hazardous soil will be transported from the screening plant to the treatment cell with the loader, and graded to a less than 2-foot thick layer using the loader bucket;
- Once the total volume of screened soil to be treated is determined and layered in the cell the amount of additive required for treatment will be calculated;
- The blended treatment additive will be applied to the top of the soil layer using the excavator;
- The Mix Head will be attached to the excavator arm and the soil additive will be mixed until well blended; and
- The treated soils will be moved to the treated hazardous soil storage cell.

4.7.3. Curing of Treated Soils

Curing is necessary for the additive to react with the soil and to allow for the stabilization process to take place. A one-day curing time is required before samples can be collected for analysis. A five-point composite sample will be collected from the treated soil after the curing period. The composite samples will be submitted to the Project laboratory for TCLP analysis as required for at the LRI Landfill (see table below).

SAMPLE FREQUENCY REQUIRED FOR DISPOSAL AT THE LRI LANDFILL	
Cubic Yards of Soil	**Number of Samples[1]**
0 – 25	2
25 – 100	3
101 – 500	5
501 - 1,000	7
1,001 - 2,000	10

4.7.4. Laboratory Testing and Analysis

TCLP analysis will be required to determine if the soil treatment additive lowered the leachability of the treated soil so that the soil is no longer characteristically hazardous. TCLP analysis will be conducted by TestAmerica of Tacoma, Washington by EPA Method 1311. Typically, up to 10 days are required for this laboratory analysis to be completed.

4.8 Excavation Verification Sampling and Over-Excavation

Post-excavation verification soil samples will be collected from the excavated area and analyzed using the XRF and, if needed, by the Project analytical laboratory. Analytical results will be evaluated to determine compliance with RELs. If soil remaining in the excavation area does not meet RELs, additional excavation, verification sampling, and analysis will be performed.

4.8.1. Excavation Bottom Verification

A TOPCON GPS depth measurement unit attached to the excavator will measure the depth to determine when all impacted soil has been removed from the RAU and the bottom of the excavation has been reached. Multiple samples will be collected from RAU sub-units and composited. This composite sample will be analyzed using the on-Property XRF to confirm compliance with RELs. The soil samples will be collected from the bottom of the excavation using the excavator bucket as collection by hand is unsafe.

If a COC concentration in an excavation bottom sample exceeds the REL, the excavation will be advanced by at least 1 foot to a maximum depth of 15 feet, if practicable. After the additional excavation is completed, an additional composite verification sample will be collected from the bottom of the excavation.

[1] One additional sample is required for each 500 CY greater than 2,000 CY

4.8.2. Excavation Sidewall Verification

Excavation sidewall sampling will only be conducted in RAUs that occur along the Property boundary or adjacent to an area of the Property that does not require remediation. No samples will be taken in interior RAUs since the adjacent RAU will also be excavated (i.e., sidewall samples will only be collected in areas that will not be excavated). The sidewall samples will be collected at the depth where the impacted soil was identified in RI data.

If an excavation sidewall sample COC concentration exceeds the REL, the sidewall will be over-excavated (advanced) by at least 1 foot laterally. Excavation will stop five feet from the Property boundary. If COC concentration exceeds the REL at the property boundary the neighboring property owner will be notified at the completion of the excavation program. Excavation into the neighboring properties is not practicable during this phase of remediation. If over-excavation into the neighboring properties is necessary, it will be performed at a later date.

4.9 De-Watering Soil

4.9.1. Landfill Transportation Compliance

All soil will require drying to meet the transportation requirements for off-Property disposal.

4.9.2. Soil De-watering Methods

The following methods will be used to dewater the soil before it is transported off-Property.

- **Soil where PW is present:** Soil excavated where PW is present will initially be dewatered in the excavator bucket, using a rocking motion, to remove as much free water as possible. After dewatering in the excavator bucket, the soil will be dewatered in the stockpile using gravity and evaporation until the soil is dry enough to meet the applicable transport requirement. The drying time will depend upon the moisture content of the soil as it is deposited onto the stockpile.
- **Soil where PW is not present:** Soil excavated in excavations where PW is not present will be dewatered in the stockpile using gravity and evaporation until the soil is dry enough to meet the applicable transport requirement. The drying time will depend upon the moisture content of the soil as it is deposited onto the stockpile.

4.10 Treatment of PW

PW is located property wide, but predominately found in the former production area. The volume of water is largely unknown due to its discontinuous nature, but at a minimum is estimated to range between 1.2 and 1.5 million US gallons. The treatment method for PW consists of adding Free Flow FF-200 FS (1:1 buffer: iron reagent) to open excavations[BG1]. The FF-200 FS treatment process removes arsenic from the groundwater by binding the arsenic to particulates in the soil.

The PW is discontinuous on the Property and may not be present in each RAU); therefore, the amount of treatment must be determined on a case-by-case basis at the time of excavation. In addition, the results of the field pilot study indicated that a wide range of arsenic:lead ratios can be expected on the Property. Different concentrations will require different additive dosing rates. The amount of additive required to treat the PW in each RAU will be calculated based upon available data and the location of the RAU. Once the amount of additive is calculated the additive will be added directly to the PW in the excavation, mixed using the Alpine Mixing Head, and backfilled.

4.11 Backfilling Excavations

Excavations will be backfilled to the approximate grade required by the SWPPP using a combination of stockpiled reusable overburden, quarry spalls, pond-liner grade clay, soil, and imported 2-inch minus gravel. The use of stockpiled, reusable overburden soil that meets the REL will be preferential to the use of imported gravel. Depending upon the condition of the subgrade material prior to backfilling, quarry spalls may be required as a base for the backfilled materials. The backfilled soil will be placed in lifts and loosely compacted using the excavator.

4.11.1. Clay

In RAUs where the excavation depth will impact the aquitard, the excavation will initially be backfilled with locally-sourced, pond-liner-grade clay. This will re-establish the aquitard and eliminate the potential for a preferential pathway to groundwater. NOTE: This is a precautionary step since the PW treatment method described above should eliminate the source of any environmental impacts to groundwater.

4.11.2. Geotextile

To add structural strength to the backfilled excavation, a layer of woven filter fabric or geotextile may be added above the backfill or the quarry spills.

4.12 Waste Management

Waste profiling will be performed concurrently with the excavation process. A disposal permit for all non-hazardous and treated waste will be required from the Tacoma Pierce County Health Department (TPCHD) prior to disposal at the LRI Landfill in Puyallup, Washington. The disposal permit application will be submitted to TPCHD after the analytical reports for the soil scheduled for disposal have been received.

A waste disposal agreement will also be required from US Ecology prior to disposal at the US Ecology Landfill in Grandview, Idaho. The information required for this disposal agreement will be submitted to US Ecology after the analytical reports for the soil scheduled for disposal have been received.

Copies of the certificates of disposal for material disposed of off-Property, if available, will be kept at the Property and will be included in the final cleanup action report for on-Property soil and PW, which will be written at the end of this phase of Site remediation.

4.13 Off-Site Disposal of Excavated Soils

All non-hazardous soil will be disposed of at the LRI Landfill in Puyallup, Washington. For the soil to be transported to this landfill, it must be dry enough to meet the “paint filter test.” All hazardous soils and debris will be disposed of at the US Ecology Landfill in Grandview, Idaho. For the hazardous soil and debris to be transported to this landfill, the moisture content must be less than 30%.

Off-Property soil disposal will be required approximately every 10 workdays. The disposal process will be initiated (1) when the stockpile storage cell capacity is reached, or (2) prior to the end of the field/work season. The excavation process will be temporarily delayed during the off-Property disposal process due to space limitations.

4.13.1. Loading and Disposal Process

Stockpiled soil that will be disposed of off-Property will be loaded into trucks using the loader or excavator. The equipment used will be dependent upon availability and the characteristics of the impacted soil. Care will be taken to minimize spillage while loading the trucks with waste. If spillage does occur, the soil will be collected immediately and returned to either the haul truck or the waste stockpile.

Trucks carrying non-hazardous soil will travel approximately 20 miles to the LRI Landfill in Puyallup, Washington. It is anticipated that four trips will be made to the LRI Landfill per day. Approximately 640 tons of soil will be disposed of in a day using 5 trucks.

Trucks carrying hazardous soil and debris will travel approximately 750 miles to the US Ecology in Grandview, Idaho. It is not possible for trucks to return for a second trip during a workday. The maximum hazardous waste tonnage hauled in a workday has been 320 tons. Truck availability for this haul route is uncertain and has ranged from two to 10 trucks in the past.

4.13.2. Waste Hauling Restrictions and Traffic Control

The trucking and traffic control procedures to be followed include:

- **Truck Haul Schedule:** Heavy-trucks will enter and leave the Property between the hours of 7:30 a.m. and 2:30 p.m.
- **Truck Access:** Haul trucks will enter the Property at the construction access control point gate. The trucks will enter one at a time with the help of a remediation contractor-supplied spotter (see Figure 4-2).
- **Traffic-Control Needs:** The need for traffic control will be based on the number of trucks entering and leaving the Property. If truck traffic is expected to exceed 20 trucks per day for more than five days, construction signage and active traffic control (i.e. flaggers) will be used to help the trucks enter and exiting the Property and Taylor Way. Trucks waiting to be loaded will be directed to park within in the median of Taylor Way, making sure to not block access to neighboring properties.
- **Accident Prevention and Response:** All drivers will be informed of the nature of the materials to be hauled. In addition, all loads will be tarped before leaving the Property to prevent loss of material during transit. All loads leaving the property will be provided with shipping instructions. In the event of an accident or spill, the driver will be instructed to report the incident to an emergency response number listed on the shipping instructions, at which point the appropriate landfill agency will dispatch emergency spill response crews and notify PERC, Ecology, and either the Washington or Oregon Department of Transportation (depending on the spill location).

- **Spotters:** Spotters will be used to direct the movement, and staging of trucks and other equipment.
- **Decontamination:** The wheels of the trucks that enter the Exclusion Zone will be brushed to remove mud and dirt, and will exit the Property from the construction access control point gate at Taylor Way. The Exclusion Zone is presented on Figure 4-2.
- **Maintenance of Site Entry:** As a condition of the Site's Construction SWPPP, no visible soil or debris will be allowed along the entrance to the Property. When soils is being transported from the property the entryway will be swept, if visible soil or debris is present, periodically throughout the day.

4.14 Decontamination of Construction Equipment

Procedures to decontaminate heavy equipment (excluding trucks) that have been in the Exclusion Zone will include the following:

- Remove all mud and other debris; and
- Pressure wash the equipment in the designated equipment decontamination area until all visible soil and dust is removed.

4.15 Site Restoration

4.15.1. Restoring the Property to Pre-Construction Condition

Whenever possible, the areas of the Property that were disturbed by remediation will be restored to a condition as close as practical to the condition at the start of remediation or to the requirements of the SWPPP. This will include:

- Paving of areas currently paved (approximately 35,500 square feet);
- Restoration of utilities and services;
- The removal of all debris created by the remediation process; and
- The construction of a gravel cover on the non-paved areas.

4.15.2. Removing the Stockpile Storage Cells and Facilities

The stockpile storage and treatment cells will be removed once no longer required. The Ecology Blocks used to construct the cells will be decontaminated and recycled off-Property. The asphalt soil processing pad will be demolished, collected and disposed of or recycled. The soils under the asphalt processing pad will be prepared for the construction of the gravel cover.

4.15.3. Disconnecting Utilities and Services

Project office and storage facility utilities will be disconnected. The utility connections will be removed and the subbase will be prepared for the construction of the gravel cover. Any changes to the Superlon buildings will be restored to their previous condition unless improvement were made during remediation activities.

4.15.4. Constructing the Gravel Cover on Unpaved Areas

The final step of the Property restoration process will be the construction of the gravel cover, which will provide an exposure barrier to humans and ecological receptors. The gravel cover will include up to four inches of gravel over a geotextile liner or woven fiber fabric at all of the disturbed, unpaved area. The gravel cover will be installed once on-Property soil remediation is complete to ensure that the final grade necessary to meet the requirement of the Property's storm water permit can be maintained. The thickness of the gravel cover will depend on the requirements in the Property's SWPPP.

5. Construction Limitations and Constraints

The following factors will impact the speed and approach taken to complete the remediation. An overview of construction limitations and constraints are presented in this section.

- Property size
- Schedule
- Weather
- Equipment Vibrations

5.1 Property Size

The most significant impact to the time required to complete the remediation is the limited useable space on the Property. The on-Property portion of the Site is approximately 3.1 acres and Superlon operations require up to 66% of the Property for the construction of pipe and for storage of Superlon's inventory. Only a small section of property will be available for processing and stockpiling impacted soil. The following accommodations will be required to adjust to this constraint.

- The excavation of impacted soils will be performed on a small scale. Excavations will be completed one RAU at a time (typically as 37.5-foot by 37.5-foot sections of the Property). The remediation progress in a controlled manner from one RAU to the next. Mass excavation is not possible.
- Daily coordination with Superlon and extra time will be required to re-locate Superlon's inventory to areas that will not be impacted by excavating, hauling, and stockpiling the impacted soil. Superlon's small staff will move the inventory an on-going basis.
- The Exclusion Zone will need to be moved as remediation moves from one group of RAUs to the next (i.e., when the excavation/remediation in each group of RAUs is complete).
- The size of the stockpiles will be limited to approximately 1,000 tons for both hazardous and non-hazardous soil. More frequent soil disposal will be required as the stockpiles fill to capacity.
- On-Property excavation and disposal cannot be conducted concurrently; therefore, excavation activities will be suspended when stockpile capacities are reached (approximately every month) until the stockpiled soil can be transported to the appropriate disposal facility.
- On-Property trucking haul routes will change regularly.
- Materials, especially backfill soil and treatment additive super sacks, will be received on an as-needed basis when remediation activities are suspended.

5.2 Schedule

Additional activities will cause occasional delays in the remediation process. These delays will impact the overall remediation schedule. Efforts will be taken to minimize the time lost by scheduling them during times of inactivity caused by one process or another. They are:

- **Removing or rerouting active utilities (e.g., storm water infrastructure, overhead power lines and poles) that may be impacted by the cleanup activities:** Since this Project is located on the same property as an active manufacturing facility, utilities that were modified or disrupted will be restored to their pre-construction function as soon as practicable.

- **Replacing paved surfaces:** Asphalt will be removed from approximately half of the Property. After asphalt and soil excavation, the RAU will be backfilled and prepared for paving (e.g. installed gravel sub-base). Once the entire previously paved area has been remediated, it will be re-paved with 3-inches of asphalt (or equivalent) as soon as practical.
- **Laboratory analysis turn-around time:** Excavation activities will be suspended while samples are being analyzed at the Project laboratory as there will be no space available to stockpile or treat additional soil. Laboratory analytical results are required to prove that the soils are nonhazardous and acceptable for disposal. The standard turn-around time for laboratory TCLP analytical results is 10 days.
- **Disposal permits from TPCHD:** Disposal permits are necessary for the disposal of waste at the LRI Landfill. The application for disposal must include laboratory data proving that the soil is non-hazardous (i.e., not a D-listed waste). Permit application preparation can range from three to five days following the receipt of the laboratory data.

5.3 Weather

Rainwater during the winter raises the PW table to high levels causing unworkable conditions. This causes productivity, during these times, to be greatly reduced. Therefore, the excavation activities will only occur between approximately March 1st and December 15th each year.

5.4 Equipment Vibrations and Limits on Equipment Size

Vibration monitoring will be conducted whenever heavy equipment is being used. All remediation activities will be suspended if heavy equipment vibrations reach a level where there is a potential for impacting the structures, and the problem will be remedied. Readings will be collected, evaluated, and stored until the end of the Project. The readings will be included in a report to the Companies within 120 days of the end of active remediation.

The concern structure damage from vibrations caused by heavy equipment has led to a limit on the size of equipment to be used during remediation. This will result in a lower daily production rate. The size limitations are:

- Excavators: No larger than a John Deere 644J loader
- Loaders: No larger than a Hitachi EX 200 excavator
- Rollers: No larger than a Sakai SV200 48-inch Drum Roller

6. Safety

All work conducted on the Site will comply with the Occupational Health and Safety Administration, Washington State Industrial Safety and Health Act, and Chemours health and safety requirements.

6.1 Health and Safety Plans

All remediation work will be conducted consistent with the procedures identified in the Project health and safety plan. Project personnel will be required to read and sign their employers' health and safety plans before beginning work. The Site's health and safety plan identifies the site hazards and general work activities along with additional information regarding the hazards associated with the specific work activities that will be conducted on the Property.

6.2 Tobacco Free Work Site

No tobacco products are allowed at the Property for all remediation personnel in accordance with Chemours' standard policies.

7. Roles and Responsibilities

7.1 White Birch – Property Owner

White Birch is the Property owner and is, under Ecology's definition, a potentially liable party. White Birch leases the Property to Superlon, an extruded plastic pipe manufacturer. White Birch's role during this Project is to work with the PMT to balance the needs of on-going facility operations with the needs of the Project. Coordination with Superlon is necessary to ensure the least impact to their operations as possible. White Birch and Superlon's contact person is:

Eivor Donahue
C/o Superlon Plastics Co Inc.
2116 Taylor Way, Tacoma, WA 98421
253.383.5877
eivor@superlon.com

7.2 Chemours

Chemours is a former Property owner, and is, under Ecology's definition, a potentially liable party. Chemours' role in this project is to supply managerial and technical expertise and financial oversight. Chemours' contact information is:

Chemours Corporate Remediation Group
1007 Market Street
Wilmington, DE 19899

7.3 Ecology

Ecology will provide Project oversight and management, technical assistance, and stakeholder coordination for the Project. Ecology's site manager for this Project is Mr. Marv Coleman. His contact information is:

Marv Coleman, Site Manager, Inspector
Southwest Regional Office
Toxics Cleanup Program
P.O. Box 47775
Olympia, WA 98504-7775
Phone: 360.407.6259
Fax: 360.407.6305
Email: mcol461@ecy.wa.gov

7.4 The Companies On-Site Representative

7.4.1. Project Management

During remediation, PERC will act as the Companies' on-Site project manager (PM). In this role, PERC will conduct the following activities:

- Ensure communications between the PMT and the Companies;
- Ensure communications between the PMT, Ecology, the City of Tacoma, and other agencies;
- Review and store financial records;
- Issue monthly and periodic reports to the Project's stakeholders;
- Direct day-to-day project operations; and
- Perform other activities requested by the Companies.

7.4.2. Construction Oversight and Monitoring

During remediation, PERC and PIONEER will act as the Companies' on-Property representative for construction oversight and monitoring activities. In this role, PERC and PIONEER will conduct the following activities:

- Overseeing the mobilization and preparation of the Property for remediation, including temporarily removing/relocating utilities as needed, decommissioning monitoring wells, and establishing temporary erosion and sediment controls;
- Overseeing soil excavation and stockpiling, and soil and debris segregation;
- Sampling soil in excavations to verify that the soil REL is achieved;
- Analyzing soil and debris samples using the on-Property XRF laboratory;
- Collecting and delivering treated soil samples to the laboratory for TCLP analysis;
- Overseeing the loading and off-Property disposal of contaminated soil and debris, including compiling certificates of disposal documentation;
- Overseeing excavation backfill and compaction; and
- Managing the safety program.

7.5 The Remediation Contractor

Active Construction (ACI) of Puyallup, Washington has been selected as the remediation contractor for this Project. ACI will supply all of the equipment and labor needed to complete the remediation of on-Property soil and PW in a safe and efficient manner. An overview of the equipment and labor required for remediation is presented in this section.

7.5.1. Equipment Required

The following equipment will be required for the remediation of soil and PW. If Project conditions change, the remediation contractor will mobilize additional equipment to the Property. In addition to the equipment listed below, a Chemours-owned vibrating screen and Alpine Mixing Attachment are to be used.

- A John Deere 644J Loader (or equivalent);

- A Hitachi EX 200 Excavator (or equivalent) equipped with a TOPCON- GR3 / TOPCON X-53 Excavator and a base station with tolerance of X & Y: 0.015 feet and Z: 0.035 feet GPS depth measurement unit;
- A Cat 420 Backhoe (or equivalent); and
- 2 Gravel Skiffs (or equivalent).

7.5.2. Labor Required

The following labor will be required to complete the remediation of soil and PW. If project conditions change, the remediation contractor will add personnel.

- Two operators for the excavator and loader; personnel must be certified to operate the assigned machinery. The loader operator must also be qualified to operate and manage the screening plant.
- One experienced laborer to aid with the excavation of the impacted soil and to complete miscellaneous remediation-related tasks.
- Two flaggers (as needed) to direct traffic on Taylor Way during waste materials hauling and receiving.

7.6 Project Management Team

7.6.1. Project Director – Chemours

Sebastian Bahr of Chemours will act as the Chemours Project Director for this Project. In this role, he will assist the PMT by providing solutions for construction-related, technical problems that may arise. His contact information is:

sebastian.bahr@chemours.com
302.773.3274

7.6.2. Project Manager – PERC

Jeff King of PERC will act as the on-Property PM for this Project. His contact information is:

Jeffrey D. King, P.G.
8424 E Meadow Lake Drive
Snohomish, WA 98290
425.238.2212
jking@perc-nw.com

7.6.3. Construction Manager/Site Safety Officer

Steve Duggan of PERC will act as the construction manager and safety officer for this Project. His contact information is:

Stephen Duggan
8424 E Meadow Lake Drive
Snohomish, WA 98290
425.328.0243
sduggan@perc-nw.com

7.6.4. Laboratory Manager

Brad Grimsted of PIONEER will act as the laboratory manager for this Project. His contact information is:

Brad Grimsted
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901
O: 360.570.1700
C: 360.790.5913
grimstedb@uspioneer.com

7.6.5. Safety Resource

Kevin Gallagher of PIONEER will act as the safety resource for this Project. In this role, he will conduct monthly safety audits to ensure that all aspects of the Health and Safety Plan are being adhered to. His contact information is:

Kevin Gallagher MS, ASP
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901
O: 360.570.1700
C: (206) 226-3623
gallagherk@uspioneer.com

8. General Restrictions for On-Site Operations

8.1 Field Season

Inclement weather has a significant impact on the productivity and success of the planned remediation. As such, the excavation work will only be conducted from approximately March 1st to December 15th. This time period will constitute the field season of the Project.

At the close of each field season all stockpiled soil will be disposed of at the applicable landfill and the Property will be winterized.

8.2 Hours of Operation

Operation of large equipment carrying out remedial activities will be limited to the following hours:

- **Work Hours:** 7:30 a.m. to 3:30 p.m. Monday through Friday (closed on weekends and holidays).
- **Daylight hours:** From sunrise to sunset.

8.3 Materials Delivery

Materials Delivery Schedule:

- All material deliveries to the Property will be restricted to the hours of 7:30 a.m. to 3:00 p.m. Monday through Friday. There will be no weekend or after hour deliveries.

Traffic-Control: The need for traffic control will be assessed based on the number of trucks accessing the site. If truck traffic is expected to exceed 20 trucks per day for more than five days, construction signage and active traffic control (i.e. flaggers) will be used to direct truck traffic to and from Taylor Way to the Property. Trucks waiting to be loaded will directed to park within the median of Taylor Way without blocking access to neighboring properties. Traffic management (i.e. flaggers) will also be provided on an as-needed basis.

Spotters: Spotters will be used to direct the movement of trucks and other equipment.

Decontamination: All trucks will pass through a construction entrance/exit. Residual soils and mud will be bushed from tires before the trucks leave the site to minimize tracking of mud or sediment onto public roads. Since the trucks will not enter contaminated areas the tires will not contain COC concentrations greater than RELs.

8.4 Equipment Fueling and Repair/Maintenance

All moveable equipment will be repaired on the vehicle/equipment Contamination Reduction Zone (CRZ) presented on Figure 4-2. The CRZ is outside of the Exclusion Zone; therefore, all moveable equipment used in the Exclusion Zone will be decontaminated prior to entering the CRZ area.

Fueling of moveable equipment will be done by reaching the fuel hose from the CRZ to the Exclusion Zone. The fuel truck will only enter the Exclusion Zone to fuel the screening plant.

8.5 Security

The site will be secured nightly at the end of remediation activities. The PERC Construction Manager, or his designee, will ensure that work area entrances are locked to prevent trespassing, and reduce potential for exposure of the public to hazardous situations.

8.6 Parking and Restricted Access

Project personnel will park their personal vehicles outside the Exclusion Zone. Personal vehicles will not be allowed in the Exclusion Zone.

9. Agency Notifications and Communications

9.1 The Washington State Department of Ecology

The PM will notify Ecology the date on which the remedial activities will be conducted. Any on-site communications with Ecology will be performed by the PERC PM or, if the PM is off-Site, a designee.

9.2 Public Outreach

No public outreach is planned for this Project. Any notifications or problems will be addressed through informal communications with neighboring property owners and other interested parties.

10. Environmental Compliance

This remediation will achieve compliance with the RELs and CLs for the on-Property soils and PW; it is not intended to be the final cleanup of the Site. Further delineation of the Site is required for complete cleanup. Ecology will identify/determine long-term institutional controls once the final cleanup action and associated cleanup action plan are approved.

11. Preliminary Construction Schedule

The table below presents a conceptual schedule for construction activities associated with the remediation of on-Property soils and PW. The start of the remediation phase of work is scheduled for March 5, 2018 and will continue on a 9.5 month per year schedule until completed. The current estimated remediation completion date is January 2022.

Conceptual Construction Schedule

Task Name	Duration	Start	Finish
Soil & PW Remediation	**596 days**	**5-Mar-18**	**3-Aug-20**
Remedial Action 2018	200 days	5-Mar-18	14-Dec-18
Winter Break	52 days	17-Dec-18	1-Mar-19
Remedial Action 2019	208 days	4-Mar-19	27-Dec-19
PW Treatment Confirmation	40 days	10-Apr-20	5-Jun-20
Remedial Action 2020	259 days	18-Dec-19	29-Dec-20
PW Treatment Confirmation	40 days	30-Dec-20	25-Feb-21
Remedial Action 2021	165 days	26-Feb-21	20-Oct-21
PW Treatment Confirmation	49 days	6-Oct-21	16-Dec-21
Site Restoration	69 days	13-Oct-21	25-Jan-22

12. Cleanup Action Reporting

A cleanup action report (CAR) will be prepared at the end of the remediation process to provide documentation of the activities for the remediation of on-Property soils and PW. At a minimum, the report will include the following:

- A description of cleanup activities conducted, including deviations from the construction specifications;
- Drawings illustrating the as-built excavation areas and other pertinent information;
- Detailed performance monitoring information, including sample locations, analytical methods, data quality review, and results;
- Drawings illustrating areas where soil RELs were not achieved (e.g., due to inaccessibility) and a discussion of any constraints, and how the constraints were addressed in consultation with Ecology;
- Documentation of contaminated soil disposal, including quantities of soil removed and disposed, and landfill certificates of disposal, if available; and
- Documentation of excavation backfill quantities by fill source.

The draft CAR will be submitted to Ecology for review. Ecology's comments will be incorporated and a final report prepared. Upon Ecology's approval of the report, the CAR will become an appendix to the Site's CAR. The data collected during the cleanup will be uploaded to Ecology's Environmental Information Management (EIM) database in accordance with the Consent Decree.

13. References

Ecology. 2015. Electronic mail from Marv Coleman to Jeff King, Brad Grimsted, and Tim Bingman regarding Ecology approval of the Final on-Property Feasibility Study. January 26.

PERC/PIONEER. 2013. Remedial Investigation Report for On-Property Soils and Surface Water at the Superlon Plastics Property, Tacoma, Washington. August.

PERC/PIONEER. 2014. Feasibility Study Report for On-Property Soils and PW at the Superlon Plastics Property, Tacoma, Washington. December.

PERC/PIONEER. 2017. Soil Volume Verification and XRF Demonstration for the Superlon Plastics Site, Tacoma, Washington. January.

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Figures

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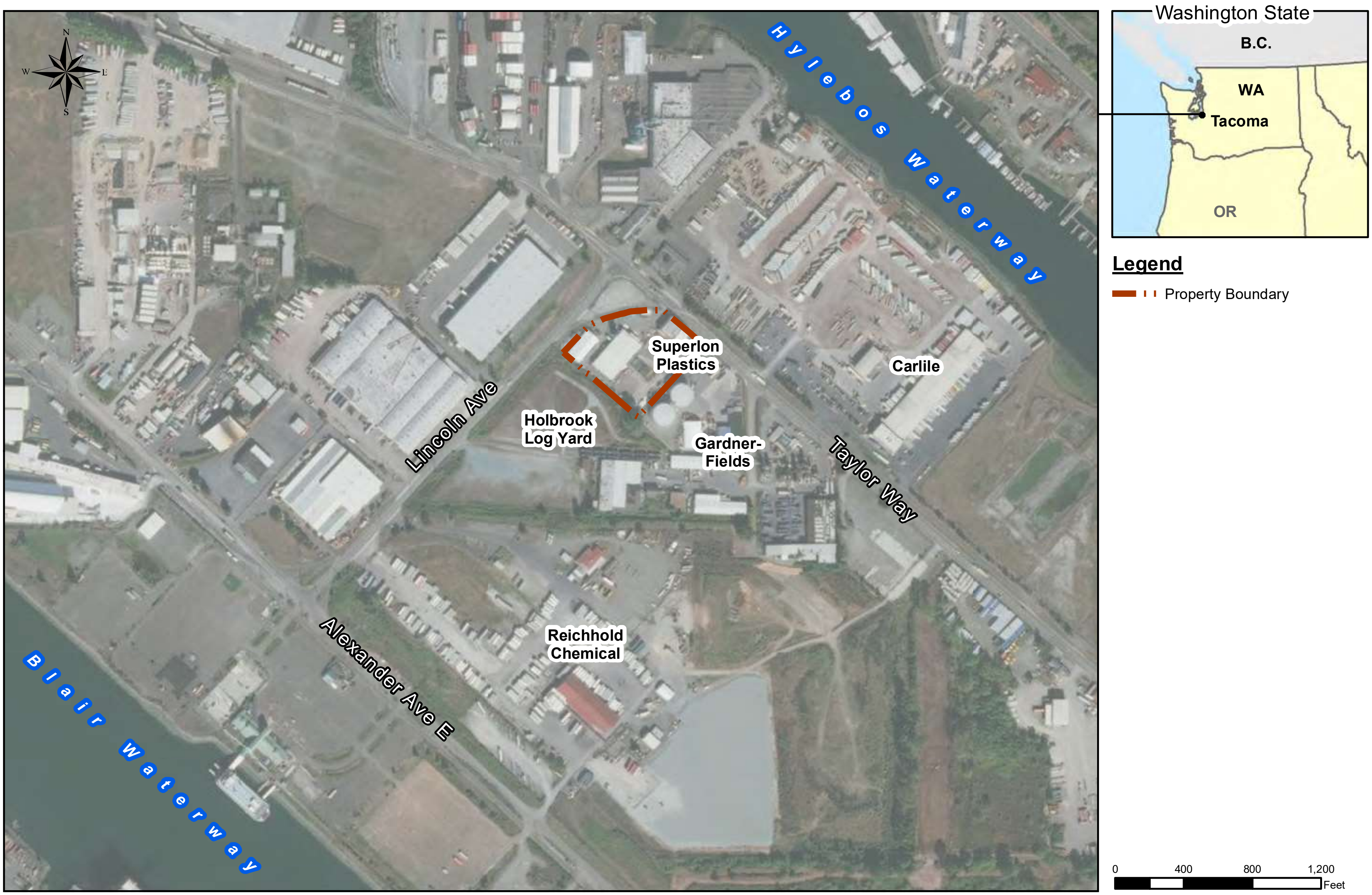
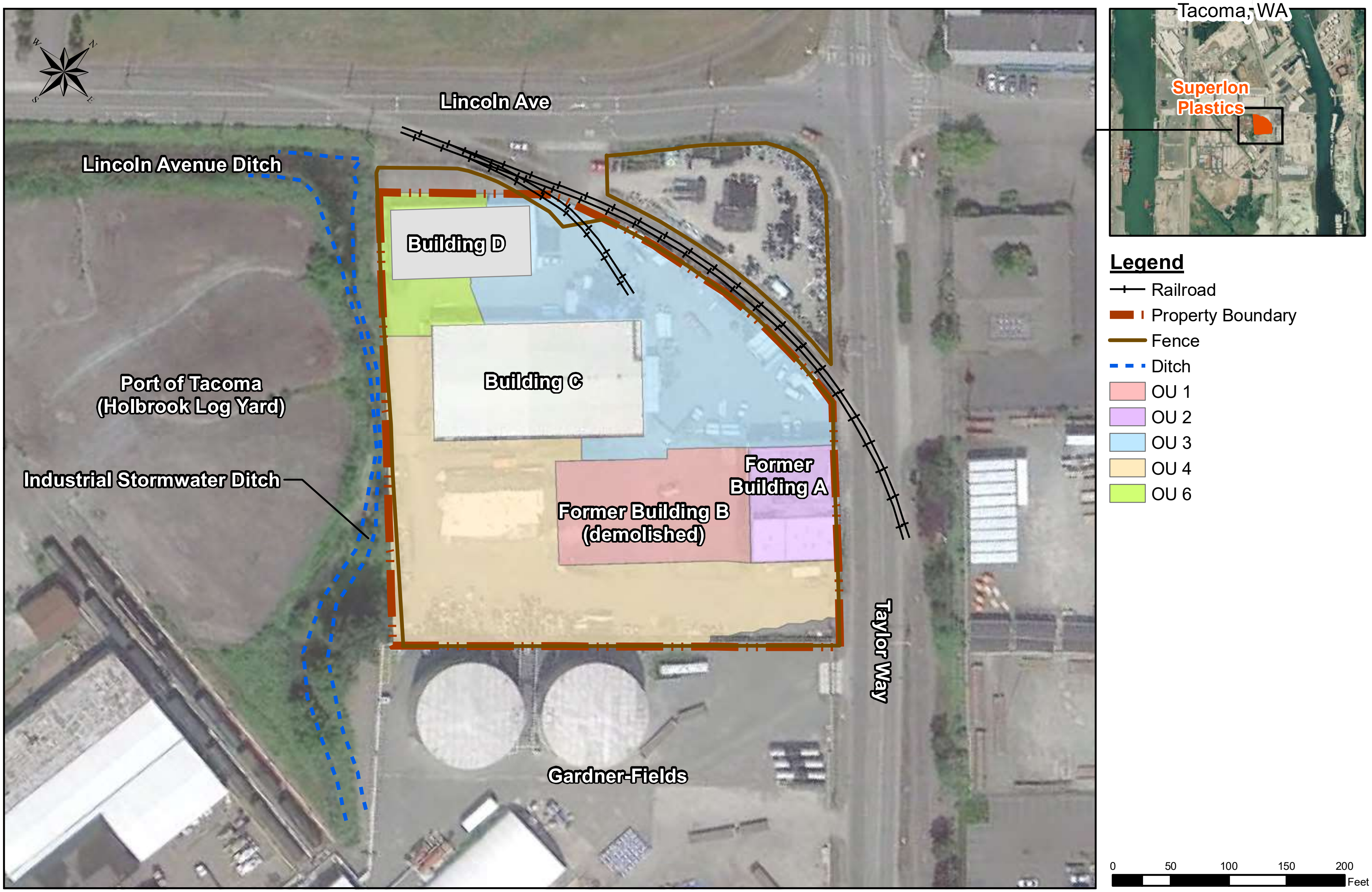


PIONEER
TECHNOLOGIES CORPORATION

Property Location
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure 1-1

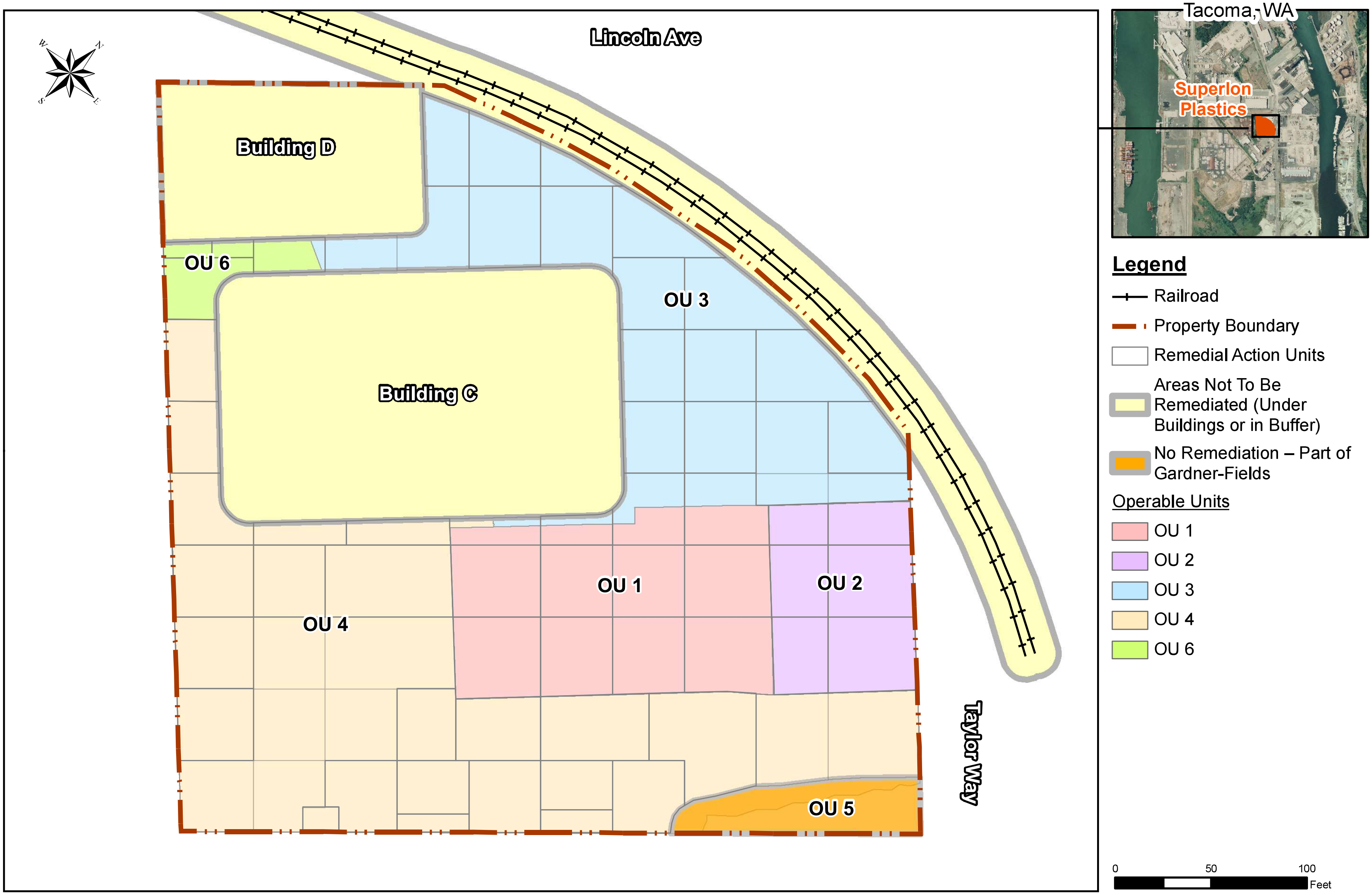


PIONEER TECHNOLOGIES CORPORATION

Property Features
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure 1-2

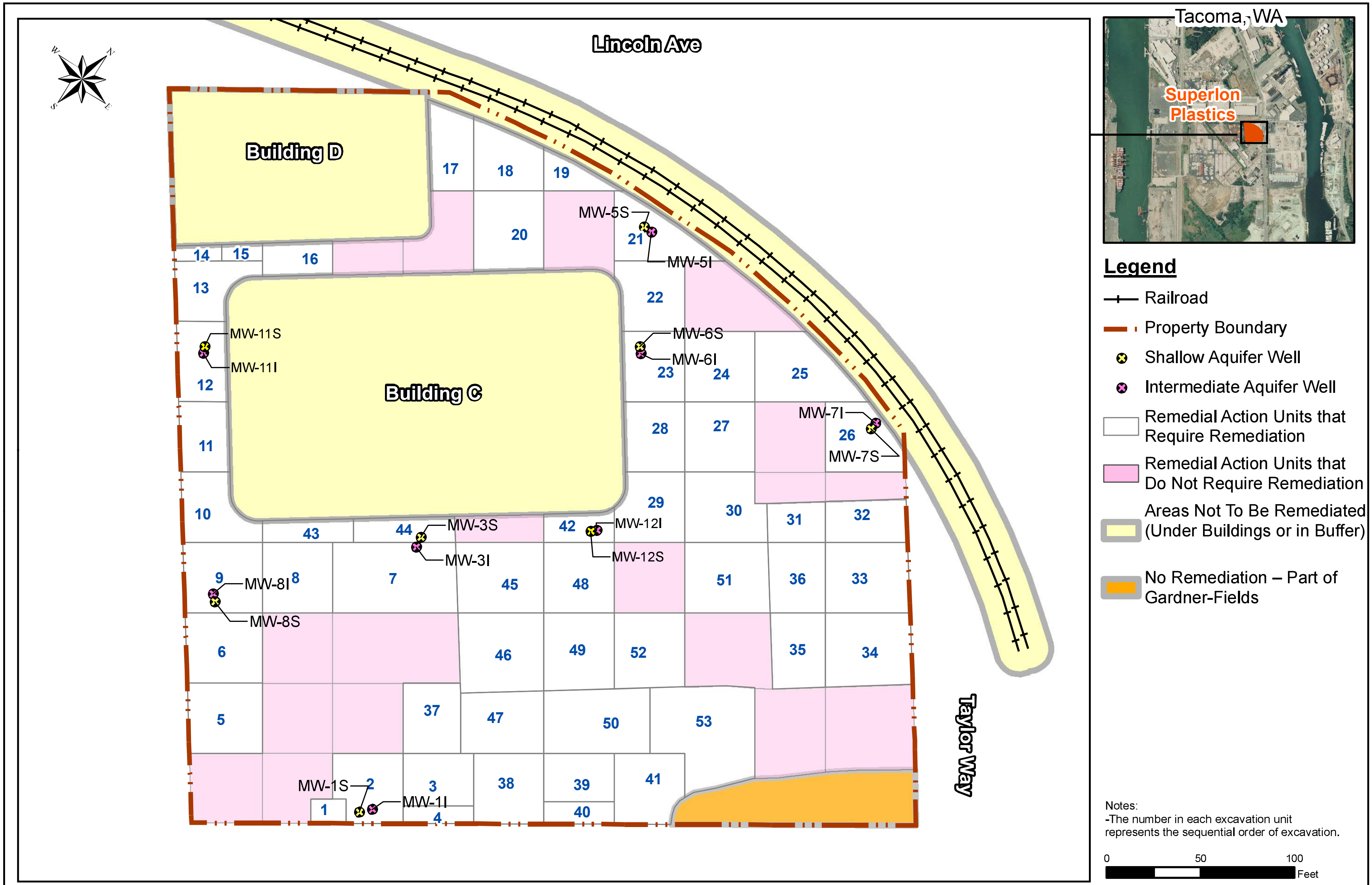
Document Path: G:\Projects\Superlon\Maps\2017\May 2017\Remedial Design Report\Figure 1-2_Site Features.mxd; Author: SM; Date Saved: 8/7/2017



PIONEER TECHNOLOGIES CORPORATION

Operable Unit Locations
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure 2-1



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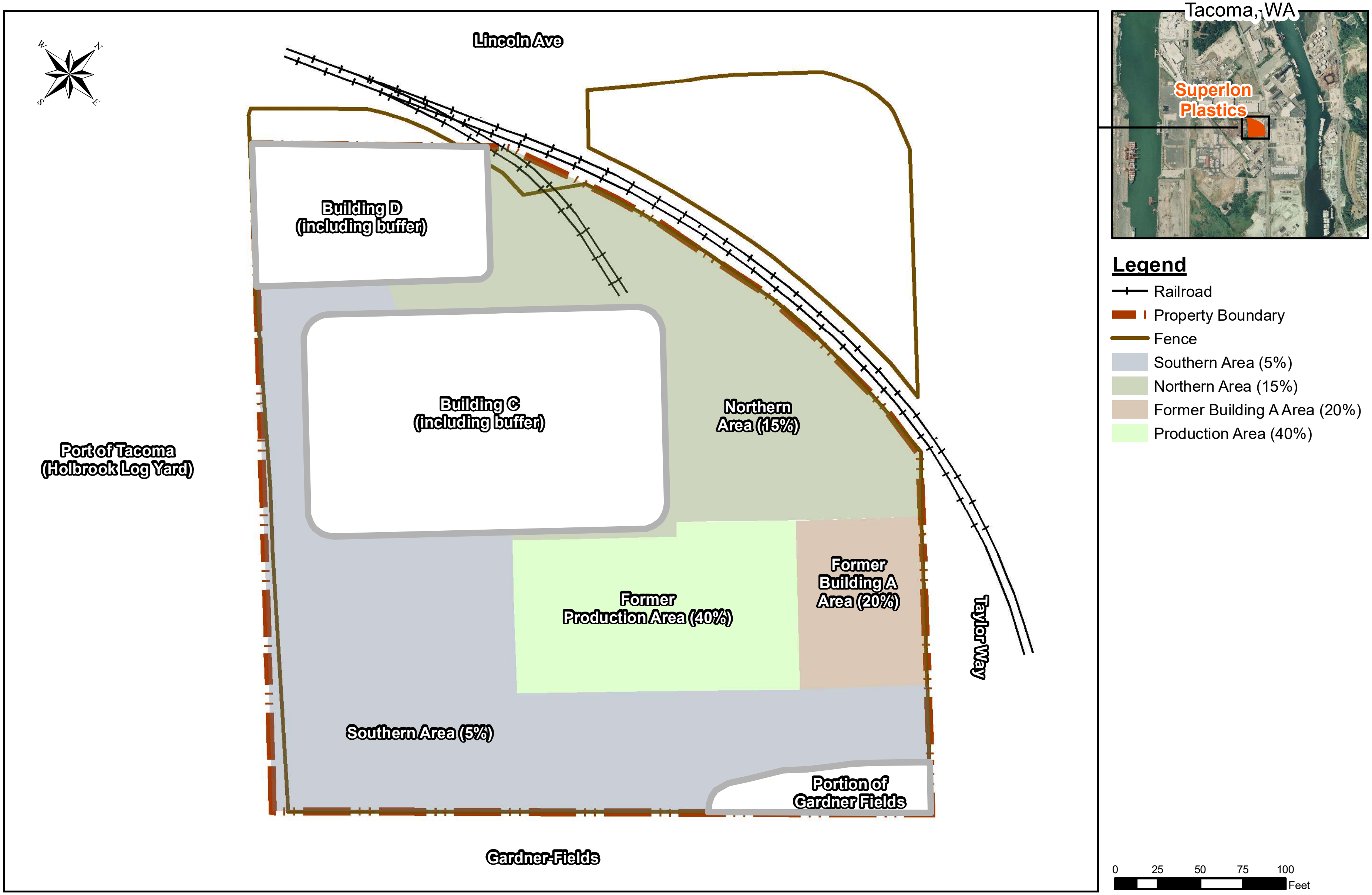
Remedial Action Unit Locations
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure 2-2



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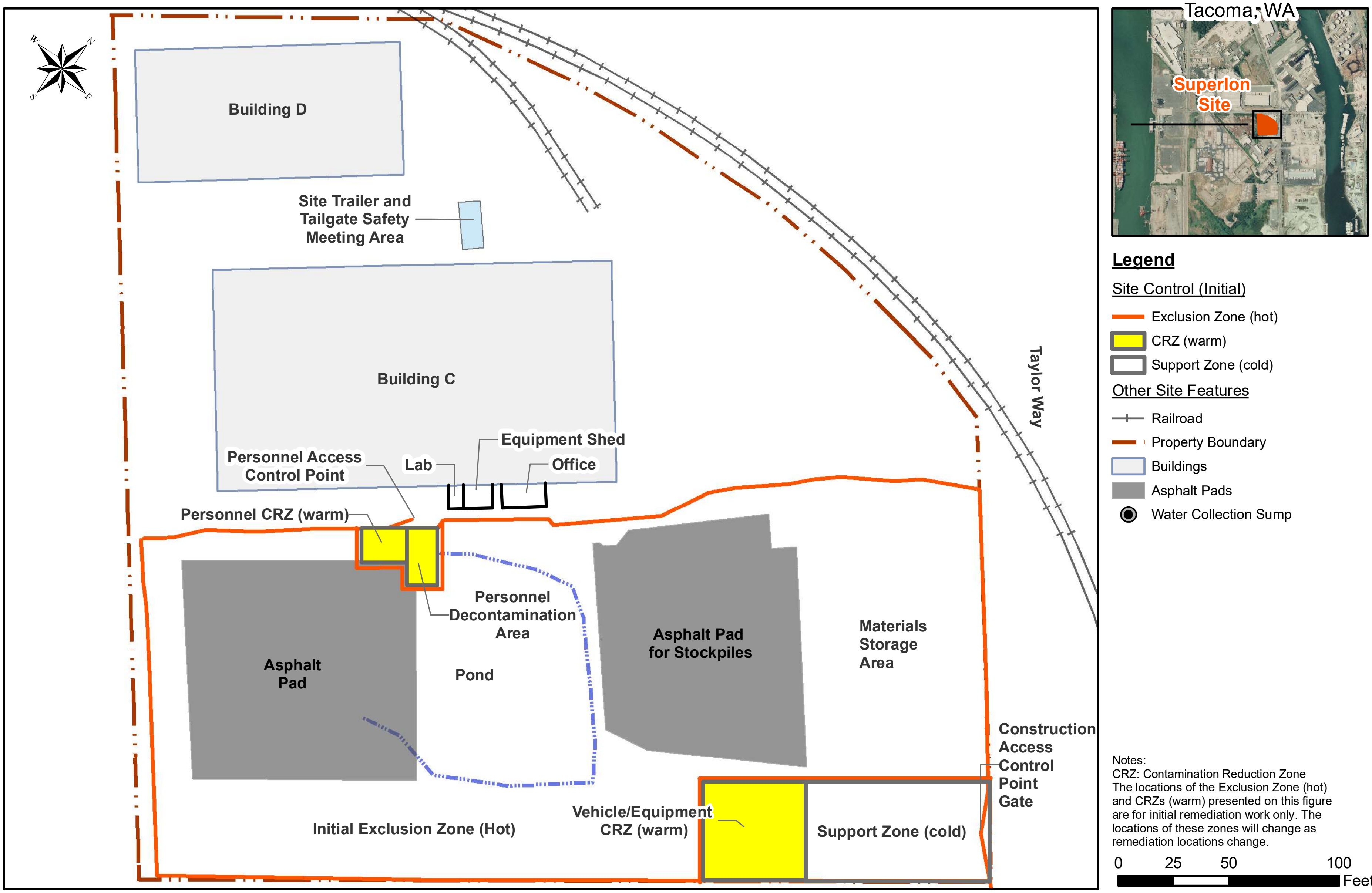
Estimated Percentage of Debris in the Excavated Material
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure 4-1

Document Path: G:\Projects\Superlon\Maps\2017\May 2017\Remedial Design Report\Figure 4-1_Estimated Percent of Debris.mxd; Author: VN; Date Saved: 8/7/2017



Notes:
CRZ: Contamination Reduction Zone
The locations of the Exclusion Zone (hot) and CRZs (warm) presented on this figure are for initial remediation work only. The locations of these zones will change as remediation locations change.

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Remedial Design Property Plan
Remedial Design Report
Superlon Plastics Property,Tacoma, Washington

Figure 4-2

Document Path: G:\Projects\Superlon\Maps\2017\May 2017\Remedial Design Report\Figure 4-2_Remedial Design Property Plan.mxd; Author: VN; Date Saved: 8/7/2017

Photographic Log

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Photo No. 1 Description: Read Screen-All RD90 Vibrating Screen	

Photo No. 2 Description: Alpine D20 Mixing Head Attachment	

Photo No. 3 Description: John Deere 644J Loader	

Photo No. 4 Description: Hitachi EX 200 Excavator	

Photo No. 5
Description: Cat 420 Backhoe

Photo No. 6
Description: Typical Gravel Skiff

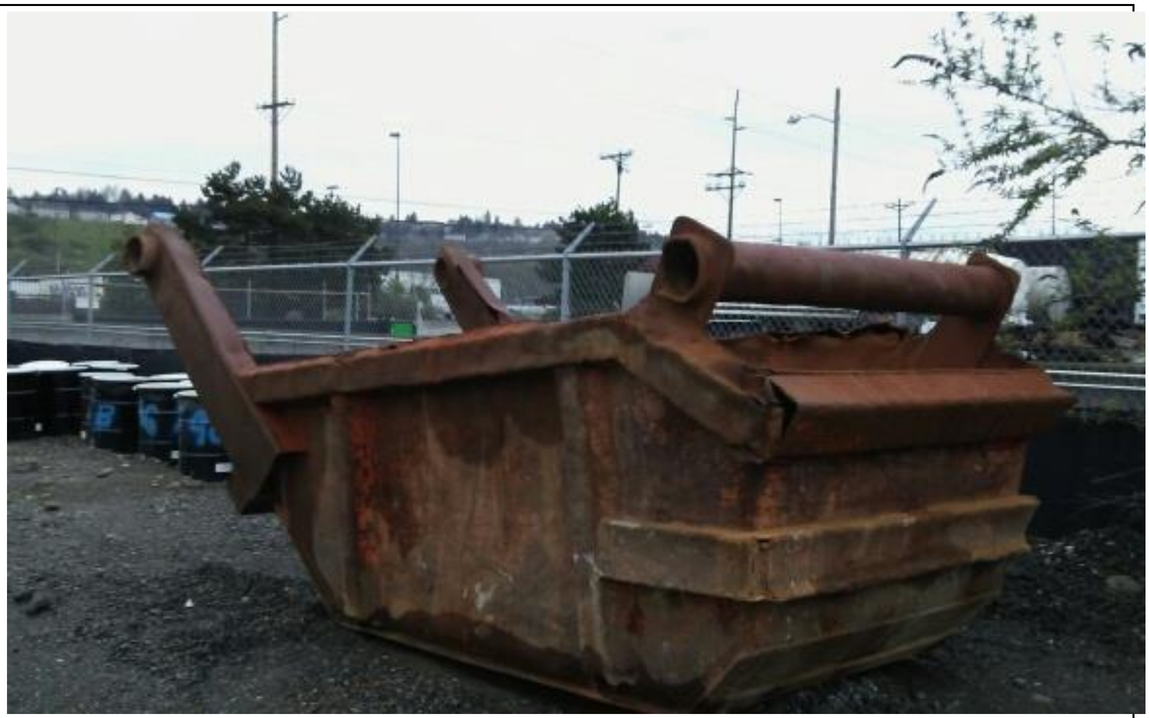
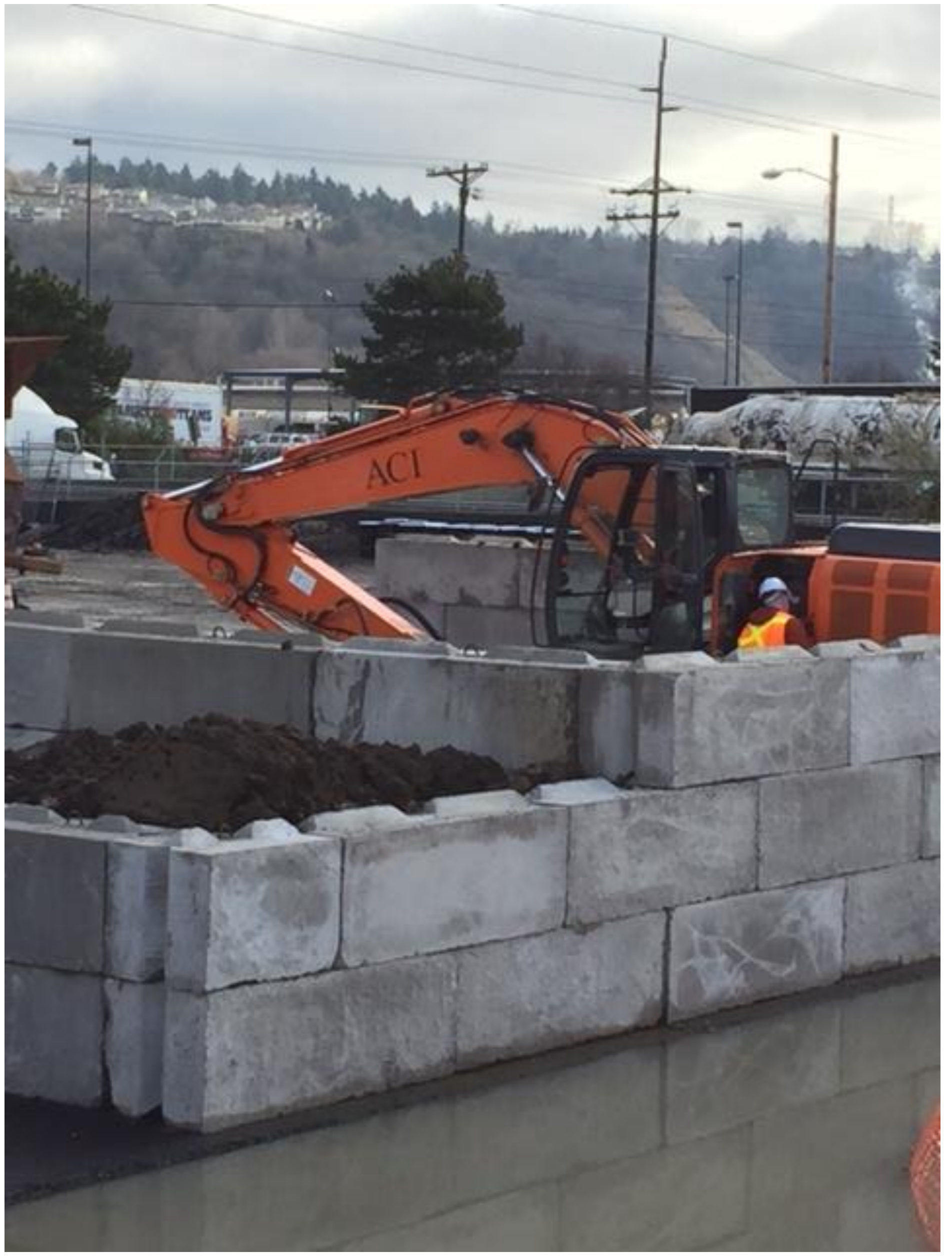


Photo No. 7 Description: Typical Storage Cell Construction Using Ecology Blocks	

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Appendix A

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Appendix A: Soil Treatability Studies

for the

Superlon Plastics Site Tacoma, Washington

Prepared for:

White Birch
2116 Taylor Way
Tacoma, WA 98401

and

The Chemours Company
6324 Fairview Road, Suite 200
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June 2017

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Table of Contents

Tables

Figures

Attachments

Acronyms and Abbreviations

Acronym/Abbreviation	Description
COC	Constituent of Concern
Property	Superlon Plastics Property
TCLP	Toxic Characteristic Leaching Procedure
Site	Superlon Plastics Site

A1 Introduction

This appendix describes the laboratory bench scale and field pilot treatability studies that were conducted to further evaluate the technical feasibility of applying three amendment technologies to characteristically hazardous soil to reduce the leachability of arsenic and lead to meet non-hazardous disposal criteria. Section A-2 presents the objectives and methodology of the laboratory bench scale treatability studies. Sections A-3, A-4, and A-5 present the bench scale treatability study results for Free Flow, Peroxychem, and Premier Magnesia, respectively. Section A-6 describes the Field Pilot study where the selected additive was tested under field conditions and the subsequent results. Section A-7 presents the conclusions and the recommended hazardous soil treatment additive for the full-scale remediation.

A2 Laboratory Bench Scale Treatability Studies

A2.1 Objective

The goal of the soil treatability studies was to determine if amending soil with different additives would be an effective way to reduce the leachability of metals in on-Property soils to achieve non-hazardous waste disposal Toxic Characteristic Leaching Procedure (TCLP) performance goals. The soil treatability studies were conducted by:

- Free Flow Technologies Laboratory Study;
- Peroxychem Laboratory Study; and
- Premier Magnesia Laboratory Study.

The focus of these studies were to:

- Confirm the suitability of the selected technologies for Property-specific soils;
- Identify the appropriate dose for achieving the TCLP objectives; and
- Identify potential problems associated with the selected technologies for application at the Superlon Plastics Property (Property).

A2.2 Soil Characterization

Soil samples for the treatability studies were collected from areas that contained targeted constituent of concern (COC) concentrations in order to provide suitable samples for the treatability study. The targeted soil samples were collected at locations shown in Figure A-1 using a GeoProbe for treatability testing. Splits of these samples were made and sent to Test America Tacoma and the Treatability vendors. The samples were analyzed at Test America for total arsenic and lead by EPA Method SW846-6010/SW846-7470, and for TCLP by EPA Method SW846-1311-6010/SW846-1311-7470. The analytical data, location, depth, and concentrations of the soil samples sent for treatability testing are presented in Table A-1. The analytical laboratory report is presented in Attachment A-1.

A2.3 Soil Treatment Methodology

The soil treatability study methodology and results are presented in the Free Flow, Peroxychem, and Premier Magnesia reports which are included in Attachments A-2, A-3, and A-3, respectively. The vendors blended impacted soils with their proprietary soil additives in test tubes and, following TCLP methodology, collected leachate from the treated soils. The leachate was analyzed for lead and arsenic and the laboratory reports are included with each vendors' attachments.

A3 Free Flow Results

The results of the treatability study are presented in Attachment A-2. The results indicate that while the soil can be treated with FF200-FS 1:1, a Free Flow reagent involving a 1:1 blend of an alkaline reagent and iron source, treatment effectiveness depends on the manner in which the soil is handled after treatment. If the soil is allowed to aerate, arsenic leaching can increase, especially for soil 80A. This indicates that treatment effectiveness depends not only on the reagents that are added but also on the way in which the soil is handled. Based on this study, the use of FF200-FS 1:1 for treatment of the soil is not recommended without a better understanding of how the soil will be handled during and after treatment.

A4 Peroxychem Results

The results of the treatability study are presented in Attachment A-3. Although each MetaFix® treatment reduced both TCLP arsenic and lead in comparison to the untreated control, there were sharp differences among the treatments (see Table 5 in Attachment A-3). The 04A soil, which had the highest total lead concentration, was the most difficult to treat. A range of MetaFix® I-6A dosages as low as 0.75% (w/w) provided good reductions in TCLP arsenic; however, TCLP lead reductions were not adequate (see Table 5 in Attachment A-3). However, when MetaFix® I-6A (1.5% w/w) was combined with soluble phosphate (0.5% w/w), good reductions in both TCLP arsenic and lead were observed. For the 44A soil, good reductions in arsenic and lead were observed using I-6T (1.5% w/w) in combination with calcium oxide (1.5% w/w). Finally, for the 80A soil, good reductions in both arsenic and lead were observed even at the low dosage (0.8% w/w) of MetaFix® I-6A.

This study demonstrated that TCLP arsenic and lead in soil excavated from the Superlong Plastics Site (Site) can be reduced to well below remedial objectives using relatively low dosages of MetaFix® I-6A alone (soil 80A), MetaFix® I-6T supplemented with calcium oxide (soil 44A), or MetaFix® I-6A supplemented with soluble phosphate (soil 04A).

A5 Premier Magnesia Results

The results of the treatability study are presented in Attachment A-4. For these samples, EnviroBlend® 50/50 HXD provided appropriate treatment in evaluation and optimization testing at three to four percent (3-4%) weight-to-weight (wt./wt.) dosage. Specifically, a sample evaluation found TCLP criteria was exceeded when EnviroBlend® 50/50 HXD was applied to 44A and 4A areas at a 4% dosage rate and to area 80A at a 3% dosage rate. Despite potential to optimize soils characteristic of sample 80A, based upon known heterogeneity of soil on-Site, Premier recommends a uniform dosage rate be applied to all soil at the Site. As before, variation in total and leachable arsenic and lead was evident in these samples, indicative of the site soil heterogeneity. Comparatively, in TCLP, 44A had the highest lead concentration and an average arsenic result; 4A had the highest arsenic concentration and an average lead result; and 80A had an average lead concentration and the lowest arsenic result. Utilizing the aforementioned 4% wt./wt. dosage rate successfully meets both arsenic and lead criteria across all three samples, despite variation in leachable metals.

A6 Field Pilot Soil Treatability Study

A6.1 Objectives

The goal of the Field Pilot soil treatability study was to determine if amending soil with Enviroblend® 50/50 HXD would be an effective means to reduce the leachability of metals in on-Property soils to achieve non-hazardous waste disposal TCLP performance goals. The Field Pilot soil treatability study was conducted in March and April of 2017 and the focus of this study was to:

- Confirm the suitability of the Enviroblend® 50/50 HXD for treating Property-specific soils;
- Confirm the appropriate dose of Enviroblend® 50/50 HXD for achieving the TCLP objectives; and
- Identify potential problems associated with applying, e.g., mixing with soil, Enviroblend® 50/50 HXD at the Property.

A6.2 Methodology

Soil was excavated from three different locations as shown in Figure A-2. The soil was screened using a 3-inch vibratory screen to remove debris and 3-inch plus materials. The screen and the soil after it has been screened can be seen in Attachment A-5. The soil was then moved to a concrete lined cell and spread out in a one-foot thick layer. The volume of soil to be treated was determined in order to identify the amount of EnviroBlend® 50/50 HXD to add.

The Enviroblend® 50/50 HXD additive was provided by the Premier Magnesia in two components and they were each added to a gravel skiff in equal parts and mixed (Attachment A-5). The additive was then spread on top of the soil and mixed thoroughly using an Alpine D20 mixing head (see Attachment A-5). The soil to be treated can be seen in the left portion of the photo and the additive, i.e., the white material on top of the soil can also be seen. The figure also shows the Alpine D20 mixing head attached to the excavator. The additive was thoroughly mixed into the soil using the mixing head.

A6.3 Results

Field Pilot soil treatability study results demonstration that amending soil with 4% dose (weight of Enviroblend®/weight of soil) of Enviroblend® 50/50 HXD was an effective means to reduce the leachability of metals in on-Property soils to achieve non-hazardous waste disposal TCLP performance goals. Table A-2 presents the analytical results of Pilot Field Study and the lab reports are presented in Attachment A-1.

A7 Conclusions

The treatability studies used bench-scale and field testing to determine the feasibility of successfully treating soils to reduce concentrations of metals in the leachate to meet non-hazardous disposal performance goals. These treatability studies demonstrated that the Premier Magnesia product EnviroBlend® 50/50 HXD used at a dosing rate of 4% was effective in treating on-Property soils to achieve the TCLP non-hazardous disposal criteria.

Tables

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Table A-1: Soil Treatability Study Baseline Sample Results

Sample	**SO-SL-44A-121216-6-8**	**SO-SL-4A-121216-6-10**	**SO-SL-75A-121216-8-10**	**SO-SL-80A-121216-4-12**
Boring #	SL-44	SL-4	SL-75	SL-80
Depth (feet bgs)	6-8	6-10	8-10	4-12
Date Collected	12/12/2016	12/12/2016	12/12/2016	12/12/2016
Constituent	**Result**			
Arsenic (mg/kg)	7,800	16,000	120	10,000
Arsenic TCLP (mg/L)	8.0	14	0.21	12
Lead (mg/kg)	15,000	27,000	2,100	1,600
Lead TCLP (mg/L)	130	14	0.053	0.23
Percent Moisture	32	42	37	28

Notes:

bgs: below ground surface.

TCLP: Toxicity characteristic leachate procedure.

U: Analyte was not detected; reporting limit is shown.

Table A-2: Soil Treatability Study Samples

Treatment	Location	Sample	Arsenic Total (mg/kg)	Arsenic TCLP (mg/L)	Lead Total (mg/kg)	Lead TCLP (mg/L)
Pre-Treatment	SL-44A	SO-SL-44A-121216-6-8	7,800	8.0	15,000	130
Post-Treatment	SL-44A	SO-SL-44PostTrea-030217	3,100	0.56	3,900	2.0
Pre-Treatment	SL-80A	SO-SL-80A-121216-4-12	10,000	12	1,600	0.23
Post-Treatment	SL-79	SO_SL_79 PostTrea 031017	Not Analyzed	1.4	Not Analyzed	0.030 U
Post-Treatment	SL-79	SO-SL-79/SL-80PostTrea-030217	5,100	2.4	2,800	0.30
Post-Treatment	SL-90	SO-SL-90PostTrea-030817	Not Analyzed	0.060 U	Not Analyzed	0.030 U

Notes:

TCLP: Toxicity characteristic leachate procedure.

U: Analyte was not detected; reporting limit is shown.

Figures

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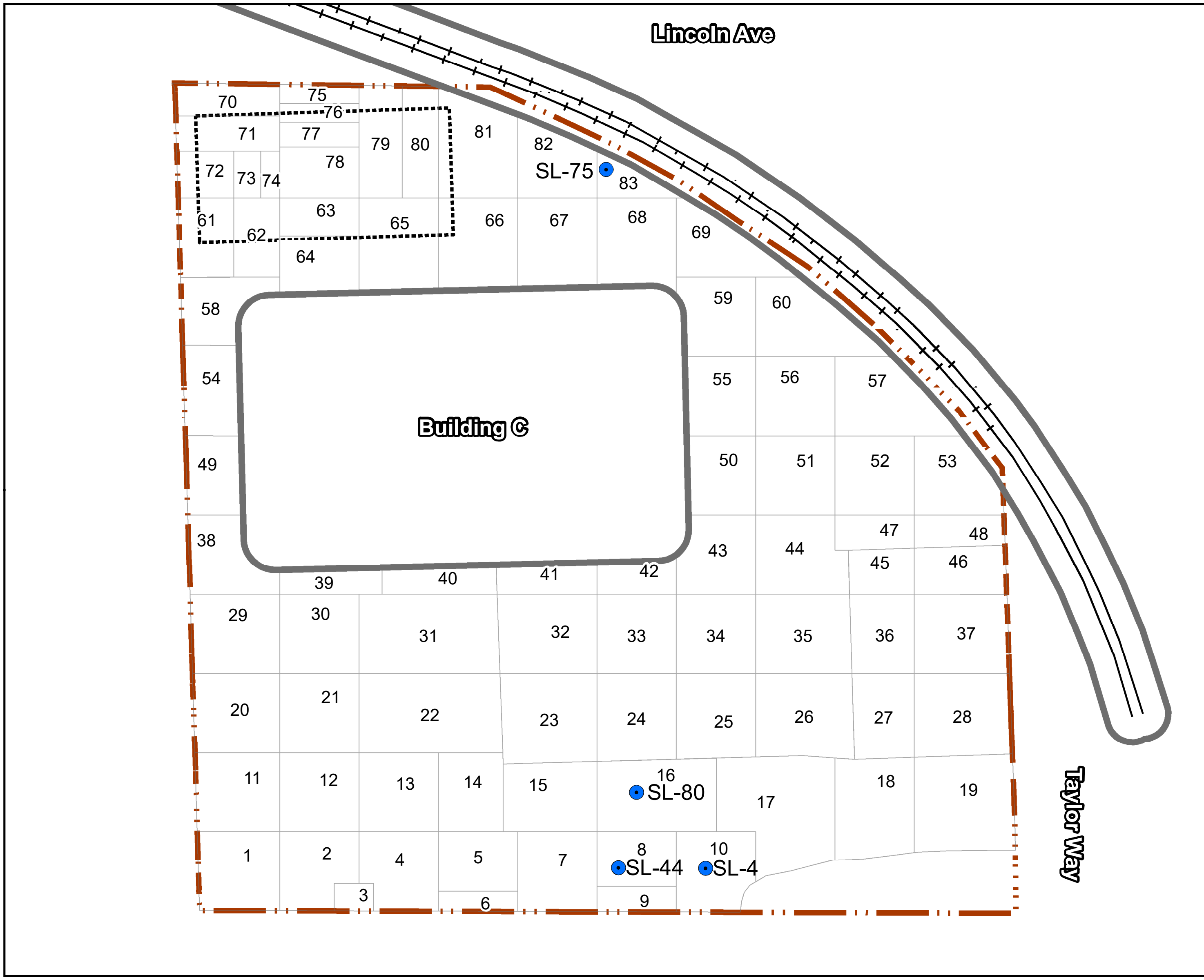

Legend

- Soil Sample Location
- Property Boundary
- Excavation Units
- Building D
- Building C 15ft Buffer
- Railroad 12 ft Buffer

Notes:
-The number in each excavation unit represents the sequential order of excavation.

0 50 100 Feet

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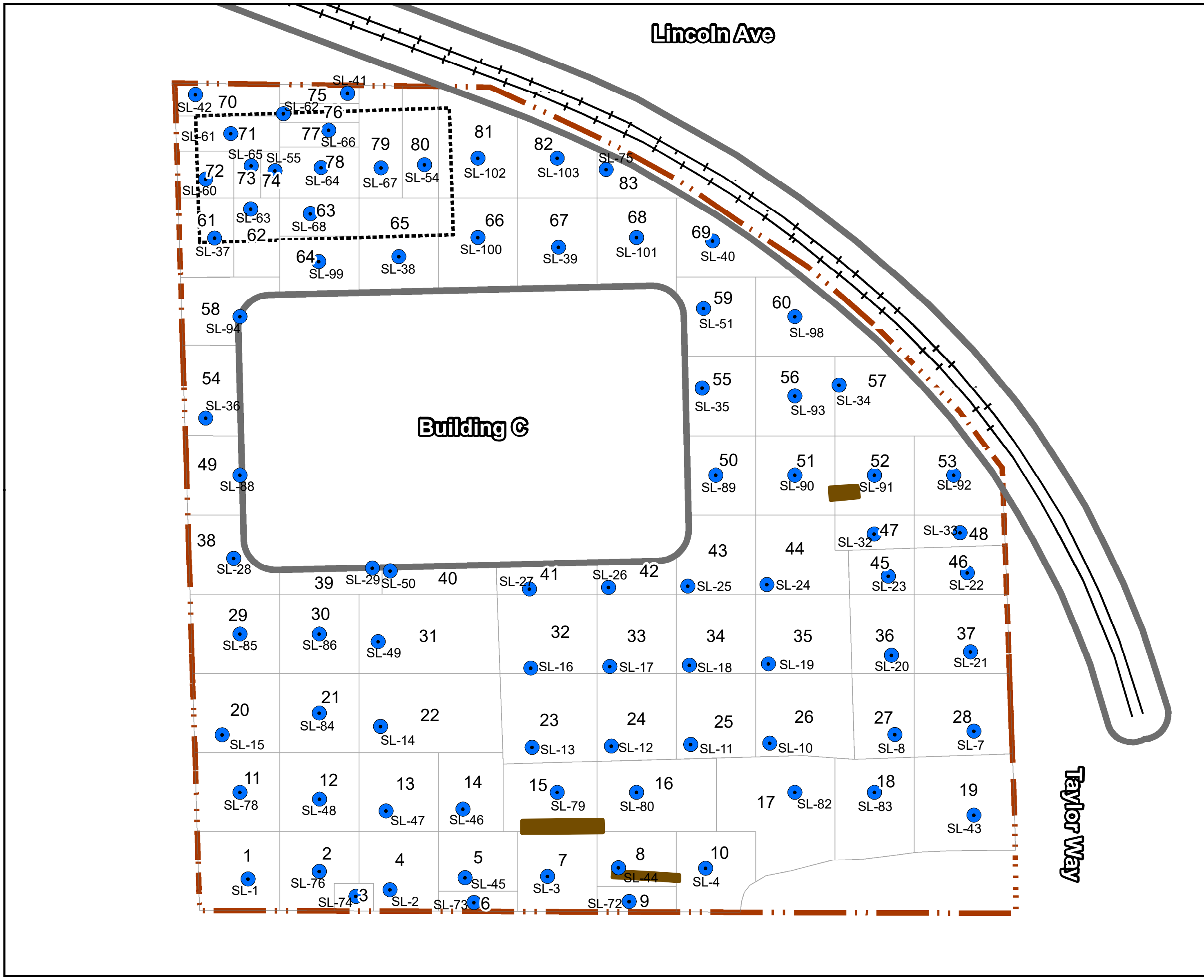
Soil Sample Locations for Laboratory Hazardous Soil Treatability Studies
Superlon Plastics Property, Tacoma, Washington

Figure A-1



Legend

- Exising Borings
- Property Boundary
- Pilot Study Excavation
- Excavation Cells
- Building D
- Building C 15ft Buffer
- Railroad 12 ft Buffer

Notes:
-The number in each excavation unit represents the sequential order of excavation.

0 50 100 Feet

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Field Pilot Treatability Study Excavation Locations
Superlon Plastics Property, Tacoma, Washington

Figure A-2

Attachment A-1: Soil Sample Laboratory Results

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-64791-1
Client Project/Site: Superlon

For:
Pacific Environmental and Redevelopment
8424 East Meadow Lake Drive
Snohomish, Washington 98290

Attn: Jeff King

Authorized for release by:
12/20/2016 2:28:45 PM

Robert Greer, Project Manager II
(253)922-2310
robert.greer@testamericainc.com

LINKS

Review your project results through TotalAccess

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Visit us at: www.testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-64791-1

Laboratory: TestAmerica Seattle

Narrative

CASE NARRATIVE
Client: Pacific Environmental and Redevelopment
Project: Superlon
Report Number: 580-64791-1

This case narrative is in the form of an exception report, where only the anomalies related to this report, method specific performance and/or QA/QC issues are discussed. If there are no issues to report, this narrative will include a statement that documents that there are no relevant data issues.

It should be noted that samples with elevated Reporting Limits (RLs) resulting from a dilution may not be able to satisfy customer reporting limits in some cases. Such increases in the RLs are an unavoidable but acceptable consequence of sample dilution that enables quantification of target analytes within the calibration range of the instrument or that reduces the interferences thereby enabling the quantification of target analytes.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

RECEIPT
The samples were received on 12/12/2016; the samples arrived in good condition, properly preserved and on ice. The temperature of the coolers at receipt was 17.6 C.

Note: All samples which require thermal preservation are considered acceptable if the arrival temperature is within 2C of the required temperature or method specified range. For samples with a specified temperature of 4C, samples with a temperature ranging from just above freezing temperature of water to 6C shall be acceptable. Samples that are hand delivered immediately following collection may not meet these criteria, however they will be deemed acceptable according to NELAC standards, if there is evidence that the chilling process has begun, such as arrival on ice, etc.

TCLP METALS
Samples SO-SL-44A-121216-6-8 (580-64791-1), SO-SL-4A-121216-6-10 (580-64791-2), SO-SL-75A-121216-8-10 (580-64791-4) and SO-SL-80A-121216-4-12 (580-64791-5) were analyzed for TCLP Metals in accordance with EPA SW-846 Method 1311/6010C. The samples were leached on 12/14/2016, prepared on 12/15/2016 and analyzed on 12/16/2016.

Sample SO-SL-44A-121216-6-8 (580-64791-1) required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

METALS (ICP)
Samples SO-SL-44A-121216-6-8 (580-64791-1), SO-SL-4A-121216-6-10 (580-64791-2), SO-SL-75A-121216-8-10 (580-64791-4) and SO-SL-80A-121216-4-12 (580-64791-5) were analyzed for Metals (ICP) in accordance with EPA SW-846 Method 6010C. The samples were prepared on 12/15/2016 and analyzed on 12/19/2016.

Samples SO-SL-44A-121216-6-8 (580-64791-1), SO-SL-4A-121216-6-10 (580-64791-2) and SO-SL-80A-121216-4-12 (580-64791-5) required dilution prior to analysis. The reporting limits have been adjusted accordingly.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

PERCENT SOLIDS
Samples SO-SL-44A-121216-6-8 (580-64791-1), SO-SL-4A-121216-6-10 (580-64791-2), SO-SL-75A-121216-8-10 (580-64791-4) and SO-SL-80A-121216-4-12 (580-64791-5) were analyzed for percent solids in accordance with ASTM D2216. The samples were analyzed on 12/15/2016.

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Client Sample ID: SO-SL-44A-121216-6-8
Date Collected: 12/12/16 10:40
Date Received: 12/12/16 14:47

Lab Sample ID: 580-64791-1
Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	8.0		0.060		mg/L		12/15/16 16:25	12/16/16 15:21	1
Lead	130		0.30		mg/L		12/15/16 16:25	12/16/16 22:42	10

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	68.0		0.1		%			12/15/16 11:05	1
Percent Moisture	32.0		0.1		%			12/15/16 11:05	1

Client Sample ID: SO-SL-44A-121216-6-8
Lab Sample ID: 580-64791-1
Date Collected: 12/12/16 10:40
Matrix: Solid
Date Received: 12/12/16 14:47
Percent Solids: 68.0

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	7800		200		mg/Kg	☼	12/15/16 14:49	12/19/16 11:47	50
Lead	15000		100		mg/Kg	☼	12/15/16 14:49	12/19/16 11:47	50

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Client Sample ID: SO-SL-4A-121216-6-10
Date Collected: 12/12/16 10:15
Date Received: 12/12/16 14:47

Lab Sample ID: 580-64791-2
Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	14		0.060	mg/L		12/15/16 16:25	12/16/16 15:25	1
Lead	14		0.030	mg/L		12/15/16 16:25	12/16/16 15:25	1

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	57.6		0.1	%			12/15/16 11:05	1
Percent Moisture	42.4		0.1	%			12/15/16 11:05	1

Client Sample Results

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Client Sample ID: SO-SL-4A-121216-6-10
Date Collected: 12/12/16 10:15
Date Received: 12/12/16 14:47

Lab Sample ID: 580-64791-2
Matrix: Solid
Percent Solids: 57.6

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**16000**		250		mg/Kg	☼	12/15/16 14:49	12/19/16 11:51	50
Lead	**27000**		120		mg/Kg	☼	12/15/16 14:49	12/19/16 11:51	50

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Client Sample ID: SO-SL-75A-121216-8-10

Lab Sample ID: 580-64791-4

Date Collected: 12/12/16 08:15
Matrix: Solid
Date Received: 12/12/16 14:47

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.21		0.060		mg/L		12/15/16 16:25	12/16/16 15:29	1
Lead	0.053		0.030		mg/L		12/15/16 16:25	12/16/16 15:29	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	62.6		0.1		%			12/15/16 11:05	1
Percent Moisture	37.4		0.1		%			12/15/16 11:05	1

Client Sample Results

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Client Sample ID: SO-SL-75A-121216-8-10

Lab Sample ID: 580-64791-4

Date Collected: 12/12/16 08:15
Date Received: 12/12/16 14:47

Matrix: Solid
Percent Solids: 62.6

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**120**		4.2		mg/Kg	☼	12/15/16 14:49	12/19/16 11:57	1
Lead	**2100**		2.1		mg/Kg	☼	12/15/16 14:49	12/19/16 11:57	1

Client Sample ID: SO-SL-80A-121216-4-12

Lab Sample ID: 580-64791-5

Date Collected: 12/12/16 11:15
Matrix: Solid
Date Received: 12/12/16 14:47

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	12		0.060		mg/L		12/15/16 16:25	12/16/16 15:32	1
Lead	0.23		0.030		mg/L		12/15/16 16:25	12/16/16 15:32	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	72.5		0.1		%			12/15/16 11:05	1
Percent Moisture	27.5		0.1		%			12/15/16 11:05	1

Client Sample Results

Client Sample ID: SO-SL-80A-121216-4-12

Lab Sample ID: 580-64791-5

Date Collected: 12/12/16 11:15
Matrix: Solid
Date Received: 12/12/16 14:47
Percent Solids: 72.5

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10000**		38		mg/Kg	☼	12/15/16 14:49	12/19/16 12:01	10
Lead	**1600**		19		mg/Kg	☼	12/15/16 14:49	12/19/16 12:01	10

Client: Pacific Environmental and Redevelopment | TestAmerica Job ID: 580-64791-1
Project/Site: Superlon

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-234627/21-A | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234820 | **Prep Batch: 234627**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Lead	ND		1.5	mg/Kg		12/15/16 14:49	12/16/16 18:05	1

Lab Sample ID: MB 580-234627/21-A | **Client Sample ID: Method Blank**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234879 | **Prep Batch: 234627**

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		3.0	mg/Kg		12/15/16 14:49	12/19/16 10:59	1
Lead	ND		1.5	mg/Kg		12/15/16 14:49	12/19/16 10:59	1

Lab Sample ID: LCS 580-234627/22-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234820 | **Prep Batch: 234627**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	50.0	46.8		mg/Kg		94	80 - 120

Lab Sample ID: LCS 580-234627/22-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234879 | **Prep Batch: 234627**

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	200		mg/Kg		100	80 - 120
Lead	50.0	50.6		mg/Kg		101	80 - 120

Lab Sample ID: LCSD 580-234627/23-A | **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234820 | **Prep Batch: 234627**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	50.0	47.7		mg/Kg		95	80 - 120	2	20

Lab Sample ID: LCSD 580-234627/23-A | **Client Sample ID: Lab Control Sample Dup**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234879 | **Prep Batch: 234627**

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	200	197		mg/Kg		98	80 - 120	2	20
Lead	50.0	50.0		mg/Kg		100	80 - 120	1	20

Lab Sample ID: LCSSRM 580-234627/24-A | **Client Sample ID: Lab Control Sample**
Matrix: Solid | **Prep Type: Total/NA**
Analysis Batch: 234820 | **Prep Batch: 234627**

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Lead	133	126		mg/Kg		94.6	72.9 - 127.8

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCSSRM 580-234627/24-A
Matrix: Solid
Analysis Batch: 234879

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 234627

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	139	138		mg/Kg		99.2	70.4 - 140.3
Lead	133	132		mg/Kg		98.9	72.9 - 127.8

Lab Sample ID: MB 580-234525/1-B
Matrix: Solid
Analysis Batch: 234741

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 234644

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060	mg/L		12/15/16 16:25	12/16/16 14:28	1
Lead	ND		0.030	mg/L		12/15/16 16:25	12/16/16 14:28	1

Lab Sample ID: LCS 580-234525/2-B
Matrix: Solid
Analysis Batch: 234741

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 234644

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.49		mg/L		112	80 - 120
Lead	1.00	1.09		mg/L		109	80 - 120

Lab Sample ID: LCSD 580-234525/3-B
Matrix: Solid
Analysis Batch: 234741

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 234644

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.51		mg/L		113	80 - 120	0	20
Lead	1.00	1.10		mg/L		110	80 - 120	1	20

Method: D 2216 - Percent Moisture

Lab Sample ID: 580-64791-5 DU
Matrix: Solid
Analysis Batch: 234589

Client Sample ID: SO-SL-80A-121216-4-12
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Solids	72.5		73.7		%		2	20
Percent Moisture	27.5		26.3		%		5	20

Client Sample ID: SO-SL-44A-121216-6-8

Lab Sample ID: 580-64791-1
Date Collected: 12/12/16 10:40
Matrix: Solid
Date Received: 12/12/16 14:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			234525	12/14/16 15:19	R1K	TAL SEA
TCLP	Prep	3010A			234644	12/15/16 16:25	PAB	TAL SEA
TCLP	Analysis	6010C		1	234741	12/16/16 15:21	HJM	TAL SEA
TCLP	Leach	1311			234525	12/14/16 15:19	R1K	TAL SEA
TCLP	Prep	3010A			234644	12/15/16 16:25	PAB	TAL SEA
TCLP	Analysis	6010C		10	234820	12/16/16 22:42	HJM	TAL SEA
Total/NA	Analysis	D 2216		1	234589	12/15/16 11:05	Y1W	TAL SEA

Client Sample ID: SO-SL-44A-121216-6-8

Lab Sample ID: 580-64791-1
Date Collected: 12/12/16 10:40
Matrix: Solid
Date Received: 12/12/16 14:47
Percent Solids: 68.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			234627	12/15/16 14:49	MKN	TAL SEA
Total/NA	Analysis	6010C		50	234879	12/19/16 11:47	HJM	TAL SEA

Client Sample ID: SO-SL-4A-121216-6-10

Lab Sample ID: 580-64791-2
Date Collected: 12/12/16 10:15
Matrix: Solid
Date Received: 12/12/16 14:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			234525	12/14/16 15:19	R1K	TAL SEA
TCLP	Prep	3010A			234644	12/15/16 16:25	PAB	TAL SEA
TCLP	Analysis	6010C		1	234741	12/16/16 15:25	HJM	TAL SEA
Total/NA	Analysis	D 2216		1	234589	12/15/16 11:05	Y1W	TAL SEA

Client Sample ID: SO-SL-4A-121216-6-10

Lab Sample ID: 580-64791-2
Date Collected: 12/12/16 10:15
Matrix: Solid
Date Received: 12/12/16 14:47
Percent Solids: 57.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			234627	12/15/16 14:49	MKN	TAL SEA
Total/NA	Analysis	6010C		50	234879	12/19/16 11:51	HJM	TAL SEA

Client Sample ID: SO-SL-75A-121216-8-10

Lab Sample ID: 580-64791-4
Date Collected: 12/12/16 08:15
Matrix: Solid
Date Received: 12/12/16 14:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			234525	12/14/16 15:19	R1K	TAL SEA
TCLP	Prep	3010A			234644	12/15/16 16:25	PAB	TAL SEA
TCLP	Analysis	6010C		1	234741	12/16/16 15:29	HJM	TAL SEA
Total/NA	Analysis	D 2216		1	234589	12/15/16 11:05	Y1W	TAL SEA

Client Sample ID: SO-SL-75A-121216-8-10 Lab Sample ID: 580-64791-4

Date Collected: 12/12/16 08:15 **Matrix: Solid**
Date Received: 12/12/16 14:47 **Percent Solids: 62.6**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			234627	12/15/16 14:49	MKN	TAL SEA
Total/NA	Analysis	6010C		1	234879	12/19/16 11:57	HJM	TAL SEA

Client Sample ID: SO-SL-80A-121216-4-12 Lab Sample ID: 580-64791-5

Date Collected: 12/12/16 11:15 **Matrix: Solid**
Date Received: 12/12/16 14:47

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			234525	12/14/16 15:19	R1K	TAL SEA
TCLP	Prep	3010A			234644	12/15/16 16:25	PAB	TAL SEA
TCLP	Analysis	6010C		1	234741	12/16/16 15:32	HJM	TAL SEA
Total/NA	Analysis	D 2216		1	234589	12/15/16 11:05	Y1W	TAL SEA

Client Sample ID: SO-SL-80A-121216-4-12 Lab Sample ID: 580-64791-5

Date Collected: 12/12/16 11:15 **Matrix: Solid**
Date Received: 12/12/16 14:47 **Percent Solids: 72.5**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			234627	12/15/16 14:49	MKN	TAL SEA
Total/NA	Analysis	6010C		10	234879	12/19/16 12:01	HJM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-17

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Sample Summary

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon

TestAmerica Job ID: 580-64791-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-64791-1	SO-SL-44A-121216-6-8	Solid	12/12/16 10:40	12/12/16 14:47
580-64791-2	SO-SL-4A-121216-6-10	Solid	12/12/16 10:15	12/12/16 14:47
580-64791-4	SO-SL-75A-121216-8-10	Solid	12/12/16 08:15	12/12/16 14:47
580-64791-5	SO-SL-80A-121216-4-12	Solid	12/12/16 11:15	12/12/16 14:47

Loc: 580
64791

Chain of Custody Record

CHOC Number: 01_1.1_E51_L39_12122016

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com

Site Contact:
PIONEER
Stacy Munson
Phone: 360-570-1700 Email: munsons@uspioneer.com

PIONEER Technologies Corporation
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com
PIONEER TECHNOLOGIES CORPORATION

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica Seattle
Cathy Kreps
Phone: 253-922-2310 Email: kathy.kreps@testamericainc.com

CHOC Version: 0.99.05

Sample Information / Analytes

Special Lab Instructions Included ==> / *<== Special Lab Instructions*

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	d422 + EPA 6010C	EPA 6010C-Inorganic	TCLP RCRA 8 Metals						Comments for Sample
									X						
SO-SL-44A-121216-6-8	12/12/2016	10:40	BG				X	X	X						Composite from multiple borings in Cell
SO-SL-4A-121216-6-10	12/12/2016	10:15	BG				X	X	X						Sample composited from multiple boring
SO-SL-75A-121216-7.5-8	12/12/2016	08:15	BG					X		5 day TAT					Composite from multiple borings in cell 5
SO-SL-75A-121216-8-10	12/12/2016	08:15	BG				X	X	X						
SO-SL-80A-121216-4-12	12/12/2016	11:15	BG				X	X	X						Composite from multiple borings in cell 5

580-64791 Chain of Custody

TB A2 Cooler ___ Cor 17.6 w/o Unc 18.5
Cooler Dsc Med Blue @Lab ___
Wet/Packs Packing bub
clidro

Cooler (Yes/No): Cooler Temp:	Turnaround Time: 5 Day	Hazard Identification:	Sample Disposal:

Preservative: None | None | None

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:
Run samples for particle size and then run ~~samples~~ fractions for 6010C. ~~Normal TAT~~ Normal TAT for SO-SL-75A-121216-7.5-8

1. Relinquished By: (Sign and Print) BRAD Grinstel	**Date/Time:** 12/12/16 2:47	**1. Received By:** (Sign and Print) [illegible] TA	**Date/Time:** 12/12/16 14:47
2. Relinquished By: (Sign and Print)	**Date/Time:**	**2. Received By:** (Sign and Print)	**Date/Time:**
3. Relinquished By: (Sign and Print)	**Date/Time:**	**3. Received By:** (Sign and Print)	**Date/Time:**

Stat Form: 01 - 07/24/2015

Login Sample Receipt Checklist

Client: Pacific Environmental and Redevelopment

Job Number: 580-64791-1

Login Number: 64791
List Number: 1
Creator: Gall, Brandon A

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	Lab does not accept radioactive samples.
The cooler's custody seal, if present, is intact.	N/A	Not present
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No Coolant
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66441-1
Client Project/Site: Superlon Pilot Study

For:
Pacific Environmental and Redevelopment
8424 East Meadow Lake Drive
Snohomish, Washington 98290

Attn: Jeff King

M. Elaine Walker

Authorized for release by:
3/15/2017 5:30:57 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11

Table of Contents

Case Narrative

Job ID: 580-66441-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66441-1

Receipt
Three samples were received on 3/2/2017 3:22 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 17.0º C.

Receipt Exceptions

The following samples were received at the laboratory outside the required temperature criteria: SO-Cell_A-2PostTrea-030217 (580-66441-1), SO-SL-44PostTrea-030217 (580-66441-2) and SO-SL-79/SL-80PostTrea-030217 (580-66441-3). There was no cooling media present in the cooler. The samples were received at 17.0°C.

Metals
Method(s) 6010C: The low level continuing calibration verification (CCVL) associated with batch 580-240526 recovered above the upper control limit for As and Pb. The samples associated with this CCVL were greater than 10 times the reporting limit for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Qualifiers

Metals

Qualifier	Qualifier Description
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: SO-Cell_A-2PostTrea-030217
Lab Sample ID: 580-66441-1
Date Collected: 03/02/17 10:15
Matrix: Solid
Date Received: 03/02/17 15:22

Method: 6020A - Metals (ICP/MS) - TCLP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.88**		0.010	mg/L		03/08/17 13:08	03/09/17 10:56	10
Barium	**0.30**		0.012	mg/L		03/08/17 13:08	03/09/17 10:56	10
Cadmium	**0.014**		0.0040	mg/L		03/08/17 13:08	03/09/17 10:56	10
Chromium	**0.0057**		0.0040	mg/L		03/08/17 13:08	03/09/17 10:56	10
Lead	**390**		0.40	mg/L		03/08/17 13:08	03/09/17 11:37	1000
Selenium	ND		0.010	mg/L		03/08/17 13:08	03/09/17 10:56	10
Silver	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 10:56	10

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	mg/L		03/08/17 13:17	03/09/17 09:22	1

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**100.0**		0.1	%			03/06/17 13:22	1
Percent Moisture	**0.0**		0.1	%			03/06/17 13:22	1

Client Sample Results

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Client Sample ID: SO-Cell_A-2PostTrea-030217

Lab Sample ID: 580-66441-1

Date Collected: 03/02/17 10:15
Date Received: 03/02/17 15:22

Matrix: Solid
Percent Solids: 100.0

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	6900		55		mg/Kg	☼	03/10/17 14:09	03/15/17 14:26	20
Lead	41000		28		mg/Kg	☼	03/10/17 14:09	03/15/17 14:26	20

Client Sample Results

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Client Sample ID: SO-SL-44PostTrea-030217

Date Collected: 03/02/17 08:35
Date Received: 03/02/17 15:22

Lab Sample ID: 580-66441-2

Matrix: Solid

Method: 6020A - Metals (ICP/MS) - TCLP

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.56**		0.010		mg/L		03/08/17 13:08	03/09/17 11:01	10
Barium	**0.83**		0.012		mg/L		03/08/17 13:08	03/09/17 11:01	10
Cadmium	ND		0.0040		mg/L		03/08/17 13:08	03/09/17 11:01	10
Chromium	**0.0045**		0.0040		mg/L		03/08/17 13:08	03/09/17 11:01	10
Lead	**2.0**		0.0040		mg/L		03/08/17 13:08	03/09/17 11:01	10
Selenium	ND		0.010		mg/L		03/08/17 13:08	03/09/17 11:01	10
Silver	ND		0.0040		mg/L		03/08/17 13:08	03/09/17 11:01	10

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/08/17 13:17	03/09/17 09:24	1

General Chemistry

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**99.9**		0.1		%			03/06/17 13:22	1
Percent Moisture	**0.1**		0.1		%			03/06/17 13:22	1

Client Sample ID: SO-SL-44PostTrea-030217

Lab Sample ID: 580-66441-2

Date Collected: 03/02/17 08:35
Date Received: 03/02/17 15:22

Matrix: Solid
Percent Solids: 99.9

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3100	^	2.8		mg/Kg	☼	03/10/17 14:09	03/14/17 21:06	1
Lead	3900	^	1.4		mg/Kg	☼	03/10/17 14:09	03/14/17 21:06	1

Client Sample ID: SO-SL-79/SL-80PostTrea-030217

Lab Sample ID: 580-66441-3

Date Collected: 03/02/17 09:20

Matrix: Solid

Date Received: 03/02/17 15:22

Method: 6020A - Metals (ICP/MS) - TCLP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.4**		0.010	mg/L		03/08/17 13:08	03/09/17 11:05	10
Barium	**0.69**		0.012	mg/L		03/08/17 13:08	03/09/17 11:05	10
Cadmium	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 11:05	10
Chromium	**0.0044**		0.0040	mg/L		03/08/17 13:08	03/09/17 11:05	10
Lead	**0.30**		0.0040	mg/L		03/08/17 13:08	03/09/17 11:05	10
Selenium	ND		0.010	mg/L		03/08/17 13:08	03/09/17 11:05	10
Silver	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 11:05	10

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	mg/L		03/08/17 13:17	03/09/17 09:26	1

General Chemistry

Analyte	Result	Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**99.9**		0.1	%			03/06/17 13:22	1
Percent Moisture	**0.07**		0.1	%			03/06/17 13:22	1

Client Sample Results

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Client Sample ID: SO-SL-79/SL-80PostTrea-030217
Date Collected: 03/02/17 09:20
Date Received: 03/02/17 15:22

Lab Sample ID: 580-66441-3
Matrix: Solid
Percent Solids: 99.9

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL		Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5100	^	2.8		mg/Kg	☼	03/10/17 14:09	03/14/17 21:10	1
Lead	2800	^	1.4		mg/Kg	☼	03/10/17 14:09	03/14/17 21:10	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-240229/19-A
Matrix: Solid
Analysis Batch: 240526

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240229

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND	^	3.0	mg/Kg		03/10/17 14:09	03/14/17 19:43	1
Lead	ND	^	1.5	mg/Kg		03/10/17 14:09	03/14/17 19:43	1

Lab Sample ID: LCS 580-240229/20-A
Matrix: Solid
Analysis Batch: 240526

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240229

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	203	^	mg/Kg		102	80 - 120
Lead	50.0	56.4	^	mg/Kg		113	80 - 120

Lab Sample ID: LCSD 580-240229/21-A
Matrix: Solid
Analysis Batch: 240526

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240229

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	200	192	^	mg/Kg		96	80 - 120	5	20
Lead	50.0	53.0	^	mg/Kg		106	80 - 120	6	20

Lab Sample ID: LCSSRM 580-240229/22-A
Matrix: Solid
Analysis Batch: 240526

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240229

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	139	129	^	mg/Kg		92.6	70.4 - 140.3
Lead	133	132	^	mg/Kg		99.1	72.9 - 127.8

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-239926/1-B
Matrix: Solid
Analysis Batch: 240115

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240000

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.010	mg/L		03/08/17 13:08	03/09/17 10:02	10
Barium	ND		0.012	mg/L		03/08/17 13:08	03/09/17 10:02	10
Cadmium	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 10:02	10
Chromium	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 10:02	10
Lead	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 10:02	10
Selenium	ND		0.010	mg/L		03/08/17 13:08	03/09/17 10:02	10
Silver	ND		0.0040	mg/L		03/08/17 13:08	03/09/17 10:02	10

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-239926/2-B
Matrix: Solid
Analysis Batch: 240115

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240000

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.12		mg/L		103	80 - 120
Barium	4.00	4.12		mg/L		103	80 - 120
Cadmium	0.100	0.106		mg/L		106	80 - 120
Chromium	0.400	0.407		mg/L		102	80 - 120
Lead	1.00	1.00		mg/L		100	80 - 120
Selenium	4.00	4.14		mg/L		104	80 - 120
Silver	0.600	0.609		mg/L		102	80 - 120

Lab Sample ID: LCSD 580-239926/3-B
Matrix: Solid
Analysis Batch: 240115

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240000

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.16		mg/L		104	80 - 120	1	20
Barium	4.00	4.16		mg/L		104	80 - 120	1	20
Cadmium	0.100	0.105		mg/L		105	80 - 120	1	20
Chromium	0.400	0.417		mg/L		104	80 - 120	2	20
Lead	1.00	1.01		mg/L		101	80 - 120	1	20
Selenium	4.00	4.18		mg/L		105	80 - 120	1	20
Silver	0.600	0.616		mg/L		103	80 - 120	1	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 580-239926/1-C
Matrix: Solid
Analysis Batch: 240083

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240004

Analyte	MB Result	MB Qualifier	RL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020	mg/L		03/08/17 13:17	03/09/17 09:01	1

Lab Sample ID: LCS 580-239926/2-C
Matrix: Solid
Analysis Batch: 240083

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240004

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0200	0.0177		mg/L		88	80 - 120

Lab Sample ID: LCSD 580-239926/3-C
Matrix: Solid
Analysis Batch: 240083

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240004

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0200	0.0177		mg/L		88	80 - 120	0	20

Lab Chronicle

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Client Sample ID: SO-Cell_A-2PostTrea-030217

Lab Sample ID: 580-66441-1

Date Collected: 03/02/17 10:15
Date Received: 03/02/17 15:22

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	3010A			240000	03/08/17 13:08	PAB	TAL SEA
TCLP	Analysis	6020A		10	240115	03/09/17 10:56	FCW	TAL SEA
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	3010A			240000	03/08/17 13:08	PAB	TAL SEA
TCLP	Analysis	6020A		1000	240115	03/09/17 11:37	FCW	TAL SEA
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	7470A			240004	03/08/17 13:17	PAB	TAL SEA
TCLP	Analysis	7470A		1	240083	03/09/17 09:22	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	239812	03/06/17 13:22	MMM	TAL SEA

Client Sample ID: SO-Cell_A-2PostTrea-030217

Lab Sample ID: 580-66441-1

Date Collected: 03/02/17 10:15
Date Received: 03/02/17 15:22

Matrix: Solid
Percent Solids: 100.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240229	03/10/17 14:09	PAB	TAL SEA
Total/NA	Analysis	6010C		20	240618	03/15/17 14:26	HJM	TAL SEA

Client Sample ID: SO-SL-44PostTrea-030217

Lab Sample ID: 580-66441-2

Date Collected: 03/02/17 08:35
Date Received: 03/02/17 15:22

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	3010A			240000	03/08/17 13:08	PAB	TAL SEA
TCLP	Analysis	6020A		10	240115	03/09/17 11:01	FCW	TAL SEA
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	7470A			240004	03/08/17 13:17	PAB	TAL SEA
TCLP	Analysis	7470A		1	240083	03/09/17 09:24	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	239812	03/06/17 13:22	MMM	TAL SEA

Client Sample ID: SO-SL-44PostTrea-030217

Lab Sample ID: 580-66441-2

Date Collected: 03/02/17 08:35
Date Received: 03/02/17 15:22

Matrix: Solid
Percent Solids: 99.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240229	03/10/17 14:09	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240526	03/14/17 21:06	HJM	TAL SEA

Lab Chronicle

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Client Sample ID: SO-SL-79/SL-80PostTrea-030217
Date Collected: 03/02/17 09:20
Date Received: 03/02/17 15:22

Lab Sample ID: 580-66441-3
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	3010A			240000	03/08/17 13:08	PAB	TAL SEA
TCLP	Analysis	6020A		10	240115	03/09/17 11:05	FCW	TAL SEA
TCLP	Leach	1311			239926	03/07/17 14:35	R1K	TAL SEA
TCLP	Prep	7470A			240004	03/08/17 13:17	PAB	TAL SEA
TCLP	Analysis	7470A		1	240083	03/09/17 09:26	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	239812	03/06/17 13:22	MMM	TAL SEA

Client Sample ID: SO-SL-79/SL-80PostTrea-030217
Date Collected: 03/02/17 09:20
Date Received: 03/02/17 15:22

Lab Sample ID: 580-66441-3
Matrix: Solid
Percent Solids: 99.9

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240229	03/10/17 14:09	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240526	03/14/17 21:10	HJM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each certification below.

Authority	Program	EPA Region	Certification ID	Expiration Date
Washington	State Program	10	C553	02-17-18

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
7470A	7470A	Solid	Mercury
D 2216		Solid	Percent Moisture
D 2216		Solid	Percent Solids

Sample Summary

Client: Pacific Environmental and Redevelopment
Project/Site: Superlon Pilot Study

TestAmerica Job ID: 580-66441-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66441-1	SO-Cell_A-2PostTrea-030217	Solid	03/02/17 10:15	03/02/17 15:22
580-66441-2	SO-SL-44PostTrea-030217	Solid	03/02/17 08:35	03/02/17 15:22
580-66441-3	SO-SL-79/SL-80PostTrea-030217	Solid	03/02/17 09:20	03/02/17 15:22

Chain of Custody Record

CHOC Number: 04_1.1_E52_25897_02032017

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com,
sduggan@perc-nw.com

Site Contact:
PIONEER Technologies Corporation
Brad Grimsted
Phone: (360) 570-1700 Email: grimstedb@uspioneer.com

PIONEER Technologies Corporation.
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica-Tacoma
ELAINE WALKER
Phone: 253.248.4972 Email:

CHOC Version: 0.99.05

Sample Information / Special Lab Instructions Included ==> / Analytes / <== Special Lab Instructions: 66441

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	EPA 6010C--Inorganic	TCLP RCRA 8 Metals (X)							Comments for Sample
SO-Cell_A-2PostTrea-030217	03/02/2017	10:15	BG				X	X							Confirmation sample after treatment with
SO-SL-44PostTrea-030217	03/02/2017	08:35	BG				X	X							Confirmation sample after Enviroblend T
SO-SL-79/SL-80PostTrea-030217	03/02/2017	09:20	BG				X	X							Treated with Enviroblend.

TB___ Cooler JB4 Cor 17.0 Unc 17.6
Cooler Dsc none @Lab___
~~Wet/Packs~~ none Packing none
Cli drop

Cooler (Yes/No): Cooler Temp:	Turnaround Time: Std	Hazard Identification:	Sample Disposal:

Preservative: None, None

580-66441 Chain of Custody

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments: Superlon Pilot Stud

1. Relinquished By: (Sign and Print) Brad Grimsted	**Date/Time:** 3/2/17 3:22	**1. Received By:** (Sign and Print) M. Bruce McDermott	**Date/Time:** 3/2/17 1522
2. Relinquished By: (Sign and Print)	**Date/Time:**	**2. Received By:** (Sign and Print)	**Date/Time:**
3. Relinquished By: (Sign and Print)	**Date/Time:**	**3. Received By:** (Sign and Print)	**Date/Time:**

Stat Form: 01 - 07/24/2015

3/15/2017

Special Instructions for Laboratory

CHOC Number: 04_1.1_E52_25897_02032017

Send Results To:	Site Contact:	
munsons@uspioneer.com, jking@perc-nw.com, sduggan@perc-nw.com	PIONEER Technologies Corporation Brad Grimsted Phone: (360) 570-1700 Email: grimstedb@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica-Tacoma ELAINE WALKER Phone: 253.248.4972 Email:	CHOC Version: 0.99.05 Copyright © 2003 - 2015. PIONEER Technologies Corporation All Rights Reserved

Analytical Method	Lab Comments	Specified Analyte	Samples Included
EPA 6010C--Inorganic		Arsenic Inorganic Lead and Compounds	SO-SL-79/SL-80PostTrea-030217 SO-SL-44PostTrea-030217 SO-Cell_A-2PostTrea-030217
TCLP RCRA 8 Metals	All 8 metals	Arsenic Inorganic Barium Chromium Total Lead and Compounds Mercury (elemental) Selenium Silver Cadmium	SO-Cell_A-2PostTrea-030217 SO-SL-44PostTrea-030217 SO-SL-79/SL-80PostTrea-030217 Rush 3day TAT

Login Sample Receipt Checklist

Client: Pacific Environmental and Redevelopment | Job Number: 580-66441-1

Login Number: 66441 | **List Source: TestAmerica Seattle**
List Number: 1
Creator: Blankinship, Tom X

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Refer to Job Narrative for details.
Cooler Temperature is acceptable.	False	Hg requires refrigeration.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

1 2 3 4 5 6 7 8 9 10 11

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66532-1
Client Project/Site: Superlon-Post-Treatment Stockpile Sample

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
3/17/2017 2:12:02 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-66532-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66532-1

Receipt
One sample was received on 3/8/2017 10:22 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 16.8º C.

Receipt Exceptions

The following sample was received at the laboratory outside the required temperature criteria: SO-SL-90PostTrea-030817 (580-66532-1). There was no cooling media present in the cooler.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Client: Pioneer Technologies Corporation | TestAmerica Job ID: 580-66532-1
Project/Site: Superlon-Post-Treatment Stockpile Sample

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

1 2 3 4 5 6 7 8 9 10 11

Client Sample ID: SO-SL-90PostTrea-030817

Lab Sample ID: 580-66532-1

Date Collected: 03/08/17 09:30
Matrix: Solid
Date Received: 03/08/17 10:22

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/15/17 13:38	03/16/17 13:16	1
Barium	**0.037**		0.010		mg/L		03/15/17 13:38	03/16/17 22:37	1
Cadmium	ND		0.020		mg/L		03/15/17 13:38	03/16/17 13:16	1
Chromium	ND		0.025		mg/L		03/15/17 13:38	03/16/17 13:16	1
Lead	ND		0.030		mg/L		03/15/17 13:38	03/16/17 13:16	1
Selenium	ND		0.10		mg/L		03/15/17 13:38	03/16/17 13:16	1
Silver	ND		0.050		mg/L		03/15/17 13:38	03/16/17 13:16	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/15/17 13:44	03/16/17 16:33	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-240466/1-B
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: TCLP
Analysis Batch: 240689
Prep Batch: 240591

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/15/17 13:39	03/16/17 12:40	1
Cadmium	ND		0.020		mg/L		03/15/17 13:39	03/16/17 12:40	1
Chromium	ND		0.025		mg/L		03/15/17 13:39	03/16/17 12:40	1
Lead	ND		0.030		mg/L		03/15/17 13:39	03/16/17 12:40	1
Selenium	ND		0.10		mg/L		03/15/17 13:39	03/16/17 12:40	1
Silver	ND		0.050		mg/L		03/15/17 13:39	03/16/17 12:40	1

Lab Sample ID: MB 580-240466/1-B
Client Sample ID: Method Blank
Matrix: Solid
Prep Type: TCLP
Analysis Batch: 240754
Prep Batch: 240591

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Barium	ND		0.010		mg/L		03/15/17 13:39	03/16/17 22:08	1

Lab Sample ID: LCS 580-240466/2-B
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: TCLP
Analysis Batch: 240689
Prep Batch: 240591

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.10		mg/L		103	80 - 120
Cadmium	0.100	0.102		mg/L		102	80 - 120
Chromium	0.400	0.340		mg/L		85	80 - 120
Lead	1.00	0.947		mg/L		95	80 - 120
Selenium	4.00	4.32		mg/L		108	80 - 120
Silver	0.600	0.541		mg/L		90	80 - 120

Lab Sample ID: LCS 580-240466/2-B
Client Sample ID: Lab Control Sample
Matrix: Solid
Prep Type: TCLP
Analysis Batch: 240754
Prep Batch: 240591

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Barium	4.00	3.81		mg/L		95	80 - 120

Lab Sample ID: LCSD 580-240466/3-B
Client Sample ID: Lab Control Sample Dup
Matrix: Solid
Prep Type: TCLP
Analysis Batch: 240689
Prep Batch: 240591

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.27		mg/L		107	80 - 120	4	20
Cadmium	0.100	0.105		mg/L		105	80 - 120	3	20
Chromium	0.400	0.353		mg/L		88	80 - 120	4	20
Lead	1.00	0.976		mg/L		98	80 - 120	3	20
Selenium	4.00	4.51		mg/L		113	80 - 120	4	20
Silver	0.600	0.563		mg/L		94	80 - 120	4	20

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCSD 580-240466/3-B
Matrix: Solid
Analysis Batch: 240754
Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240591

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium			4.00	3.71		mg/L		93	80 - 120	3	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 580-240466/1-C
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240595

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/15/17 13:44	03/15/17 16:27	1

Lab Sample ID: LCS 580-240466/2-C
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240595

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.0200	0.0180		mg/L		90	80 - 120		

Lab Sample ID: LCSD 580-240466/3-C
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240595

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury			0.0200	0.0180		mg/L		90	80 - 120	0	20

Lab Sample ID: 580-66532-1 MS
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: SO-SL-90PostTrea-030817
Prep Type: TCLP
Prep Batch: 240595

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury	ND		0.0200	0.0176		mg/L		88	80 - 120		

Lab Sample ID: 580-66532-1 MSD
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: SO-SL-90PostTrea-030817
Prep Type: TCLP
Prep Batch: 240595

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.0200	0.0175		mg/L		88	80 - 120	1	20

Lab Sample ID: 580-66532-1 DU
Matrix: Solid
Analysis Batch: 240633
Client Sample ID: SO-SL-90PostTrea-030817
Prep Type: TCLP
Prep Batch: 240595

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Mercury	ND			ND		mg/L				NC	20

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon-Post-Treatment Stockpile Sample

TestAmerica Job ID: 580-66532-1

Client Sample ID: SO-SL-90PostTrea-030817
Date Collected: 03/08/17 09:30
Date Received: 03/08/17 10:22

Lab Sample ID: 580-66532-1
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240466	03/14/17 14:00	R1K	TAL SEA
TCLP	Prep	3010A			240591	03/15/17 13:38	PAB	TAL SEA
TCLP	Analysis	6010C		1	240689	03/16/17 13:16	HJM	TAL SEA
TCLP	Leach	1311			240466	03/14/17 14:00	R1K	TAL SEA
TCLP	Prep	3010A			240591	03/15/17 13:38	PAB	TAL SEA
TCLP	Analysis	6010C		1	240754	03/16/17 22:37	HJM	TAL SEA
TCLP	Leach	1311			240466	03/14/17 14:00	R1K	TAL SEA
TCLP	Prep	7470A			240595	03/15/17 13:44	PAB	TAL SEA
TCLP	Analysis	7470A		1	240633	03/15/17 16:33	PAB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Pioneer Technologies Corporation
TestAmerica Job ID: 580-66532-1
Project/Site: Superlon-Post-Treatment Stockpile Sample

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon-Post-Treatment Stockpile Sample

TestAmerica Job ID: 580-66532-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66532-1	SO-SL-90PostTrea-030817	Solid	03/08/17 09:30	03/08/17 10:22

Chain of Custody Record

CHOC Number: 06_1.1_E52_7421_08032017

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com,
grimstedb@uspioneer.com, sduggan@perc-nw.com

Site Contact:
PIONEER Technologies Corporation
Brad Grimsted
Phone: (360) 570-1700 Email: grimstedb@uspioneer.com

PIONEER Technologies Corporation.
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com

CHOC Version: 0.99.05

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica-Tacoma
ELAINE WALKER
Phone: 253.248.4972 Email:

Sample Information / **Analytes**

Special Lab Instructions Included ==> X *<== Special Lab Instructions*

580-66532 Chain of Custody

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	TCLP RCRA 8 Metals	Comments for Sample
SO-SL-90PostTrea-030817	03/08/2017	09:30	BG				X	atment Stockpile Sample

TB___ Cooler IR5 Cor 16.8 Unc 17.0
Cooler Dsc None @Lab
~~Wet/Packs~~ Packing None
Cl/do w/o

Cooler (Yes/No): Cooler Temp:	Turnaround Time: Std	Hazard Identification:	Sample Disposal:	Preservative: None	Lab Use Only:

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:

Relinquished By: (Sign and Print)	Date/Time:	Received By: (Sign and Print)	Date/Time:
1. [signature] STEPHEN DUGGAN	3/8/17 10:22	1. B. [signature] B. Gell SEA TA	3.8.17 1022
2.		2.	
3.		3.	

Stat Form: 01 - 07/24/2015

Loc: 580

66532

Chain of Custody Record

CHOC Number: 06_1.1_E52_7421_08032017

Send Results To: munsons@uspioneer.com, jking@perc-nw.com, grimstedb@uspioneer.com, sduggan@perc-nw.com	**Site Contact:** PIONEER Technologies Corporation Brad Grimsted Phone: (360) 570-1700 Email: grimstedb@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 www.uspioneer.com PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica-Tacoma ELAINE WALKER Phone: 253.248.4972 Email:	CHOC Version: 0.99.05 Copyright © 2003 - 2015. PIONEER Technologies Corp. All Rights Reserved

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	TCLP RCRA 8 Metals	Comments for Sample
		Special Lab Instructions Included ==>					X	<== Special Lab Instructions
SO-SL-90PostTrea-030817	03/08/2017	09:30	BG				X	Post-Treatment Stockpile Sample

Analytes — Preservative: None

580-66532 Chain of Custody

TB ___ Cooler IR5 Cor 16.8 Unc 17.0
Cooler Dsc None @Lab ___
~~Wet/Packs~~ Packing None
Cl4do w/o

Cooler (Yes/No):	Turnaround Time:	Hazard Identification:	Sample Disposal:	Lab Use Only:
Cooler Temp:	Std			

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:

Relinquished By: (Sign and Print)	Date/Time:	Received By: (Sign and Print)	Date/Time:
1. [signature] STEPHEN DUGGAN	3/8/17 10:22	1. B. Gell B. Gell SEA TA	3.8.17 1022
2.		2.	
3.		3.	

Stat Form: 01 - 07/24/2015

3/17/2017

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation

Job Number: 580-66532-1

Login Number: 66532
List Number: 1
Creator: Gonzales, Steve

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice per client request.
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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1 2 3 4 5 6 7 8 9 10 11

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66627-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
3/17/2017 8:57:29 AM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Case Narrative

Job ID: 580-66627-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66627-1

Receipt
One sample was received on 3/10/2017 11:06 AM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 20.6º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: SO_SL_79 PostTrea 031017
Date Collected: 03/10/17 10:02
Date Received: 03/10/17 11:06

Lab Sample ID: 580-66627-1
Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.4**		0.060		mg/L		03/15/17 13:38	03/16/17 12:50	1
Lead	ND		0.030		mg/L		03/15/17 13:38	03/16/17 12:50	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-240466/1-B
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240591

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/15/17 13:39	03/16/17 12:40	1
Lead	ND		0.030		mg/L		03/15/17 13:39	03/16/17 12:40	1

Lab Sample ID: LCS 580-240466/2-B
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240591

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.10		mg/L		103	80 - 120
Lead	1.00	0.947		mg/L		95	80 - 120

Lab Sample ID: LCSD 580-240466/3-B
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240591

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.27		mg/L		107	80 - 120	4	20
Lead	1.00	0.976		mg/L		98	80 - 120	3	20

Lab Sample ID: 580-66627-1 MS
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: SO_SL_79 PostTrea 031017
Prep Type: TCLP
Prep Batch: 240591

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	1.4		4.00	5.37		mg/L		100	75 - 125
Lead	ND		1.00	0.911		mg/L		89	75 - 125

Lab Sample ID: 580-66627-1 MSD
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: SO_SL_79 PostTrea 031017
Prep Type: TCLP
Prep Batch: 240591

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	1.4		4.00	5.61		mg/L		106	75 - 125	4	20
Lead	ND		1.00	0.952		mg/L		93	75 - 125	4	20

Lab Sample ID: 580-66627-1 DU
Matrix: Solid
Analysis Batch: 240689

Client Sample ID: SO_SL_79 PostTrea 031017
Prep Type: TCLP
Prep Batch: 240591

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	1.4		1.37		mg/L		1	20
Lead	ND		ND		mg/L		NC	20

Client Sample ID: SO_SL_79 PostTrea 031017
Lab Sample ID: 580-66627-1
Date Collected: 03/10/17 10:02
Matrix: Solid
Date Received: 03/10/17 11:06

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240466	03/14/17 14:00	R1K	TAL SEA
TCLP	Prep	3010A			240591	03/15/17 13:38	PAB	TAL SEA
TCLP	Analysis	6010C		1	240689	03/16/17 12:50	HJM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66627-1

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66627-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66627-1	SO_SL_79 PostTrea 031017	Solid	03/10/17 10:02	03/10/17 11:06

TestAmerica

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TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.testamericainc.com

☒ Rush
☐ Short Hold

Chain of Custody Record

Client: PERC
Client Contact: JEFF KING (PERC) / BRAD GRIMSTED (PIONEER)
Date: 3/10/17
Chain of Custody Number: 28711

Address: 8424 E. Meadow Lk Dr
Telephone Number (Area Code)/Fax Number: JK 425 238-2212 BG 360 570-1700
Lab Number:
Page 1 of 1

City: Snohomish State: WA Zip Code: 98290
Sampler: KING
Lab Contact:
Analysis (Attach list if more space is needed): 1311 TCLP As/Pb

Project Name and Location (State): SUPERLON
Billing Contact: JEFF KING

Contract/Purchase Order/Quote No.:

Special Instructions/ Conditions of Receipt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Air	Aqueous	Sed.	Soil		Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/ NaOH	1311	TCLP As/Pb
SO_SL-79 PostTrea 031017	3/10/17	10:02				X								X	

580-66627 Chain of Custody

TB___ Cooler IR5 Cor 20.6 Unc 20.8
Cooler Dsc none @Lab___
~~Wet/Packs~~ none Packing none
Cli drop

Cooler: ☐ Yes ☒ No Cooler Temp: ______

Possible Hazard Identification: ☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☒ Unknown

Sample Disposal: ☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): ☐ 24 Hours ☐ 48 Hours ☒ 5 Days ☐ 10 Days ☐ 15 Days ☐ Other ______

QC Requirements (Specify)

1. Relinquished By Sign/Print: JEFF KING	Date 3/10/17	Time 11:06	1. Received By Sign/Print: McPounce McDermott	Date 3/10/17	Time 1106
2. Relinquished By Sign/Print	Date	Time	2. Received By Sign/Print	Date	Time
3. Relinquished By Sign/Print	Date	Time	3. Received By Sign/Print	Date	Time

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

TAL-8274-580 (0210)

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation

Job Number: 580-66627-1

Login Number: 66627
List Number: 1
Creator: Bean, Dennis L

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Attachment A-2: Free Flow Technologies Bench Scale Treatability Study Report

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Superlon Site Soil Treatability Study
Prepared for Pioneer Technologies
By Robert Stanforth, Ph.D.
TRC Applied Chemistry Laboratory
January, 2017

Background

Three soil samples from the Superlon site in Washington were sent by Pioneer Technologies to the TRC Applied Chemistry Laboratory for treatability testing using reagents from Free Flow Technologies, Rockford IL. The soils are hazardous for lead and arsenic due to leaching in the TCLP test. Pioneer provided analysis of the soils, as follows:

Soil	Arsenic		Lead	
	Compositional, mg/kg	TCLP Leachate Concentration, mg/L	Compositional, mg/kg	TCLP Leachate Concentration, mg/L
SO-SL-4A-121216 6-10	16,000	14	27,000	14
SO-SL-44A-121216 6-8	7,800	8.0	15,000	130
SO-SL-80A-121216 4-12	10,000	12	1,600	0.23

Approach

Lead stabilization can often be effectively accomplished by using a phosphate based reagent forming a highly insoluble lead phosphate as the product. However, the presence of arsenic in the waste complicates the treatment, as phosphate often solubilizes arsenic from adsorbed or precipitated forms and increase arsenic leaching. An alternative approach is to add reagents that adsorb both lead and many forms of arsenic and adjust pH in the leaching environment to the neutral pH range where both reagents are effectively sorbed. Note that arsenic can occur in many forms in the natural environment, and while the adsorption approach works effectively for the most common forms of arsenic (arsenate and arsenite), the approach may not work for all forms.

A composite was made of the three soil samples for the initial testing. The first step was to observe what happens when the pH of the leaching solution (i.e. the TCLP test leachate) was adjusted to monitor the ability of the soil to adsorb both lead and arsenic without additional sorbents. Two alkaline reagents were tested – magnesium oxide (MgO) and FF200. The results are given in Table 1 and shown in Figures 1 and 2 for arsenic and lead respectively. Iron is included among the parameters measured since iron oxides are important sorption agents, and understanding what is happening to the iron can help in designing the treatment approach. The results indicate that pH control alone can reduce both lead and arsenic leaching to below the hazardous waste criteria, however arsenic concentrations are still close to the criteria of 5 mg/L, and improved treatment results are desirable.

Previous treatment testing of site groundwater by addition of reagents to backfill soil indicated that a Free Flow reagent involving a 1:1 blend of an alkaline reagent and iron source (FF200-FS (1:1)) was effective for the groundwater. The same reagent was tested for the composite soil and found to effectively reduce arsenic leaching (Table 1), but was less effective for lead leaching, requiring a 10% dose to bring lead to below 5 mg/L in the TCLP test (the “straight” results in Table 1). The 1:1 blend of

FF200-FS is designed to be neutral in water, and so does little to raise the pH in the TCLP test. Additional alkaline reagent (FF200) was therefore added to the different FF200-FS doses to raise the pH in the TCLP test. The results (Table 1) show that both arsenic and lead can be treated by a combination of the two additives. However, the formulation involves adding two reagents to the soil rather than just one.

FF-200 FS is commonly sold as a 3:1 blend of the FF200 and FS, and it would be much simpler to add just one reagent rather than two. Therefore, the 3:1 blend was tested on the composite soil and on the individual soils. In the initial test, the reagents were added to the soil and the TCLP test started immediately afterwards. The results (Table 2) indicated that the reagent was not effective for lead in the composite soil, and had rather inconsistent results for the individual soils. Further, dissolved iron in the samples indicates that a portion of the iron in the sample is still in reduced form and is not contributing to the treatment process. The test was repeated but with the treated sample allowed to sit overnight before TCLP testing. The results (Table 3) indicate that the reagents did not treat the soils consistently, and especially for soil 80A arsenic leaching increased and remained high despite increasing doses of the reagent.

The results indicate that while the soil can be treated with FF200 FS, treatment effectiveness depends on the manner in which the soil is handled after treatment. If the soil is allowed to aerate, arsenic leaching can increase, especially for soil 80A. This indicates that treatment effectiveness depends not only on the reagents that are added but also on the way in which the soil is handled. **Based on this study, the use of FF200-FS for treatment of the soil is not recommended without a better understanding of how the soil will be handled during and after treatment**. Assurance of effective treatment could be improved by investigating the speciation of both lead and arsenic in the soil and on the leaching behavior of both metals under the leaching conditions after disposal.

Table 1. pH and treatment testing on composite soil.

Sample	Screening TCLP Test Results			
	pH	As	Pb	Fe
		mg/L		
Untreated, TCLP Solution 2				
Untreated	4.25	12.37	65.6	61.7
+ 2% MgO	4.78	9.69	9.59	15.8
+ 3% MgO	5.07	7.93	29.0	10.9
+ 4% MgO	5.88	4.65	2.34	0.51
+ 5% MgO	9.00	2.41	0.18	0.03
+ 6% MgO	9.54	2.43	0.30	0.28
Untreated, TCLP Solution 1				
Straight	5.07	4.63	12.5	9.6
+ 2.5% FF-200	5.33	3.81	7.54	1.85
+ 5.0% FF-200	5.98	1.79	3.24	1.80
+ 7.5% FF-200	9.63	3.18	0.10	0.08
+ 2.5% FF200-FS (1:1)				
Straight	5.10	1.51	7.57	37.2
+ 2.5% FF-200	5.39	0.84	4.90	1.25
+ 5.0% FF-200	6.39	0.62	0.82	0.63
+ 7.5% FF-200	8.88	0.79	0.11	0.16
+ 5.0% FF200-FS (1:1)				
Straight	5.16	0.58	11.8	84.3
+ 2.5% FF-200	5.55	0.44	3.89	31.7
+ 5.0% FF-200	6.66	0.38	0.83	0.52
+ 7.5% FF-200	9.19	0.31	<0.01	0.244
+ 7.5% FF200-FS (1:1)				
Straight	5.28	0.33	5.43	132
+ 2.5% FF-200	5.49	0.29	2.0	29.7
+ 5.0% FF-200	6.66	0.21	0.29	2.6
+ 7.5% FF-200	8.40	0.24	0.15	0.28
+ 10% FF200-FS (1:1)				
Straight	5.30	0.40	3.69	159
+ 2.5% FF-200	5.63	0.24	1.29	39.2
+ 5.0% FF-200	6.73	0.27	0.41	0.70
+ 7.5% FF-200	7.88	0.11	0.17	0.25

Table 2. Soil Treated with FF200-FS (3:1), not aerated

Sample	Screening TCLP Test Results			
	pH	As	Pb	Fe
		mg/L		
Composite Soil				
Untreated	5.07	4.63	12.5	9.6
+1% FF200 FS (3:1)	5.13	1.14	10.2	10.5
+ 2% FF200 FS (3:1)	5.13	1.09	9.3	14.9
+ 4% FF200 FS (3:1)	5.25	0.51	8.5	47.6
+ 6% FF200 FS (3:1)	5.48	0.55	12.1	38.8
Soil SO-SL-4A-121216-6-10				
Untreated	4.95	4.27	4.40	2.56
+ 2% FF200 FS (3:1)	5.12	2.30	12.6	19.1
+ 4% FF200 FS (3:1)	5.24	1.04	11.1	15.2
+ 6% FF200 FS (3:1)	5.31	0.81	3.76	28.2
Soil SO-SL-44A-121216-6-8				
Untreated	5.21	3.06	79.8	2.12
+ 2% FF200 FS (3:1)	5.37	1.13	28.3	23.2
+ 4% FF200 FS (3:1)	5.75	0.33	4.39	15.6
+ 6% FF200 FS (3:1)	5.90	0.28	4.65	9.98
Soil SO-SL-80A-121216-4-12				
Untreated	5.04	4.50	0.11	2.03
+ 2% FF200 FS (3:1)	5.14	1.35	0.11	29.9
+ 4% FF200 FS (3:1)	5.31	1.83	0.29	33.0
+ 6% FF200 FS (3:1)	5.49	0.62	0.24	65.0

Table 3. Soils treated with FF200-FS (3:1), aerated.

Sample	Screening TCLP Test Results			
	pH	As	Pb	Fe
		mg/L		
Composite Soil				
Untreated	5.07	4.63	12.5	9.6
+ 4% FF200 FS (3:1)	5.31	2.20	2.88	0.74
+ 6% FF200 FS (3:1)	5.46	1.96	14.3	0.43
+ 8% FF200 FS (3:1)	5.54	3.7	1.86	0.83
Soil SO-SL-4A-121216-6-10				
Untreated	4.95	4.27	4.40	2.56
+ 4% FF200 FS (3:1)	5.20	2.20	2.77	0.51
+ 6% FF200 FS (3:1)	5.23	1.59	2.97	0.78
+ 8% FF200 FS (3:1)	5.50	1.56	0.74	0.41
	5.49	1.14	2.1	0.36
+ 10% FF200 FS (3:1)	7.12	0.61	0.18	0.04
+12% FF200 FS (3:1)	6.92	0.62	0.07	0.03
Soil SO-SL-44A-121216-6-8				
Untreated	5.21	3.06	79.8	2.12
+ 2% FF200 FS (3:1)	5.40	0.60	14.5	1.51
+ 4% FF200 FS (3:1)	5.62	0.73	1.35	0.61
+ 6% FF200 FS (3:1)	5.87	0.10	0.87	0.22
	6.34	0.36	0.34	0.06
+ 10% FF200 FS (3:1)	7.00	0.23	0.05	0.15
+12% FF200 FS (3:1)	7.60	<0.01	0.06	0.08
Soil SO-SL-80A-121216-4-12				
Untreated	5.04	4.50	0.11	2.03
+ 4% FF200 FS (3:1)	5.10	13.2	0.05	4.99
+ 6% FF200 FS (3:1)	5.44	33.0	0.10	1.16
+ 8% FF200 FS (3:1)	5.46	13.9	0.01	1.74
	5.51	20.1	0.17	10.1
+ 10% FF200 FS (3:1)	5.90	12.1	0.06	0.68
+12% FF200 FS (3:1)	6.23	16.0	0.02	0.07

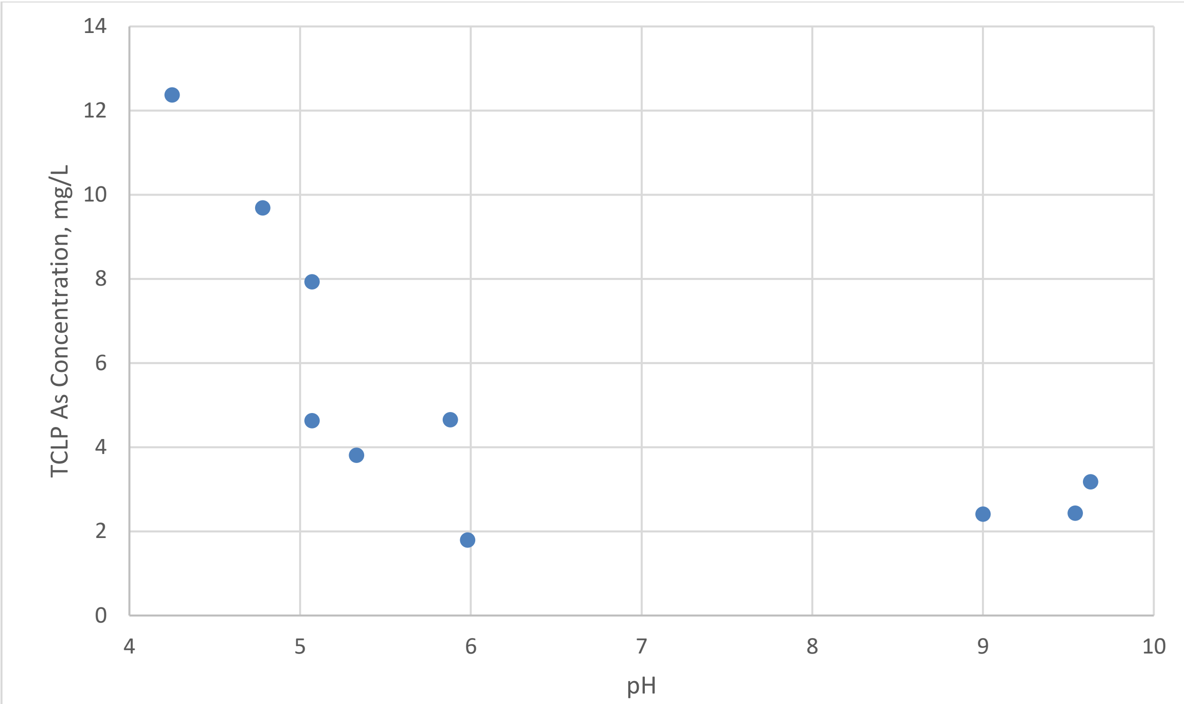

Figure 1. TCLP Arsenic concentration versus pH.

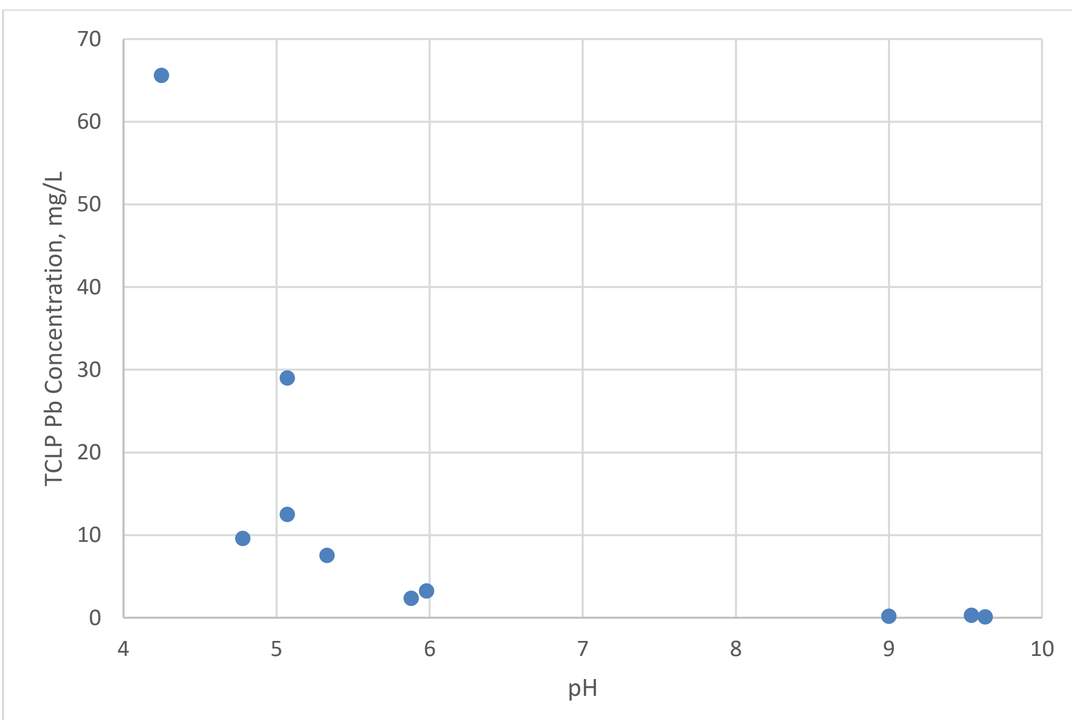

Figure 2. TCLP Lead concentration versus pH

Free Flow -
Rockford, L.L.C.
A Free Flow Technologies, Ltd. Company

SAFETY DATA SHEET (SDS)

OSHA Hazard Communication Standard 29 CFR 1910.1200. Prepared to GHS

SECTION 1 – PRODUCT AND COMPANY IDENTIFICATION

Trade Name:	**Free Flow 100®, Free Flow 200®, Free Flow 300®**
Product CAS:	None
Recommended use:	Stabilize RCRA Metals

Company Identification:

Free Flow Technologies, Inc.	For information call:	(815) 636-0166
4920 Forest Hills Rd, Suite 200	Emergency Contact:	Timothy Danzer
Loves Park, Illinois 61111	Fax:	(815) 636-0560

SECTION 2 – HAZARD(S) IDENTIFICATION

GHS07 Acute Toxicity

Classification of the substance:

- H303 Acute Toxicity, category 5 (oral)
- H313 Acute Toxicity, category 5 (dermal)
- H332 Acute Toxicity, category 4 (inhalation)
- H315 Skin, eye irritation, category 2
- H317 Skin sensitization, category 1
- H335 Specific Target Organ Toxicity, category 3 (single exposure, respiratory tract irritation)

WARNING

Hazard Statements:

- H303 May be harmful if swallowed
- H313 May be harmful in contact with skin
- H332 Harmful if inhaled
- H315 Causes skin irritation
- H317 May cause an allergic skin reaction
- H335 May cause respiratory irritation

Precautionary Statements:

Prevention	P261	Avoid breathing dust.
	P264	Wash hands thoroughly after handling.
	P271	Use only outdoors or in a well-ventilated area.
	P272	Contaminated work clothing should not be allowed out of the workplace.

SECTION 2 – HAZARD(S) IDENTIFICATION (CONT.)

Prevention cont. P280 Wear protective gloves, safety glasses, and protective clothing such as long sleeves and pant cuffs over shoes to minimize skin contact.

Response
P302+P352 IF ON SKIN: Wash with plenty of soap and water.
P304+P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312 Call a POISON CENTER or doctor/physician if you feel unwell.
P321 Specific treatment, see supplemental first aid information.
P332+P313 If skin irritation occurs: Get medical advice/attention.
P362+P364 Take off contaminated clothing and wash it before reuse.

Storage/Disposal
P403+P233 Store in a well-ventilated place. Keep container tightly closed.
P501 Dispose of container in accordance with local, regional, national, and/or international regulations.

Hazards Ratings HMIS

HEALTH	1
FLAMMABILITY	0
REACTIVITY	1
PERSONAL PROTECTION	0

SECTION 3 – COMPOSITION, INFORMATION ON INGREDIENTS

Chemical Name	CAS	Approx. % (w/w)	LD50	LC50
Phosphate Compounds	7758-23-8	0 - 80	Not Available	Not Available
Calcium Oxide	1305-78-8	10 - 70	Not Available	Not Available
Sulfur Trioxide	7446-11-9	0 - 40	Not Available	Not Available
Silicon Dioxide	60676-86-0	2.5 – 15	Not Available	Not Available
Aluminum Oxide – Non-fibrous	1344-28-1	0.5 - 5	Not Available	Not Available
Iron Oxide	1309-37-1	0.5 - 5	Rat, oral, >5000 mg/kg	Not Available
Sodium Bicarbonate	144-55-8	0 - 70	Mouse, oral, 3360 mg/kg	Not Available
Magnesium Oxide	1309-48-4	0 - 60	Not Available	Not Available

SECTION 4 – FIRST AID MEASURES

After Eye Contact: Flush eyes with water while lifting lids. Seek medical attention.

After Skin Contact: Wash skin with soap and water, remove contaminated clothing and shoes. If irritation develops, seek medical attention.

After Ingestion: Dilute with water, fruit juice or vinegar. Seek medical attention.

After Inhalation: Remove to fresh air, if irritation develops, seek medical attention.

Most important symptoms and effects, both acute and delayed.
Refer to Section 11 – Toxicological Information

Indication of any immediate medical attention and special treatment needed.
All treatments should be based on observed signs and symptoms of distress in the patient. Consideration should be given to the possibility that overexposure to materials other than this product may have occurred.

SECTION 5 – FIRE FIGHTING MEASURES

Suitable extinguishing equipment:
This material is noncombustible.

Extinguishing equipment that is not appropriate for a particular situation:
Do not use water on adjacent fires. Extinguish adjacent fires with dry chemical or CO_2.

Specific hazards that develop from the chemical during the fire:
No specific hazards are identified.

Protective equipment or precautions for firefighters:
No special measures required.

SECTION 6 – ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures:
Wear protective equipment to prevent skin exposure and inhalation. Keep unprotected persons away.

Environmental Precautions:
Avoid runoff to waterways and sewers.

Methods and materials used for containment and cleanup:
Use appropriate protective equipment while using dry cleanup methods (sweep/shovel) which minimize dusting. Reclaim in watertight containers. Small amounts may be flushed with water to drain.

SECTION 7 – HANDLING AND STORAGE

Precautions for safe handling:
Swells when wet, may expand the container. Keep eyewash bottles available throughout work area.

Conditions for safe storage, including any incompatibilities:
Store away from water or acids.

SECTION 8 – EXPOSURE CONTROLS AND PERSONAL PROTECTION

Control Parameters

Component	Formula	CAS	PEL	TLV
Phosphate Compounds	$Ca(H_2PO_4)_2H_2O$	7758-23-8	Not established	Not established
Calcium Oxide	CaO	1305-78-8	5 mg/m^3	2 mg/m^3
Sulfur Trioxide	SO_3	7446-11-9	1 mg/m^3	0.2 mg/m^3
Silicon Dioxide**	SiO_2	60676-86-0	0.1 mg/m^3*	0.1 mg/m^3*
Aluminum Oxide	Al_2O_3	1344-28-1	10 mg/m^3+	10 mg/m^3+
Iron Oxide**	Fe_2O_3	1309-37-1	15 mg/m^3	5 mg/m^3
Sodium Bicarbonate	$NaHCO_3$	144-55-8	15 mg/m^3*	10 mg/m^3*
Magnesium Oxide	MgO	1309-48-4	15 mg/m^3*	10 mg/m^3*

* Respirable Dust
\+ 5 mg/M^3 as Respirable Fraction
**Silicon Dioxide and Iron Oxide are listed by IARC as potential carcinogens.

Exposure Controls
Engineering Controls:
Use general and local exhaust to keep dust levels within acceptable limits.

Personal Protective Equipment Pictograms:


Breathing Protection:
Use NIOSH approved dust respirator when exposure limits exceeded.
Hand Protection:
Wear gloves to minimize skin contact.
Eye Protection:
Wear tight fitting goggles.
Skin Protection:
Wear long sleeves, gloves, and pant cuffs over shoes to minimize skin contact.

SECTION 9 – PHYSICAL AND CHEMICAL PROPERTIES

Appearance:	White-gray powder.	Boiling Point:	N/A
Odor:	Odorless	Flammable, Lower Limit:	N/A
Odor Threshold:	N/A	Flammable, Upper Limit:	N/A
Solubility:	N/A	Flash Point:	N/A
Partition Coefficient:	Not determined.	Auto Ignition Temperature:	N/A
pH:	6.0 – 12.0	Freezing/Melting Point:	N/A
Density:	80 – 85 lbs/ft^3	Viscosity:	N/A
Vapor Pressure:	N/A	Decomposition Temp.:	N/A
Vapor Density:	N/A	Evaporation Rate:	N/A
Molecular Formula:	Mixture		

SECTION 10 – STABILITY AND REACTIVITY

Reactivity:
No dangerous reactions known under conditions of normal use.

Chemical Stability:
Stable, keep dry.

Thermal decomposition/conditions to be avoided:
Avoid extreme temperatures.

Possibility of hazardous reactions:
Contains calcium oxide and may react with water or acid to produce heat.

Incompatible materials:
Water, strong acids.

SECTION 11 – TOXICOLOGICAL INFORMATION

Toxicological Effects

Component	Formula	LD50	LC50
Phosphate Compounds	$Ca(H_2PO_4)_2H_2O$	Not Available	Not Available
Calcium Oxide	CaO	Not Available	Not Available
Sulfur Trioxide	SO_3	Not Available	Not Available
Silicon Dioxide**	SiO_2	Not Available	Not Available
Aluminum Oxide	Al_2O_3	Not Available	Not Available
Iron Oxide**	Fe_2O_3	rat, oral, >5000 mg/kg	Not Available
Sodium Bicarbonate	$NaHCO_3$	mouse, oral, 3360 mg/kg	Not Available
Magnesium Oxide	MgO	Not Available	Not Available

**Silicon Dioxide and Iron Oxide are listed by IARC as potential carcinogens.

SECTION 11 – TOXICOLOGICAL INFORMATION (CONT.)

Routes of exposure
Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Potential health effects

Eye:	Acute: May cause mild eye irritation Chronic: No data available
Skin:	Acute: Causes skin irritation Chronic: Repeated and prolonged exposure may cause dermatitis
Ingestion:	Acute: May cause irritation Chronic: No data available
Inhalation:	Acute: May cause respiratory irritation Chronic: No data available

Symptoms from exposure

Target Organs:	Eyes, respiratory passages, skin, digestive tract. Pre-existing respiratory diseases including asthma and emphysema may also be aggravated.
Eye:	May cause irritation/inflammation and tissue damage.
Skin:	May cause irritation to moist skin.
Ingestion:	May cause ulceration to the digestive tract.
Inhalation:	May cause irritation/inflammation to nasal and upper respiratory passages.

SECTION 12 – ECOLOGICAL INFORMATION

Toxicity:
No further relevant information available.

Persistence and degradability:
No further relevant information available.

Bioaccumulative potential:
No further relevant information available.

Mobility in soil:
No further relevant information available.

SECTION 13 – DISPOSAL CONSIDERATIONS

Recommended Waste Treatment Methods:
No treatment necessary.

Recommended Package Disposal:
Dispose of in container in accordance with local, regional, national, and/or international regulations.

SECTION 14 – TRANSPORT INFORMATION

UN Number:	N/A
UN proper shipping name:	N/A
Transport Hazard class:	N/A
Packing group number:	N/A
Environmental hazards:	N/A
Special Precautions:	To prevent dust, cover product with tarp if not in bulk bag container.

SECTION 15 – REGULATORY INFORMATION

SARA Title III - Section 302 Extremely Hazardous Material - None

SARA Title III – Section 31/312 – Hazard Categories:

Fire Hazard – No
Sudden Release of Pressure – No
Reactivity Hazard – Yes
Immediate Health Hazard – Yes
Delayed Health Hazard - Yes

SARA Title III – Section 313 - This material is not subject to the toxic chemical reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372.

SECTION 16 – ADDITIONAL INFORMATION

Information herein is based on data believed to be accurate at the time of the preparation. No warranty or representation, express or implied, is made to the accuracy or completeness of the SDS. No responsibility can be assumed by vendor for any damage or injury resulting from misuse, failure to follow recommended practices, or from any hazards inherent in the nature of the product.

SECTION 16 – ADDITIONAL INFORMATION (CONT.)

SDS Effective: 12/1/2014

Attachment A-3: Peroxychem Bench Scale Treatability Study Report

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16 March 2017

Brad Grimsted M.S., M.B.A.
Project Manager
PIONEER Technologies Corporation
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA
98503-5901

Subject: MetaFix Bench-scale Treatability Investigation Results, Superlon Site, Tacoma WA

Dear Mr. Grimsted:

Bench-scale treatability testing was conducted to determine if soluble concentrations of arsenic and lead in soil and groundwater from the Superlon site in Tacoma, WA ("the Site") could be reduced by treatment with PeroxyChem's MetaFix® reagent. The first treatability test was conducted on groundwater from the site. The second treatability test was conducted on a mixture of Site groundwater and soil expected to be used as backfill during remediation activities at the Site. A third treatability test was conducted to evaluate MetaFix for treatment of excavated soil, with the objective of passing TCLP criteria for arsenic and lead. This report provides a summary of results from each of the three treatability tests.

First Treatability Test (Groundwater)

Objective and Baseline Characterization of Groundwater Sample

The objective of the first treatability test was to determine if soluble concentrations of arsenic and lead could be reduced by adding a MetaFix reagent to the groundwater. A groundwater sample was received on 27 April 2016 and analyzed to determine the baseline pH and heavy metal concentrations. The water sample, GW-MW-125-042216, (hereinafter MW-125) was used in the Phase I treatability test.

The values reported for the MW-125 water represent soluble metals as determined by ICP analysis of a filtered (0.45 µm, glass fiber) water sample. Water samples were filtered prior to metals analyses to make the test more representative of flowing groundwater in the aquifer. Use of a 0.45 µm glass fiber filter is considered standard practice in metals treatment work because the pore size is small enough to remove most suspended particulate and the glass fiber filter composition ensures that colloidal organic particles will not be adsorbed. The baseline metals concentrations in Site groundwater sample are presented in Table 1.

Table 1: Baseline metals concentrations and pH in as received Site groundwater sample.

Sample ID	Units	Metals		GW pH (SU)
		Arsenic	Lead	
MW-125	mg/L	56.1	<0.03	5.14

Methodology

Based on the observed baseline pH and heavy metals concentrations (Table 1), testing was conducted on 200 mL samples of the MW-125 groundwater in amber glass reaction vessels that had previously received the specified mass (1.0% or 2.0% w/w) of the appropriate MetaFix reagent (I-6A or I-7A). The reaction vessels were then sealed with Teflon® lined lids, and tumbled daily during a 7 day reaction period. Upon completion of the reaction period, the samples were filtered through a 0.45 µm glass fiber filter and analyzed for metals by ICP.

Results

Substantial reductions in soluble arsenic were observed in response to all MetaFix treatments. Soluble lead was below the detection limit in the control as well as all the treatments. The results of the treatability testing are presented in Table 2.

Table 2. Influence of MetaFix treatments on soluble heavy metals concentrations.

Control/Treatment	Units	Metals		pH (s.u.)
		Arsenic	Lead	
Control (no amendments)	mg/L	76	<0.03	7.34
1.0 wt% MetaFix I-6A	mg/L	0.14	<0.03	7.27
2.0 wt% MetaFix I-6A	mg/L	0.16	<0.03	7.80
1.0 wt% MetaFix I-7A	mg/L	0.06	<0.03	7.55
2.0 wt% MetaFix I-7A	mg/L	0.04	<0.03	8.02

Equivalent reductions in soluble arsenic were observed in response to the low (1.0% w/w) and high (2.0% w/w) doses of the two MetaFix reagents. The reduction in soluble arsenic for the I-6A reagent was approximately 99.8% to <0.2 mg/L. The reduction in soluble arsenic for the I-7A reagent was approximately 99.9% to <0.1 mg/L. Hence, both treatments at both the low and high doses reduced soluble arsenic to well below the remedial objective of 0.67 mg/L. The soluble lead concentration was below the method detection limit in the untreated control and all the MetaFix treatments so the influence of treatments upon soluble lead could not be determined.

Second Treatability Test (Groundwater/Backfill soil)

Objective and Baseline Characterization of Backfill and Groundwater Samples

The objective of the second treatability test was to determine if soluble concentrations of arsenic and lead in a soil/groundwater matrix composed of Site groundwater mixed with clean backfill soil could be reduced by amending the soil/groundwater matrix with MetaFix. One soil and two groundwater samples were received on 26 October 2016 and submitted for determination of baseline pH and heavy metal concentrations. These samples were used for the second treatability test.

- Soil-SO Backfill-102416-0-0.5 (hereinafter SO-Backfill)
- GW-MW-11S (hereinafter MW-11S)
- GW-MW-12S (hereinafter MW-12S)

For soil, the total compositional metals analysis was based on a simplified soil digestion procedure. The procedure is similar to SW-846 Method 3050B; however, 6N HNO_3/4 N HCl (Aqua Regia, slightly diluted) was used rather than additions of concentrated acid as in the SW-846 method. Furthermore, in the compositional procedure, the samples were heated, and the total digestion time was 3 hours. The baseline metals values reported for the groundwater samples represent soluble metals determined by ICP analysis of filtered (0.45 µm, glass fiber) samples. Water samples were filtered prior to metals analyses to make the test more representative of flowing groundwater in the aquifer. The use of a 0.45 µm glass fiber filter is considered standard practice in metals treatment work because the pore size is small enough to remove most suspended particulate and the glass fiber filter composition ensures that colloidal organic particles will not be adsorbed. The baseline metals concentrations in Site soil and groundwater samples are presented in Table 3.

Table 3: Baseline metals concentrations and pH in as received Site groundwater and soil samples.

Sample ID	Units	Metals		pH (s.u.)
		Arsenic	Lead	
SO-Backfill	mg/kg	1.8	2.5	7.59
MW-12S	mg/L	2.9	0.15	6.36
MW-11S	mg/L	30.9	<0.03	6.78

Methodology

Testing was conducted on a blend of groundwater (200 mL of the MW-12S groundwater) and 50.0 g of backfill in amber glass reaction vessels that had previously received the specified mass (0.25%, 0.5%, 1.0%, or 2.0% w/w) of the appropriate MetaFix reagent (I-6A or I-7A). The reaction vessels were then sealed with Teflon® lined lids, and tumbled daily during a 7 day reaction period. Upon completion of the reaction period, the samples were filtered through a 0.45 µm glass fiber filter and analyzed for metals by ICP.

Results

For the MW-12S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil), the soluble arsenic concentration in the control was below the remedial goal (0.67 mg/L); however, substantial reductions in soluble arsenic were observed in response to each of the MetaFix treatments. The results suggest that, for this soil/groundwater blend, even the lowest MetaFix dosage tested (0.25% w/w) will result in reduction of soluble arsenic to below the method detection limit of 0.030 mg/L. This was true for both MetaFix I-6A and MetaFix I-7A. Soluble lead was below the detection limit in the control and all the treatments, hence, it is not possible to draw conclusions about the influence of the various MetaFix dosages on soluble lead in this soil/groundwater blend.

Table 4: Influence of MetaFix treatments on soluble metals concentrations in the MW-12S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil).

Control/Treatment	Metals (mg/L)		pH (SU)
	Arsenic	Lead	
Control (no treatment)	0.24	<0.030	7.09
0.25% I-6A	<0.030	<0.030	7.18
0.5% I-6A	0.037	<0.030	7.22
1.0% I-6A	0.037	<0.030	7.24
2.0% I-6A	0.037	<0.030	7.31
0.25% I-7A	<0.030	<0.030	7.24
0.5% I-7A	<0.030	<0.030	7.23
1.0% I-7A	0.042	<0.030	7.27
2.0% I-7A	<0.030	<0.030	7.31

Table 5: Influence of MetaFix treatments on soluble metals concentrations in the MW-11S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil).

Control/Treatment	Metals (mg/L)		pH (SU)
	Arsenic	Lead	
Control (no treatment)	5.69	<0.030	6.99
0.25% I-6A	0.23	<0.030	6.99
0.5% I-6A	0.072	<0.030	7.05
1.0% I-6A	<0.030	<0.030	7.06
2.0% I-6A	0.041	<0.030	7.14
0.25% I-7A	0.38	<0.030	7.05
0.5% I-7A	0.042	<0.030	7.09
1.0% I-7A	0.057	<0.030	7.17
2.0% I-7A	0.11	<0.030	7.26

For the MW-11S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil), the soluble arsenic concentration in the control was 5.69 mg/L – nearly ten-fold above the remedial goal (0.67 mg/L). Substantial reductions in soluble arsenic were observed in response to each of the I-6A MetaFix treatments, and a positive dosage response was observed from as dosage was increased from 0.25% to 0.5% to 1.0% (w/w). At the 1.0% w/w dosage, soluble arsenic fell to below the method detection limit of 0.03 mg/L. When the I-6A dosage was further increased to 2.0% w/w the observed soluble arsenic concentration was 0.041 mg/L, which is probably not significantly different from the value observed for the 1.0% w/w dosage. The results suggest that, for this soil/groundwater blend, even the lowest MetaFix dosage tested (0.25% w/w) would result in reduction of soluble arsenic to below the remedial objective of 0.67 mg/L; however, more complete removal of arsenic was observed as dosage increased up to 1.0% w/w. The results also suggest that performance was slightly better with the I-6A than with the I-7A reagent. The observed performance, and the fact that the I-6A reagent has a lower selling price than the I-7A reagent, makes it clear that the best approach for treatment of arsenic at the Site would be MetaFix I-6A. Regarding dosage, our recommendation would be to go with either 0.5% or 1.0% w/w to provide a margin of safety and greater longevity of treatment.

Consistent with the MW-12S groundwater/SO-Backfill soil blend, the soluble lead concentration in the MW-11S groundwater/SO-Backfill soil blend lead was below the detection limit in the control and all the treatments, hence, it was not possible to draw conclusions about the influence of the various MetaFix dosages on soluble lead in this soil/groundwater blend.

Third Treatability Test (Excavated Soil)

Objective and Baseline Characterization of Soil Samples

The objective of the third treatability study was to determine if MetaFix reagents could reduce TCLP leachable arsenic and lead to below the industrial treatment standards. Three soil samples, excavated from the Site were received on December 23, 2016 and submitted for determination of baseline pH and heavy metal concentrations. These samples were used for the third treatability test. Baseline arsenic and lead concentrations were relatively high in all samples (Table 6). The highest arsenic was found in soil 80A (16,100 mg/kg) and the highest lead in soil sample 04A (10,600 mg/kg).

Table 6: Baseline metals concentrations and pH in as received excavated soil samples.

Sample ID	Metals (mg/kg)		pH (s.u.)
	Arsenic	Lead	
04A	10,500	10,600	7.59
44A	5,250	9,460	6.36
80A	16,100	3,400	6.78

Methodology

Testing was conducted on a blend of deionized water (adequate to make soil wet but not saturated) and 50.0 g of the appropriate excavated soil sample in amber glass reaction vessels that had previously received the specified mass of the appropriate MetaFix reagent. The reaction vessels were then sealed with Teflon® lined lids, and tumbled daily during a 7 day reaction period. Upon completion of the reaction period, the wet soil was subjected to the standard TCLP procedure.

Results

Although each MetaFix treatment reduced both TCLP arsenic and lead as compared to the untreated control, there were sharp differences among the treatments (Table 5). The 04A soil, which had the highest total lead concentration, was the most difficult to treat. A range of MetaFix I-6A dosages as low as 0.75% (w/w) provided good reductions in TCLP arsenic; however, TCLP lead reductions were not adequate (Table 5). When MetaFix I-6A (1.5% w/w) was combined with soluble phosphate (0.5% w/w), however, good reductions in both TCLP arsenic and lead were observed. For the 44A soil, good reductions in arsenic and lead were observed using I-6T (1.5% w/w) in combination with calcium oxide (1.5% w/w). Finally, for the 80A soil, good reductions in both arsenic and lead were observed even at the low (0.8% w/w) dosage of MetaFix I-6A.

Table 7: Influence of MetaFix treatments on TCLP arsenic and lead in soil samples 04A, 44A, and 80A.

Soil	Reagent and Dosage (% w/w)						TCLP Results				Composition (mg/kg)	
	I-6A	I-7A	I-6T	CaO	Carbonate	Phosphate	Solution	Final pH	Arsenic (mg/L)	Lead (mg/L)	Arsenic	Lead
04A	---	---	---	---	---	---	1	4.98	7.84	16.9	10,500	10,600
	0.75	---	---	---	---	---	1	5.01	0.80	4.79		
	1.5	---	---	---	---	---	1	5.08	0.62	3.02		
	3.0	---	---	---	---	---	1	5.15	0.23	3.60		
	6.0	---	---	---	---	---	2	3.93	3.09	11.8		
	1.5	---	---	---	---	0.10	1	5.03	0.14	2.42	---	---
	1.5	---	---	---	---	0.25	1	5.04	0.27	1.41	---	---
	1.5	---	---	---	---	0.50	1	5.07	1.18	0.52	---	---
	1.5	---	---	---	1.5	0.50	1	5.22	0.96	0.55	---	---
44A	---	---	---	---	---	---	1	5.11	1.62	5.43	5,250	9,460
	1.5	---	---	10.0	---	---	2	6.75	1.85	0.47	---	---
	---	---	1.5	1.5	---	---	1	5.75	2.04	1.35	---	---
80A	---	---	---	---	---	---	1	5.10	6.01	0.43	16,100	3,400
	0.75	---	---	---	---	---	1	5.10	2.02	0.12	---	---
	1.5	---	---	---	---	---	1	5.19	1.16	0.28	---	---

Summary and Conclusions

In summary, the results of treatability testing reported here indicate that MetaFix treatment can be used to reduce soluble concentrations of arsenic and lead in both Site groundwater and Site groundwater mixed with clean backfill. In addition, TCLP arsenic and lead in soil excavated from the Site can be reduced to well below remedial objectives using relatively low dosages of MetaFix I-6A alone (soil 80A), MetaFix I-6T supplemented with calcium oxide (soil 44A), or MetaFix I-6A supplemented with soluble phosphate (soil 04A).

If you have questions regarding these results, please contact me at 949-514-1068.

Sincerely,

Alan Seech, Ph.D.
Senior Manager – Technology Applications
PeroxyChem Environmental Solutions

Copy: Stacey Telesz – PeroxyChem

SAFETY DATA SHEET
MetaFix® I-6 and I-7 Reagent

SDS # : METAFIX
Revision date: 2017-04-06
Format: NA
Version 3

PeroxyChem

1. PRODUCT AND COMPANY IDENTIFICATION

Product Identifier

Product Name MetaFix® I-6 and I-7 Reagent

Other means of identification

Synonyms Reduced iron: Iron, Ferrum, Carbonyl iron, ferrous iron; Iron sesquioxide: Ferric(III) oxide, anhydrous iron oxide; indian red oxide; Iron sulfide: Pyrite, Marcasite, iron disulfide, iron (II) sulfide, ferric disulfide; Activated carbon: Activated charcoal, Carbon black, Carbon soot, Charcoal, Lampblack; Monoammonium phosphate: Ammonium dihydrogen phosphate; Ammonium dihydrogen orthophosphate; Calcium carbonate: Carbonic acid, calcium salt (1:1); Precipitated chalk

Recommended use of the chemical and restrictions on use

Recommended Use: Remediation of contaminated soil and groundwater

Restrictions on Use: Not for direct treatment of potable drinking water.

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 numbers

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
P210 - Keep away from heat/sparks/open flames/hot surfaces. - No smoking
Prevent dust accumulation (to minimize explosion hazard)

Hazards not otherwise classified (HNOC)
Product may form by-products during processing which can be toxic or potentially explosive such as hydrogen, hydrogen sulfide and carbon monoxide.

Other Information
Use non-sparking tools and equipment. May generate static charge during bulk handling or processing. Dust cloud can be ignited by a spark.
CONTAINMENT HAZARD: Any vessel that contains wet product must be vented due to potential pressure build up from gases.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical name	CAS-No	Weight %
Reduced Iron	7439-89-6	<50
Iron Sesquioxide	1309-37-1	<50
Activated carbon	7440-44-0	<50
Calcite	1317-65-3	<50
Potassium Magnesium Sulfate	14977-37-8	<50
Iron sulfide	1309-36-0	<50
Monoammonium phosphate	7722-76-1	<50

4. FIRST AID MEASURES

Eye Contact In case of contact, immediately flush eyes with plenty of water. Get medical attention if irritation persists.

Skin Contact Wash off with soap and water. In the case of skin irritation or allergic reactions see a physician.

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.

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 Carbon dioxide (CO_2). Dry chemical. Water spray. Foam.

Specific Hazards Arising from the Chemical Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

Flammable properties Combustible material

Hazardous Combustion Products Oxides of sulfur. Carbon monoxide.

<u>**Explosion data**</u>
Sensitivity to Mechanical Impact Not sensitive.
Sensitivity to Static Discharge Fine dust dispersed in air, in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.

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. Eliminate all ignition sources (no smoking, flares, sparks or flames in immediate area). Avoid contact with eyes. Use personal protective equipment. For personal protection see Section 8.

Other For further clean-up instructions, call PeroxyChem Emergency Hotline number listed in Section 1 "Product and Company Identification" above.

Environmental Precautions Local authorities should be advised if significant spillages cannot be contained.

Methods for Containment Maintain good housekeeping practices to avoid accumulation of settled dust, especially on overhead surfaces. Cover powder spill with plastic sheet or tarp to minimize spreading and keep powder dry.

Methods for cleaning up Pick up and transfer to properly labeled containers. Take precautionary measures against static discharges. Avoid wetting dust and clean up as a dry powder with appropriate PPE for handling dry dusty materials; store in containers that keep material dry, segregated but allow to vent. The waste may be recovered and recycled.

7. HANDLING AND STORAGE

Handling Avoid contact with eyes. Avoid breathing dust. Wear personal protective equipment. Refer to Section 8. Minimize dust generation and accumulation. Keep away from open flames, hot surfaces and sources of ignition. Dry powdered material can build static electricity when subjected to the friction of transfer and mixing operations. Provide adequate precautions, such as electrical grounding and bonding, or inert atmosphere.

Storage Store in a well-ventilated place. Keep cool. Keep away from open flames, hot surfaces and sources of ignition. Any vessel that contains wet product must be vented due to potential pressure build up from gases.

Incompatible products Oxidizing agents Strong acids Strong bases Oxidizing agents. Strong acids. Strong bases.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

<u>**Control parameters**</u>

Exposure Guidelines .

Chemical name	ACGIH TLV	OSHA PEL	NIOSH	Mexico
Iron Sesquioxide 1309-37-1	TWA: 5 mg/m³	TWA: 10 mg/m³ TWA: 15 mg/m³ TWA: 5 mg/m³	IDLH: 2500 mg/m³ TWA: 5 mg/m³	Mexico: TWA 5 mg/m³ Mexico: STEL 10 mg/m³
Activated carbon 7440-44-0	-	-	-	Mexico: TWA 2 mg/m³

Calcite 1317-65-3	-	TWA: 15 mg/m³ TWA: 5 mg/m³	TWA: 10 mg/m³ TWA: 5 mg/m³	Mexico: TWA 10 mg/m³ Mexico: STEL 20 mg/m³
Iron sulfide 1309-36-0	TWA: 1 mg/m³	-	-	-
Iron sulfate 7720-78-7	TWA: 1 mg/m³	-	-	-
Chemical name	**British Columbia**	**Quebec**	**Ontario TWAEV**	**Alberta**
Iron Sesquioxide 1309-37-1	TWA: 10 mg/m³ TWA: 3 mg/m³ TWA: 5 mg/m³ STEL: 10 mg/m³	TWA: 5 mg/m³ TWA: 10 mg/m³	TWA: 5 mg/m³ respirable	TWA: 5 mg/m³
Calcite 1317-65-3	TWA: 10 mg/m³ TWA: 3 mg/m³ STEL: 20 mg/m³	TWA: 10 mg/m³	-	TWA: 10 mg/m³
Iron sulfide 1309-36-0	TWA: 1 mg/m³	TWA: 1.0 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³
Iron sulfate 7720-78-7	TWA: 1 mg/m³	TWA: 1.0 mg/m³	TWA: 1 mg/m³	TWA: 1 mg/m³

Appropriate engineering controls

Engineering measures Provide appropriate exhaust ventilation at places where dust is formed. Use grounding and bonding of dry handling equipment for pneumatics or free falling powder during processing in enclosed systems. Use only appropriately classified electrical equipment and powered industrial trucks.

Individual protection measures, such as personal protective equipment

Eye/Face Protection Whenever airborn dust concentrations are high, appropriate protective eyewear, such as mono-goggles, should be worn to prevent eye contact.

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

Hand Protection Protective gloves

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 Clean water should be available for washing in case of eye or skin contamination. Remove and wash contaminated clothing before re-use. Do not eat, drink or smoke when using this product.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Appearance Powder, dark brown to black
Physical State Solid
Color dark brown to black
Odor No information available
Odor threshold No information available
pH 6 - 8 (as aqueous solution)
Melting point/freezing point No information available
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: No information available
Lower flammability limit: No information available

Vapor pressure	No information available
Vapor density	No information available
Density	No information available
Specific gravity	1.50 - 1.75 g/cm³ @ 20ºC
Water solubility	50 % w/w
Solubility in other solvents	No information available
Partition coefficient	No information available
Autoignition temperature	No information available
Decomposition temperature	No information available
Viscosity, kinematic	Not applicable (Solid)
Viscosity, dynamic	Not applicable
Explosive properties	Fine dust dispersed in air may ignite
K_{st}	15 bar-m/sec; St1 Class dust
Oxidizing properties	No information available
Molecular weight	No information available
Bulk density	No information available

10. STABILITY AND REACTIVITY

Reactivity None under normal use conditions.

Chemical Stability Stable under recommended storage conditions.

Possibility of Hazardous Reactions Product may form by-products during processing which can be toxic or potentially explosive such as hydrogen, hydrogen sulfide and carbon monoxide. 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.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid Heat, flames and sparks.

Incompatible materials Oxidizing agents. Strong acids. Strong bases.

Hazardous Decomposition Products Thermal decomposition can lead to release of irritating and toxic gases and vapors: Hydrogen sulfide. Hydrogen gas, Sulfur oxides, Carbon oxides (COx), Calcium oxides, Potassium oxides.

11. TOXICOLOGICAL INFORMATION

Product Information

No acute toxicity information is available for this product.

Serious eye damage/eye irritation Not expected to be irritating based on the components.
Skin corrosion/irritation Not expected to be irritating based on the components.

Component Information

Chemical name	LD50 Oral	LD50 Dermal	LC50 Inhalation	NOAEL Oral Value
Iron Sesquioxide (1309-37-1)	> 10000 mg/kg (Rat)			
Reduced Iron (7439-89-6)	984 mg/kg (Rat)			
Activated carbon (7440-44-0)	> 10000 mg/kg (Rat)			

Information on toxicological effects

Symptoms Dust is irritating eyes, nose, throat, and lungs.

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

Chronic toxicity Chronic exposure to dust at concentrations exceeding occupational exposure limits may cause pneumoconosis (lung disease).

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical name	ACGIH	IARC	NTP	OSHA
Iron Sesquioxide 1309-37-1		Group 3		

IARC (International Agency for Research on Cancer)
Group 3 - Not classifiable as to its carcinogenicity to humans

Mutagenicity This product is not recognized as mutagenic by Research Agencies

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

STOT - single exposure None known.
STOT - repeated exposure None known.

Aspiration hazard Not applicable.

12. ECOLOGICAL INFORMATION

Ecotoxicity

Ecotoxicity effects Ecotoxicity effects of component substances

Chemical name	Toxicity to algae	Toxicity to fish	Toxicity to Microorganisms	Toxicity to daphnia and other aquatic invertebrates
Reduced Iron		96 h LC50: = 13.6 mg/L (Morone saxatilis) static		

Persistence and degradability This product contain some inorganic compounds. Inorganic compounds in contact with soil, sub-surface or surface waters may be taken up by plants and utilized as essential nutrients. Phosphates may also form precipitates, usually with calcium or magnesium. The resultant compounds are insoluble in water and become a part of the soil or sediment. .

Bioaccumulation Bioaccumulation is unlikely.

Mobility No information available.

Other Adverse Effects None known.

13. DISPOSAL CONSIDERATIONS

Waste disposal methods This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). This material could become a hazardous waste if it is mixed with or otherwise comes in contact with a hazardous waste, if chemical additions are made to this material, or if the material is processed or otherwise altered. Consult 40 CFR 261 to determine whether the altered material is a hazardous waste. Consult the appropriate state, regional, or local regulations for additional requirements.

Contaminated Packaging Dispose of in accordance with local regulations.

14. TRANSPORT INFORMATION

DOT NOT REGULATED

TDG 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)

Chemical name	CWA - Reportable Quantities	CWA - Toxic Pollutants	CWA - Priority Pollutants	CWA - Hazardous Substances
Iron sulfate 7720-78-7	1000 lb			X

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

Chemical name	CERCLA Hazardous Substances RQs (40 CFR 302.4)	SARA Sec 304 Extremely Hazardous Substance RQ (40 CFR 355 Appendix A)	SARA Section 302 EHS Threshold Planning Quantity (40 CFR 355)
Iron sulfate 7720-78-7	1000 lb		

US State Regulations

U.S. State Right-to-Know Regulations
This product contains the following substances regulated under state Right-to-Know laws:

Chemical name	Massachusetts	New Jersey	Pennsylvania	Illinois	Rhode Island
Iron Sesquioxide	X	X	X		
Calcite	X	X	X		
Iron sulfate	X	X	X		

California Proposition 65
This product does not contain any Proposition 65 chemicals

International Inventories

Component	TSCA (United States)	DSL (Canada)	EINECS/ELINCS (Europe)	ENCS (Japan)	China (IECSC)	KECL (Korea)	PICCS (Philippines)	AICS (Australia)	NZIoC (New Zealand)
Reduced Iron 7439-89-6 (<50)	X	X	X		X	X	X	X	X
Iron Sesquioxide 1309-37-1 (<50)	X	X	X	X	X	X	X	X	X
Activated carbon 7440-44-0 (<50)	X	X	X		X	X	X	X	X
Calcite 1317-65-3 (<50)	X	X	X	X	X	X	X	X	X
Iron sulfide 1309-36-0 (<50)	X	X	X		X	X	X	X	X
Monoammonium phosphate 7722-76-1 (<50)	X	X	X	X	X	X	X	X	X

Mexico

Mexico - Grade Slight risk, Grade 1

16. OTHER INFORMATION

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

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: 2017-04-06
Revision note (M)SDS sections updated: 1, 2, 3, 8, 11, 15.
Issuing Date: 2015-07-14

Disclaimer
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Prepared By:

PeroxyChem

End of Safety Data Sheet

Attachment A-4: Premier Magnesia Bench-Scale Treatability Study Report

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1275 Drummers Ln, Suite 102
Wayne, PA 19087
Phone: (610)-828-6929
Fax: (610) 828-8142

To: Brad Grimsted
Pioneer Technologies Corporation

15 January 2017

From: Derek Pizarro
Premier Magnesia, LLC

Re: **Superlon site, Tacoma, WA**

Premier Magnesia, LLC (Premier) is pleased to provide this performance memorandum to support Pioneer Technologies Corporation (Pioneer) with the Superlon Plastics site (Superlon) remedial construction project in Tacoma, Washington, USA. Premier evaluated three (3) site samples provided by Pioneer and generated a laboratory workup comparing effective treatment levels utilizing EnviroBlend 50/50 HXD treatment reagent ("amendment", "product"). This product was chosen for treatment evaluation based on compositional and leachable metal concentrations of site soil samples, previous soil and testing experience at Superlon, and other remedial projects with similar soil. Premier contracted with URSUS Remediation Testing & Technologies (URSUS) for this third-party laboratory evaluation. Samples as listed:

Name	ID
SO-SL-44A121216-6-8	44A
SO-SL-4A121216-6-10	4A
SO-SL-80A121216-4-12	80A

Summary

For these samples, EnviroBlend 50/50 HXD provided appropriate treatment in evaluation and optimization testing at three to four percent (3-4%) weight-to-weight (wt./wt.) dosage. Specifically, sample evaluation found Toxicity Characteristic Leaching Procedure (TCLP) criteria was exceeded with EnviroBlend 50/50 HXD applied to 44A and 4A areas at a 4% dosage rate and 3% dosage rate to area 80A. Despite potential to optimize soils characteristic of sample 80A, based upon know heterogeneity of soil onsite, Premier recommends a uniform dosage rate be applied to all at the site.

As before, variation in total and leachable arsenic and lead was evident in these samples, indicative of the site fill soil/sediments. Comparatively, in TCLP, 44A had the highest lead concentration and an average arsenic result; 4A had the highest arsenic concentration and an average lead result; and 80A had an average lead concentration and the lowest arsenic result. Utilizing the aforementioned 4% wt./wt. dosage rate successfully meets both arsenic and lead criteria across all three samples, despite variation in leachable metals.

1. **Amendment** – EnviroBlend 50/50 HXD for treatment of soil that contains or may contain fragments, particles, or leachable arsenic and/or lead. This product has been extensively used to remediate heavy metals-impacted soils, and – with the appropriate dosage rate – has rendered

leachable metal concentrations to orders of magnitude lower than site standards or non-detect concentrations in laboratory confirmations.

EnviroBlend 50/50 HXD is appropriate for soil or waste testing in TCLP Solution 1. Premier targeted product and dosage rate testing and recommendations for TCLP Solution 1 with the assumption that, generally, this is the more cost efficient method for waste treatment and testing, versus TCLP Solution 2. See Section 4 for TCLP procedures.

In addition to pH regulation, utilization of this reagent affords oxidation-reduction control (ORP) and adsorption and co-precipitation treatment pathways. Since pH of the soil matrix controls the leaching potential of the soil in tandem with the redox potential of the soil, a balance between the buffering agent and ORP controlling reagent must be optimized. Depending on the system ORP and species of arsenic, this proportion is generally either a one to one or three to one blend ratio. For comingled lead with arsenic, the buffering reagent dominates lead treatment via lead hydroxide formation. Concomitantly, the buffering agent assists arsenic treatment by forming iron hydroxides from the ORP additive that provide adsorption sites for arsenic stabilization.

The technology described herein is consistent with patents licensed to Premier from TRC Companies, Inc. via RMT, Inc. where the ORP control reagents are iron salt derivatives, and the buffering agent and hydroxide precipitant is magnesium oxide/hydroxide.

2. **Long-Term Stability** – Amended soil or waste requires regulation of matrix pH for long-term stability. EnviroBlend products primarily use a magnesia base component. Magnesia has a very high buffering capacity, not just increasing pH to effective treatment levels, but controls alkalinity within an appropriate pH range.

   Typically, Premier targets treatment for comingled lead and arsenic at a pH range of 5 to 9 SU for appropriate treatment recommendations. However, depending on arsenic speciation, the range could be most effective at a pH of 4 to 6 SU if the overall treatment process is driven more so by arsenic solubility than lead solubility, and if the prevalent species of arsenic is arsenate. For these samples, we found the appropriate pH range at 5 to 6 SU.

   For comparison, extremely alkaline products, such as calcic and sodic amendments, can potentially increase pH to 12 SU or higher where some heavy metals are extremely mobile. These products have a higher solubility, and are not effective in managing pH within optimum range for lead and arsenic stabilization, and at low dosages, do not provide enough alkalinity to achieve optimum pH control or hydroxide conversion.

3. **Dosage Ratio** – Based on treatability testing data compiled in URSUS Treatability Report, *Appendix A*, Premier is recommending EnviroBlend 50/50 HXD at 4% wt/wt. dosage, which effectively treated multiple samples of site soil.

4. **Laboratory Procedure** – In order to determine amendment and dosage ratio, EPA Method SW-846 1311 – Toxicity Characteristic Leaching Procedure was appropriate. Method procedure details – http://www.epa.gov/osw/hazard/testmethods/sw846/pdfs/1311.pdf.

   A representative sub-sample was sieved through a 3/8” sieve. Material retained in the sieve was crushed and/or cut until all material passed the sieve. After sieving, the sieved sample was analyzed for compositional metals following EPA Methods SW-846 3050 and SW-846 6010. The sieved sample was also used for all TCLP testing. TCLP leachate was testing by EPA Method SW-846 6010.

For treatability testing, the sample was crushed to size. Ten grams of crushed soil was treated with varying dosages of treatment chemistry and leached in the appropriate TCLP leaching solution (10 g soil/200 mls leaching solution). EnviroBlend reagent was added on a weight to weight basis. After leaching, the leachate was prepared and analyzed for arsenic and lead using EPA method SW-846 6010. TCLP results were reported in mg/L.

5. **Handling** – Level D or modified Level D personal protective equipment (PPE) is sufficient when handling this material. See *Appendix B*, Safety Data Sheet (SDS) and Handling and Application for safe storage and management procedures.

6. **Application** – EnviroBlend products do not require water or chemical activators for treatment of impacted soil, waste, or water mediums. Once amendment has been mixed homogeneously into the matrix at the recommended dosage rate, confirmatory sampling can be conducted- the treatment reaction and conversion process is essentially instantaneous. There is no miscible exothermic reaction at evaluated dosage rates. There is no curing time necessary.

   It is anticipated for the product to be delivered in two thousand (2,000) pound Supersacks due to ease of product management within the ascribed site delivery and laydown area. Considering the location, scope, and duration of the project, it would be anticipated that work during high wind events may take place. It may be practical to have a fugitive particulate management/suppression plan (e.g. water hose or curtain) in place for mixing operations during elevated wind events. Such additional water will not affect the efficacy of the product during suppression/mixing.

7. **Quantity** – Premier is notified by Pioneer that there are/may be multiple phases of work on this project, not including a pilot test. A pilot test is scheduled to be conducted in Q1 2017. The quantities of reagent for pilot and possible full-scale work have not been set, but should be based on this study.

8. **Experience and Qualifications** – Premier has provided examples of past experience with treatment of lead and arsenic impacted soils, specifically industrial manufacturing sites. *Appendix C* includes significant or key projects.

9. **Performance Estimate** – Premier requires Pioneer or site prime to provide a minimum two (2) weeks lead time to begin manufacturing EnviroBlend 50/50 HXD product for the pilot test. This product can be delivered as an A+B mix or premixed. Premier recommends for additional cost optimization, that an A+B mix is utilized, offering better value considering the veteran operations team at this site and the straightforward 1:1 Supersack mixing ratio.

EnviroBlend®
Metal Waste Treatment by Premier Magnesia, LLC

SAFETY DATA SHEET

Issue Date 19-September 2016 **Revision Date** **Version** 1

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier
Product Name ENVIROBLEND® 50/50 HX

Other means of identification
Product Code ENVIROBLEND® 50/50 HX
Synonyms None

Recommended use of the chemical and restrictions on use
Recommended Use A blend of magnesium oxide and ferrous sulfate monohydrate used for treating heavy metal bearing wastes.
Uses advised against No information available

Details of the supplier of the safety data sheet
Manufacturer Address
Premier Magnesia, LLC, 75 Giles Place, Waynesville, NC 28786

Emergency telephone number
Company Phone Number 828-452-4784
24 Hour Emergency Phone Number Chemtrec 1-800-424-9300
Emergency Telephone Chemtrec 1-800-424-9300

2. HAZARDS IDENTIFICATION

Classification

OSHA Regulatory Status
Pre-existing medical conditions, including dermatitis, asthma or chronic lung disease may be aggravated by exposure; individuals who are atopic (with a history of allergies) may experience greater amounts of respiratory irritation. Avoid dust inhalation and contact. Dust particulate is corrosive to eyes and upper respiratory tract. **Acute toxicity oral category 4; skin category 2; eye category 2A**

Label elements

Emergency Overview

A blend of white to beige powdered material and a dry bluish-green granular material. Avoid dust inhalation and contact. Dust particulate is corrosive to eyes and upper respiratory tract. Prevent spills from entering water or drain systems. Not a fire hazard.

Appearance Fine powder to granular **Physical state** Solid **Odor** Odorless

Particulate is corrosive to the eye by contact. Excessive contact may cause irritation or inflammation.
Prolonged skin contact or contact with wet, perspiring skin may cause skin irritation and possible inflammation.
Excessive inhalation of particulate is very irritating to the nasal septum and the upper respiratory system.
Ingestion is an unlikely route of exposure. If ingested in large amounts it may cause irritation, nausea, vomiting, diarrhea, abdominal pain, black stool, pink urine, coma and possibly death.

Hazards not otherwise classified (HNOC)
Other Information

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No.	Weight-%	Trade Secret
Magnesium Oxide	1309-48-4	52	
Ferrous Sulfate Monohydrate	17375-41-6	48	

4. FIRST AID MEASURES

First aid measures

Eye contact Flush eyes, including under the eyelids, with large amounts of water. If irritation persists, seek medical attention.

Skin Contact Wash skin with soap and water.

Inhalation Move victim to fresh air. If breathing has stopped, give artificial respiration. Get medical attention immediately.

Ingestion Ingestion is an unlikely route of exposure. If ingested in sufficient quantity and victim is conscious, give 1-2 glasses of water or milk. Never give anything by mouth to an unconscious person. Leave decision to induce vomiting to qualified medical personnel, since particles may be aspirated into the lungs. Seek immediate medical attention.

Most important symptoms and effects, both acute and delayed

Symptoms No information available.

Indication of any immediate medical attention and special treatment needed

Note to physicians Treat symptomatically.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media
Dry chemical. Carbon dioxide (CO_2). Foam.

Unsuitable extinguishing media Water reacts with magnesium oxide producing magnesium hydroxide and heat. Do not allow water to get inside containers: reaction with water will cause product to swell, generate heat, and burst its container. If contact is unavoidable, use sufficient water to safely absorb the heat that may be generated.

Specific hazards arising from the chemical
No information available.

Explosion data
Sensitivity to Mechanical Impact None.
Sensitivity to Static Discharge None.

Protective equipment and precautions for firefighters
Firefighters should wear NIOSH approved, positive pressure, self-contained breathing apparatus and full protective clothing when appropriate.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions If conditions warrant, clean-up personnel should wear approved respiratory protection, gloves and goggles to prevent irritation from contact and/or inhalation.

Environmental precautions

Environmental precautions See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Dike spills to prevent release into sewers and waterways. Carefully clean up and place material into a suitable container, being careful to avoid creating excessive dust. If conditions warrant, clean up personnel should wear approved respiratory protection, gloves and goggles to prevent irritation from contact and/or inhalation.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Handle in accordance with good industrial hygiene and safety practice.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep in a dry, cool and well-ventilated place.

Incompatible materials Arsenic Trioxide and Sodium Nitrate. Magnesium Oxide component is soluble in aqueous acids generating heat and steam; violent reaction or ignition with interhalogens (e.g., bromine pentifluoride; chlorine trifluoride). Incandescent reaction with phosphorus pentachloride.

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.

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Magnesium Oxide 1309-48-4	TWA: 10 mg/m^3 inhalable fraction	TWA: 15 mg/m^3 fume, total particulate	IDLH: 750 mg/m^3 fume
Ferrous Sulfate Monohydrate 17375-41-6	TWA: 1 mg/m^3		

Appropriate engineering controls

Engineering Controls Provide sufficient ventilation, in both volume and air flow patterns to control mist/dust concentrations below allowable exposure limits.

Individual protection measures, such as personal protective equipment

Eye/face protection The use of eye protection, gloves and long sleeve clothing is recommended.

Skin and body protection The use of eye protection, gloves and long sleeve clothing is recommended.

Respiratory protection Provide workers with NIOSH approved respirators in accordance with requirements of 29 CFR 1910. 134 for level of exposure incurred.

General Hygiene Considerations Avoid contact with skin, eyes or clothing. After handling this product, wash hands before eating or drinking.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state Solid

Appearance Fine powder to granular

Color White to beige powder with bluish-green granules

Odor Odorless

Odor threshold No information available

Property	Values	Remarks • Method
pH	No information available	
Melting point/freezing point	No information available	
Boiling point / boiling range	No information available	
Flash point	No information available	
Evaporation rate	No information available	
Flammability (solid, gas)	No information available	
Flammability Limit in Air		
Upper flammability limit:	No information available	
Lower flammability limit:	No information available	
Vapor pressure	No information available	
Vapor density	No information available	
Specific Gravity	No information available	
Water solubility	No information available	
Solubility in other solvents	No information available	
Partition coefficient	No information available	
Autoignition temperature	No information available	
Decomposition temperature	No information available	
Kinematic viscosity	No information available	
Dynamic viscosity	No information available	
Explosive properties	No information available	
Oxidizing properties	No information available	

Other Information

Softening point	No information available
Molecular weight	No information available
VOC Content (%)	No information available
Density	No information available
Bulk density	50-60

10. STABILITY AND REACTIVITY

Reactivity
No data available

Chemical stability
Stable under recommended storage conditions.

Possibility of Hazardous Reactions
None under normal processing.

Hazardous polymerization Hazardous polymerization does not occur.

Conditions to avoid
Extremes of temperature and direct sunlight.

Incompatible materials
Arsenic Trioxide and Sodium Nitrate. Magnesium Oxide component is soluble in aqueous acids generating heat and steam; violent reaction or ignition with interhalogens (e.g., bromine pentifluoride; chlorine trifluoride). Incandescent reaction with phosphorus pentachloride.

Hazardous Decomposition Products
Heat and steam.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information Magnesium Oxide # 1309-48-4 does not present an acute toxicity hazard based on known or supplied information. Ferrous Sulfate Monohydrate, moderately toxic by ingestion and rectal routes.

Inhalation Excessive inhalation of particulate is very irritating to the nasal septum and the upper respiratory system.

Eye contact Particulate is corrosive to the eye by contact. Excessive contact may cause irritation or inflammation.

Skin Contact Prolonged skin contact or contact with wet, perspiring skin may cause skin irritation and possible inflammation.

Ingestion Ingestion is an unlikely route of exposure. If ingested in large amounts it may cause irritation, nausea, vomiting, diarrhea, abdominal pain, black stool, pink urine, coma and possibly death.

Information on toxicological effects

Symptoms No information available.

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

Sensitization No information available.
Germ cell mutagenicity No information available.
Carcinogenicity No information available.
Reproductive toxicity No information available.
STOT - single exposure No information available.
STOT - repeated exposure No information available.
Other adverse effects Chronic overexposure may damage blood vessels.
Aspiration hazard No information available.

Numerical measures of toxicity - Product Information

12. ECOLOGICAL INFORMATION

Ecotoxicity

No data available on any adverse effects of this material on the environment

Persistence and degradability
No information available.

Bioaccumulation
No information available.

Other adverse effects No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes Contact licensed waste disposal professional for proper disposal.

Contaminated packaging Do not reuse container.

14. TRANSPORT INFORMATION

DOT

Not regulated as a DOT hazardous material.

15. REGULATORY INFORMATION

Ferrous sulfate monohydrate is not listed on Toxic Substance Control Act inventory list(TSCA) since it is a hydrate. The anhydrous form is listed on TSCA and Canadian Domestic Substance List (DSL). Magnesium oxide is listed on both TSA and Canadian DSL.

US 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	Yes
Chronic Health Hazard	Yes
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

Section 311 Hazardous Substances (40 CFR 117.3), Sulfuric acid, iron (2) salt (1:1), Monohydrate.

CERCLA

(40 CFR 302.4) Sulfuric acid, Iron (2) salt (1:1), Monohydrate.

US State Regulations

California Proposition 65
This product does not contain any Proposition 65 chemicals

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Magnesium Oxide/Ferrous Sulfate Monohydrate	X	X	X

U.S. EPA Label Information

EPA Pesticide Registration Number Not Applicable

16. OTHER INFORMATION

NFPA	**Health hazards** 2	**Flammability** 0	**Instability** 0	**Physical and Chemical Properties** -
HMIS	**Health hazards** 2	**Flammability** 0	**Physical hazards** 0	**Personal protection** X

Issue Date 19-Sept 2016
Revision Date
Revision Note
No information available

Disclaimer

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

End of Safety Data Sheet

Attachment A-5: Photographic Log

This page has been left blank intentionally to allow for double-sided printing.

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Photo No. A-1: Shaker Screen and Processed Soil	
Description: Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. A-2: Gravel Skiff	
Description: Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. A-3: Mixing Head	
Description: Alpine Mixing Head used to mix soil and additive. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Appendix B

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Appendix B: Perched Water Treatability Studies

for the

Superlon Plastics Site Tacoma, Washington

Prepared for:

White Birch
2116 Taylor Way
Tacoma, WA 98401

and

The Chemours Company
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June 2017

PERC

Pacific Environmental and Redevelopment Corporation
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and

PIONEER TECHNOLOGIES CORPORATION

PIONEER Technologies Corporation
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Olympia, Washington 98503-5901

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Tables

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Acronyms and Abbreviations

Acronym/Abbreviation	Description
Pilot	Field Pilot Treatability Study
Property	Superlon Plastics Property
PW	Perched Water
RELs	Remediation Levels

B1 Introduction

Laboratory bench-scale and field pilot treatability studies (Pilot) were conducted to evaluate the technical feasibility of applying three additive technologies to perched water (PW) at The Superlon Plastics Property (Property). The purpose of treating the water with additives was to reduce dissolved arsenic and lead concentrations to meet Site-specific groundwater remediation levels (RELs).[1] This appendix is organized as follows:

- Section B2 presents the objective, characterization, and methodology of the laboratory bench-scale PW treatability studies;
- Section B3 presents the PW bench-scale treatability study results for Free Flow (FF) Technologies;
- Section B4 presents the PW bench-scale treatability study results for Peroxychem (MetaFix);
- Section B5 presents the PW bench-scale treatability study results for Premier Magnesia (EnviroBlend HXD);
- Section B6 describes the transfer process of arsenic and lead to soil after water treatment,
- Section B7 describes the PW field pilot treatability results, selected additive test treatment conditions, and results; and
- Section B8 presents the conclusion and recommended additive for the full-scale remediation.

[1] For the purposes of this report, remediation levels (RELs) include soil-to-groundwater RELs and groundwater and perched water cleanup levels.

B2 Laboratory Perched Water Bench-Scale Treatability Studies

B2.1 Goals and Objectives

The goal of the PW treatability studies was to determine if amending PW with different additives would be an effective means to reduce the dissolved arsenic and lead concentrations to achieve groundwater RELs. Three Laboratories conducted the PW treatability studies:

- Free Flow Technologies (TRC Laboratory conducted the study);
- Peroxychem; and
- Premier Magnesia (Ursus laboratory conducted the study).

Each PW treatability study focused on the following objectives:

- Confirm the suitability of the selected technologies for property PW;
- Identify the appropriate additive dose to achieve the objective; and
- Identify any potential problems associated with the selected technologies at the Property.

B2.2 Perched Water Characterization

Groundwater was collected from two shallow aquifer locations using a peristaltic pump to represent PW with low and high arsenic and lead concentrations (see Figure B-1 and Table B-1):

- Monitoring well MW-11S to represent low arsenic and lead concentrations, and
- Monitoring well MW-12S to represent high arsenic and lead concentrations.

Water and clean soil samples were provided to each laboratory. Analytical results are presented in Table B-1.

Clean soil purchased from an off-Property source was included in the study as it will be used to back fill excavations. Clean soil samples were sent to the lab and mixed with an additive, and then combined with the PW. This approach was tested in the lab since it reflects the process that will take place in the field. Additional testing was performed to determine if applying the additive directly to the PW and then adding the clean soil was equally effective. The results of the laboratory PW bench-scale treatability study are presented in Section B3 through B5.

B2.3 Blended Additive and Clean Soil Methodology

The PW treatability study methodology and results are presented in the Free Flow, Peroxychem, and Premier Magnesia reports, which are included in Attachments B-2, B-3, and B-4, respectively. The three vendors blended the additives with clean back fill soil, added the mixture to Property PW, and then collected a treated water sample. In addition, Free Flow additive was used to determine the effectiveness of the treatment if the additive was blended with the PW and then clean soil was added. The water sample was then analyzed for dissolved arsenic and lead (see Free Flow Report Number 2). The laboratory reports are included with each vendors' reports in Attachments B-2, B-3, and B-4, respectively.

B3 Free Flow Perched Water Bench-Scale Treatability Study Results

The bench-scale treatability study report documenting the ability of the Free Flow additive to treat Superlon PW is presented in Attachment B-2. The initial water samples had dissolved arsenic concentrations of 3.0 mg/L for the less concentrated water, and 36.7 mg/L for the more concentrated water (MW-11s) (see Table B-1). The initial lead concentrations in each sample were below the REL and are not discussed further. Each treatment dose successfully lowered the dissolved arsenic concentrations to below the target concentration of 0.66 mg/L. A 0.25% treatment dose of the FF-200 + FS (1:1 - buffer:iron ratio) brought the concentration of arsenic down to below the remedial level of 0.67 mg/L in the saturated soil test. In addition, the higher buffer:iron source ratios resulted in higher final pH values in the water. Since arsenic absorption is stronger at slightly acidic pH values, rather than at slightly basic pH values, the 1:1 buffer:iron reagent is recommended. Lower doses of reagent were not tested due to the difficulty of homogeneously mixing small amounts of dry treatment reagent in the soil to ensure uniform treatment. Based on the results of the study, a dose of 0.25% FF-200 FS (at a 1:1 ratio) was recommended.

B4 Peroxychem Perched Water Bench-Scale Treatability Study Results

The bench-scale treatability study report documenting the ability of the Peroxychem Metafix® additive to treat Superlon PW is presented in Attachment B-3. The initial groundwater samples had dissolved arsenic concentrations of 2.9 mg/L (MW-12s) for the less concentrated water, and 30.9 mg/L (MW-11s)for the more concentrated water (see Table B-1). The results of treatability testing indicate that the Peroxychem MetaFix® treatment can reduce dissolved arsenic concentrations below the REL. The dissolved lead concentration was below the method detection limit in the untreated baseline water sample, and was not evaluated further.

The results indicate that the Peroxychem MetaFix I-6A formulation was the most effective for treatment of arsenic. The dose response results suggest that even the lowest evaluated dose of 0.25% w/w could result in achievement of the REL. The Peroxychem MetaFix® bench-scale treatability study results of increasing the additive dose indicates that higher dosages (i.e., 0.5% or 1.0%) would provide increased assurance of high removal efficiency. In addition, the use of a higher additive dose would make adequate distribution of the Peroxychem MetaFix® reagent within the backfill matrix easier to achieve.

B5 Premier Magnesia Perched Water Bench-Scale Treatability Study Results

The treatability study report documenting the ability of the Premier Magnesia EnviroBlend® additive to treat Superlon PW is presented in Attachment B-4. The initial groundwater samples had dissolved arsenic concentrations of 2.75 mg/L (MW-12s) for the less concentrated water, and 36.7 mg/L (MW-11s) for the more concentrated water (see Table B-1). Enviroblend HXD was amended to backfill material with concentrations of 3%, 4%, and 5% and then the material was added to the PW (see Attachment B-4, Table 3). The less concentrated groundwater sample was effectively treated, and met the RELs with a 3% EnviroBlend® HXD dosage. A 4% EnviroBlend® HXD dosage met the REL for the more concentrated groundwater. In fact, the treatments reduced both arsenic and lead concentrations to below their respective detection limit.

B6 Transfer of Arsenic and Lead to Soil after Water Treatment

The treatment process removes arsenic from PW by binding arsenic to iron, and then to the particulates in the soil. This results in arsenic and lead being transferred from the PW to the soil after the water treatment.

In the laboratory bench-scale studies, the saturated soil samples, (which represents approximate field conditions) had a solid solution ratio of 5:1. This means that 500 g of soil will contain 100 mL water. Assuming the water has 100 mg/L arsenic, the increase in the arsenic soil concentration will be (100 mg/L arsenic x 0.10 L) / 500 g soil = 20 mg/kg arsenic. For the 36.7 mg/L arsenic concentration sample, the increase is 7.5 mg/kg arsenic (See Attachment B-2). These arsenic levels are below state background concentrations (20 mg/kg), default industrial cleanup levels (90 mg/kg), and the lowest Property-specific REL of 91 mg/kg for Operable Unit 2. This means that soil RELs will not be exceeded as a result of using of a water treatment additive.

B7 Field Pilot Perched Water Treatability Studies

B7.1 Goals and Objectives

The goal of the PW field pilot treatability study was to confirm that amending PW with FF-200 FS (1:1 ratio), METAFIX I6i, and EnviroBlend® additives could be an effective means to reduce the dissolved arsenic and lead concentrations to achieve groundwater RELs. The PW field pilot treatability study was conducted in March and April of 2017 and focused on the following objectives:

- Confirming the suitability of the three additives for treating Property PW;
- Confirming the appropriate dose of the three additives to achieve PW RELs; and
- Identifying potential problems associated with mixing clean soil with additives at the Property.

B7.2 Methodology

The methodology used for the field pilot treatability study consisted of placing PW collected from four different source areas into 20-gallon drums and then treating the PW by adding soil amended with the three additives as follows:

PW Source	Free Flow FF 200 (1:1) Dose as W%/W% of Clean Backfill	Peroxychem Metafix I-6A Dose as W%/W% of Clean Backfill	Premier Magnesia Enviroblend HXD Dose as W%/W% of Clean Backfill
Former Building B Sampling Port	0.5	0.25	4
Monitoring Well 12s (MW-12S)	0.5	0.25	4
Pilot Study SL-79 Excavation	0.5	0.25	4
Pilot Study SL-90 Excavation	0.5	0.25	4

Representative arsenic and lead concentrations were obtained from PW samples prior to treatment with the additives. The PW from SL-79 excavation contained the highest concentrations of arsenic and/or lead obtainable and represented the worst case scenario. The PW from former Building B sampling ports represented the expected typical scenario. Treated water samples were collected one week later from each drum and the analytical results are presented in Table B-2.

B7.3 Results

Based on the results of the Pilot, FF 200 (1:1) was the most effective PW treatment under current field conditions (see table B-2, the table below, and Table B-2). FF 200 (1:1) successfully treated the water from Former Building B, Monitoring Well 12s and the Pilot SL-90 excavation whereas the other additives were only successful in treating water from the Former Building B. In addition, the treatment with FF 200 (1:1) resulted in dissolved arsenic concentrations that were more than an order of magnitude lower than the other additives for the Building B and MW-12 water.

PW Source	Achieve Groundwater REL Free Flow FF 200 (1:1) Dose as W%/W% of Clean Backfill	Peroxychem Metafix I-6A Dose as W%/W% of Clean Backfill	Premier Magnesia Enviroblend HXD Dose as W%/W% of Clean Backfill
Former Building B Sampling Ports	Yes	No	Yes
Monitoring Well 12s (MW-12S)	Yes	No	No
Pilot SL-79 Excavation	No	No	No
Pilot SL-90 Excavation	Yes	Yes	Yes

The additives doses were too low to successfully treat the PW in SL-79 due to the sample collection method used in this excavation. An excavator bucket was used to collect the PW from the bottom of the excavation and a significant amount of suspended soil was inadvertently collected with the PW. The suspended soil in the PW sample resulted in unrealistically high arsenic and lead concentrations. The total arsenic concentration (which included solids) was 95 mg/L and the dissolved arsenic concentration (which did not include solids) was 6.1 mg/L; the total lead concentration (which included solids) was 137 mg/L and the dissolved lead concentration (which did not include solids) was 0.02 mg/L (see Attachment B-2).

Suspended soil in PW will not impact sample concentrations during the remedial action because suspended soil will be filtered from PW samples. In addition, during the remedial action, some of the suspended soil in PW will settle to the bottom of the excavation, and other suspended soil will be bound up to clean backfill as it is used to fill the excavation. This will result in dissolved PW concentrations that are expected to be approximately 10 times lower during the remedial action than they were in the Pilot SL-79 drums.

B8 Conclusions

Treatability studies were performed to determine if on-Property PW could be treated to reduce dissolved arsenic and lead concentrations to achieve RELs. The results of the treatability studies demonstrated that Free Flow FF 200 (1:1) at a 0.5% dose was the most effective treatment for on-Property PW and that it will successfully treat on-Property PW to achieve site-specific groundwater RELs.

Tables

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Table B-1: Bench-Scale Treatability Study Perched Water and Soil Concentrations

Sample Source	Lab Sample Number	Treatment	Additive	Dose % Weight of Backfill	Sample Number	Dissolved or Total?	Arsenic (mg/L)[1]	Lead (mg/L)[2]	pH (SU)
MW-12s	Free Flow (TRC Lab)	Baseline	None	None	GW-MW-11S-Low 102416-(20)	Dissolved	3	0.17	6.99
MW-11s	Free Flow (TRC Lab)	Baseline	None	None	GW-MW-11S-Low 102416-(20)	Dissolved	36.7	0.075	6.65
Clean Backfill Soil	Peroxychem	Baseline	None	None	Soil-SO Backfill-102416-0-0.5	Not Applicable	1.8[(3)]	2.5[(3)]	7.59
MW-12s	Peroxychem	Baseline	None	None	GW-MW-12S-High 102416-(20)	Dissolved	2.9	0.15	6.36
MW-11s	Peroxychem	Baseline	None	None	GW-MW-11S-Low 102416-(20)	Dissolved	30.9	<0.03	6.78
MW-12S	Premier Magnesia (Ursus Lab)	Baseline	None	None	GW-MW-12S-High 102416-(20)	Dissolved	2.75	0.29	6.81
MW-11s	Premier Magnesia (Ursus Lab)	Baseline	None	None	GW-MW-11S-Low 102416-(20)	Dissolved	36.7	0.76	6.41

Notes:

[1]Remedial level is 0.67 mg/L.

[2]Remedial level is 1.65 mg/L.

[3]Units are mg/kg for this sample.

Table B-2: Pilot Study Treatability Study Laboratory Results

Sample Source	Lab Sample Number	Treatment	Additive	Dose % Weight of Backfill	Sample Number	Dissolved or Total?	Arsenic (mg/L)[1]	Lead (mg/L)[2]	pH (SU)
Bld_B	580-66530-2	Baseline	None	None	PP-Bld_B_Sample Ports-030317	Total	66	0.70	--
Bld_B	580-66905-1	Free Flow	FF-200 + FS (1:1 - buffer:iron ratio)	0.5	PP-BLD_B-Freeflow-PT-032217	Dissolved	0.091	0.0020	7.2
Bld_B	580-66905-2	Peroxychem	MetaFix I-6A	0.25	PP-BLD_B-MFIX-PT-032217	Dissolved	1.5	0.0020	7.3
Bld_B	580-66905-3	Peroxychem	MetaFix I-6A	0.25	PP-BLD_B-MFIX-PT-032217-(01)	Dissolved	1.4	0.0020	7.3
Bld_B	580-66905-4	Premier Magnesia	Enviroblend HXD	4	PP-BLD_B-PM-PT-032217	Dissolved	0.61	0.040	4.2
MW-12	580-66530-1	Baseline	None	None	GW-MW-12S-030317	Total	59	0.046	--
MW-12	580-66905-5	Free Flow	FF-200 + FS (1:1 - buffer:iron ratio)	0.5	PP-MW-12i-Freeflow-PT-032217	Dissolved	0.12	0.0020	7.1
MW-12	580-66905-6	Peroxychem	MetaFix I-6A	0.25	PP-MW-12i-MFIX-PT-032217	Dissolved	3.0	0.0020	7.6
MW-12	580-66905-7	Premier Magnesia	Enviroblend HXD	4	PP-MW-12i-PM-PT-032217	Dissolved	4.2	0.040	3.9
SL-79	580-66386-1	Baseline	None	None	PP-SL-79-022717	Total	330	380	--
SL-79	580-66905-8	Free Flow	FF-200 + FS (1:1 - buffer:iron ratio)	0.5	PP-SL-79-Freeflow-PT-032217	Dissolved	4.4	0.0036	7.0
SL-79	580-66905-9	Peroxychem	MetaFix I-6A	0.25	PP-SL-79-MFIX-PT-032217	Dissolved	11	0.0070	7.3
SL-79	580-66905-10	Premier Magnesia	Enviroblend HXD	4	PP-SL-79-PM-PT-032217	Dissolved	10	0.040	5.1

Table B-2: Pilot Study Treatability Study Laboratory Results

Sample Source	Lab Sample Number	Treatment	Additive	Dose % Weight of Backfill	Sample Number	Dissolved or Total?	Arsenic (mg/L)[1]	Lead (mg/L)[2]	pH (SU)
SL-90	580-66530-3	Baseline	None	None	PP-SL 90-030317	Total	1.1	1.5	--
SL-90	580-66905-11	Free Flow	FF-200 + FS (1:1 - buffer:iron ratio)	0.5	PP-SL-90-Freeflow-PT-032217	Dissolved	0.013	0.0066	12.7
SL-90	580-66905-12	Peroxychem	MetaFix I-6A	0.25	PP-SL-90-MFIX-PT-032217	Dissolved	0.017	0.055	12.8
SL-90	580-66905-13	Premier Magnesia	Enviroblend HXD	4	PP-SL-90-PM-PT-032217	Dissolved	0.10	0.040	6.8

Notes:

[1]Remedial level is 0.67 mg/L.

[2]Remedial level is 1.65 mg/L.

-- = Not analyzed for constituent.

See Attachments B-2, B-3, and B-4 for laboratory reports for Free Flow, Peroxychem, and Premier Magnesia, respectively.

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Figures

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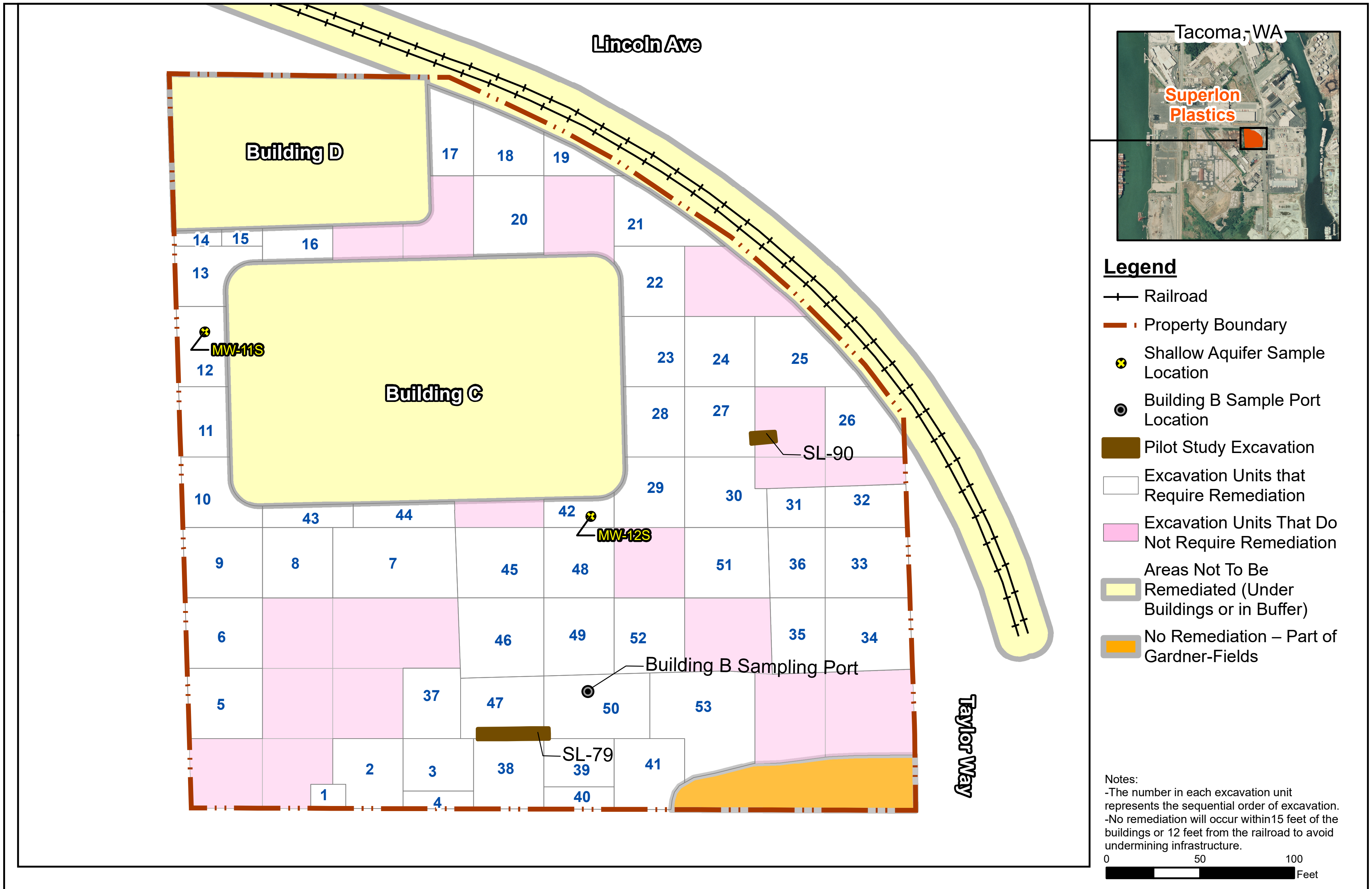

PIONEER TECHNOLOGIES CORPORATION

Perched Water Treatability Study Sample Locations
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure B-1

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Attachment B-1: Laboratory Reports

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ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66386-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
3/8/2017 12:45:09 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

1 2 3 4 5 6 7 8 9 10 11

Job ID: 580-66386-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66386-1

Receipt
One sample was received on 2/27/2017 3:50 PM; the sample arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 14.4º C.

Receipt Exceptions

The reference method requires samples to be preserved to a pH of 2 or less. The following sample was received with insufficient preservation at a pH of 6: PP-SL-79-022717 (580-66386-1). The sample was preserved with nitric aciid from lot 0000133393 to the appropriate pH at 0930 in the laboratory on the first of March in 2017.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66386-1

Client Sample ID: PP-SL-79-022717
Date Collected: 02/27/17 10:45
Date Received: 02/27/17 15:50

Lab Sample ID: 580-66386-1
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	330		0.50		mg/L		03/06/17 10:03	03/07/17 13:24	500
Lead	380		0.20		mg/L		03/06/17 10:03	03/07/17 13:24	500

QC Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66386-1

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-239776/21-A
Matrix: Water
Analysis Batch: 239958

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 239776

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		03/06/17 10:03	03/07/17 11:31	1
Lead	ND		0.00040		mg/L		03/06/17 10:03	03/07/17 11:31	1

Lab Sample ID: LCS 580-239776/22-A
Matrix: Water
Analysis Batch: 239958

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 239776

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.05		mg/L		101	80 - 120
Lead	1.00	1.05		mg/L		105	80 - 120

Lab Sample ID: LCSD 580-239776/23-A
Matrix: Water
Analysis Batch: 239958

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 239776

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	3.99		mg/L		100	80 - 120	2	20
Lead	1.00	1.04		mg/L		104	80 - 120	1	20

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66386-1

Client Sample ID: PP-SL-79-022717
Date Collected: 02/27/17 10:45
Date Received: 02/27/17 15:50

Lab Sample ID: 580-66386-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			239776	03/06/17 10:03	MKN	TAL SEA
Total Recoverable	Analysis	6020A		500	239958	03/07/17 13:24	FCW	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Pioneer Technologies Corporation
TestAmerica Job ID: 580-66386-1
Project/Site: Superlon Metals Fractionation

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66386-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66386-1	PP-SL-79-022717	Water	02/27/17 10:45	02/27/17 15:50

66386

Chain of Custody Record

CHOC Number: 03_1.1_E52_40421_27022017

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com,
sduggan@perc-nw.com

Site Contact:
PIONEER Technologies Corporation
Brad Grimsted
Phone: (360) 570-1700 Email: grimstedb@uspioneer.com

PIONEER Technologies Corporation,
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com
PIONEER TECHNOLOGIES CORPORATION

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica-Tacoma
ELAINE WALKER
Phone: 253.248.4972 Email:

CHOC Version: 0.99.05

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	Metals in Water								Comments for Sample
PP-SL-79-022717	02/27/2017	10:45	BG				X								Water from SL-79 excavation. A lot of s

Sample Information — *Special Lab Instructions Included ==>* | Analytes | *<== Special Lab Instructions*

TB___ Cooler IR5 Cor 14.4 w/o Unc 14.6
Cooler Dsc Med Blue @Lab___
~~Wet/Packs~~ Packing ___
cli dru

Cooler (Yes/No):
Cooler Temp:

Turnaround Time: Std

Hazard Identification:

Sample Disposal:

Preservative: HNO3

Lab Use Only:

580-66386 Chain of Custody

QA/QC Requirements:

Sampling Event Comments:
Analyze for total arsenic and lead

Relinquished By: (Sign and Print)	Date/Time:	Received By: (Sign and Print)	Date/Time:
1. BRAD Grimsted [signature]	2/27/17 3:50	1. Tom [signature]	2/27/17 1550
2.		2.	
3.		3.	

Stat Form: 01 - 07/24/2015

3/8/2017

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation

Job Number: 580-66386-1

Login Number: 66386
List Number: 1
Creator: Blankinship, Tom X

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	Thermal preservation not required.
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	Required adjustment.
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66530-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
3/17/2017 2:06:06 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11

Table of Contents

Case Narrative

Job ID: 580-66530-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66530-1

Receipt
Eleven samples were received on 3/3/2017 3:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 14.7º C.

Receipt Exceptions

The reference method requires samples to be preserved to a pH of 2 or less. The following sample was received with insufficient preservation at a pH of more than 2: PP-SL 90-030317 (580-66530-3). The sample was preserved to the appropriate pH in the laboratory using Nitric Acid Lot# 0000133393:

The following samples were received at the laboratory outside the required temperature criteria: GW-MW-12S-030317 (580-66530-1), PP-Bld_B_Sample Ports-030317 (580-66530-2), PP-SL 90-030317 (580-66530-3), SO-SL-90-Pilot_bottom-030317-12-12.5 (580-66530-4), SO-SL-90-Pilot_Interfac-030317-8-9 (580-66530-5), WD-SL-79debris_a-030217 (580-66530-6), WD-SL-79debris_a-030217-(01) (580-66530-7), WD-SL-79debris_b-030217 (580-66530-8), WD-SL-79debris_b-030217-(01) (580-66530-9), WD-SL-79debris_c-030217 (580-66530-10) and WD-SL-79debris_c-030217-(01) (580-66530-11). There was no cooling media present in the cooler. As these are samples for metals analysis, the temperature guidance is not applicable.

Metals
Method(s) 6010C: The laboratory control sample duplicate (LCSD) for preparation batch 580-240133, 580-240133, 580-240204 and 580-240204 and analytical batch 580-240412 recovered outside control limits for the following analytes: Se. These analytes were biased high in the LCSD and were not detected in the associated samples; therefore, the data have been reported.

Method(s) 6010C: The continuing calibration verification (CCV) associated with batch 580-240412 recovered above the upper control limit for Se. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Qualifiers

Metals

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: GW-MW-12S-030317
Date Collected: 03/03/17 01:15
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-1
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**59**		0.50		mg/L		03/13/17 10:51	03/16/17 08:33	500
Lead	**0.046**		0.0020		mg/L		03/13/17 10:51	03/13/17 18:59	5

Client Sample ID: PP-Bld_B_Sample Ports-030317

Lab Sample ID: 580-66530-2

Date Collected: 03/03/17 01:40
Matrix: Water
Date Received: 03/03/17 15:40

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	66		0.50		mg/L		03/13/17 10:51	03/16/17 08:38	500
Lead	0.70		0.0020		mg/L		03/13/17 10:51	03/13/17 19:04	5

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: PP-SL 90-030317
Date Collected: 03/03/17 11:30
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-3
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.1**		0.0050		mg/L		03/13/17 10:51	03/13/17 19:08	5
Lead	**1.5**		0.0020		mg/L		03/13/17 10:51	03/13/17 19:08	5

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Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5

Lab Sample ID: 580-66530-4

Date Collected: 03/03/17 10:35

Matrix: Solid

Date Received: 03/03/17 15:40

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	99.6		0.1		%			03/10/17 11:20	1
Percent Moisture	0.4		0.1		%			03/10/17 11:20	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5
Lab Sample ID: 580-66530-4
Date Collected: 03/03/17 10:35
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 99.6

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5.5		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:10	1
Lead	5.3		1.5		mg/Kg	☼	03/10/17 17:08	03/13/17 21:10	1

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9
Date Collected: 03/03/17 11:15
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-5
Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	99.1		0.1		%			03/10/17 11:22	1
Percent Moisture	0.9		0.1		%			03/10/17 11:22	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9
Lab Sample ID: 580-66530-5
Date Collected: 03/03/17 11:15
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 99.1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	320		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:13	1
Lead	86		1.5		mg/Kg	☼	03/10/17 17:08	03/13/17 21:13	1

Client Sample ID: WD-SL-79debris_a-030217

Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-6

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**9.7**		0.060		mg/L		03/10/17 12:20	03/14/17 12:10	1
Barium	**0.31**		0.010		mg/L		03/10/17 12:20	03/13/17 17:06	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:06	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:06	1
Lead	**2.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:06	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:06	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:06	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 12:01	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.5**		0.1		%			03/15/17 16:39	1
Percent Moisture	**48.5**		0.1		%			03/15/17 16:39	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_a-030217
Lab Sample ID: 580-66530-6
Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 51.5

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10000**		36		mg/Kg	☼	03/10/17 17:08	03/14/17 12:30	10
Lead	**8200**		18		mg/Kg	☼	03/10/17 17:08	03/14/17 12:30	10

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_a-030217-(01)

Lab Sample ID: 580-66530-7

Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10**		0.060		mg/L		03/10/17 12:20	03/14/17 12:13	1
Barium	**0.30**		0.010		mg/L		03/10/17 12:20	03/13/17 17:10	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:10	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:10	1
Lead	**2.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:10	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:10	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:10	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**47.0**		0.1		%			03/10/17 11:22	1
Percent Moisture	**53.0**		0.1		%			03/10/17 11:22	1

Client Sample ID: WD-SL-79debris_a-030217-(01)

Lab Sample ID: 580-66530-7

Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 47.0

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4000		5.7		mg/Kg	☼	03/10/17 17:08	03/13/17 21:20	1
Lead	710		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:20	1

Client Sample ID: WD-SL-79debris_b-030217

Lab Sample ID: 580-66530-8

Date Collected: 03/02/17 08:45

Matrix: Solid

Date Received: 03/03/17 15:40

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.3**		0.060		mg/L		03/10/17 12:20	03/14/17 12:17	1
Barium	**0.49**		0.010		mg/L		03/10/17 12:20	03/13/17 17:13	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:13	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:13	1
Lead	**2.9**		0.030		mg/L		03/10/17 12:20	03/13/17 17:13	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:13	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:13	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.8**		0.1		%			03/10/17 11:22	1
Percent Moisture	**48.2**		0.1		%			03/10/17 11:22	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_b-030217

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-8

Matrix: Solid
Percent Solids: 51.8

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3500		4.7		mg/Kg	☼	03/10/17 17:08	03/13/17 21:24	1
Lead	1200		2.4		mg/Kg	☼	03/10/17 17:08	03/13/17 21:24	1

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.0**		0.060		mg/L		03/10/17 12:20	03/14/17 12:20	1
Barium	**0.45**		0.010		mg/L		03/10/17 12:20	03/13/17 17:16	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:16	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:16	1
Lead	**1.8**		0.030		mg/L		03/10/17 12:20	03/13/17 17:16	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:16	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:16	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.2**		0.1		%			03/10/17 11:55	1
Percent Moisture	**48.8**		0.1		%			03/10/17 11:55	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 51.2

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4500		45		mg/Kg	☼	03/10/17 17:08	03/14/17 12:33	10
Lead	710		2.2		mg/Kg	☼	03/10/17 17:08	03/13/17 21:28	1

1 2 3 4 5 6 7 8 9 10 11

Client Sample ID: WD-SL-79debris_c-030217

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-10

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.4**		0.060		mg/L		03/10/17 12:20	03/14/17 12:23	1
Barium	**0.056**		0.010		mg/L		03/10/17 12:20	03/13/17 17:20	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:20	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:20	1
Lead	**1.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:20	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:20	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:20	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**46.2**		0.1		%			03/10/17 11:55	1
Percent Moisture	**53.8**		0.1		%			03/10/17 11:55	1

Client Sample Results

Client Sample ID: WD-SL-79debris_c-030217
Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-10
Matrix: Solid
Percent Solids: 46.2

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3800		5.6		mg/Kg	☼	03/10/17 17:08	03/13/17 21:31	1
Lead	900		2.8		mg/Kg	☼	03/10/17 17:08	03/13/17 21:31	1

Client Sample ID: WD-SL-79debris_c-030217-(01)
Lab Sample ID: 580-66530-11
Date Collected: 03/02/17 08:35
Matrix: Solid
Date Received: 03/03/17 15:40

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.8**		0.060		mg/L		03/10/17 12:20	03/14/17 12:27	1
Barium	**0.097**		0.010		mg/L		03/10/17 12:20	03/13/17 17:23	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:23	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:23	1
Lead	**0.87**		0.030		mg/L		03/10/17 12:20	03/13/17 17:23	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:23	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:23	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**45.4**		0.1		%			03/10/17 11:55	1
Percent Moisture	**54.6**		0.1		%			03/10/17 11:55	1

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 45.4

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3600		6.4		mg/Kg	☼	03/10/17 17:08	03/13/17 21:35	1
Lead	430		3.2		mg/Kg	☼	03/10/17 17:08	03/13/17 21:35	1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-240266/20-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240266

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		3.0		mg/Kg		03/10/17 17:08	03/13/17 20:06	1
Lead	ND		1.5		mg/Kg		03/10/17 17:08	03/13/17 20:06	1

Lab Sample ID: LCS 580-240266/21-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	205		mg/Kg		103	80 - 120
Lead	50.0	52.1		mg/Kg		104	80 - 120

Lab Sample ID: LCSD 580-240266/22-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	200	212		mg/Kg		106	80 - 120	3	20
Lead	50.0	53.8		mg/Kg		108	80 - 120	3	20

Lab Sample ID: LCSSRM 580-240266/23-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	139	141		mg/Kg		101.6	70.4 - 140.3
Lead	133	144		mg/Kg		108.0	72.9 - 127.8

Lab Sample ID: MB 580-240133/1-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/10/17 12:20	03/13/17 16:30	1
Barium	ND		0.010		mg/L		03/10/17 12:20	03/13/17 16:30	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 16:30	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 16:30	1
Lead	ND		0.030		mg/L		03/10/17 12:20	03/13/17 16:30	1
Selenium	ND		0.10		mg/L		03/10/17 12:20	03/13/17 16:30	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 16:30	1

Lab Sample ID: MB 580-240133/1-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/10/17 12:20	03/14/17 11:34	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 580-240133/2-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.42		mg/L		110	80 - 120
Barium	4.00	4.00		mg/L		100	80 - 120
Cadmium	0.100	0.104		mg/L		104	80 - 120
Chromium	0.400	0.360		mg/L		90	80 - 120
Lead	1.00	0.970		mg/L		97	80 - 120
Selenium	4.00	4.65		mg/L		116	80 - 120
Silver	0.600	0.589		mg/L		98	80 - 120

Lab Sample ID: LCS 580-240133/2-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.34		mg/L		108	80 - 120

Lab Sample ID: LCSD 580-240133/3-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	4.00	4.41		mg/L		110	80 - 120	10	20
Cadmium	0.100	0.114		mg/L		114	80 - 120	9	20
Chromium	0.400	0.398		mg/L		100	80 - 120	10	20
Lead	1.00	1.05		mg/L		105	80 - 120	8	20
Selenium	4.00	5.22	*	mg/L		131	80 - 120	12	20
Silver	0.600	0.653		mg/L		109	80 - 120	10	20

Lab Sample ID: LCSD 580-240133/3-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.26		mg/L		106	80 - 120	2	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-240321/16-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		03/13/17 10:51	03/13/17 17:02	1
Lead	ND		0.00040		mg/L		03/13/17 10:51	03/13/17 17:02	1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-240321/17-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	3.96		mg/L		99	80 - 120
Lead	1.00	0.960		mg/L		96	80 - 120

Lab Sample ID: LCSD 580-240321/18-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.01		mg/L		100	80 - 120	1	20
Lead	1.00	0.967		mg/L		97	80 - 120	1	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 580-240133/1-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240209

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:23	1

Lab Sample ID: LCS 580-240133/2-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240209

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0200	0.0216		mg/L		108	80 - 120

Lab Sample ID: LCSD 580-240133/3-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240209

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0200	0.0215		mg/L		107	80 - 120	1	20

Client Sample ID: GW-MW-12S-030317

Lab Sample ID: 580-66530-1

Date Collected: 03/03/17 01:15
Matrix: Water
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 18:59	HJM	TAL SEA
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		500	240691	03/16/17 08:33	FCW	TAL SEA

Client Sample ID: PP-Bld_B_Sample Ports-030317

Lab Sample ID: 580-66530-2

Date Collected: 03/03/17 01:40
Matrix: Water
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 19:04	HJM	TAL SEA
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		500	240691	03/16/17 08:38	FCW	TAL SEA

Client Sample ID: PP-SL 90-030317

Lab Sample ID: 580-66530-3

Date Collected: 03/03/17 11:30
Matrix: Water
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 19:08	HJM	TAL SEA

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5

Lab Sample ID: 580-66530-4

Date Collected: 03/03/17 10:35
Matrix: Solid
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:20	DSO	TAL SEA

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5

Lab Sample ID: 580-66530-4

Date Collected: 03/03/17 10:35
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 99.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:10	HJM	TAL SEA

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9

Lab Sample ID: 580-66530-5

Date Collected: 03/03/17 11:15
Matrix: Solid
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9

Lab Sample ID: 580-66530-5

Date Collected: 03/03/17 11:15
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 99.1

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:13	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217

Lab Sample ID: 580-66530-6

Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:06	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:10	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 12:01	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240630	03/15/17 16:39	Y1W	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217

Lab Sample ID: 580-66530-6

Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 51.5

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		10	240447	03/14/17 12:30	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217-(01)

Lab Sample ID: 580-66530-7

Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:10	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217-(01)
Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:13	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:45	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217-(01)
Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-7
Matrix: Solid
Percent Solids: 47.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:20	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217
Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:13	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:17	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:47	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217
Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-8
Matrix: Solid
Percent Solids: 51.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:24	HJM	TAL SEA

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:16	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:20	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:49	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 51.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:28	HJM	TAL SEA
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		10	240447	03/14/17 12:33	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217

Lab Sample ID: 580-66530-10

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:20	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:23	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:56	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217

Lab Sample ID: 580-66530-10

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 46.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:31	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35

Matrix: Solid

Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:23	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:27	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:58	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35

Matrix: Solid

Date Received: 03/03/17 15:40

Percent Solids: 45.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:35	HJM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66530-1	GW-MW-12S-030317	Water	03/03/17 01:15	03/03/17 15:40
580-66530-2	PP-Bld_B_Sample Ports-030317	Water	03/03/17 01:40	03/03/17 15:40
580-66530-3	PP-SL 90-030317	Water	03/03/17 11:30	03/03/17 15:40
580-66530-4	SO-SL-90-Pilot_bottom-030317-12-12.5	Solid	03/03/17 10:35	03/03/17 15:40
580-66530-5	SO-SL-90-Pilot_Interfac-030317-8-9	Solid	03/03/17 11:15	03/03/17 15:40
580-66530-6	WD-SL-79debris_a-030217	Solid	03/02/17 08:50	03/03/17 15:40
580-66530-7	WD-SL-79debris_a-030217-(01)	Solid	03/02/17 08:50	03/03/17 15:40
580-66530-8	WD-SL-79debris_b-030217	Solid	03/02/17 08:45	03/03/17 15:40
580-66530-9	WD-SL-79debris_b-030217-(01)	Solid	03/02/17 08:45	03/03/17 15:40
580-66530-10	WD-SL-79debris_c-030217	Solid	03/02/17 08:35	03/03/17 15:40
580-66530-11	WD-SL-79debris_c-030217-(01)	Solid	03/02/17 08:35	03/03/17 15:40

Loc: 580

66530

Chain of Custody Record

CHOC Number: 05_1.1_E52_19868_03032017

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com, sduggan@perc-nw.com

Site Contact:
PIONEER Technologies Corporation
Brad Grimsted
Phone: (360) 570-1700 Email: grimstedb@uspioneer.com

PIONEER Technologies Corporation.
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com
PIONEER TECHNOLOGIES CORPORATION

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica-Tacoma
ELAINE WALKER
Phone: 253.248.4972 Email:

Sample Information — *Special Lab Instructions Included ==>*

Analytes — *<== Special Lab Instructions*

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	EPA 6010C-Inorganic	Metals in Water	TCLP RCRA 8 Metals						Comments for Sample
									X						
GW-MW-12S-030317	03/03/2017	01:15	BG					X							Water from MW-12S
PP-Bld_B_Sample Ports-030317	03/03/2017	01:40	BG					X							
PP-SL-90-030317	03/03/2017	11:30	BG					X							Water from Pilot SL-90 Excavation
~~SO-SL-79-022717-15~~	~~02/27/2017~~	~~00:00~~	~~BG~~				~~X~~								~~Pilot Study: Sample from bottom of~~
SO-SL-90-Pilot_bottom-030317-12-12.5	03/03/2017	10:35	BG				X								
SO-SL-90-Pilot_Interfac-030317-8-9	03/03/2017	11:15	BG				X								
WD-SL-79debris_a-030217	03/02/2017	08:50	BG				X		X						
WD-SL-79debris_a-030217-(01)	03/02/2017	08:50	BG				X		X						
WD-SL-79debris_b-030217	03/02/2017	08:45	BG				X		X						
WD-SL-79debris_b-030217-(01)	03/02/2017	08:45	BG				X		X						
WD-SL-79debris_c-030217	03/02/2017	08:35	BG				X		X						
WD-SL-79debris_c-030217-(01)	03/02/2017	08:35	BG				X		X						

TB ___ Cooler IR5 Cor 14.7 Unc 14.9
Cooler Dsc Med. blue white @ Lab ___
~~Wet/Packs~~ none Packing none
Cli drop w/o CS

Cooler (Yes/No): Cooler Temp:	Turnaround Time: Std	Hazard Identification:	Sample Disposal:	None	HNO3	None						Lab Use Only:
				Preservative								

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:

Relinquished By: (Sign and Print)	Date/Time:	Received By: (Sign and Print)	Date/Time:
1. BRAD Grimsted	3/3/17 3:40	1. [signature] McDermott	3/3/17 1540
2.		2.	
		3.	

580-66530 Chain of Custody

Stat Form: 01 - 07/24/2015

3/17/2017

Special Instructions for Laboratory

CHOC Number: 05_1.1_E52_19868_03032017

Send Results To: munsons@uspioneer.com, jking@perc-nw.com, sduggan@perc-nw.com	**Site Contact:** PIONEER Technologies Corporation Brad Grimsted Phone: (360) 570-1700 Email: grimstedb@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica-Tacoma ELAINE WALKER Phone: 253.248.4972 Email:	**CHOC Version: 0.99.05** Copyright © 2003 - 2015. PIONEER Technologies Corporation All Rights Reserved

Analytical Method	Lab Comments	Specified Analyte	Samples Included
EPA 6010C--Inorganic		Arsenic Inorganic Lead and Compounds	SO-SL-79-022717-15 WD-SL-79debris_a-030217 WD-SL-79debris_a-030217-(01) WD-SL-79debris_b-030217 WD-SL-79debris_b-030217-(01) WD-SL-79debris_c-030217 WD-SL-79debris_c-030217-(01) SO-SL-90-Pilot_bottom-030317-12-12.5 SO-SL-90-Pilot_Interfac-030317-8-9
TCLP RCRA 8 Metals	All 8 metals	Arsenic Inorganic Barium Chromium Total Lead and Compounds Mercury (elemental) Selenium Silver Cadmium	WD-SL-79debris_a-030217 WD-SL-79debris_a-030217-(01) WD-SL-79debris_b-030217 WD-SL-79debris_b-030217-(01) WD-SL-79debris_c-030217 WD-SL-79debris_c-030217-(01)
Metals in Water		Arsenic Inorganic Lead and Compounds	PP-SL-90-030317 PP-Bld_B_Sample Ports-030317 GW-MW-12S-030317

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation | Job Number: 580-66530-1

Login Number: 66530
List Number: 1
Creator: Gonzales, Steve

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Not requested on COC.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	pH adjusted
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66905-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

Kristine D. Allen

Authorized for release by:
3/29/2017 3:18:47 PM

Kristine Allen, Manager of Project Management
(253)248-4970
kristine.allen@testamericainc.com

Designee for

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-66905-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66905-1

Comments
No additional comments.

Receipt
The samples were received on 3/22/2017 10:10 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 8.1° C.

Metals
Method(s) 6020A: The following samples was diluted due to the nature of the sample matrix: PP-BLD_B-PM-PT-032217 (580-66905-4), PP-MW-12i-PM-PT-032217 (580-66905-7), PP-SL-79-PM-PT-032217 (580-66905-10) and PP-SL-90-PM-PT-032217 (580-66905-13). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) 150.1, 9045D: The sample duplicate (DUP) precision for analytical batch 580-241403 was outside control limits. Sample matrix interference is suspected.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Qualifiers

General Chemistry

Qualifier	Qualifier Description
HF	Field parameter with a holding time of 15 minutes. Test performed by laboratory at client's request.
F3	Duplicate RPD exceeds the control limit

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-BLD_B-Freeflow-PT-032217
Lab Sample ID: 580-66905-1
Date Collected: 03/22/17 08:30
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.091**		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:11	5
Lead	ND		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:11	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.2**	**HF**			SU			03/27/17 09:34	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-BLD_B-MFIX-PT-032217
Date Collected: 03/22/17 08:30
Date Received: 03/22/17 10:10

Lab Sample ID: 580-66905-2
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.5**		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:29	5
Lead	ND		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:29	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.3**	**HF**			SU			03/27/17 09:37	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-BLD_B-MFIX-PT-032217-(01)
Date Collected: 03/22/17 08:30
Date Received: 03/22/17 10:10

Lab Sample ID: 580-66905-3
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**1.4**		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:34	5
Lead	ND		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:34	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.3**	**HF**			SU			03/27/17 09:39	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-BLD_B-PM-PT-032217

Lab Sample ID: 580-66905-4

Date Collected: 03/22/17 08:30
Date Received: 03/22/17 10:10
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.61**		0.10	0.027	mg/L		03/24/17 16:46	03/27/17 19:56	100
Lead	ND		0.040	0.0034	mg/L		03/24/17 16:46	03/27/17 19:56	100

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**4.2**	**HF**			SU			03/27/17 09:41	1

Client Sample ID: PP-MW-12i-Freeflow-PT-032217
Lab Sample ID: 580-66905-5
Date Collected: 03/22/17 08:30
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.12**		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:25	5
Lead	ND		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:25	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	**7.1**	**HF**			SU			03/27/17 09:44	1

Client Sample ID: PP-MW-12i-MFIX-PT-032217

Lab Sample ID: 580-66905-6

Date Collected: 03/22/17 08:30
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3.0		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:38	5
Lead	ND		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:38	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.6	HF			SU			03/27/17 09:46	1

Client Sample ID: PP-MW-12i-PM-PT-032217 Lab Sample ID: 580-66905-7

Date Collected: 03/22/17 08:45 **Matrix: Water**
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4.2		0.10	0.027	mg/L		03/24/17 16:46	03/27/17 19:52	100
Lead	ND		0.040	0.0034	mg/L		03/24/17 16:46	03/27/17 19:52	100

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	3.9	HF			SU			03/27/17 09:48	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-SL-79-Freeflow-PT-032217
Lab Sample ID: 580-66905-8
Date Collected: 03/22/17 08:45
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4.4		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:43	5
Lead	0.0036		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:43	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.0	HF			SU			03/27/17 09:50	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Client Sample ID: PP-SL-79-MFIX-PT-032217
Date Collected: 03/22/17 08:45
Date Received: 03/22/17 10:10

Lab Sample ID: 580-66905-9
Matrix: Water

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	11		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:47	5
Lead	0.0070		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:47	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	7.3	HF			SU			03/27/17 09:53	1

Client Sample ID: PP-SL-79-PM-PT-032217
Lab Sample ID: 580-66905-10
Date Collected: 03/22/17 08:45
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	10		0.10	0.027	mg/L		03/24/17 16:46	03/27/17 20:01	100
Lead	ND		0.040	0.0034	mg/L		03/24/17 16:46	03/27/17 20:01	100

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	5.1	HF			SU			03/27/17 09:55	1

Client Sample ID: PP-SL-90-Freeflow-PT-032217 **Lab Sample ID: 580-66905-11**
Date Collected: 03/22/17 09:00 **Matrix: Water**
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.013		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:16	5
Lead	0.0066		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:16	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	12.7	HF			SU			03/27/17 09:57	1

Client Sample ID: PP-SL-90-MFIX-PT-032217

Lab Sample ID: 580-66905-12

Date Collected: 03/22/17 09:00
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.017		0.0050	0.0014	mg/L		03/24/17 16:46	03/28/17 13:20	5
Lead	0.055		0.0020	0.00017	mg/L		03/24/17 16:46	03/28/17 13:20	5

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	12.8	HF			SU			03/27/17 09:59	1

Client: Pioneer Technologies Corporation
TestAmerica Job ID: 580-66905-1
Project/Site: Superlon Metals Fractionation

Client Sample ID: PP-SL-90-PM-PT-032217
Lab Sample ID: 580-66905-13
Date Collected: 03/22/17 09:00
Matrix: Water
Date Received: 03/22/17 10:10

Method: 6020A - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.10	0.027	mg/L		03/24/17 16:46	03/27/17 20:06	100
Lead	ND		0.040	0.0034	mg/L		03/24/17 16:46	03/27/17 20:06	100

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
pH	6.8	HF			SU			03/27/17 10:00	1

1 2 3 4 5 6 7 8 9 10 11

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: LCS 580-241356/18-A
Matrix: Water
Analysis Batch: 241499

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 241356

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	3.86		mg/L		97	80 - 120
Lead	1.00	0.935		mg/L		94	80 - 120

Lab Sample ID: LCSD 580-241356/19-A
Matrix: Water
Analysis Batch: 241499

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 241356

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	3.89		mg/L		97	80 - 120	1	20
Lead	1.00	0.949		mg/L		95	80 - 120	1	20

Lab Sample ID: MB 580-241251/14-B
Matrix: Water
Analysis Batch: 241499

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 241356

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.010	0.0027	mg/L		03/24/17 16:46	03/27/17 15:56	10
Lead	ND		0.0040	0.00034	mg/L		03/24/17 16:46	03/27/17 15:56	10

Lab Sample ID: 580-66905-1 MS
Matrix: Water
Analysis Batch: 241499

Client Sample ID: PP-BLD_B-Freeflow-PT-032217
Prep Type: Dissolved
Prep Batch: 241356

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	ND		4.00	3.81		mg/L		93	80 - 120
Lead	ND		1.00	0.909		mg/L		91	80 - 120

Lab Sample ID: 580-66905-1 MSD
Matrix: Water
Analysis Batch: 241499

Client Sample ID: PP-BLD_B-Freeflow-PT-032217
Prep Type: Dissolved
Prep Batch: 241356

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		4.00	3.79		mg/L		93	80 - 120	1	20
Lead	ND		1.00	0.912		mg/L		91	80 - 120	0	20

Lab Sample ID: 580-66905-1 DU
Matrix: Water
Analysis Batch: 241499

Client Sample ID: PP-BLD_B-Freeflow-PT-032217
Prep Type: Dissolved
Prep Batch: 241356

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	ND		ND		mg/L		NC	20
Lead	ND		ND		mg/L		NC	20

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66905-1

Method: 150.1 - pH (Electrometric)

Lab Sample ID: 580-66905-13 DU
Matrix: Water
Analysis Batch: 241403

Client Sample ID: PP-SL-90-PM-PT-032217
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
pH	6.8	HF	6.6	F3	SU		2	1

Client Sample ID: PP-BLD_B-Freeflow-PT-032217 — Lab Sample ID: 580-66905-1

Date Collected: 03/22/17 08:30 — **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:11	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:34	RSB	TAL SEA

Client Sample ID: PP-BLD_B-MFIX-PT-032217 — Lab Sample ID: 580-66905-2

Date Collected: 03/22/17 08:30 — **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:29	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:37	RSB	TAL SEA

Client Sample ID: PP-BLD_B-MFIX-PT-032217-(01) — Lab Sample ID: 580-66905-3

Date Collected: 03/22/17 08:30 — **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:34	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:39	RSB	TAL SEA

Client Sample ID: PP-BLD_B-PM-PT-032217 — Lab Sample ID: 580-66905-4

Date Collected: 03/22/17 08:30 — **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		100	241499	03/27/17 19:56	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:41	RSB	TAL SEA

Client Sample ID: PP-MW-12i-Freeflow-PT-032217 — Lab Sample ID: 580-66905-5

Date Collected: 03/22/17 08:30 — **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:25	FCW	TAL SEA

Client Sample ID: PP-MW-12i-Freeflow-PT-032217 Lab Sample ID: 580-66905-5

Date Collected: 03/22/17 08:30 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	150.1		1	241403	03/27/17 09:44	RSB	TAL SEA

Client Sample ID: PP-MW-12i-MFIX-PT-032217 Lab Sample ID: 580-66905-6

Date Collected: 03/22/17 08:30 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:38	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:46	RSB	TAL SEA

Client Sample ID: PP-MW-12i-PM-PT-032217 Lab Sample ID: 580-66905-7

Date Collected: 03/22/17 08:45 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		100	241499	03/27/17 19:52	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:48	RSB	TAL SEA

Client Sample ID: PP-SL-79-Freeflow-PT-032217 Lab Sample ID: 580-66905-8

Date Collected: 03/22/17 08:45 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:43	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:50	RSB	TAL SEA

Client Sample ID: PP-SL-79-MFIX-PT-032217 Lab Sample ID: 580-66905-9

Date Collected: 03/22/17 08:45 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:47	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:53	RSB	TAL SEA

Client Sample ID: PP-SL-79-PM-PT-032217 Lab Sample ID: 580-66905-10

Date Collected: 03/22/17 08:45 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		100	241499	03/27/17 20:01	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:55	RSB	TAL SEA

Client Sample ID: PP-SL-90-Freeflow-PT-032217 Lab Sample ID: 580-66905-11

Date Collected: 03/22/17 09:00 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:16	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:57	RSB	TAL SEA

Client Sample ID: PP-SL-90-MFIX-PT-032217 Lab Sample ID: 580-66905-12

Date Collected: 03/22/17 09:00 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		5	241643	03/28/17 13:20	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 09:59	RSB	TAL SEA

Client Sample ID: PP-SL-90-PM-PT-032217 Lab Sample ID: 580-66905-13

Date Collected: 03/22/17 09:00 **Matrix: Water**
Date Received: 03/22/17 10:10

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Filtration	FILTRATION			241251	03/23/17 15:21	ADB	TAL SEA
Dissolved	Prep	3005A			241356	03/24/17 16:46	ADB	TAL SEA
Dissolved	Analysis	6020A		100	241499	03/27/17 20:06	FCW	TAL SEA
Total/NA	Analysis	150.1		1	241403	03/27/17 10:00	RSB	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Laboratory: TestAmerica Seattle

The certifications listed below are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Oregon	NELAP	10	WA100007	11-05-17
Washington	State Program	10	C553	02-17-18

The following analytes are included in this report, but certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
150.1		Water	pH
6020A	3005A	Water	Arsenic
6020A	3005A	Water	Lead

Sample Summary

Client: Pioneer Technologies Corporation
TestAmerica Job ID: 580-66905-1
Project/Site: Superlon Metals Fractionation

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66905-1	PP-BLD_B-Freeflow-PT-032217	Water	03/22/17 08:30	03/22/17 10:10
580-66905-2	PP-BLD_B-MFIX-PT-032217	Water	03/22/17 08:30	03/22/17 10:10
580-66905-3	PP-BLD_B-MFIX-PT-032217-(01)	Water	03/22/17 08:30	03/22/17 10:10
580-66905-4	PP-BLD_B-PM-PT-032217	Water	03/22/17 08:30	03/22/17 10:10
580-66905-5	PP-MW-12i-Freeflow-PT-032217	Water	03/22/17 08:30	03/22/17 10:10
580-66905-6	PP-MW-12i-MFIX-PT-032217	Water	03/22/17 08:30	03/22/17 10:10
580-66905-7	PP-MW-12i-PM-PT-032217	Water	03/22/17 08:45	03/22/17 10:10
580-66905-8	PP-SL-79-Freeflow-PT-032217	Water	03/22/17 08:45	03/22/17 10:10
580-66905-9	PP-SL-79-MFIX-PT-032217	Water	03/22/17 08:45	03/22/17 10:10
580-66905-10	PP-SL-79-PM-PT-032217	Water	03/22/17 08:45	03/22/17 10:10
580-66905-11	PP-SL-90-Freeflow-PT-032217	Water	03/22/17 09:00	03/22/17 10:10
580-66905-12	PP-SL-90-MFIX-PT-032217	Water	03/22/17 09:00	03/22/17 10:10
580-66905-13	PP-SL-90-PM-PT-032217	Water	03/22/17 09:00	03/22/17 10:10

Chain of Custody Record

CHOC Number: 02_1.1_E52_197_21032017

Send Results To:
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ELAINE WALKER
Phone: 253.248.4972 Email:

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	150.2 USEPA pH	Dissolved Metals In Water							Comments for Sample
		Special Lab Instructions Included ==>													*<== Special Lab Instructions*
PP-BLD_B-Freeflow-PT-032217	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-BLD_B-MFIX-PT-032217	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-BLD_B-MFIX-PT-032217-(01)	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-BLD_B-PM-PT-032217	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-MW-12i-Freeflow-PT-032217	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-MW-12i-MFIX-PT-032217	03/22/2017	08:30	sm				X	X							Filter in Lab
PP-MW-12i-PM-PT-032217	03/22/2017	08:45	sm				X	X							Filter in Lab
PP-SL-79-Freeflow-PT-032217	03/22/2017	08:45	sm				X	X							Filter in Lab
PP-SL-79-MFIX-PT-032217	03/22/2017	08:45	sm				X	X							Filter in Lab
PP-SL-79-PM-PT-032217	03/22/2017	08:45	sm				X	X							Filter in Lab
PP-SL-90-Freeflow-PT-032217	03/22/2017	09:00	sm				X	X							Filter in Lab
PP-SL-90-MFIX-PT-032217	03/22/2017	09:00	sm				X	X							Filter in Lab
PP-SL-90-PM-PT-032217	03/22/2017	09:00	sm				X	X							Filter in Lab
Cooler (Yes/No): Cooler Temp:	Turnaround Time: Rush: 5 day TAT	Hazard Identification:	Sample Disposal:				~~HNO_3~~ (w)	None							Lab Use Only:
							Preservative								

QA/QC Requirements:

Sampling Event Comments:

580-66905 Chain of Custody

TB___ Cooler IR5 Cor 8.1 Unc 8.3
Cooler Dsc Lt. blue wht @Lab
Wet/Packs Packing bubble
Cl: drop w/o CS

1. Relinquished By: (Sign and Print) Stacy Munson [signature]	**Date/Time:** 10:10am 3/22/17	**1. Received By:** (Sign and Print) [signature]	**Date/Time:** 3/22/17 1010
2. Relinquished By: (Sign and Print)	**Date/Time:**	**2. Received By:** (Sign and Print)	**Date/Time:**
3. Relinquished By: (Sign and Print)	**Date/Time:**	**3. Received By:** (Sign and Print)	**Date/Time:**

Stat Form: 01 - 07/24/2015 3/29/2017

Special Instructions for Laboratory

CHOC Number: 02_1.1_E52_197_21032017

Send Results To: munsons@uspioneer.com, jking@perc-nw.com, grimstedb@uspioneer.com, sduggan@perc-nw.com	**Site Contact:** PIONEER Technologies Corporation Brad Grimsted Phone: (360) 570-1700 Email: grimstedb@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica-Tacoma ELAINE WALKER Phone: 253.248.4972 Email:	CHOC Version: 0.99.05 Copyright © 2003 - 2015. PIONEER Technologies Corporation All Rights Reserved

Analytical Method	Lab Comments	Specified Analyte	Samples Included
150.2 USEPA pH			PP-BLD_B-Freeflow-PT-032217 PP-BLD_B-MFIX-PT-032217 PP-BLD_B-MFIX-PT-032217-(01) PP-BLD_B-PM-PT-032217 PP-MW-12i-Freeflow-PT-032217 PP-MW-12i-MFIX-PT-032217 PP-MW-12i-PM-PT-032217 PP-SL-79-Freeflow-PT-032217 PP-SL-79-MFIX-PT-032217 PP-SL-79-PM-PT-032217 PP-SL-90-Freeflow-PT-032217 PP-SL-90-MFIX-PT-032217 PP-SL-90-PM-PT-032217
Dissolved Metals In Water - 6010C		Arsenic Inorganic Lead and Compounds	PP-BLD_B-Freeflow-PT-032217 PP-BLD_B-MFIX-PT-032217 PP-BLD_B-MFIX-PT-032217-(01) PP-BLD_B-PM-PT-032217 PP-MW-12i-Freeflow-PT-032217 PP-MW-12i-MFIX-PT-032217 PP-MW-12i-PM-PT-032217 PP-SL-79-Freeflow-PT-032217 PP-SL-79-MFIX-PT-032217 PP-SL-79-PM-PT-032217 PP-SL-90-Freeflow-PT-032217 PP-SL-90-MFIX-PT-032217 PP-SL-90-PM-PT-032217

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation

Job Number: 580-66905-1

Login Number: 66905
List Number: 1
Creator: Torres, Terri L

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	Received same day of collection; chilling process has begun.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

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Attachment B-2: Free Flow Technologies Bench-Scale Treatability Study Report

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Superlon Soil Amendment Treatability Study
Prepared for Pioneer Technologies Corporation
By Robert Stanforth, Ph.D., TRC Applied Chemistry Laboratory
November, 2016

Background

A study was conducted on amendments that could be introduced into backfill material that will be placed in contact with arsenic-contaminated groundwater from the Superlon site in Tacoma Washington. Pioneer sent samples of the backfill soil and two samples of groundwater (nominally 2 mg/L and 100 mg/L arsenic) to the TRC Applied Chemistry for testing. Pioneer had originally contacted Free Flow Technologies, of Rockford, IL for testing of their reagents. Free Flow Technologies suggested that TRC do the testing directly for Pioneer. Since the contact came through Free Flow, the appropriate Free Flow products (specifically FF-200 + FS) were used in the testing.

Methods.

The backfill soil contained both fine and sand-size material as well as larger gravel size material. The gravel size material interferes with the testing, and so the backfill was sieved using a ¼" mesh size sieve, and the smaller fraction used in the testing. The smaller fraction consisted of 50% of the total, by weight.

FF-200 + FS contains two components – an iron source and a pH buffer. The treatment is based on the sorption of arsenic and lead on ferric hydroxide. The sorption process is much greater if the ferric hydroxide is freshly formed, so the reagent consists of an iron source and a buffer to precipitate the iron without raising the pH to too high a level. Various blends of these reagents were used in the testing, ranging from a 1:1 blend to a 2:1 blend of the buffer to iron source.

The soil was mixed with the treatment reagent, allowed to sit for about an hour, and then mixed with one of the two samples of groundwater. The slurry was allowed to sit overnight and then centrifuged, filtered, and the filtrate analyzed for arsenic and lead concentrations using inductively coupled plasma-atomic emission spectrometry (ICP).

Several rounds of testing were conducted using varying solid solution ratios (i.e. the amount of soil and groundwater in the sample). The solid:solution ratio is particularly important in this testing, as the additive is being added to the soil but then used to treat contaminants in the groundwater. Treatment depends on having sufficient iron in the soil to adsorb the arsenic in the groundwater. The amount of iron in contact with the water depends both on the amount of additive in the soil and on the amount of soil in contact with the water, as indicated by the solid:liquid ratio. Since the soil will be used as backfill, the groundwater will be present in the pores in the soil, which means that in the field there will be a very high solid:solution ratio and the treatment testing should reflect this high solid:liquid ratio. Since the soil is simply the carrier for the treatment additives being used to remediate the groundwater, the composition of the soil itself is not crucial, hence the removal of the larger particle size pieces from the soil does not influence the dose being used. The dose used in the testing is the same whether the complete soil is used or just the finer fraction. In other words, if the testing indicates that a 1.0% dose should be used then a 1.0% dose is needed for the total soil as well as for the finer fraction. No correction should be made for using just the finer fraction in the testing.

The initial tests used 20 mL or water mixed with 20 g soil (wet weight) or a 1:1 solid:solution ratio. The slurry was placed in 50 mL centrifuge tubes for ease in the separation. The soil settled to the bottom with a significant volume of water above it. However, in the field the solid:solution ratio will be much higher (i.e. the amount of water in the pores of the soil will be much less than the weight of the soil), and a second round of tests were run using more realistic solid:solution ratios. Also this testing was done by placing the soil and water in a 40 mL VOA vial that was completely filled, thus eliminating any air contact with the slurry. Two solid:solution ratios were used, one in which the vials was filled with backfill soil and then sufficient water added to saturate the soil, and a second which used half the amount of soil required to fill the vial, and then the vial was filled with water. Both the amount of soil and water were measured for each vial. The saturated vials had a solid:solution ratio of 5:1 (i.e. 50 g of soil contained 10 g (or mL) of water). The vials with half as much soil had a solid:solution ratio of 1.27:1. A picture of the vials is shown below:

Results

Treatment Testing

The results of the testing are given in Table 1. The groundwater samples had initial dissolved arsenic concentrations of 3.0 mg/L for the low arsenic water and 37.6 mg/L for the high arsenic water. All the treatment dosages added were successful in bring the arsenic concentrations to below the target concentration of 0.66 mg/L. A 0.25% dose of the FF-200 FS (1:1 ratio) brought arsenic down to below the treatment criterion in the saturated soil test. The higher buffer:iron source ratios resulted in higher final pH values in the water. Since arsenic adsorption is stronger at slightly acidic pH values than at slightly basic pH values, the 1:1 buffer:iron reagent is recommended. Lower doses of reagent were not tested due to the difficulty of homogeneously mixing such a small amount of dry treatment reagent in the soil to ensure uniform treatment.

Interestingly, the backfill itself with no treatment reagent lowered the arsenic concentration from the original groundwater concentration (as shown in the "None" row in the saturated soil sections of the table), presumably due to adsorption on the soil components in the backfill. The concentration was lowered to below the treatment criterion in the 3.0 mg/L sample (to 0.15 mg/L), and to slightly above the criterion in the 37.6 mg/L groundwater (to 0.94 mg/L versus the criterion of 0.66 mg/L). If the initial arsenic concentration had been higher, presumably the final concentration would be higher as well. This suggests that the soil used in areas with lower arsenic concentration groundwater may not need additional treatment. However, addition of a small amount of the FF-200 FS would provide insurance of the treatment effectiveness.

Based on the results, a dose of 0.25% FF-200 FS (at a 1:1 ratio) is recommended.

Compositional Analysis

The treatment process removes arsenic from the groundwater by binding the arsenic to particulates in the soil. During the process the compositional levels of arsenic in the soil will increase. The increase can be calculated if the solid:solution ratio is known. For the saturated soil samples (which approximates field conditions) the solid solution ratio was 5:1. Thus 500 g of soil will contain 100 mL water. Assuming the water has 100 mg/L arsenic, the increase in compositional arsenic will be

(100 mg/L As x 0.10 L) / 500 g soil = 20 mg/kg As.

For the 37.6 mg/L arsenic concentration sample, the increase is 7.5 mg/kg arsenic.

Table 1. Groundwater Treatability Study Results

<table>
<tr><th colspan="2">Sample</th><th colspan="3">Results</th></tr>
<tr><th>Reagent (FF-200 + FS)</th><th>Dose, %</th><th>pH</th><th>Arsenic, mg/L</th><th>Lead, mg/L</th></tr>
<tr><td colspan="3">Treatment Criteria</td><td>0.66</td><td>Not Specified</td></tr>
<tr><td colspan="5">Low Arsenic Groundwater</td></tr>
<tr><td colspan="2">Untreated</td><td>6.99</td><td>3.0</td><td>0.17</td></tr>
<tr><td colspan="5">1:1 solid:liquid ratio</td></tr>
<tr><td rowspan="3">1:1 FF-200:FS</td><td>0.50</td><td>6.64</td><td>0.049</td><td>0.017</td></tr>
<tr><td>1.0</td><td>6.38</td><td>0.012</td><td>0.0286</td></tr>
<tr><td>2.0</td><td>6.28</td><td>0.002</td><td>0.051</td></tr>
<tr><td rowspan="2">3:2 FF-200:FS</td><td>1.0</td><td>7.30</td><td>0.006</td><td>0.0104</td></tr>
<tr><td>2.0</td><td>7.51</td><td>0.010</td><td>0.0165</td></tr>
<tr><td rowspan="2">2:1 FF-200:FS</td><td>1.0</td><td>7.93</td><td>0.023</td><td>0.0105</td></tr>
<tr><td>2.0</td><td>9.33</td><td>0.011</td><td>0.0221</td></tr>
<tr><td colspan="5">Saturated soil (5:1 solid:liquid ratio)</td></tr>
<tr><td rowspan="4">1:1 FF-200:FS</td><td>None</td><td rowspan="4">Not Measured</td><td>0.150</td><td>0.083</td></tr>
<tr><td>0.25</td><td>0.140</td><td>BD</td></tr>
<tr><td>0.50</td><td>0.020</td><td>BD</td></tr>
<tr><td>1.0</td><td>0.020</td><td>0.04</td></tr>
<tr><td colspan="5">High Arsenic Groundwater</td></tr>
<tr><td colspan="2">Untreated</td><td>6.65</td><td>37.6</td><td>0.075</td></tr>
<tr><td colspan="5">1:1 solid:liquid ratio</td></tr>
<tr><td rowspan="5">1:1 FF-200:FS</td><td>0.50</td><td>6.56</td><td>0.013</td><td>0.0158</td></tr>
<tr><td>1.0</td><td>6.19</td><td>BD</td><td>0.0246</td></tr>
<tr><td>2.0</td><td>6.18</td><td>BD</td><td>0.0516</td></tr>
<tr><td>3.0</td><td>6.09</td><td>BD</td><td>0.0861</td></tr>
<tr><td>4.0</td><td>5.95</td><td>BD</td><td>0.138</td></tr>
<tr><td rowspan="2">3:2 FF-200:FS</td><td>1.0</td><td>7.50</td><td>0.053</td><td>0.016</td></tr>
<tr><td>2.0</td><td>7.53</td><td>0.024</td><td>0.015</td></tr>
<tr><td rowspan="2">2:1 FF-200:FS</td><td>1.0</td><td>8.13</td><td>0.192</td><td>0.0383</td></tr>
<tr><td>2.0</td><td>9.50</td><td>0.105</td><td>0.0146</td></tr>
<tr><td colspan="5">1.27:1 solid:liquid ratio</td></tr>
<tr><td rowspan="4">1:1 FF-200:FS</td><td>None</td><td>7.38</td><td>7.72</td><td>0.023</td></tr>
<tr><td>0.25</td><td>6.96</td><td>0.113</td><td>0.0075</td></tr>
<tr><td>0.50</td><td>6.65</td><td>0.031</td><td>0.022</td></tr>
<tr><td>1.0</td><td>6.43</td><td>0.019</td><td>0.014</td></tr>
<tr><td colspan="5">Saturated Soil (5:1 solid:liquid ratio)</td></tr>
<tr><td rowspan="4">1:1 FF-200:FS</td><td>None</td><td rowspan="4">Not Measured</td><td>0.94</td><td>0.038</td></tr>
<tr><td>0.25</td><td>0.059</td><td>BD</td></tr>
<tr><td>0.50</td><td>0.257</td><td>BD</td></tr>
<tr><td>1.0</td><td>0.229</td><td>BD</td></tr>
</table>

Superlon Site Perched Water Treatability Study
Prepared for Pioneer Technologies
By Robert Stanforth, Ph.D.
TRC Applied Chemistry Laboratory
June, 2017

Background

Some perched water samples form the Superlon site were found to contain elevated levels of arsenic and lead. Pioneer Technologies requested that a treatability study be run on the samples to see if one of the reagents used for treatment at the site – Free Flow 200-FS (1:1) – could be used to treat the perched water.

Methods and Results

A sample of the perched water labelled SL-79 was sent to the TRC Applied Chemistry Laboratory. The sample had a significant amount of suspended solids, which occupied approximately half the bottle when settled. Analysis of both the total and dissolved levels of arsenic and lead indicated that much of the arsenic and almost all the lead is contained in the particulates, with the supernatant concentrations being much lower (Table 1). Since the solids readily settle out, treatment testing was done on the supernatant after the solids have settled.

Table 1. Total and dissolved arsenic and lead concentrations in SL-79 water and solids

Sample	Results		
Perched Water			
Handling	pH	As, mg/L	Pb, mg/L
Total (including solids)	7.37	95	137
Dissolved		6.1	0.02

FF-200 FS consists of two components; FF-200 which is a pH buffer and FS. Treatment was conducted by adding varying amounts of FS to 250 mL samples of the SL-79 water. The reagent was allowed to react, then the sample divided into 50 aliquots in centrifuge tubes. Varying amounts of FF-200 were added and the samples shaken. The samples were then allowed to sit overnight, centrifuged and filtered, and the filtrate analyzed for arsenic and lead. The results are given in Table 2. The results indicate that the FF-200 FS 1:1 (i.e. the 0.1% FS : 0.1% FF-200 or 0.2% FS : 0.2% FF-200) effective treats the water. The lowest dose tested – 0.2% - brings both lead and arsenic to well below the treatment criteria for the water.

Conclusions

FF200-FS (1:1) can effectively treat the arsenic in the perched groundwater at SL-79 at doses of 0.2% and above.

Table 2. Treatment testing results on SL-79 water

Sample			Results		
FS	FF-200	Total Additive	pH	As, mg/L	Pb, mg/L
Untreated			7.50	4.43	0.03
0.1% FS	0	0.1%	6.31	<0.01	0.03
	0.1%	0.2%	6.64	0.03	0.02
	0.2%	0.3%	7.03	<0.01	0.03
	0.3%	0.4%	8.28	0.01	0.01
0.2% FS	0	0.2%	6.14	<0.01	0.05
	0.2%	0.4%	6.67	0.02	0.04
	0.4%	0.6%	7.01	0.02	0.03
	0.6%	0.8%	8.43	0.02	0.02
Treatment Criteria			-	0.66	Not Specified

Note: Doses based on weight of additive to volume of water, e.g. 0.1% = 1 g per 1000 mL water (or 0.1% by weight)

Attachment B-3: Peroxychem Bench-Scale Treatability Study Report

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30 December 2016

Brad Grimsted M.S., M.B.A.
Project Manager
PIONEER Technologies Corporation
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901

Subject: Phase I and Phase II Bench-scale Treatability Investigation Results, Superlon Site, Tacoma WA

Dear Mr. Grimsted:

A bench-scale treatability study was conducted to determine if aqueous concentrations of arsenic and lead in groundwater from the Superlon site in Tacoma, WA ("the Site") could be reduced by treatment with PeroxyChem's MetaFix® reagent. Sharp reductions in aqueous metal concentrations were observed during an initial bench-scale treatability test; however, a second bench-scale treatability study was commissioned to more accurately determine the dosage requirements of the MetaFix reagents. This report provides a summary of the results from both the original bench-scale study (Phase I) and the subsequent dosage optimization study (Phase II).

Phase I Treatability Test

Baseline Characterization of Groundwater Sample

A groundwater sample was received on 27 April 2016 and analyzed to determine the baseline pH and heavy metal concentrations. The water sample, GW-MW-125-042216, (hereinafter MW-125) was used in the Phase I treatability test.

The values reported for the MW-125 water represent soluble metals as determined by ICP analysis of a filtered (0.45 µm, glass fiber) water sample. Water samples were filtered prior to metals analyses to make the test more representative of flowing groundwater in the aquifer. Use of a 0.45 µm glass fiber filter is considered to be standard practice in metals treatment work because the pore size is small enough to remove most suspended particulate and the glass fiber filter composition ensures that colloidal organic particles will not be adsorbed. The baseline metals concentrations in Site groundwater sample are presented in Table 1.

Table 1: Baseline metals concentrations and pH in as received Site groundwater sample.

		Metals		GW pH
Sample ID	Units	Arsenic	Lead	(SU)
MW-125	mg/L	56.1	<0.03	5.14

Treatability Study Set-up for Phase I

Based on the observed baseline pH and heavy metals concentrations (Table 1), testing was conducted on 200 mL samples of the MW-125 groundwater in amber glass reaction vessels that had previously received the specified mass (1.0% or 2.0% w/w) of the appropriate MetaFix reagent (I-6A or I-7A). The reaction vessels were then sealed with Teflon® lined lids, and tumbled daily during a 7 day reaction period. Upon completion of the reaction period, the samples were filtered through a 0.45 µm glass fiber filter and analyzed for metals by ICP.

Phase I Results

Substantial reductions in soluble arsenic were observed in response to all MetaFix treatments. Soluble lead was below the detection limit in the control as well as all the treatments. The results of the treatability testing are presented in Table 2.

Table 2. Influence of MetaFix treatments on soluble heavy metals concentrations.

Control/Treatment	Units	Metals		pH (s.u.)
		Arsenic	Lead	
Control (no amendments)	mg/L	76	<0.03	7.34
1.0 wt% MetaFix I-6A	mg/L	0.14	<0.03	7.27
2.0 wt% MetaFix I-6A	mg/L	0.16	<0.03	7.80
1.0 wt% MetaFix I-7A	mg/L	0.06	<0.03	7.55
2.0 wt% MetaFix I-7A	mg/L	0.04	<0.03	8.02

Equivalent reductions in soluble arsenic were observed in response to the low (1.0% w/w) and high (2.0% w/w) doses of the two MetaFix reagents. The reduction in soluble arsenic for the I-6A reagent was approximately 99.8% to <0.2 mg/L. The reduction in soluble arsenic for the I-7A reagent was approximately 99.9% to <0.1 mg/L. Hence, both treatments at both the low and high doses reduced soluble arsenic to well below the remedial objective of 0.67 mg/L. The soluble lead concentration was below the method detection limit in the untreated control and all the MetaFix treatments so the influence of treatments upon soluble lead could not be determined.

Phase II Treatability Test

Baseline Characterization of Soil and Groundwater Samples

One soil and two groundwater samples were received on 26 October 2016 and submitted for determination of baseline pH and heavy metal concentrations. These samples were used for the Phase II treatability test.

- Soil-SO Backfill-102416-0-0.5 (hereinafter SO-Backfill)
- GW-MW-11S (hereinafter MW-11S)
- GW-MW-12S (hereinafter MW-12S)

For soil, the total compositional metals analysis was based on a simplified soil digestion procedure. The procedure is similar to the SW-846 Method 3050B; however, 6N HNO_3/4 N HCl (Aqua Regia, slightly diluted) was used rather than additions of concentrated acid as in the SW-846 method. Furthermore, in the compositional procedure, the samples were heated, and the total digestion time was 3 hours. The baseline metals values reported for the groundwater samples represent soluble metals determined by ICP analysis of filtered (0.45 µm, glass fiber) samples. Water samples were filtered prior to metals analyses to make the test more representative of flowing groundwater in the aquifer. The use of a 0.45 µm glass fiber filter is considered to be standard practice in metals treatment work because the pore size is small enough to remove most suspended particulate and the glass fiber filter composition ensures that colloidal organic particles will not be adsorbed. The baseline metals concentrations in Site soil and groundwater samples are presented in Table 3.

Table 3: Baseline metals concentrations and pH in as received Site groundwater and soil samples.

Sample ID	Units	Metals		pH (s.u.)
		Arsenic	Lead	
SO-Backfill	mg/kg	1.8	2.5	7.59
MW-12S	mg/L	2.9	0.15	6.36
MW-11S	mg/L	30.9	<0.03	6.78

Phase II Results

For the MW-12S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil), the soluble arsenic concentration in the control was below the remedial goal (0.67 mg/L); however, substantial reductions in soluble arsenic were observed in response to each of the MetaFix treatments. The results suggest that, for this soil/groundwater blend, even the lowest MetaFix dosage tested (0.25% w/w) will result in reduction of soluble arsenic to below the method detection limit of 0.030 mg/L. This was true for both MetaFix I-6A and MetaFix I-7A. Soluble lead was below the detection limit in the control and all the treatments, hence, it is not possible to draw conclusions about the influence of the various MetaFix dosages on soluble lead in this soil/groundwater blend.

Table 4: Influence of MetaFix treatments on soluble metals concentrations in the MW-12S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil).

Control/Treatment	Metals (mg/L)		pH (SU)
	Arsenic	Lead	
Control (no treatment)	0.24	<0.030	7.09
0.25% I-6A	<0.030	<0.030	7.18
0.5% I-6A	0.037	<0.030	7.22
1.0% I-6A	0.037	<0.030	7.24
2.0% I-6A	0.037	<0.030	7.31
0.25% I-7A	<0.030	<0.030	7.24
0.5% I-7A	<0.030	<0.030	7.23
1.0% I-7A	0.042	<0.030	7.27
2.0% I-7A	<0.030	<0.030	7.31

Table 5: Influence of MetaFix treatments on soluble metals concentrations in the MW-11S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil).

Control/Treatment	Metals (mg/L)		pH (SU)
	Arsenic	Lead	
Control (no treatment)	5.69	<0.030	6.99
0.25% I-6A	0.23	<0.030	6.99
0.5% I-6A	0.072	<0.030	7.05
1.0% I-6A	<0.030	<0.030	7.06
2.0% I-6A	0.041	<0.030	7.14
0.25% I-7A	0.38	<0.030	7.05
0.5% I-7A	0.042	<0.030	7.09
1.0% I-7A	0.057	<0.030	7.17
2.0% I-7A	0.11	<0.030	7.26

For the MW-11S groundwater/SO-Backfill soil blend (200 mL groundwater/50.0 g soil), the soluble arsenic concentration in the control was 5.69 mg/L – nearly ten-fold above the remedial goal (0.67 mg/L). Substantial reductions in soluble arsenic were observed in response to each of the I-6A MetaFix treatments, and a positive dosage response was observed from as dosage was increased from 0.25% to 0.5% to 1.0% (w/w). At the 1.0% w/w dosage, soluble arsenic fell to below the method detection limit of 0.03 mg/L. When the I-6A dosage was further increased to 2.0% w/w the observed soluble arsenic concentration was 0.041 mg/L, which is probably not significantly different from the value observed for the 1.0% w/w dosage. The results suggest that, for this soil/groundwater blend, even the lowest MetaFix dosage tested (0.25% w/w) would result in reduction of soluble arsenic to below the remedial objective of 0.67 mg/L; however, more complete removal of arsenic was observed as dosage increased up to 1.0% w/w. The results also suggest that performance was slightly better with the I-6A than with the I-7A reagent. The observed performance, and the fact that the I-6A reagent has a lower selling price than the I-7A reagent, makes it clear that the best approach for treatment of arsenic at the Site would be MetaFix I-6A. Regarding dosage, our recommendation would be to go with either 0.5% or 1.0% w/w to provide a margin of safety and greater longevity of treatment.

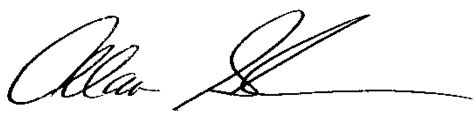
As noted above, for the other groundwater/soil blend, the soluble lead concentration in the MW-11S groundwater/SO-Backfill soil blend lead was below the detection limit in the control and all the treatments, hence, it is not possible to draw conclusions about the influence of the various MetaFix dosages on soluble lead in this soil/groundwater blend.

Summary and Conclusions

In summary, the results of treatability testing reported here indicate that MetaFix treatment can reduce soluble concentrations of arsenic in water from the Site to well below the remedial objective. The results suggest also indicate that the MetaFix I-6A formulation is somewhat more effective than the I-7A formulation for treatment of arsenic. The dosage response results suggest that even the lowest evaluated dosage (0.25% w/w) could result in achievement of the Site remedial objective; however, the positive response to increasing dosage indicates that a one of the higher dosages (i.e., 0.5% or 1.0%) would provide increased assurance of high removal efficiency. It should also be noted that use of a higher dosage would make adequate distribution of the MetaFix reagent within the backfill matrix easier to achieve.

If you have questions regarding these results, please contact me at 949-514-1068.

Sincerely,



Alan Seech, Ph.D.
Senior Manager – Technology Applications
PeroxyChem Environmental Solutions

Copy: Stacey Telesz – PeroxyChem

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Attachment B-4: Premier Magnesia Bench-Scale Treatability Study Report

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200 E Lincoln Street
Mount Horeb, WI 53572
(608) 437-7413

November 28, 2016

Mr. Derek Pizarro
Premier Magnesia, LLC
1275 Drummers Lane, Suite 102
Wayne, PA 19087

Subject: Pioneer Technologies Corporation – Superlon Site Tacoma, WA.

Mr. Pizarro:

Ursus Remediation Testing & Technologies, LLC (Ursus) is pleased to provide Premier Magnesia LLC, (Premier) this report for treatability testing for the Pioneer Technologies Corporation – Superlon Site Tacoma, WA.

OBJECTIVE

The objective of the study was to evaluate the effectiveness of EnviroBlend® treated backfill material to lower dissolved phase arsenic and lead in groundwater when the treated backfill is placed in the saturated zone. The remedial objective is to reduce groundwater arsenic concentrations to < 666 ug/L and groundwater lead concentrations to < 1,650 ug/L.

BACKGROUND

One backfill material and two groundwater samples were received for the study on October 26, 2016. A description of the samples and comments are shown in Table 1.

Table 1.
Samples Received for Treatability Testing

Sample Name	Sample Date	Matrix	Comments
SO-Backfill-102416 0-0.5	10/24/16	Soil	Backfill material.
GW-MW-11S-Low 102416-(20). Low GW	10/24/16	GW	Sample received in 4 individual liter plastic containers, unpreserved. Some headspace in each container.
GW-MW-11S-High 102416-(20). High GW	10/24/16	GW	Sample received in 4 individual liter plastic containers, unpreserved. Some headspace in each container.

MATERIAL & METHODOLOGY

Backfill material was sieved to separate material > 3/8" in size. Material sized < 3/8" was treated with EnviroBlend® HXD. The EnviroBlend® HXD backfill was leached with the low concentration groundwater (GW-MW-11S-Low 102416-(20)) Low GW and the high concentration groundwater (GW-MW-11S-High 102416-(20)) High GW.

Leaching was performed in a Zero Headspace Extractor (ZHE) to retain redox conditions of groundwater. The mobility of arsenic is dependent on the oxidation state of arsenic. If groundwater arsenic is as arsenite (reduced As) and leached with exposure to air/headspace, then arsenite can be oxidized to arsenate. Arsenate is less soluble than arsenite; possibly biasing the treatment effectiveness by lowering dissolved phase total arsenic due to redox changes of arsenic. Therefore, if the groundwater is exposed to air during treatment/leaching in the laboratory, it may not model the disposal setting and may give false positives of performance.

Backfill material to groundwater ratio was performed at a 1:20 ratio (10g of backfill to 200 mls of GW). A ratio of 1:20 was performed to show the capacity of EnviroBlend® HXD treated backfill to stabilize arsenic and lead containing groundwater over time. Leachates where filtered through a 0.45µ filter prior to metal analysis.

Ursus is not a NELAC certified laboratory; therefore, results are screening results. Screening results are not intended for regulatory compliance.

RESULTS

Sizing of the backfill material was performed where the mass of backfill material > 3/8" and < 3/8" were determine. Testing found 54% by weight of the backfill was < 3/8" and 46% of the backfill material was > 3/8". For treatability testing, only the 3/8" material was used.

Compositional analysis of the < 3/8/" backfill material was performed. Testing found a total arsenic concentration of 0.88 mg/kg dry wt., 2.22 mg/kg lead dry wt., a total solids of 95%, and a bulk density of 2.18 tons/yard^3.

Total background analysis of the low and high GW samples is shown in Table 2. Arsenic concentrations exceeded the remedial objective of 666 ug/L (0.666 mg/L) for the Low GW and high GW samples. Low GW and High GW samples did not exceed the lead remedial objective of 1,650 ug/L (1.650 mg/L). Therefore, arsenic is the primary driver for treatment.

Table 2.
Dissolved Arsenic, Lead and pH of the Low and High Groundwater.

Sample Name	Arsenic, mg/L	Lead, mg/L	pH
Remedial Objective	0.666	1.650	-
GW-MW-11S-Low 102416-(20). Low GW	2.75	0.29	6.81
GW-MW-12S-High 102416-(20). High GW	36.7	0.076	6.41

Backfill material (<3/8/") was leached with the Low GW sample and the High GW sample in an "as is" untreated manner to determine baseline concentrations of GW with backfill alone. Leaching of untreated backfill material with the Low and High GW samples (Table 3) found lower arsenic concentrations when compared to background concentrations (Table 2). Thereby, the backfill material alone has properties to stabilize arsenic, but the level of stabilization is not enough to meet the remedial objective.

The <3/8" backfill material was treated with EnviroBlend® HXD at 3%, 4% and 5% by weight and leached with Low and High GW (Table 3). The low GW sample was effectively treated and met the remedial objective with a 3% EnviroBlend® HXD dosage. A 4% EnviroBlend® HXD dosage met the remedial objective for the High GW sample. In fact, the treatments reduced both arsenic and lead below their respective detection limit.

Table 3.
Screening Leaching Results of Untreated and EnviroBlend® HXD Treated Samples

Sample Name	EnviroBlend® Dosage		Treated Water Test Results, Dissolved Metals (<0.45u)		
	Chemical	Percentage wt./wt.	Final pH	Arsenic, mg/L	Lead, mg/L
Remedial Objective	-	-	-	0.666	1.650
GW-MW-11S-Low 102416-(20). Low GW	Untreated	-	7.28	1.92	0.092
	EnviroBlend® HXD	3%	6.52	<0.030	<0.030
GW-MW-12S-High 102416-(20). High GW	Untreated	-	7.26	23.0	<0.030
	EnviroBlend® HXD	3%	6.24	1.31	<0.030
		4%	6.06	<0.030	<0.030
		5%	5.66	<0.030	<0.030

This study designed testing to minimize oxidation of arsenite to arsenate by leaching samples in a ZHE. The ZHE provided a leaching environment free of air so arsenic oxidation could not occur. This better represents the disposal setting where groundwater low in oxygen and low in ORP will be exposed to treated backfill.

EnviroBlend® HXD was shown to be effective in treating arsenic and lead in groundwater at the Superlon site. EnviroBlend® HXD has demonstrated the ability to treat at least 100 PV of GW that may infiltrate the backfill material to <0.030 mg/L As and <0.030 mg/L Pb.

Sincerely,

Andrew Wenzel

Andrew Wenzel
Principal

Ursus Remediation Testing & Technologies, LLC
200 E Lincoln Street, Mount Horeb, WI 53572

Appendix C

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Appendix C: Pilot Study Findings and Key Learnings

for the

Superlon Plastics Site
Tacoma, Washington

Prepared for:

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and

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June 2017

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Table of Contents

Figures

Attachments

Acronyms and Abbreviations

Acronym/Abbreviation	Description
ACI	Active Construction, Incorporated
bgs	Below Ground Surface
COC	Constituent of Concern
EC	Excavation Cell
Ecology	Washington State Department of Ecology
FS-OSP	Feasibility Study for On-Property Soils and Perched Water
HASP	Health and Safety Plan
MW	Monitoring Well
PERC	Pacific Environmental and Redevelopment Corporation
Pilot Study	Pilot Study for On-Property Soils and Perched Water
PIONEER	PIONEER Technologies Corporation
Property	Superlon Plastics Property
PW	Perched Water
RAO	Remedial Action Objective
RI	Remedial Investigation
RELs	Remedial Levels
Site	Superlon Plastics Site
SOW	Scope of Work
SWPPP	Storm Water Pollution Prevention Plan
TCLP	Toxicity Characterization Leaching Protocol
XRF	X-Ray Fluorescence

C1 Introduction

This appendix describes the findings and key learnings from the Pilot Study for On-Property Soils and Perched Water (Pilot) conducted at the Superlon Plastics Site (Site), between February 20 and March 3, 2017. The Pilot Study was completed to further evaluate the remedial options described in the Feasibility Study for On-Property Soils and Perched Water (FS-OSP) that was submitted to the Washington State Department of Ecology (Ecology) in December of 2014. Ecology approved the FS-OSP in January of 2015, and verbally requested that the approved remediation processes be re-evaluated to determine if the time to meet remedial action objectives (RAOs) could be shortened.

During the subsequent remedial design process, it became apparent that some of the remedial processes/methodologies that were proposed in the FS-OSP could be improved upon to be more efficient and still meet RAOs. This discovery led to the need for a Pilot Study to evaluate and prove the technical feasibility and effectiveness of the approved and revised remedial processes and methodologies. The details of the Pilot were presented to Ecology in a work plan (Pacific Environmental and Redevelopment Corporation [PERC]/PIONEER Technologies Corporation [PIONEER], 2017). This appendix presents the Pilot findings and any deviations from the scope of work (SOW) proposed in the work plan.

C1.1 Pilot Goals

The goal of the Pilot Study was to evaluate the effectiveness of the approved and revised processes and methodologies for remediating soil and perched water (PW) located on the Superlon Plastics Property (Property).

C1.2 Pilot Objectives

The Pilot Study's objectives were to complete the following tests:

- **Test 1:** Determine the effectiveness of screening and reuse of oversized rock and debris for different waste types using various methods and procedures for excavating, processing, and treating soil;
- **Test 2:** Determine a predictable production rate;
- **Test 3:** Determine the most efficient approach to mix stabilization additives with wet soil from each waste type and confirm that hazardous soil can be treated to no longer be characteristically hazardous (i.e., the Toxicity Characterization Leaching Protocol [TCLP] results are less than 5 mg/L for arsenic and lead); and
- **Test 4**: Determine the specific additive, dose rate, and mixing method to treat PW in order to reduce dissolved arsenic and lead concentrations.

The following sections present the SOW (and any changes to the SOW), results, findings, and key learnings for tests 1 through 4.

C2 Pre-Pilot Activities

C2.1 Pilot Logistics

PERC and PIONEER completed the Pilot using leased equipment. TestAmerica of Tacoma, Washington served as the project laboratory. Active Construction, Incorporated (ACI) of Puyallup, Washington, acted as the general contractor

C2.2 Excavation Cell Selection Criteria

The pre-Pilot activities included the selection of excavation cells (ECs) based on certain criteria. Excavation areas (ECs[1]) were determined based on waste types and physical characteristics of the soil to be tested. The criteria used was as follows:

- Each EC contained both types of waste (i.e., non-hazardous and characteristically hazardous);
- Each EC contained the highest concentration of constituents of concern (COCs) possible within the waste type, so that the effectiveness of the process could be tested;
- One EC had material to be excavated at the maximum depth of the planned remediation (15 feet below ground surface [bgs]);
- One EC had material to be excavated at the minimum depth of the planned remediation (4 feet to 6 feet bgs); and
- No EC was located under an existing stockpile or a structure.

In addition to the physical characteristics, the ECs were selected to represent the three most predominant waste types on the Property, including:

- A silt, sand, and debris mixture, located in the south, south west and south east areas of the Property;
- A clay-rich silt and debris mixture, located in the former production area; and
- A sand, gravel, and hydrated lime mixture, located in the northern area of the Property.

C2.3 Pilot Excavation Cells

The following ECs (see Figure C-1) were chosen for the Pilot to represent the most predominant waste types:

- EC 8 (represented by Boring SL-44) was chosen as the representative EC for the silt, sand, and debris mixture, located in the south, south west, and south east areas of the Property;
- EC 16 (represented by Boring SL-80) was chosen as the representative EC for the clay-rich silt and debris mixture, located within the former production area of the Property;

[1] ECs are areas of the Property that are roughly 37.5 feet by 37.5 feet in size (see Figure C-1). The EC size was determined based on the Remedial Investigation (RI) sampling locations, arsenic and lead concentrations, and the working reach (if the EC is processed in thirds) of a medium sized excavator (Caterpillar 316 or equivalent), if they were to dig to a depth of 12 feet.

- EC 83 (represented by Boring SL-75) was chosen as the representative EC for the sand, gravel, and hydrated lime mixture, located in the northern area of the Property.

C2.4 Construction Activities

Additional pre-Pilot activities included the construction of four asphalt-based stockpile areas using Ecology Blocks to store excavated soil (see Figure C-2 and Attachment C-1). Three of the four stockpile areas were used for the storage and treatment of characteristically hazardous soil, and one stockpile area was used for the storage of non-hazardous soil.

Pre-Pilot activities also included construction of a processing pad for the screening plant as well as stockpile storage (see Figure C-2). This pad was constructed of a gravel sub-base, covered by three inches of asphalt. The sub-base was graded to a 1% slope so that water flow could be controlled to ensure compliance with the Site's Construction Storm Water Pollution Prevention Plan (SWPPP) (ESM 2009). Prior to the start of work, straw bales were installed along the downslope sides of the asphalt pad to collect any sediment runoff created by processing and storing soil.

C3 Test 1: Determine the Effectiveness of Screening and Reuse of Oversized Rock and Debris

The goals of Test 1 were to determine:

- The effectiveness of screening in separating the coarse rock and debris from the excavated soils;
- The effectiveness of washing the debris so that the residual concentrations of COCs were below the Site-specific Remedial Levels (RELs), as confirmed by X-Ray Fluorescence (XRF) and laboratory analysis; and
- The expected percentage of coarse material and debris co-mingled with the excavated soils, to establish an estimate of the material that could be reused on-Property.

C3.1 Work Plan Scope of Work

The SOW for Test 1 included the following:

- Collect a sample of each waste type (e.g., quarry spalls, wood, pilings) currently in the stockpile, as the waste type is removed;
- Use an XRF to determine the lead and arsenic concentrations within, or adhered to, the surface of debris and oversize material;
- Screen and (if necessary) wash the excavated material to remove quarry spalls and oversized debris and rock (>3-inch);
- Use an XRF to determine the lead and arsenic concentrations within, or adhered to, the surface of the quarry spalls (>3-inch rock and debris).
- Re-wash (if necessary) the oversized material and retest by XRF to determine the arsenic and lead concentrations within, or adhered to, the surface of the debris and oversized material (>3-inch);
- Stockpile the oversized material and debris and reuse as backfill once XRF results determine that the arsenic and lead concentrations were below the RELs; and
- Return the 3-inch minus soils to the stockpile.

NOTE: Stockpiled soils excavated during the previously conducted Building B Basement Interim Action Program (Row A), as well as soil from SL-79 excavation were evaluated in this test. These soils are representative of the clay-rich silt and debris mixture, located within the former production area of the Property.

Soil was excavated and screened using a Read Screen All PD60 vibratory screen with a 3-inch grate (screen) to remove debris and quarry spalls.

The screened >3-inch oversized material was segregated into two piles for analysis; (1) quarry spalls, and (2) wood and rock >3 inches in size. Samples of the quarry spalls were collected for washing and analysis. The wood and rock >3 inches were sampled and analyzed.

A loader transported the <3-inch soil to an asphalt-based cell for treatment, as described in section 5.

C3.2 Changes to the Scope of Work

The SOW activities that proved to be ineffective or inefficient early in the testing phase of Test 1 were discontinued. Changes to the SOW include:

- Oversized material washing (in particular the wood debris) proved ineffective and was discontinued. Instead, the quarry spalls were soaked in water for 24 hours to determine if the soils adhered to the quarry spall surfaces would release during that time (see section 3.3). The quarry spalls (>5-inch rock) and oversized debris and rock (>3 inch) were not returned to the excavation. Instead, the quarry spalls and oversized debris and rock were stockpiled on-Property for additional treatment and analysis.
- Soils with elevated lead concentrations were not previously evaluated to determine how to reduce their leachability (so they could be converted to non-hazardous soils). Therefore, all the screened soils from Test 1 were added to Test 3 (see section 5).

There were no other exceptions to the Test 1 SOW.

C3.3 Results and Findings

The Test 1 objective was to determine the effectiveness of screening and reuse of oversized rock and debris for different waste types, using various methods and procedures for excavating, processing, and treating soil. The Test 1 results and findings are described below.

- **The effectiveness of screening excavated soil and debris:** Clay-rich soil adhered to the all of the oversized debris. Washing was somewhat effective in removing the soil from the coarse rock and quarry spalls, but was ineffective in cleaning the debris. The coarse rock and quarry spalls, when crushed and analyzed, did not contain COC concentrations above Site-specific RELs (see Appendix D).
- **The effectiveness of washing the debris:** Aggressive washing and/or soaking in gallon buckets for 48 hours removed the soils adhered to the quarry spalls. The COC concentrations (due entirely to the adhered soil residue on the quarry spalls) were reduced to meet Site-specific RELS. Each sample of oversized debris (>90% wood) contained arsenic and lead concentrations at levels that are characteristically hazardous. Though washing did reduce the amount of soil residue, the COC concentrations were not reduced enough to meet Site-specific RELs (see Appendix D).
- **Higher than expected Lead content:** Screened soils were characteristically hazardous and contained higher concentrations of lead than typically expected on-Property.

The expected percentage of coarse material and debris co-mingled with the excavated soil will be discussed in the following section.

C3.4 Key Learnings

The completion of Test 1 resulted in the following key learnings:

- Existing stockpiled soils contained approximately 40% debris and oversized rock. These soils are representative of the clay-rich silt that will require excavation in the former production area of the Property during remedial action.

- Screening of stockpiled soil is required due to the high percentage of the coarse materials and debris. The majority of the coarse materials consists of quarry spalls and oversized (>3-inch) rock. Very little oversized wood debris (<10% of the coarse materials) was present.
- The time required to screen the stockpiled soils was significant; 3.5 work-days for 405 tons (116 tons/day).
- Each sample of the oversized wood debris contained arsenic and lead concentrations at levels that are characteristically hazardous. The cost and time required to aggressively scrub the wood debris in order to remove the adhered soil was not determined, but would be extensive, and may not be effective in reducing the arsenic and lead concentrations enough to achieve TCLP criteria. As such, the oversized wood debris will require off-Site disposal at a Subtitle D landfill.
- Screening of the stockpiled characteristically hazardous soil is both cost effective and necessary (when a comparison of the disposal costs of hazardous vs. non-hazardous soils is considered). Mixing soil that contains debris with the additive could potentially cause damage to the mixing equipment. Therefore, screening is beneficial in that debris is removed and clay-rich soil is broken down into smaller pieces, which improves soil-additive mixing.
- Soil excavated from the former production area contains up to 40% debris, unlike the remainder of the Property, where small percentages of debris are present (see section C-5-2.3). As such, the extra step of size separation for non-hazardous soils within the production area is necessary and cost effective, and will be done during the remediation of on-Property soils and PW.

C4 Test 2: Establish a Predictable Production Rate

The Test 2 objectives were to determine:

- A production rate that could be relied on for long-term planning;
- If there was a need for additional drying, so that the soil can be treated or disposed of in a timely manner;
- If there was more effective equipment that could be used to meet project goals; and
- If the Pilot soil excavation, screening, and additive mixing process will be adequate (i.e. size, functionality, production) for the full scale remediation.

C4.1 Work Plan Scope of Work

The SOW for Test 2 included the following three steps:

C4.1.1 Step 1: Excavation and Screening

The goal of Test 2 Step 1 was to determine the time required to:

- Excavate 50% of the soil in EC 8, EC 16, and EC 83;
- Transport the excavated soil and debris (using a loader) to the screening plant (see Attachment C-1);
- Screen and, if necessary, wash the excavated material to remove quarry spalls and oversized debris;
- Collect samples of the excavated characteristically hazardous soils (based on previously collected data) for laboratory TCLP testing;
- Transport the non-hazardous soils to the stockpile areas using a loader for gravity dewatering/drying;
- Determine the arsenic and lead concentrations within, or adhered to, the surface of the debris and oversized material using the XRF; and
- Determine the arsenic and lead concentrations of the 3-inch minus material.

C4.1.2 Step 2: Backfilling of Excavation and Perched Water Treatment

The goal of Test 2 Step 2 was to determine the amount of time required to:

- Install 1-inch thick Steel plates along the excavation sidewalls to demarcate the excavated portion of the EC;
- Import and stockpile clean backfill (2-inch pit run) to the Property;
- Thoroughly mix the dry backfill with the water treatment additive in a Midland Mix-Trailer T-3000 Twin Screw Pug Mill (See Attachment C-1); and
- Backfill the excavation with one ton of the backfill/additive mixture to treat PW.

C4.1.3 Step 3: Confirmation Analysis and Drying of all Stockpiled Soils

The goal of Test 2 Step 3 was to determine how many days soil had to dry in order to pass the paint filter test, which was determined by completing two tests:

- Let soil dry for two days, then determine moisture content and evaluate soil to see if it passes the paint filter test; and
- Re-test the soil after seven days, if the soil is not dry enough to pass the paint filter test after two days. If the soil is still not dry enough for transport, the need for additional drying steps will be evaluated.

C4.2 Changes to the Scope of Work

The SOW activities that proved to be ineffective or inefficient early in the testing phase of Test 2 were discontinued. Changes to the SOW included:

- Selected EC 51 rather than EC 83 due to the presence of unknown underground features and an above ground propane tank. EC 51 had similar characteristics to EC 83.
- Selected EC 15 due to the presence of a buried concrete foundation at EC 16. The adjacent EC 15 was chosen to assess the clay-rich silt and debris mixture associated with the former production area of the Property.
- Reduced the size of the excavation areas due to time constraints. Therefore, 20% of EC8 and EC51, and 15% of EC15, were excavated.
- Used trench boxes due to excavations exceeding 6 feet in depth or PW being present.
- Discontinued screening non-hazardous soil (following the initial steps) due to the lack of significant debris in the Pilot ECs. The screening of hazardous soil continued in order to prepare the soil for treatment in Test 3.
- Expanded the evaluation of the percentage of coarse material and debris co-mingled with the excavated soils in the ECs. This evaluation was expanded to all of the ECs to establish a percentage of debris and coarse materials for reuse on-Property.

There were no other exceptions to Test 2 SOW.

C4.3 Results and Findings

The goal of Test 2 was to determine predictable production rates. The subsequent results and findings are described below.

- **Production Rate:** The production rate proved to be significantly lower due to the need for trench boxes which decreased the size of the excavations. The actual per ton production rate achieved during the Pilot ranged from 17.2 tons/hour for one of the trench box sized excavations in EC 51 to 38.9 tons/hour for one of the non-trench box excavations in in EC 15. The use of trench boxes made excavation significantly slower. These production rates did not include the time required to screen non-hazardous soils. However, it did include the time required to screen and treat hazardous soils. As expected, each excavation was typical for the soils/waste type and range in time needed to complete the excavation.

  The time needed to complete excavations is directly related to the presence or absence of water in the excavation and the need for a trench box. The following production rates were determined by averaging the amount of time needed to complete the sub-excavations within each EC, and can be expected during the remediation of on-Property soil and PW.

Area-Specific Production Rates	Tons/Hour
Former Production Area	23
Northern Area	23
Southern Area (Excluding the Former Production Area)	28

- **Soil Drying Time:** All of the excavated soils passed the paint filter test within two days which will not impact the project schedule.
- **Equipment Effectiveness:** All equipment worked as expected.
- **Soil Processing Plant:** The plant design requires modification to shorten the haul routes between the screening plant and the soil stockpile cells. The continued use of the pug mill is not recommended, and elimination of this equipment will simplify the plant design.
- **Coarse Material and Debris Co-mingled with the Excavated Soils:** The amount of debris present in the excavation differs by area of the Property. The expected percentage of debris within each area of the Property is presented in the following table.

Area of the Property	Percent of Debris Present Within the Excavated Material
Former Production Area	40%
Northern Area	15%
Southern Area (Excluding the Production Area)	5%

C4.4 Key Learnings

The completion of Test 2 resulted in the following key learnings:

- Mixing the soils and additive in the Midland Mix-Trailer T-3000 Twin Screw Pug Mill was effective, but unnecessary for the scale of the project. A less expensive and more efficient method was developed by mixing the soils and additive in a gravel skiff (see Attachment C-1) with an excavator and the Alpine D20 Mixing Head Attachment (mix head) (see Attachment C-1).
- Trench boxes will be necessary either when the excavation exceeds 6 feet in depth, or when PW is present in the excavation, due to the high potential for sidewall collapse.
- The percentage of debris and oversized rock was greatly reduced in the EC 8, EC 15 and EC 51 from the interim action stockpiled soils that came from the former production area. These cells were representative of soils found outside of the former production areas. The percentage of debris and oversized rock dropped from 40% in the stockpiled cells tested in Test 1, to less than 10% in these excavations. All of the debris and oversized rock occurred within the top 10 feet of the soils column. The volume of debris and oversized rock within the excavated soils was not great enough (excluding the former production area) to justify the cost of the screening non-hazardous soils, and so the process was halted.

C5 Test 3: Conversion of Hazardous Soils to Non-Hazardous Soils

The goal of Test 3 was to determine:

- The most efficient approach for the mixing stabilization additives with wet soils from each waste type;
- If hazardous soils could be treated in the field so that they "pass" TCLP and can be disposed of as non-hazardous waste; and
- The optimum dosing rate for each of the three characteristically hazardous soil types.

C5.1 Work Plan Scope of Work

The SOW for Test 3 included the following:

- Use of the loader to transport hazardous soils from the screening plant to the stockpile areas. These soils were to be placed in a treatment stockpile area in 1-foot thick layers.
- Place treatment additives (using Vendor recommended dosing rates) on top of each layer of soil and mix using one of two methods:
  - Method 1: use of an excavator with bucket teeth to break up the soil in half of the stockpile area and mix with the additive in a "back and forth" manner both laterally and horizontally.
  - Method 2: use of an Alpine D20 Mixing Head Attachment (see Attachment C-1) to blend the additive into the other half of the soils within the stockpile area.
- Collect soil samples processed by each method within the same stockpile area and conduct laboratory TCLP analysis to determine the effectiveness of each method.
- Cure soil for the Vendor recommended time period, or seven days.
- Decontaminate equipment (e.g., loader, mixer, and excavator) prior to working in the next stockpile area.
- Sample treated hazardous soils for laboratory TCLP testing after seven days (or less, depending on the Vendor's recommendations). Soils was excavated from three different ECs (see Figure C-1). The soils was screened to remove debris and quarry spalls, moved to an asphalt-based cell, and spread in a one-foot thick layer. The volume of soil to be treated was then determined to identify the amount of treatment additive (EnviroBlend® 50/50 HXD) needed.
- The EnviroBlend® 50/50 HXD was sprinkled over the surface of the one-foot thick layer of soils and mixed using the mixing head until well-blended. The soil/additive mixture was cured for 24 hours, sampled, and then submitted to the project's laboratory (TestAmerica in Tacoma Washington) for analysis. Test 1 screened soils were processed in the same manner.

C5.2 Changes to the Scope of Work

Soil was not mixed using the excavator bucket because it was visually evident that the mix head blended the additive into wet soils quite well. There were no other exceptions to the Test 3 SOW.

C5.3 Results and Findings

The Test 3 objective was to determine the most efficient approach to mix stabilization additives with wet soils to achieve TCLP objectives. The subsequent results and findings are described below.

- **Most efficient approach for mixing additives with wet soils:** The Alpine D20 Mixing Attachment was very effective in blending the clay-rich soils with the chemical additive, and the resulting soil was well mixed.
- **Treatment of hazardous soil in the field so that they "pass" TCLP**: The Field Pilot Soil Treatability Study results demonstrated that amending soil with a 4% dose (weight EnviroBlend®/weight of soil) of EnviroBlend® 50/50 HXD was an effective means to reduce the leachability of metals in on-Property soils, to achieve non-hazardous waste disposal TCLP performance goals. The results and findings of this Test can be found in Appendix B of the Remedial Design Report.
- **The optimum dosing rate for each of the three soil types:** The Vendor recommended dosing rates of 4% dose (weight EnviroBlend®/weight of soil) of EnviroBlend® 50/50 HXD was effective for soil containing high concentrations of arsenic but not lead. The additive/dosing requirements for soils containing high concentrations of lead need to be refined.

C5.4 Key Learnings

The completion of Test 3 resulted in the following key learnings:

- An aggressive blending method is required to sufficiently mix the clay-rich soils with the chemical additive. The mixing head worked well to blend the soil and the additive.
- The treatment of characteristically hazardous soils was successful (at the Vendor calculated dosing rates) for the typical soils (high concentrations of arsenic with lower concentrations of lead) found on the Property, so that they "pass" TCLP and can be disposed of as non-hazardous waste.
- The dose requirements for soils containing high concentrations of lead need to be refined. This will be done in future bench scale studies.

C6 Test 4: Testing the Effectiveness of the Perched Water Treatment Process

The goals of Test 4 were to determine:

- If the revised treatment method was effective in reducing arsenic and lead concentrations in the PW to achieve RELs;
- Optimum additive dose rates to be used during the remediation to effectively treat PW; and
- If the tested water treatment process was technical, cost effective, and easy to implement.

C6.1 Objectives

The Test 4 objectives were as follows:

- Demonstrate with water from actual excavations and monitoring well MW-12 that amending clean backfill with additives is effective in reducing the dissolved arsenic and lead concentrations in PW to achieve the groundwater RELs;
- Evaluate the dosing rates to be used during the remediation of PW; and
- Determine the most effective water treatment procedure in terms of cost and materials handling.

C6.2 Work Plan Scope of Work

The SOW for Test 4 consisted of the following:

- Additives from three Vendors (Premier Magnesia, Free Flow Technologies and PeroxyChem) were to be tested;
- Up to three different doses per additive were to be tested (the Vendor recommended dose plus one percent higher and lower) to determine the best dosing rate;
- To represent the "worst case scenario," PW from MW-12 (the well with the highest concentrations of arsenic and/or lead that can be obtained) was to be used in 50% of the tests; and
- To represent the "expected typical scenario," PW collected from the former Building B basement (i.e., the Pond area on Figure C-2) was to be used in 50% of the tests.

A total of 6 tests per additive (i.e., two different PW sources and three doses for each PW source) for a total of 18 tests was proposed.

Prior to the start of Test 4, the following tasks were completed:

- Additives under consideration were tested through bench-scale work;
- Sufficient quantities of the additives being tested were obtained and present on-Property;
- Test vessels (e.g., 20 gallon drums) were obtained and present on-Property; and
- Water from MW-12 was collected and placed within the drums.

Test 4 was conducted using the following procedure:

- Approximately 33% of the drum was to be filled with the PW being treated;

- Water was to be sampled and tested at the project laboratory (TestAmerica) to determine pre-treatment concentrations and pH;
- Pre-mixed clean backfill and water treatment additive mixture was to be added to the test vessel with enough backfill and additive mixture to fill the container;
- The water/soil was to cure for the Vendor recommended time frame;
- The water was to be sampled and tested at the project laboratory (TestAmerica) after the designated curing period, to determine post-treatment concentrations and pH; and
- The soil from each drum was to be tested.

C6.3 Changes to the Scope of Work

Samples of PW were not collected from the former Building B basement. Water was collected using a peristaltic pump from MW-11S to represent low arsenic and lead concentrations, and from MW-12S to represent high arsenic and lead concentrations.

There were no other exceptions to Test 4 SOW.

C6.4 Results and Findings

The Test 4 objective was to determine the specific additive, dose rate, and mixing method to treat PW in order to reduce dissolved arsenic and lead concentrations. The results and findings for the Test 4 objectives are presented in Appendix B and described below.

- PW treatment method was effective in reducing the arsenic and lead concentration in the dissolved PW to achieve RELs in each test;
- Vendor recommended dose rates of 0.5% dose of Free Flow FS-200 + FS blend at a 1:1 ratio was effective in treating the PW; and
- The testing process was easy to implement and less expensive than previously evaluated methods.

C6.5 Key Learnings

The completion of Test 4 resulted in the following key learnings:

- Tested methods for PW treatment were successful.
- Tests indicated that site-specific RELs can be met using this method.
- Doses of additive required to treat PW needs to be done on an excavation-by-excavation basis, due to the discontinuous nature of the PW body and the fluctuation in the height of the PW table. The additive amount needs to be calculated based on water volume in the excavation. The water volume in each excavation will be determined by calculating the water depth from the observable top of the water to the aquitard depth (as pre-determined in the RI sampling). If water is not observed, the top of the water will be the assumed final depth of excavation. This depth will be multiplied by the width and length of the excavation to determine the cubic feet of the water above the aquitard.

C7 Equipment Evaluation

C7.1 Equipment Evaluated During the Pilot

The equipment that was used in the Pilot were evaluated so as to determine how effective they were, and if they were needed in the future. The equipment evaluated included:

- Read Screen All RD90 vibrating screen with a 3-inch grid;
- John Deere 644J loader;
- Hitachi EX 200 excavator;
- Midland Mix-Trailer T-3000 Twin Screw Pug Mill; and
- Alpine D20 Mixing Attachment (mixing head).

In addition, the Pilot also evaluated the use of a TOPCON- GR3 / TOPCON X-53 Excavator GPS depth measurement unit and base station with tolerance of X & Y: 0.015 feet and Z: 0.035 feet. This unit was used to determine the excavation depths. Determining actual excavation depths is especially useful in excavations containing PW.

C7.1.1 Results and Findings

All of the equipment used during the Pilot worked as expected.

- The Read Screen All vibratory screen with a 3-inch grid worked as expected and the following was observed:
  - High clay content in the soils required modification to allow for longer residence time on the screen.
  - Screened soil and debris (wood, coarse rock, and quarry spalls) were effectively separated.
  - Clay-rich soil residue remained on the debris.
  - Soil (<3 inch) was screened to a size efficient for mixing with a soil treatment additive using the mixing head.
- The John Deere 644J loader and the Hitachi EX 200 excavator worked as expected. The equipment was the correct size (vibration measurements within Superlon's production building were within acceptable limits) and the reach and lifting potential were sufficient.
- The Midland Mix-Trailer T-3000 Twin Screw Pug Mill worked as expected and the following was observed:
  - The Pug Mill was effective in mixing the clean backfill soil with the PW treatment additive.
  - The Pug Mill is effective for a larger scale project, but was expensive to operate for this project. This method would be effective if the additive to soil ratio was consistent.
  - A more time and cost efficient method of mixing the clean backfill soils with the PW treatment additive in a gravel skiff was developed during the Pilot, and will be used during the remediation process.
- The mixing head exceeded expectations. The mixing head was very effective in blending the soil and treatment additive, and will be used during the remediation process.

- The TOPCON-GR3/TOPCON X-53 Excavator GPS depth measurement unit and base station exceeded expectations. The excavation depths were determined to an accuracy of + or – 0.1 inches, which is an acceptable tolerance. This unit, or a similar unit with the same tolerance, will be used during the remediation process.

C7.1.2 Key Learnings

The remediation phase can be effectively completed using minimal equipment[2]. The required equipment includes a Read Screen All Vibratory Screen with a 3-inch grid, a John Deere 644J Loader (or equivalent), a Hitachi EX 200 (or equivalent) Excavator equipped with a TOPCON-GR3/TOPCON X-53 Excavator GPS depth measurement unit and base station, an Alpine D20 Mixing Head, and two gravel skiffs.

The Midland Mix-Trailer T-3000 Twin Screw Pug Mill is not required. A more precise, time and cost efficient mixing process was developed using the excavator, mix head, and gravel skiff.

C7.2 X-Ray Fluorescence Analysis

C7.2.1 Goal

The goal of analyzing debris with the XRF was to collect the data necessary to establish a correlation between XRF and laboratory total arsenic and lead concentrations for debris.

C7.2.2 Changes to the Scope of Work

Due to the findings of Test 1, 2 and 3, and the lack of sufficient mixed debris (wood and metal) comingled with the soils, a correlation between XRF and laboratory results for debris is not required. Therefore, this test was not conducted.

[2] Based upon current conditions. If conditions change additional equipment may be necessary.

C8 Conclusions

Based upon the findings from the Pilot Study, the following conclusions can be made:

- Treatment of the characteristically hazardous soils to reduce the leachability of metals in on-Property soils was successful to achieve non-hazardous waste disposal TCLP performance goals. Additional testing will be necessary to determine the correct additive dose rates to treat soils containing high concentrations of lead.
- Samples of oversized debris comingled with characteristically hazardous soils contained arsenic and lead concentrations at levels that are characteristically hazardous. Washing was ineffective in reducing residue on and in the wood debris in concentrations greater than TCLP criteria (see Appendix D of the Remedial Design Report). Therefore, wood will not be reused on-Property and will be disposed of appropriately. Washing was effective in reducing residue on coarse rock and quarry spalls. Based on the results of the washing study (see Appendix D of the Remedial Design Report), quarry spalls and rocks can be reused at the Property as fill after they have been soaked in water for one week.
- Characteristically hazardous soil screening is a necessary and cost effective process although the presence of coarse material could make additive and soil mixing difficult and cause damage to the Mix Head. Screening of the characteristically hazardous soil also breaks up the clay-rich soils into smaller pieces for effective mixing.
- The soil/debris ratio was highly dependent on the area of the Property. The observed (or expected) percentage of debris from each area of the Property is presented in the following table and in Figure C-3.

Area of the Property	Percent of Debris Present Within the Excavated Material
Former Production Area	40%
Former Building A Area	20%
Northern Area	15%
Southern Area (Excluding the Production Area)	5%

- The screening of the non-hazardous soils located in the former production area is cost effective and necessary, due to the expected high percentage of oversized debris.
- The small percentage of debris in areas outside the former production area make the extra step of size separation for non-hazardous soils inefficient (i.e., time and cost). Therefore, size screening will not be done for non-former production areas' non-hazardous soils during the remediation of on-Property soils and PW. However, hazardous soils in the non-former production areas' OUs will be screened to reduce particle size (required to aid in the treatment process).

- The equipment necessary[3] to complete the remediation of on-Property soils and PW consists of a Read Screen All Vibrating Screen with a 3-inch grid, a John Deere 644J loader (or equivalent), a Hitachi EX 200 excavator (or equivalent) equipped with a TOPCON-GR3/TOPCON X-53 Excavator GPS depth measurement unit and base station, an Alpine D20 Mixing Head Attachment, two gravel skiffs, and an Innov-X Delta XRF.
- The tested method for PW treatment was successful for all tests. Tests indicate that Site-specific RELs can be met using this method. The discontinuous nature of the PW body, and the fluctuation of the height of the PW table, make the determination of the additive amount required to treat PW an excavation-by-excavation based decision.

[3] If conditions change, additional equipment may be required.

References

Ecology. 2015. Electronic mail from Marv Coleman to Jeff King, Brad Grimsted, and Tim Bingman regarding Ecology approval of the Final on-Property Feasibility Study. January 26.

ESM. 2009. Superlon Plastics MTCA Interim Action: Construction Stormwater Pollution Prevention Plan. December.

PERC/PIONEER. 2014a. Feasibility Study Report for On-Property Soils and PW at the Superlon Plastics Property, Tacoma, Washington. December.

PERC/Pioneer. 2017. Superlon Plastics Site: Soil and Perched Water Pilot Study Work Plan, January 30, 2017

Figures

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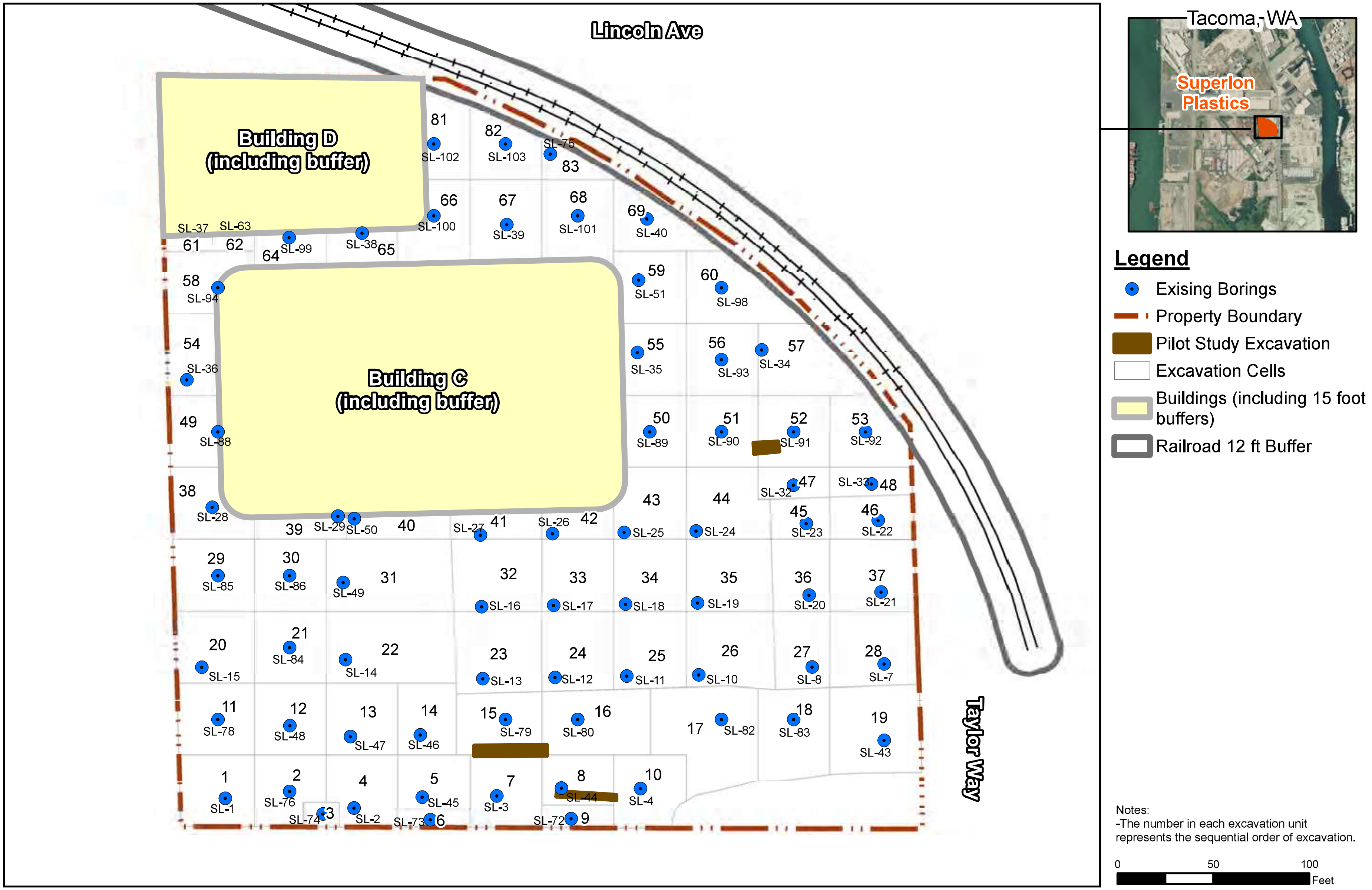
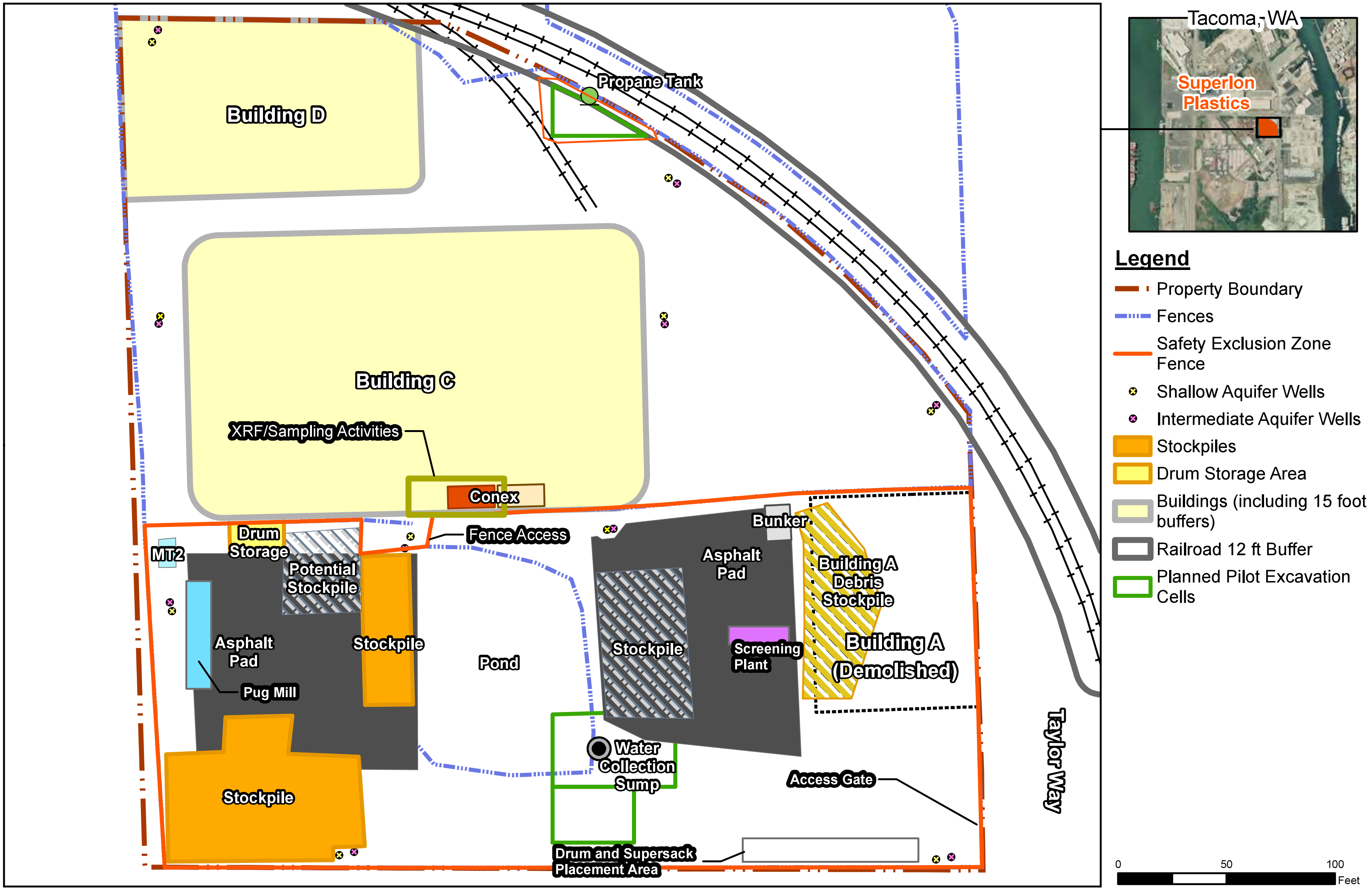


PIONEER TECHNOLOGIES CORPORATION

Pilot Study Excavation Unit Locations
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure C-1



PIONEER TECHNOLOGIES CORPORATION

Pilot Study Layout
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure C-2

PIONEER TECHNOLOGIES CORPORATION

Estimated Percentage of Debris in the Excavated Material
Remedial Design Report
Superlon Plastics Property, Tacoma, Washington

Figure C-3

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Attachment C-1: Photographic Log

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Photo No. C-1: Storage Cell Construction

Description:
Typical storage cell construction using ecology blocks. Taken at the Superlon Plastics Property, Tacoma, Washington.

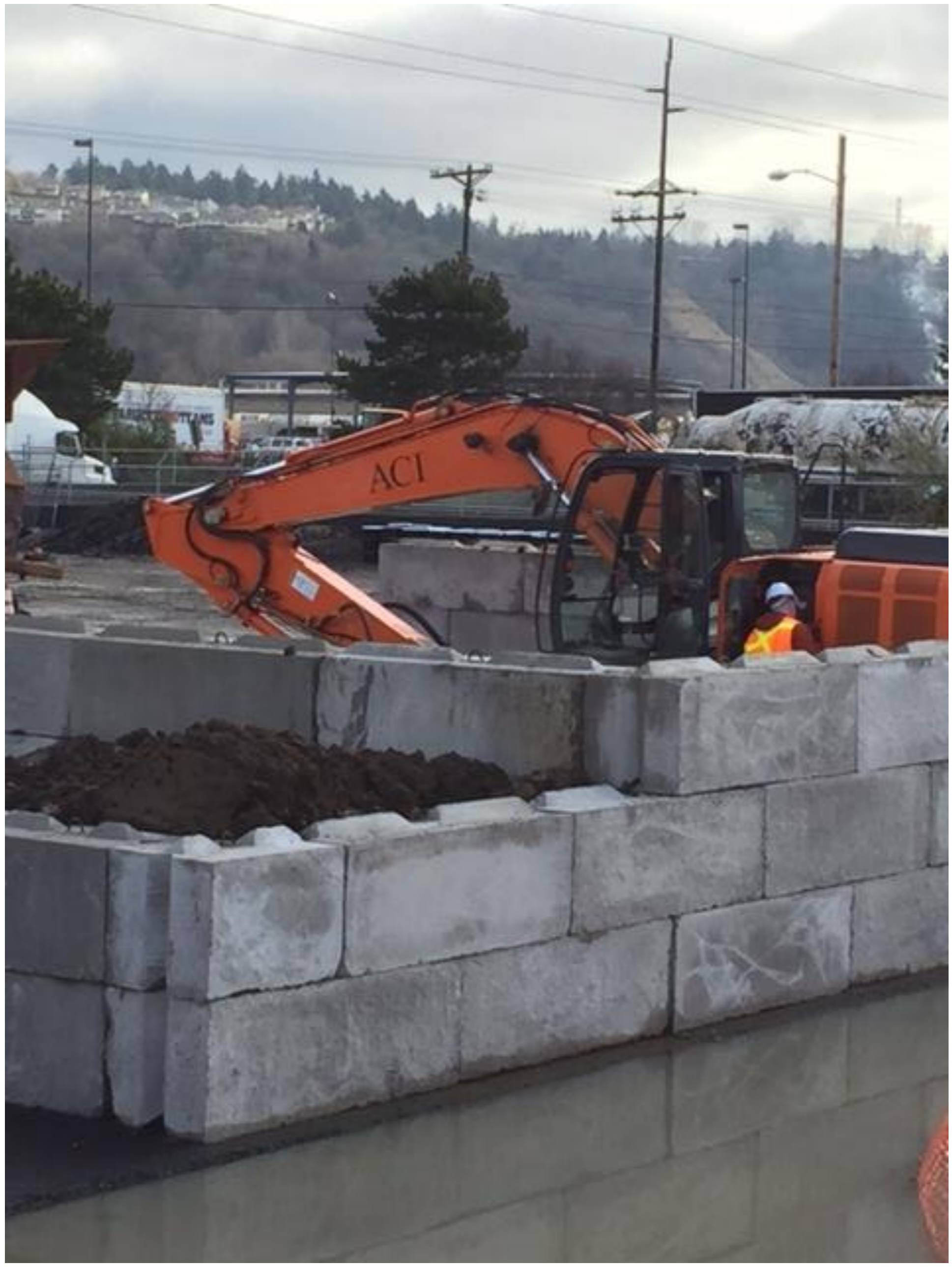

Photo No. C-2: John Deer 644J Loader

Description:
John Deer 644J Loader. Taken at the Superlon Plastics Property, Tacoma, Washington.

Photo No. C-3: Screening Plant

Description:
Screening Plant, Read Screen All Vibrating Screen.

Photo No. C-4: Midland Mix-Trailer T-3000 Twin Screw Pug Mill	
Description: Midland Mix-Trailer T-3000 Twin Screw Pug Mill. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. C-5: Gravel Skiff	
Description: Gravel Skiff. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. C-6: Alpine D20 Mixing Attachment **Description:** Alpine D20 Mixing Attachment. Taken at the Superlon Plastics Property, Tacoma, Washington.	
Photo No. C-7: Mixing Attachment in Use **Description:** Alpine D20 Mixing Attachment in use. Taken at the Superlon Plastics Property, Tacoma, Washington.	

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Appendix D

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Appendix D: Debris Washing Study

for the

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Tacoma, Washington

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Acronyms and Abbreviations

Acronym/Abbreviation	Description
cy	Cubic Yards
kg	Kilogram
mg/kg	Milligram per kilogram
Property	Superlon Plastics Property
REL	Remediation Level
TCLP	Toxicity Characteristic Leaching Procedure
XRF	X-Ray Fluorescence

D1 Introduction

A debris-washing study was conducted at the Superlon Plastics Property (Property) to determine if the debris (wood, quarry spalls, and rocks) that will be excavated during future remedial actions can be washed and reused on the Property as fill. To be reused on the Property, arsenic and lead concentrations in the soil on (and possibly in) the debris need to be less than site-specific remediation levels (RELs). To measure arsenic and lead concentrations in the soil on the debris, the wood, quarry spalls, and rocks were washed and the soil and debris were sampled. The debris-washing study was conducted as part of the Pilot Study for On-Property Soils and Perched Water for the Property.[1] The approach used for the debris-washing study and the results are presented in this report.

D1.1 Approach

Soil on the outside of wood, quarry spalls, and rocks greater than 3 inches long and wide (referred to as oversized debris) was washed off, measured, and sampled. The measurements and sample results were used to calculate (1) the mass of soil that was coating the debris, (2) the amount of soil coating the debris that could be removed through washing, and (3) the potential arsenic and lead concentrations in Property soil if the debris were used as backfill.

The debris were sampled and analyzed in the field using an X-Ray Fluorescence (XRF) instrument and sent to TestAmerica Tacoma laboratory for toxicity characteristic leaching procedure (TCLP); see Attachment D-2. The results of the XRF analysis were compared to the following criteria (Pacific Environmental & Redevelopment Corporation and PIONEER Technologies Corporation 2014):

Constituent	Soil Direct Contact Cleanup Level (mg/kg)	Lowest Soil-to-Perched Water REL (mg/kg)	TCLP Criterion (mg/L)[1]
Arsenic	588 REL	91	5
Lead	1,000	679	5

[1] The TCLP criterion is the level at which arsenic and lead are considered characteristically hazardous.

D1.2 Source

The debris evaluated in the study were collected from Building B Basement (column A) and SL-79 pilot study excavation soil stockpiles (see Figure D-1). The quarry spalls at the Property were imported and used as clean fill during interim action activities.

D1.3 Screening

To separate oversized debris from stockpiled soil, a Read Screen All PD90 vibratory screen with a 3-inch grate was used. The oversized debris were segregated into two piles: a wood and other debris

[1] The Pilot Study for On-Property Soils and Perched Water is documented in Appendix C of the Remedial Design Report.

pile and a quarry spall and rock pile. The wood, quarry spalls, and rocks evaluated in this study were collected from one of the two piles.

D1.4 Report Organization

This appendix is organized as follows:

- Section 2: Evaluation
- Section 3: Results
- Section 4: Discussion and Conclusion
- Section 5: References

D2 Evaluation

Soil on and in the wood, quarry spalls, and rocks was evaluated using different methods to identify the best approach for washing debris for possible on-Property reuse. The evaluations are described in this section.

D2.1 Wood Debris Evaluation

Wood debris from the SL-79 excavation was evaluated for possible on-Property reuse (see Attachment D-1). The following process was used to evaluate the wood:

1. The wood was rinsed with water to remove surface soil and cut up using a saw to create wood shavings (see Attachment D-1).
2. The wood shavings were analyzed in the field using the XRF and sent to the laboratory for TCLP analysis.

D2.2 Quarry Spall/Rock Debris Evaluations

Quarry spalls and rocks from the Building B Basement column A excavation were evaluated to determine if quarry spalls that will be excavated during upcoming remedial actions may be reused on the Property (see Attachment D-1). The quarry spalls and rocks from this area were used because they were readily available and the clay-rich silt soil layer on the outside of this debris was representative of the type of soil that will be found in the former production area of the Property (see Attachment D-1). Three evaluations were performed using the quarry spalls/rocks.

D2.2.1 Soil Mass Evaluation

The first evaluation was conducted to determine the soil mass on the outside of the quarry spalls/rocks. The following steps were used for this evaluation:

1. Three quarry spalls from the quarry spalls and rock pile were collected and weighed.
2. The quarry spalls were scrubbed using a brush and clean tap water to remove the soil.
3. The soil and the rinse water from the quarry spalls were collected in the bottom of the bucket.
4. The collected soil was dried in a convection oven (i.e., to remove the water).
5. The soil was measured to determine the soil mass that was on the quarry spalls.
6. The soil was sampled for arsenic and lead.

D2.2.2 Soaking Evaluation (36-Hours)

The second evaluation was conducted to determine the mass of the soil that could be removed from the surface of the quarry spall by soaking the spall in a bucket with clean tap water for 36 hours. This evaluation was performed in two steps:

Step 1

1. One quarry spall from the quarry spalls and rock pile was collected and weighed.

2. The quarry spall was submerged in a bucket of clean tap water for 36-hours.
3. The soil and water that soaked off the quarry spall was collected in the bottom of the bucket.
4. The collected soil was dried in a convection oven.

Step 2

1. The quarry spall that was soaked for 36-hours was scrubbed with a brush and clean tap water.
2. The soil and water that washed off the quarry spall was collected in the bottom of the bucket.
3. The collected soil was dried in a convection oven.

D2.2.3 Soaking Evaluation (One Week)

The third evaluation was conducted to determine the total amount of arsenic and lead on and in a quarry spall and a rock after they were soaked in water for a week. The following steps were performed for this evaluation:

1. Quarry spalls and rocks were submerged in Former Building B pond for one week.
2. One quarry spall and one rock were collected from the pond after one week.
3. The quarry spall and rock were sent to TestAmerica where they were crushed and analyzed for total arsenic and lead.[2]

[2] To determine if the quarry spalls and rocks were porous (which could result in elevated arsenic and lead concentrations), they were crushed and analyzed at the laboratory.

D3 Results

The results of the wood, quarry spall, and rock evaluations are presented in this section.

D3.1 Wood Debris

Wood debris samples were collected and analyzed using an XRF at the Property and at TestAMerica for TCLP. The XRF arsenic concentrations in the shavings ranged from 1,106 to 8,608 mg/kg and the XRF lead concentrations ranged from 405 to 2,520 mg/kg (see Table D-1). Four laboratory arsenic concentrations and one laboratory lead concentration were greater than the TCLP criterion of 5 mg/L (see Table D-1). In addition, all of arsenic concentrations were greater than the REL[3] of 588 mg/kg. Three of the seven lead concentrations were greater than the REL of 1,000 mg/kg.

D3.2 Quarry Spalls and Rocks

The results of the three quarry spalls/rocks washing evaluations are presented below.

D3.2.1 *Soil Mass Evaluation Results*

Based on the results of the soil mass evaluation, 150 grams of soil had collected on the outside of the three quarry spalls (see Table D-2). The 95% upper confidence limit (UCL) on the mean concentrations of the soil that will be excavated during remedial activities were used to calculate the arsenic and lead concentrations in the soil on the outside of the quarry spalls. The soil:quarry spall weight ratio was 150:3,880 grams (i.e., 3.9%). Based on the soil-to-quarry spall loading rate and the 95% UCL arsenic and lead concentrations, the arsenic and lead concentrations in the soil on the outside of the quarry spalls (by weight) were 35 mg/kg and 29 mg/kg, respectively.

D3.2.2 *Soaking Evaluation (36-Hours) Results*

Based on the results of the 36-hour soaking evaluation, the amount of soil that was removed from the quarry spall after 36-hours of soaking was 223 grams (see Table D-3). The soil:quarry spall weight ratio was 223:1,920 grams (i.e., 11.6%).

The amount of soil that remained on the quarry spall after soaking for 36-hours was 118 grams (see Table D-3). The soil:quarry spall weight ratio was 118:1,920 grams (i.e., 6.1%). Based on the soil-to-quarry spall loading rate and the 95% UCL arsenic and lead concentrations, the arsenic and lead concentrations in the soil on the outside of the quarry spalls (by weight) were 56 mg/kg and 47 mg/kg, respectively.

D3.2.3 *Soaking Evaluation (One Week)*

The laboratory results for the arsenic and lead concentrations for the quarry spall and rock soaked in water for one week are presented on Table D-4. The arsenic and lead results for the rock (OS-

[3] For the purposes of this report, remediation levels (RELs) include direct contact RELS and CLs as well as soil-to-groundwater RELs.

ROCK_1-060917) were 2.4 and 5.9 mg/kg, respectively. The arsenic and lead results for the quarry spall (OS-SPALL_1-060917) were 14 and 16 mg/kg, respectively.

D4 Discussion and Conclusions

D4.1 Discussion

An evaluation was also conducted to calculate the concentrations in Property soil if the soil on the outside of the quarry spalls mixed with clean soil (i.e., the quarry spall soil mixed with the clean soil below). The arsenic and lead concentrations were calculated based on the amount of soil on three quarry spalls after washing and on one quarry spall after a 36-hour soak, using the 95% UCL arsenic and lead concentrations (see Table D-3). The calculated (predicted) arsenic and lead concentrations were compared to lowest site-specific RELs.

Evaluation	Predicted Arsenic Concentration (mg/kg)	Lowest Arsenic REL (mg/kg)	Predicted Lead Concentration (mg/kg)	Lowest Lead REL (mg/kg)
Soil Mass Evaluation	32	91	27	679
Soaking Evaluation (36-Hours)	52	91	43	679

D4.2 Conclusions

The results of the wood evaluation indicate that wood debris at the Property is characteristically hazardous (i.e., concentrations were greater than TCLP criteria). Therefore, wood will not be reused on-Property and will be disposed[4] of appropriately.

The results of the quarry spall/rock evaluations indicate the arsenic and lead concentrations in the soil on the outside of quarry spalls and rocks were well below site-specific RELs — even before the quarry spalls and rocks were soaked in water for 36-hours or one week (see Table D-2). Soaking the quarry spalls in water for 36-hours removed 65% of the contaminated soil from the outside of the quarry spalls. Soaking the quarry spalls and rocks in water for one week removed all visible soil. In addition, the arsenic and lead concentrations were well below RELs for the quarry spalls and rocks soaked for one week, indicating that the quarry spalls and rocks were relatively clean and not porous (see Table D-4).

Based on the results of this washing study, quarry spalls and rocks can be reused at the Property as fill even if they are not washed as long as the arsenic and lead soil concentrations are below 910 mg/kg and 759 mg/kg, respectively. If the arsenic and lead concentrations in soil are greater than 910 mg/kg (arsenic) or 759 mg/kg (lead) then, they will be soaked in water to remove the soil.

[4] See the Remedial Design Report for more information about waste disposal.

References

2014. Pacific Environmental & Redevelopment Corporation and PIONEER Technologies Corporation. Final Feasibility Study for On-Property Soils and Perched Water. Superlon Plastics Property. Tacoma, Washington. December 17.

Tables

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Table D-1: Wood Debris Analytical Results

Sample Number	Constituent	XRF Result (mg/kg)	Lab Result (mg/L)
WD-SL-79-022417-0-0	Arsenic	1,106	1.2
WD-SL-79-022417-0-0	Lead	2,520	9.6
WD-SL-79debris_a-030217	Arsenic	7,622	9.7
WD-SL-79debris_a-030217	Lead	1,804	2.7
WD-SL-79debris_a-030217-(01)	Arsenic	3,488	10
WD-SL-79debris_a-030217-(01)	Lead	687	2.7
WD-SL-79debris_b-030217	Arsenic	3,749	3.3
WD-SL-79debris_b-030217	Lead	405	2.9
WD-SL-79debris_b-030217-(01)	Arsenic	8,608	3.0
WD-SL-79debris_b-030217-(01)	Lead	1,345	1.8
WD-SL-79debris_c-030217	Arsenic	6,094	7.4
WD-SL-79debris_c-030217	Lead	459	1.7
WD-SL-79debris_c-030217-(01)	Arsenic	N/A	7.8
WD-SL-79debris_c-030217-(01)	Lead	N/A	0.87

Notes:

TCLP results are reported in mg/L.

Highlighted values exceed TCLP critieria.

Table D-2: Soil Mass Evaluation

Evaluation	Material	Value	Units	Arsenic	Units	Lead	Units
Soil Mass	Total soil on outside of 3 quarry spalls	150	grams				
	Mass of 3 quarry spalls	3,880	grams				
	Soil-to-quarry spall loading rate	3.9%					
	Concentrations in soil on outside of quarry spalls (i.e., 95% UCL of samples that will be excavated during the on-Property remedial action)			910	mg/kg	759	mg/kg
	Mass of arsenic and lead on outside of 3 quarry spalls			137	mg	114	mg
	Concentrations by weight			35	mg/kg	29	mg/kg
	Full 2-gallon bucket of quarry spalls	5,385	grams/gallons				
	Conversion factor	7.5	gallons/ft^3				
	Conversion factor	27	ft^3/cy				
	Kilograms (kg) in one cubic yard (cy) of quarry spalls	1,088	kg/cy				
	Pounds in one cy of quarry spalls	2,398	pounds/cy				
	Tons in one cy of quarry spalls	1.2	tons/cy				
	Mass of arsenic and lead in one cy of quarry spalls			38,261	mg/cy	31,912	mg/cy
	Tons in one cy of soil	1.3	ton/cy				
	Kg in one cy of soil	1,179	kg/cy				
	The concentrations in soil if the mass of soil from 1 cy of quarry spalls was mixed with 1 cy of clean soil:			**32**	**mg/kg**	**27**	**mg/kg**

Table D-3: Quarry Spall Soaking Evaluation

Evaluation	Material	Value	Units	Arsenic	Units	Lead	Units
Soaking Evaluation (Step 1)	Amount of soil removed from outside of quarry spall after soaking for 36 hours	223	grams				
	Mass of 1 quarry spall	1,920	grams				
	Soil-to-quarry spall loading rate	11.6%					
	Concentrations in soil on outside of quarry spall (i.e., 95% UCL of samples that will be excavated during the on-Property remedial action)			910	mg/kg	759	mg/kg
	Mass of arsenic and lead on outside of quarry spall			202.9	mg	169	mg
	Concentrations by weight			106	mg/kg	88	mg/kg
	Full 2-gallon bucket of quarry spalls	5,385	grams/gallon				
	Conversion factor	7.5	gallons/ft^3				
	Conversion factor	27	ft^3/cy				
	Kilograms (kg) in one cubic yard (cy) of quarry spalls	1,088	kg/cy				
	Pounds in one cy of quarry spalls	2,398	pounds/cy				
	Tons in one cy of quarry spalls	1.2	tons/cy				
	Tons in one cy of soil	1.3	tons/cy				
	Kg in one cy of soil	1,179	kg/cy				
Soaking Evaluation (Step 2)	Amount of soil left on quarry spall after soaking 36-hours	118	grams				
	Mass of 1 quarry spall	1,920	grams				
	Concentrations in soil on outside of quarry spall (i.e., 95% UCL of samples that will be excavated during the on-Property remedial action)			910	mg/kg	759	mg/kg
	Mass of arsenic and lead on outside of quarry spall			107	mg	90	mg
	Soil-to-quarry spall loading rate	6.1%					
	Concentrations by weight			56	mg/kg	47	mg/kg
	Arsenic and lead mass in 1 cy of quarry spalls			60,824	mg/cy	50,731	mg/cy
	Concentration in soil if the remaining mass on 1 cy of quarry spalls after a 36 hour soak mixed with 1 cy of clean soil			**52**	**mg/kg**	**43**	**mg/kg**

Notes:

Starting mass of soil on outside of quarry spall: 341 grams

Soil mass removed after soaking for 36-hours: 223 grams

Decrease in mass after soaking for 36-hours: 65% grams

Table D-4: Crushed Quarry Spall and Rock Analytical Results

Sample Number	Constituent	Result	Units	Qualifier
OS-ROCK_1-060917	Arsenic	2.4	mg/kg	
OS-ROCK_1-060917	Lead	5.9	mg/kg	
OS-SPALL_1-060917	Arsenic	14	mg/kg	
OS-SPALL_1-060917	Lead	16	mg/kg	

Figures

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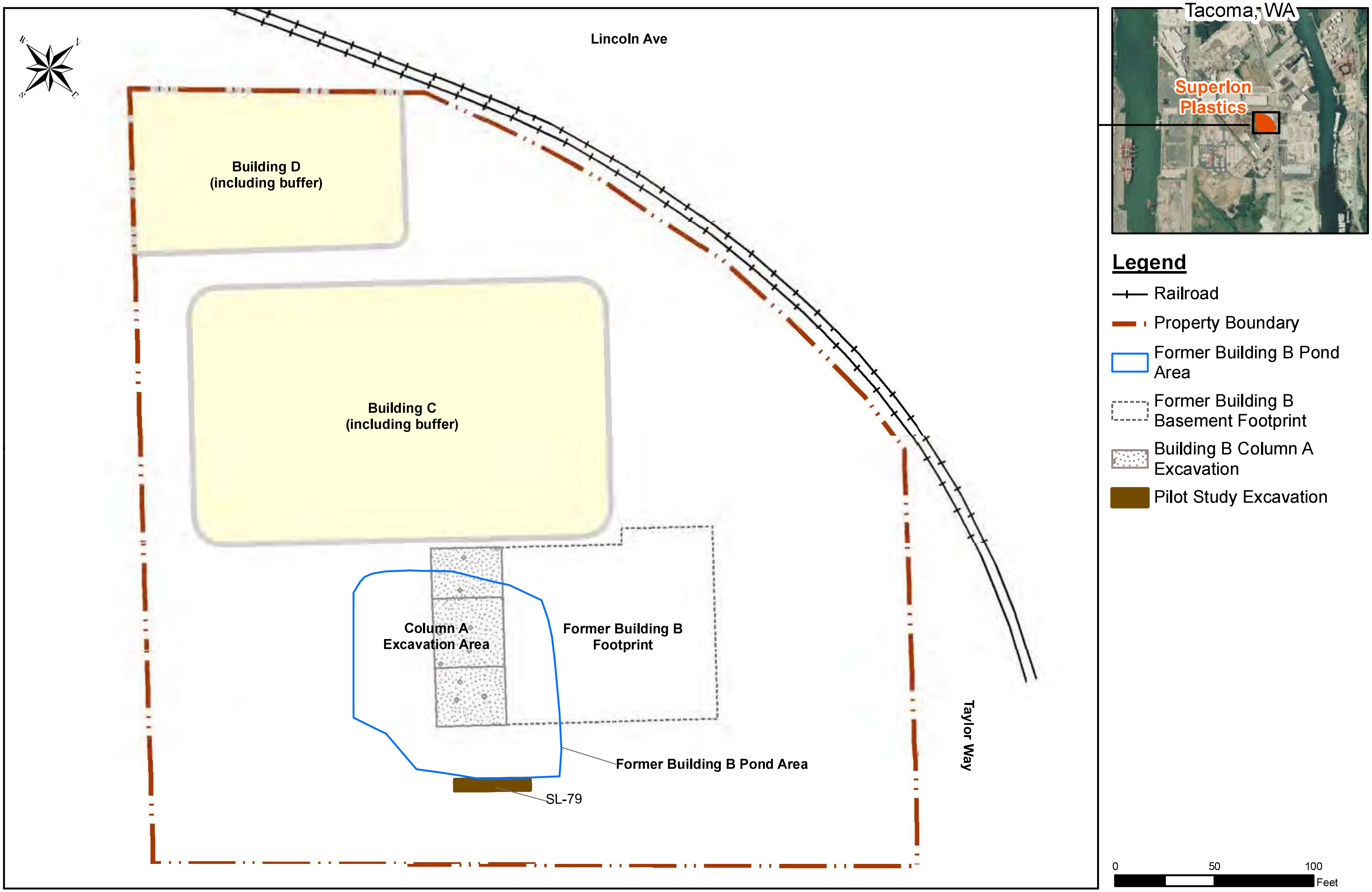

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PIONEER TECHNOLOGIES CORPORATION

Debris Excavation Areas
Appendix D: Debris Washing Pilot Study
Superlon Plastics Property, Tacoma, Washington

Figure D-1

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Attachment D-1: Photographic Log

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Photo No. D-1: Screened Debris	
Description: Screened Debris from SL-79 Excavation. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. D-2: Wood Debris	
Description: Wood Debris from SL-79 Excavation. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. D-3: Wood Debris Shavings

Description:
Wood Debris Shavings from SL-79 Excavation. Taken at the Superlon Plastics Property, Tacoma, Washington.

Photo No. D-4: Screened Debris

Description:
Screened debris from Building B, Row A Stockpile. Taken at the Superlon Plastics Property, Tacoma, Washington.

Photo No. D-5: Quarry Spalls	
Description: Quarry spalls from Building B, Row A Stockpile. Taken at the Superlon Plastics Property, Tacoma, Washington.	

Photo No. D-6: Quarry Spall After Soaking **Description:** Quarry spall after 36-hours of soaking. Taken at the Superlon Plastics Property, Tacoma, Washington.	
Photo No. D-7: Rock and Quarry Spall After Soaking **Description:** Rock and quarry spall after one week of soaking. Taken at the Superlon Plastics Property, Tacoma, Washington.	

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Attachment D-2: Laboratory Report for Crushed Rock and Quarry Spall Samples

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TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-66530-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
3/17/2017 2:06:06 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-66530-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-66530-1

Receipt
Eleven samples were received on 3/3/2017 3:40 PM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 14.7º C.

Receipt Exceptions

The reference method requires samples to be preserved to a pH of 2 or less. The following sample was received with insufficient preservation at a pH of more than 2: PP-SL 90-030317 (580-66530-3). The sample was preserved to the appropriate pH in the laboratory using Nitric Acid Lot# 0000133393:

The following samples were received at the laboratory outside the required temperature criteria: GW-MW-12S-030317 (580-66530-1), PP-Bld_B_Sample Ports-030317 (580-66530-2), PP-SL 90-030317 (580-66530-3), SO-SL-90-Pilot_bottom-030317-12-12.5 (580-66530-4), SO-SL-90-Pilot_Interfac-030317-8-9 (580-66530-5), WD-SL-79debris_a-030217 (580-66530-6), WD-SL-79debris_a-030217-(01) (580-66530-7), WD-SL-79debris_b-030217 (580-66530-8), WD-SL-79debris_b-030217-(01) (580-66530-9), WD-SL-79debris_c-030217 (580-66530-10) and WD-SL-79debris_c-030217-(01) (580-66530-11). There was no cooling media present in the cooler. As these are samples for metals analysis, the temperature guidance is not applicable.

Metals
Method(s) 6010C: The laboratory control sample duplicate (LCSD) for preparation batch 580-240133, 580-240133, 580-240204 and 580-240204 and analytical batch 580-240412 recovered outside control limits for the following analytes: Se. These analytes were biased high in the LCSD and were not detected in the associated samples; therefore, the data have been reported.

Method(s) 6010C: The continuing calibration verification (CCV) associated with batch 580-240412 recovered above the upper control limit for Se. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Qualifiers

Metals

Qualifier	Qualifier Description
*	LCS or LCSD is outside acceptance limits.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC is outside acceptance limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: GW-MW-12S-030317

Lab Sample ID: 580-66530-1

Date Collected: 03/03/17 01:15

Matrix: Water

Date Received: 03/03/17 15:40

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	59		0.50		mg/L		03/13/17 10:51	03/16/17 08:33	500
Lead	0.046		0.0020		mg/L		03/13/17 10:51	03/13/17 18:59	5

Client Sample ID: PP-Bld_B_Sample Ports-030317

Lab Sample ID: 580-66530-2

Date Collected: 03/03/17 01:40
Matrix: Water
Date Received: 03/03/17 15:40

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	66		0.50		mg/L		03/13/17 10:51	03/16/17 08:38	500
Lead	0.70		0.0020		mg/L		03/13/17 10:51	03/13/17 19:04	5

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: PP-SL 90-030317

Lab Sample ID: 580-66530-3

Date Collected: 03/03/17 11:30
Matrix: Water
Date Received: 03/03/17 15:40

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	1.1		0.0050		mg/L		03/13/17 10:51	03/13/17 19:08	5
Lead	1.5		0.0020		mg/L		03/13/17 10:51	03/13/17 19:08	5

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5
Lab Sample ID: 580-66530-4
Date Collected: 03/03/17 10:35
Matrix: Solid
Date Received: 03/03/17 15:40

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	99.6		0.1		%			03/10/17 11:20	1
Percent Moisture	0.4		0.1		%			03/10/17 11:20	1

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5
Date Collected: 03/03/17 10:35
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-4
Matrix: Solid
Percent Solids: 99.6

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	5.5		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:10	1
Lead	5.3		1.5		mg/Kg	☼	03/10/17 17:08	03/13/17 21:10	1

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9
Lab Sample ID: 580-66530-5
Date Collected: 03/03/17 11:15
Matrix: Solid
Date Received: 03/03/17 15:40

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	99.1		0.1		%			03/10/17 11:22	1
Percent Moisture	0.9		0.1		%			03/10/17 11:22	1

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9
Lab Sample ID: 580-66530-5
Date Collected: 03/03/17 11:15
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 99.1

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	320		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:13	1
Lead	86		1.5		mg/Kg	☼	03/10/17 17:08	03/13/17 21:13	1

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_a-030217

Lab Sample ID: 580-66530-6

Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**9.7**		0.060		mg/L		03/10/17 12:20	03/14/17 12:10	1
Barium	**0.31**		0.010		mg/L		03/10/17 12:20	03/13/17 17:06	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:06	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:06	1
Lead	**2.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:06	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:06	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:06	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 12:01	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.5**		0.1		%			03/15/17 16:39	1
Percent Moisture	**48.5**		0.1		%			03/15/17 16:39	1

Client Sample Results

Client Sample ID: WD-SL-79debris_a-030217
Lab Sample ID: 580-66530-6
Date Collected: 03/02/17 08:50
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 51.5

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	10000		36		mg/Kg	☼	03/10/17 17:08	03/14/17 12:30	10
Lead	8200		18		mg/Kg	☼	03/10/17 17:08	03/14/17 12:30	10

Client Sample ID: WD-SL-79debris_a-030217-(01)

Lab Sample ID: 580-66530-7

Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40
Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**10**		0.060		mg/L		03/10/17 12:20	03/14/17 12:13	1
Barium	**0.30**		0.010		mg/L		03/10/17 12:20	03/13/17 17:10	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:10	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:10	1
Lead	**2.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:10	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:10	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:10	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:45	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**47.0**		0.1		%			03/10/17 11:22	1
Percent Moisture	**53.0**		0.1		%			03/10/17 11:22	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_a-030217-(01)
Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-7
Matrix: Solid
Percent Solids: 47.0

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	4000		5.7		mg/Kg	☼	03/10/17 17:08	03/13/17 21:20	1
Lead	710		2.9		mg/Kg	☼	03/10/17 17:08	03/13/17 21:20	1

Client Sample ID: WD-SL-79debris_b-030217

Lab Sample ID: 580-66530-8

Date Collected: 03/02/17 08:45

Matrix: Solid

Date Received: 03/03/17 15:40

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.3**		0.060		mg/L		03/10/17 12:20	03/14/17 12:17	1
Barium	**0.49**		0.010		mg/L		03/10/17 12:20	03/13/17 17:13	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:13	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:13	1
Lead	**2.9**		0.030		mg/L		03/10/17 12:20	03/13/17 17:13	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:13	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:13	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:47	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.8**		0.1		%			03/10/17 11:22	1
Percent Moisture	**48.2**		0.1		%			03/10/17 11:22	1

Client Sample ID: WD-SL-79debris_b-030217
Lab Sample ID: 580-66530-8
Date Collected: 03/02/17 08:45
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 51.8

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3500		4.7		mg/Kg	☼	03/10/17 17:08	03/13/17 21:24	1
Lead	1200		2.4		mg/Kg	☼	03/10/17 17:08	03/13/17 21:24	1

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45

Matrix: Solid

Date Received: 03/03/17 15:40

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**3.0**		0.060		mg/L		03/10/17 12:20	03/14/17 12:20	1
Barium	**0.45**		0.010		mg/L		03/10/17 12:20	03/13/17 17:16	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:16	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:16	1
Lead	**1.8**		0.030		mg/L		03/10/17 12:20	03/13/17 17:16	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:16	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:16	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**51.2**		0.1		%			03/10/17 11:55	1
Percent Moisture	**48.8**		0.1		%			03/10/17 11:55	1

Client Sample Results

Client Sample ID: WD-SL-79debris_b-030217-(01)
Lab Sample ID: 580-66530-9
Date Collected: 03/02/17 08:45
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 51.2

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**4500**		45		mg/Kg	☼	03/10/17 17:08	03/14/17 12:33	10
Lead	**710**		2.2		mg/Kg	☼	03/10/17 17:08	03/13/17 21:28	1

Client Sample ID: WD-SL-79debris_c-030217

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-10

Matrix: Solid

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.4**		0.060		mg/L		03/10/17 12:20	03/14/17 12:23	1
Barium	**0.056**		0.010		mg/L		03/10/17 12:20	03/13/17 17:20	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:20	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:20	1
Lead	**1.7**		0.030		mg/L		03/10/17 12:20	03/13/17 17:20	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:20	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:20	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:56	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**46.2**		0.1		%			03/10/17 11:55	1
Percent Moisture	**53.8**		0.1		%			03/10/17 11:55	1

Client Sample ID: WD-SL-79debris_c-030217
Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-10
Matrix: Solid
Percent Solids: 46.2

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3800		5.6		mg/Kg	☼	03/10/17 17:08	03/13/17 21:31	1
Lead	900		2.8		mg/Kg	☼	03/10/17 17:08	03/13/17 21:31	1

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35
Matrix: Solid
Date Received: 03/03/17 15:40

Method: 6010C - Metals (ICP) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**7.8**		0.060		mg/L		03/10/17 12:20	03/14/17 12:27	1
Barium	**0.097**		0.010		mg/L		03/10/17 12:20	03/13/17 17:23	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 17:23	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 17:23	1
Lead	**0.87**		0.030		mg/L		03/10/17 12:20	03/13/17 17:23	1
Selenium	ND	* ^	0.10		mg/L		03/10/17 12:20	03/13/17 17:23	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 17:23	1

Method: 7470A - Mercury (CVAA) - TCLP

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:58	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	**45.4**		0.1		%			03/10/17 11:55	1
Percent Moisture	**54.6**		0.1		%			03/10/17 11:55	1

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35
Matrix: Solid
Date Received: 03/03/17 15:40
Percent Solids: 45.4

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	3600		6.4		mg/Kg	☼	03/10/17 17:08	03/13/17 21:35	1
Lead	430		3.2		mg/Kg	☼	03/10/17 17:08	03/13/17 21:35	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 580-240266/20-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 240266

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		3.0		mg/Kg		03/10/17 17:08	03/13/17 20:06	1
Lead	ND		1.5		mg/Kg		03/10/17 17:08	03/13/17 20:06	1

Lab Sample ID: LCS 580-240266/21-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	200	205		mg/Kg		103	80 - 120
Lead	50.0	52.1		mg/Kg		104	80 - 120

Lab Sample ID: LCSD 580-240266/22-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	200	212		mg/Kg		106	80 - 120	3	20
Lead	50.0	53.8		mg/Kg		108	80 - 120	3	20

Lab Sample ID: LCSSRM 580-240266/23-A
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 240266

Analyte	Spike Added	LCSSRM Result	LCSSRM Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	139	141		mg/Kg		101.6	70.4 - 140.3
Lead	133	144		mg/Kg		108.0	72.9 - 127.8

Lab Sample ID: MB 580-240133/1-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/10/17 12:20	03/13/17 16:30	1
Barium	ND		0.010		mg/L		03/10/17 12:20	03/13/17 16:30	1
Cadmium	ND		0.020		mg/L		03/10/17 12:20	03/13/17 16:30	1
Chromium	ND		0.025		mg/L		03/10/17 12:20	03/13/17 16:30	1
Lead	ND		0.030		mg/L		03/10/17 12:20	03/13/17 16:30	1
Selenium	ND		0.10		mg/L		03/10/17 12:20	03/13/17 16:30	1
Silver	ND		0.050		mg/L		03/10/17 12:20	03/13/17 16:30	1

Lab Sample ID: MB 580-240133/1-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240204

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.060		mg/L		03/10/17 12:20	03/14/17 11:34	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 580-240133/2-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.42		mg/L		110	80 - 120
Barium	4.00	4.00		mg/L		100	80 - 120
Cadmium	0.100	0.104		mg/L		104	80 - 120
Chromium	0.400	0.360		mg/L		90	80 - 120
Lead	1.00	0.970		mg/L		97	80 - 120
Selenium	4.00	4.65		mg/L		116	80 - 120
Silver	0.600	0.589		mg/L		98	80 - 120

Lab Sample ID: LCS 580-240133/2-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	4.34		mg/L		108	80 - 120

Lab Sample ID: LCSD 580-240133/3-C
Matrix: Solid
Analysis Batch: 240412

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Barium	4.00	4.41		mg/L		110	80 - 120	10	20
Cadmium	0.100	0.114		mg/L		114	80 - 120	9	20
Chromium	0.400	0.398		mg/L		100	80 - 120	10	20
Lead	1.00	1.05		mg/L		105	80 - 120	8	20
Selenium	4.00	5.22	*	mg/L		131	80 - 120	12	20
Silver	0.600	0.653		mg/L		109	80 - 120	10	20

Lab Sample ID: LCSD 580-240133/3-C
Matrix: Solid
Analysis Batch: 240447

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240204

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.26		mg/L		106	80 - 120	2	20

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-240321/16-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		03/13/17 10:51	03/13/17 17:02	1
Lead	ND		0.00040		mg/L		03/13/17 10:51	03/13/17 17:02	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCS 580-240321/17-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	4.00	3.96		mg/L		99	80 - 120
Lead	1.00	0.960		mg/L		96	80 - 120

Lab Sample ID: LCSD 580-240321/18-A
Matrix: Water
Analysis Batch: 240426

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 240321

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	4.00	4.01		mg/L		100	80 - 120	1	20
Lead	1.00	0.967		mg/L		97	80 - 120	1	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 580-240133/1-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Method Blank
Prep Type: TCLP
Prep Batch: 240209

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.0020		mg/L		03/10/17 12:45	03/13/17 11:23	1

Lab Sample ID: LCS 580-240133/2-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Lab Control Sample
Prep Type: TCLP
Prep Batch: 240209

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.0200	0.0216		mg/L		108	80 - 120

Lab Sample ID: LCSD 580-240133/3-D
Matrix: Solid
Analysis Batch: 240341

Client Sample ID: Lab Control Sample Dup
Prep Type: TCLP
Prep Batch: 240209

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.0200	0.0215		mg/L		107	80 - 120	1	20

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: GW-MW-12S-030317

Lab Sample ID: 580-66530-1

Date Collected: 03/03/17 01:15
Date Received: 03/03/17 15:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 18:59	HJM	TAL SEA
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		500	240691	03/16/17 08:33	FCW	TAL SEA

Client Sample ID: PP-Bld_B_Sample Ports-030317

Lab Sample ID: 580-66530-2

Date Collected: 03/03/17 01:40
Date Received: 03/03/17 15:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 19:04	HJM	TAL SEA
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		500	240691	03/16/17 08:38	FCW	TAL SEA

Client Sample ID: PP-SL 90-030317

Lab Sample ID: 580-66530-3

Date Collected: 03/03/17 11:30
Date Received: 03/03/17 15:40

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total Recoverable	Prep	3005A			240321	03/13/17 10:51	ADB	TAL SEA
Total Recoverable	Analysis	6020A		5	240426	03/13/17 19:08	HJM	TAL SEA

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5

Lab Sample ID: 580-66530-4

Date Collected: 03/03/17 10:35
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:20	DSO	TAL SEA

Client Sample ID: SO-SL-90-Pilot_bottom-030317-12-12.5

Lab Sample ID: 580-66530-4

Date Collected: 03/03/17 10:35
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 99.6

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:10	HJM	TAL SEA

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9 **Lab Sample ID: 580-66530-5**
Date Collected: 03/03/17 11:15 **Matrix: Solid**
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: SO-SL-90-Pilot_Interfac-030317-8-9 **Lab Sample ID: 580-66530-5**
Date Collected: 03/03/17 11:15 **Matrix: Solid**
Date Received: 03/03/17 15:40 **Percent Solids: 99.1**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:13	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217 **Lab Sample ID: 580-66530-6**
Date Collected: 03/02/17 08:50 **Matrix: Solid**
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:06	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:10	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 12:01	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240630	03/15/17 16:39	Y1W	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217 **Lab Sample ID: 580-66530-6**
Date Collected: 03/02/17 08:50 **Matrix: Solid**
Date Received: 03/03/17 15:40 **Percent Solids: 51.5**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		10	240447	03/14/17 12:30	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217-(01) **Lab Sample ID: 580-66530-7**
Date Collected: 03/02/17 08:50 **Matrix: Solid**
Date Received: 03/03/17 15:40

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:10	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_a-030217-(01)
Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-7
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:13	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:45	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_a-030217-(01)
Date Collected: 03/02/17 08:50
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-7
Matrix: Solid
Percent Solids: 47.0

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:20	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217
Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-8
Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:13	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:17	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:47	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:22	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217
Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Lab Sample ID: 580-66530-8
Matrix: Solid
Percent Solids: 51.8

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:24	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:16	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:20	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:49	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_b-030217-(01)

Lab Sample ID: 580-66530-9

Date Collected: 03/02/17 08:45
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 51.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:28	HJM	TAL SEA
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		10	240447	03/14/17 12:33	HJM	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217

Lab Sample ID: 580-66530-10

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:20	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:23	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:56	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217

Lab Sample ID: 580-66530-10

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 46.2

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:31	HJM	TAL SEA

Lab Chronicle

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240412	03/13/17 17:23	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	3010A			240204	03/10/17 12:20	PAB	TAL SEA
TCLP	Analysis	6010C		1	240447	03/14/17 12:27	HJM	TAL SEA
TCLP	Leach	1311			240133	03/09/17 14:32	R1K	TAL SEA
TCLP	Prep	7470A			240209	03/10/17 12:45	PAB	TAL SEA
TCLP	Analysis	7470A		1	240341	03/13/17 11:58	FCW	TAL SEA
Total/NA	Analysis	D 2216		1	240182	03/10/17 11:55	DSO	TAL SEA

Client Sample ID: WD-SL-79debris_c-030217-(01)

Lab Sample ID: 580-66530-11

Date Collected: 03/02/17 08:35
Date Received: 03/03/17 15:40

Matrix: Solid
Percent Solids: 45.4

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3050B			240266	03/10/17 17:08	PAB	TAL SEA
Total/NA	Analysis	6010C		1	240412	03/13/17 21:35	HJM	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Certification Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Laboratory: TestAmerica Seattle

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Alaska (UST)	State Program	10	UST-022	03-02-18
California	State Program	9	2901	01-31-18
L-A-B	DoD ELAP		L2236	01-19-19
L-A-B	ISO/IEC 17025		L2236	01-19-19
Montana (UST)	State Program	8	N/A	04-30-20
Oregon	NELAP	10	WA100007	11-05-17
US Fish & Wildlife	Federal		LE058448-0	10-31-17
USDA	Federal		P330-14-00126	04-08-17
Washington	State Program	10	C553	02-17-18

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 580-66530-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-66530-1	GW-MW-12S-030317	Water	03/03/17 01:15	03/03/17 15:40
580-66530-2	PP-Bld_B_Sample Ports-030317	Water	03/03/17 01:40	03/03/17 15:40
580-66530-3	PP-SL 90-030317	Water	03/03/17 11:30	03/03/17 15:40
580-66530-4	SO-SL-90-Pilot_bottom-030317-12-12.5	Solid	03/03/17 10:35	03/03/17 15:40
580-66530-5	SO-SL-90-Pilot_Interfac-030317-8-9	Solid	03/03/17 11:15	03/03/17 15:40
580-66530-6	WD-SL-79debris_a-030217	Solid	03/02/17 08:50	03/03/17 15:40
580-66530-7	WD-SL-79debris_a-030217-(01)	Solid	03/02/17 08:50	03/03/17 15:40
580-66530-8	WD-SL-79debris_b-030217	Solid	03/02/17 08:45	03/03/17 15:40
580-66530-9	WD-SL-79debris_b-030217-(01)	Solid	03/02/17 08:45	03/03/17 15:40
580-66530-10	WD-SL-79debris_c-030217	Solid	03/02/17 08:35	03/03/17 15:40
580-66530-11	WD-SL-79debris_c-030217-(01)	Solid	03/02/17 08:35	03/03/17 15:40

Loc: 580

66530

Chain of Custody Record

CHOC Number: 05_1.1_E52_19868_03032017

Send Results To:
munsons@uspioneer.com, jking@perc-nw.com,
sduggan@perc-nw.com

Site Contact:
PIONEER Technologies Corporation
Brad Grimsted
Phone: (360) 570-1700 Email: grimstedb@uspioneer.com

PIONEER Technologies Corporation.
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
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PIONEER TECHNOLOGIES CORPORATION

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica-Tacoma
ELAINE WALKER
Phone: 253.248.4972 Email:

Sample Information / **Analytes**

Special Lab Instructions Included ==> / *<== Special Lab Instructions*

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	EPA 6010C-Inorganic	Metals in Water	TCLP RCRA 8 Metals (X)						Comments for Sample
GW-MW-12S-030317	03/03/2017	01:15	BG					X							Water from MW-12S
PP-Bld_B_Sample Ports-030317	03/03/2017	01:40	BG					X							
PP-SL-90-030317	03/03/2017	11:30	BG					X							Water from Pilot SL-90 Excavation
~~SO-SL-79-022717-15~~	~~02/27/2017~~	~~00:00~~	~~BG~~				~~X~~								~~Pilot Study - Sample from bottom of ex~~
SO-SL-90-Pilot_bottom-030317-12-12.5	03/03/2017	10:35	BG				X								
SO-SL-90-Pilot_Interfac-030317-8-9	03/03/2017	11:15	BG				X								
WD-SL-79debris_a-030217	03/02/2017	08:50	BG				X		X						
WD-SL-79debris_a-030217-(01)	03/02/2017	08:50	BG				X		X						
WD-SL-79debris_b-030217	03/02/2017	08:45	BG				X		X						
WD-SL-79debris_b-030217-(01)	03/02/2017	08:45	BG				X		X						
WD-SL-79debris_c-030217	03/02/2017	08:35	BG				X		X						
WD-SL-79debris_c-030217-(01)	03/02/2017	08:35	BG				X		X						

TB ___ Cooler IR5 Cor 14.7 Unc 14.9
Cooler Dsc Med. blue white @Lab ___
~~Wet/Packs~~ none Packing none
Cli drop w/o CS

Cooler (Yes/No): Cooler Temp:	Turnaround Time: Std	Hazard Identification:	Sample Disposal:	Preservative: None	HNO3	None	Lab Use Only:

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:

1. Relinquished By: (Sign and Print) Brad Grimsted BRAD Grimsted	Date/Time: 3/3/17 3:40	1. Received By: (Sign and Print) [illegible signature]	Date/Time: 3/3/17 1540
2. Relinquished By: (Sign and Print)	Date/Time:	2. Received By: (Sign and Print)	Date/Time:
	Date/Time:	3. Received By: (Sign and Print)	Date/Time:

580-66530 Chain of Custody

Stat Form: 01 - 07/24/2015

3/17/2017

Special Instructions for Laboratory

CHOC Number: 05_1.1_E52_19868_03032017

Send Results To: munsons@uspioneer.com, jking@perc-nw.com, sduggan@perc-nw.com	**Site Contact:** PIONEER Technologies Corporation Brad Grimsted Phone: (360) 570-1700 Email: grimstedb@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica-Tacoma ELAINE WALKER Phone: 253.248.4972 Email:	**CHOC Version: 0.99.05** **Copyright © 2003 - 2015.** **PIONEER Technologies Corporation** **All Rights Reserved**

Analytical Method	Lab Comments	Specified Analyte	Samples Included
EPA 6010C--Inorganic		Arsenic Inorganic Lead and Compounds	SO-SL-79-022717-15 WD-SL-79debris_a-030217 WD-SL-79debris_a-030217-(01) WD-SL-79debris_b-030217 WD-SL-79debris_b-030217-(01) WD-SL-79debris_c-030217 WD-SL-79debris_c-030217-(01) SO-SL-90-Pilot_bottom-030317-12-12.5 SO-SL-90-Pilot_Interfac-030317-8-9
TCLP RCRA 8 Metals	All 8 metals	Arsenic Inorganic Barium Chromium Total Lead and Compounds Mercury (elemental) Selenium Silver Cadmium	WD-SL-79debris_a-030217 WD-SL-79debris_a-030217-(01) WD-SL-79debris_b-030217 WD-SL-79debris_b-030217-(01) WD-SL-79debris_c-030217 WD-SL-79debris_c-030217-(01)
Metals in Water		Arsenic Inorganic Lead and Compounds	PP-SL-90-030317 PP-Bld_B_Sample Ports-030317 GW-MW-12S-030317

Login Sample Receipt Checklist

Client: Pioneer Technologies Corporation

Job Number: 580-66530-1

Login Number: 66530
List Number: 1
Creator: Gonzales, Steve

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	False	No ice
Cooler Temperature is acceptable.	False	Cooler temperature outside required temperature criteria.
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	False	Not requested on COC.
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	pH adjusted
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Canton
4101 Shuffel Street NW
North Canton, OH 44720
Tel: (330)497-9396

TestAmerica Job ID: 240-80822-1
Client Project/Site: Superlon Metals Fractionation

For:
Pioneer Technologies Corporation
5205 Corporate Ctr. Ct. SE
Ste A
Olympia, Washington 98503

Attn: Brad Grimsted

M. Elaine Walker

Authorized for release by:
6/15/2017 2:47:36 PM

Elaine Walker, Project Manager II
(253)248-4972
elaine.walker@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1 2 3 4 5 6 7 8 9 10 11 12 13

Table of Contents

Definitions/Glossary

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 240-80822-1

Laboratory: TestAmerica Canton

Narrative

Job Narrative
240-80822-1

Receipt
Two samples were received on 6/12/2017 8:20 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 26.1º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Method	Method Description	Protocol	Laboratory
6020A	Metals (ICP/MS)	SW846	TAL CAN
Moisture	Percent Moisture	EPA	TAL CAN

Protocol References:

EPA = US Environmental Protection Agency

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
240-80822-1	OS-ROCK_1-060917	Solid	06/09/17 10:30	06/12/17 08:20
240-80822-2	OS-SPALL_1-060917	Solid	06/09/17 10:30	06/12/17 08:20

Detection Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Client Sample ID: OS-ROCK_1-060917 — Lab Sample ID: 240-80822-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	2.4		0.92	0.024	mg/Kg	2	☼	6020A	Total/NA
Lead	5.9		0.18	0.041	mg/Kg	2	☼	6020A	Total/NA

Client Sample ID: OS-SPALL_1-060917 — Lab Sample ID: 240-80822-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Arsenic	14		0.83	0.022	mg/Kg	2	☼	6020A	Total/NA
Lead	16		0.17	0.037	mg/Kg	2	☼	6020A	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: OS-ROCK_1-060917
Lab Sample ID: 240-80822-1
Date Collected: 06/09/17 10:30
Matrix: Solid
Date Received: 06/12/17 08:20

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	98.9		0.1	0.1	%			06/12/17 15:17	1
Percent Moisture	1.1		0.1	0.1	%			06/12/17 15:17	1

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Client Sample ID: OS-ROCK_1-060917
Date Collected: 06/09/17 10:30
Date Received: 06/12/17 08:20

Lab Sample ID: 240-80822-1
Matrix: Solid
Percent Solids: 98.9

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**2.4**		0.92	0.024	mg/Kg	☼	06/13/17 12:50	06/14/17 14:34	2
Lead	**5.9**		0.18	0.041	mg/Kg	☼	06/13/17 12:50	06/14/17 14:34	2

Client Sample Results

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Client Sample ID: OS-SPALL_1-060917

Date Collected: 06/09/17 10:30
Date Received: 06/12/17 08:20

Lab Sample ID: 240-80822-2

Matrix: Solid

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Percent Solids	97.7		0.1	0.1	%			06/12/17 15:17	1
Percent Moisture	2.3		0.1	0.1	%			06/12/17 15:17	1

Client Sample ID: OS-SPALL_1-060917

Date Collected: 06/09/17 10:30
Date Received: 06/12/17 08:20

Lab Sample ID: 240-80822-2

Matrix: Solid
Percent Solids: 97.7

Method: 6020A - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	14		0.83	0.022	mg/Kg	☼	06/13/17 12:55	06/14/17 14:55	2
Lead	16		0.17	0.037	mg/Kg	☼	06/13/17 12:55	06/14/17 14:55	2

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 240-282935/1-A ^2
Matrix: Solid
Analysis Batch: 283213

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 282935

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		1.0	0.026	mg/Kg		06/13/17 12:50	06/14/17 14:16	2
Lead	ND		0.20	0.045	mg/Kg		06/13/17 12:50	06/14/17 14:16	2

Lab Sample ID: LCS 240-282935/3-A ^2
Matrix: Solid
Analysis Batch: 283213

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 282935

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	100	87.4		mg/Kg		87	80 - 120
Lead	100	98.8		mg/Kg		99	80 - 120

Lab Sample ID: 240-80822-1 MS
Matrix: Solid
Analysis Batch: 283213

Client Sample ID: OS-ROCK_1-060917
Prep Type: Total/NA
Prep Batch: 282935

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	2.4		87.2	79.4		mg/Kg	☼	88	75 - 125
Lead	5.9		87.2	91.8		mg/Kg	☼	98	75 - 125

Lab Sample ID: 240-80822-1 MSD
Matrix: Solid
Analysis Batch: 283213

Client Sample ID: OS-ROCK_1-060917
Prep Type: Total/NA
Prep Batch: 282935

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	2.4		87.2	77.1		mg/Kg	☼	86	75 - 125	3	20
Lead	5.9		87.2	93.0		mg/Kg	☼	100	75 - 125	1	20

Method: Moisture - Percent Moisture

Lab Sample ID: 240-80822-1 DU
Matrix: Solid
Analysis Batch: 282651

Client Sample ID: OS-ROCK_1-060917
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Solids	98.9		98.9		%		0	20
Percent Moisture	1.1		1.1		%		2	20

Lab Sample ID: 240-80822-2 DU
Matrix: Solid
Analysis Batch: 282651

Client Sample ID: OS-SPALL_1-060917
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Percent Solids	97.7		97.7		%		0	20
Percent Moisture	2.3		2.3		%		0.7	20

TestAmerica Canton

QC Association Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Metals

Processed Batch: 282702

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-80822-1	OS-ROCK_1-060917	Total/NA	Solid	Part Size Red	
240-80822-2	OS-SPALL_1-060917	Total/NA	Solid	Part Size Red	
240-80822-1 MS	OS-ROCK_1-060917	Total/NA	Solid	Part Size Red	
240-80822-1 MSD	OS-ROCK_1-060917	Total/NA	Solid	Part Size Red	

Prep Batch: 282935

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-80822-1	OS-ROCK_1-060917	Total/NA	Solid	3050B	282702
240-80822-2	OS-SPALL_1-060917	Total/NA	Solid	3050B	282702
MB 240-282935/1-A ^2	Method Blank	Total/NA	Solid	3050B	
LCS 240-282935/3-A ^2	Lab Control Sample	Total/NA	Solid	3050B	
240-80822-1 MS	OS-ROCK_1-060917	Total/NA	Solid	3050B	282702
240-80822-1 MSD	OS-ROCK_1-060917	Total/NA	Solid	3050B	282702

Analysis Batch: 283213

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-80822-1	OS-ROCK_1-060917	Total/NA	Solid	6020A	282935
240-80822-2	OS-SPALL_1-060917	Total/NA	Solid	6020A	282935
MB 240-282935/1-A ^2	Method Blank	Total/NA	Solid	6020A	282935
LCS 240-282935/3-A ^2	Lab Control Sample	Total/NA	Solid	6020A	282935
240-80822-1 MS	OS-ROCK_1-060917	Total/NA	Solid	6020A	282935
240-80822-1 MSD	OS-ROCK_1-060917	Total/NA	Solid	6020A	282935

General Chemistry

Analysis Batch: 282651

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-80822-1	OS-ROCK_1-060917	Total/NA	Solid	Moisture	282702
240-80822-2	OS-SPALL_1-060917	Total/NA	Solid	Moisture	282702
240-80822-1 DU	OS-ROCK_1-060917	Total/NA	Solid	Moisture	282702
240-80822-2 DU	OS-SPALL_1-060917	Total/NA	Solid	Moisture	282702

Processed Batch: 282702

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
240-80822-1	OS-ROCK_1-060917	Total/NA	Solid	Part Size Red	
240-80822-2	OS-SPALL_1-060917	Total/NA	Solid	Part Size Red	
240-80822-1 DU	OS-ROCK_1-060917	Total/NA	Solid	Part Size Red	
240-80822-2 DU	OS-SPALL_1-060917	Total/NA	Solid	Part Size Red	

Client Sample ID: OS-ROCK_1-060917 **Lab Sample ID: 240-80822-1**
Date Collected: 06/09/17 10:30 **Matrix: Solid**
Date Received: 06/12/17 08:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Processed	Part Size Red			282702	06/12/17 12:30	RB1	TAL CAN
Total/NA	Analysis	Moisture		1	282651	06/12/17 15:17	PW	TAL CAN

Client Sample ID: OS-ROCK_1-060917 **Lab Sample ID: 240-80822-1**
Date Collected: 06/09/17 10:30 **Matrix: Solid**
Date Received: 06/12/17 08:20 **Percent Solids: 98.9**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Processed	Part Size Red			282702	06/12/17 12:30	RB1	TAL CAN
Total/NA	Prep	3050B			282935	06/13/17 12:50	DEE	TAL CAN
Total/NA	Analysis	6020A		2	283213	06/14/17 14:34	AS1	TAL CAN

Client Sample ID: OS-SPALL_1-060917 **Lab Sample ID: 240-80822-2**
Date Collected: 06/09/17 10:30 **Matrix: Solid**
Date Received: 06/12/17 08:20

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Processed	Part Size Red			282702	06/12/17 12:30	RB1	TAL CAN
Total/NA	Analysis	Moisture		1	282651	06/12/17 15:17	PW	TAL CAN

Client Sample ID: OS-SPALL_1-060917 **Lab Sample ID: 240-80822-2**
Date Collected: 06/09/17 10:30 **Matrix: Solid**
Date Received: 06/12/17 08:20 **Percent Solids: 97.7**

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Processed	Part Size Red			282702	06/12/17 12:30	RB1	TAL CAN
Total/NA	Prep	3050B			282935	06/13/17 12:55	DEE	TAL CAN
Total/NA	Analysis	6020A		2	283213	06/14/17 14:55	AS1	TAL CAN

Laboratory References:

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Accreditation/Certification Summary

Client: Pioneer Technologies Corporation
Project/Site: Superlon Metals Fractionation

TestAmerica Job ID: 240-80822-1

Laboratory: TestAmerica Canton

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
California	State Program	9	2927	02-23-18
Connecticut	State Program	1	PH-0590	12-31-17
Florida	NELAP	4	E87225	06-30-17 *
Illinois	NELAP	5	200004	07-31-17 *
Kansas	NELAP	7	E-10336	01-31-18
Kentucky (UST)	State Program	4	58	02-23-18
Kentucky (WW)	State Program	4	98016	12-31-17
Minnesota	NELAP	5	039-999-348	12-31-17
Minnesota (Petrofund)	State Program	1	3506	07-31-17 *
Nevada	State Program	9	OH-000482008A	07-31-17 *
New Jersey	NELAP	2	OH001	06-30-17 *
New York	NELAP	2	10975	03-31-18
Ohio VAP	State Program	5	CL0024	09-14-17
Oregon	NELAP	10	4062	02-23-18
Pennsylvania	NELAP	3	68-00340	08-31-17 *
Texas	NELAP	6	T104704517-15-5	08-31-17 *
USDA	Federal		P330-16-00404	12-28-19
Virginia	NELAP	3	460175	09-14-17
Washington	State Program	10	C971	01-12-18
West Virginia DEP	State Program	3	210	12-31-17
Wisconsin	State Program	5	999518190	08-31-17 *

Laboratory: TestAmerica Seattle

The accreditations/certifications listed below are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Oregon	NELAP	10	WA100007	11-05-17
Washington	State Program	10	C553	02-17-18

* Accreditation/Certification renewal pending - accreditation/certification considered valid.

261|261

Chain of Custody Record

CHOC Number: 01_1.1_E56_69098_09062017

Send Results To:
grimstedb@uspioneer.com

Site Contact:
PIONEER
Stacy Munson
Phone: 360-570-1700 Email: munsons@uspioneer.com

PIONEER Technologies Corporation.
5205 Corporate Ctr. Court SE, Suite A
Lacey, WA 98503
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com
PIONEER TECHNOLOGIES CORPORATION

Send Invoice To:
Pacific Environmental Redevelopment Coporation
Jeff King
Phone: 425-238-2212 Email: jking@perc-nw.com

Laboratory Information:
TestAmerica Canton OH
Aaron Martin
Phone: 330-497-9396 Email: N/A

Sample Information / Special Lab Instructions Included ==> / Analytes / <== Special Lab Instructions

Sample ID (Auto Generated)	Date (MM/DD/YYYY)	Time (0000 to 2400)	Sampler's Initials	Leachate	Filtered	MS/MSD	6010B – Inorganics by ICP/AA								Comments for Sample
							X								
OS-Rock_1-060917	06/09/2017	10:30	SM				X								Lab must crush sample before analysis
OS-Spall_1-060917	06/09/2017	10:30	SM				X								Lab must crush sample before analysis

240-80822 Chain of Custody

Cooler (Yes/No): Cooler Temp:	Turnaround Time: 48 Hr	Hazard Identification:	Sample Disposal:	Preservative: None	Lab Use Only:

These data are protected by Attorney/Client Privelege. No Un-Authorized distribution is allowed.

QA/QC Requirements:

Sampling Event Comments:
Lab must crush samples before analysis

Relinquished By: (Sign and Print)	Date/Time:	Received By: (Sign and Print)	Date/Time:
1. Stacy Munson	6/9/17 11:00am	1. Nick Sutek	6-12-17 820
2.		2.	
3.		3.	

Stat Form: 01 - 07/24/2015

1 2 3 4 5 6 7 8 9 10 11 12 13

Special Instructions for Laboratory

CHOC Number: 01_1.1_E56_69098_09062017

Send Results To: grimstedb@uspioneer.com	**Site Contact:** PIONEER Stacy Munson Phone: 360-570-1700 Email: munsons@uspioneer.com	PIONEER Technologies Corporation. 5205 Corporate Ctr. Court SE, Suite A Lacey, WA 98503 Phone: 360.570.1700 Fax: 360.570.1777 PIONEER TECHNOLOGIES CORPORATION
Send Invoice To: Pacific Environmental Redevelopment Coporation Jeff King Phone: 425-238-2212 Email: jking@perc-nw.com	**Laboratory Information:** TestAmerica Canton OH Aaron Martin Phone: 330-497-9396 Email: N/A	**CHOC Version: 0.99.05** **Copyright © 2003 - 2015.** **PIONEER Technologies Corporation** **All Rights Reserved**

Analytical Method	Lab Comments	Specified Analyte	Samples Included
6010B -- Inorganics by ICP/AA	Lab must crush samples before analysis	Arsenic Inorganic Lead and Compounds	OS-Rock_1-060917 OS-Spall_1-060917

1 of 1

TestAmerica Canton Sample Receipt Form/Narrative Login # : 808222
Canton Facility

Client Pacific Env. Site Name ______ Cooler unpacked by:

Cooler Received on 6-12-17 Opened on 6-12-17

FedEx: 1st Grd Exp UPS FAS Clipper Client Drop Off TestAmerica Courier Other ______

Receipt After-hours: Drop-off Date/Time ______ Storage Location ______

TestAmerica Cooler # ______ Foam Box Client Cooler Box Other ______

Packing material used: Bubble Wrap Foam Plastic Bag None Other ______

COOLANT: Wet Ice Blue Ice Dry Ice Water None

1. Cooler temperature upon receipt ☐ See Multiple Cooler Form
   IR GUN# IR-8 (CF **-0.4** °C) Observed Cooler Temp.______°C Corrected Cooler Temp.______°C
   IR GUN #36 (CF **+0**°C) Observed Cooler Temp. 26.1 °C Corrected Cooler Temp. 26.1 °C
2. Were custody seals on the outside of the cooler(s)? If Yes Quantity ______ Yes No
   -Were custody seals on the outside of the cooler(s) signed & dated? Yes No NA
   -Were custody seals on the bottle(s) or bottle kits (LLHg/MeHg)? Yes No
3. Shippers' packing slip attached to the cooler(s)? Yes No
4. Did custody papers accompany the sample(s)? Yes No
5. Were the custody papers relinquished & signed in the appropriate place? Yes No
6. Was/were the person(s) who collected the samples clearly identified on the COC? Yes No
7. Did all bottles arrive in good condition (Unbroken)? Yes No
8. Could all bottle labels be reconciled with the COC? Yes No
9. Were correct bottle(s) used for the test(s) indicated? Yes No
10. Sufficient quantity received to perform indicated analyses? Yes No
11. Are these work share samples? Yes No
    If yes, Questions 11-15 have been checked at the originating laboratory.
11. Were sample(s) at the correct pH upon receipt? Yes No NA pH Strip Lot# **HC697954**
12. Were VOAs on the COC? Yes No
13. Were air bubbles >6 mm in any VOA vials? ⬤ ⬅ Larger than this. Yes No NA
14. Was a VOA trip blank present in the cooler(s)? Trip Blank Lot # ______ Yes No
15. Was a LL Hg or Me Hg trip blank present? ______ Yes No

Contacted PM ______ Date ______ by ______ via Verbal Voice Mail Other

Concerning ______

16. CHAIN OF CUSTODY & SAMPLE DISCREPANCIES Samples processed by:

17. SAMPLE CONDITION

Sample(s) ______ were received after the recommended holding time had expired.

Sample(s) ______ were received in a broken container.

Sample(s) ______ were received with bubble >6 mm in diameter. (Notify PM)

18. SAMPLE PRESERVATION

Sample(s) ______ were further preserved in the laboratory.

Time preserved: ______ Preservative(s) added/Lot number(s): ______.

Ref: SOP NC-SC-0005, Sample Receiving

\\tacorp\corp\QA\QA_Facilities\Canton-QA\Document-Management\Work-Instruction\Word Version Work Instructions\WI-NC-099-052317 Cooler Receipt Form.doc djl

Appendix E

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Appendix E: Paint Filter Liquids Test Protocol

for the

Superlon Plastics Site Tacoma, Washington

Prepared for:

White Birch
2116 Taylor Way
Tacoma, WA 98401

and

The Chemours Company
6324 Fairview Road, Suite 200
Charlotte, NC 28210

June 2017

PERC

Pacific Environmental and Redevelopment Corporation
424 East Meadow Lake Drive
Snohomish, Washington 98290

And

PIONEER TECHNOLOGIES CORPORATION

PIONEER Technologies Corporation
5205 Corporate Center Ct. SE, Suite A
Olympia, Washington 98503-5901

Table of Contents

Figures

E1 Introduction

The following protocol, developed by the US EPA, for Method 9095A – Paint Filter Liquids Test[1]. The method will be followed to determine if the non-hazardous soil is dry enough for transport to the LRI Landfill. The testing apparatus used during the remediation of on-Property soil and perched water may differ from that shown on Figure 1.

[1] https://www.epa.gov/sites/production/files/documents/9095a.pdf

E2 Method Protocol

E2.1 Scope and Application

- This method is used to determine the presence of free liquids in a representative sample of waste.
- The method is used to determine compliance with 40 CFR 264.314 and 265.314.

E2.2 Summary of Method

A predetermined amount of material is placed in a paint filter. If any portion of the material passes through and drops from the filter within the 5-min test period, the material is deemed to contain free liquids.

E2.3 Interferences

- Filter media were observed to separate from the filter cone on exposure to alkaline materials. This development causes no problem if the sample is not disturbed.
- Temperature can affect the test results if the test is performed below the freezing point of any liquid in the sample. Tests must be performed above the freezing point and can, but are not required to, exceed room temperature of 25° C.

E2.4 Apparatus and Materials

- Conical paint filter: Mesh number 60 +/- 5% (fine meshed size). Available at local paint stores.
- Glass funnel: If the paint filter, with the waste, cannot sustain its weight on the ring stand, then a fluted glass funnel or glass funnel with a mouth large enough to allow at least 1 in. of the filter mesh to protrude should be used to support the filter. The funnel should be fluted or have a large open mouth in order to support the paint filter yet not interfere with the movement, to the graduated cylinder, of the liquid that passes through the filter mesh.
- Ring stand and ring, or tripod.
- Graduated cylinder or beaker: 100-mL.

E2.5 Sample Collection, Preservation and Handling

A 100-mL or 100-g representative sample is required for the test. If it is not possible to obtain a sample of 100 mL or 100 g that is sufficiently representative of the waste, the analyst may use larger size samples in multiples of 100 mL or 100 g, i.e., 200, 300, 400 mL or g. However, when larger samples are used, analysts shall divide the sample into 100-mL or 100-g portions and test each portion separately. If any portion contains free liquids, the entire sample is considered to have free liquids. If the sample is measured volumetrically, then it should lack major air spaces or voids.

E2.6 Procedure

1. Assemble test apparatus as shown in Figure 1.

2. Place sample in the filter. A funnel may be used to provide support for the paint filter. If the sample is of such light bulk density that it overflow the filter, then the sides of the filter can be extended upward by taping filter paper to the inside of the filter and above the mesh. Settling the sample into the paint filter may be facilitated by lightly tapping the side of the filter as it is being filled.

3. In order to assure uniformity and standardization of the test, material such as sorbent pads or pillows which do not conform to the shape of the paint filter, should be cut into small pieces and poured into the filter. Sample size reduction may be accomplished by cutting the sorbent material with scissors, shears, knife, or other such device so as to preserve as much of the original integrity of the sorbent fabric as possible. Sorbents enclosed in a fabric should be mixed with the resultant fabric pieces. The particles to be tested should be reduced smaller than 1 cm (i.e., should be capable of passing through a 9.5 mm (0.375 inch) standard sieve). Grinding sorbent materials should be avoided as this may destroy the integrity of the sorbent and produce many "fine particles" which would normally not be present.

4. For brittle materials larger than 1 cm that do not conform to the filter, light crushing to reduce oversize particles is acceptable if it is not practical to cut the material. Materials such as clay, silica gel, and some polymers may fall into this category.

5. Allow sample to drain for 5 min into the graduated cylinder.

6. If any portion of the test material collects in the graduated cylinder in the 5-min period, then the material is deemed to contain free liquids for purposes of 40 CFR 264.314 and 265.314.

E2.7 Quality Control

Duplicate samples should be analyzed on a routine basis.

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Figures

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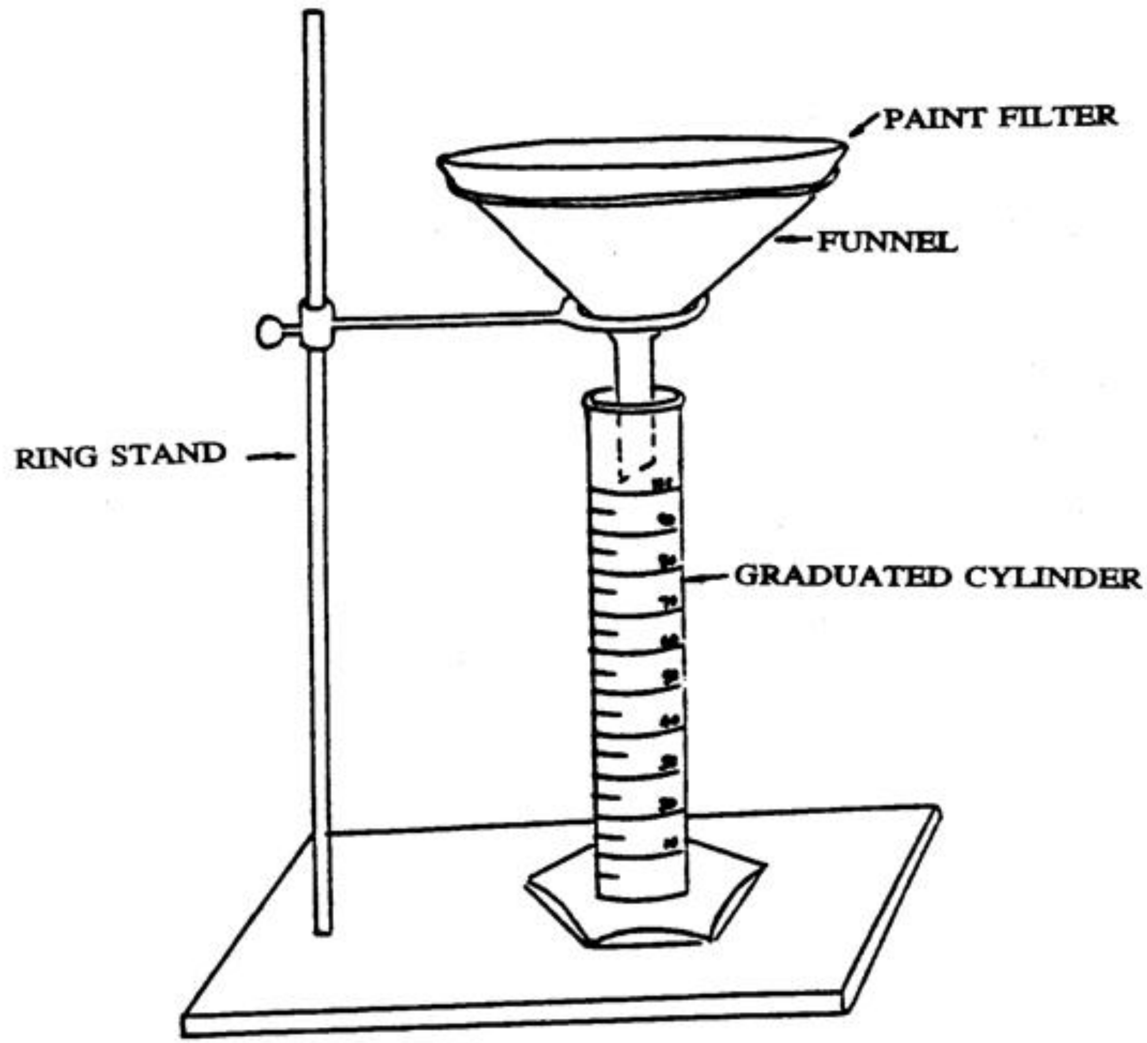

PIONEER
TECHNOLOGIES CORPORATION

Paint Filter Test Apparatus
Appendix E: Paint Filter Liquids Test Protocol
Superlon Plastics Property, Tacoma, Washington

Figure E-1

APPENDICES F AND G ARE LARGE DOCUMENTS AVAILABLE UPON REQUEST