Feasibility Study

Van Stone Mine
Onion Creek, Washington

for
Washington State Department of Ecology

May 2, 2017

GeoEngineers
Earth Science + Technology

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1.0 INTRODUCTION

This Feasibility Study (FS) was conducted for the Van Stone Mine (herein referred to as the “site”) located in Stevens County, Washington (Vicinity Map and Areas of Interest, Figure 1) and near the headwaters of Onion Creek, a Columbia River tributary.

The site operated intermittently from approximately 1938 to 1993 as a lead and zinc mine utilizing underground and open pit mining techniques until closure in 1993. The site included a concentrating mill that employed typical froth and flotation techniques to extract zinc and lead from ore and concentrate it for further processing off site.

Potentially liable parties have included American Smelting and Refining Company (ASARCO), Callahan Mining Corp., Sundown Holdings, Ltd., Equinox Resources (Wash) Inc. and Vaagen Brothers Lumber, Inc. (Vaagen). In 2005, ASARCO filed for reorganization under Chapter 11 of the United States Bankruptcy Code. The Washington State Department of Ecology (Ecology) filed a contingent proof of claim related to the anticipated Van Stone Mine cleanup as part of the ASARCO bankruptcy proceedings. Under the bankruptcy settlement, Ecology received $3.5 million for its Van Stone Mine related claim. Using settlement funds, Ecology is actively pursuing site remedial actions in compliance with Washington State Model Toxics Control Act (MTCA) regulations.

An Agreed Order (AO) was negotiated between Ecology and Vaagen (AO No. 8613). The AO required Vaagen to allow site access for completion of a Remedial Investigation (RI) and FS. The RI was completed in 2013 (Hart Crowser 2013).

This FS was conducted to develop and evaluate cleanup alternatives to address contamination identified in the RI and select a preferred cleanup alternative. This FS also includes the results of additional investigations conducted after the RI. Additional investigations were performed to address data gaps identified in the RI, and collect missing or incomplete information required to complete the FS process.

This FS has been prepared in general accordance with the requirements defined by MTCA (Washington Administrative Code [WAC] 173-340-350) and follows the format of Ecology’s Feasibility Study Checklist (Ecology 2016). Based on FS recommendations, Ecology will select a cleanup alternative and prepare a cleanup action plan (CAP) for the site.

2.0 SITE BACKGROUND AND DESCRIPTION

The following sections provide a brief site history and description, describe the site environmental setting, describe current and future land uses, provide a summary of previous site investigations and describe interim actions conducted at the site.

2.1. Site History

The site is in the Selkirk Mountains of northeastern Washington within the Onion Creek watershed headwaters, as shown on Figure 1. Exploration activities in the area began in the early part of the 20th century and Willow Creek Mines began active underground mining for lead and zinc at the site in approximately 1938. The site was originally operated as an underground lead and zinc mine and eventually converted to an open pit operation. Open pit mining at the south pit consumed the underground development in 1953 (DNR 2005). To support open pit operations, a flotation mill was constructed onsite by ASARCO. Open pit mining was conducted by drilling and blasting out ore reserves and trucking the ore to the mill for processing. Blasted rock not classified as ore was placed into waste rock dumps around the open pit operations. Operations ceased in 1993.

As the ore was processed though the flotation mill, lead and zinc concentrates were produced and shipped off-site. Milling process material not classified as concentrates (tailings) was transported as a slurry through pipelines to one of two disposal areas. Tailings were hydraulically placed and coarser tailings were used to construct retainment berms along the tailings deposition perimeter. Water from the tailings was most likely decanted off and allowed to flow into nearby drainages.

The Upper Tailings Pile was used until a berm failure in 1961, resulted in a release of water and tailings into a tributary to Onion Creek. The Lower Tailings Pile was constructed after the 1961 berm failure. Tailings were placed in this lower pile for the remaining mine life. As part of mine reopening in 1992, Equinox reconfigured the Lower Tailings Pile and placed a polyvinyl chloride (PVC) geomembrane on top of the old tailings. In addition, a seepage collection pond was constructed out of tailings next the facility. Tailings were then placed on top of the PVC liner during the brief restart in the 1990's. A PVC geomembrane was also installed on top of the upper tailings pile for emergency tailings storage.

After final shutdown, mine buildings, access roads, waste rock, process tailings and exposed mining faces remained. The PVC geomembrane that was installed in the tailings piles has degraded because of UV exposure.

As previously noted, the 15 parcels of land comprising the site are currently owned by Stevens County, Vaagen, and Mr. Daniel Paul. Stevens County owns portions of the waste rock piles, north and south pits, a tailings conveyance pipeline, and the Lower Tailings Pile. Current land use for these areas by Stevens County is unknown. Vaagen owns portions of the waste rock piles, west end pit and the Upper Tailings Pile. Primary site use for these areas is likely timber management and harvesting. Mr. Daniel Paul owns the mill facility. His current and future land use intent are unknown.

Surrounding site land use is primarily designated forest land; however, residential single family properties are present to the south and northeast of the Lower Tailings Pile as well as adjacent to the mill site. A school and two additional residential single family parcels are located near the intersection of Onion Creek Road and Lotze Creek Road on the way to the site.

2.2. Areas of Interest

The RI identified five areas of interest (AOIs) at the site (AOI-1 through AOI-5) as shown on Figure 1. Site Features are identified on Van Stone Mine Features, Figure 2. The AOIs are based on site features, environmental impacts associated with past mining activity, and geographic locations within the watershed. The following sections provide a summary of site features within each AOI.

2.2.1. AOI-1 – Mill Area, Open Pits and Waste Rock

Primary site features of AOI-1 are show on AOI-1 Explorations, Figures 3 and 4 and include:

- The North Pit, including West End Pit Lake;

- Pit Lake Dam;
- The South Pit;
- Waste rock piles;
- Overburden stockpiles; and
- Mill area.

The North Pit is the larger of the two mine pits and is divided into two distinct sub-areas referred to as the North End Pit and the West End Pit (Figure 4). An approximately 4½-acre lake referred to as the West End Pit Lake occupies the West End Pit. The lake is about 100 feet deep and formed when North Pit dewatering ended at cessation of mining operations. The West End Pit Lake currently discharges over fill material and into the Southwest tributary of Onion Creek. A feature referred to as the Pit Lake Dam was created by overburden and overlying fill material placed to create a road to the other side of the pit.

On June 11, 2010, Ecology inspected the Pit Lake Dam and estimated that it impounded approximately 50 acre-feet of water. The jurisdictional threshold for Ecology's Dam Safety Office (DSO) is 10 acre-feet; therefore, Ecology determined the Pit Lake Dam was under their authority and must meet the requirements of WAC 173-175. Because of the inspection, the dam was assigned State ID number ST61-2033 and rated Hazard Class 2 (having a significant downstream hazard classification). Required corrective actions were provided to Equinox, but actions have not been taken to upgrade the dam.

The South Pit is located approximately 1,000 feet south of the North Pit. A small, shallow pond occupies the center of the pit floor. The pond volume likely fluctuates seasonally; affected by spring snowmelt, seasonal precipitation, and/or limited discharge from pit wall seepage.

Waste rock is placed predominately north of the North Pit, but exploration areas are also distributed northwest, east, and southeast of the South Pit in AOI-1 (see Figures 3 and 4). Waste rock was generally end dumped at the angle of repose away from the mining pit and varies in size from fine rock flour to boulders.

An overburden stockpile was identified in a former Reclamation Plan (Beacon Hill 1999). The overburden stockpile is located east of the mill site and north of the North Pit (AOI-1- Explorations – Mill Area, Figure 3). According to the reclamation plan, the stockpiled material was reserved to cover waste rock piles and the ground surface around the mill area. Additional smaller overburden piles were also identified in disturbed areas around the mining pits.

The mill area consists of concrete foundations from the former mill buildings and crusher, offices, shop buildings, a former aboveground storage tank (AST) area, former water tank and core shack. Most of the milling equipment has been removed; however, some living quarters and office buildings remain. The ball mill and flotation equipment, AST(s), thickener and crusher were removed from the site. Many roads and laydown areas are present in the mill area including the crushing pad, where ore from the open pit was staged before it was fed into the crusher and milling circuit.

2.2.2. AOI-2 – Upper Tailings Pile

AOI-2 includes the Upper Tailings Pile which is located approximately 3,800 feet topographically downslope and west of the North Pit (Figure 1). The Upper Tailings Pile occupies approximately 9½ acres and is divided into east and west basins, divided by a waste rock-lined drainage ditch (AOI-2 Explorations – Upper Tailings Area, Figure 5). The maximum height of the Upper Tailings Pile is approximately 35 feet, and it contains approximately 195,700 cubic yards of tailings.

Tailings were deposited in the Upper Tailings Pile from the earliest operations until 1961 when a failure resulted in erosion and transport of material into the Southeast Tributary of Onion Creek, and eventually, the main stem of Onion Creek. Additional failures and resulting tailings releases have occurred since 1961. As part of the mine reopening in the early 1990's, a PVC-lined tailings storage area was constructed atop the east basin.

During the April 23, 2014 site visit, GeoEngineers observed a degraded PVC geomembrane extending from below the 1990 tailings at the east basin. Standing water was observed on the surface of the east basin. The west basin was re-graded in 2010, as part of an emergency cleanup action conducted by Ecology to stop erosion of tailings into the southeast tributary of Onion Creek.

2.2.3. AOI-3 – Lower Tailings Pile

The Lower Tailings Pile and Seepage Recovery Pond comprise the primary site features of AOI-3 (AOI-3 Explorations – Lower Tailings Area, Figure 6). The Lower Tailings Pile was constructed after the 1961 Upper Tailings Pile breach and used until ASARCO ceased operations in 1970. The Lower Tailings Pile was reconfigured by Equinox in the late 1980's and early 1990's to accommodate the 1992 mine reopening. Reconfiguration included re-sloping the existing pile and constructing a PVC-lined containment on top of the tailings deposited prior to 1970.

The Lower Tailings Pile occupies about 40 acres and is approximately 60 to 75 feet in height. The Lower Tailings Pile contains an estimated 2,287,140 cubic yards of tailings. After the reconfiguration, the Lower Tailings Pile topmost surface was separated by an earthen berm forming two ponds; however, after mine closure, the berm was breached to connect the ponds and provide water and erosion control. The exposed portions of the PVC geomembrane had also degraded.

The Seepage Recovery Pond (SRP), is a geomembrane-lined pond located south of the Lower Tailings Pile. The SRP was reportedly constructed with tailings and has a liner manufactured from a slightly elastic, impregnated woven fabric material. The SRP reportedly was constructed to contain seepage water from the Lower Tailings Pile; however, the feature was never utilized for this purpose. The SRP liner appears to be in better condition than the PVC geomembranes observed at the Upper and Lower Tailings Piles.

2.2.4. AOI-4 – Tailings Pipelines and Access Roads

The former pipeline alignment and site access roads are the primary features of AOI-4 (Figure 1). There were two distinct former tailings pipeline routes designated as the north pipeline and south pipeline (Figure 2). The South Pipeline trends west from the southwest corner of the West End Pit to the Upper Tailings Pile. The North Pipeline was installed after the 1961 Upper Tailings Pile failure, and initially connected the South Pipeline to the Lower Tailings Pile. However, the North Pipeline was later extended to the mill area and the South Pipeline was abandoned. As part of the RI, multiple deposits of tailings were observed along the alignments. The deposits were the results of spills from the conveyance system.

2.2.5. AOI-5 – Onion Creek and Tributaries

AOI-5 includes Onion Creek and its tributaries (see Figure 1). Potential mining activity impacts to Onion Creek and its tributaries include surface water quality degradation and deposition of tailings as sediments along the creek channel.

2.3. Environmental Setting

The following sections provide information on the meteorology, geologic setting, hydrogeologic setting and hydraulic setting of the Van Stone Mine.

2.3.1. Meteorology

The site lies in a forested mountainous area. Precipitation is rain-snow dominated below elevation 3,600 feet above mean sea level (MSL) and changes to snow dominated above. The rain-snow dominated portion of the site receives approximately 25 inches of precipitation annually, while the higher snow dominated areas typically receive about 30 inches of precipitation annually (Hart Crowser 2013). Previous studies (Klohn 1990) estimated a pan evaporation rate of 37.6 inches for the site based on records from the Spokane weather station and National Oceanic and Atmospheric Administration (NOAA) Atlas.

As part of the RI, a weather station was installed near the Lower Tailings Pile. Data was collected from the station over a 7-month period from November 2011 to June 2012. The weather station's primary purpose was collecting wind data to assess potential windblown contamination from the exposed tailings pile. The results of data collection indicated that "maximum hourly wind direction is dominated by gentle westerly winds (blowing down-valley) with the higher intensity winds predominately blowing easterly up the valley".

2.3.2. Geologic Setting and Soil Conditions

The site is located adjacent to the Colville National Forest in Northeast Washington within the Selkirk Mountain range. The site ranges in elevation from approximately 2,700 feet above MSL near the Lower Tailings Pile to about 3,800 feet above MSL at the West End Pit high wall.

The Metaline Limestone is the principal host for lead-zinc mineralization in northeastern Washington. Yates and others (1964) place the Van Stone mineralization in the Middle Unit, which is principally dolomite. Early investigators felt the mineralization at Van Stone originated by hydrothermal replacement due to the orebody's proximity to the granitic Spirit pluton. Later investigators (Neitzel 1972) found evidence the sulfide mineralization was of syngenetic origin modified by one or more periods of regional metamorphism, overturned folding, and thermal metamorphism that caused recrystallization and grain growth of both the dolomite and sulfides. These processes concentrated what may have been disseminated galena and sphalerite into streaks, pods, and elongated tabular masses of commercial ore. These features make up the higher-grade portions of the ore body separated by low-grade areas where the sulfides are found in small streaks and lenticles (Mills 1977).

2.3.3. Hydrogeologic Setting

The site is underlain by at least two aquifers. These aquifers occur within: (1) unconsolidated glaciofluvial deposits (known as the Upper Outwash aquifer); and (2) bedrock. Groundwater within unconsolidated sediments near the site generally occurs within the Upper Outwash aquifer. The sediments are derived from the Colville Lobe of the Cordilleran ice sheet, which covered much of the area. The Okanogan Lobe, advancing to the west, dammed the Columbia River, creating glacial Lake Columbia, which deposited thick, fine-grained sediments throughout the region (USGS 2004). As the Colville Lobe retreated, glacial-outburst flood deposits comprised of stratified sand, gravel, and boulders were deposited and reworked. The glaciofluvial sediments range from 10 to 480 feet thick (USGS 2004). The Upper Outwash aquifer is recharged by direct precipitation (as rain and snow), seepage from lakes, and losses by streams overlying the aquifer. Ground water discharge from the Upper Outwash aquifer occurs as seepage to streams. Overall, hydraulic conductivity estimates in the Upper Outwash aquifer range from 1.9 to 2,400 feet per day.

The bedrock aquifer likely includes dolomite and/or granite. Yields from the bedrock aquifer produce locally usable quantities where rocks are fractured. Bedrock hydraulic conductivity ranges from 0.0011 to 4.4 feet per day (USGS 2004).

2.3.4. Hydrologic setting

The site is within the upper Onion Creek watershed. In addition to Onion Creek, the upper watershed is drained by two tributaries; the Northeast Tributary and Southeast Tributary (Figure 2). Onion Creek and the larger tributaries are fed by smaller, unnamed tributaries with either year-round or intermittent flow.

Onion Creek originates approximately 2½ miles south of the site, flowing north-northwest to its confluences with the Southeast Tributary, Northeast Tributary, West Fork Onion Creek and eventually to the Columbia River. Until its confluence with the Southeast Tributary, Onion Creek is topographically isolated from the mine site.

The Southeast Tributary flows northeast to southwest, passing topographically and hydrogeologically downgradient from the mine pits and Upper Tailings Pile, before the channel is topographically redirected to the northwest and discharges to Onion Creek. When the Upper Tailings Pile failed, the material was discharged directly into the Southeast Tributary. Additionally, two unnamed tributaries flowing from southeast to northwest and discharging to the Southeast Tributary also flow topographically and hydrogeologically downgradient from the mine pit area and Upper Tailings Pile as shown on Figure 1.

The Northeast Tributary is topographically and hydrogeologically isolated from the mine site area, except for the lower reach, which passes topographically and hydrogeologically downgradient of the Lower Tailings Pile, before reaching its confluence with Onion Creek.

2.4. Current and Likely Future Land Use

As previously discussed, current land use for areas owned by Stevens County and Mr. Paul is unknown. Primary site uses for areas owned by Vaagen are likely timber management and harvesting. As noted in the RI, the public accesses the site to dump domestic garbage and for recreation (as observed by ORV use on the tailings piles).

2.5. Summary of Site Assessment and Remedial Investigation Activities

Multiple site investigations have been conducted; prior to the 1991 mine restart, and after mine closure in 1993. These investigations included:

- A seepage and environmental analysis of a tailings pond slime zone (USBM 1974).
- Onion Creek water quality which included collecting water samples and a “livebox survey” using eastern brook trout placed directly into the creek in circular liveboxes (Ecology 1976).

- A preliminary site assessment and sampling study conducted by Ecology on October 16, 1985 (Ecology 1986).
- A United States Environmental Protection Agency (EPA) Site Assessment conducted as part of the Upper Columbia River Mines and Mills Preliminary assessment in June 2001 (EPA 2002).
- Physical Limnology and Geochemistry of the North Pit Lake (Lentz 2002).
- Washington State Department of Natural Resources (DNR) Site Assessment in October 2002 (DNR 2003).
- An inactive and abandoned mine lands report by DNR for the mine in 2005. The report provided an overview of the current site conditions, as well as analytical results of various soil and water samples collected at the site (DNR 2005).
- Water quality and sediment sampling and analysis from 2004 to 2006 by Ecology at and around the site. Water samples were collected from surface waters and groundwater. Though, the samples were analyzed and results tabulated, a formal report was not prepared.
- A MTCA Site Hazard Assessment (Ecology 2007).
- A Van Stone Tailings Dam Periodic Inspection (Ecology 2008).
- Collecting surface water samples from the creeks around the site by Ecology in October 2010. The samples were analyzed and results were provided in GIS files and a table, but a formal report was not prepared.
- The Van Stone Mine RI (Hart Crowser 2013). The RI report and associated work plan included a historical document review and documentation of the following activities:
    - A list of nearby land owners;
    - A list/construction details of nearby domestic water wells in the area;
    - Installing five new monitoring wells (MW-1, MW-2, MW-3, MW-4 and MW-5);
    - Collecting and analyzing surface soil samples;
    - Collecting and analyzing surface water and sediment samples from Onion Creek and nearby tributaries;
    - Collecting and analyzing groundwater samples from nearby domestic water wells and site monitoring wells;
    - Conducting human health and ecological risk assessments;
    - Evaluating site Applicable or Relevant and Appropriate Requirements (ARARs); and
    - Conducting geotechnical stability evaluations for the Lower Tailings Pile and Upper Tailings Pile and Pit Lake Dam.

2.6. Interim Actions

In June of 2012, a substantial release of water and tailings from the Upper Tailings Pile was observed traveling downgradient into the southeast tributary of Onion Creek. To reduce additional migration of tailings, the failure channel within the Upper Tailings Pile was regraded to approximately a 2:1 slope, lined with geotextile, covered with waste rock quarry spalls and re-vegetated. This was done to reduce the amount of water stored on top of the tailings pile and minimize the transport of tailings downstream towards the tributary to Onion Creek.

An existing diversion ditch was also improved between the two cells of the Upper Tailings Piles to convey water from a culvert upstream of the pile. Water from the culvert discharges upgradient of the Upper Tailings Pile and into the diversion ditch. The diversion ditch diverts water from the two cells of the pile and discharges it into the downstream wooded area towards the Onion Creek Tributary. Design and construction activities were documented in an Emergency Action Work Plan (Hart Crowser 2012a) and Construction Completion Report (Hart Crowser 2012b).

3.0 ADDITIONAL INVESTIGATIONS SINCE THE RI

Additional investigations conducted in support of the FS after completion of the RI include:

- Conducting additional investigations at AOI-1, AOI-2 and AOI-3 to evaluate the extents or presence of metals and asbestos, evaluate leaching and acid generating potentials and determine geotechnical properties of the tailings including thickness, grain size and shear strength;
- Conducting two rounds of groundwater monitoring from existing site monitoring wells;
- Collecting a sample from an open pipe in the mill area;
- Obtaining additional topographic data of the site; and
- Conducting an additional geotechnical assessment of the tailings piles.

The following sections discuss the results of the additional investigations. Chemical analysis samples were submitted to Pace Analytical of Minneapolis, Minnesota. Geotechnical testing was conducted by GeoEngineers of Spokane Washington and Materials Testing and Consulting of Burlington, Washington. Laboratory Chemical Analysis results are provided in Appendix A. Boring logs, test pit logs and geotechnical test results are provided in Appendix B.

3.1. Additional Environmental Sampling in AOI-1

To better define lateral and vertical extents of contamination in the mill area and evaluate leaching and acid generating potential of waste rock in the mining area, 18 test pits (MS-19 through MS-36) were excavated in AOI-1 (Figures 3 and 4). One soil sample was collected from each the test pits and analyzed for various parameters.

3.1.1. Investigation Summary

Soil samples collected from test pits in the mill area (MS-19 through MS-28) were generally analyzed for the following:

- Total metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- Synthetic Precipitation Leaching Procedure (SPLP) on select samples;
- Toxicity Characteristic Leaching Procedure (TCLP) on select samples;
- Asbestos; and
- Total petroleum hydrocarbons (TPH) where contamination was suspected.

Soil samples collected in the waste rock area (MS-29 through MS-36) were generally analyzed for the following:

- Total metals (antimony, arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc);
- Asbestos; and
- Acid/Base accounting (ABA).

Test pit logs are provided in Appendix B.

3.1.2. Investigation results

Total metal analysis results were compared to the site cleanup levels for soil established in the RI. The results indicated that antimony, arsenic, cadmium, lead, mercury and zinc generally exceeded the respective cleanup levels. Each location sampled exceeded the cadmium, lead and zinc cleanup level. Results for other metals varied and are presented in Table 1.

SPLP testing indicated that most metals analyzed did not mobilize into the leachate except for lead. Seven out of the eight samples analyzed detected lead in the leachate in concentrations ranging from 0.0031 milligrams per liter (mg/L) to 0.051 mg/L. Other metals analyzed for SPLP had less than three detections of the respective metal in the leachate. This generally indicates that lead has the potential to leach into precipitation as it infiltrates through the waste rock at the site. SPLP results are presented in Table 2.

TCLP analytical results indicate lead concentrations at values considered to be dangerous waste were present in and around the mill area, former crusher and ore storage areas. Other metals analyzed did not exceed hazardous waste criteria. TCLP results are presented in Table 2.

Asbestos analysis results generally indicate that asbestos was not detected in the samples analyzed. Asbestos results are presented in Table 3.

The ABA analysis included acid generating potential (AGP), acid neutralization potential (ANP), acid base potential (ABP), and sulfur forms. The ABP is the result of the ANP minus the AGP. ABP units are presented as tons of calcium carbonate needed to neutralize a kiloton of waste ($tCaCO_3/Kt$). A negative ABP indicates that the AGP is greater than the ANP and thus the material has the potential to produce acid rock drainage (ARD). In general, ABP greater than 20 $CaCO_3/Kt$ indicate that the material does not have the potential to generate ARD.

The ABP of waste rock samples ranged from 39.9 to 92 $tCACO_3/Kt$, indicating that the waste rock does not have the potential to produce ARD. Total sulfur ranged from less than the MRL (0.05 percent) to 2.2 percent, indicating low presence of sulfur forms. ABA accounting is presented in Table 4.

Diesel-range petroleum hydrocarbon (DRPH) and oil-range petroleum hydrocarbon (ORPH) concentrations were detected in collected samples, but did not exceed MTCA Method A cleanup levels. Gasoline-range petroleum hydrocarbon (GRPH) was not detected in the samples analyzed. Hydrocarbon analysis results are presented in Table 5.

3.2. Upper Tailings Pile Characterization (AOI-2)

Six hollow stem borings (HSA-1 through HSA-6) were advanced in AOI-2 (Figure 5) to depths of about 31 to 62 feet below ground surface (bgs) to further characterize the area. Three soil samples were collected from various depths in each boring and analyzed for various parameters. Boring logs are provided in Appendix B.

3.2.1. Investigation Summary

Samples collected in the upper tailings pile were generally analyzed for the following:

- Total metals;
- SPLP on select samples;
- TCLP on select samples;
- Asbestos; and
- ABA.

3.2.2. Investigation results

Total metal analysis results were compared to the site cleanup levels for soil established in the RI. The results indicate that the tailings exceed the metal cleanup level for at least one metal, while most locations exceed for multiple metals. Metal concentrations in soil samples of native soil under the tailings pile were less than cleanup levels. Results for other metals varied and are presented in Table 1.

SPLP testing indicated that most metals analyzed mobilized into the leachate except for mercury. Most SPLP leaching results were generally less than 0.001 mg/L except zinc, which ranged from 0.011 to 0.0069 mg/L. This indicates that most metals analyzed have the potential to leach from the pile as a result of precipitation infiltrating through the pile. SPLP results are presented in Table 2.

TCLP analytical results generally indicate that the tailings analyzed from HSA-1 and HSA-3 qualify as hazardous waste for lead concentrations. Other metals analyzed did not exceed hazardous waste criteria for TCLP analysis. TCLP results are presented in Table 2.

Asbestos analysis results generally indicate that asbestos was present in trace quantities in the samples analyzed. Asbestos results are presented in Table 3.

The ABP of tailings samples collected from AOI-2 ranged from 380 to 580 $tCACO_3/Kt$ indicating that the tailings are highly buffering for acid and do not have the potential to produce ARD. Total sulfur samples were all less than the MRL of 0.05 percent, indicating low presence of sulfur forms. ABA accounting is presented in Table 4.

3.3. Lower Tailings Pile Characterization (AOI-3)

Five hollow stem borings (HSA-7 through HSA-11) were advanced in AOI-3 (Figure 6) to depths of about 27 to 97 feet bgs to further characterize the area. In addition, two shallow test pits (LT-NS-1 and LT-NS-2) were excavated downstream of the lower tailings pile near a historic water detention pond. Multiple soil samples were collected from various depths in each boring and analyzed for various parameters. Boring logs are provided in Appendix B.

3.3.1. Investigation Summary

Soil samples collected in the lower tailings pile were generally analyzed for the following:

- Total metals;
- SPLP on select samples;
- TCLP on select samples;
- Asbestos; and
- ABA.

3.3.2. Investigation results

Total metal analysis results were compared to the site cleanup levels for soil established in the RI. The results indicate that each boring exceeds the metals cleanup level for at least one metal, while most locations exceed for multiple metals. Metal concentrations in soil samples of native soil under the tailings pile were less than cleanup levels. Metal concentrations in soil samples collected from shallow test pits near the water detention pond did not exceed the site cleanup levels. Chemical analysis results are provided in Table 1.

SPLP testing indicated that most metals analyzed mobilized into the leachate. The SPLP results for chromium and nickel mobilized into the leachate in one sample, HSA-10(50-51.5). The SPLP analysis results indicate that most metals analyzed have the potential to leach from the lower tailings pile and into precipitation infiltrating through the pile. SPLP results are presented in Table 2.

Asbestos analysis results generally indicate that asbestos was not detected in the samples analyzed. One sample from HSA-7, collected around 35 feet bgs indicated less than 2 percent of chrysotile and actinolite. Asbestos results are presented in Table 3.

The ABP of tailings samples collected from AOI-3 ranged from 176 to 3900 $tCACO_3/Kt$ indicating that the tailings are highly buffering for acid and do not have the potential to produce ARD. The ABP of the two shallow soil samples collected near the former detention pond were low; however, this could be characteristic of native soil in the area. Total sulfur samples ranged from less than the MRL of 0.05 percent to 0.57 percent, indicating low presence of sulfur forms. ABA accounting is presented in Table 4.

3.4. Groundwater Monitoring

Groundwater samples were collected from seven monitoring wells (DH-2, MW-1 through MW-3, MW-5, W-1, and W-2) in October 2015 and February 2016. During both sampling events water was not observed in MW-4 or DH-5. The samples were submitted for chemical analysis of metals (antimony, arsenic, cadmium, calcium, lead, magnesium, nickel, thallium and zinc), hardness as CaCO3, total dissolved solids (TDS), total suspended solids (TSS) and total alkalinity. The analytical parameters were generally selected based upon those metals which exceeded cleanup levels in the RI. Analytical results are presented in Tables 6 and 7. Groundwater analytical results indicate that metal concentrations were less than the RI cleanup levels for the two monitoring events.

3.5. Mill Pipe Water Sample

During a site visit in April 2014, water was observed flowing from a vertical pipe on the south side of the former mill. According to Gary Eichler of Knife River and resident of Onion Creek, a dug well was constructed in the mill area and held open with a steel culvert (Eicher 2015). A pipe was then installed for gravity conveyance of water from the dug well to the mill buildings. Water from the dug well was used as a non-potable water source for the mill and office facilities. On October 13, 2015, a water sample was collected from the pipe (Figure 3). Before collecting the sample Gary Eichler opened a valve on the pipe system and water was purged from the pipe for approximately 15 minutes before sampling. The sample was collected and submitted to Pace Analytical for chemical analysis.

Table I summarizes the chemical analysis results and compares the results to the site cleanup levels for groundwater and surface water quality criteria established in WAC 173-201A. Lead was greater than the site cleanup levels for groundwater and surface water. Zinc was also greater than the site surface water cleanup level, but less than the groundwater cleanup level. The other metals analyzed were less than the available water quality standards.

TABLE I. MILL PIPE CHEMICAL ANALYSIS RESULTS

Parameter	Result (µg/L)	Groundwater Cleanup Level (µg/L)	Surface Water Cleanup Level (µg/L)
Cadmium	< 3.0	5	1.07
Calcium	114,000	NE	NE
Lead	**50.4**	15	4.5
Magnesium	40,900	NE	NE
Zinc	**236**	4,800	164
Alkalinity	176	NE	NE
TDS	609	NE	NE
TSS	30.0	NE	NE
Hardness	453,000	NE	NE

Notes: µg/L = micrograms per liter, NE = Not Established

3.6. Topographic Data

Quantum Spatial was retained to conduct a Light Detection and Ranging (LiDAR) survey of the site. The LiDAR survey was used to develop a topographic map of the site with 2-foot contour intervals. The topographic survey was used to further characterize the tailings piles and estimate waste rock and tailings quantities. The topographic map can also be used for design purposes as part of the cleanup action plan and engineering design report. Cross sections and plan views developed to estimate tailings and waste rock quantities are provided in Figures 7 through 18.

3.7. Tailings Pile Geotechnical Assessment

Six borings were advanced at the upper tailings pile and five borings were advanced in the lower tailings pile to obtain additional geotechnical data on the tailings and estimate the pile thickness. Samples of the tailings and underlying material were also submitted for chemical analysis as discussed in Sections 3.2 and 3.3. Boring locations for the Upper and Lower Tailings Piles are shown on Figures 5 and 6, respectively.

Information obtained from the borings and testing was used to conduct a stability analysis for the existing tailings and estimate more stable slope configurations to be considered as part of the design process. A copy of the slope stability evaluation is included in Appendix C.

The results of the evaluation indicated that the existing tailings embankments did not provide suitable factors of safety under static or seismic conditions in the current 1.5H:1V slope configurations. Using a 1.5 factor of safety for static conditions, a stable slope inclination between 2H:1V and 3H:1V was estimated for both tailings piles. As part of the final design; material costs, capping materials, earthwork costs and other items can be used to refine the stability analysis and determine a stable and cost effective slope inclination. For the purposes of this FS, a stable slope configuration of 3H:1V was used as a conservative assumption for cost comparisons between alternatives.

4.0 CONCEPTUAL SITE MODEL

As part of the RI, a detailed conceptual site model (CSM) was developed for the site. Modifications to the CSM were not made because the additional investigations conducted were focused on refining the extent of contamination, filling in a few data gaps and refining cleanup levels.

4.1. Contaminants of Concern (COCs)

The RI established COCs for the site. Additional investigations conducted after the RI did not indicate modifications to the site COCs were necessary. Site COCs were generally limited to metals including:

- Antimony;
- Arsenic;
- Beryllium;
- Cadmium;
- Chromium;
- Copper;
- Lead;
- Mercury;
- Nickel;
- Selenium;
- Silver;
- Thallium; and
- Zinc.

Volatile organic compounds (VOCs) and petroleum hydrocarbons were also identified as COCs in and around the mill area.

4.2. Cleanup Levels

Metal cleanup levels were established as part of the RI for the various site media including:

- Soil;
- Surface water;
- Groundwater; and
- Sediment.

The following sections provide information on development of the cleanup levels. A summary of cleanup levels is provided in Table 8. Petroleum hydrocarbon cleanup levels were based upon MTCA Method A cleanup levels.

4.2.1. Soil

Soil cleanup levels (referenced as screening levels in the RI) were based on natural background metal concentrations established in the RI, unless a background metal concentrations fell below the regulatory standard; in which case the lowest regulatory standard was used (Hart Crowser 2013). Natural background concentrations in soil were used for antimony, arsenic, cadmium, lead, mercury, selenium, and zinc. Other cleanup standards, including Ecology-accepted natural background, MTCA Method A and Method B soil cleanup levels, state ecological indicator screening criteria, and federal ecological soil screening levels, were used for aluminum, barium, beryllium, chromium (III and VI), cobalt, copper, iron, manganese, nickel, silver, thallium, and vanadium. Soil cleanup levels established in the RI were also used in this FS.

4.2.2. Surface Water

Surface water cleanup levels for dissolved metals were based upon Washington state water quality standards, MTCA Method B cleanup levels, water quality criteria from section 304 of the Clean Water Act and the National Toxics Rule (40CFR 131.36). Hardness dependent surface water cleanup levels established in the RI were updated using a revised hardness concentration. In the RI, a hardness value of 98 mg/L was used as determined by the median of the background concentrations from a sampling event in October 2011. A review of the background concentrations indicated that hardness values might increase as the tributaries travel through the naturally occurring mineralized areas near the mining area. This was primarily represented by increased hardness concentrations in background samples BG-8 and B-10, as hardness concentrations were 200 and 300 mg/L, respectively. The median hardness concentration from water samples collected within AOI-5 was 180 mg/L.

In addition to surface water quality samples collected as part of the RI in 2011, Ecology conducted water quality monitoring of Onion Creek at Widow-Hawks Road, approximately 2 to 3 miles downstream of AOI-5. Water quality samples were collected in October 2011, December 2011, April 2012, June 2012 and August 2012 and hardness concentrations were 223, 220, 122, 134 and 195 mg/L, respectively. The median of the background, AOI-5 and Onion Creek at Widow-Hawks Road hardness concentrations was calculated as 170 mg/L to develop a revised representative hardness concentration for the site. This revised value was used to update the surface water cleanup levels for dissolved metals cadmium, chromium, copper, lead, nickel, silver and zinc.

The cleanup level for total arsenic was also revised from the RI. A cleanup level of 3.8 µg/L based upon the laboratory method detection limit (MDL) was used for dissolved arsenic in the RI. MDLs vary between samples and laboratories and might not be protective of human or ecological health. The cleanup level for total arsenic was revised to 0.098 µg/L, which is based on the MTCA Method B cleanup level for protection of human health for fish consumption. This value is more conservative than the previously used MDL and protects human health for the consumption of fish from Onion Creek. Onion Creek is not a source of drinking water; therefore, a more conservative value for consumption of fish and water under the national recommended water quality criteria was not used.

4.2.3. Groundwater

Groundwater cleanup levels for total metals presented in the RI were based on the lowest potential ARARs except for arsenic and thallium. The cleanup levels for total arsenic and thallium were based upon their respective laboratory MDLs of 3.8 µg/L and 1.4 µg/L. For the FS, the cleanup level for total arsenic in groundwater was revised to 5 µg/L which is the MTCA Method A cleanup level and is reasonably near the previously used MDL. The cleanup value for thallium was revised as part of the FS to 2 µg/L which is based upon the state and federal Maximum Contaminant Level (MCL) and is reasonably close to the previously used MDL. Other groundwater cleanup levels for total metals established in the RI were also used in this FS.

4.2.4. Sediment

Sediment cleanup levels were revised from the RI. Revised sediment cleanup levels were developed using literature based sediment quality values for available metals. The consensus based Probably Effects Concentrations (PEC) (MacDonald 2000) were used for arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc. Background concentrations were used for antimony, beryllium and thallium. Freshwater sediment quality values based on WAC 173-204-563 were used for selenium and silver, as the regulations were greater than background concentrations.

4.3. Extents of Contamination

Table 9 provides a summary of the site COCs that exceed cleanup values for select media (soil, sediment, surface water and groundwater). This evaluation was based upon data collected during the RI and additional investigations conducted since the RI. The following sections provide a summary of site COCs for each AOI.

In general, groundwater at the site was determined as not impacted based upon monitoring results to date. Residential wells sampled as part of the RI generally did not exceed site cleanup levels. One residential well sampled (RW-2) indicated arsenic was near the site cleanup level; however, the reported concentration (0.0053 mg/L) is generally equal to the site cleanup level of 0.005 mg/L.

4.3.1. AOI-1

Soil that exceeded cleanup levels in AOI-1 was generally limited to disturbed areas including the mining pit, mill area and waste rock. Soil samples collected around the former mill, crusher and ore staging area indicate soil in this area qualifies as dangerous waste as a result of TCLP analysis for lead. Soil samples collected in the native material just below the waste rock indicated reduced concentrations, but COC cleanup levels were still exceeded in these samples. Figures 3 and 4 show the approximate extents of soil contamination in AOI-1.

Surface water sampled from the south pit lake indicated cadmium and zinc were greater than cleanup levels.

Groundwater monitoring wells are not installed in within AOI-1.

4.3.2. AOI-2

Soil that exceeded cleanup levels in AOI-2 was generally limited to the tailings pile and shallow surface samples collected from the wooded area downstream of the tailing pile. Soil samples collected from borings through the tailings pile generally indicated that COCs were not present above cleanup levels in native soil under the tailings.

Surface water sampled from discharges of the tailings pile to the Onion Creek tributary in June 2011 generally indicated cadmium, lead and zinc were near or greater than cleanup levels. A sample of a seep coming from the tailings pile in November 2011 did not exceed site cleanup levels.

Two monitoring wells (MW-4 and MW-5) are installed within AOI-2 and downstream of the tailings pile. Groundwater monitoring conducted in November 2011 for MW-4 and MW-5 and MW-5 in October 2015 and February 2016 did not indicate COCs were greater than the cleanup levels in AOI-2. MW-4 was dry during the monitoring events in 2015 and 2016.

4.3.3. AOI-3

Soil that exceeded cleanup levels in AOI-3 was generally limited to the tailings pile and shallow surface samples collected downstream of the tailing pile along a former pipeline pathway. Soil samples collected from borings through the tailings pile generally indicated that COCs were not present above cleanup levels in native soil under the tailings.

Surface water was not sampled as part of AOI-3. The accumulated water on top of the tailings pile is not considered surface water and is not viable fish habitat. Cleanup of the site will most likely reduce or prevent the accumulation of water directly on top of the tailings surface.

Seven groundwater monitoring wells (MW-1, MW-2, MW-3, DH-2, DH-5, W-1[DH-8], W-2) are installed around the tailings pile in AOI-3. Some site COCs were detected in groundwater monitoring wells MW-2, MW-3, DH-2 and W-2 greater than cleanup levels during a groundwater monitoring event in November 2011. Follow up groundwater monitoring events in October 2015 and February 2016 did not indicate the COCs were greater than the cleanup values. DH-5 was dry during each groundwater monitoring event.

4.3.4. AOI-4

Soil that exceeded cleanup levels in AOI-4 was generally limited to surficial tailings deposits from historical tailings spills along the pipeline alignments.

Surface water was not sampled as part of AOI-4.

Groundwater monitoring wells are not installed to assess groundwater impacts in AOI-4.

4.3.5. AOI-5

Soil that exceeded cleanup levels in AOI-5 was generally limited to the sediments within Onion Creek and its tributaries.

Surface water sampling conducted in October of 2011 included 20 downstream locations and 14 background locations. Analysis results indicated two locations (OC-9-SW and OC-11-SW) within AOI-5 had detectable cadmium and zinc concentrations, but the concentrations were less than their respective surface water cleanup levels. During the sample monitoring event, background sample BG-10-SW exceeded cleanup levels for cadmium, lead and zinc.

Groundwater monitoring wells are not installed to assess groundwater impacts in AOI-5.

4.4. Exposure Pathways and Receptors

A MTCA compliant baseline Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) were completed during the RI (Hart Crowser 2013). A goal of unrestricted land use was assumed for the HHRA. In addition to the HHRA human receptors; ecological receptors used in the ERA consisted of terrestrial plants, soil invertebrates, birds, mammals, and aquatic species. Identified exposure pathways included soil/sediment ingestion, surface water ingestions (as drinking water and through fish ingestion), groundwater ingestion, and protection of groundwater. Figure 19 includes a site CSM and shows the potential exposure pathways and receptors at the site.

4.5. Locations and Media Requiring Cleanup Actions

Based upon the results of the RI, additional investigations, exposure pathways and potential receptors, the following sections describe the media, areas and features within each AOI to be addressed as part of the cleanup.

4.5.1. AOI-1

Features within AOI-1 to be addressed as part of the cleanup include the waste rock area, mill area and west end pit dam. The waste rock area and part of the mill area contain soil which exceed cleanup levels and part of the mill area has soil which qualifies as dangerous waste around the mill and former crusher. The west end pit dam is a physical hazard. If a dam failure were to occur, it could result in inundations of property downstream. Surface water within the west end pit was less than the site cleanup levels. Groundwater was not evaluated, although because of the steep topography, residential well sampling and groundwater monitoring results near the tailings areas, impacts to groundwater as a result of mining activities are not anticipated and therefore will not be addressed as part of the cleanup action.

Outlying overburden piles and the south pit will not be addressed as part of a cleanup action due to limited site accessibility and therefore limited exposure pathways. Exceedance of cleanup levels for soil at the overburden piles were generally a result of metals concentrations exceeding background concentrations. Provided that the overburden soil sampled was most likely in-situ soil that had been disturbed, chemical analysis results for metals within these areas is most likely representative of background concentrations with the mineralized area.

Surface water collected within the floor of the south pit is most likely the result of accumulated precipitations within the south pit. Although some water may overflow into the nearby tributary, if enough water accumulates within the south pit, dilution and limited volumes are expected to have minimal impacts to water quality along the adjacent tributary.

4.5.2. AOI-2

Features within AOI-2 to be addressed as part of the cleanup include the Upper Tailings Pile and tailings which have eroded from the pile and migrated towards the southeast tributary to Onion Creek. Each cleanup alternative for this area includes limiting precipitation accumulation on top of the tailings pile and reducing/preventing infiltration through the tailings which should address surface water quality within AOI-2. Sampling has not indicated that groundwater exceeds cleanup levels within AOI-2.

4.5.3. AOI-3

Features within AOI-3 to be addressed as part of the cleanup include the Lower Tailings Pile, SRP and tailings which have eroded from the pile and migrated towards the Onion Creek tributaries. Each cleanup alternative for this area includes limiting precipitation accumulation on top of the tailings pile and reducing/preventing infiltration through the tailings which should address surface water quality. Groundwater sampling has not indicated that groundwater exceeds cleanup levels within AOI-3.

4.5.4. AOI-4

Features within AOI-4 to be addressed as part of the cleanup include tailings deposited on the forest floor as a result historical releases from the conveyance system. Surface water and groundwater are not believed to be impacted because of limited historical releases along the conveyance alignment.

4.5.5. AOI-5

Sediments and surface water of Onion Creek and the tributaries will not be addressed as part of the FS. Except for antimony and zinc, sediment concentrations were less than cleanup levels. The antimony cleanup value (0.59 milligrams per kilogram [mg/kg]) was based upon estimated background concentrations. State and federal regulations along with literature do not provide antimony sediment quality values. Four of the 21 samples analyzed exceeded the antimony cleanup level. Of the four samples that exceed the cleanup level, concentrations ranged from 0.67 to 1 mg/kg.

Five of the 21 sediment samples exceeded the PEC based cleanup level for zinc (459 mg/kg). Two locations (OC-9-SD and OC-11-SD) exceeded both the zinc and antimony cleanup levels. Of the five samples that exceed the zinc cleanup level, concentrations ranged from 510 to 970 mg/Kg. These values are significantly less than the sediment cleanup objective (SCO) of 3,200 mg/kg and cleanup screening level (CSL) of 4,200 mg/kg provided in WAC 173-204-563. In addition,

Only sample background location BG-10-SW was greater than the cleanup levels for cadmium, lead and zinc. The 20 other surface water samples collected from within AOI-5 were less than the site cleanup levels and therefore surface water of Onion Creek will not be directly addressed as part of this FS. By addressing potential source areas like the tailings and waste rock areas, impacts to AOI-5 are expected to be minimized and improve over time, although the sampling conducted in 2011 doesn’t indicate that the surface water within AOI-5 is impacted.

4.6. Points of Compliance

Under MTCA, the point of compliance is the point or location on a site where cleanup levels must be attained. The points of compliance for the affected media will be approved by Ecology and presented in the CAP. However, it is necessary to identify points of compliance to evaluate the effectiveness of the cleanup action alternatives in the FS. This section describes the proposed points of compliance for soil and groundwater.

4.6.1. Soil

The standard point of compliance for soil cleanup levels to protect humans from direct contact will be throughout the soil column from the ground surface to 15 feet below ground surface, in accordance with WAC 173-340-740(6)(d) and WAC 173-340-7490(4)(b). The standard point of compliance for preliminary soil cleanup levels based on protection of groundwater shown in the table above will be throughout the soil column [WAC 173-340-740(6)(b)]. For cleanup actions that involve containment of hazardous substances, soil cleanup levels will typically not be met inside containment areas [WAC 173-340-740(6)(f)].

For potential terrestrial ecological exposures, MTCA regulations allow a conditional point of compliance to be established from the ground surface to 6 feet (the biologically active zone according to MTCA default assumptions), provided institutional controls are used to prevent excavation of deeper soil [WAC 173-340-7490(4)(a)]. Accordingly, in areas of the site where potential ecological exposures are a concern, and where appropriate institutional controls can be implemented, a conditional point of compliance for soil concentrations protective of terrestrial ecological receptors may be proposed throughout the soil column from the ground surface to 6 feet. For cleanup actions that involve containment of hazardous substances, soil cleanup levels will typically not be met inside containment area(s) [WAC 173-340-740(6)(f)].

4.6.2. Surface Water

The standard point of compliance for surface water cleanup levels will be at points where hazardous are release to surface waters of the state, WAC 173-340-730(6). A mixing zone will not be used as part of the proposed cleanup action.

4.6.3. Groundwater

The standard point of compliance for groundwater cleanup levels will be all groundwater beneath the site from the top of the saturated zone to the lowest depth which could be affected by the site {WAC 173-340-720(8)(b)}, which likely is bedrock.

4.6.4. Sediment

The point of compliance for sediment cleanup levels will be at sediments within the stream channels and up to the ordinary high water mark.

5.0 DEVELOPMENT OF REMEDIAL ACTION ALTERNATIVES

This section identifies the remedial action objectives and the initial screening of remedial alternatives for the site. An evaluation of the alternatives is presented in Section 6.0.

5.1. Remedial Action Objectives

MTCA requires that cleanup actions meet the threshold requirements identified in WAC 173-340-360. According to this section, the cleanup action shall:

- Protect human health and the environment – Each alternative is assessed for its ability to protect present and future public health, safety, welfare, and the environment.
- Comply with cleanup standards – Proposed cleanup standards are identified in Section 4.2 and Table 8. The MTCA cleanup regulation specifies that a cleanup action alternative that does not comply with cleanup standards is an "interim action" not a "cleanup action."
- Comply with applicable local, state and federal laws.
- Provide for compliance monitoring – The cleanup action must provide for monitoring to verify that the cleanup action remains effective over time.
- Use permanent solutions to the maximum extent practicable – Permanent solutions are those in which cleanup standards can be met without further action being required such as long-term monitoring and inspection or institutional controls.
- Provide for a reasonable restoration time frame – This refers to the estimate of time required to achieve cleanup standards or other performance standards.
- Consider public concerns – This FS of remedial alternatives will seek to address the potential technical and administrative concerns of state and local regulatory entities.

The primary remedial action objective (RAO) is to mitigate human exposure to contaminants in soil, tailings, and waste rock by dermal contact and ingestion. A secondary, although equally important, RAO is to mitigate ecological receptors (plants and animals) from exposure to contaminants.

5.2. General Categories of Response Actions and Initial Screening

The general categories of remedial actions identified for the site include:

- No Action
- Institutional Controls
- Engineering Controls
- Off-Site Disposal

5.2.1. No Action

The no action alternative does not achieve the remedial action objectives because it does not protect present and future public health, safety, and welfare, and the environment. However, it is retained for further evaluation, but does not meet MTCA requirements.

5.2.2. Institutional Controls

Institutional controls involve the placement of access barriers such as fencing and barricades to motorized and non-motorized travel, as well as withdrawal or restrictions on development of affected lands from future use (i.e., deed restrictions). The primary purpose of these controls is to minimize development and human activities on contaminated areas and provide protection to an implemented solution. While institutional controls does not achieve the stated goals and objectives of the remedial action, it can protect the remedy that is implemented on site.

5.2.3. Engineering Controls

The engineering controls evaluated for this FS involve the use of containment technologies that serve as source control. These controls mitigate or reduce the migration of contaminants off site via the erosion/wind pathways. The engineering controls do not affect the chemical composition of the contaminated materials nor do they reduce the toxicity of the materials. Engineering controls include such measures as capping, placement of a coarse permeable barrier (to eliminate access to contaminated soil from burrowing animals), placement of a low-permeability (geotextile) liner, grading, and revegetation.

Cap and cover designs can vary in complexity from simple soil covers to multi-layered covers. Installation of a soil cover only would provide protection from direct exposure to contaminated material; however, it would not mitigate the potential infiltration of precipitation through the contaminated material and potentially to groundwater. Placement of a low-permeability liner would reduce or eliminate the infiltration of precipitation through contaminated material. Based on this and documented dangerous waste in the tailings, a soil cover only option is not retained for further evaluation for the tailings piles. However, a soil cover is retained for consideration for the waste rock and mill areas. Revegetation activities involve promoting plant growth, performing grading activities, and additional soil amendments and nutrients to facilitate vegetative growth. Revegetation should include species native to the area and consist of a variety of grasses and forbs. The establishment of vegetative covers can significantly reduce erosion potential and also reduces the infiltration of precipitation through the soil cover through the natural evapotranspiration process.

The use of engineering controls is retained as a stand-alone remedial alternative and in conjunction with other alternatives.

5.2.4. Off-Site Disposal

Off-site disposal options include excavation and transport of contaminated material to an engineered, permitted landfill that accepts dangerous waste. The only viable landfill that could accept the contaminated material on-site is the Waste Management facility in Arlington, Oregon, (310 miles from site). Although this alternative can be very costly compared to other alternatives, it is retained as a stand-alone remedial alternative.

5.3. Description of Remedial Alternatives

Six remedial alternatives were developed and evaluated for the FS. Based on information obtained during the original RI and additional investigations, no additional action is anticipated for AOI-5 – Onion Creek and its tributaries at this time and the focus of the FS will be on the major source areas. The evaluated alternatives include: no action; implementing engineering and/or institutional controls; in-place containment; creating a centralized repository to consolidate impacted material at the Lower Tailings Pile; and off-site disposal. Each alternative is discussed below. Quantities provided in Table 10 were used to develop cost estimates for each alternative. Table 11 provides a comparison of the alternatives.

5.3.1. Alternative 1 – No Action

A no action alternative is used to compare future conditions against other alternatives to determine beneficial and/or adverse impacts (i.e., what conditions would occur if other alternatives are not implemented), as well as, to compare potential mitigation measures used to minimize other alternative option impacts. Under Alternative 1, the impacted soil, waste rock, and tailings would remain in-place, and a comprehensive, long-term soil and surface water monitoring program would be required. However, given that this alternative does not protect human health and the environment, that cleanup level exceedances are not addressed, it does not comply with applicable state or federal laws, and it does not allow for a restoration time frame; this alternative does not meet MTCA Feasibility Study requirements and is not a selected option.

5.3.2. Alternative 2 – Institutional Controls

Alternative 2 include installing a security fence limiting public access and posting signage warning of site hazards and dangers. Institutional controls are legal or administrative tools or actions taken to reduce potential exposure to hazardous substances. Institutional controls include: easements, use restrictions/ covenants, zoning, administrative or judicial orders, and/or public information and education. The controls are evaluated through site monitoring and periodic review by the regulatory agency.

5.3.3. Alternative 3 – In-place Containment without Cover System

Alternative 3 consists of in-place containment of AOI-1, AOI-2, AOI-3, and AOI-4 with no cover system. Current slopes of the waste rock and tailings in AOI-1, AOI-2, and AOI-3 are not stable as evident of downgradient erosion. The waste rock in AOI-1 would be graded out to blend in with natural contours and then revegetated. The tailings piles in AOI-2 and AOI-3 would be regraded to a stable 3H:1V slope or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would not be covered with a soil cap, but plant seed would be applied to the surfaces and the areas would be left to naturally revegetate over time.

Because of the fine-grained nature and elevated metals concentrations in tailings, in-place containment without a cover system is not an effective alternative for AOI-2 or AOI-3. In-place containment without a cover system could be an effective alternative to mitigate exposure risks and contaminant mobility in AOI-1 and AOI-4.

5.3.4. Alternative 4 – In-place Containment with Cover System

Alternative 4 is the same as Alternative 3 except a cover system would be installed over the tailings in AOI-2 and AOI-3 to mitigate infiltration through contaminated materials and exposure to biological receptors. In addition, under this alternative, dispersed tailing associated with AOI-4, will be excavated and consolidated with the nearest regraded tailings pile (AOI-2 or AOI-3) because placing a cover system on the dispersed tailings in not practicable. Also, dangerous waste identified in AOI-1 (Figure 3) would be excavated, transported to the Upper Tailings Pile and incorporated into the overall grading plan near the center of the tailings pile. The dangerous waste would be placed directly on the tailings surface and then covered with additional tailings from regrading activities to encapsulate it.

The cover system would consist of a multi-layer cover as below:

1. Top Soil (1-foot) and Vegetation
2. Common Borrow (2-feet) – would consider using waste rock.
3. Geonet drainage geotextile
4. 12 oz. nonwoven geotextile
5. 60-mil HDPE geomembrane
6. 12 oz. nonwoven geotextile
7. Regraded Tailings/Waste Rock/Soil

Once the cover system is constructed, the regraded areas would be revegetated. For this alternative, the cover system is only proposed for AOI-2 and AOI-3 because metal concentrations in AOI-1 are relatively low and the dangerous waste material will be removed before grading activities. In addition, installation of a cover system over the large area of waste rock is impracticable.

The multi-layer cover system over the tailings will function not only to reduce contaminant migration but also address terrestrial and ecological exposure pathways. The multi-layer cover system creates a barrier to nearly eliminate the ingestion exposure pathway by controlling direct contact with the tailings. In addition, the multi-layer cover system reduces direct contact exposure pathways to vegetation and burrowing animals. Direct exposure to contaminants in the tailings to vegetation and burrowing animals could lead to contaminants working their way upwards through the food chain.

5.3.5. Alternative 5 – Centralized Tailings Repository at AOI-3

Under Alternative 5, tailings from AOI-2 and AOI-4, and dangerous waste material from AOI-1 would be excavated and hauled to AOI-3 for placement into a centralized repository. The dangerous waste from AOI-1 would be placed near the center of the repository directly on top of the tailings of lower tailings pile and covered with tailings from the upper tailings pile. The repository would have the same cover system as outlined in Alternative 4. The excavated areas in AOI-1 and AOI-2 would be graded with onsite materials and revegetated. This alternative will increase the beneficial use of AOI-2 and reduce monitoring costs by consolidating the tailings into one area as opposed to two separate units to be managed and monitoring individually.

5.3.6. Alternative 6 – Off-Site Disposal

Alternative 6 involves excavating tailings and waste rock greater than TCLP and hauling them offsite for disposal in a permitted landfill. The closest landfill that could accept the material is the Waste Management facility in Arlington, Oregon, (310 miles from site). Disturbed areas would be graded with onsite materials and revegetated. Although this alternative is cost prohibitive, it is an effective alternative for protection of human health and the environment and could be readily implemented. Therefore, this alternative is retained for further evaluation.

5.3.7. Common Item to Alternatives 2, 3, 4, 5 and 6

The following items are considered common to Alternatives 2, 3, 4, 5 and 6 and will be implemented regardless of which alternative is selected:

- Installation of a buttress and emergency spillway at the North Pit Lake. There have been documented concerns with the stability of the earthen dam at the North Pit Lake (Johnson 2010) and it presents a physical hazard. There exists a potential for a full or partial high-wall mass release that could overtop the dam leading to the potential release of water and sediment into the southwest fork of Onion Creek and could lead to inundation of downstream property and residences.

  As part of the remedial design, the dam will be stabilized using a buttress, increasing the cross section, flattening the slopes or a combination of these items. An impermeable surface on the upstream face may also be incorporated into the design.

  A broad-crested rock-lined spillway will be installed to maintain the water level at approximately Elevation 3,510 feet above MSL while maintaining sufficient freeboard. The spillway will be designed to pass the inflow design flood (IDF). An operations and maintenance plan and emergency action plan will be developed in accordance with Washington State dam safety regulations. Preliminary costs have been included in the alternatives.
- The waste rock area will be graded into the existing site contours. A seed mix will be applied to the rock and it will be allowed to revegetate naturally.

6.0 EVALUATION CRITERIA

This section presents a description of the threshold requirements for cleanup actions under MTCA and the additional criteria used in this FS to evaluate the cleanup action alternatives.

6.1. Threshold Requirements

Cleanup actions performed under MTCA must comply with several basic requirements. Cleanup action alternatives that do not comply with these criteria are not considered suitable cleanup actions. As provided in WAC 173-340-360(2)(a), the four threshold requirements for cleanup actions must:

- Protect human health and the environment;
- Comply with cleanup standards (WAC 173-340-700 through -760);
- Comply with applicable state and federal laws (WAC 173-340-710); and
- Provide for compliance monitoring (WAC 173-340-410 and WAC 173-340-720 through -760).

6.1.1. Protection of Human Health and the Environment

The results of cleanup actions performed under MTCA must ensure that both human health and the environment are protected.

6.1.2. Compliance with Cleanup Standards

Compliance with cleanup standards requires, in part, that cleanup levels are met at the applicable points of compliance. If a remedial action does not comply with cleanup standards, the remedial action is considered an interim action, not a cleanup action. When a cleanup action involves containment of soils with hazardous substance concentrations exceeding cleanup levels at the point of compliance, the cleanup action may be determined to comply with cleanup standards, provided the requirements specified in WAC 173-340-740(6)(f) are met.

6.1.3. Compliance with Applicable State and Federal Laws

Cleanup actions conducted under MTCA must comply with applicable state and federal laws. The term "applicable state and federal laws" includes legally applicable requirements and those requirements that Ecology determines to be relevant and appropriate as described in WAC 173-340-710. An evaluation of the ARARs potentially applicable to each alternative was completed and is summarized in Table 12. The alternatives evaluated in this FS comply with the intent of these laws and statutes and are protective of human health and the environment.

6.1.4. Provision for Compliance Monitoring

The cleanup action must allow for compliance monitoring in accordance with WAC 173-340-410. Compliance monitoring consists of protection monitoring, performance monitoring and conformational monitoring. Protection monitoring is conducted to confirm that human health and the environment are adequately protected during construction and the operation and maintenance period of a cleanup action. Performance monitoring is conducted to confirm that the cleanup action has attained cleanup standards and, if appropriate, remediation levels or other performance standards. Conformational monitoring (groundwater and/or soil) is conducted to confirm the long-term effectiveness of the cleanup action once cleanup standards and, if appropriate, remediation levels or other performance standards have been attained.

6.2. Other MTCA Requirements

Under MTCA, when selecting from the alternatives that meet the minimum requirements described above, the alternatives shall be further evaluated against the following additional criteria:

Use permanent solutions to the maximum extent practicable [WAC 173-340-360(2)(b)(i)]. MTCA requires that when selecting from cleanup action alternatives that fulfill the threshold requirements, the selected action shall use permanent solutions to the maximum extent practicable [WAC 173-340-360(2)(b)(i)]. MTCA specifies that the permanence of these qualifying alternatives shall be evaluated by balancing the costs and benefits of each of the alternatives using a “disproportionate cost analysis” in accordance with WAC 173-340-360(3)(e). The criteria for conducting this analysis are described in Section 6.3 below.

Provide a reasonable restoration time frame [WAC 173-340-360(2)(b)(ii)]. In accordance with WAC 173-340-360(2)(b)(ii), MTCA places a preference on those cleanup action alternatives that, while equivalent in other respects, can be implemented in a shorter period of time. MTCA includes a summary of factors to be considered in evaluating whether a cleanup action provides for a reasonable restoration time frame [WAC 173-340-360(4)(b)].

Consideration of public concerns [WAC 173-340-360(2)(b)(iii)]. Ecology will consider public comments submitted during the FS process when making its preliminary selection of an appropriate cleanup action alternative. This preliminary selection is subject to further public review and comment when the proposed remedy is published in the draft CAP.

6.3. MTCA Disproportionate Cost Analysis

The MTCA disproportionate cost analysis (DCA) is used to evaluate which of the alternatives that meet the threshold requirements are permanent to the maximum extent practicable. This analysis involves comparing the costs and benefits of alternatives and selecting the alternative with incremental costs that are not disproportionate to the incremental benefits. The evaluation criteria for the disproportionate cost analysis are specified in WAC 173-340-360(2) and WAC 173-340-360(3), and include protectiveness, permanence, cost, long-term effectiveness, management of short-term risks, implementability and consideration of public concerns.

As outlined in WAC 173-340-360(3)(e), MTCA provides a methodology that uses the criteria below to determine whether the costs associated with each cleanup alternative are disproportionate relative to the incremental benefit of the alternative above the next lowest-cost alternative. The comparison of benefits relative to costs may be quantitative, but will often be qualitative. When possible for this FS, quantitative factors such as mass of contaminant removed or percentage of area of impacts remaining were compared to costs for the alternatives evaluated, but many of the benefits associated with the criteria described below were necessarily evaluated qualitatively. Costs are disproportionate to benefits if the incremental costs of the more permanent alternative exceed the incremental degree of benefits achieved by the other lower-cost alternative [WAC-173-340-360(e)(i)]. Where two or more alternatives are equal in benefits, Ecology selects the less costly alternative [WAC 173-340-360(e)(ii)(c)].

Each of the MTCA criteria used in the DCA is described below.

6.3.1. Protectiveness

The overall protectiveness of a cleanup action alternative is evaluated based on several factors. First, the extent to which human health and the environment are protected and the degree to which overall risk at a site is reduced are considered. Both on-site and off-site risk reduction resulting from implementing the alternative are considered.

6.3.2. Permanence

MTCA specifies that when selecting a cleanup action alternative, preference shall be given to actions that are “permanent solutions to the maximum extent practicable.” Evaluation criteria include the degree to which the alternative permanently reduces the toxicity, mobility or mass of hazardous substances; the effectiveness of the alternative in destroying the hazardous substances; the reduction or elimination of hazardous substance releases and sources of releases; the degree of irreversibility of waste treatment processes; and the characteristics and quantity of treatment residuals generated.

6.3.3. Cost

The analysis of cleanup action alternative costs under MTCA includes all costs associated with implementing an alternative including design, construction, long-term monitoring and institutional controls. Costs are intended to be comparable among different alternatives to assist in the overall analysis of relative costs and benefits of the alternatives. The costs to implement an alternative include the cost of construction, the net present value of any long-term costs and agency oversight costs. Long-term costs include operation and maintenance costs, monitoring costs, equipment replacement costs and the cost of maintaining institutional controls. Unit costs used to develop overall remediation costs for this FS were derived using a combination of published engineering reference manuals (i.e., R.S. Means); construction cost estimates solicited from applicable vendors and contractors; a review of actual costs incurred during similar applicable projects; and professional judgment.

6.3.4. Long-Term Effectiveness

Long-term effectiveness is a parameter that expresses the degree of certainty that the alternative will be successful in maintaining compliance with cleanup standards over the long-term performance of the cleanup action. The MTCA regulations contain a specific preference ranking for different types of technologies that will be considered as part of the comparative analysis. The ranking places the highest preference on technologies such as reuse/recycling, treatment, immobilization/solidification, and disposal in an engineered, lined, and monitored facility. Lower preference rankings are applied for technologies such as on-site isolation/containment with attendant engineered controls, and institutional controls and monitoring.

6.3.5. Management of Short-term Risks

Evaluation of this criterion considers the relative magnitude and complexity of actions required to maintain protection of human health and the environment during implementation of the cleanup action. Cleanup actions carry short-term risks such as potential mobilization of contaminants during construction or safety risks typical of large construction projects. Some short-term risks can be managed through best practices during project design and construction, while other risks are inherent to project alternatives and can offset the long-term benefits of an alternative.

6.3.6. Implementability

Implementability is an overall metric expressing the relative difficulty and uncertainty of implementing the cleanup action. Evaluation of implementability includes consideration of technical factors such as the availability of mature technologies and experienced contractors to accomplish the cleanup work. It also includes administrative factors associated with permitting and completing the cleanup.

6.3.7. Consideration of Public Concerns

The public involvement process under MTCA is used to identify potential public concerns regarding cleanup action alternatives. The extent to which an alternative addresses those concerns is considered as part of the evaluation process. This includes concerns raised by individuals, community groups, local governments, tribes, federal and state agencies, and other organizations that may have an interest in or knowledge of the site. Public concerns for this site generally would be associated with environmental issues and cleanup action performance, which are addressed under other criteria such as protectiveness and permanence.

7.0 EVALUATION AND COMPARISON OF CLEANUP ALTERNATIVES

This section provides an evaluation and comparative analysis of cleanup action alternatives developed for the site. The alternatives are evaluated with respect to the MTCA evaluation criteria described in Section 6.0 and then compared to each other relative to its expected performance under each criterion. The components of the six alternatives are described above in Section 5.3 and summarized in Table 11. Detailed evaluation of the alternatives is presented in Evaluation of Cleanup Action Alternatives, Table 13, and the results of the evaluation are summarized in Summary of MTCA Evaluation and Ranking of Cleanup Action Alternatives, Table 14.

To evaluate reasonableness of costs, planning level estimates were developed for each alternative. While adequate for decision making purposes, final cost estimates will depend on the scope of the final remedial design. Please note that:

1. The estimated costs for each alternative are considered to be within a margin of +/- 30 percent;
2. Unit costs were derived from RS Means, professional experience, similar bids, or from local vendors;
3. Long-term monitoring and maintenance costs beyond 25 years are not included in the estimates; and
4. Costs are based on 2017 dollars.

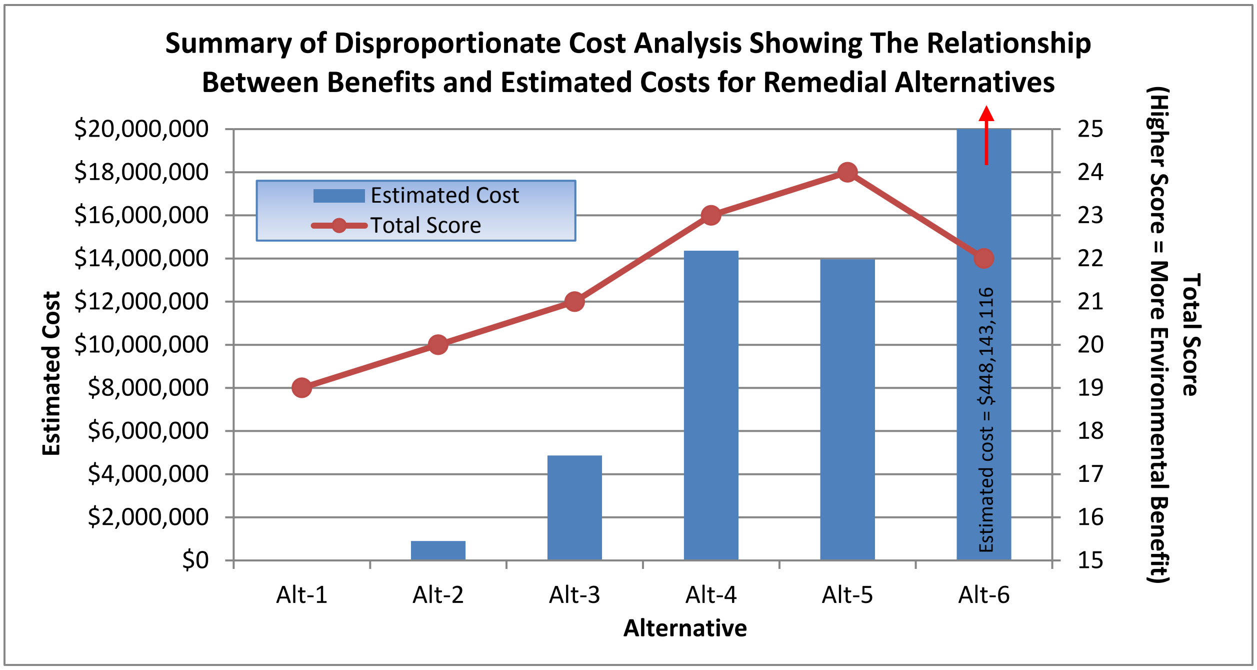
Cost estimates for alternatives 2 through 6 are provided in Tables 15 through 19.

7.1. Threshold Requirements

Four of the six alternatives developed meet the four MTCA threshold requirements described for cleanup actions: protection of human health and the environment, compliance with cleanup standards, compliance with applicable state and federal regulations and provision for compliance monitoring. Alternatives 1 and 2, do not meet the threshold requirements for MTCA.

7.2. MTCA Disproportionate Cost Analysis

As discussed in Section 6.3, the MTCA analysis of disproportionate costs is used to determine which cleanup alternative meets threshold requirements and is permanent to the maximum extent practicable. The alternatives were evaluated based on the relative benefits ranking factors of the DCA. Using a numeric scoring scale of 1 (lowest) to 5 (highest) and the methodology described above in Section 7.0 and in Table 13, each individual criterion is evaluated based on how it applies to each alternative. Table 14 presents the analysis of these results, including the summation of the resulting scores for each alternative and the determination of disproportionate cost. The conclusions of this evaluation are summarized in the following sections and the graph below.



7.3. Protectiveness

Alternatives 4 through 6 achieve the highest level of protectiveness by containing or removing contaminated soil. Alternatives 1, 2 and 3 achieve lower levels of protectiveness because those alternatives result in contaminated soil remaining onsite with an elevated chance of mobility. Alternative 3 stabilizes the contaminated soil, and reduces the chance for mobility; however, without a cover there is still a potential for windblown erosion or exposure to biological receptors. Alternatives 4 and 5 are more protective by providing covers to control contaminant migration and reduce direct contact exposure to terrestrial and ecological receptors. Alternative 6 is the most protective by removing contamination from the site.

7.4. Permanence

Alternatives 1 through 3 generally provide low levels of permanence since they do not reduce the toxicity or mass of material at the site. Alternative 3 is slightly more permanent as it is expected to reduce contaminant mobility when compared to Alternatives 1 and 2. Alternatives 4 and 5 provide higher levels of permanence by reducing the toxicity of mobility of site contaminants; however, contaminant volumes at the site general remain unchanged. Alternative 6 is the most permanent by reducing the toxicity, mobility and volume of contaminated material at the site through off-site disposal.

7.5. Cost

For purposes of this evaluation, higher cost equates to lower scoring. Alternative 1 is the lowest cost alternative and therefore ranks highest. Alternative 6 is the highest cost alternative and therefore ranks lowest. The cost estimates for Alternatives 2 through 6 were developed as described in Section 5.3 and are presented in Tables 15 through 19, respectively. Estimated costs include maintenance and monitoring ranging from 5 to 25 years, dependent upon the alternative.

7.6. Long-Term Effectiveness

Long-term effectiveness of the alternatives has relative rankings similar to those described above for the permanence category. The long-term effectiveness relies on using proven technologies to remove or contain contaminant mass. Alternative 3 has moderate long term effectiveness by reducing the potential for contaminant mobility through erosion, but still leaves the contaminant exposed and could result in contaminant remobilization. Alternatives 4 and 5 protect human health and the environment and have longer term effectiveness by capping the material. Alternative 6 relies on removal of the contaminant mass from the site to the greatest extent practicable and therefore achieves the highest level of long-term effectiveness.

7.7. Management of Short-Term Risks

Alternatives 1 and 2 have the lowest short-term risks since minimal site work is required. Alternatives 3, 4 and 5 have moderate short-term risks associated with importing material to the site and general construction activities required to regrade or move contaminated material. Alternative 6 has the highest short-term risk since large volumes of material will need to excavated from the remote site, transported over a long distance and disposed of as dangerous waste.

7.8. Technical and Administrative Implementability

All five alternatives are generally implementable using commonly available methods. Alternatives 1 and 2 rank as the most technically implementable because they require minimal activities. Alternatives 3, 4 and 5 require mostly earthwork with capping of the tailings required for Alternatives 4 and 5. Earthwork and capping are generally implementable with factors of central repository design and cover material availability differentiating between the alternative ratings for Alternatives 3, 4 and 5. Alternative 6, removal of site contamination is the least implementable, since the volume of waste is so large and it would be difficult to procure enough transportation trucks to remove the material from the site within a reasonable timeframe.

7.9. Consideration of Public Concerns

The alternatives proposed vary in expected acceptance to the public. Alternatives 1 and 2 are least acceptable since they do little for beneficial uses of the site and do not sufficiently address contaminant exposure and migration. Alternative 6 has an assumed moderate level of public acceptance. Although the contaminated material would be removed from the site, the amount of traffic between the site and disposal area might not be acceptable to the public, especially residents around the site. In addition, the carbon footprint required to transport the material from the site to the dangerous waste disposal facility should also be considered. Alternatives 4 and 5 are assumed to be acceptable to the public, since this address contaminant exposure pathways and migration and alternative 5 has the added benefit of improving the future land use for AOI-2.

7.10. Reasonable Restoration Time Frame

The restoration time frame for the proposed alternatives is expected to be on the order of one to three years. This time frame includes project design, permitting, contracting and construction. Alternatives 4 and 5 require long-term cap, surface water and groundwater monitoring.

8.0 RECOMMENDED REMEDIAL ACTION

Based on the Disproportionate Cost Analysis, Alternative 5 is the preferred alternative. Alternatives 1, 2 and 3 had the lowest costs but were least protective. Alternative 6 was the most protective, but it had the highest costs and was not practical. Alternatives 4 and 5 had the highest total environmental benefit scores and relatively similar costs. Alternative 4 had a slightly better management of short term risks, by reducing the amount of material that would need to be hauled along the public roads between the upper and lower tailings piles. However, the overall costs are lower for moving the Upper Tailings Pile and consolidating it with the Lower Tailings Pile, which reduces long-term monitoring for another site and consolidates the material under one cover system that needs to be monitored. In compliance with MTCA [WAC 173-340-360(3)(e)(ii)(c)], Alternative 5 should be the preferred remedial alternative.

9.0 REFERENCES

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TABLES

Table 1

Soil Chemical Analytical Results - Total Metals[1]

Van Stone Mine

Onion Creek, Washington

Sample Name	Date	Depth Interval Feet	Metals[2]									
			Antimony	Arsenic	Cadmium	Chromium	Hexavalent Chromium	Copper	Lead	Mercury[3]	Nickel	Zinc
			mg/kg									
Cleanup Level[4]			0.86	5.04	1.60	26 [5]	19	28	44.9	0.13	30	206
AOI-1												
MS-19 (0.5-1)	10/13/2015	0.5-1	**1.8**	**13.1**	**78.3**	**0.76**	--	**6.9**	**6,890**	**0.34**	**7.2**	**29,700**
MS-20 (0.5-1)	10/13/2015	0.5-1	**2.4**	**5.6**	**31.7**	**1.9**	--	**15.2**	**14,700**	**0.50**	**3.7**	**7,560**
MS-21 (0.5-1)	10/13/2015	0.5-1	**0.45**	**4.3**	**9.3**	**3.7**	--	**175**	**1,370**	**0.12**	**3.1**	**2,980**
MS-22 (0.5-1)	10/13/2015	0.5-1	**0.77**	**8.2**	**17.2**	**3.0**	--	**103**	**2,400**	**0.42**	**3.0**	**5,400**
MS-23 (0.5-1)	10/13/2015	0.5-1	**0.71**	**2.0**	**215**	**0.91**	--	**57.7**	**3,730**	**0.31**	**1.8**	**57,200**
MS-24 (0.5-1)	10/13/2015	0.5-1	0.37 U	**4.0**	**7.7**	**3.8**	--	**9.1**	**123**	**0.072**	**4.2**	**2,130**
MS-25 (0.5-1)	10/13/2015	0.5-1	**0.83**	**13.5**	**11.3**	**1.1**	--	**3.2**	**272**	**0.050**	**4.8**	**1,860**
MS-26 (0.5-1)	10/13/2015	0.5-1	**3.2**	**9.4**	**105**	**0.84**	--	**10.8**	**13,900**	**0.056**	**2.9**	**27,400**
MS-27 (0.5-1)	10/13/2015	0.5-1	0.46 U	**5.7**	**6.2**	**3.0**	--	**8.6**	**608**	**0.095**	**3.5**	**3,680**
MS-28 (0.5-1)	10/13/2015	0.5-1	0.40 U	**1.5**	**2.4**	**3.3**	--	**7.1**	**330**	**0.028**	**3.2**	**746**
MS-29 (6-7)	10/12/2015	6-7	**0.77**	**7.0**	**30.9**	**3.2**	--	**3.3**	**11.5**	0.019 U	**6.9**	**2,930**
MS-30 (4-5)	10/13/2015	4-5	0.48 U	**26.5**	**36.7**	0.48 U	--	**2.4**	**423**	**0.13**	**3.4**	**13,200**
MS-31 (6-8)	10/13/2015	6-8	**0.45**	**5.3**	**4.7**	**5.9**	--	**6.3**	**293**	**0.048**	**6.2**	**1,580**
MS-32 (4-5)	10/13/2015	4-5	**0.57**	**10.7**	**28.6**	**2.2**	--	**4.1**	**438**	**0.35**	**5.4**	**5,930**
MS-33 (4-5)	10/12/2015	4-5	0.50 U	**1.8**	**0.56**	**4.0**	--	**3.6**	**63**	0.019 U	**3.3**	**269**
MS-34 (4-5)	10/12/2015	4-5	0.51 U	**5.5**	**5.3**	**3.8**	--	**4.7**	**158**	**0.067**	**5.2**	**3,200**
MS-35 (6-8)	10/12/2015	6-8	0.49 U	**13.5**	**10**	**2.3**	--	**3.3**	**186**	**0.079**	**4.4**	**3,950**
MS-36 (3-5)	10/12/2015	3-5	0.47 U	**14.4**	**3.6**	0.47 U	--	**1.3**	**58.9**	**0.038**	**3.2**	**1,540**
AOI-2												
HSA-1 (20-21.5)	01/08/2015	20-21.5	**1.7**	**10.6**	**32.3**	--	--	**23.3**	**814**	**0.0065**	--	**12,600**
HSA-1 (30-31.5)	01/08/2015	30-31.5	**1.7**	**20.6**	**105**	--	--	**152**	**3,780**	**0.043**	--	**35,300**
HSA-1 (40-41.5)	01/08/2015	40-41.5	0.42 U	**0.75**	**0.097**	--	--	**10.1**	**8.6**	0.018 U	--	**38.2**
HSA-2 (10-11.5)	01/09/2015	10-11.5	**0.60**	**3.8**	**17.6**	--	--	**23.3**	**179**	**0.0014**	--	**9,180**
HSA-2 (15-16.5)	01/09/2015	15-16.5	0.49 U	0.49 U	0.079 U	--	--	0.99 U	**1.9**	0.019 U	--	**57.9**
HSA-2 (20-21.5)	01/09/2015	20-21.5	0.50 U	**0.53**	**0.14**	--	--	**19.8**	**3.5**	0.020 U	--	**86.8**

Sample Name	Date	Depth Interval Feet	Metals[2]									
			Antimony	Arsenic	Cadmium	Chromium	Hexavalent Chromium	Copper	Lead	Mercury[3]	Nickel	Zinc
			mg/kg									
Cleanup Level[4]			0.86	5.04	1.60	26 [5]	19	28	44.9	0.13	30	206
HSA-3 (10-11.5)	01/09/2015	10-11.5	**1.0**	**3.3**	**19.4**	--	--	**21.8**	**329**	0.0023 U	--	**8,290**
HSA-3 (20-21.5)	01/09/2015	20-21.5	**2.6**	**7.8**	**37.8**	--	--	**25.5**	**934**	**0.0056**	--	**16,200**
HSA-3 (30-31.5)	01/09/2015	30-31.5	0.51 U	**2.1**	**0.096**	--	--	**3.7**	**5.2**	0.022 U	--	**448**
HSA-4 (10-11.5)	01/09/2015	10-11.5	**1.0**	**3.0**	**14.4**	--	--	**21.3**	**439**	**0.0011**	--	**5,780**
HSA-4 (20-21.5)	01/09/2015	20-21.5	0.49 U	**2.0**	**0.11**	--	--	**2.9**	**11.8**	0.00021 U	--	**19.0**
HSA-4 (25-26)	01/09/2015	25-26	0.47 U	**0.63**	**0.12**	--	--	**9.2**	**6.4**	0.00020 U	--	**62.9**
HSA-5 (10-11.5)	01/08/2015	10-11.5	0.56 U	**5.9**	**5.7**	--	--	**32.4**	**146**	**0.0011**	--	**2,890**
HSA-5 (20-21.5)	01/08/2015	20-21.5	**0.79**	**7.7**	**9.5**	--	--	**149**	**716**	**0.0043**	--	**4,340**
HSA-5 (30-31.5)	01/08/2015	30-31.5	0.41 U	**0.66**	0.066 U	--	--	**2.8**	**4.2**	0.019 U	--	**49.2**
HSA-6 (10-11.5)	01/07/2015	10-11.5	**0.82**	**6.3**	**13.0**	--	--	**27.9**	**240**	**0.0019**	--	**5,410**
HSA-6 (20-21.5)	01/07/2015	20-21.5	**1.5**	**5.9**	**25.8**	--	--	**18.9**	**335**	**0.0032**	--	**11,700**
HSA-6 (30-31.5)	01/07/2015	30-31.5	0.56 U	**0.76**	0.090 U	--	--	**3.2**	**5.4**	0.023 U	--	**45.6**
AOI-3												
LT-NS-1 (0.5-1)	10/12/2015	0.5-1	0.48 U	**0.82**	**0.10**	**1.6**	2.0 U	**5.6**	**2.2**	0.019 U	**1.7**	**13.2**
LT-NS-2 (0.5-1)	10/12/2015	0.5-1	0.50 U	**0.78**	**0.10**	**1.6**	2.0 U	**8.8**	**7.5**	0.018 U	**1.7**	**27.6**
HSA-7 (10-11.5)	12/08/2014	10-11.5	**0.54** U	**4.1**	**4.6**	**1.3**	--	**17.1**	**268**	--	**2.3**	**1,560**
HSA-7 (35-36.5)	12/08/2014	35-36.5	**1.6**	**6.2**	**7.3**	**0.91**	--	**20.8**	**334**	--	**12.2**	**4,000**
HSA-7 (60-61.5)	12/08/2014	60-61.5	0.62 U	**10.5**	**6.2**	**4.2**	--	**95.6**	**244**	--	**3.9**	**4,030**
HSA-7 (70-71.5)	12/08/2014	70-71.5	**0.81**	**12.3**	**13.2**	**1.4**	--	**36.6**	**195**	--	**3.4**	**5,020**
HSA-7 (76.1-76.5)	12/08/2014	76.1-76.5	0.63 U	**2.3**	**0.62**	**5.3**	--	**8.7**	**13.0**	--	**6.7**	**87.7**
HSA-8 (20-21.5)	12/08/2014	20-21.5	**0.68**	**27.0**	**4.8**	**2.4**	--	**19.3**	**282**	--	**2.3**	**2,190**
HSA-8 (40-41.5)	12/08/2014	40-41.5	0.52 U	**2.9**	**4.8**	**1.2**	--	**17.2**	**375**	--	**1.3**	**2,080**
HSA-8 (70-71.5)	12/08/2014	70-71.5	**0.97**	**5.3**	**15.2**	**0.60**	--	**23.9**	**193**	--	**2.1**	**6,070**
HSA-8 (76.4-76.5)	12/08/2014	76.4-76.5	**1.1**	**19.0**	**11.8**	**2.1**	--	**143**	**200**	--	**4.3**	**5,190**
HSA-8 (80-81.5)	12/09/2014	80-81.5	0.56 U	**2.4**	**0.24**	**--**	--	**4.9**	**2.9**	--	--	**29.0**
HSA-9 (10-11.5)	12/09/2014	10-11.5	**0.99**	**4.5**	**5.3**	**1.9**	--	**15.9**	**495**	--	**1.9**	**2,270**
HSA-9 (50-51.5)	12/10/2014	50-51.5	**2.3**	**7.5**	**16.2**	**0.57**	--	**11.2**	**1,200**	--	**1.3**	**4,710**
HSA-9 (80-81.5)	12/10/2014	80-81.5	0.53 U	**3.7**	**11.4**	**1.9**	--	**24.7**	**144**	--	**2.2**	**7,290**
HSA-9 (85-86.5)	12/10/2014	85-86.5	0.60 U	**2.8**	**0.50**	**7.4**	--	**11.5**	**14.1**	--	**9.1**	**94.6**
HSA-10 (10-11.5)	12/10/2014	10-11.5	**0.80**	**8.4**	**5.5**	**2.5**	--	**16.5**	**291**	--	**2.8**	**2,270**
HSA-10 (30-31.5)	12/10/2014	30-31.5	**0.84**	**11.9**	**11.9**	**3.4**	--	**234**	**912**	--	**3.8**	**4,480**
HSA-10 (50-51.5)	12/10/2014	50-51.5	**0.73**	**30.8**	**8.8**	**3.1**	--	**201**	**567**	--	**4.1**	**3,370**

Sample Name	Date	Depth Interval Feet	Metals[2]									
			Antimony	Arsenic	Cadmium	Chromium	Hexavalent Chromium	Copper	Lead	Mercury[3]	Nickel	Zinc
			mg/kg									
Cleanup Level[4]			0.86	5.04	1.60	26 [5]	19	28	44.9	0.13	30	206
HSA-10 (60-61.5)	12/11/2014	60-61.5	**0.99**	**7.4**	**2.6**	**6.0**	--	**117**	**184**	--	**8.4**	**793**
HAS-10 (63-63.5)	12/11/2014	63-63.5	0.50 U	**1.2**	**0.10**	--	--	**6.6**	**6.5**	--	--	**82.1**
HSA-11 (20-21.5)	12/11/2014	20-21.5	**0.84**	**12.0**	**3.4**	**2.8**	--	**37.7**	**383**	--	**2.1**	**1,470**
HSA-11 (25.5-26.5)	12/11/2014	25.5-26.5	0.54 U	**1.9**	**0.83**	**3.7**	--	**9**	**35.4**	--	**4.9**	**277**

Notes

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

[2] Metals analyzed by EPA Method 6020A.

[3] Mercury analyzed by EPA Method 7471B.

[4] Cleanup levels adapted from draft screening levels listed in Table 11 from the Hart Crowser Remedial Investigation.

[5] Cleanup level for Chromium III (Cr III)

'--' = not tested; AOI = Area of Interest (see Figure 1 for locations); ft = feet; mg/kg - milligrams per kilogram; U = Analyte was not detected above reporting limit; NE = not established; NL = no limit

Bold indicates analyte was detected above the reporting limit.

▨ **Red Bold** and gray shading indicates analyte was detected above the applicable cleanup level or screening level.

Table 2

Soil Chemical Analytical Results - TCLP and SPLP[1]

Van Stone Mine
Onion Creek, Washington

Sample Name	Date	Depth Interval Feet	Metals[2,3]													
			SPLP Antimony	SPLP Arsenic	TCLP Arsenic	SPLP Cadmium	TCLP Cadmium	SPLP Chromium	TCLP Chromium	SPLP Copper	SPLP Lead	TCLP Lead	SPLP Mercury	TCLP Mercury	SPLP Nickel	SPLP Zinc
			mg/L													
RCRA Hazardous Waste Limit			NE	5	5	1	1	5	5	NE	5	5	0.2	0.2	NE	NE
AOI-1																
MS-19 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.35**	--	0.012 U	0.010 U	**0.0035**	**7.7**	--	0.00060 U	--	0.050 U
MS-20 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	**0.00083**	**0.54**	--	0.012 U	0.010 U	**0.013**	**257**	--	0.00060 U	--	0.050 U
MS-21 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.19**	--	0.012 U	**0.011**	**0.051**	**17.4**	--	0.00060 U	--	0.20 U
MS-22 (0.5-1)	10/13/2015	0.5-1	--	--	--	--	**--**	--	--	--	**--**	**--**	--	--	--	--
MS-23 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.35**	--	0.012 U	0.010 U	**0.0043**	**51.9**	--	0.00060 U	--	0.050 U
MS-24 (0.5-1)	10/13/2015	0.5-1	--	--	--	--	**--**	--	--	--	**--**	**--**	--	--	--	--
MS-25 (0.5-1)	10/13/2015	0.5-1	--	--	--	--	**--**	--	--	--	**--**	**--**	--	--	--	--
MS-26 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	**0.00082**	**0.56**	--	0.012 U	0.010 U	**0.0031**	**5.9**	--	0.00060 U	--	0.050 U
MS-27 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.16**	--	0.012 U	0.010 U	**0.021**	**4.8**	--	0.00060 U	--	**0.13**
MS-28 (0.5-1)	10/13/2015	0.5-1	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.029**	--	0.012 U	0.010 U	**0.015**	**1.9**	--	0.00060 U	--	**0.063**
MS-29 (6-7)	10/12/2015	6-7	--	--	--	--	--	--	--	--	--	**--**	--	--	--	--
MS-30 (4-5)	10/13/2015	4-5	0.0050 U	0.0050 U	0.012 U	0.00080 U	**0.21**	--	0.012 U	0.010 U	0.0010 U	**2.9**	--	0.00060 U	--	0.050 U
AOI-2																
HSA-1 (20-21.5)	01/08/2015	20-21.5	**0.0025**	0.00050 U	**0.0032**	**0.00027**	**0.18**	--	--	0.0010 U	**0.00088**	**9.3**	0.00020 U	0.00060 U	--	**0.0069**
HSA-1 (30-31.5)	01/08/2015	30-31.5	**0.00061**	0.00050 U	0.012 U	**0.0012**	**0.91**	--	--	**0.0014**	**0.026**	**23.6**	0.00020 U	0.00060 U	--	**0.065**
HSA-2 (10-11.5)	01/09/2015	10-11.5	**0.00090**	0.00050 U	0.0025 U	**0.00023**	**0.17**	--	--	**0.0015**	**0.0082**	**0.19**	0.00020 U	0.00060 U	--	**0.078**
HSA-3 (10-11.5)	01/09/2015	10-11.5	0.00050 U	0.00050 U	0.012 U	**0.00019**	**0.020**	--	--	0.0010 U	**0.0035**	**0.73**	0.00020 U	0.00060 U	--	**0.092**
HSA-3 (20-21.5)	01/09/2015	20-21.5	**0.0019**	0.00050 U	0.0025 U	**0.00014**	**0.15**	--	--	**0.0011**	**0.011**	**9.0**	0.00020 U	0.00060 U	--	**0.037**
HSA-4 (10-11.5)	01/09/2015	10-11.5	**0.0015**	0.00050 U	0.0025 U	0.000080 U	**0.069**	--	--	0.0010 U	**0.00078**	**3.9**	0.00020 U	0.00060 U	--	**0.0080**
HSA-4 (20-21.5)	01/09/2015	20-21.5	0.00050 U	**0.0011**	0.025 U	0.000080 U	0.0040 U	--	--	**0.0014**	**0.0097**	**0.11**	0.00020 U	0.00060 U	--	**0.013**
HSA-4 (25-26)	01/09/2015	25-26	0.00050 U	**0.0012**	0.025 U	0.000080 U	0.0040 U	--	--	**0.031**	**0.0047**	**0.15**	0.00020 U	0.00060 U	--	**0.048**
HSA-5 (10-11.5)	01/08/2015	10-11.5	**0.0018**	**0.00051**	0.012 U	**0.000090**	**0.11**	--	--	0.0010 U	**0.0029**	**1.6**	0.00020 U	0.00060 U	--	**0.027**
HSA-5 (20-21.5)	01/08/2015	20-21.5	**0.0046**	0.00050 U	0.012 U	**0.00022**	**0.088**	--	--	**0.0055**	**0.0042**	**2.1**	0.00020 U	0.00060 U	--	**0.033**
HSA-6 (10-11.5)	01/07/2015	10-11.5	**0.0022**	0.00050 U	0.012 U	0.000080 U	**0.078**	--	--	0.0010 U	**0.0012**	**2.6**	0.00020 U	0.00060 U	--	**0.011**
HSA-6 (20-21.5)	01/07/2015	20-21.5	**0.0024**	**0.00095**	0.0025 U	0.000080 U	**0.068**	--	--	0.0010 U	**0.0024**	**2.3**	0.00020 U	0.00060 U	--	**0.019**

Sample Name	Date	Depth Interval Feet	Metals[2,3]													
			SPLP Antimony	SPLP Arsenic	TCLP Arsenic	SPLP Cadmium	TCLP Cadmium	SPLP Chromium	TCLP Chromium	SPLP Copper	SPLP Lead	TCLP Lead	SPLP Mercury	TCLP Mercury	SPLP Nickel	SPLP Zinc
			mg/L													
RCRA Hazardous Waste Limit			NE	5	5	1	1	5	5	NE	5	5	0.2	0.2	NE	NE
AOI-3																
HSA-7 (35-36.5)	12/08/2014	35-36.5	**0.0036**	0.0025 U	0.012 U	0.00040 U	**0.048**	0.0025 U	0.012 U	0.0050 U	**0.0025**	**2.0**	--	--	0.0025 U	**0.026**
HSA-7 (70-71.5)	12/08/2014	70-71.5	**0.0051**	**0.013**	--	**0.00094**		0.0025 U		**0.034**	**0.029**	--	--	--	0.0025 U	**0.40**
HSA-8 (76.4-76.5)	12/08/2014	76.4-76.5	**0.026**	**0.0062**	0.012 U	**0.00046**	**0.096**	0.0025 U	0.012 U	**0.0066**	**0.0040**	**0.97**	--	--	0.0025 U	**0.19**
HSA-9 (50-51.5)	12/10/2014	50-51.5	**0.0054**	0.0025 U	0.012 U	0.00040 U	**0.048**	0.0025 U	0.012 U	0.0050 U	**0.015**	**4.5**	--	--	0.0025 U	**0.041**
HSA-9 (80-81.5)	12/10/2014	80-81.5	--	0.0025 U	0.012 U	**0.0045**	**0.098**	0.0025 U	0.012 U	**0.033**	**0.067**	**0.35**	--	--	0.0025 U	**2.1**
HSA-10 (10-11.5)	12/10/2014	10-11.5	0.0025 U	0.0025 U	--	**0.00068**	**--**	0.0025 U	--	0.0050 U	**0.026**	--	--	--	0.0025 U	**0.14**
HSA-10 (30-31.5)	12/10/2014	30-31.5	**0.0071**	0.0025 U	0.012 U	**0.00098**	**0.049**	0.0025 U	0.012 U	**0.020**	**0.032**	**3.0**	--	--	0.0025 U	**0.41**
HSA-10 (50-51.5)	12/10/2014	50-51.5	**0.0064**	**0.0068**	0.012 U	**0.0081**	**0.031**	**0.0035**	0.012 U	**0.19**	**0.39**	**1.1**	--	--	**0.0097**	**3.8**
HSA-10 (60-61.5)	12/11/2014	60-61.5	**0.020**	**0.0030**	0.012 U	**0.00092**	**0.043**	0.0025 U	0.012 U	**0.0087**	**0.069**	**0.61**	--	--	0.0025 U	**0.33**
HSA-11 (20-21.5)	12/11/2014	20-21.5	**0.0046**	0.0025 U	--	0.00040 U	--	0.0025 U	--	0.0050 U	**0.0023**	--	--	--	0.0025 U	**0.032**

Notes

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota

[2] Toxic Characteristic Leaching Procedure (TCLP): Samples extracted using EPA Method 1311 and analyzed by EPA Method 6020A and/or EPA Method 7470A.

[3] Synthetic Precipitation Leaching Procedure (SPLP): Samples extracted using EPA Method 1312 and analyzed by EPA Method 6020A

--' = not tested; AOI = Area of Interest (see Figure 1 for locations); ft. = feet; mg/L = milligrams per liter.

U = Analyte was not detected above reporting limit; NE = not established.

Bold indicates analyte was detected above the reporting limit

▨ **Red Bold** and gray shading indicates analyte was detected above the applicable cleanup level or screening level.

Table 3

Soil Chemical Analytical Results - Asbestos[1]

Van Stone Mine

Onion Creek, Washington

Sample Name	Date	Depth Interval	Sample Description			Asbestos Identification Estimated Quantity %	Non-Asbestos Material Identification %
			Layers	Color	Matrix		
AOI-1							
MS-29 (6-7)	10/13/15	6-7 ft	1/1	Tan	Sand	None Detected	100% Nonfibrous Binder
MS-30 (4-5)	10/13/15	4-5 ft	1/1	Brown	Soil	None Detected	100% Nonfibrous Binder
MS-31 (6-8)	10/13/15	6-8 ft	1/1	Brown	Soil	None Detected	100% Nonfibrous Binder
MS-32 (4-5)	10/13/15	4-5 ft	1/1	Brown	Soil	None Detected	100% Nonfibrous Binder
MS-33 (4-5)	10/13/15	4-5 ft	1/1	Brown	Soil	None Detected	100% Nonfibrous Binder
MS-34 (4-5)	10/13/15	4-5 ft	1/1	Brown	Soil	None Detected	100% Nonfibrous Binder
MS-35 (6-8)	10/12/15	6-8 ft	1/1	Brown	Sand/Rocks	None Detected	100% Nonfibrous Binder
MS-36 (3-5)	10/12/15	3-5 ft	1/1	Tan/Gray	Sand/Rocks	None Detected	100% Nonfibrous Binder
AOI-2							
HSA-3 (10-11.5)	01/09/2015	10-11.5 ft	1/1	Tan	Sand	Trace Actinolite	100% Nonfibrous Binder
HSA-3 (20-21.5)	01/09/2015	20-21.5 ft	1/1	Gray	Sand	Trace Actinolite	100% Nonfibrous Binder
HSA-6 (10-11.5)	01/07/2015	10-11.5 ft	1/1	Gray	Sand	Trace Actinolite	100% Nonfibrous Binder
HSA-6 (20-21.5)	01/07/2015	20-21.5 ft	1/1	Gray	Sand	Trace Actinolite	100% Nonfibrous Binder
AOI-3							
LT-NS-1 (0.5-1)	10/12/15	0.5-1 ft	1/1	Tan	Sand	None Detected	100% Nonfibrous Binder
LT-NS-2 (0.5-1)	10/12/15	0.5-1 ft	1/1	Tan	Sand	None Detected	100% Nonfibrous Binder
HSA-7 (10-11.5)	12/08/2014	10-11.5 ft	1/1	Gray	Sand	None Detected	None Detected
HSA-7 (35-36.5)	12/08/2014	35-36.5 ft	1/1	Gray	Sand	<1 Chrysotile <1 Actinolite	98% Nonfibrous Binder
HSA-7 (70-71.5)	12/08/2014	70-71.5 ft	1/1	Gray	Sand	None Detected	100% Nonfibrous Binder
HSA-9 (10-11.5)	12/09/2014	10-11.5 ft	1/1	Gray	Sand	None Detected	100% Nonfibrous Binder
HSA-9 (50-51.5)	12/10/2014	50-51.5 ft	1/1	Gray	Sand	None Detected	100% Nonfibrous Binder
HSA-9 (80-81.5)	12/10/2014	80-81.5 ft	1/1	Gray	Sand	None Detected	100% Nonfibrous Binder

Notes:

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

AOI = Area of interest (see Figure 1 for locations); ft = feet

Table 4

Soil Chemical Analytical Results - ABAs^1

Van Stone Mine
Onion Creek, Washington

Sample Name	Sample Date	Depth Interval	ABAs^2							
			Acid Generating Potential (AGP) t $CaCO_3$/Kt	Acid Neutralization Potential (ANP) t $CaCO_3$/Kt	Acid Base Potential (ABP) t $CaCO_3$/Kt	Total Sulfur % by weight	Sulfur HCl Extractable % by weight	Sulfur HNO3 Extractable % by weight	Sulfur Hot Water Extractable % by weight	Sulfur, Residual % by weight
AOI-1										
MS-29 (6-7)	10/12/2015	6-7 ft	4.3 U	**92.0**	**92.0**	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
MS-30 (4-5)	10/13/2015	4-5 ft	**47.6**	**92.6**	**45.0**	**2.20**	**0.563**	**1.08**	**0.532**	0.050 U
MS-31 (6-8)	10/13/2015	6-8 ft	**4.8**	**44.6**	**39.9**	**0.329**	0.050 U	**0.115**	**0.173**	0.050 U
MS-35 (6-8)	10/12/2015	6-8 ft	4.3 U	**91.7**	**91.7**	0.050 U	**0.053**	0.050 U	0.050 U	0.050 U
MS-36 (3-5)	10/12/2015	3-5 ft	4.3 U	**92.0**	**92.0**	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
AOI-2										
HSA-1 (20-21.5)	01/08/2015	20-21.5 ft	**7.8**	**580**	**570**	**0.338**	0.050 U	**0.232**	**0.331**	0.050 U
HSA-1 (30-31.5)	01/08/2015	30-31.5 ft	**8.4**	**480**	**470**	**0.427**	0.050 U	**0.223**	**0.416**	0.050 U
HSA-2 (10-11.5)	01/09/2015	10-11.5 ft	4.3 U	**430**	**430**	**0.195**	0.050 U	**0.077**	**0.194**	0.050 U
HSA-3 (10-11.5)	01/09/2015	10-11.5 ft	4.3 U	**380**	**380**	**0.355**	0.050 U	**0.113**	**0.354**	0.050 U
HSA-3 (20-21.5)	01/09/2015	20-21.5 ft	**5.9**	**570**	**560**	**0.230**	0.050 U	**0.178**	**0.230**	0.050 U
HSA-4 (10-11.5)	01/09/2015	10-11.5 ft	**8.1**	**580**	**570**	**0.299**	0.050 U	**0.244**	**0.287**	0.050 U
HSA-5 (10-11.5)	01/08/2015	10-11.5 ft	**5.3**	**510**	**500**	**0.482**	0.050 U	**0.151**	**0.476**	0.050 U
HSA-5 (20-21.5)	01/08/2015	20-21.5 ft	**11**	**580**	**570**	**0.175**	0.050 U	**0.325**	**0.175**	0.050 U
HSA-6 (10-11.5)	01/07/2015	10-11.5 ft	**21**	**480**	**459**	**1.17**	0.050 U	**0.521**	**1.10**	**0.141**
HSA-6 (20-21.5)	01/07/2015	20-21.5 ft	**11**	**400**	**389**	**0.885**	0.050 U	**0.321**	**0.862**	0.050 U

			ABAs^2							
Sample Name	Sample Date	Depth Interval	Acid Generating Potential (AGP) t CaCO$_3$/Kt	Acid Neutralization Potential (ANP) t CaCO$_3$/Kt	Acid Base Potential (ABP) t CaCO$_3$/Kt	Total Sulfur % by weight	Sulfur HCl Extractable % by weight	Sulfur HNO3 Extractable % by weight	Sulfur Hot Water Extractable % by weight	Sulfur, Residual % by weight
AOI-3										
LT-NS-1 (0.5-1)	10/12/2015	0.5-1 ft	4.3 U	0.050 U	**0.0**	0.50 U	0.050 U	0.050 U	0.050 U	0.050 U
LT-NS-2 (0.5-1)	10/12/2015	0.5-1 ft	4.3 U	**6.19**	**6.2**	0.050 U	0.050 U	0.050 U	0.050 U	0.050 U
HSA-7 (10-11.5)	12/08/2014	10-11.5 ft	4.3 U	**3800**	**3900**	**0.120**	0.050 U	**0.130**	**0.120**	0.050 U
HSA-7 (35-36.5)	12/08/2014	35-36.5 ft	**11.3**	**3600**	**3590**	**0.390**	0.050 U	**0.350**	**0.260**	0.050 U
HSA-7 (70-71.5)	12/08/2014	70-71.5 ft	**7.6**	**200**	**196**	**0.350**	**0.210**	**0.0800**	**0.0600**	0.050 U
HSA-9 (10-11.5)	12/09/2014	10-11.5 ft	4.3 U	**390**	**390**	0.050 U	0.050 U	**0.0900**	0.050 U	0.050 U
HSA-9 (50-51.5)	12/10/2014	50-51.5 ft	**9.40**	**310**	**304**	**0.570**	0.050 U	**0.300**	**0.290**	0.050 U
HSA-9 (80-81.5)	12/10/2014	80-81.5 ft	**8.55**	**180**	**176**	**0.350**	**0.250**	**0.0800**	0.050 U	0.050 U

Notes:

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

[2] Acid Base Accounting analyzed using EPA Method Modified Sobek 3.2.

'--' = not tested; ft = feet; t CaCO3/Kt = tons of calcium carbonate to per 1,000 tons of waste

AOI = Area of Interest (see Figure 1 for locations)

U = Analyte was not detected above reporting limit.

Bold indicates analyte was detected above the reporting limit.

Table 5

Soil Chemical Analytical Results - Petroleum Hydrocarbons[1]

Van Stone Mine

Onion Creek, Washington

Sample Name	Date	Depth Interval	Gasoline-range hydrocarbons[2]	Diesel-range Hydrocarbons[3]	Oil-range Hydrocarbons[3]
			mg/Kg		
MS-20 (0.5-1)	10/13/2015	0.5-1 ft	5.2 U	15.8 U	**91.3**
MS-21 (0.5-1)	10/13/2015	0.5-1 ft	5.3 U	**123**	**1,020**
MS-22 (0.5-1)	10/13/2015	0.5-1 ft	5.2 U	**76.4**	**932**
MS-23 (0.5-1)	10/13/2015	0.5-1 ft	5.2 U	15.9 U	**139**
MS-27 (0.5-1)	10/13/2015	0.5-1 ft	5.0 U	15.6 U	**110**
MS-28 (0.5-1)	10/13/2015	0.5-1 ft	5.1 U	15.5 U	**30.2**
MTCA Method A CUL[4]			30/100[5]	2,000	2,000

Notes:

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

[2] Gasoline-range hydrocarbons analyzed by NWTPH-Gx.

[3] Diesel-range and motor oil range hydrocarbons analyzed by NWTPH-Dx.

[4] Model Toxics Control Act (MTCA) Method A cleanup levels.

[5] Gasoline-range petroleum hydrocarbon cleanup level is 100 mg/kg if benzene is not present and the total of ethylbenzene, toluene and xylenes is less than 1% of the gasoline mixture, and 30 mg/kg when benzene is present.

ft = feet; mg/kg = milligrams per kilogram; TPH = total petroleum hydrocarbons; U = analyte was not detected above reporting limit

Table 6

Groundwater Chemical Analytical Results - Metals[1]

Van Stone Mine

Onion Creek, Washington

Location	Sample ID	Date	Metals[2]							
			Antimony	Arsenic	Cadmium	Calcium	Lead	Magnesium	Nickel	Thallium
			µg/L							
Cleanup Level[3,4]			6	5	5	NE	15	NE	100	2
DH-2 (DH89-2)	DH-2-101415	10/14/2015	3.0 U[5]	4.0 U[5]	**4.2**	**333,000**	10.0 U	**320,000**	20.0 U	5.0 U[5,6]
	DH-2:020116	02/01/2016	0.15 U	**1.1**	**3.3**	**350,000**	**2.7**	**341,000**	**8.0**	0.10 U
Duplicate (MW-2)	DUP-1-101515	10/15/2015	3.0 U[5]	4.0 U[5]	3.0 U	**335,000**	10.0 U	**110,000**	20.0 U	5.0 U[5,6]
	DUP: 020116	02/01/2016	0.15 U	**1.4**	**0.13**	**355,000 M1**	0.98	**121,000 M1**	**1.0**	0.10 U
MW-1	MW-1: 020116	02/01/2016	0.15 U	**2.0**	0.080 U	**92,000**	**0.34**	**20,600**	**0.68**	0.10 U
MW-2	MW-2-101515	10/15/2015	3.0 U[5]	4.0 U[5]	3.0 U	**343,000**	10.0 U	**112,000**	20.0 U	5.0 U[5,6]
	MW-2: 020116	02/01/2016	0.15 U	**1.4**	**0.10**	**345,000**	**0.99**	**117,000**	**1.0**	0.10 U
MW-3	MW-3-101415	10/14/2015	3.0 U[5]	4.0 U[5]	3.0 U	**80,400**	10.0 U	**20,600**	20.0 U	5.0 U[5,6]
	MW-3: 020216	02/02/2016	0.15 U	0.50 U	0.080 U	**88,800**	0.10 U	**23,800**	0.50 U	0.10 U
MW-5	MW-5-101515	10/15/2015	3.0 U[5]	4.0 U[5]	3.0 U	**121,000**	10.0 U	**46,900**	20.0 U	5.0 U[5,6]
	MW-5: 020216	02/02/2016	0.15 U	**1.4**	**3.5**	**104,000**	**3.9**	**39,900**	**7.3**	0.10 U
W-1 (DH89-8 or DH-8)	W1-101415	10/14/2015	3.0 U[5]	4.0 U[5]	3.0 U	**185,000 M1**	10.0 U	**149,000 M1**	20.0 U	5.0 U[5,6]
	W1: 020116	02/01/2016	**0.65**	**0.68**	**0.45**	**197,000**	**0.64**	**161,000**	**1.1**	0.10 U
W-2	W-2-101415	10/14/2015	3.0 U[5]	4.0 U[5]	3.0 U	**88,900**	10.0 U	**20,000**	20.0 U	5.0 U[5,6]

Notes:

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

[2] Metals analyzed by EPA Method 6020A.

[3] Model Toxics Control Act (MTCA) Method A and B cleanup levels. Method B cleanup levels are referenced from Ecology's CLARC Master Spreadsheet. When compounds have multiple cleanup levels referenced in CLARC (carcinogenic and non-carcinogenic), the most conservative value is displayed.

[4] Cleanup levels adapted from lowest potential groundwater ARAR listed in Table 14 from Hart Crowser Remedial Investigation.

[5] Result reported down to the method detection limit (MDL).

[6] MDL is greater than the applicable cleanup level (CUL).

'--' = not tested; U = Analyte was not detected above reporting limit; µg/L = micrograms per liter; NE = not established; NL = indicates that a value (Method A or B) is available, but was not selected as the project cleanup level; M1 = Matrix spike recovery exceeded quality control limits. Batch accepted based on laboratory control (LCS) recovery.

Bold indicates analyte was detected above the reporting limit.

▨ **Red Bold** and gray shading indicates analyte was detected above the applicable cleanup level.

Table 7

Groundwater Chemical Analytical Results - General Chemistry[1]

Van Stone Mine
Onion Creek, Washington

Location	Sample Name	Date	Alkalinity as $CaCO_3$[2]	Total Dissolved Solids[3]	Total Suspended Solids[4]	Hardness as $CaCO_3$[5]
			mg/L	mg/L	mg/L	µg/L
DH-2	DH-2-101415	10/14/2015	**328**	**3,000**	**12.0**	**2,150,000**
	DH-2: 020116	02/01/2016	**313**	**3,020**	**17.0**	**2,280,000**
Duplicate (MW-2)	DUP-1-101515	10/15/2015	**323**	**1,960**	**135**	**1,290,000**
	DUP: 020116	02/01/2016	**302**	**1,800**	**31.0**	**1,380,000**
MW-1	MW-1: 020116	02/01/2016	**145**	**413**	10.0 U	**315,000**
MW-2	MW-2-101515	10/15/2015	**321**	**1,970**	**145**	**1,320,000**
	MW-2: 020116	02/01/2016	**301**	**1,780**	**27.0**	**1,340,000**
MW-3	MW-3-101415	10/14/2015	**223**	**409**	10.0 U	**286,000**
	MW-3: 020216	02/02/2016	**210**	**410**	10.0 U	**320,000**
MW-5	MW-5-101515	10/15/2015	**155**	**692**	**200**	**494,000**
	MW-5: 020216	02/02/2016	**152**	**653**	**190**	**424,000**
W-1	W1-101415	10/14/2015	**244**	**1,520**	10.0 U	**1,070,000**
	W1: 020116	02/01/2016	**244**	**1,500**	10.0 U	**1,160,000**
W-2	W-2-101415	10/14/2015	**218**	**412**	10.0 U	**304,000**

Notes:

[1] Chemical analysis conducted by Pace Analytical located in Minneapolis, Minnesota.

[2] Alkalinity as calcium carbonate ($CaCO_3$) was analyzed by EPA Method 2320B.

[3] Total Dissolved Solids was analyzed by EPA Method SM2540C.

[4] Total Suspended Solids analyzed by EPA Method SM2540D.

[5] Hardness as CaCO3 was analyzed by EPA Method 6010C.

mg/L = milligrams per liter; µg/L = milligrams per liter; U = analyte was not detected above reporting limit.

Bold indicates analyte was detected above the laboratory reporting limit.

Table 8

Site COCs and Cleanup Levels

Van Stone Mine

Onion Creek, Washington

Media	Metals[1]												
	Antimony	Arsenic	Beryllium	Cadmium	Chromium[2]	Copper	Lead	Mercury	Nickel	Selenium	Silver	Thallium	Zinc
Soil Cleanup Level (mg/kg)[3]	0.86	5.04	1.4	1.60	26	28	44.9	0.13	30	1.65	2	1	206
Surface Water Cleanup Level (mg/L)[4]	0.014	0.098[5]	0.273[5]	0.00107[6]	0.114[6]	0.0141[6]	0.0045[6]	0.00014	0.081[6]	0.005	0.008[6]	0.0014	0.164[7]
Groundwater Cleanup Level (mg/L)[8]	0.006	0.005[9]	0.004	0.005	0.1	0.64	0.015	0.002	0.1	0.05	0.08	0.002[10]	4.8
Sediment Cleanup Level (mg/kg)[11]	0.59[12]	33	0.74[12]	4.98	111	149	128	1.06	48.6	11	0.57[12]	0.41[12]	459

Notes:

[1] Metal concentrations are reported as total concentrations, unless otherwise noted.

[2] Screening level for total chromium

[3] Soil cleanup level based upon Table 11 of the RI (Hart Crowser, 2013).

[4] Surface water cleanup level based upon dissolved metal concentrations in Table 13 of the RI (Hart Crowser, 2013), unless otherwise noted.

[5] Surface water cleanup level for total concentration based on MTCA Method B for protection of human health, fish ingestion.

[6] Surface water cleanup level for dissolved metal based upon National Recommended Water Quality Criteria for Aquatic life, chronic criteria and a median hardness concentration of 170 mg/L.

[7] Surface water cleanup level for dissolved metal based upon WAC 173-201A and a median hardness concentration of 170 mg/L.

[8] Groundwater cleanup level based upon Table 14 of the RI (Hart Crowser, 2013), unless otherwise noted.

[9] Groundwater cleanup value established by MTCA Method A. Previous value was based on laboratory reporting limits which can very between samples and laboratories.

[10] Groundwater cleanup level based upon Washington State and Federal Maximum Contaminant Limit (MCL). Previous cleanup level was based upon laboratory detection limit which can very between samples and laboratories

[11] Sediment cleanup level based upon consensus based freshwater sediment values (MacDonald, 2000), unless otherwise noted

[12] Sediment cleanup level based upon background concentrations developed as part of the RI (Hart Crowser, 2013)

Table 9

Site COC Extents and Exceedance of Cleanup Levels

Van Stone Mine
Onion Creek, Washington

Media and AOI where site COCs exceed Cleanup Levels	Antimony	Arsenic	Cadmium	Copper	Lead	Mercury	Zinc
AOI-1 – Mill Area, Open Pits and Waste Rock							
Soil	X	X	X	X	X	X	X
Surface Water			X		X		X
Groundwater[1]	NA	NA	NA	NA	NA	NA	NA
AOI-2 – Upper Tailings Pile							
Soil	X	X	X	X	X	X	X
Surface Water			X	X	X		X
Groundwater							
AOI-3 – Lower Tailings Pile							
Soil	X	X	X	X	X		X
Surface Water[2]	NA	NA	NA	NA	NA	NA	NA
Groundwater							
AOI-4 – Tailings Pipelines and Access Roads							
Soil	X	X	X	X	X	X	X
Surface Water	NA	NA	NA	NA	NA	NA	NA
Groundwater	NA	NA	NA	NA	NA	NA	NA
AOI-5 – Onion Creek and Tributaries							
Sediment	X						X
Surface Water[3]							
Groundwater	NA	NA	NA	NA	NA	NA	NA

Notes:

[1] Groundwater monitoring wells not installed in this AOI.

[2] Surface water not present in this AOI. Standing water on the lower tailings was not considered surface water.

[3] Cadmium, lead and zinc exceeded at a background location (BG-10-SW) during the October 2011 monitoring event.

NA = Not Applicable

Table 10

Summary of Quantities Used in Feasibility Study

Van Stone Mine

Onion Creek, Washington

Item	Quantity	Units	Assumptions
Mill and Waste Rock Area - AOI-1			
Perimeter of AOI-1	7,392	feet	From Google Earth
Areal extent of Mill Area	9.4	acres	From Google Earth
Volume of contaminated material at Mill Area	86,060	cubic yards	From Civil 3D
Areal extent of existing Waste Rock Area	53	acres	From Google Earth
Areal extent of graded Waste Rock Area	60	acres	From Google Earth
Volume of contaminated material at Waste Rock Area	3,787,615	cubic yards	From Civil 3D
Upper Tailings Pile - AOI-2			
Perimeter of AOI-2	3,696	feet	From Google Earth
Areal extent of Tailings Pile	9.6	acres	From Google Earth
Areal extent of graded Tailings Pile - Alternatives 3/4	17	acres	From Civil 3D
Volume of tailings	196,000	cubic yards	From Civil 3D
Volume of tailings to grade to achieve in-place 3:1 slopes - Alternatives 3/4	39,000	cubic yards	From Civil 3D
Liner material for Alternative 4	740,000	square feet	From Civil 3D
Cover soil for Alternative 4	54,815	cubic yards	Calculation based on liner area
Haul distance from Upper to Lower Tailings Pile	2.2	miles	From Google Earth
Weight for disposal all tailings - Alternative 6	294,000	tons	Based on tailings moist unit weight of 110 pcf
Lower Tailings Pile - AOI-3			
Perimeter of AOI-3	5,808	feet	From Google Earth
Areal extent of existing Tailings Pile	35.1	acres	From Google Earth
Areal extent of graded Tailings Pile - Alternatives 3/4	51	acres	From Civil 3D
Areal extent of graded Tailings Pile - Alternative 5	59	acres	From Civil 3D, 8 additional acres for Upper Tailings
Volume of tailings, including seepage collection pond	2,300,000	cubic yards	From Civil 3D
Volume of tailings to grade to achieve in-place 3:1 slopes - Alternatives 3/4/5	300,000	cubic yards	From Civil 3D
Liner material for Alternative 4	2,221,560	square feet	From Civil 3D, calc based on overall acreage
Liner material for Alternative 5	2,570,040	square feet	From Civil 3D, calc based on overall acreage
Cover soil for Alternative 4	164,560	cubic yards	Calculation based on liner area
Cover soil for Alternative 5	190,373	cubic yards	Calculation based on liner area
Weight for disposal all tailings - Alternative 6	3,450,000	tons	Based on tailings moist unit weight of 110 pcf
Pipeline Dispersed Tailings - AOI-4			
Volume of dispersed tailings	1,000	cubic yards	From Google Earth

Table 11

Comparison of Retained Remediation Alternatives

Van Stone Mine

Onion Creek, Washington

Remedial Method	Conceptual Description	Benefits	Limitations	Relative Cost	Construction Feasibility	Duration of O&M	Impacts to Future Development, Adjacent Land Uses	MTCA Preference
Alternative 1 - No Action	No change to existing conditions, but includes long-term soil and surface water monitoring plan.	Low cost.	Provides no active source control or waste volume reduction. Does not address downwind migration of contaminants. Does not address community. Does not provide restoration.	Low	Easy	Very long (+25 years or longer)	High. Site will be generally unusable, potential for wind-blown migration of contaminants to adjacent land.	Does not meet MTCA requirements for cleanup.
Alternative 2 - Institutional Controls	Institutional controls, including a restrictive covenant and fencing, would be established for the remedial area to mitigate dermal contact exposure to metals-contaminated soil, waste rock and tailings. In this scenario, there would be no active remedial measures.	Non-invasive and relatively low cost. Provides some control on potential exposure to contaminated media.	Provides no active source control or waste volume reduction. Does not address downwind migration of contaminants. Does not provide restoration.	Low	Easy	Very long (+25 years or longer)	High. Site will be generally unusable, potential for wind-blown migration of contaminants to adjacent land.	Lowest MTCA preference, doesn't treat source or create barrier to human and ecological receptors.
Alternative 3: In-Place Containment without Cover System.	In-place containment of waste rock and tailings with no cover system. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to blend with site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would not be covered with a soil cap. The tailings and waste rock areas would be seeded and left to naturally revegetate over time. Reclaimed areas would be fenced to limit access.	Moderate costs because no cover material import Contaminated materials not transported on public roadways. Provides some control on potential direct human exposure. Stabilizes sources areas from mass wasting and stormwater erosion.	No barrier to limit human and ecological exposure. Potential for wind-blown migration of contaminants.	Moderate	Moderate	Very long (+25 years or longer)	High. Site will be generally unusable. Although the areas will be regraded to stable slopes, there is still a potential for wind-blown migration of contaminants to adjacent land because no cover system.	Low MTCA preference, doesn't treat source or create barrier to human and ecological receptors.
Alternative 4: In-Place Containment with Cover System.	In-place containment of tailings and waste rock with multi-layer cover system. Dangerous waste from AOI-1 would be added to the upper tailings pile. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to match site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would be covered with a multi-layer geo synthetic cover system and 3-feet of common borrow and topsoil. All disturbed areas would be revegetated.	Permanent closure with reduced long-term monitoring. Stabilized source areas Geotextile and soil barrier to control human and ecological exposure, and wind-blown migration. Contaminated materials not transported on public roadways. Potential to use onsite material for cover system.	High costs due to imported materials. Long construction schedule.	High	Difficult	Moderate (10+ years or longer)	Moderate. Site will be generally unusable because of onsite reclamation. Impacts to adjacent land will be controlled with a cover system and vegetation. Wind-blown migration controlled.	Higher MTCA preference, create barrier to human and ecological receptors, but multiple sources areas remain.

Remedial Method	Conceptual Description	Benefits	Limitations	Relative Cost	Construction Feasibility	Duration of O&M	Impacts to Future Development, Adjacent Land Uses	MTCA Preference
Alternative 5: Centralized Repository at AOI-3	Tailings from AOI-2 and dangerous waste material from AOI-1 would be excavated and hauled to AOI-3 for placement into a centralized repository. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to match site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would be covered with a multi-layer geosynthetic cover system and 3-feet of common borrow and topsoil. All disturbed areas would be revegetated.	Permanent closure with waste consolidated in one location with stable slopes. Reduced long-term monitoring. Geotextile and soil barrier to control human and ecological exposure, and wind-blown migration. Potential to use onsite material for cover system.	High costs due to imported materials. Long construction schedule. Contaminated materials hauled on public roadways	High	Difficult	Moderate (10+ years or longer)	Moderate. Site will be generally unusable because of onsite reclamation. Impacts to adjacent land will be controlled with a cover system and vegetation. Wind-blown migration controlled.	Higher MTCA preference, create barrier to human and ecological receptors and all waste consolidated onsite.
Alternative 6: Off-Site Disposal	Tailings and waste rock that exceeds TCLP for lead would be excavated and hauled offsite for disposal in a permitted landfill. Waste rock would be graded to match site contours.	Permanent closure with all waste removed from the Site. Short long-term monitoring.	Very high costs Long construction schedule. Contaminated materials hauled on public roadways.	Very High	Difficult	Short (5 years)	Low	Highest MTCA preference, all contaminated waste removed from the Site.

Table 12

Summary of ARARs

Van Stone Mine
Onion Creek, Washington

ARAR	Chemical, Location, or Action Specific ARAR	Regulated Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Evaluation
Washington State									
Washington Administrative Code 173-60	Action	Noise Levels	Applies	Applies	Applies	Applies	Applies	Applies	Maximum noise levels are applicable depending on action selected.
Washington Administrative Code 173-160	Action	Well Construction and Maintenance	Applies	Applies	Applies	Applies	Applies	Applies	Minimum standards for construction of water and monitoring wells, and decommissioning
Washington Administrative Code 173-162	Action	Well Contractors and Operators	Applies	Applies	Applies	Applies	Applies	Applies	Procedures for well contractors and operators, applicable to installation and decommissioning of wells and borings.
Washington Administrative Code 173-175	Action	Dam Safety	Applies	Applies	Applies	Applies	Applies	Applies	Regulations associated with dams in order to reasonability secure safety to life and property.
Washington Administrative Code 173-201A	Chemical	Water Quality Standards for Surface Waters	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Washington Administrative Code 173-303	Chemical/Action	Dangerous Waste Management	Applies	Applies	Applies	Applies	Applies	Applies	Identified dangerous waste onsite.
Washington Administrative Code 173-304	Chemical/Action/Location	Solid Waste Handling Standards	Does Not Apply	Does Not Apply	Does Not Apply	Does Not Apply	Does Not Apply	Does Not Apply	The facility was operated prior to 1985, when WAC 173-304 was promulgated. Therefore compliance with these regulations is not required.
Washington Administrative Code 173-333	Chemical	Bioaccumulation Toxins Rule	Applies	Applies	Applies	Applies	Applies	Applies	Criteria to identify persistent, bioaccumulative toxins that pose human and ecological threats, and action plan.
Washington Administrative Code 173-340 (and subsets)	Chemical/Action	Toxic Waste Cleanup (MTCA)	Applies	Applies	Applies	Applies	Applies	Applies	The remedial action will be conducted under MTCA. Remedial alternatives will comply with MTCA regulations.
Washington Administrative Code 173-350	Action	Solid Waste Handling Standards	Applies	Applies	Applies	Applies	Applies	Applies	Limited purpose landfill regulations would apply if waste is capped in-place.
Washington Administrative Code 173-400	Action	Fugitive Emissions	Applies	Applies	Applies	Applies	Applies	Applies	Requires owner to take reasonable precautions to prevent fugitive emissions
Washington Administrative Code 197-11 and 173-802	Action	State Environmental Policy Act	Applies	Applies	Applies	Applies	Applies	Applies	A SEPA review is required for projects with potential significant environmental impacts.
Washington Administrative Code 332-30	Action	Aquatic Lands Management	Applies	Applies	Applies	Applies	Applies	Applies	Applicable for actions involving Onion Creek or tributaries.
Washington Administrative Code 296-155	Action	Safety Standards for Construction Work	Does Not Apply	Applies	Applies	Applies	Applies	Applies	Applicable during construction activities.
Washington Administrative Code 296-62	Action	General Occupational Health Standards	Does Not Apply	Applies	Applies	Applies	Applies	Applies	Applicable during construction activities.
Washington Administrative Code 246-290	Chemical	State Maximum Contaminant Level (MCL) limits	Applies	Applies	Applies	Applies	Applies	Applies	State MCLs are applicable to potential groundwater sources of drinking water in accordance with MTCA.
RCW 90.03-0.44	Action	Surface and Groundwater Withdrawal	Applies	Applies	Applies	Applies	Applies	Applies	Substantive compliance with regulations is applicable since action could involve withdrawal or diversion of groundwater or surface water.
RCW 90.48	Action	Water Pollution Control (Construction Stormwater Permit)	Applies	Applies	Applies	Applies	Applies	Applies	A Stormwater Pollution Prevention Plan (SWPPP) is required for each remediation alternative.
RCW 119A	Chemical	Drinking Water Regulations	Applies	Applies	Applies	Applies	Applies	Applies	MTCA has risk-based MCLs to protect consumes using public water supplies (surface water and groundwater)
Federal Regulations									
Title 40 Code of Federal Regulations 50	Action	Clean Air Act	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 61	Action	Asbestos Removal	Applies	Applies	Applies	Applies	Applies	Applies	Demolition or removal of asbestos containing materials in mill building would be applicable
Title 40 Code of Federal Regulations 131	Chemical	Water Quality Standards (National Toxics Rule)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.

ARAR	Chemical, Location, or Action Specific ARAR	Regulated Activity	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6	Evaluation
Washington State									
Title 40 Code of Federal Regulations 141/143	Chemical	Drinking Water Regulations (MCLs)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 40 Code of Federal Regulations 260-279	Chemical/Action	Hazardous Waste (RCRA)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
US Environmental Protection Agency - Region 9	Chemical	Preliminary Remediation Goals	Applies	Applies	Applies	Applies	Applies	Applies	PRGs are used as a screening tool, used as part of the risk assessment process.
Title 16 of United States Code, 461-467	Location	Historic Site, Buildings, Objects, and Antiquities Act	Applies	Applies	Applies	Applies	Applies	Applies	Could be applicable if buildings at the site are deemed historic.
Title 16 of United States Code, 469	Location	Archaeological and Historic Preservation Act	Applies	Applies	Applies	Applies	Applies	Applies	Would be applicable if actions cause loss or adverse impacts to significant, prehistoric, historic, and archaeological data
Title 16 of United States Code, 470	Location	National Historic Preservation Action	Applies	Applies	Applies	Applies	Applies	Applies	Could be applicable if buildings at the site are deemed historic.
Title 16 of United States Code, 661-667, 2901-2911	Location	Fish and Wildlife Conservation Act	Applies	Applies	Applies	Applies	Applies	Applies	Applicable for actions that involve Onion Creek and its tributaries
Title 16 of United States Code, 668	Location	Bald Eagle Protection Act	Applies	Applies	Applies	Applies	Applies	Applies	Applicable and actions would be carried out in a way that avoids unnecessarily adversely affecting bald and golden eagles.
Title 16 of United States Code, 703	Location	Migratory Bird Treaty Act	Applies	Applies	Applies	Applies	Applies	Applies	Applicable and actions would be carried out in a way that avoids taking or killing of protected birds and their nests.
Title 16 of United States Code, 1531-1544	Location	Endangered Species Act	Applies	Applies	Applies	Applies	Applies	Applies	Protect species of fish, wildlife, and plants that are listed.
Title 25 of United States Code, 3001-3013	Location	Native American Graves Protection and Reparation Act	Applies	Applies	Applies	Applies	Applies	Applies	Would be applicable if actions cause disturbance or alteration of graves.
Title 33 of United States Code, 26	Chemical/Action	Water Pollution Control (Clean Water Act)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 33 of United States Code, 26	Chemical/Action	Water Pollution Control (Clean Water Act)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 33 of United States Code, 26, Section 404	Action/Location	Dredge and Fill Material	Applies	Applies	Applies	Applies	Applies	Applies	Establishes programs to regulate discharge of fill and dredged material into waters of US, including wetlands
Title 33 of United States Code, 1251	Action/Location	Water Pollution Control (Clean Water Act)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Title 33 of United States Code, 300g-1	Action/Location	Water Pollution Control (Safe Drinking Water Act)	Applies	Applies	Applies	Applies	Applies	Applies	MTCA requires cleanup actions comply with applicable regulations.
Executive Order 11990	Location	Protection of Wetlands	Applies	Applies	Applies	Applies	Applies	Applies	Applicable for actions that involve Onion Creek and its tributaries and onsite wetlands
Executive Order 11988	Location	Protection of Floodplains	Applies	Applies	Applies	Applies	Applies	Applies	Applicable for actions that take place within the 100-year floodplain of Onion Creek and its tributaries

Table 13

Evaluation of Cleanup Action Alternatives

Van Stone Mine

Onion Creek, Washington

Alternative Numbers	Alternative 1	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Alternative Descriptions	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3: In-Place Containment without Cover System.	Alternative 4: In-Place Containment with Cover System.	Alternative 5: Centralized Repository at AOI-3	Alternative 6: Off-Site Disposal
	No change to existing conditions, but includes long-term soil and surface water monitoring plan.	Institutional controls, including a restrictive covenant and fencing, would be established for the remedial area to mitigate dermal contact exposure to metals-contaminated soil, waste rock and tailings. In this scenario, there would be no active remedial measures.	In-place containment of waste rock and tailings with no cover system. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to blend with site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would not be covered with a soil cap. The tailings and waste rock areas would be seeded and left to naturally revegetate over time. Reclaimed areas would be fenced to limit access.	In-place containment of tailings and waste rock with multi-layer cover system. Dangerous waste from AOI-1 would be added to the upper tailings pile. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to match site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would be covered with a multi-layer geo synthetic cover system and 3-feet of common borrow and topsoil. All disturbed areas would be revegetated.	Tailings from AOI-2 and dangerous waste material from AOI-1 would be excavated and hauled to AOI-3 for placement into a centralized repository. Tailings slopes would be regraded to a stable 3:1 or less (depending on final design); with additional site grading to control and mitigate stormwater run-on and run-off. Waste rock would be graded to match site contours. Additionally, buttresses, reinforce stabilized slopes, and benches could be used to enhance the stability and reduce the overall slope. The regraded areas would be covered with a multi-layer geosynthetic cover system and 3-feet of common borrow and topsoil. All disturbed areas would be revegetated.	Tailings and waste rock that exceeds TCLP for lead would be excavated and hauled offsite for disposal in a permitted landfill. Waste rock would be graded to match site contours.
Alternative Ranking Under MTCA						
1. Compliance with MTCA Threshold Criteria					1. Compliance with MTCA Threshold Criteria	
Protection of Human Health and the Environment	No - Alternative does not provide protection of human health and environment.	No - Alternative does not provide protection of human health and environment.	No - Alternative does not provide protection of human health and environment.	Yes - Alternative will protect human health and the environment.	Yes - Alternative will protect human health and the environment.	Yes - Alternative will protect human health and the environment.
Compliance with Cleanup Standards	No - Alternative does not comply with cleanup standards	No - Alternative does not comply with cleanup standards	Unlikely - Alternative provides for stable slopes and will reduce offsite migration, but no soil cover so potential exists for offsite migration via precipitation and wind-blow particles.	Yes - Alternative is expected to comply with cleanup standards through combination of excavation, grading, and capping.	Yes - Alternative is expected to comply with cleanup standards through combination of excavation, consolidation, grading, and capping.	Yes - Alternative is expected to comply with cleanup standards through excavation and offsite disposal.
Compliance with Applicable State and Federal Regulations	No - Alternative will not comply with applicable state and federal regulations	No - Alternative will not comply with applicable state and federal regulations.	No - Alternative will not comply with applicable state and federal regulations.	Yes - Alternative complies with applicable state and federal regulations	Yes - Alternative complies with applicable state and federal regulations	Yes - Alternative complies with applicable state and federal regulations
Provision for Compliance Monitoring	Yes - Alternative includes long-term monitoring.	Yes - Alternative includes long-term monitoring.	Yes - Alternative includes provision for compliance monitoring (i.e., compliance sampling during remedial excavation, and long-term surface water and sediment monitoring).	Yes - Alternative includes provision for compliance monitoring (i.e., compliance sampling during remedial excavation, long-term cap monitoring, and long-term surface water and sediment monitoring).	Yes - Alternative includes provision for compliance monitoring (i.e., compliance sampling during remedial excavation, long-term cap monitoring, and long-term surface water and sediment monitoring).	Yes - Alternative includes provision for compliance monitoring (i.e., compliance sampling during remedial excavation) but no need for long-term cap and surface water and sediment monitoring because all material removed from the site.
2. Restoration Time Frame						
	Immediate for implementation. Long-term monitoring expected for 25+ years	Short timeframe for installation of fence (estimated at 4 weeks). Long-term monitoring expected for 25+ years.	Initial restoration timeframe is moderate (estimated at 10 weeks). Long-term monitoring expected for 25+ years	Initial restoration timeframe is moderate to long (estimated at 20 weeks - 2 field seasons). Long-term monitoring expected for 10 years.	Initial restoration timeframe is moderate to long (estimated at 20 weeks - 2 field seasons). Long-term monitoring expected for 10 years.	Initial restoration timeframe is long (estimated at 25 weeks - 2 field seasons). Long-term monitoring expected for 5 years.

Alternative Numbers	Alternative 1		Alternative 2		Alternative 3		Alternative 4		Alternative 5		Alternative 6	
3. Disproportionate Cost Analysis - Relative Benefits Ranking[1]												
		Score		**Score**		**Score**		**Score**		**Score**		**Score**
Protectiveness	No protectiveness achieved	1	Low level of protectiveness.	2	Achieves general protectiveness by reducing the potential for offsite migration but doesn't provide a cover system to control wind-blow migration.	3	Achieves overall protectiveness. This alternative is less protective than Alternative 6 because waste material will remain onsite. Addresses direct exposure pathway for terrestrial and ecological receptors.	4	Achieves overall protectiveness. This alternative is less protective than Alternative 6 because waste material will remain onsite. Addresses direct exposure pathway for terrestrial and ecological receptors.	4	Highest overall protectiveness will all waste material transported offsite for disposal. Addresses direct exposure pathway for terrestrial and ecological receptors.	5
Permanence	No reduction in the toxicity, mobility, and mass of material onsite.	1	No reduction in the toxicity, mobility, and mass of material onsite.	1	No reduction in the toxicity and mass of material onsite. Mobility is reduced by grading to stable slopes.	2	Achieves permanent reduction in toxicity and mobility, but not volume as the onsite material is contained by a cover system.	3	Achieves permanent reduction in toxicity and mobility, but not volume as the onsite material are consolidated in a centralized repository contained by a cover system. Improves future land use for AOI-2.	4	Achieves permanent reduction in toxicity, mobility, and volume with contaminated material transported offsite for disposal.	5
Long-Term Effectiveness	No long-term effectiveness	1	Limited long-term effectiveness	2	Moderate long-term effectiveness with slopes reduced, but waste material still exposed.	3	High long-term effectiveness with contaminated materials graded to stable slopes and contained in a cover system.	4	High long-term effectiveness with contaminated materials consolidated, graded to stable slopes and contained in a cover system. Requires monitoring of one repository and not two.	4	Highest long-term effectiveness with contaminated material hauled offsite.	5
Management of Short-Term Risks	Lowest short-term risks because no action is taken.	5	Lowest short-term risks because only a fence is installed and no contaminated material is excavated.	5	Lower level of short-term risks with no export or import of material from the site.	4	Moderate level of short-term risks with import of cover materials and onsite grading.	3	Moderate to high level of short-term risks due onsite transport of contaminated material to the centralized repository and import of cover materials.	3	Highest level of short-term risks due to excavation of large volumes of material, related over-the-road truck traffic for disposal, and transport of dangerous waste. Therefore, this alternative presents higher short term risks than Alternatives 3, 4 and 5.	1
Technical and Administrative Implementability	Highest level of implementability because no actions taken at the site.	5	High level of implementability with construction of a fence.	5	Moderate to high level of Implementability, and relies on long term maintenance. Plenty of experienced contractors in the areas that can implement this project.	4	Moderate level of Implementability, and relies on long term maintenance. Plenty of experienced contractors in the areas that can implement this project. Availability of cover material to import makes this alternative less implementable than Alternatives 1, 2 and 3.	3	Moderate level of Implementability, and relies on long term maintenance. Plenty of experienced contractors in the areas that can implement this project. Availability of cover material to import makes this alternative less implementable than Alternatives 1, 2 and 3.	3	Implementable, technically feasible, off-site disposal facilities are available, access for earthwork and transportation equipment is good. However, the number of trucks available to transport material off-site will be a limiting factor to the timeframe of construction and likely would prolong construction activities.	2
Consideration of Public Concerns	Lowest level of public acceptance because contaminated materials remain onsite with no control on migration offsite.	1	Lowest level of public acceptance because contaminated materials remain onsite with no control on migration offsite.	1	Low to moderate level of public acceptable because contaminated materials are stabilized onsite, but no control for offsite migration via wind-blow dust and surface erosion.	2	Moderate level of public acceptance because contaminated materials are covered onsite to control offsite migration and exposure.	4	Moderate level of public acceptance because contaminated materials are covered onsite to control offsite migration and exposure. Increased use of the public roadway to consolidate material in the lower tailings pile will impact local residents.	4	Higher level of public acceptable expected because contaminated material would be removed from the site, but significant traffic between the site and disposal area might not be acceptable to the public, especially residents around the site.	3
Total Score		**14**		**16**		**18**		**21**	**Total Score**	**22**		**21**

Notes:

[1] Alternatives were scored using a scale of 1 to 5 with a score of 1 being the least amount of benefits provided by the alternative and a score of 5 being the most amount of benefits provided by the alternative.

Table 14

Summary of MTCA Evaluation and Ranking of Cleanup Action Alternatives

Van Stone Mine
Onion Creek, Washington

	Alternative 1 - No Action	Alternative 2 - Institutional Controls	Alternative 3: In-Place Containment without Cover System.	Alternative 4: In-Place Containment with Cover System.	Alternative 5: Centralized Repository at AOI-3	Alternative 6: Off-Site Disposal
Alternative Ranking Under MTCA						
1. Compliance with MTCA Threshold (	**No**	**No**	**Yes**	**Yes**	**Yes**	**Yes**
2. Restoration Time Frame	Immediate for implementation. Long-term monitoring expected for 25+ years.	Short timeframe for installation of fence (estimated at 4 weeks). Long-term monitoring expected for 25+ years.	Initial restoration timeframe is moderate (estimated at 10 weeks). Long-term monitoring expected for 25+ years.	Initial restoration timeframe is moderate to long (estimated at 20 weeks - 2 field seasons). Long-term monitoring expected for 10 years.	Initial restoration timeframe is moderate to long (estimated at 20 weeks - 2 field seasons). Long-term monitoring expected for 10 years.	Initial restoration timeframe is long (estimated at 25 weeks - 2 field seasons). Long-term monitoring expected for 5 years.
3. Disproportionate Cost Analysis Relative Benefits Ranking						
Protectiveness	1	2	3	4	4	5
Permanence	1	1	2	3	4	5
Cost[2]	5	4	3	2	2	1
Long-Term Effectiveness	1	2	3	4	4	5
Management of Short-Term Risks	5	5	4	3	3	1
Implementability	5	5	4	3	3	2
Consideration of Public Concerns	1	1	2	4	4	3
Total of Scores	**19**	**20**	**21**	**23**	**24**	**22**
4. Disproportionate Cost Analysis						
	$0	**$903,400**	**$4,863,076**	**$14,361,469**	**$13,960,482**	**$448,143,116**
Benefits	Yes	Yes	No	No	No	No
Practicability of Remedy	Not Practicable	Not Practicable	Low Practicability	Practicable	Practicable	Not Practicable
Remedy Permanent to Maximum Extent Practicable	Not Permanent	Not Permanent	Not Permanent	Yes	Yes	Yes
Overall Alternative Ranking	**6th**	**5th**	**4th**	**2nd**	**1st**	**3rd**

Notes:

[1] WAC 173-340-360(2)(a)

[2] Low cost is a benefit.

Table 15

Alternative 2. Institutional Controls

Van Stone Mine

Onion Creek, Washington

Scope Item	Unit	Unit Cost	Quantity	Extended
Design/Project Management				
Design, work plan and procurement	lump sum	$20,000.00	1	$20,000
			Task Sub-Total	**$20,000**
8-foot Chain Link Fence Around AOIs				
Mill/Waste Rock Area	feet	$15.00	7,392	$110,880
Upper Tailings Pile	feet	$15.00	3,696	$55,440
Lower Tailings Pile	feet	$15.00	5,808	$87,120
			Remedial Action Sub-Total	**$253,440**
			Remedial Action Contingency (15%)	**$38,016**
			Engineering, Construction Oversight, Project Management, Reporting	**$20,000**
			Remedial Action Estimated Total	**$311,456**
Annual Maintenance and Monitoring				
Quarterly Groundwater Monitoring/Inspection and Reporting	event	$10,000.00	4	$40,000
Occasional repairs	event	$2,000.00	1	$2,000
			Annual Maintenance and Monitoring Total	**$42,000**
			Present Worth Annual Maintenance and Monitoring Costs (5%, 25 years)	**$591,944**
			Total Estimated Costs for Alternative 2	**$903,400**

Notes:

Unit costs derived from either RS Means, estimates from local vendors, and experience. Estimated costs are considered to be within a margin of +/- 30 percent.

Refer to Table 1 for assumptions used to generate material quantities.

Table 16

Alternative 3. In-Place Containment without Cover System

Van Stone Mine
Onion Creek, Washington

Scope Item	Unit	Unit Cost	Quantity	Extended
Design / Work Plan / Project Management				
Design Data Gaps - Borrow Materials, Dam Spillway, etc.	lump sum	$35,000.00	1	$35,000
Design, Work Plan, Plans/Specs, Project Management	lump sum	$300,000.00	1	$300,000
			Task Sub-Total	**$335,000**
Construction Oversight / Project Management / Reporting				
Construction monitoring/oversight - assume 10 weeks construction, includes PM and Per Diem	day	$2,000.00	70	$140,000
Analytical	lump sum	$15,000.00	1	$15,000
Remedial action report	lump	$60,000.00	1	$60,000
			Task Sub-Total	**$215,000**
Mill Area / Waste Rock - AOI-1				
Grading mine area/waste rock	acre	$5,000.00	60	$300,000
Surface water controls	lump sum	$100,000.00	1	$100,000
Revegetation	acre	$2,000.00	60	$120,000
			Task Sub-Total	**$520,000**
Upper Tailings Pile - AOI-2				
Grading tailings to 3:1 slope	cubic yards	$7.00	39,000	$273,000
Surface water controls	lump sum	$25,000.00	1	$25,000
Revegetation	acre	$2,000.00	17	$34,000
			Task Sub-Total	**$332,000**
Lower Tailings Pile - AOI-3				
Grading tailings to 3:1 slope	cubic yards	$5.00	300,000	$1,500,000
Surface water controls	lump sum	$100,000.00	1	$100,000
Revegetation	acre	$2,000.00	51	$102,000
			Task Sub-Total	**$1,702,000**
North Pit Lake Dam				
Emergency Spillway Installation	lump sum	$100,000.00	1	$100,000
Dam Stabilization	lump sum	$100,000.00	1	$100,000
			Task Sub-Total	**$200,000**
Additional Costs				
Erosion control	lump sum	$100,000.00	1	$100,000
Mobilization/Demobilization (10% of construction est.)	lump sum	$250,000.00	1	$250,000
Temp Construction Facilities	lump sum	$75,000.00	1	$75,000
Construction Surveying	day	$2,000.00	10	$20,000
			Task Sub-Total	**$445,000**
			Remedial Action Sub-Total	**$3,199,000**
			Remedial Action Contingency (15%)	**$479,850**
			Engineering, Construction Oversight, Project Management, Reporting	**$550,000**
			Remedial Action Estimated Total	**$4,228,850**

Scope Item	Unit	Unit Cost	Quantity	Extended
Annual Maintenance and Monitoring				
Quarterly Groundwater Monitoring/Inspection and Reporting	event	$10,000.00	4	$40,000
Occasional repairs/grading	event	$5,000.00	1	$5,000
Annual Maintenance and Monitoring Total				**$45,000**
Present Worth Annual Maintenance and Monitoring Costs (5%, 25 years)				**$634,226**
Total Estimated Costs for Alternative 3				**$4,863,076**

Notes:

Unit costs derived from either RS Means, estimates from local vendors, and experience. Estimated costs are considered to be within a margin of +/- 30 percent.

Refer to Table 1 for assumptions used to generate material quantities.

Table 17

Alternative 4. In-Place Containment with Cover System

Van Stone Mine
Onion Creek, Washington

Scope Item	Unit	Unit Cost	Quantity	Extended
Design / Work Plan / Project Management				
Design Data Gaps - Borrow Materials, Dam Spillway, etc.	lump sum	$35,000	1	$35,000
Design, Work Plan, Plans/Specs, Project Management	lump sum	$300,000	1	$300,000
			Task Sub-Total	**$335,000**
Construction Oversight / Project Management / Reporting				
PM and Per Diem	day	$2,000	140	$280,000
Analytical	lump sum	$30,000	1	$30,000
Remedial action report	lump	$75,000	1	$75,000
			Task Sub-Total	**$385,000**
Mill Area / Waste Rock - AOI-1				
Grading mine area/waste rock	acre	$5,000	60	$300,000
Surface water controls	lump sum	$100,000	1	$100,000
Revegetation	acre	$2,000	60	$120,000
			Task Sub-Total	**$520,000**
Upper Tailings Pile - AOI-2				
Grading tailings to 3:1 slope	cubic yards	$5	39,000	$195,000
Install multi-layer liner system (non-woven, 60-mil HDPE, non-woven, geogrid drainage)	square feet	$2	740,520	$1,147,806
Purchase and place 2 ft cover soil	cubic yards	$15	54,815	$822,222
Surface water controls	lump sum	$25,000	1	$25,000
Revegetation	acre	$2,000	17	$34,000
			Task Sub-Total	**$2,224,028**
Lower Tailings Pile - AOI-3				
Grading tailings to 3:1 slope	cubic yards	$5	300,000	$1,500,000
Install multi-layer liner system (non-woven, 60-mil HDPE, non-woven, geogrid drainage)	square feet	$2	2,221,560	$3,443,418
Purchase and place 2 ft cover soil	cubic yards	$15	190,373	$2,855,600
Surface water controls	lump sum	$100,000	1	$100,000
Revegetation	acre	$2,000	51	$102,000
			Task Sub-Total	**$8,001,018**
Dispersed Tailings - AOI-4				
Excavation, transport and place in AOI-2 or AOI-3	cubic yards	$35	1,000	$35,000
Grading with surrounding soils	lump sum	$5,000	1	$5,000
			Task Sub-Total	**$40,000**
North Pit Lake Dam				
Emergency Spillway Installation	lump sum	$100,000	1	$100,000
Dam Stabilization	lump sum	$100,000	1	$100,000
			Task Sub-Total	**$200,000**

Scope Item	Unit	Unit Cost	Quantity	Extended
Additional Costs				
Erosion control	lump sum	$100,000	1	$100,000
Mobilization/Demobilization (est)	lump sum	$400,000	1	$400,000
Temp Construction Facilities	lump sum	$75,000	1	$75,000
Construction Surveying	day	$2,000	10	$20,000
Task Sub-Total				**$595,000**
Remedial Action Sub-Total				**$11,580,046**
Remedial Action Contingency (15%)				**$1,737,007**
Engineering, Construction Oversight, Project Management, Reporting				**$720,000**
Remedial Action Estimated Total				**$14,037,053**
Annual Maintenance and Monitoring				
Quarterly Groundwater Monitoring/Inspection and Reporting (Years 1-3)	event	$10,000	4	$40,000
Annual Groundwater Monitoring/Inspection and Reporting (Years 7-10)	event	$10,000	1	$10,000
Occasional repairs/grading (Years 1-10)	event	$7,500	1	$7,500
Present Worth Annual Monitoring Costs (5%, Years 1-3)				**$108,928**
Present Worth Annual Monitoring Costs (5%, Years 4-10)				**$157,575**
Present Worth Annual Maintenance Costs (5%, Years 1-10)				**$57,913**
Total Estimated Costs for Alternative 4				**$14,361,469**

Notes:

Unit costs derived from either RS Means, estimates from local vendors, and experience. Estimated costs are considered to be within a margin of +/- 30 percent.

Refer to Table 1 for assumptions used to generate material quantities.

Table 18

Alternative 5. Centralized Repository at AOI-3

Van Stone Mine
Onion Creek, Washington

Scope Item	Unit	Unit Cost	Quantity	Extended
Design / Work Plan / Project Management				
Design Data Gaps - Borrow Materials, Dam Spillway, etc.	lump sum	$35,000.00	1	$35,000
Design, Work Plan, Plans/Specs, Project Management	lump sum	$300,000.00	1	$300,000
			Task Sub-Total	**$335,000**
Construction Oversight / Project Management / Reporting				
Construction monitoring/oversight - assume 20 weeks construction, includes PM and Per Diem	day	$2,000.00	140	$280,000
Analytical	lump sum	$30,000.00	1	$30,000
Remedial action report	lump	$75,000.00	1	$75,000
			Task Sub-Total	**$385,000**
Mill Area / Waste Rock - AOI-1				
Grading mine area/waste rock	acre	$5,000.00	60	$300,000
Surface water controls	lump sum	$100,000.00	1	$100,000
Revegetation	acre	$2,000.00	60	$120,000
			Task Sub-Total	**$520,000**
Upper Tailings Pile - AOI-2				
Excavation, transport and place tailings at AOI-3	cubic yards	$6.00	196,000	$1,176,000
Site grading	acres	$2,500.00	9.6	$24,000
Revegetation	acre	$2,000.00	9.6	$19,200
			Task Sub-Total	**$1,219,200**
Lower Tailings Pile - AOI-3				
Grading tailings to 3:1 slope	cubic yards	$5.00	300,000	$1,500,000
Install multi-layer liner system (non-woven, 60-mil HDPE, non-woven, geogrid drainage)	square feet	$1.55	2,570,040	$3,983,562
Purchase and place 2 ft cover soil	cubic yards	$15	190,373	$2,855,600
Surface water controls	lump sum	$100,000.00	1	$100,000
Revegetation	acre	$2,000.00	59	$118,000
			Task Sub-Total	**$8,557,162**
Dispersed Tailings - AOI-4				
Excavation, transport and place in AOI-3	cubic yards	$35	1,000	$35,000
Grading with surrounding soils	lump sum	$5,000	1	$5,000
			Task Sub-Total	**$40,000**
North Pit Lake Dam				
Emergency Spillway Installation	lump sum	$100,000.00	1	$100,000
Dam Stabilization	lump sum	$100,000.00	1	$100,000
			Task Sub-Total	**$200,000**

Scope Item	Unit	Unit Cost	Quantity	Extended
Additional Costs				
Erosion control	lump sum	$100,000.00	1	$100,000
Mobilization/Demobilization (est)	lump sum	$500,000.00	1	$500,000
Temp Construction Facilities	lump sum	$75,000.00	1	$75,000
Construction Surveying	day	$2,000.00	10	$20,000
			Task Sub-Total	**$695,000**
			Remedial Action Sub-Total	**$11,231,362**
			Remedial Action Contingency (15%)	**$1,684,704**
			Engineering, Construction Oversight, Project Management, Reporting	**$720,000**
			Remedial Action Estimated Total	**$13,636,066**
Annual Maintenance and Monitoring				
Quarterly Groundwater Monitoring/Inspection and Reporting (Years 1-3)	event	$10,000	4	$40,000
(Years 7-10)	event	$10,000	1	$10,000
Occasional repairs/grading (Years 1-10)	event	$7,500	1	$7,500
			Present Worth Annual Monitoring Costs (5%, Years 1-3)	**$108,928**
			Present Worth Annual Monitoring Costs (5%, Years 4-10)	**$157,575**
			Present Worth Annual Maintenance Costs (5%, Years 1-10)	**$57,913**
			Total Estimated Costs for Alternative 5	**$13,960,482**

Notes:

Unit costs derived from either RS Means, estimates from local vendors, and experience. Estimated costs are considered to be within a margin of +/- 30 percent.

Refer to Table 1 for assumptions used to generate material quantities.

Table 19

Alternative 6. Off-Site Disposal

Van Stone Mine

Onion Creek, Washington

Scope Item	Unit	Unit Cost	Quantity	Extended
Design / Work Plan / Project Management				
Design Data Gaps - Borrow Materials, Dam Spillway, etc.	lump sum	$35,000.00	1	$35,000
Design, Work Plan, Plans/Specs, Project Management	lump sum	$125,000.00	1	$125,000
			Task Sub-Total	**$160,000**
Construction Oversight / Project Management / Reporting				
Construction monitoring/oversight - assume 25 weeks construction, includes PM and Per Diem	day	$2,000.00	175	$350,000
Analytical	lump sum	$30,000.00	1	$30,000
Remedial action report	lump	$75,000.00	1	$75,000
			Task Sub-Total	**$455,000**
Mill Area / Waste Rock - AOI-1				
Excavation, transport and disposal of wasterock greater than TCLP	cubic yards	$150.00	86,060	$12,909,000
Grading mine area/waste rock	acre	$5,000.00	60	$300,000
Surface water controls	lump sum	$100,000.00	1	$100,000
Revegetation	acre	$2,000.00	60	$120,000
			Task Sub-Total	**$13,429,000**
Upper Tailings Pile - AOI-2				
Excavation, transport and disposal of tailings	cubic yards	$150.00	196,000	$29,400,000
Site grading	acres	$2,500.00	9.6	$24,000
Revegetation	acre	$2,000.00	9.6	$19,200
			Task Sub-Total	**$29,443,200**
Lower Tailings Pile - AOI-3				
Excavation, transport and disposal of tailings	cubic yards	$150.00	2,300,000	$345,000,000
Site grading	acres	$2,500.00	51.0	$127,500
Revegetation	acre	$2,000.00	59	$118,000
			Task Sub-Total	**$345,245,500**
Dispersed Tailings - AOI-4				
Excavation, transport and place in AOI-3 for off-site transport	cubic yards	$35	1,000	$35,000
Grading with surrounding soils	lump sum	$5,000	1	$5,000
			Task Sub-Total	**$40,000**
North Pit Lake Dam				
Emergency Spillway Installation	lump sum	$100,000.00	1	$100,000
Dam Stabilization	lump sum	$100,000.00	1	$100,000
			Task Sub-Total	**$200,000**

Scope Item	Unit	Unit Cost	Quantity	Extended
Additional Costs				
Erosion control	lump sum	$100,000.00	1	$100,000
Mobilization/Demobilization (est)	lump sum	$500,000.00	1	$500,000
Temp Construction Facilities	lump sum	$75,000.00	1	$75,000
			Task Sub-Total	**$675,000**
			Remedial Action Sub-Total	**$389,032,700**
			Remedial Action Contingency (15%)	**$58,354,905**
			Engineering, Construction Oversight, Project Management, Reporting	**$615,000**
			Remedial Action Estimated Total	**$448,002,605**
Annual Maintenance and Monitoring (5 Years)				
Quarterly Groundwater Monitoring/Inspection and Reporting (Years 1-3)	event	$10,000	4	$40,000
Annual Groundwater Monitoring/Inspection and Reporting (Years 4-5)	event	$10,000	1	$10,000
Occasional repairs/grading (Years 1-5)	event	$3,000	1	$3,000
			Present Worth Annual Monitoring Costs (5%, Years 1-3)	**$108,928**
			Present Worth Annual Monitoring Costs (5%, Years 4-5)	**$18,594**
			Present Worth Annual Maintenance Costs (5%, Years 1-5)	**$12,989**
			Total Estimated Costs for Alternative 6	**$448,143,116**

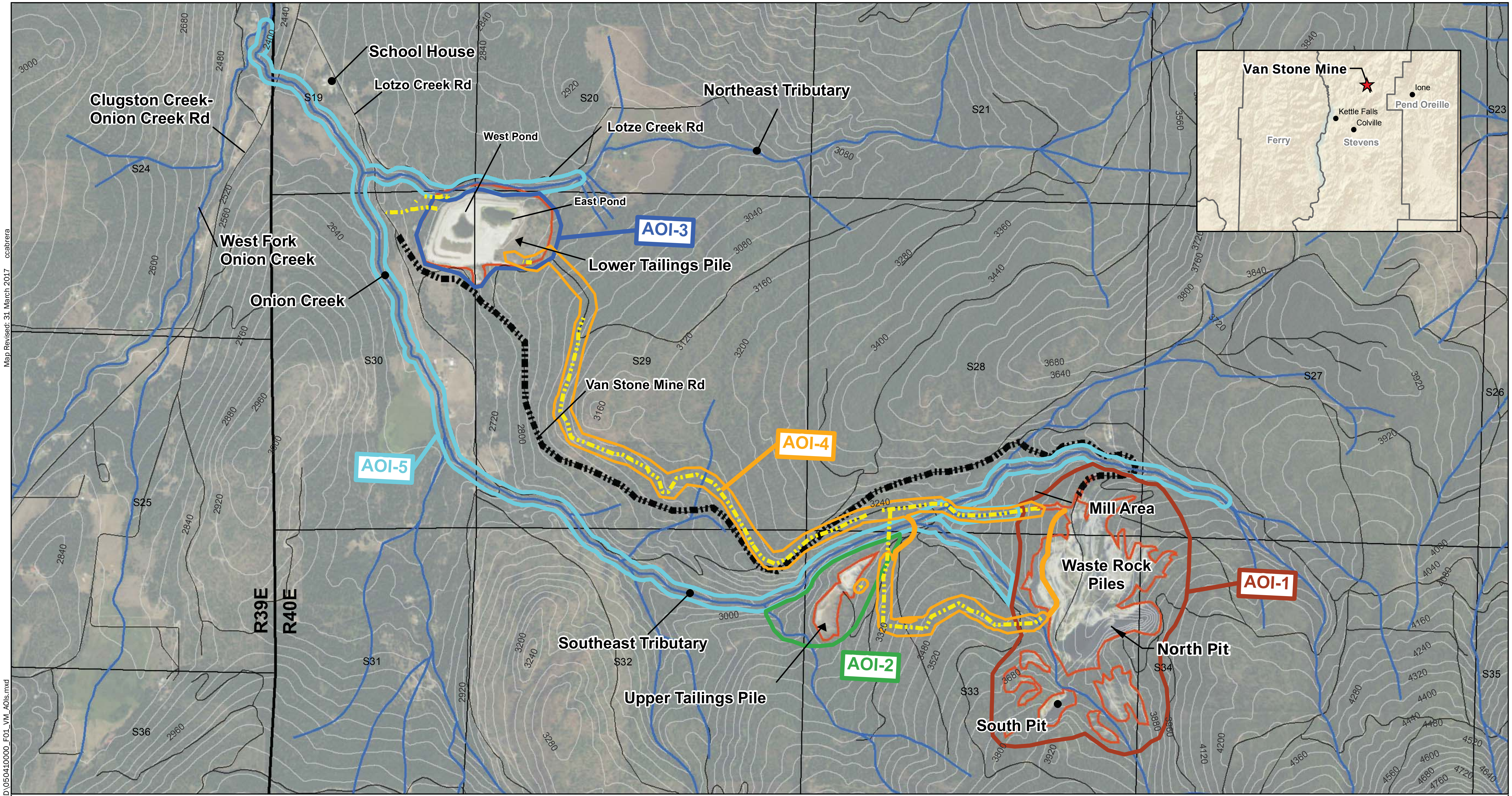
Notes:

Unit costs derived from either RS Means, estimates from local vendors, and experience. Estimated costs are considered to be within a margin of +/- 30 percent.

Refer to Table 1 for assumptions used to generate material quantities.

FIGURES

GeoEngineers



Data Source: Aerial and shaded relief background from ArcGIS Online.
Base data from HartCrowser, Job No. 17800-11 3/13.

Notes:
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Projection: NAD 1983 UTM Zone 11N

Vicinity Map and Area of Interest

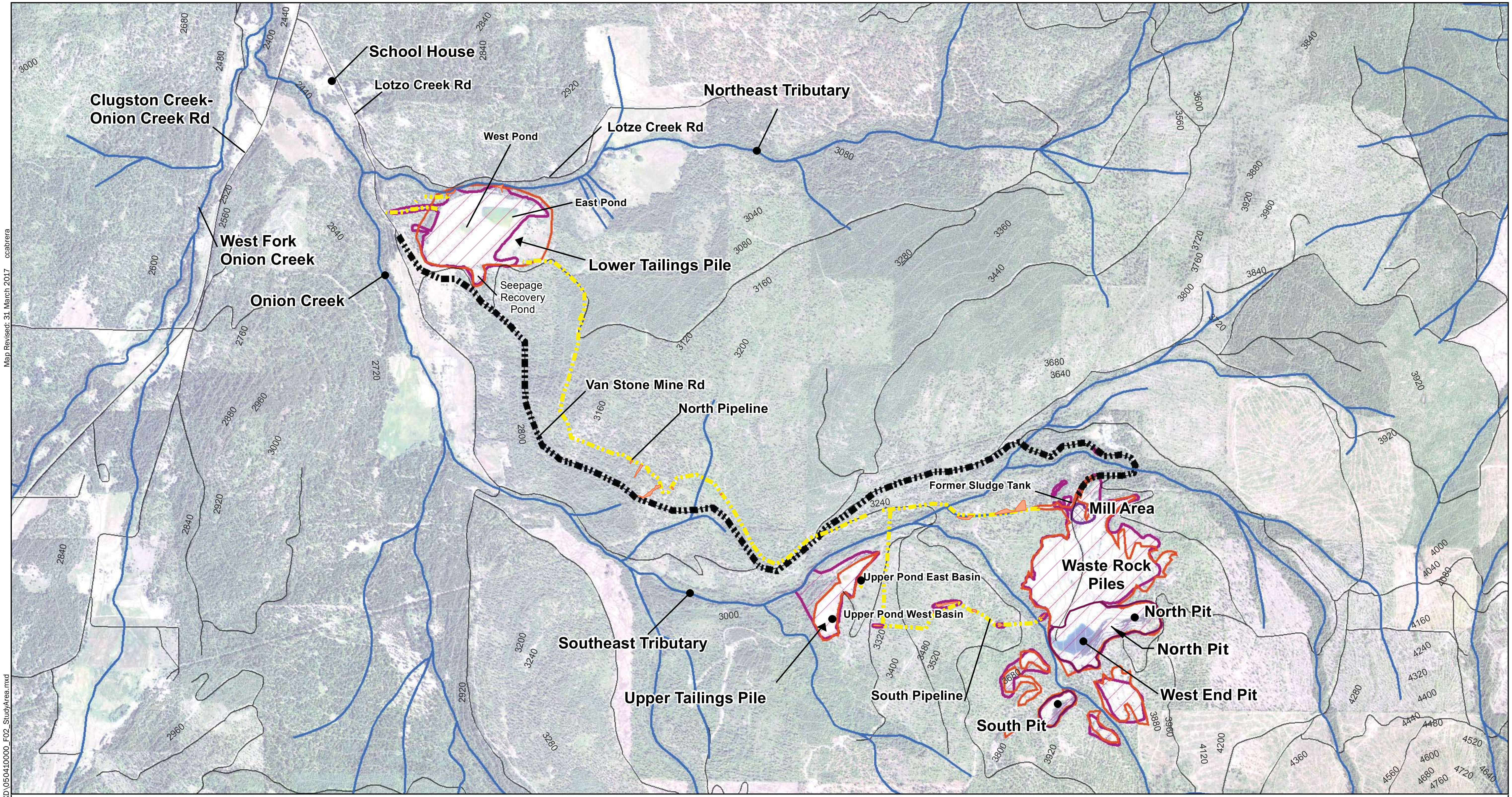
Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 1

Map Revised: 31 March 2017 ccabrera
Path: P:\0\0504100\GIS\MXD\050410000_F01_VM_AOIs.mxd
Office: SPO

Map Revised: 31 March 2017 ccabrera



Data Source: Aerial and shaded relief
background from ArcGIS Online.
Base data from HartCrowser,
Job No. 17800-11 3/13.

Notes:
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Projection: NAD 1983 UTM Zone 11N

Legend

- - -	Tailings Pipeline
▮▮▮▮	Van Stone Mine Road
—	Roads
~	Creeks
▭	Areas Disturbed by Mining Activities
🟧	Observed Surface Tailings Outside of Tailings Accumulation Area
▨	Lead TCLP Exceeds Dangerous Waste Threshold
▭	Metals Concentrations Exceed Clean-up Level

N
W E
S

1,500 0 1,500
Feet

Van Stone Mine Features

Van Stone Mine
Onion Creek, Washington

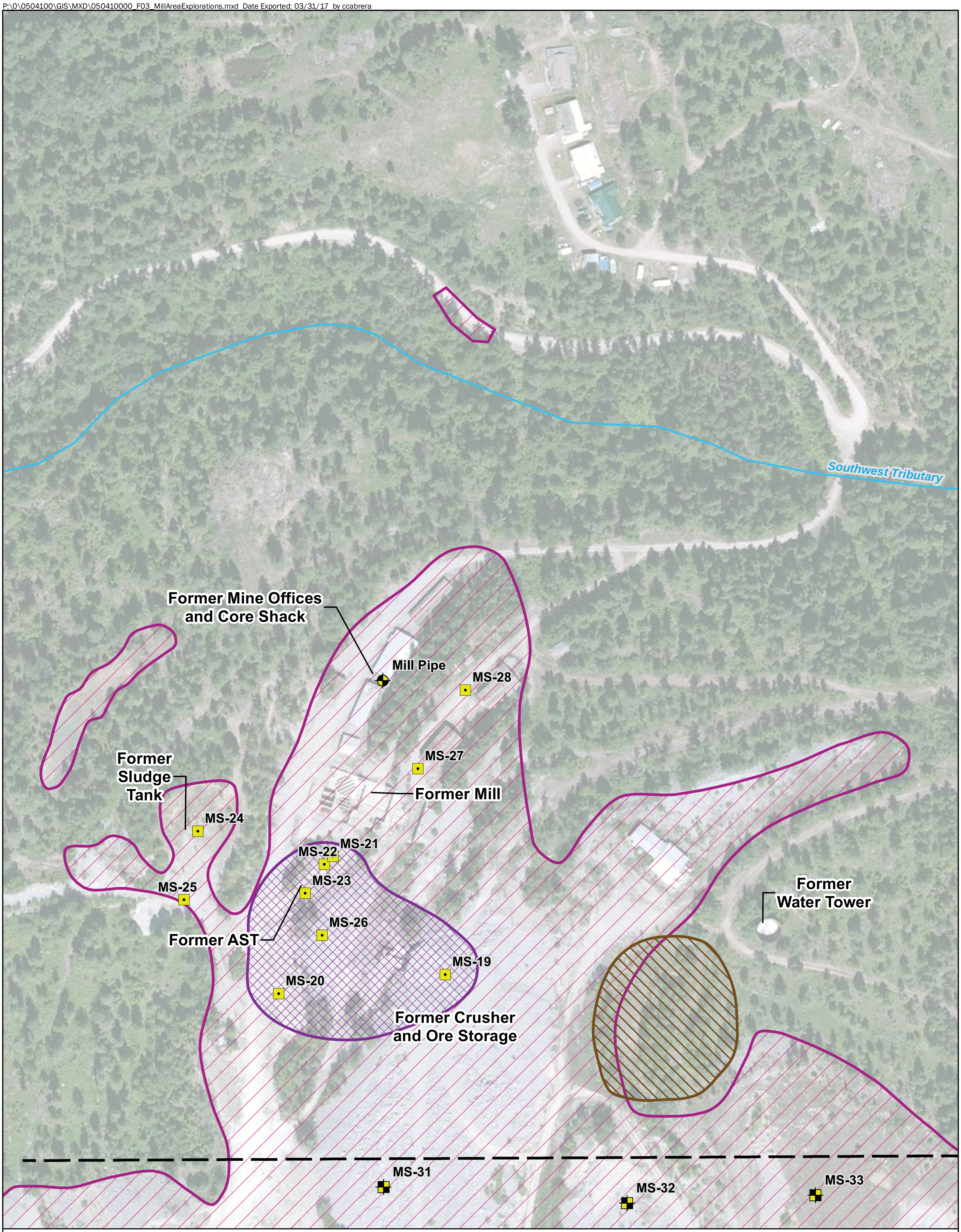
GEOENGINEERS

Figure 2

Path: P:\0\0504100\GIS\MXD\050410000_F02_StudyArea.mxd

Office: SPO

P:\0\0504100\GIS\MXD\050410000_F03_MillAreaExplorations.mxd Date Exported: 03/31/17 by ccabrera



Legend

▣	Near Surface Sample Number and Location (GeoEngineers, October 2015)	▨	Lead TCLP Exceeds Dangerous Waste Threshold
⊞	Test Pit Sample Number and Location (GeoEngineers, October 2015)	▨	Metals Concentrations Exceed Clean-up Level
⊕	Mill Pipe Sample Name and Location (GeoEngineers, 2016)	— —	Matchline with Figure 3
		▨	Historic Overburden Stockpile

N
W E
S

150 0 150
Feet

Data Source: Aerial from ArcGIS Online. Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCrowser, Job No. 17800-11 3/13.

Notes:
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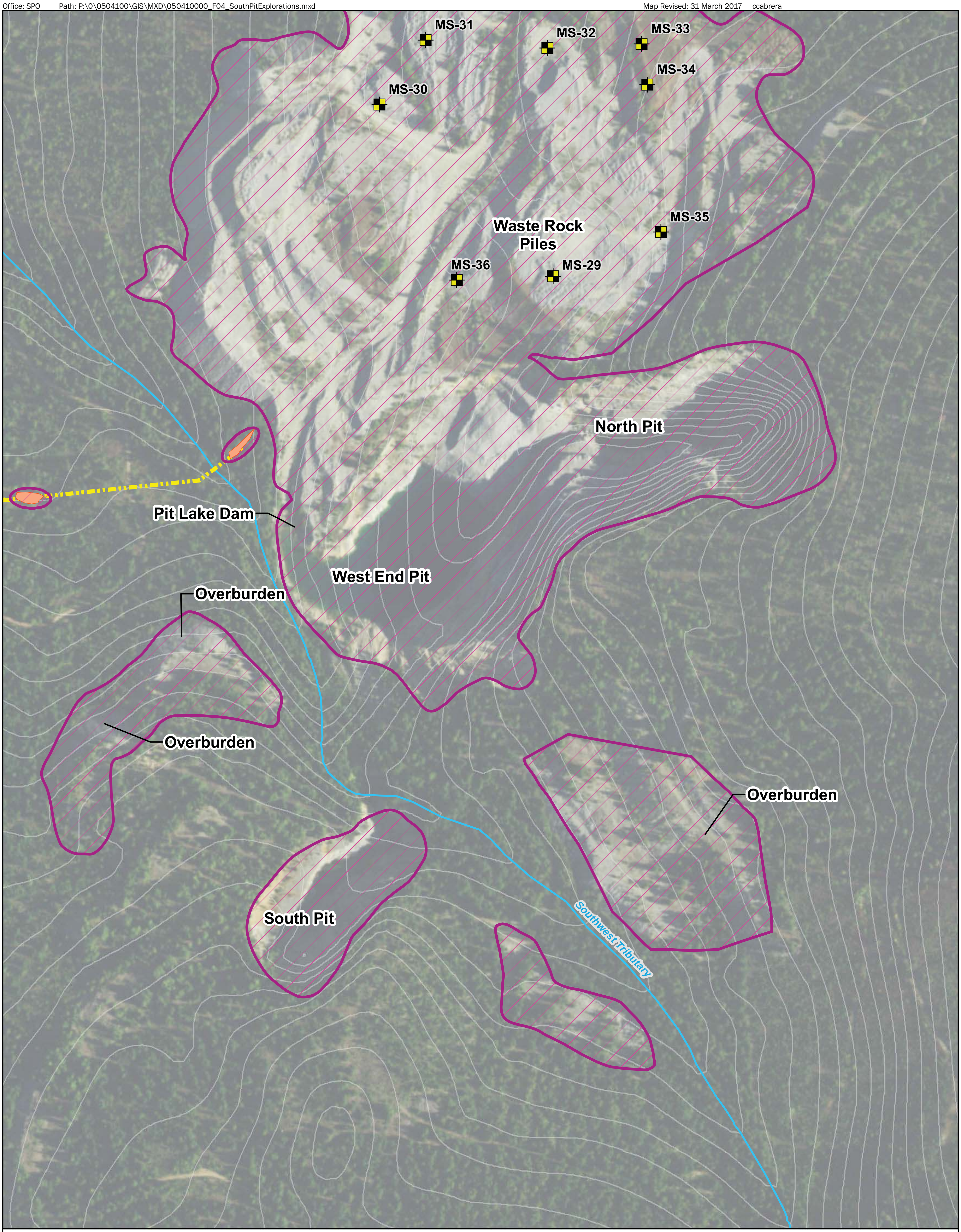
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

AOI-1 Explorations – Mill Area

Van Stone Mine
Onion Creek, Washington

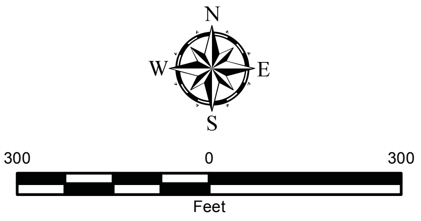
GEOENGINEERS

Figure 3



Legend

▣	GeoEngineersTest Pit Number and Location
▬ · ▬	Tailings Pipeline
●	Observed Surface Tailings Outside of Tailings Accumulation Area
▨	Metals Concentrations Exceed Clean-up Level



Notes:
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Data Source: Aerial from ArcGIS Online. Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCroswer, Job No. 17800-11 3/13.

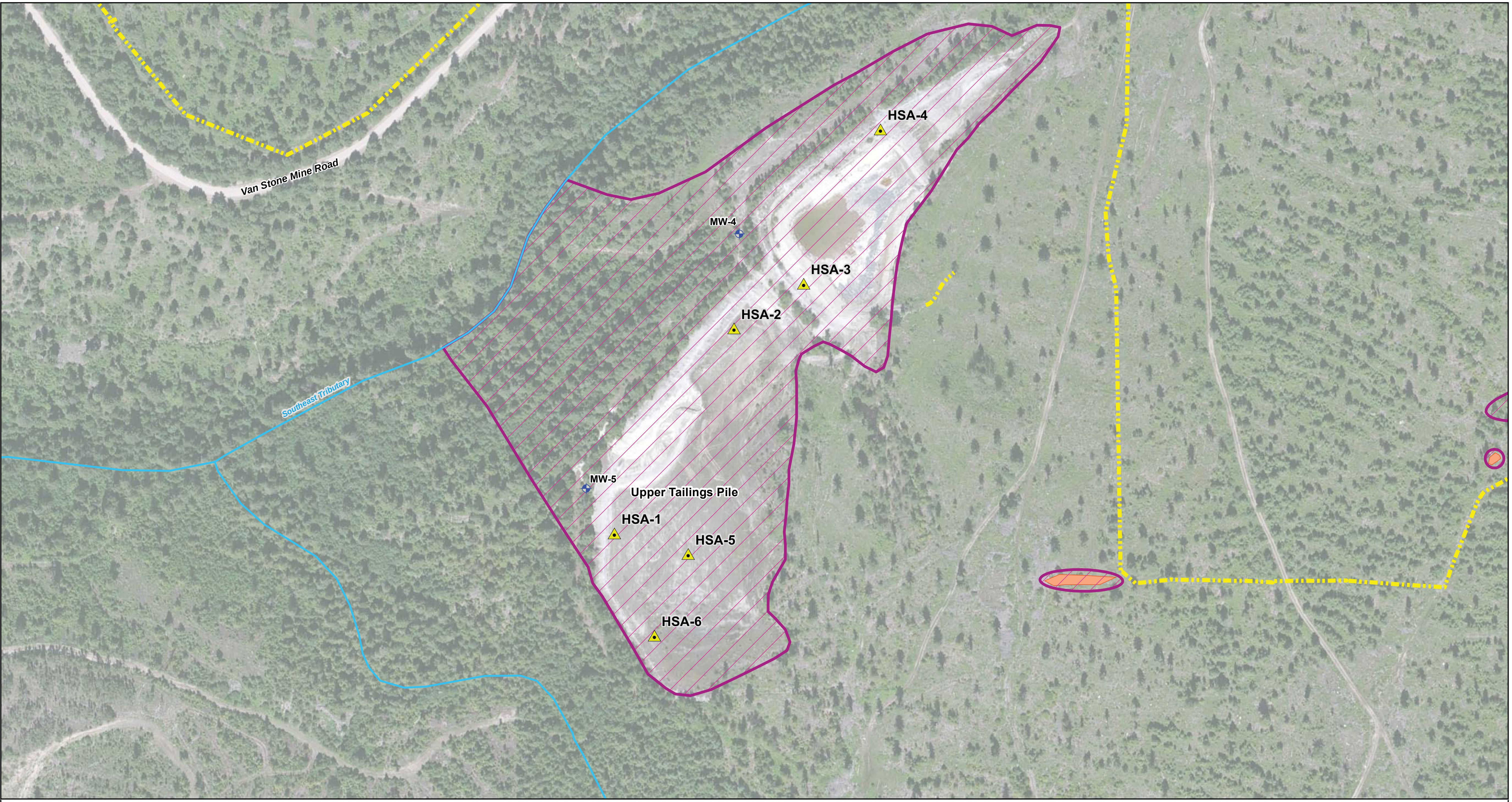
Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

**AOI-1 Explorations -
Waste Rock Piles and Mine Pits**

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 4



Notes:
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Data Source: Aerial from ArcGIS Online. Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCrowser, Job No. 17800-11 3/13.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

▲ GeoEngineers Hollow Stem Auger Number and Location

⊕ Monitoring Well

- · · - Tailings Pipeline

▨ Observed Surface Tailings Outside of Tailings Accumulation Area

▨ Metals Concentrations Exceed Cleanup Level

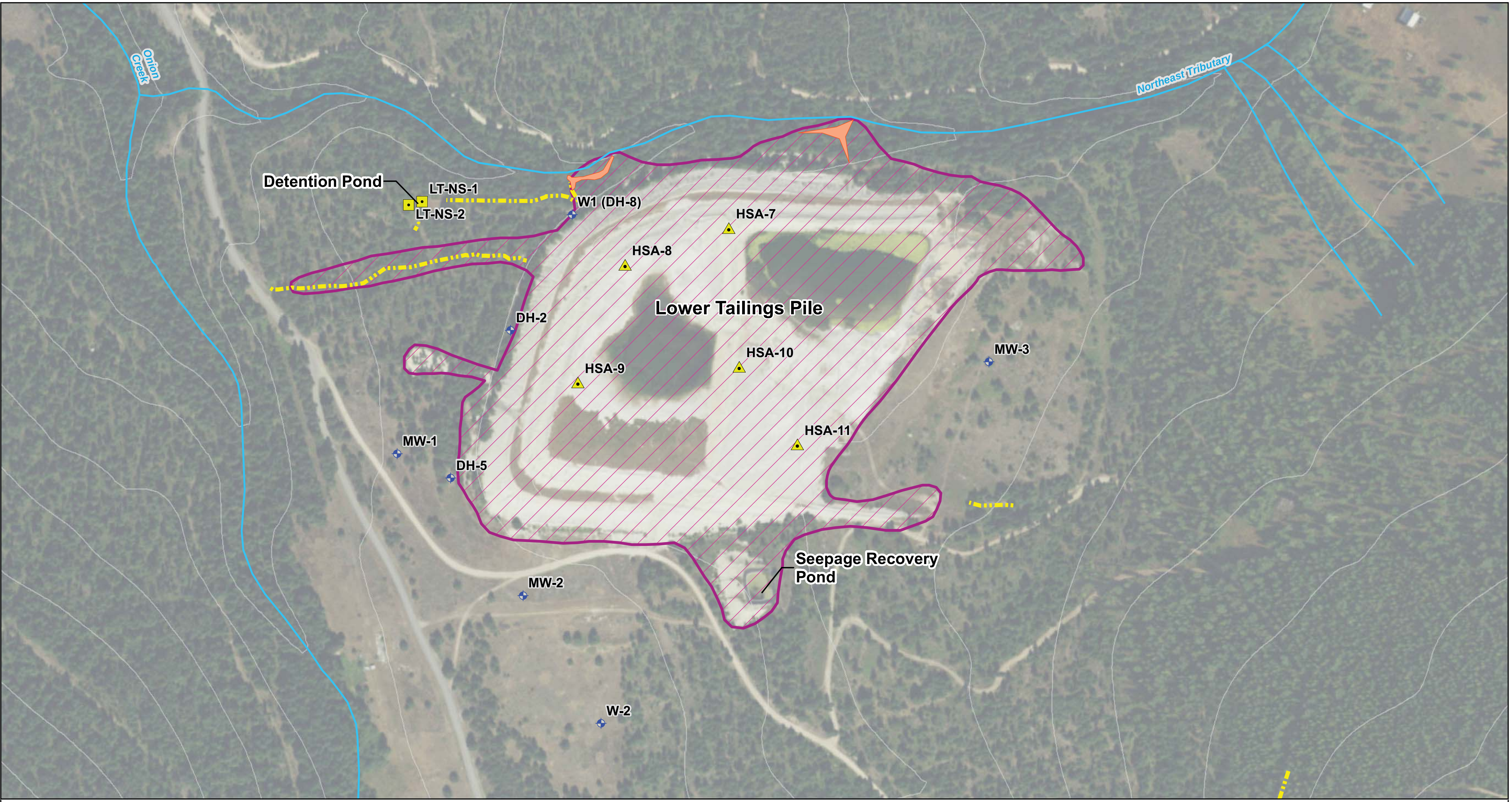
AOI-2 Explorations -
Upper Tailings Pile

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 5

P:\0\0504100\GIS\MXD\050410000_F5_UpperTailingsExplorations.mxd Date Exported: 03/29/17 by ccabrera



Notes:
1. The locations of all features shown are approximate.
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Data Source: Aerial from ArcGIS Online. Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCrowser, Job No. 17800-11 3/13.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

▲	GeoEngineers Hollow Stem Auger Number and Location	▬ ▪ ▬	Tailings Pipeline
■	GeoEngineers Near Surface Sample Number and Location	▨	Observed Surface Tailings Outside of Tailings Accumulation Area
⊕	Monitoring Well	▨	Metals Concentrations Exceed Clean-up Level

N
W E
S

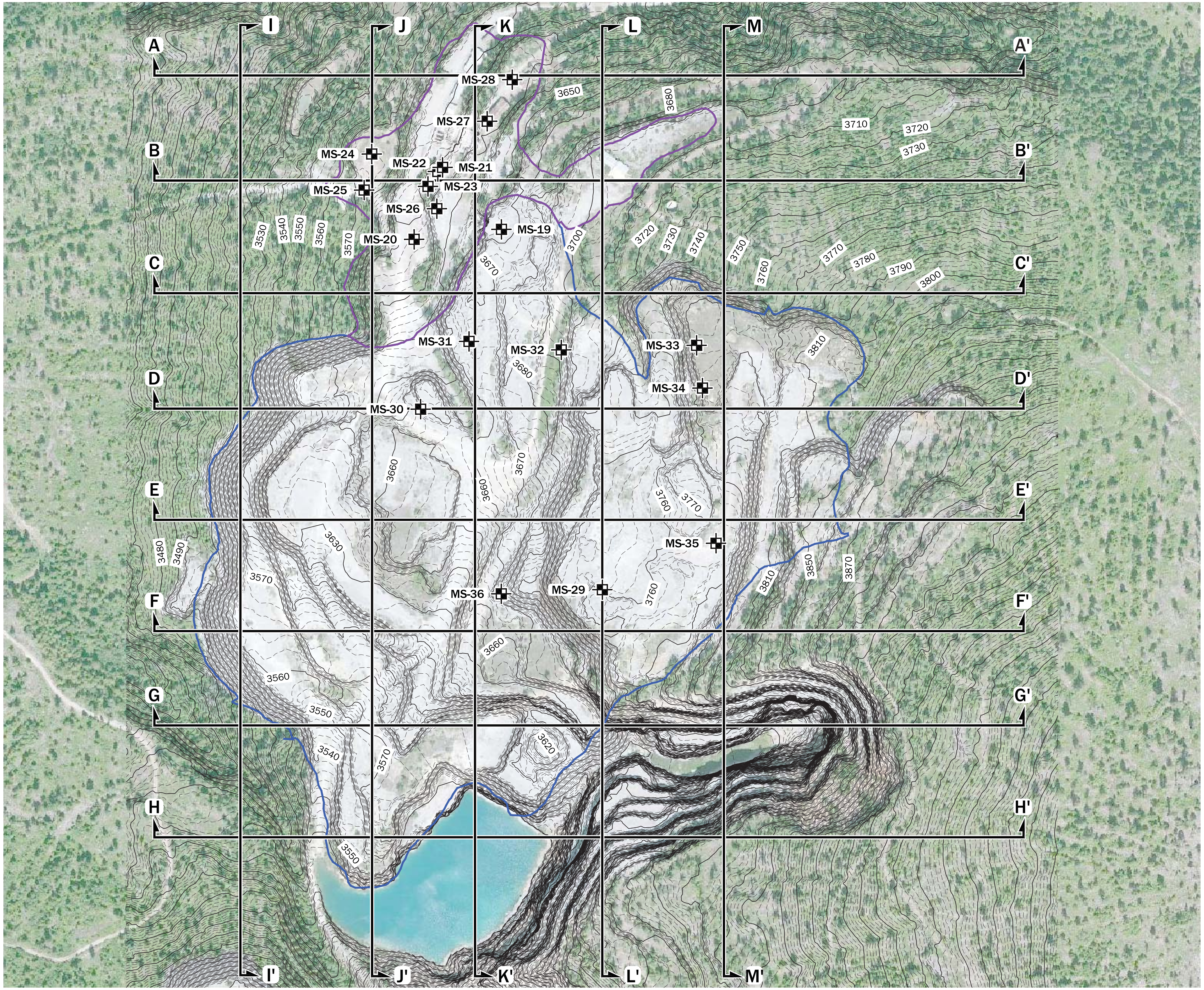
300 0 300
Feet

AOI-3 Explorations -
Lower Tailings Pile

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 6



Legend

Mill Area

Mine Area

MS-21 Test Pit by GeoEngineers

3770 Ground Contour - Major (10' Interval)

Ground Contour - Minor (2' Interval)

A A' Cross-Section Location

Volumes

Estimated Mine Area Volume = 3,787,615 cy

Estimated Mill Area Volume = 86,060 cy

N
W E
S

300 0 300
Feet

Notes:

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Projection: NAD83 WA State Planes, N Zone, US Foot

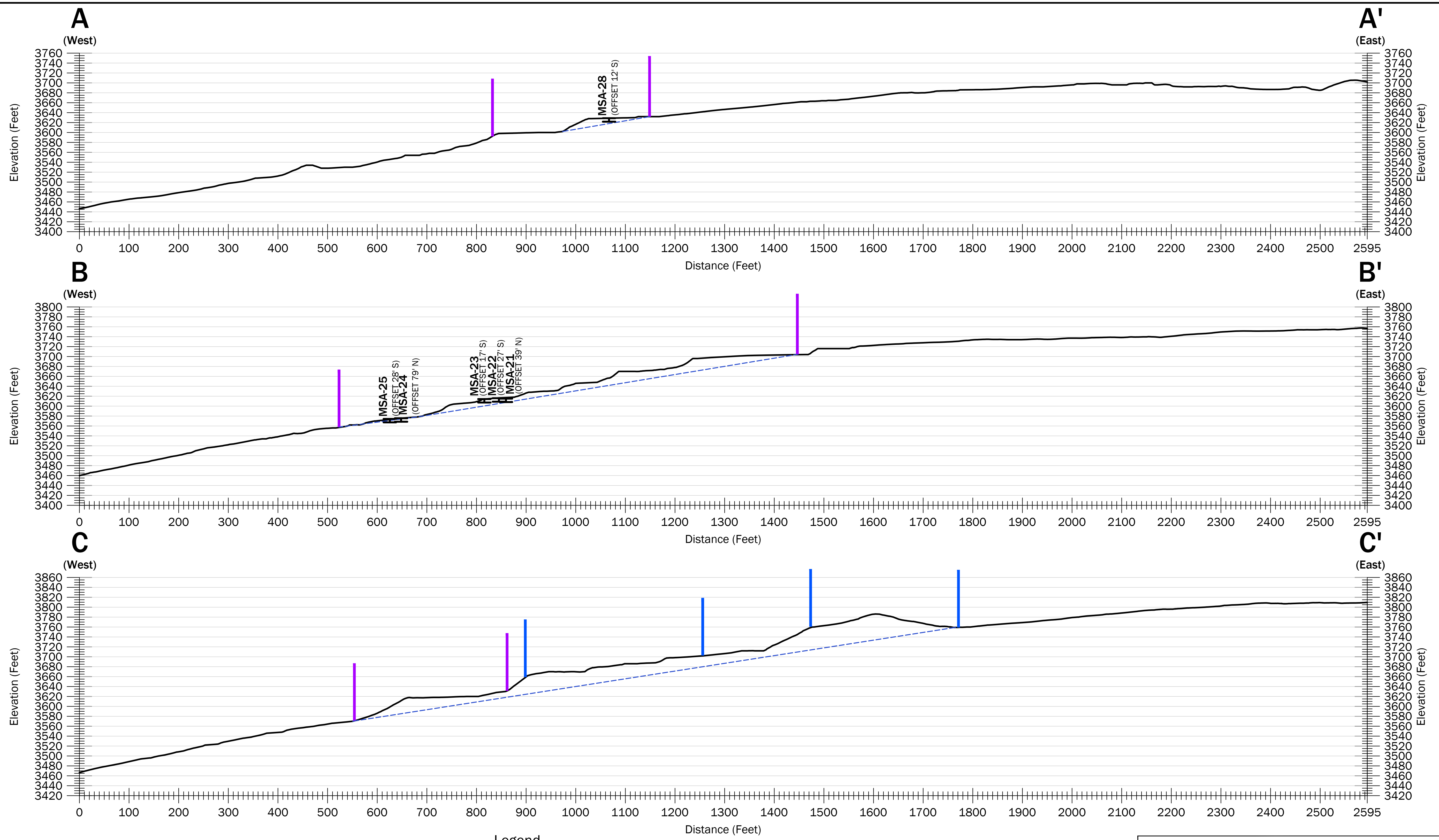
Approximate Volumes of Waste Rock in Mill and Mine Area

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 7

P:\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:Mill and Mine - PLAN Date Exported: 03/31/17 - 9:32 by tmichaud



Legend

Top of Tailings

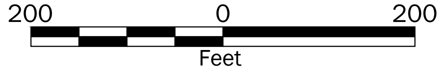
Estimated Bottom of Waste Rock

MSA-24 Test Pit

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD83 WA State Planes, N Zone, US Foot



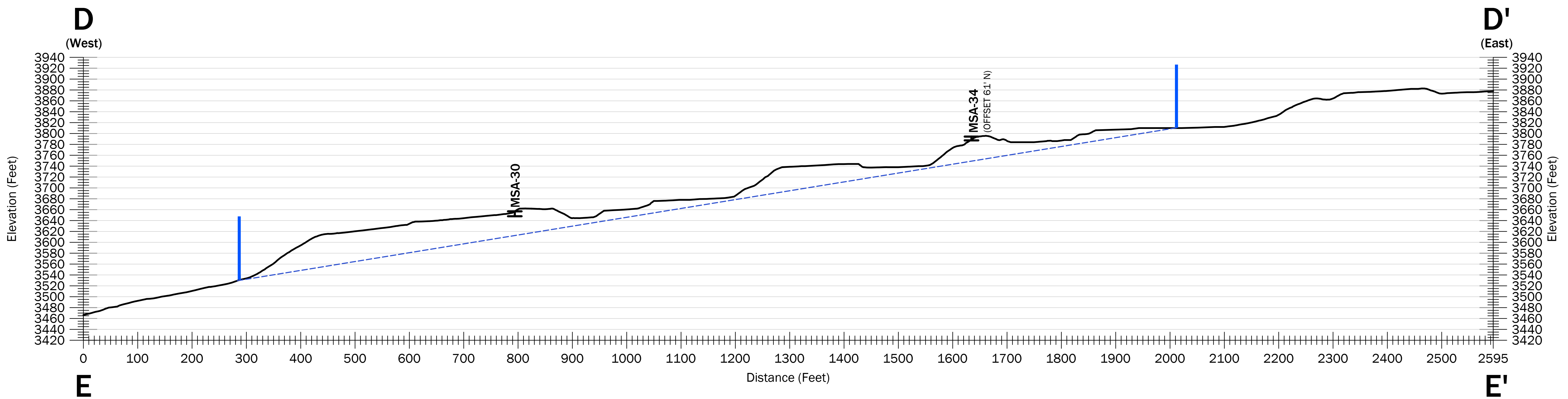
Cross-Sections of Mill and Mine Area, A-A', B-B', and C-C'

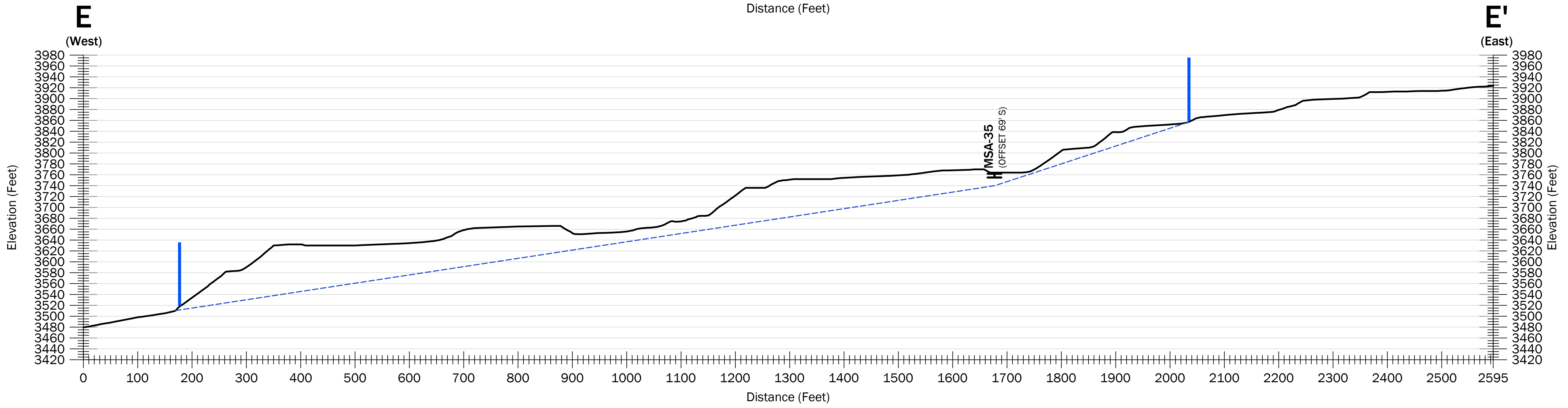
Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 8

P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:A-C Date Exported: 03/31/17 - 9:34 by tmichaud





Notes:
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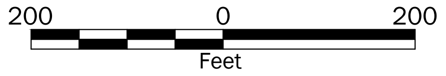
Projection: NAD83 WA State Planes, N Zone, US Foot

Legend

——— Top of Tailings

- - - - Estimated Bottom of Waste Rock

Test Pit



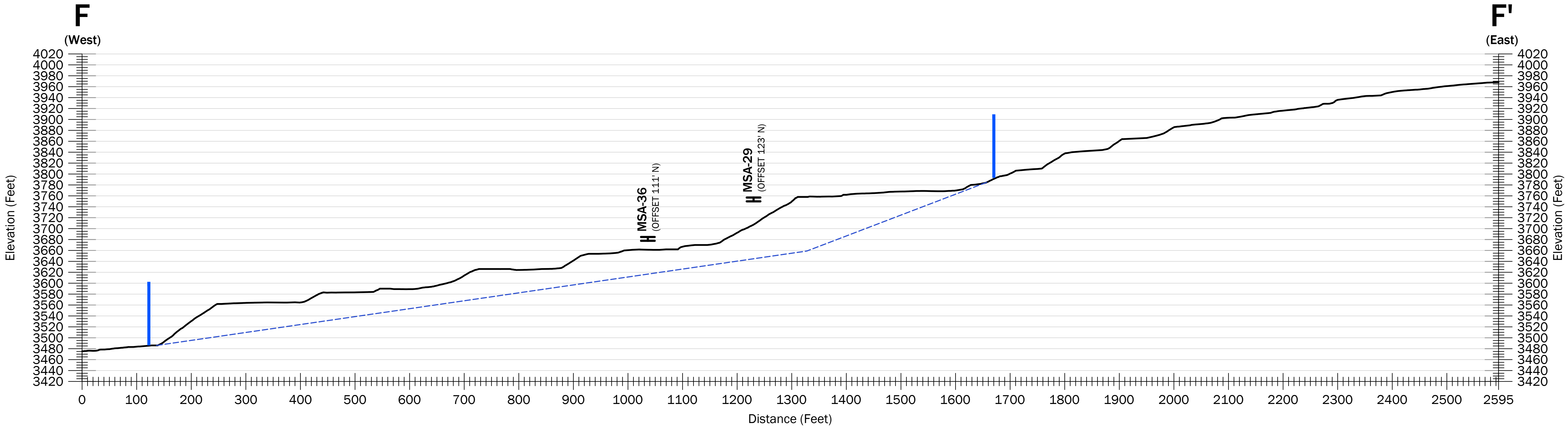
Cross-Sections of Mill and Mine Area, D-D', and E-E'

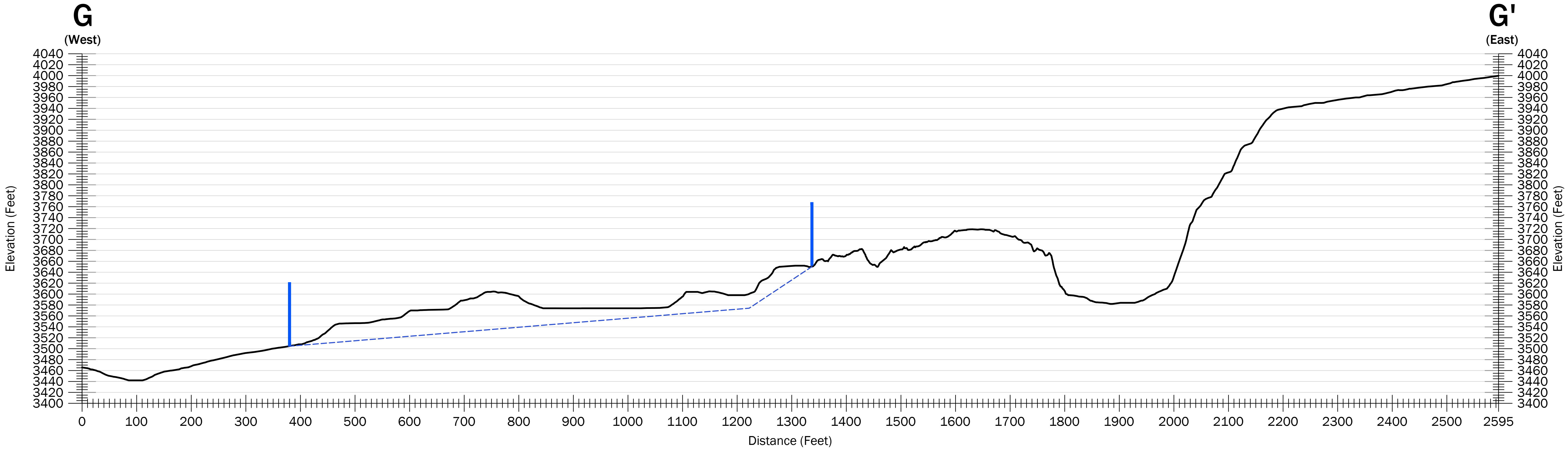
Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 9

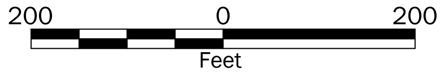
P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:D-E Date Exported: 03/31/17 - 9:35 by tmichaud





Legend

———	Top of Tailings
- - - -	Estimated Bottom of Waste Rock
MSA-24	Test Pit



Notes:

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Projection: NAD83 WA State Planes, N Zone, US Foot

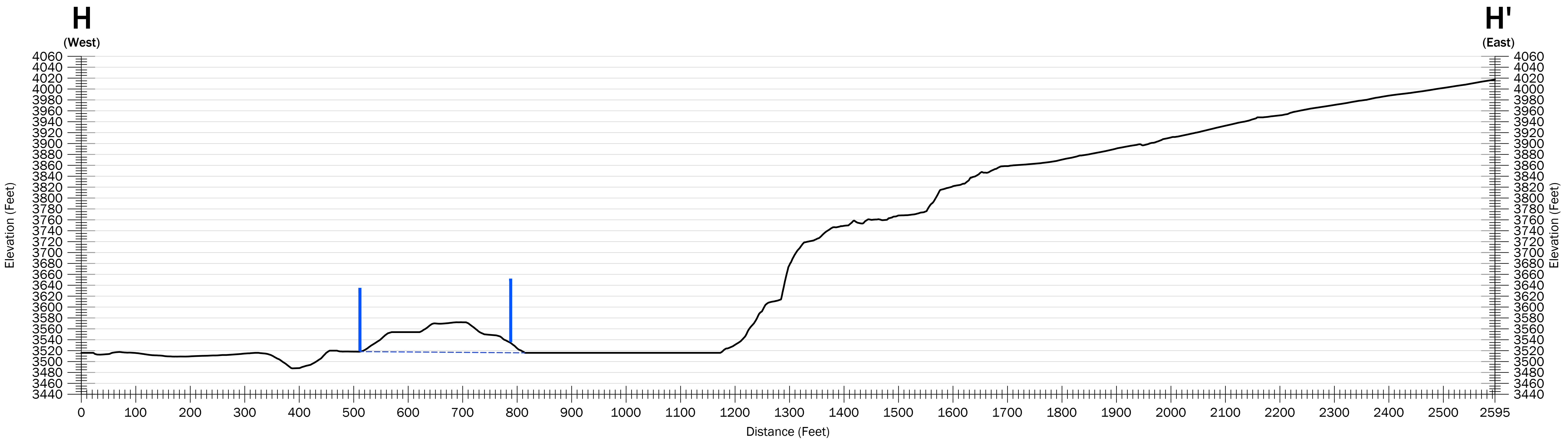
P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:F-G Date Exported: 03/31/17 - 9:37 by tmichaud

**Cross-Sections of Mill and Mine Area,
F-F', and G-G'**

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 10



Legend

—— Top of Tailings

- - - Estimated Bottom of Waste Rock

MSA-24 Test Pit

200 0 200
Feet

Notes:

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Projection: NAD83 WA State Planes, N Zone, US Foot

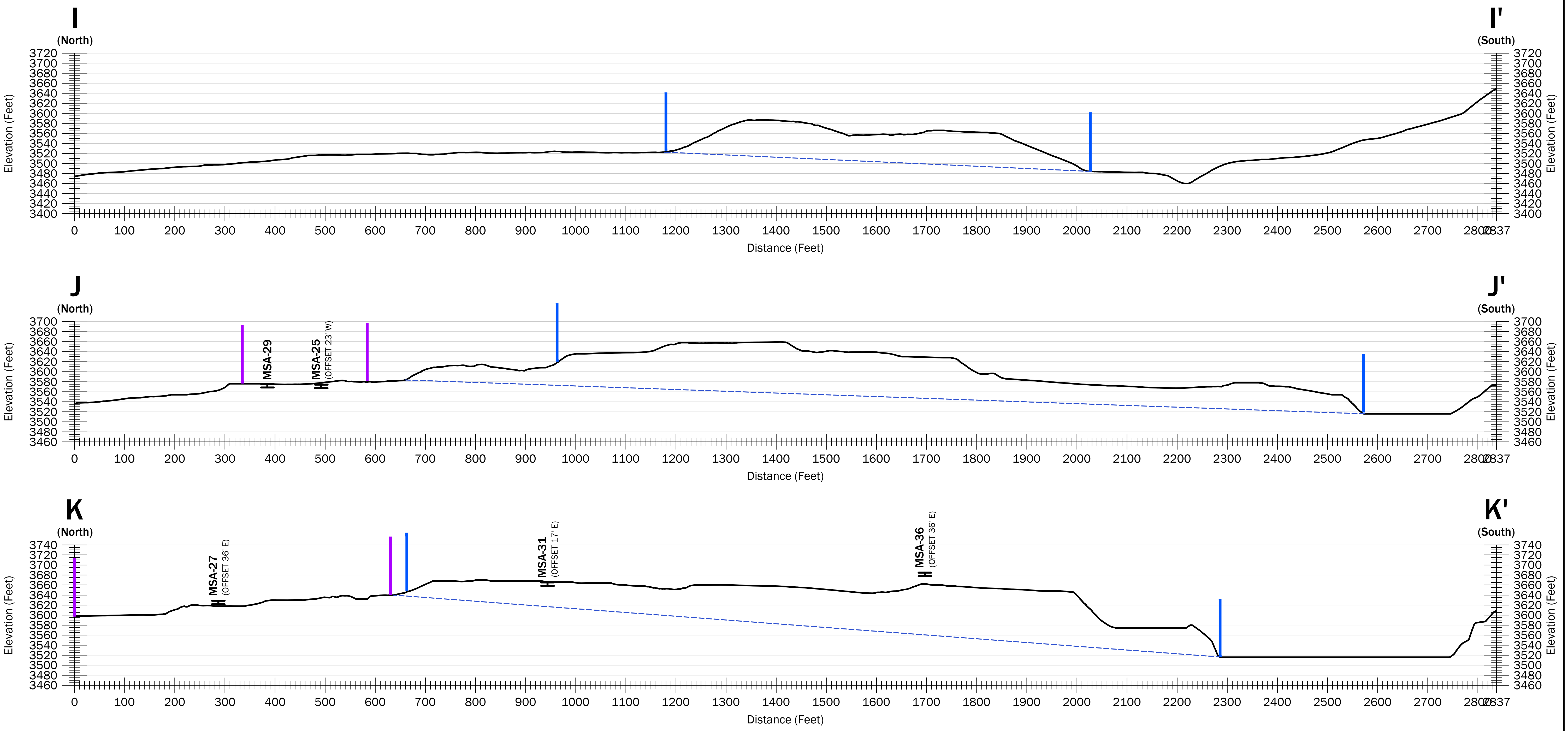
P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:H Date Exported: 03/31/17 - 9:38 by tmichaud

**Cross-Sections of Mill and Mine Area,
H-H'**

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 11



Legend

Top of Tailings

Estimated Bottom of Waste Rock

MSA-24 Test Pit

200 0 200
Feet

Notes:
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Projection: NAD83 WA State Planes, N Zone, US Foot

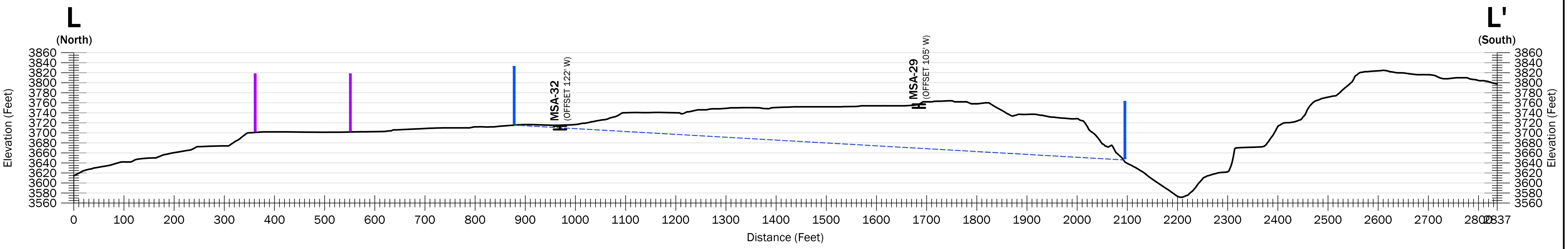
Cross-Sections of Mill and Mine Area,
I-I', J-J', and K-K'

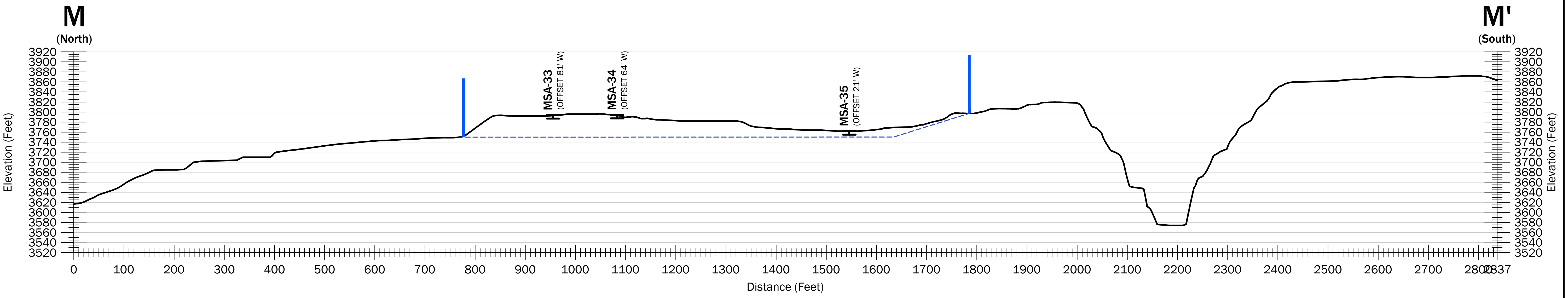
Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 12

P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:I-L Date Exported: 03/31/17 - 9:39 by tmichaud





Legend

Top of Tailings

Estimated Bottom of Waste Rock

MSA-24 Test Pit

Notes:
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Projection: NAD83 WA State Planes, N Zone, US Foot

200 0 200
Feet

Cross-Sections of Mill and Mine Area, L-L', and M-M'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 13

P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Mine and Mill Grading and Volumes.dwg TAB:M Date Exported: 03/31/17 - 9:41 by tmichaud

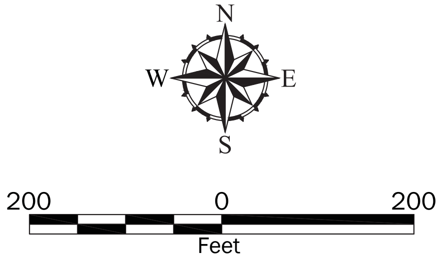
P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Upper Tailings Pond Grading and Volumes.dwg TAB:Tailings Pond - PLAN Date Exported: 03/31/17 - 9:43 by tmichaud

Legend

HSA-2 ⊕	Hollow Stem Auger by GeoEngineers
UT-CPT-4 △	Cone Penetrometer Test by GeoEngineers
——3220——	Ground Contour - Major (10' Interval)
- - - - - -	Ground Contour - Minor (2' Interval)
A A'	Cross-Section Location

Volumes

Approximate Tailings Pile Volume = 195,733 cubic yards



Notes:

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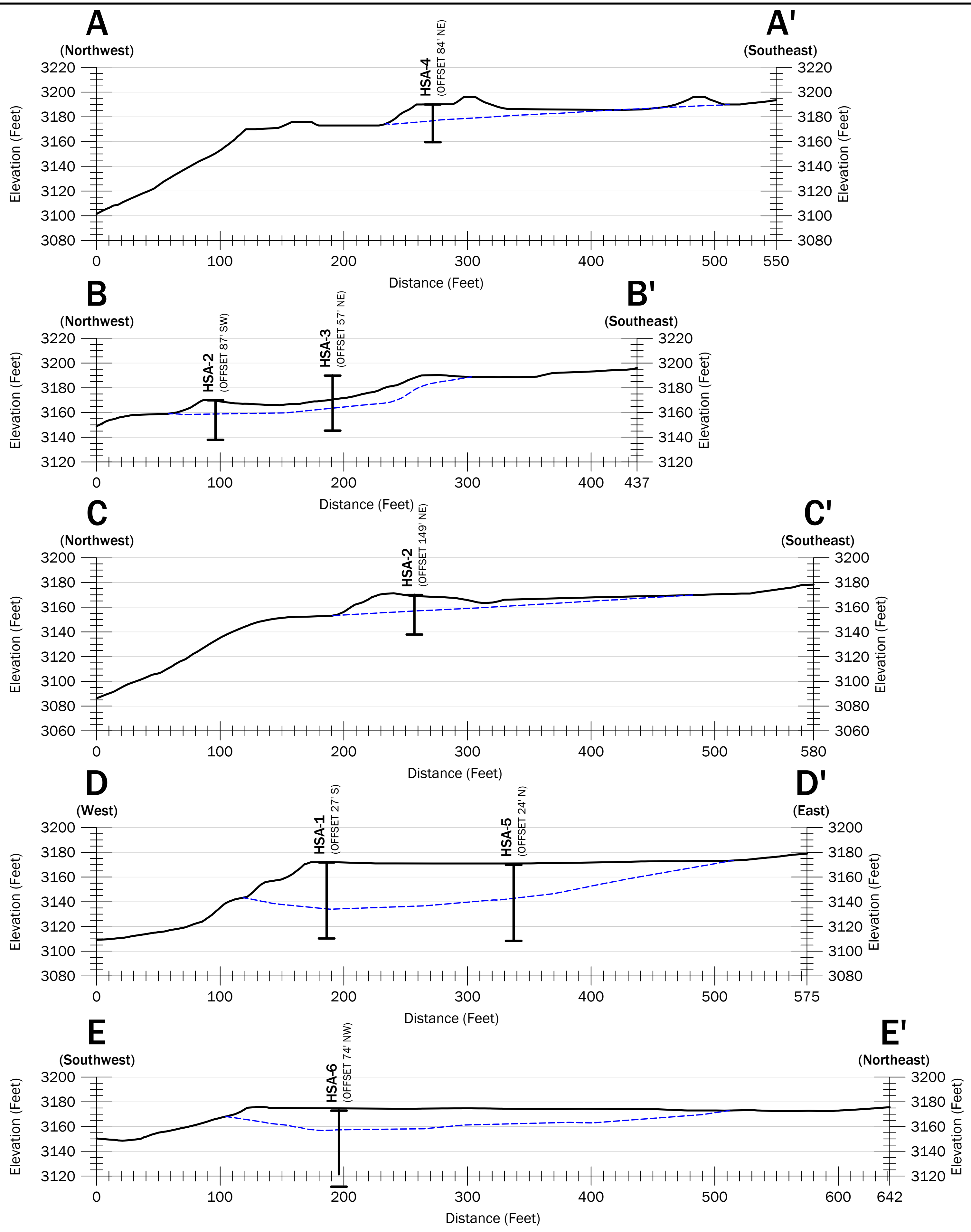
Projection: NAD83 WA State Planes, N Zone, US Foot

Approximate Volumes of Tailings in the Upper Tailings Pile

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 14

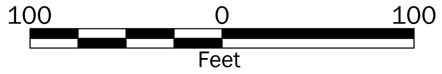


Legend

Top of Tailings

Estimated Bottom of Tailings Pile

HSA-10 Boring



Notes:
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Projection: NAD83 WA State Planes, N Zone, US Foot

Approximate Volumes of Tailings in the Upper Tailings Pile - Sections, A-A' through E-E'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure15

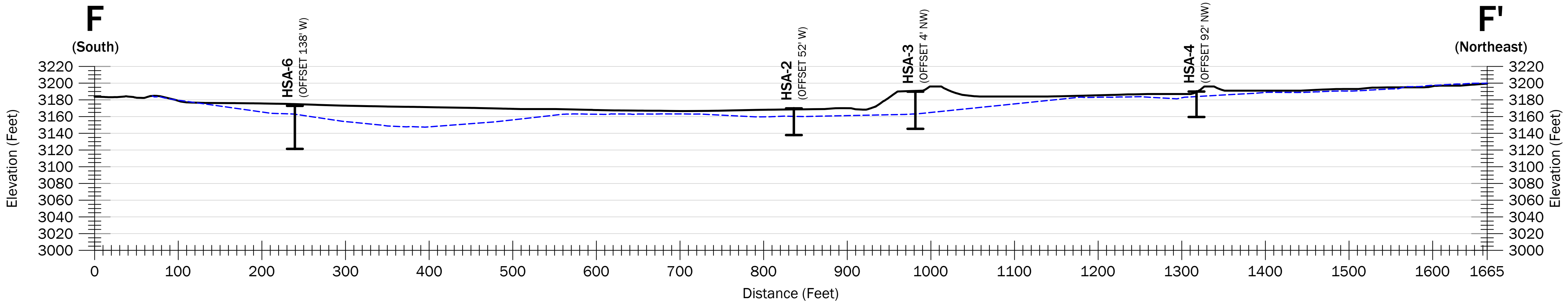
P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Upper Tailings Pond Grading and Volumes.dwg TAB:Tailings Pond Volume - SECTIONS Date Exported: 03/31/17 - 9:44 by tmichaud

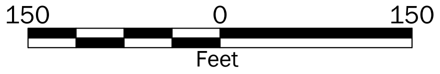
Legend

— Top of Tailings

- - - Estimated Bottom of Tailings Pile

HSA-10 Boring





Notes:

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Projection: NAD83 WA State Planes, N Zone, US Foot

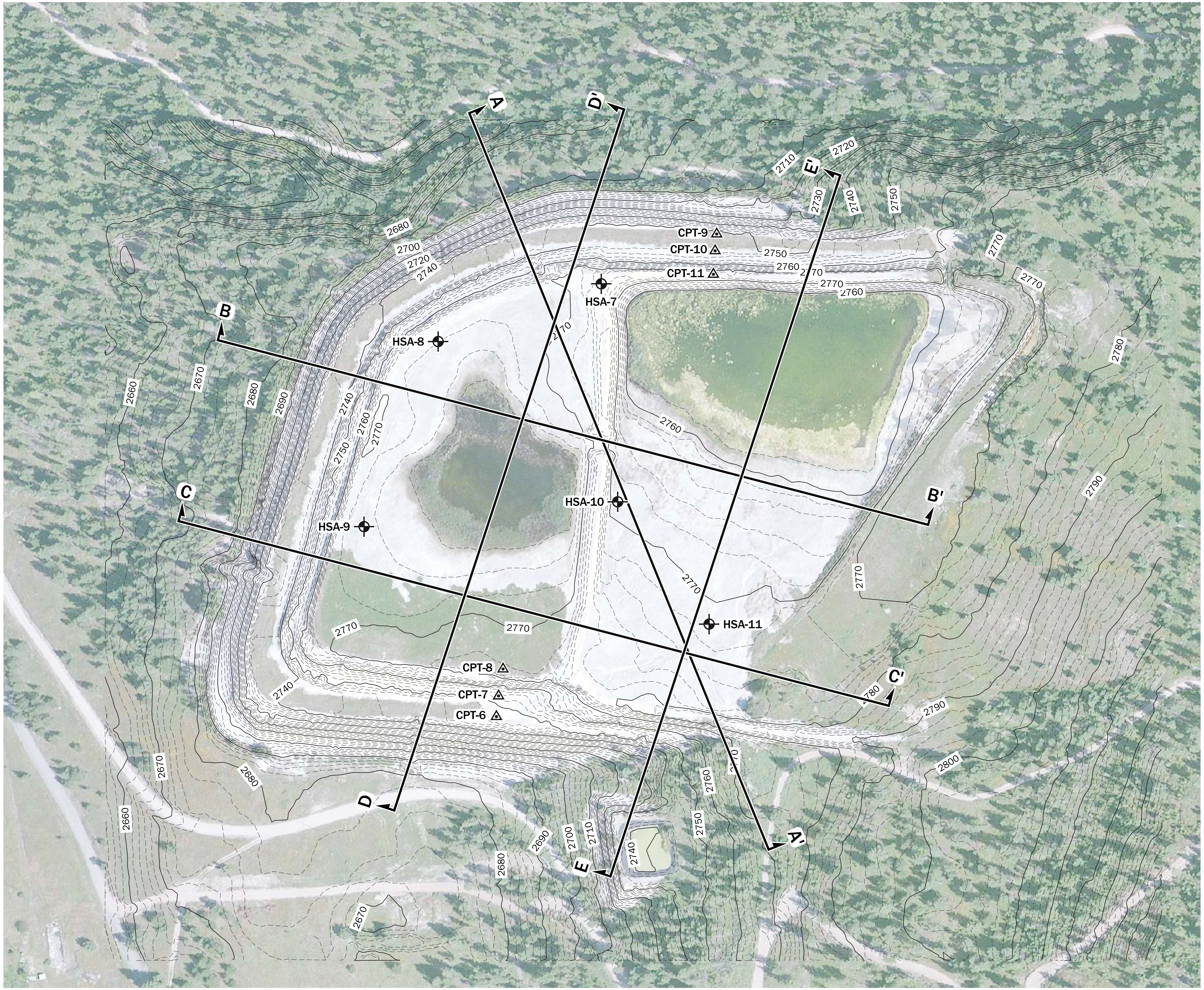
Approximate Volumes of Upper Tailings Pile - Section F-F'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 16

P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Upper Tailings Pond Grading and Volumes.dwg TAB:Tailings Pond Volume - SECTIONS (2) Date Exported: 03/31/17 - 9:45 by tmichaud



Legend

HSA-9 ⌖	Hollow Stem Auger by GeoEngineers
CPT-9 △	Cone Penetrometer Test by GeoEngineers
——2770——	Ground Contour - Major (10' Interval)
- - - - - -	Ground Contour - Minor (2' Interval)
A ⌐ ¬ A'	Cross-Section Location

Volumes

Approximate Tailings Pond Volume = 2,299,437 cubic yards

N
W E
S

200 0 200
Feet

Notes:

1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.

Projection: NAD83 WA State Planes, N Zone, US Foot

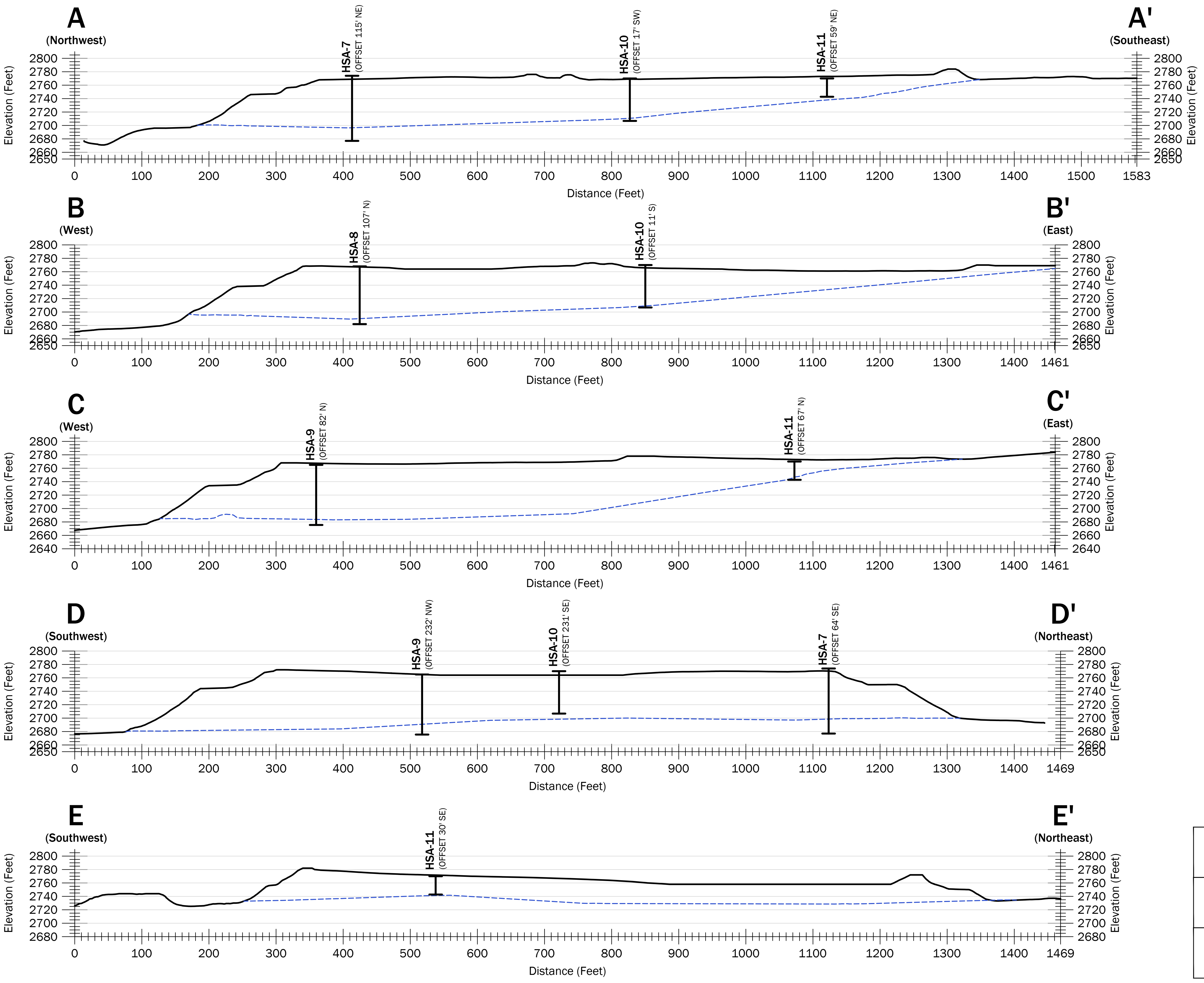
Approximate Volumes of Tailings in the Lower Tailings Pile

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure 17

P:\0\0504100\CAD\01\Engineering Cost Analysis\050410001_Lower Tailings Pond Grading and Volumes.dwg TAB:Tailings Pond Volume - PLAN Date Exported: 03/31/17 - 9:48 by tmichaud

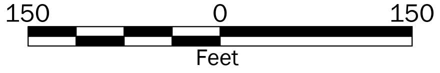


Legend

— Top of Tailings

- - - Estimated Bottom of Tailings Pile

HSA-10 Boring



Notes:
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Projection: NAD83 WA State Planes, N Zone, US Foot

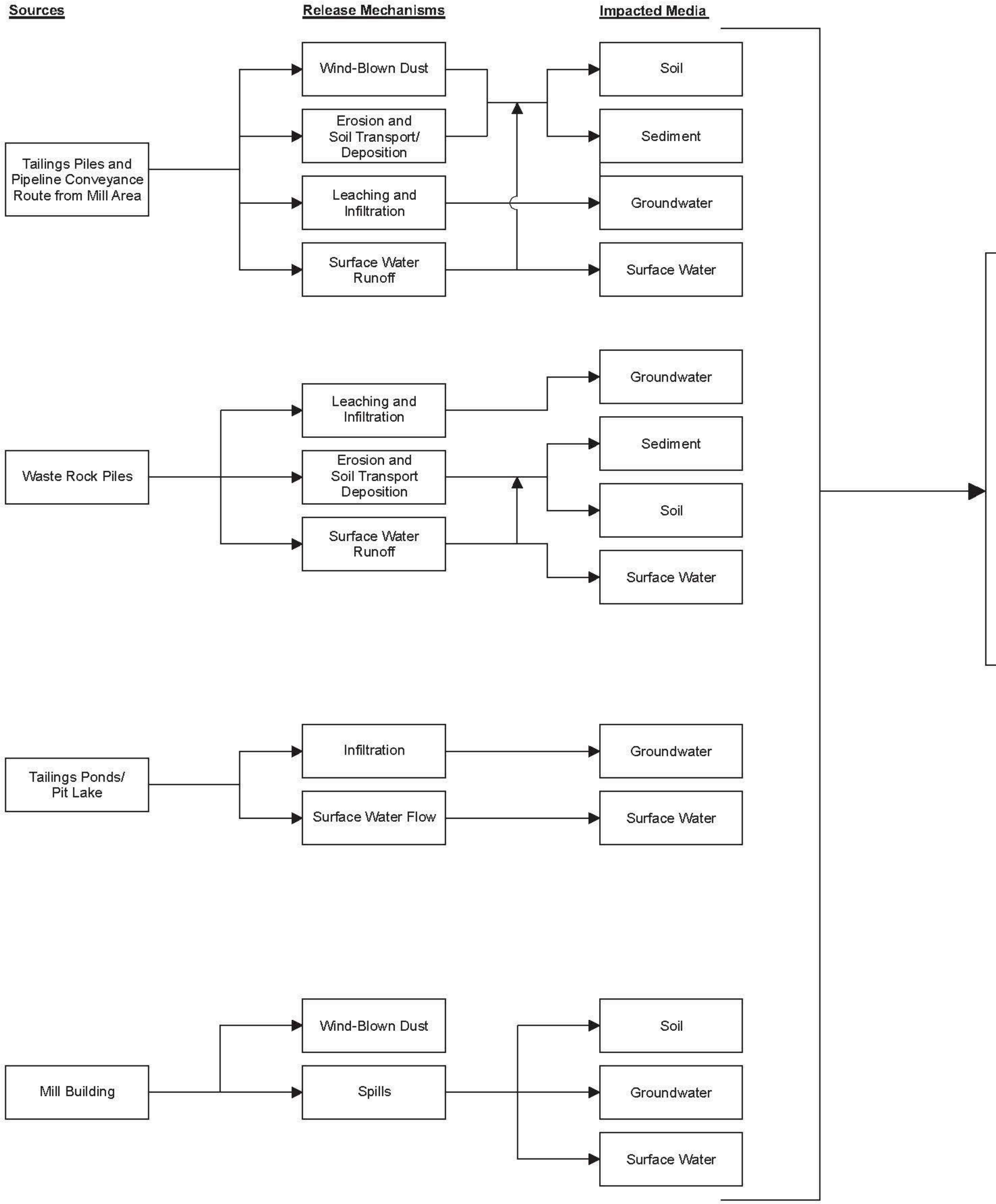
Approximate Volumes of Tailings in the Lower Tailings Pile - Sections A-A' through E-E'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 18

P:\0504100\CAD\01\Engineering Cost Analysis\050410001_Lower Tailings Pond Grading and Volumes.dwg TAB:Tailings Pond Volume - SECTIONS Date Exported: 03/31/17 - 9:48 by tmichaud



Impacted Media	Exposure Route	Unrestricted Adult and Child Resident	Unrestricted Quantified Pathways	Tresspasser	Terrestrial Plant, Soil Biota	Aquatic Biota	Terrestrial Wildlife
Air	Inhalation				◐	◐	●
	Dermal Contact						
	Ingestion						
Soil[1]	Inhalation	●		●			
	Dermal Contact	◐		◐	●	◐	◐
	Ingestion	●	○	●	●	◐	◐
Groundwater	Inhalation	◐		◐			
	Dermal Contact	◐		◐			
	Ingestion	●	○	◐	◐	◐	◐
Surface Water	Inhalation	◐		◐			
	Dermal Contact	◐		◐	◐	●	●
	Ingestion	●	○	●	◐	●	●
Sediment	Inhalation	◐		◐			
	Dermal Contact	◐		◐	◐	●	●
	Ingestion	●	○	●	◐	◐	●
Biota[2]	Inhalation						
	Dermal Contact						
	Ingestion	●		●	●	●	

Legend

●	Complete Pathway
◐	Incomplete Pathway
○	Exposure Pathway and Medium Quantified in the HHRA

[1] Note that Stain Soils is included under soil. Stained Soil have limited aerial extent but represent a complete pathway for ingestion and dermal contact under Terrestrial Plants and Soil Biota.

[2] Biota (e.g., homegrown vegetables, insects, fish, plants) may be considered a secondary source that accumulate constituents of concern from impacted soil, sediment, surface water, and groundwater and may be consumed by humans or ecological receptors. Independent of being a secondary source, terrestrial and aquatic biota are also receptors. Fish ingestion biota are the only medium and route quantified in the HHRA, based on the highest use of a surface water body, determined in accordance with WAL 173-201A (Ecology 2003).

Data Source: Van Stone Mine Remedial Investigation, Hart Crowser, November, 2013.

Conceptual Site Model

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure 19

APPENDIX A

Laboratory Chemical Analysis Results

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

March 11, 2015

John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

RE: Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Dear John Haney:

Enclosed are the analytical results for sample(s) received by the laboratory on December 17, 2014. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenni Gross

Jennifer Gross
jennifer.gross@pacelabs.com
Project Manager

Enclosures

cc: Chelsea Voss, GeoEngineers

CERTIFICATIONS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

Montana Certification IDs

150 N. 9th Street, Billings, MT 59101
Colorado Asbestos #: 17119
A2LA Certification #: 3590.01
EPA Region 8 Certification #: 8TMS-L
Idaho Certification #: MT00012
Minnesota Dept of Health Certification #: 030-999-442
Montana Certification #: MT CERT0040
North Dakota Dept. Of Health #: R-209
NVLAP Certification #: 101292-0
Washington Department of Ecology #: C993

SAMPLE SUMMARY

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10292097001	**HSA-7 (10-11.5)**	Solid	12/08/14 09:35	12/17/14 10:15
10292097002	**HSA-7 (25-26.5)**	Solid	12/08/14 10:00	12/17/14 10:15
10292097003	**HSA-7 (35-36.5)**	Solid	12/08/14 10:20	12/17/14 10:15
10292097004	**HSA-7 (45-46.5)**	Solid	12/08/14 10:50	12/17/14 10:15
10292097005	**HSA-7 (60-61.5)**	Solid	12/08/14 12:00	12/17/14 10:15
10292097006	**HSA-7 (70-71.5)**	Solid	12/08/14 13:00	12/17/14 10:15
10292097007	**HSA-7 (76.1-76.5)**	Solid	12/08/14 13:15	12/17/14 10:15
10292097008	**HSA-7 (76.5-78)**	Solid	12/08/14 13:20	12/17/14 10:15
10292097009	**HSA-7 (83-84.5)**	Solid	12/08/14 14:00	12/17/14 10:15
10292097010	**HSA-7 (85-86.5)**	Solid	12/08/14 14:40	12/17/14 10:15
10292097011	**HSA-7 (91.5-93)**	Solid	12/08/14 15:20	12/17/14 10:15
10292097012	**HSA-7 (95-96.5)**	Solid	12/08/14 16:00	12/17/14 10:15
10292097013	**HSA-8 (10-11.5)**	Solid	12/09/14 09:10	12/17/14 10:15
10292097014	**HSA-8 (20-21.5)**	Solid	12/08/14 09:35	12/17/14 10:15
10292097015	**HSA-8 (30-31.5)**	Solid	12/09/14 09:50	12/17/14 10:15
10292097016	**HSA-8 (40-41.5)**	Solid	12/08/14 10:15	12/17/14 10:15
10292097017	**HSA-8 (50-51.5)**	Solid	12/09/14 10:40	12/17/14 10:15
10292097018	**HSA-8 (60-61.5)**	Solid	12/09/14 11:15	12/17/14 10:15
10292097019	**HSA-8 (70-71.5)**	Solid	12/08/14 11:45	12/17/14 10:15
10292097020	**HSA-8 (76.4-76.5)**	Solid	12/08/14 12:15	12/17/14 10:15
10292097021	**HSA-8 (80-81.5)**	Solid	12/09/14 12:30	12/17/14 10:15
10292097022	**HSA-8 (85-86)**	Solid	12/09/14 13:00	12/17/14 10:15
10292097023	**HSA-9 (10-11.5)**	Solid	12/09/14 15:40	12/17/14 10:15
10292097024	**HSA-9 (20-21.5)**	Solid	12/09/14 16:10	12/17/14 10:15
10292097025	**HSA-9 (30-31.5)**	Solid	12/09/14 16:20	12/17/14 10:15
10292097026	**HSA-9 (40-41.5)**	Solid	12/10/14 08:20	12/17/14 10:15
10292097027	**HSA-9 (50-51.5)**	Solid	12/10/14 08:55	12/17/14 10:15
10292097028	**HSA-9 (60-61.5)**	Solid	12/10/14 09:15	12/17/14 10:15
10292097029	**HSA-9 (70-71.5)**	Solid	12/10/14 10:00	12/17/14 10:15
10292097030	**HSA-9 (80-81.5)**	Solid	12/10/14 10:30	12/17/14 10:15
10292097031	**HSA-9 (85-86.5)**	Solid	12/10/14 12:20	12/17/14 10:15
10292097032	**HSA-9 (89-89.5)**	Solid	12/10/14 13:10	12/17/14 10:15
10292097033	**HSA-11 (10-11.5)**	Solid	12/11/14 10:00	12/17/14 10:15
10292097034	**HSA-11 (20-21.5)**	Solid	12/11/14 10:20	12/17/14 10:15
10292097035	**HSA-11 (25.5-26.5)**	Solid	12/11/14 10:30	12/17/14 10:15
10292097036	**HSA-11 (27.1-27.3)**	Solid	12/11/14 10:40	12/17/14 10:15
10292097037	**HSA-10 (10-11.5)**	Solid	12/10/14 15:00	12/17/14 10:15

SAMPLE SUMMARY

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10292097038	**HSA-10 (20-21.5)**	Solid	12/10/14 13:20	12/17/14 10:15
10292097039	**HSA-10 (30-31.5)**	Solid	12/10/14 15:40	12/17/14 10:15
10292097040	**HSA-10 (40-41.5)**	Solid	12/10/14 15:50	12/17/14 10:15
10292097041	**HSA-10 (50-51.5)**	Solid	12/10/14 16:00	12/17/14 10:15
10292097042	**HSA-10 (60-61.5)**	Solid	12/11/14 07:50	12/17/14 10:15
10292097043	**HSA-10 (63-63.5)**	Solid	12/11/14 08:25	12/17/14 10:15

SAMPLE ANALYTE COUNT

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10292097001	**HSA-7 (10-11.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097003	**HSA-7 (35-36.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097005	**HSA-7 (60-61.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097006	**HSA-7 (70-71.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097007	**HSA-7 (76.1-76.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097014	**HSA-8 (20-21.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097016	**HSA-8 (40-41.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097019	**HSA-8 (70-71.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097020	**HSA-8 (76.4-76.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097021	**HSA-8 (80-81.5)**	EPA 6020A	RJS	6	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097023	**HSA-9 (10-11.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097027	**HSA-9 (50-51.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097030	**HSA-9 (80-81.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	7	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10292097031	**HSA-9 (85-86.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097034	**HSA-11 (20-21.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097035	**HSA-11 (25.5-26.5)**	EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097037	**HSA-10 (10-11.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097039	**HSA-10 (30-31.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097041	**HSA-10 (50-51.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M
		ASTM D2974	JDL	1	PASI-M
10292097042	**HSA-10 (60-61.5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	RJS	4	PASI-M
		EPA 6020A	RJS	8	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		ASTM D2974	JDL	1	PASI-M
10292097043	**HSA-10 (63-63.5)**	EPA 6020A	RJS	6	PASI-M
		ASTM D2974	JDL	1	PASI-M

PROJECT NARRATIVE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Date: March 11, 2015

12/19/14 Per client request only the following samples were analyzed for ABA and Asbestos:

HSA-7(10-11.5)
HSA-7(35-36.5)
HSA-7(70-71.5)
HSA-9(10-11.5)
HSA-9(50-51.5)
HSA-9(80-81.5)

01/27/15 Per client request the following samples were analyzed:

HSA-7 (35-36.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-7 (70-71.5) SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-8 (76.4-76.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HAS-8 (80-81.5) Total As, Cd, Cu, Pb, Sb, Zn
HSA-9 (50-51.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-9 (80-81.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Zn
HSA-10 (10-11.5) SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-10 (30-31.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-10 (50-51.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HSA-10 (60-61.5) TCLP As, Cd, Cr, Pb, SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn
HAS-10 (63-63.5) Total As, Cd, Cu, Pb, Sb, Zn
HSA-11 (20-21.5) SPLP As, Cd, Cr, Cu, Pb, Ni, Sb, Zn

PROJECT NARRATIVE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
21 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/51399

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10292097001

M6: Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

- MS (Lab ID: 1870378)
  - Lead
  - Zinc
- MSD (Lab ID: 1870379)
  - Arsenic
  - Copper
  - Lead
  - Zinc

QC Batch: MPRP/52123

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10292097021

R1: RPD value was outside control limits.

- MSD (Lab ID: 1891345)
  - Antimony

PROJECT NARRATIVE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers_WA
Date: March 11, 2015

QC Batch: MPRP/52123

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10292097021

R1: RPD value was outside control limits.

- Cadmium
- Lead

Additional Comments:

Analyte Comments:

QC Batch: MPRP/51399

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MS (Lab ID: 1870378)
  - Zinc
- MSD (Lab ID: 1870379)
  - Zinc

PROJECT NARRATIVE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Method: **EPA 6020A**
Description: 6020A MET ICPMS, TCLP
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
7 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Method: **EPA 6020A**
Description: 6020A MET ICPMS, SPLP
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
10 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Method: **Modified Sobek 3.2**
Description: Sobek Acid Base Potential
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
6 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Method: **Modified Sobek 3.2**
Description: Sobek Extractable Sulfur
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
6 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

QC Batch: MT/17890

D6: The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.

- DUP (Lab ID: 1874580)
  - Sulfur, HNO3 Extractable
  - Sulfur, Hot Water Extractable

Additional Comments:

Analyte Comments:

QC Batch: MT/17890

C0: Result confirmed by second analysis.

- DUP (Lab ID: 1874580)
  - Sulfur, Hot Water Extractable

PROJECT NARRATIVE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Method: **Modified Sobek 3.2**
Description: Sobek Extractable Sulfur
Client: GeoEngineers_WA
Date: March 11, 2015

Analyte Comments:

QC Batch: MT/17890

C0: Result confirmed by second analysis.

- HSA-7 (70-71.5) (Lab ID: 10292097006)
  - Sulfur, Hot Water Extractable
- HSA-9 (10-11.5) (Lab ID: 10292097023)
  - Sulfur, HNO3 Extractable
  - Total Sulfur

PROJECT NARRATIVE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Method: **Modified Sobek 3.2**
Description: Sobek Calculations
Client: GeoEngineers_WA
Date: March 11, 2015

General Information:
6 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-7 (10-11.5) **Lab ID: 10292097001** Collected: 12/08/14 09:35 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.54**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:43	7440-36-0	
Arsenic	**4.1**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:43	7440-38-2	M6
Cadmium	**4.6**	mg/kg	0.086	20	12/22/14 11:50	12/22/14 20:43	7440-43-9	
Chromium	**1.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:43	7440-47-3	
Copper	**17.1**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 20:43	7440-50-8	M6
Lead	**268**	mg/kg	1.1	200	12/22/14 11:50	12/23/14 15:17	7439-92-1	M6
Nickel	**2.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:43	7440-02-0	
Zinc	**1560**	mg/kg	53.6	200	12/22/14 11:50	12/23/14 15:17	7440-66-6	M6
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**6.7**	%	0.10	1		01/05/15 10:10		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**3800**	tons/1000	0.50	1		01/07/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 08:55		
Sulfur, HNO3 Extractable	**0.130**	% (w/w)	0.050	1		12/31/14 08:55		
Sulfur, Hot Water Extractable	**0.120**	% (w/w)	0.050	1		12/31/14 08:55		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 08:55		
Total Sulfur	**0.120**	% (w/w)	0.050	1		12/31/14 08:55		
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**3900**	tons/1000		1		12/31/14 14:22		
Acid Potential	**<4.3**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-7 (35-36.5) **Lab ID: 10292097003** Collected: 12/08/14 10:20 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.6**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 20:29	7440-36-0	
Arsenic	**6.2**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 20:29	7440-38-2	
Cadmium	**7.3**	mg/kg	0.087	20	12/22/14 11:50	12/22/14 20:29	7440-43-9	
Chromium	**0.91**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 20:29	7440-47-3	
Copper	**20.8**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 20:29	7440-50-8	
Lead	**334**	mg/kg	1.1	200	12/22/14 11:50	12/23/14 15:41	7439-92-1	
Nickel	**12.2**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 20:29	7440-02-0	
Zinc	**4000**	mg/kg	54.5	200	12/22/14 11:50	12/23/14 15:41	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.19; Final pH: 5.29							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:49	7440-38-2	
Cadmium	**0.048**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:49	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:49	7440-47-3	
Lead	**2.0**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:49	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.91							
Antimony	**0.0036**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:52	7440-36-0	
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:52	7440-38-2	
Cadmium	**<0.00040**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 18:52	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:52	7440-47-3	
Copper	**<0.0050**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 18:52	7440-50-8	
Lead	**0.0025**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 18:52	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:52	7440-02-0	
Zinc	**0.026**	mg/L	0.025	5	02/01/15 15:37	02/02/15 18:52	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**8.3**	%	0.10	1		01/05/15 10:11		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**3600**	tons/1000	0.50	1		01/07/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 09:08		
Sulfur, HNO3 Extractable	**0.350**	% (w/w)	0.050	1		12/31/14 09:08		
Sulfur, Hot Water Extractable	**0.260**	% (w/w)	0.050	1		12/31/14 09:08		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 09:08		
Total Sulfur	**0.390**	% (w/w)	0.050	1		12/31/14 09:08		
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**3590**	tons/1000		1		12/31/14 14:22		
Acid Potential	**11.3**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-7 (60-61.5) **Lab ID: 10292097005** Collected: 12/08/14 12:00 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.62**	mg/kg	0.62	20	12/22/14 11:50	12/22/14 20:33	7440-36-0	
Arsenic	**10.5**	mg/kg	0.62	20	12/22/14 11:50	12/22/14 20:33	7440-38-2	
Cadmium	**6.2**	mg/kg	0.099	20	12/22/14 11:50	12/22/14 20:33	7440-43-9	
Chromium	**4.2**	mg/kg	0.62	20	12/22/14 11:50	12/22/14 20:33	7440-47-3	
Copper	**95.6**	mg/kg	1.2	20	12/22/14 11:50	12/22/14 20:33	7440-50-8	
Lead	**244**	mg/kg	1.2	200	12/22/14 11:50	12/23/14 15:46	7439-92-1	
Nickel	**3.9**	mg/kg	0.62	20	12/22/14 11:50	12/22/14 20:33	7440-02-0	
Zinc	**4030**	mg/kg	61.6	200	12/22/14 11:50	12/23/14 15:46	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**21.2**	%	0.10	1		01/05/15 11:49		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-7 (70-71.5) **Lab ID: 10292097006** Collected: 12/08/14 13:00 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.81**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:38	7440-36-0	
Arsenic	**12.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:38	7440-38-2	
Cadmium	**13.2**	mg/kg	0.086	20	12/22/14 11:50	12/22/14 20:38	7440-43-9	
Chromium	**1.4**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:38	7440-47-3	
Copper	**36.6**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 20:38	7440-50-8	
Lead	**195**	mg/kg	2.7	500	12/22/14 11:50	12/23/14 16:00	7439-92-1	
Nickel	**3.4**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 20:38	7440-02-0	
Zinc	**5020**	mg/kg	135	500	12/22/14 11:50	12/23/14 16:00	7440-66-6	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 9.11							
Antimony	**0.0051**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:42	7440-36-0	
Arsenic	**0.013**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:42	7440-38-2	
Cadmium	**0.00094**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 18:42	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:42	7440-47-3	
Copper	**0.034**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 18:42	7440-50-8	
Lead	**0.029**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 18:42	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:42	7440-02-0	
Zinc	**0.40**	mg/L	0.025	5	02/01/15 15:37	02/02/15 18:42	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**8.0**	%	0.10	1		01/05/15 11:49		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**200**	tons/1000	0.50	1		01/06/15 14:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**0.210**	% (w/w)	0.050	1		12/31/14 09:33		
Sulfur, HNO3 Extractable	**0.0800**	% (w/w)	0.050	1		12/31/14 09:33		D6
Sulfur, Hot Water Extractable	**0.0600**	% (w/w)	0.050	1		12/31/14 09:33		C0,D6
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 09:33		
Total Sulfur	**0.350**	% (w/w)	0.050	1		12/31/14 09:33		
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**196**	tons/1000		1		12/31/14 14:22		
Acid Potential	**7.6**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-7 (76.1-76.5) **Lab ID: 10292097007** Collected: 12/08/14 13:15 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.63**	mg/kg	0.63	20	12/22/14 11:50	12/22/14 21:18	7440-36-0	
Arsenic	**2.3**	mg/kg	0.63	20	12/22/14 11:50	12/22/14 21:18	7440-38-2	
Cadmium	**0.62**	mg/kg	0.10	20	12/22/14 11:50	12/22/14 21:18	7440-43-9	
Chromium	**5.3**	mg/kg	0.63	20	12/22/14 11:50	12/22/14 21:18	7440-47-3	
Copper	**8.7**	mg/kg	1.3	20	12/22/14 11:50	12/22/14 21:18	7440-50-8	
Lead	**13.0**	mg/kg	0.32	50	12/22/14 11:50	12/23/14 16:05	7439-92-1	
Nickel	**6.7**	mg/kg	0.63	20	12/22/14 11:50	12/22/14 21:18	7440-02-0	
Zinc	**87.7**	mg/kg	6.3	20	12/22/14 11:50	12/22/14 21:18	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**21.5**	%	0.10	1		01/05/15 11:50		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-8 (20-21.5) **Lab ID: 10292097014** Collected: 12/08/14 09:35 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.68**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:22	7440-36-0	
Arsenic	**27.0**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:22	7440-38-2	
Cadmium	**4.8**	mg/kg	0.086	20	12/22/14 11:50	12/22/14 21:22	7440-43-9	
Chromium	**2.4**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:22	7440-47-3	
Copper	**19.3**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 21:22	7440-50-8	
Lead	**282**	mg/kg	1.1	200	12/22/14 11:50	12/23/14 16:10	7439-92-1	
Nickel	**2.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:22	7440-02-0	
Zinc	**2190**	mg/kg	54.0	200	12/22/14 11:50	12/23/14 16:10	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**11.8**	%	0.10	1		01/05/15 11:50		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-8 (40-41.5) **Lab ID: 10292097016** Collected: 12/08/14 10:15 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.52**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 21:27	7440-36-0	
Arsenic	**2.9**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 21:27	7440-38-2	
Cadmium	**4.8**	mg/kg	0.084	20	12/22/14 11:50	12/22/14 21:27	7440-43-9	
Chromium	**1.2**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 21:27	7440-47-3	
Copper	**17.2**	mg/kg	1.0	20	12/22/14 11:50	12/22/14 21:27	7440-50-8	
Lead	**375**	mg/kg	1.0	200	12/22/14 11:50	12/23/14 16:15	7439-92-1	
Nickel	**1.3**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 21:27	7440-02-0	
Zinc	**2080**	mg/kg	52.3	200	12/22/14 11:50	12/23/14 16:15	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**5.3**	%	0.10	1		01/05/15 11:50		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-8 (70-71.5) **Lab ID: 10292097019** Collected: 12/08/14 11:45 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.97**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:32	7440-36-0	
Arsenic	**5.3**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:32	7440-38-2	
Cadmium	**15.2**	mg/kg	0.079	20	12/22/14 11:50	12/22/14 21:32	7440-43-9	
Chromium	**0.60**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:32	7440-47-3	
Copper	**23.9**	mg/kg	0.99	20	12/22/14 11:50	12/22/14 21:32	7440-50-8	
Lead	**193**	mg/kg	2.5	500	12/22/14 11:50	12/23/14 16:19	7439-92-1	
Nickel	**2.1**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:32	7440-02-0	
Zinc	**6070**	mg/kg	124	500	12/22/14 11:50	12/23/14 16:19	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**5.1**	%	0.10	1		01/05/15 11:50		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-8 (76.4-76.5) **Lab ID: 10292097020** Collected: 12/08/14 12:15 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.1**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 21:37	7440-36-0	
Arsenic	**19.0**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 21:37	7440-38-2	
Cadmium	**11.8**	mg/kg	0.094	20	12/22/14 11:50	12/22/14 21:37	7440-43-9	
Chromium	**2.1**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 21:37	7440-47-3	
Copper	**143**	mg/kg	1.2	20	12/22/14 11:50	12/22/14 21:37	7440-50-8	
Lead	**200**	mg/kg	2.9	500	12/22/14 11:50	12/23/14 16:24	7439-92-1	
Nickel	**4.3**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 21:37	7440-02-0	
Zinc	**5190**	mg/kg	147	500	12/22/14 11:50	12/23/14 16:24	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.33; Final pH: 5.2							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:02	7440-38-2	
Cadmium	**0.096**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:02	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:02	7440-47-3	
Lead	**0.97**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:02	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.99							
Antimony	**0.026**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:47	7440-36-0	
Arsenic	**0.0062**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:47	7440-38-2	
Cadmium	**0.00046**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 18:47	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:47	7440-47-3	
Copper	**0.0066**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 18:47	7440-50-8	
Lead	**0.0040**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 18:47	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 18:47	7440-02-0	
Zinc	**0.19**	mg/L	0.025	5	02/01/15 15:37	02/02/15 18:47	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**19.6**	%	0.10	1		01/05/15 11:51		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-8 (80-81.5) **Lab ID: 10292097021** Collected: 12/09/14 12:30 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.56**	mg/kg	0.56	20	02/01/15 12:17	02/02/15 16:51	7440-36-0	
Arsenic	**2.4**	mg/kg	0.56	20	02/01/15 12:17	02/02/15 16:51	7440-38-2	
Cadmium	**0.24**	mg/kg	0.090	20	02/01/15 12:17	02/02/15 16:51	7440-43-9	
Copper	**4.9**	mg/kg	1.1	20	02/01/15 12:17	02/02/15 16:51	7440-50-8	
Lead	**2.9**	mg/kg	0.11	20	02/01/15 12:17	02/02/15 16:51	7439-92-1	
Zinc	**29.0**	mg/kg	5.6	20	02/01/15 12:17	02/02/15 16:51	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**14.7**	%	0.10	1		02/02/15 11:49		

REPORT OF LABORATORY ANALYSIS

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-9 (10-11.5) **Lab ID: 10292097023** Collected: 12/09/14 15:40 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.99**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:42	7440-36-0	
Arsenic	**4.5**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:42	7440-38-2	
Cadmium	**5.3**	mg/kg	0.080	20	12/22/14 11:50	12/22/14 21:42	7440-43-9	
Chromium	**1.9**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:42	7440-47-3	
Copper	**15.9**	mg/kg	1.0	20	12/22/14 11:50	12/22/14 21:42	7440-50-8	
Lead	**495**	mg/kg	1.0	200	12/22/14 11:50	12/23/14 16:29	7439-92-1	
Nickel	**1.9**	mg/kg	0.50	20	12/22/14 11:50	12/22/14 21:42	7440-02-0	
Zinc	**2270**	mg/kg	49.8	200	12/22/14 11:50	12/23/14 16:29	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**4.4**	%	0.10	1		01/05/15 11:51		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**390**	tons/1000	0.50	1		01/07/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 10:08		
Sulfur, HNO3 Extractable	**0.0900**	% (w/w)	0.050	1		12/31/14 10:08		C0
Sulfur, Hot Water Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 10:08		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 10:08		
Total Sulfur	**<0.050**	% (w/w)	0.050	1		12/31/14 10:08		C0
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**390**	tons/1000		1		12/31/14 14:22		
Acid Potential	**<4.3**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-9 (50-51.5) **Lab ID: 10292097027** Collected: 12/10/14 08:55 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**2.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:46	7440-36-0	
Arsenic	**7.5**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:46	7440-38-2	
Cadmium	**16.2**	mg/kg	0.086	20	12/22/14 11:50	12/22/14 21:46	7440-43-9	
Chromium	**0.57**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:46	7440-47-3	
Copper	**11.2**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 21:46	7440-50-8	
Lead	**1200**	mg/kg	2.7	500	12/22/14 11:50	12/23/14 16:33	7439-92-1	
Nickel	**1.3**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 21:46	7440-02-0	
Zinc	**4710**	mg/kg	134	500	12/22/14 11:50	12/23/14 16:33	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.22; Final pH: 4.54							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:06	7440-38-2	
Cadmium	**0.048**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:06	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:06	7440-47-3	
Lead	**4.5**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:06	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 9.14							
Antimony	**0.0054**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:32	7440-36-0	
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:32	7440-38-2	
Cadmium	**<0.00040**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:32	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:32	7440-47-3	
Copper	**<0.0050**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:32	7440-50-8	
Lead	**0.015**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:32	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:32	7440-02-0	
Zinc	**0.041**	mg/L	0.025	5	02/01/15 15:37	02/02/15 19:32	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.0**	%	0.10	1		01/05/15 11:51		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**310**	tons/1000	0.50	1		01/06/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 10:18		
Sulfur, HNO3 Extractable	**0.300**	% (w/w)	0.050	1		12/31/14 10:18		
Sulfur, Hot Water Extractable	**0.290**	% (w/w)	0.050	1		12/31/14 10:18		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 10:18		
Total Sulfur	**0.570**	% (w/w)	0.050	1		12/31/14 10:18		
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**304**	tons/1000		1		12/31/14 14:22		
Acid Potential	**9.40**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-9 (80-81.5) **Lab ID: 10292097030** Collected: 12/10/14 10:30 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.53**	mg/kg	0.53	20	12/22/14 11:50	12/22/14 21:51	7440-36-0	
Arsenic	**3.7**	mg/kg	0.53	20	12/22/14 11:50	12/22/14 21:51	7440-38-2	
Cadmium	**11.4**	mg/kg	0.084	20	12/22/14 11:50	12/22/14 21:51	7440-43-9	
Chromium	**1.9**	mg/kg	0.53	20	12/22/14 11:50	12/22/14 21:51	7440-47-3	
Copper	**24.7**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 21:51	7440-50-8	
Lead	**144**	mg/kg	2.6	500	12/22/14 11:50	12/23/14 16:38	7439-92-1	
Nickel	**2.2**	mg/kg	0.53	20	12/22/14 11:50	12/22/14 21:51	7440-02-0	
Zinc	**7290**	mg/kg	131	500	12/22/14 11:50	12/23/14 16:38	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.43; Final pH: 3.17							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:11	7440-38-2	
Cadmium	**0.098**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:11	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:11	7440-47-3	
Lead	**0.35**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:11	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 9.35							
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:37	7440-38-2	
Cadmium	**0.0045**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:37	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:37	7440-47-3	
Copper	**0.033**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:37	7440-50-8	
Lead	**0.067**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:37	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:37	7440-02-0	
Zinc	**2.1**	mg/L	0.025	5	02/01/15 15:37	02/02/15 19:37	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**6.7**	%	0.10	1		01/05/15 11:52		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**180**	tons/1000	0.50	1		01/06/15 14:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**0.250**	% (w/w)	0.050	1		12/31/14 10:32		
Sulfur, HNO3 Extractable	**0.0800**	% (w/w)	0.050	1		12/31/14 10:32		
Sulfur, Hot Water Extractable	**<0.050**	% (w/w)	0.050	1		12/31/14 10:32		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		12/31/14 10:32		
Total Sulfur	**0.350**	% (w/w)	0.050	1		12/31/14 10:32		
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**176**	tons/1000		1		12/31/14 14:22		
Acid Potential	**8.55**	tons/1000	4.3	1		12/31/14 14:22		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-9 (85-86.5) **Lab ID: 10292097031** Collected: 12/10/14 12:20 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.60**	mg/kg	0.60	20	12/22/14 11:50	12/22/14 21:56	7440-36-0	
Arsenic	**2.8**	mg/kg	0.60	20	12/22/14 11:50	12/22/14 21:56	7440-38-2	
Cadmium	**0.50**	mg/kg	0.096	20	12/22/14 11:50	12/22/14 21:56	7440-43-9	
Chromium	**7.4**	mg/kg	0.60	20	12/22/14 11:50	12/22/14 21:56	7440-47-3	
Copper	**11.5**	mg/kg	1.2	20	12/22/14 11:50	12/22/14 21:56	7440-50-8	
Lead	**14.1**	mg/kg	0.30	50	12/22/14 11:50	12/23/14 16:43	7439-92-1	
Nickel	**9.1**	mg/kg	0.60	20	12/22/14 11:50	12/22/14 21:56	7440-02-0	
Zinc	**94.6**	mg/kg	6.0	20	12/22/14 11:50	12/22/14 21:56	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**19.5**	%	0.10	1		01/05/15 11:52		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-11 (20-21.5) **Lab ID: 10292097034** Collected: 12/11/14 10:20 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.84**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 22:16	7440-36-0	
Arsenic	**12.0**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 22:16	7440-38-2	
Cadmium	**3.4**	mg/kg	0.088	20	12/22/14 11:50	12/22/14 22:16	7440-43-9	
Chromium	**2.8**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 22:16	7440-47-3	
Copper	**37.7**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 22:16	7440-50-8	
Lead	**383**	mg/kg	1.1	200	12/22/14 11:50	12/23/14 16:57	7439-92-1	
Nickel	**2.1**	mg/kg	0.55	20	12/22/14 11:50	12/22/14 22:16	7440-02-0	
Zinc	**1470**	mg/kg	55.2	200	12/22/14 11:50	12/23/14 16:57	7440-66-6	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.92							
Antimony	**0.0046**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:42	7440-36-0	
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:42	7440-38-2	
Cadmium	**<0.00040**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:42	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:42	7440-47-3	
Copper	**<0.0050**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:42	7440-50-8	
Lead	**0.0023**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:42	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:42	7440-02-0	
Zinc	**0.032**	mg/L	0.025	5	02/01/15 15:37	02/02/15 19:42	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**12.8**	%	0.10	1		01/05/15 11:52		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-11 (25.5-26.5) **Lab ID: 10292097035** Collected: 12/11/14 10:30 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.54**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 22:20	7440-36-0	
Arsenic	**1.9**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 22:20	7440-38-2	
Cadmium	**0.83**	mg/kg	0.087	20	12/22/14 11:50	12/22/14 22:20	7440-43-9	
Chromium	**3.7**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 22:20	7440-47-3	
Copper	**9.0**	mg/kg	1.1	20	12/22/14 11:50	12/22/14 22:20	7440-50-8	
Lead	**35.4**	mg/kg	0.27	50	12/22/14 11:50	12/23/14 17:02	7439-92-1	
Nickel	**4.9**	mg/kg	0.54	20	12/22/14 11:50	12/22/14 22:20	7440-02-0	
Zinc	**277**	mg/kg	5.4	20	12/22/14 11:50	12/22/14 22:20	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.6**	%	0.10	1		01/05/15 11:52		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-10 (10-11.5) **Lab ID: 10292097037** Collected: 12/10/14 15:00 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.80**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 22:25	7440-36-0	
Arsenic	**8.4**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 22:25	7440-38-2	
Cadmium	**5.5**	mg/kg	0.084	20	12/22/14 11:50	12/22/14 22:25	7440-43-9	
Chromium	**2.5**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 22:25	7440-47-3	
Copper	**16.5**	mg/kg	1.0	20	12/22/14 11:50	12/22/14 22:25	7440-50-8	
Lead	**291**	mg/kg	1.0	200	12/22/14 11:50	12/23/14 17:07	7439-92-1	
Nickel	**2.8**	mg/kg	0.52	20	12/22/14 11:50	12/22/14 22:25	7440-02-0	
Zinc	**2270**	mg/kg	52.5	200	12/22/14 11:50	12/23/14 17:07	7440-66-6	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.71							
Antimony	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:47	7440-36-0	
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:47	7440-38-2	
Cadmium	**0.00068**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:47	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:47	7440-47-3	
Copper	**<0.0050**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:47	7440-50-8	
Lead	**0.026**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:47	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:47	7440-02-0	
Zinc	**0.14**	mg/L	0.025	5	02/01/15 15:37	02/02/15 19:47	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**6.6**	%	0.10	1		01/05/15 11:53		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-10 (30-31.5) **Lab ID: 10292097039** Collected: 12/10/14 15:40 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.84**	mg/kg	0.64	20	12/22/14 11:50	12/22/14 22:30	7440-36-0	
Arsenic	**11.9**	mg/kg	0.64	20	12/22/14 11:50	12/22/14 22:30	7440-38-2	
Cadmium	**11.9**	mg/kg	0.10	20	12/22/14 11:50	12/22/14 22:30	7440-43-9	
Chromium	**3.4**	mg/kg	0.64	20	12/22/14 11:50	12/22/14 22:30	7440-47-3	
Copper	**234**	mg/kg	1.3	20	12/22/14 11:50	12/22/14 22:30	7440-50-8	
Lead	**912**	mg/kg	3.2	500	12/22/14 11:50	12/23/14 17:12	7439-92-1	
Nickel	**3.8**	mg/kg	0.64	20	12/22/14 11:50	12/22/14 22:30	7440-02-0	
Zinc	**4480**	mg/kg	160	500	12/22/14 11:50	12/23/14 17:12	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.23; Final pH: 5.02							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:16	7440-38-2	
Cadmium	**0.049**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:16	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:16	7440-47-3	
Lead	**3.0**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:16	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 9.03							
Antimony	**0.0071**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:52	7440-36-0	
Arsenic	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:52	7440-38-2	
Cadmium	**0.00098**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:52	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:52	7440-47-3	
Copper	**0.020**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:52	7440-50-8	
Lead	**0.032**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:52	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:52	7440-02-0	
Zinc	**0.41**	mg/L	0.025	5	02/01/15 15:37	02/02/15 19:52	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**25.0**	%	0.10	1		01/05/15 11:53		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-10 (50-51.5) **Lab ID: 10292097041** Collected: 12/10/14 16:00 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.73**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 22:35	7440-36-0	
Arsenic	**30.8**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 22:35	7440-38-2	
Cadmium	**8.8**	mg/kg	0.095	20	12/22/14 11:50	12/22/14 22:35	7440-43-9	
Chromium	**3.1**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 22:35	7440-47-3	
Copper	**201**	mg/kg	1.2	20	12/22/14 11:50	12/22/14 22:35	7440-50-8	
Lead	**567**	mg/kg	3.0	500	12/22/14 11:50	12/23/14 17:16	7439-92-1	
Nickel	**4.1**	mg/kg	0.59	20	12/22/14 11:50	12/22/14 22:35	7440-02-0	
Zinc	**3370**	mg/kg	148	500	12/22/14 11:50	12/23/14 17:16	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 9.28; Final pH: 4.91							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:20	7440-38-2	
Cadmium	**0.031**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:20	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:20	7440-47-3	
Lead	**1.1**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:20	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.99							
Antimony	**0.0064**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:57	7440-36-0	
Arsenic	**0.0068**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:57	7440-38-2	
Cadmium	**0.0081**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 19:57	7440-43-9	
Chromium	**0.0035**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:57	7440-47-3	
Copper	**0.19**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 19:57	7440-50-8	
Lead	**0.39**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 19:57	7439-92-1	
Nickel	**0.0097**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 19:57	7440-02-0	
Zinc	**3.8**	mg/L	0.25	50	02/01/15 15:37	02/03/15 10:16	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**24.1**	%	0.10	1		01/05/15 11:53		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-10 (60-61.5) **Lab ID: 10292097042** Collected: 12/11/14 07:50 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.99**	mg/kg	0.71	20	12/22/14 11:50	12/22/14 22:39	7440-36-0	
Arsenic	**7.4**	mg/kg	0.71	20	12/22/14 11:50	12/22/14 22:39	7440-38-2	
Cadmium	**2.6**	mg/kg	0.11	20	12/22/14 11:50	12/22/14 22:39	7440-43-9	
Chromium	**6.0**	mg/kg	0.71	20	12/22/14 11:50	12/22/14 22:39	7440-47-3	
Copper	**117**	mg/kg	1.4	20	12/22/14 11:50	12/22/14 22:39	7440-50-8	
Lead	**184**	mg/kg	0.71	100	12/22/14 11:50	12/23/14 17:21	7439-92-1	
Nickel	**8.4**	mg/kg	0.71	20	12/22/14 11:50	12/22/14 22:39	7440-02-0	
Zinc	**793**	mg/kg	35.5	100	12/22/14 11:50	12/23/14 17:21	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 02/03/15 11:20 Initial pH: 8.27; Final pH: 2.4							
Arsenic	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:25	7440-38-2	
Cadmium	**0.043**	mg/L	0.0020	5	02/04/15 13:27	02/04/15 22:25	7440-43-9	
Chromium	**<0.012**	mg/L	0.012	5	02/04/15 13:27	02/04/15 22:25	7440-47-3	
Lead	**0.61**	mg/L	0.0025	5	02/04/15 13:27	02/04/15 22:25	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/31/15 13:12 Initial pH: ; Final pH: 8.78							
Antimony	**0.020**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 20:02	7440-36-0	
Arsenic	**0.0030**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 20:02	7440-38-2	
Cadmium	**0.00092**	mg/L	0.00040	5	02/01/15 15:37	02/02/15 20:02	7440-43-9	
Chromium	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 20:02	7440-47-3	
Copper	**0.0087**	mg/L	0.0050	5	02/01/15 15:37	02/02/15 20:02	7440-50-8	
Lead	**0.069**	mg/L	0.00050	5	02/01/15 15:37	02/02/15 20:02	7439-92-1	
Nickel	**<0.0025**	mg/L	0.0025	5	02/01/15 15:37	02/02/15 20:02	7440-02-0	
Zinc	**0.33**	mg/L	0.025	5	02/01/15 15:37	02/02/15 20:02	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**29.6**	%	0.10	1		01/05/15 11:54		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Sample: HSA-10 (63-63.5) **Lab ID: 10292097043** Collected: 12/11/14 08:25 Received: 12/17/14 10:15 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.50**	mg/kg	0.50	20	02/01/15 12:17	02/02/15 16:41	7440-36-0	
Arsenic	**1.2**	mg/kg	0.50	20	02/01/15 12:17	02/02/15 16:41	7440-38-2	
Cadmium	**0.10**	mg/kg	0.081	20	02/01/15 12:17	02/02/15 16:41	7440-43-9	
Copper	**6.6**	mg/kg	1.0	20	02/01/15 12:17	02/02/15 16:41	7440-50-8	
Lead	**6.5**	mg/kg	0.10	20	02/01/15 12:17	02/02/15 16:41	7439-92-1	
Zinc	**82.1**	mg/kg	5.0	20	02/01/15 12:17	02/02/15 16:41	7440-66-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**1.7**	%	0.10	1		02/02/15 11:50		

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/51399
Analysis Method: EPA 6020A
QC Batch Method: EPA 3050
Analysis Description: 6020A Solids UPD4
Associated Lab Samples: 10292097001, 10292097003, 10292097005, 10292097006, 10292097007, 10292097014, 10292097016, 10292097019, 10292097020, 10292097023, 10292097027, 10292097030, 10292097031, 10292097034, 10292097035, 10292097037, 10292097039, 10292097041, 10292097042

METHOD BLANK: 1870376
Matrix: Solid
Associated Lab Samples: 10292097001, 10292097003, 10292097005, 10292097006, 10292097007, 10292097014, 10292097016, 10292097019, 10292097020, 10292097023, 10292097027, 10292097030, 10292097031, 10292097034, 10292097035, 10292097037, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/kg	<0.50	0.50	12/23/14 15:07	
Arsenic	mg/kg	<0.50	0.50	12/23/14 15:07	
Cadmium	mg/kg	<0.079	0.079	12/23/14 15:07	
Chromium	mg/kg	<0.50	0.50	12/23/14 15:07	
Copper	mg/kg	<0.99	0.99	12/23/14 15:07	
Lead	mg/kg	<0.099	0.099	12/23/14 15:07	
Nickel	mg/kg	<0.50	0.50	12/23/14 15:07	
Zinc	mg/kg	<5.0	5.0	12/23/14 15:07	

LABORATORY CONTROL SAMPLE: 1870377

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	19.2	18.8	98	80-120	
Arsenic	mg/kg	19.2	18.3	95	80-120	
Cadmium	mg/kg	19.2	19.1	99	80-120	
Chromium	mg/kg	19.2	18.6	97	80-120	
Copper	mg/kg	19.2	18.7	97	80-120	
Lead	mg/kg	19.2	19.3	100	80-120	
Nickel	mg/kg	19.2	18.9	98	80-120	
Zinc	mg/kg	19.2	19.0	99	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1870378 1870379

Parameter	Units	10292097001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/kg	<0.54	21	21.2	16.8	18.0	78	83	75-125	7	20	
Arsenic	mg/kg	4.1	21	21.2	28.5	31.5	116	129	75-125	10	20	M6
Cadmium	mg/kg	4.6	21	21.2	27.9	29.9	111	119	75-125	7	20	
Chromium	mg/kg	1.3	21	21.2	24.5	26.5	110	119	75-125	8	20	
Copper	mg/kg	17.1	21	21.2	41.9	46.8	118	140	75-125	11	20	M6
Lead	mg/kg	268	21	21.2	322	361	259	439	75-125	11	20	M6
Nickel	mg/kg	2.3	21	21.2	25.9	28.3	112	123	75-125	9	20	
Zinc	mg/kg	1560	21	21.2	2020	1940	2180	1770	75-125	4	20	E,M6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

QC Batch:	MPRP/52123	Analysis Method:	EPA 6020A
QC Batch Method:	EPA 3050	Analysis Description:	6020A Solids UPD4

Associated Lab Samples: 10292097021, 10292097043

METHOD BLANK: 1891342 Matrix: Solid

Associated Lab Samples: 10292097021, 10292097043

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/kg	<0.49	0.49	02/02/15 16:31	
Arsenic	mg/kg	<0.49	0.49	02/02/15 16:31	
Cadmium	mg/kg	<0.078	0.078	02/02/15 16:31	
Copper	mg/kg	<0.97	0.97	02/02/15 16:31	
Lead	mg/kg	<0.097	0.097	02/02/15 16:31	
Zinc	mg/kg	<4.9	4.9	02/02/15 16:31	

LABORATORY CONTROL SAMPLE: 1891343

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	18.5	16.3	88	80-120	
Arsenic	mg/kg	18.5	16.8	90	80-120	
Cadmium	mg/kg	18.5	16.6	90	80-120	
Copper	mg/kg	18.5	17.2	93	80-120	
Lead	mg/kg	18.5	17.3	93	80-120	
Zinc	mg/kg	18.5	17.0	92	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1891344 1891345

Parameter	Units	10292097021 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/kg	<0.56	19.7	21.7	17.3	22.6	87	103	75-125	26	20	R1
Arsenic	mg/kg	2.4	19.7	21.7	22.9	27.8	104	117	75-125	19	20	
Cadmium	mg/kg	0.24	19.7	21.7	20.1	25.6	101	117	75-125	24	20	R1
Copper	mg/kg	4.9	19.7	21.7	25.8	31.0	107	120	75-125	18	20	
Lead	mg/kg	2.9	19.7	21.7	22.2	27.6	98	114	75-125	22	20	R1
Zinc	mg/kg	29.0	19.7	21.7	51.4	53.1	114	111	75-125	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/52217
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A TCLP UPD4
Associated Lab Samples: 10292097003, 10292097020, 10292097027, 10292097030, 10292097039, 10292097041, 10292097042

METHOD BLANK: 1893954 Matrix: Water
Associated Lab Samples: 10292097003, 10292097020, 10292097027, 10292097030, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.0025	0.0025	02/04/15 21:47	
Cadmium	mg/L	<0.00040	0.00040	02/04/15 21:47	
Chromium	mg/L	<0.0025	0.0025	02/04/15 21:47	
Lead	mg/L	<0.00050	0.00050	02/04/15 21:47	

METHOD BLANK: 1892242 Matrix: Water
Associated Lab Samples: 10292097003, 10292097020, 10292097027, 10292097030, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.012	0.012	02/04/15 21:57	
Cadmium	mg/L	<0.0020	0.0020	02/04/15 21:57	
Chromium	mg/L	<0.012	0.012	02/04/15 21:57	
Lead	mg/L	<0.0025	0.0025	02/04/15 21:57	

METHOD BLANK: 1892243 Matrix: Water
Associated Lab Samples: 10292097003, 10292097020, 10292097027, 10292097030, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.012	0.012	02/04/15 22:44	
Cadmium	mg/L	<0.0020	0.0020	02/04/15 22:44	
Chromium	mg/L	<0.012	0.012	02/04/15 22:44	
Lead	mg/L	<0.0025	0.0025	02/04/15 22:44	

LABORATORY CONTROL SAMPLE: 1893955

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	.4	0.40	99	80-120	
Cadmium	mg/L	.4	0.40	100	80-120	
Chromium	mg/L	.4	0.41	103	80-120	
Lead	mg/L	.4	0.41	102	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1893956 1893957

Parameter	Units	10292097003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	<0.0025	.4	.4	0.41	0.41	103	102	75-125	1	20	
Cadmium	mg/L	<0.00040	.4	.4	0.46	0.45	102	100	75-125	2	20	
Chromium	mg/L	<0.0025	.4	.4	0.42	0.41	105	103	75-125	2	20	
Lead	mg/L	0.0025	.4	.4	2.4	2.3	116	86	75-125	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/52155
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A SPLP UPD4
Associated Lab Samples: 10292097003, 10292097006, 10292097020, 10292097027, 10292097030, 10292097034, 10292097037, 10292097039, 10292097041, 10292097042

METHOD BLANK: 1892182
Matrix: Water
Associated Lab Samples: 10292097003, 10292097006, 10292097020, 10292097027, 10292097030, 10292097034, 10292097037, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/L	<0.00050	0.00050	02/02/15 18:26	
Arsenic	mg/L	<0.00050	0.00050	02/02/15 18:26	
Cadmium	mg/L	<0.000080	0.000080	02/02/15 18:26	
Chromium	mg/L	<0.00050	0.00050	02/02/15 18:26	
Copper	mg/L	<0.0010	0.0010	02/02/15 18:26	
Lead	mg/L	<0.00010	0.00010	02/02/15 18:26	
Nickel	mg/L	<0.00050	0.00050	02/02/15 18:26	
Zinc	mg/L	<0.0050	0.0050	02/02/15 18:26	

METHOD BLANK: 1891421
Matrix: Solid
Associated Lab Samples: 10292097003, 10292097006, 10292097020, 10292097027, 10292097030, 10292097034, 10292097037, 10292097039, 10292097041, 10292097042

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/L	<0.0025	0.0025	02/02/15 18:36	
Arsenic	mg/L	<0.0025	0.0025	02/02/15 18:36	
Cadmium	mg/L	<0.00040	0.00040	02/02/15 18:36	
Chromium	mg/L	<0.0025	0.0025	02/02/15 18:36	
Copper	mg/L	<0.0050	0.0050	02/02/15 18:36	
Lead	mg/L	<0.00050	0.00050	02/02/15 18:36	
Nickel	mg/L	<0.0025	0.0025	02/02/15 18:36	
Zinc	mg/L	<0.025	0.025	02/02/15 18:36	

LABORATORY CONTROL SAMPLE: 1892183

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	.08	0.077	96	80-120	
Arsenic	mg/L	.08	0.078	98	80-120	
Cadmium	mg/L	.08	0.077	96	80-120	
Chromium	mg/L	.08	0.076	94	80-120	
Copper	mg/L	.08	0.079	99	80-120	
Lead	mg/L	.08	0.078	97	80-120	
Nickel	mg/L	.08	0.080	100	80-120	
Zinc	mg/L	.08	0.078	97	80-120	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1892184 1892185

Parameter	Units	10292097003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	0.0036	.08	.08	0.089	0.087	107	104	75-125	3	20	
Arsenic	mg/L	<0.0025	.08	.08	0.086	0.083	107	103	75-125	4	20	
Cadmium	mg/L	<0.00040	.08	.08	0.085	0.083	106	103	75-125	3	20	
Chromium	mg/L	<0.0025	.08	.08	0.083	0.081	104	101	75-125	3	20	
Copper	mg/L	<0.0050	.08	.08	0.088	0.085	108	105	75-125	3	20	
Lead	mg/L	0.0025	.08	.08	0.089	0.087	108	105	75-125	3	20	
Nickel	mg/L	<0.0025	.08	.08	0.087	0.084	108	105	75-125	3	20	
Zinc	mg/L	0.026	.08	.08	0.11	0.10	102	98	75-125	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/51626
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10292097001, 10292097003

SAMPLE DUPLICATE: 1876706

Parameter	Units	10292097001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	6.7	7.1	5	30	

SAMPLE DUPLICATE: 1876707

Parameter	Units	10293120007 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	4.8	5.3	9	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/51627
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10292097005, 10292097006, 10292097007, 10292097014, 10292097016, 10292097019, 10292097020, 10292097023, 10292097027, 10292097030, 10292097031, 10292097034, 10292097035, 10292097037, 10292097039, 10292097041, 10292097042

SAMPLE DUPLICATE: 1876798

Parameter	Units	10292097005 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	21.2	21.1	0	30	

SAMPLE DUPLICATE: 1876805

Parameter	Units	10292097042 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	29.6	29.6	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MPRP/52167
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10292097021, 10292097043

SAMPLE DUPLICATE: 1892421

Parameter	Units	10295556009 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	14.8	15.3	3	30	

SAMPLE DUPLICATE: 1892452

Parameter	Units	10295180001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	19.0	19.2	1	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MT/17889
Analysis Method: Modified Sobek 3.2
QC Batch Method: Modified Sobek 3.2
Analysis Description: Sobek Acid Base Potential
Associated Lab Samples: 10292097001, 10292097003, 10292097006, 10292097023, 10292097027, 10292097030

METHOD BLANK: 1874576
Matrix: Solid
Associated Lab Samples: 10292097001, 10292097003, 10292097006, 10292097023, 10292097027, 10292097030

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Neutralization Potential	tons/1000	<0.5	0.50	12/29/14 12:00	

SAMPLE DUPLICATE: 1874577

Parameter	Units	10292097006 Result	Dup Result	RPD	Max RPD	Qualifiers
Neutralization Potential	tons/1000	200	199			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

QC Batch: MT/17890
Analysis Method: Modified Sobek 3.2
QC Batch Method: Modified Sobek 3.2
Analysis Description: Sobek Extractable Sulfur
Associated Lab Samples: 10292097001, 10292097003, 10292097006, 10292097023, 10292097027, 10292097030

METHOD BLANK: 1874578
Matrix: Solid
Associated Lab Samples: 10292097001, 10292097003, 10292097006, 10292097023, 10292097027, 10292097030

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Sulfur	% (w/w)	<0.050	0.050	12/31/14 08:46	

LABORATORY CONTROL SAMPLE: 1874579

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Sulfur	% (w/w)	1.06	1.10	104	70-130	

SAMPLE DUPLICATE: 1874580

Parameter	Units	10292097006 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfur, HCl Extractable	% (w/w)	0.210	<0.050		20	
Sulfur, HNO3 Extractable	% (w/w)	0.0800	0.120	40	20	D6
Sulfur, Hot Water Extractable	% (w/w)	0.0600	0.340	140	20	C0,D6
Sulfur, Residual	% (w/w)	<0.050	<0.050		20	
Total Sulfur	% (w/w)	0.350	0.340	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALIFIERS

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis
PASI-MT	Pace Analytical Services - Montana

ANALYTE QUALIFIERS

C0	Result confirmed by second analysis.
D6	The relative percent difference (RPD) between the sample and sample duplicate exceeded laboratory control limits.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
R1	RPD value was outside control limits.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10292097

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10292097001	**HSA-7 (10-11.5)**		ASB/6196		
10292097003	**HSA-7 (35-36.5)**		ASB/6196		
10292097006	**HSA-7 (70-71.5)**		ASB/6196		
10292097023	**HSA-9 (10-11.5)**		ASB/6196		
10292097027	**HSA-9 (50-51.5)**		ASB/6196		
10292097030	**HSA-9 (80-81.5)**		ASB/6196		
10292097001	**HSA-7 (10-11.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097003	**HSA-7 (35-36.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097005	**HSA-7 (60-61.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097006	**HSA-7 (70-71.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097007	**HSA-7 (76.1-76.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097014	**HSA-8 (20-21.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097016	**HSA-8 (40-41.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097019	**HSA-8 (70-71.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097020	**HSA-8 (76.4-76.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097021	**HSA-8 (80-81.5)**	EPA 3050	MPRP/52123	EPA 6020A	ICPM/23122
10292097023	**HSA-9 (10-11.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097027	**HSA-9 (50-51.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097030	**HSA-9 (80-81.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097031	**HSA-9 (85-86.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097034	**HSA-11 (20-21.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097035	**HSA-11 (25.5-26.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097037	**HSA-10 (10-11.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097039	**HSA-10 (30-31.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097041	**HSA-10 (50-51.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097042	**HSA-10 (60-61.5)**	EPA 3050	MPRP/51399	EPA 6020A	ICPM/22832
10292097043	**HSA-10 (63-63.5)**	EPA 3050	MPRP/52123	EPA 6020A	ICPM/23122
10292097003	**HSA-7 (35-36.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097020	**HSA-8 (76.4-76.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097027	**HSA-9 (50-51.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097030	**HSA-9 (80-81.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097039	**HSA-10 (30-31.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097041	**HSA-10 (50-51.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097042	**HSA-10 (60-61.5)**	EPA 3020	MPRP/52217	EPA 6020A	ICPM/23146
10292097003	**HSA-7 (35-36.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097006	**HSA-7 (70-71.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097020	**HSA-8 (76.4-76.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097027	**HSA-9 (50-51.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097030	**HSA-9 (80-81.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097034	**HSA-11 (20-21.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097037	**HSA-10 (10-11.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097039	**HSA-10 (30-31.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097041	**HSA-10 (50-51.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097042	**HSA-10 (60-61.5)**	EPA 3020	MPRP/52155	EPA 6020A	ICPM/23121
10292097001	**HSA-7 (10-11.5)**	ASTM D2974	MPRP/51626		

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10292097

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10292097003	**HSA-7 (35-36.5)**	ASTM D2974	MPRP/51626		
10292097005	**HSA-7 (60-61.5)**	ASTM D2974	MPRP/51627		
10292097006	**HSA-7 (70-71.5)**	ASTM D2974	MPRP/51627		
10292097007	**HSA-7 (76.1-76.5)**	ASTM D2974	MPRP/51627		
10292097014	**HSA-8 (20-21.5)**	ASTM D2974	MPRP/51627		
10292097016	**HSA-8 (40-41.5)**	ASTM D2974	MPRP/51627		
10292097019	**HSA-8 (70-71.5)**	ASTM D2974	MPRP/51627		
10292097020	**HSA-8 (76.4-76.5)**	ASTM D2974	MPRP/51627		
10292097021	**HSA-8 (80-81.5)**	ASTM D2974	MPRP/52167		
10292097023	**HSA-9 (10-11.5)**	ASTM D2974	MPRP/51627		
10292097027	**HSA-9 (50-51.5)**	ASTM D2974	MPRP/51627		
10292097030	**HSA-9 (80-81.5)**	ASTM D2974	MPRP/51627		
10292097031	**HSA-9 (85-86.5)**	ASTM D2974	MPRP/51627		
10292097034	**HSA-11 (20-21.5)**	ASTM D2974	MPRP/51627		
10292097035	**HSA-11 (25.5-26.5)**	ASTM D2974	MPRP/51627		
10292097037	**HSA-10 (10-11.5)**	ASTM D2974	MPRP/51627		
10292097039	**HSA-10 (30-31.5)**	ASTM D2974	MPRP/51627		
10292097041	**HSA-10 (50-51.5)**	ASTM D2974	MPRP/51627		
10292097042	**HSA-10 (60-61.5)**	ASTM D2974	MPRP/51627		
10292097043	**HSA-10 (63-63.5)**	ASTM D2974	MPRP/52167		
10292097001	**HSA-7 (10-11.5)**	Modified Sobek 3.2	MT/17889		
10292097003	**HSA-7 (35-36.5)**	Modified Sobek 3.2	MT/17889		
10292097006	**HSA-7 (70-71.5)**	Modified Sobek 3.2	MT/17889		
10292097023	**HSA-9 (10-11.5)**	Modified Sobek 3.2	MT/17889		
10292097027	**HSA-9 (50-51.5)**	Modified Sobek 3.2	MT/17889		
10292097030	**HSA-9 (80-81.5)**	Modified Sobek 3.2	MT/17889		
10292097001	**HSA-7 (10-11.5)**	Modified Sobek 3.2	MT/17890		
10292097003	**HSA-7 (35-36.5)**	Modified Sobek 3.2	MT/17890		
10292097006	**HSA-7 (70-71.5)**	Modified Sobek 3.2	MT/17890		
10292097023	**HSA-9 (10-11.5)**	Modified Sobek 3.2	MT/17890		
10292097027	**HSA-9 (50-51.5)**	Modified Sobek 3.2	MT/17890		
10292097030	**HSA-9 (80-81.5)**	Modified Sobek 3.2	MT/17890		
10292097001	**HSA-7 (10-11.5)**	Modified Sobek 3.2	MT/17907		
10292097003	**HSA-7 (35-36.5)**	Modified Sobek 3.2	MT/17907		
10292097006	**HSA-7 (70-71.5)**	Modified Sobek 3.2	MT/17907		
10292097023	**HSA-9 (10-11.5)**	Modified Sobek 3.2	MT/17907		
10292097027	**HSA-9 (50-51.5)**	Modified Sobek 3.2	MT/17907		
10292097030	**HSA-9 (80-81.5)**	Modified Sobek 3.2	MT/17907		

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

1029097

Page : 1 Of 4

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 East Second Street
Spokane, WA 99202
Email To: cvoss@geoengineers.com
Phone: 5093633125 Fax:
Requested Due Date/TAT: 10 Day (Standard)

Section B
Required Project Information:

Report To: Chelsea Voss
Copy To:
Purchase Order No.
Client Project ID: Van Stone Mine
Container Order Number:

Section C
Invoice Information:

Attention: Accounts Payable
Company Name: GeoEngineers
Address: 523 E. 2nd Ave, Spokane, WA 99202
Pace Quote Reference:
Pace Project Manager: Jenni Gross
Pace Profile #: 34631 # 1

Regulatory Agency:
State / Location: WA

SAMPLE ID — One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

ITEM#	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Acid Base Potential/ Acid Potential	Sulfur Forms / Neutralization Potential	Asbestos (PLM)	[redacted]	[redacted]	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*	Residual Chlorine (Y/N)	
1	HSA-7 (10-11.5)			12/16/14	0935				4										X					X				001
2	HSA-7 (25-26.5)				1000				4																			002
3	HSA-7 (35-36.5)				1020				4										X					X				003
4	HSA-7 (45-46.5)				1050				4																			004
5	HSA-7 (60-61.5)				1200				4										X					X				005
6	HSA-7 (70-71.5)				1300				4										X					X				006
7	HSA-7 (75-76.5)				~~1300~~ 1315				1															X				1 jar ([illegible]) 007
8	HSA-7 (76.5-78)				1320				4																			008
9	HSA-7 (83-84.5)				1400				4																			009
10	HSA-7 (85-86.5)				1440				4																			010
11	HSA-7 (91.5-93)				1520				4																			011
12	HSA-7 (95-96.5)			↓	1600				2																			012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*AOI-1 / AOI-2 = Sb, As, Cd, Cu, Pb, Zn / Hg				PACE	12-17-14	1015	3.7	Y	N	Y
*AOI-3 = Sb, As, Cd, Cr, Cu, Pb, Ni, Zn (Hg not needed)							0.8			
							0.4			
							0.2			
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed: 12/16/14

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 2 Of 4

Section A
Required Client Information:
Company: GeoEngineers
Address: 523 East Second Street
Spokane, WA 99202
Email To: cvoss@geoengineers.com
Phone: 5093633125 Fax
Requested Due Date/TAT: 10 Day (Standard)

Section B
Required Project Information:
Report To: Chelsea Voss
Copy To:
Purchase Order No.
Client Project ID: Van Stone Mine
Container Order Number:

Section C
Invoice Information:
Attention: Accounts Payable
Company Name: GeoEngineers
Address: 523 E. 2nd Ave, Spokane, WA 99202
Pace Quote Reference:
Pace Project Manager: Jenni Gross
Pace Profile #: 34631 # 1

Regulatory Agency
State / Location: WA

SAMPLE ID: One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

ITEM#	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Y/N: Analyses Test	Requested Analysis Filtered (Y/N): Acid Base Potential/ Acid Potential	Sulfur Forms / Neutralization Potential	Asbestos (PLM)	[redacted]	[redacted]	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*					Residual Chlorine (Y/N)	
1	HSA-8 (10-11.5)			12/9/14	0910				4																							013
2	HSA-8 (20-21.5)				0935				4										X					X								014
3	HSA-8 (30-31.5)				0950				4																							015
4	HSA-8 (40-41.5)				1015				4										X					X								016
5	HSA-8 (50-51.5)				1040				4																							017
6	HSA-8 (60-61.5)				1115				4																							018
7	HSA-8 (70-71.5)				1145				4										X					X								019
8	HSA-8 (75-76.5				1215				2															X								2 jars 020
9	HSA-8 (80-81.5)				1230				4																							021
10	HSA-8 (85-86)				1300				2																							2 jars 022
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*AOI-1 / AOI-2 = Sb, As, Cd, Cu, Pb, Zn / Hg				PACE	12-17-14	1015	3.7	Y	N	Y
*AOI-3 = Sb, As, Cd, Cr, Cu, Pb, Ni, Zn (Hg not needed)							0.8			
							0.4			
							0.2			
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed: 12/16/14

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 3 Of 4

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 East Second Street
Spokane, WA 99202
Email To: cvoss@geoengineers.com
Phone: 5093633125 Fax
Requested Due Date/TAT: 10 Day (Standard)

Section B
Required Project Information:

Report To: Chelsea Voss
Copy To:
Purchase Order No.
Client Project ID: Van Stone Mine
Container Order Number:

Section C
Invoice Information:

Attention: Accounts Payable
Company Name: GeoEngineers
Address: 523 E. 2nd Ave, Spokane, WA 99202
Pace Quote Reference:
Pace Project Manager: Jenni Gross
Pace Profile #: 34631 # 1

Regulatory Agency

State / Location
WA

SAMPLE ID
One Character per box.
(A-Z, 0-9 / , -)
Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

ITEM#	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED				SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives								Requested Analysis Filtered (Y/N)														
				START		END												Y/N														
				DATE	TIME	DATE	TIME			Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test	Acid Base Potential/ Acid Potential	Sulfur Forms / Neutralization Potential	Asbestos (PLM)	~~NWTPH-Dx (Diesel only)~~	~~NWTPH-Gx~~	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*					Residual Chlorine (Y/N)	
1	HSA-9 (10-11.5)			12/9	1540			4											X					X								023
2	HSA-9 (20-21.5)				1610			4																								024
3	HSA-9 (30-31.5)			↓	1620			4																								025
4	HSA-9 (40-41.5)			12/10	0820			4																								026
5	HSA-9 (50-51.5)				0855			4											X					X								~~025~~ 027
6	HSA-9 (60-61.5)				0915			4																								028
7	HSA-9 (70-71.5)				1000			4																								029
8	HSA-9 (80-81.5)				1030			4											X					X								030
9	HSA-9 (85-86.5)				1220			4																X								031
10	HSA-9 (89-89.5)			↓	1310			4																								032
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*AOI-1 / AOI-2 = Sb, As, Cd, Cu, Pb, Zn / Hg				PACE	12-17-14	1015	3.7	Y	N	Y
*AOI-3 = Sb, As, Cd, Cr, Cu, Pb, Ni, Zn (Hg not needed)							0.8			
							0.4			
							0.2			
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed: 12/16/14

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page : 4 Of 4

Section A
Required Client Information:

Company:	GeoEngineers
Address:	523 East Second Street Spokane, WA 99202
Email To:	cvoss@geoengineers.com
Phone:	5093633125 Fax
Requested Due Date/TAT:	10 Day (Standard)

Section B
Required Project Information:

Report To:	Chelsea Voss
Copy To:	
Purchase Order No.	
Client Project ID:	Van Stone Mine
Container Order Number:	

Section C
Invoice Information:

Attention:	Accounts Payable
Company Name:	GeoEngineers
Address:	523 E. 2nd Ave, Spokane, WA 99202
Pace Quote Reference:	
Pace Project Manager:	Jenni Gross
Pace Profile #:	34631 # 1

Regulatory Agency

State / Location
WA

SAMPLE ID
One Character per box.
(A-Z, 0-9 / , -)
Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

ITEM#	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other
1	HSA-11 (10-11.5)			12/11	1000			~~4~~	4								
2	HSA-11 (20-21.5)			↓	1020			~~4~~	4								
3	HSA-11 (25-26.5)				1030			~~2~~	2								
4	HSA-11 (27-27.5)				1040			~~2~~	2								
5	HSA-10 (10-11.5)			12/10	1500			~~4~~	4								
6	HSA-10 (20-21.5)			↓	1320			~~4~~	4								
7	HSA-10 (30-31.5)				1540			~~4~~	4								
8	HSA-10 (40-41.5)				1550			~~4~~	4								
9	HSA-10 (50-51.5)				1600			~~4~~	4								
10	HSA-10 (60-61.5)			12/11	0750			~~4~~	4								
11	HSA-10 (63-63.5)			12/11	0825			~~2~~	2								
12								~~2~~									

ITEM#	Y/N Analyses Test	Requested Analysis Filtered (Y/N) Acid Base Potential/ Acid Potential	Sulfur Forms / Neutralization Potential	Asbestos (PLM)	[redacted]	[redacted]	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*					Residual Chlorine (Y/N)	
1		X													033
2		X					X								034
3							X								035
4															036
5		X					X								037
6															038
7		X					X								039
8															040
9		X					X								041
10							X								042
11															043
12															

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*AOI-1 / AOI-2 = Sb, As, Cd, Cu, Pb, Zn / Hg				PACE	12-17-14	1015	3.7	Y	N	Y
*AOI-3 = Sb, As, Cd, Cr, Cu, Pb, Ni, Zn (Hg not needed)							0.8			
							0.4			
							0.2			
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee

SIGNATURE of SAMPLER:

DATE Signed: 12/16/14

Pace Analytical®	Document Name: Sample Condition Upon Receipt Form	Document Revised: 28Feb2014 Page 1 of 1
	Document No.: F-MN-L-213-rev.09	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: GeoEngineers

Project #: **WO# : 10292097**

10292097

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: See exceptions sheet

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No **Seals Intact?** ☐ Yes ☑ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☑ Yes ☐ No

Thermom. Used: ☑ 888A9130516413 ☐ 888A912167504 ☐ 888A9132521491 **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): see exceptions **Cooler Temp Corrected (°C):** see exceptions **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** true **Date and Initials of Person Examining Contents:** 12-17-14 NS

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☐ Yes	☑ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11.
Sample Labels Match COC? **-Includes Date/Time/ID/Analysis Matrix:** SL	☑ Yes	☑ No	☐ N/A	12. time labeled on the containers from sample 6 off of coc page 4 is 1520, not 1320
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? **(HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)**	☐ Yes	☐ No	☑ N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☑ No		Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☑ No

Person Contacted: John Haney **Date/Time:** 12/19/14 18:00

Comments/Resolution:

Only analyze ABA on HSA-7(10-11.5), ~~HS-A~~ JG 12/22/14 HSA-7(35-36.5), HSA-7(70-71.5), HSA-9(10-11.5), HSA-9(50-51.5), HSA-9(80-81.5). Also run these for asbestos.

Project Manager Review: JENN GROSS **Date:** 12/19/14

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical	Document Name: **SCUR Exceptions Form**	Document Revised: 16Apr2012 Page 1 of 1
	Document No.: **F-MN-L-220-Rev.00**	Issuing Authority: Pace Minnesota Quality Office

Workorder #: 10292097

~~Issue~~	~~Sample ID~~	~~Container Type/#~~
Tracking Number	Read Temp (°C)	Corrected Temp (°C)
5779 5332 6170	3.7	3.7
" " 6192	0.8	0.8
" " 6207	0.4	0.4
" " 6181	0.2	0.2

Pace Analytical	Document Name: MN to MT Sample Transfer Form	Revised Date: 14Jul2014 Page: 1 of 1
	Document Number: F-MN-C-043-rev.11	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS Fed Ex
Tracking #:	
Client:	Geoengineers
Due Date:	01/07/14 or Sooner
Pace WO:	10292097
Project Manager:	Jenni Gross

MN to MT Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	Container Type	# of Bottles	Lab ID's	Preservative Yes or No	Verify Arrival Date & Initials
Tests			12/24/14		
Acid Base Accounting	JGCU	1	-001,-003,~~-005~~,-006,~~-014~~	No	
Acid Base Accounting	JGCU	1	~~-016~~,~~-019~~,-023,-027,-030	No	
Acid Base Accounting	JGCU	1	~~-034,-037,-039,-041~~	No	

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

01/07/14 due date or sooner (Acid Base Potential, Acid Potential, Sulfur Forms, Neutralization Potential)

MONTANA SAMPLE RECEIPT INFORMATION

IR Gun: B88A0140728348, Correction Factor:		Sample Matrix:	
Cooler Temp Read (°C):	Cooler Temp Corrected (°C):	Filtred volume rec'd for dissolved tests:	Yes __ No__ NA ___
Arrived on Ice:	Yes __ No__	Samples pH have been checked:	Yes __ No__ NA ___
Custody Seal Present:	Yes __ No__	Trip Blank Present:	Yes __ No__ NA ___
Short Hold Time Requested < 72 Hours:	Yes __ No__	Trip Blank Custody Seals Present:	Yes __ No__ NA ___
Rush TAT Requested:	Yes __ No__	Pace Trip Blank Lot #:	
Sufficient Sample Volume:	Yes __ No__	Sample Composites Required:	Yes __ No__ NA ___
Samples Arrived within Hold Time:	Yes __ No__	Report Samples:	Wet Wt. __ Dry Wt.__
Containers Intact:	Yes __ No__	Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	Date	Time	Accepted By Affiliation	Date	Time
/Pace	12/19/14	1520			

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: John Haney **Date:** 12/19/14 18:00

Comments/Resolution: Analyze ABA + Asbestos on -001, -003, -006, -023, -027, -030 - Cancel other samples for ABA.

Project Manager Review: Jenni Gross **Date:** 12/19/14 ~~18~~ 12/19/14

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

REPORT TO:	John Haney GeoEngineers, Inc - WA 523 East Second Ave. Spokane, WA 99202	**DATE:** **PACE PROJECT NO:** **PAGE:**	**December 24, 2014** **10292097** **1 of 9**
REPORT OF:	Bulk Material Analysis - Van Stone Mine		

CASE NARRATIVE:

On December 17, 2014, our laboratory received 6 bulk material sample(s) from the client. The asbestos analysis was performed in accordance with EPA 600/M4-82-020 and EPA/600/R-93/116 official test methods as outlined in 40CFR763.109 appendix A.

The samples will be held for sixty (60) days from the date of this report.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described.
Concentrations of analyte, if present, below this were not quantifiable.

Pace Analytical Services, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for conducting asbestos analysis (NVLAP Lab Code 101292-0). Each result listed in the report applies only to the sample analyzed. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government nor may it be reproduced except in full without written approval of Pace Analytical Services, Inc.

12/19/14 Per client request only the following samples are to be analyzed for ABA and Asbestos has been added:

HSA-7(10-11.5)
HSA-7(35-36.5)
HSA-7(70-71.5)
HSA-9(10-11.5)
HSA-9(50-51.5)
HSA-9(80-81.5)

Project Manager	Analyst/Approved Signatory
William Thomas	Michael J. Otness
Will Thomas for Jennifer Gross - Project Manager jennifer.gross@pacelabs.com	Michael Otness - Laboratory Analyst

Building Material Analysis
Asbestos Content

GeoEngineers WA
Sobeks

Lab Number	Date Analyzed	Sample Identification	Sample Description			Asbestos Identification and Estimated Quantity		Non-Asbestos Material Identification	
			Layers	Color	Matrix				
10292097001	12/22/2014	HSA-7 (10-11.5)	1/1	Gray	Sand		None Detected	100%	Nonfibrous Binder
10292097003	12/22/2014	HSA-7 (35.36.5)	1/1	Gray	Sand	<1	Chrysotile	98%	Nonfibrous Binder
						<1	Actinolite		
10292097006	12/22/2014	HSA-7 (70.71.5)	1/1	Gray	Sand		None Detected	100%	Nonfibrous Binder
10292097023	12/22/2014	HSA-9 (10.11.5)	1/1	Gray	Sand		None Detected	100%	Nonfibrous Binder
10292097027	12/22/2014	HSA-9 (50.51.5)	1/1	Gray	Sand		None Detected	100%	Nonfibrous Binder
10292097030	12/22/2014	HAS-9 (80-81.5)	1/1	Gray	Sand		None Detected	100%	Nonfibrous Binder

Michael Otness, analyst

In the case of nonhomogeneous samples (samples which contain more than one visually distinct material which is not mixed), concentrations of materials are given for each layer and, where applicable, composite values are given for the entire sample. The quantification of asbestos in the sample is an estimate only due to the nature of the test method.

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

March 11, 2015

John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

RE: Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Dear John Haney:

Enclosed are the analytical results for sample(s) received by the laboratory on January 13, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

02/24/15 Per client request the following samples were analyzed for TCLP As, Cd, Pb, Hg and SPLP As, Cd, Cu, Pb, Sb, Zn, Hg:

HSA-1 (20-21.5)
HSA-1 (30-31.5)
HSA-2 (10-11.5)
HSA-3 (10-11.5)
HSA-3 (20-21.5)
HSA-4 (10-11.5)
HSA-4 (20-21.5)
HSA-4 (25-26)
HSA-5 (10-11.5)
HSA-5 (20-21.5)
HSA-6 (10-11.5)
HSA-6 (20-21.5)

March 11, 2015
Page 2

Per client request the following samples were analyzed for Asbestos:

HSA-3 (10-11.5)
HSA-3 (20-21.5)
HSA-6 (10-11.5)
HSA-6 (20-21.5)

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenni Gross

Jennifer Gross
jennifer.gross@pacelabs.com
Project Manager

Enclosures

cc: Chelsea Voss, GeoEngineers

CERTIFICATIONS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

Montana Certification IDs

150 N. 9th Street, Billings, MT 59101
Colorado Asbestos #: 17119
A2LA Certification #: 3590.01
EPA Region 8 Certification #: 8TMS-L
Idaho Certification #: MT00012
Minnesota Dept of Health Certification #: 030-999-442
Montana Certification #: MT CERT0040
North Dakota Dept. Of Health #: R-209
NVLAP Certification #: 101292-0
Washington Department of Ecology #: C993

SAMPLE SUMMARY

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10294014001	**HSA-6(10-11.5)**	Solid	01/07/15 11:35	01/13/15 10:00
10294014002	**HSA-6(20-21.5)**	Solid	01/07/15 12:00	01/13/15 10:00
10294014003	**HSA-6(30-31.5)**	Solid	01/07/15 12:30	01/13/15 10:00
10294014004	**HSA-6(35-36.5)**	Solid	01/07/15 13:00	01/13/15 10:00
10294014005	**HSA-6(40-41)**	Solid	01/07/15 13:15	01/13/15 10:00
10294014006	**HSA-6(45-46.5)**	Solid	01/07/15 13:30	01/13/15 10:00
10294014007	**HSA-6(50-51.5)**	Solid	01/07/15 14:00	01/13/15 10:00
10294014008	**HSA-5(10-11.5)**	Solid	01/08/15 08:30	01/13/15 10:00
10294014009	**HSA-5(20-21.5)**	Solid	01/08/15 09:00	01/13/15 10:00
10294014010	**HSA-5(30-31.5)**	Solid	01/08/15 09:25	01/13/15 10:00
10294014011	**HSA-1(10-11.5)**	Solid	01/08/15 12:00	01/13/15 10:00
10294014012	**HSA-1(20-21.5)**	Solid	01/08/15 12:30	01/13/15 10:00
10294014013	**HSA-1(30-31.5)**	Solid	01/08/15 13:00	01/13/15 10:00
10294014014	**HSA-1(40-41.5)**	Solid	01/08/15 13:20	01/13/15 10:00
10294014015	**HSA-1(45-46.5)**	Solid	01/08/15 13:40	01/13/15 10:00
10294014016	**HSA-1(50-51.5)**	Solid	01/08/15 13:50	01/13/15 10:00
10294014017	**HSA-1(55-56.5)**	Solid	01/08/15 14:00	01/13/15 10:00
10294014018	**HSA-1(60-61.5)**	Solid	01/08/15 14:15	01/13/15 10:00
10294014019	**HSA-2(10-11.5)**	Solid	01/09/15 08:15	01/13/15 10:00
10294014020	**HSA-2(15-16.5)**	Solid	01/09/15 09:00	01/13/15 10:00
10294014021	**HSA-2(20-21.5)**	Solid	01/09/15 09:10	01/13/15 10:00
10294014022	**HSA-2(25-26)**	Solid	01/09/15 09:20	01/13/15 10:00
10294014023	**HSA-2(30-31.5)**	Solid	01/09/15 09:40	01/13/15 10:00
10294014024	**HSA-3(10-11.5)**	Solid	01/09/15 11:00	01/13/15 10:00
10294014025	**HSA-3(20-21.5)**	Solid	01/09/15 11:15	01/13/15 10:00
10294014026	**HSA-3(30-31.5)**	Solid	01/09/15 11:40	01/13/15 10:00
10294014027	**HSA-3(35-36.5)**	Solid	01/09/15 12:00	01/13/15 10:00
10294014028	**HSA-3(40-41.5)**	Solid	01/09/15 12:40	01/13/15 10:00
10294014029	**HSA-3(43-44.5)**	Solid	01/09/15 13:10	01/13/15 10:00
10294014030	**HSA-4(10-11.5)**	Solid	01/09/15 14:40	01/13/15 10:00
10294014031	**HSA-4(20-21.5)**	Solid	01/09/15 15:00	01/13/15 10:00
10294014032	**HSA-4(25-26)**	Solid	01/09/15 15:20	01/13/15 10:00
10294014033	**HSA-4(30-30.5)**	Solid	01/09/15 15:40	01/13/15 10:00

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10294014001	**HSA-6(10-11.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014002	**HSA-6(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014003	**HSA-6(30-31.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014008	**HSA-5(10-11.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014009	**HSA-5(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014010	**HSA-5(30-31.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014012	**HSA-1(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014013	**HSA-1(30-31.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014014	**HSA-1(40-41.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014019	**HSA-2(10-11.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014020	**HSA-2(15-16.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014021	**HSA-2(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014024	**HSA-3(10-11.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014025	**HSA-3(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014026	**HSA-3(30-31.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014030	**HSA-4(10-11.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		Modified Sobek 3.2	WT1	2	PASI-MT
10294014031	**HSA-4(20-21.5)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10294014032	**HSA-4(25-26)**	EPA 6020A	TT3	6	PASI-M
		EPA 6020A	TT3	3	PASI-M
		EPA 6020A	RJS	6	PASI-M
		EPA 7470A	DM	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471	DM	1	PASI-M
		ASTM D2974	JDL	1	PASI-M

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-6(10-11.5) **Lab ID: 10294014001** Collected: 01/07/15 11:35 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.82**	mg/kg	0.47	20	01/20/15 10:44	01/21/15 10:49	7440-36-0	M6
Arsenic	**6.3**	mg/kg	0.47	20	01/20/15 10:44	01/21/15 10:49	7440-38-2	
Cadmium	**13.0**	mg/kg	0.076	20	01/20/15 10:44	01/21/15 10:49	7440-43-9	
Copper	**27.9**	mg/kg	0.95	20	01/20/15 10:44	01/21/15 10:49	7440-50-8	M6
Lead	**240**	mg/kg	2.4	500	01/20/15 10:44	01/21/15 19:41	7439-92-1	M6
Zinc	**5410**	mg/kg	119	500	01/20/15 10:44	01/21/15 19:41	7440-66-6	M6,R1
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
	Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 9.43; Final pH: 5.21							
Arsenic	**<0.012**	mg/L	0.012	5	03/04/15 14:16	03/05/15 11:06	7440-38-2	
Cadmium	**0.078**	mg/L	0.0020	5	03/04/15 14:16	03/05/15 11:06	7440-43-9	
Lead	**2.6**	mg/L	0.0025	5	03/04/15 14:16	03/05/15 11:06	7439-92-1	M6
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
	Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.88; Final pH: 8.88							
Antimony	**0.0022**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:22	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:22	7440-38-2	
Cadmium	**<0.000080**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 11:22	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 11:22	7440-50-8	
Lead	**0.0012**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 11:22	7439-92-1	
Zinc	**0.011**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 11:22	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A							
	Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.88; Final pH: 8.88							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:26	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A							
	Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 9.43; Final pH: 5.21							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:28	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0019**	mg/L	0.00020	1	01/20/15 12:02	01/21/15 13:01	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**10**	%	0.10	1		01/16/15 13:47		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**480**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 10:32		
Sulfur, HNO3 Extractable	**0.521**	% (w/w)	0.050	1		01/26/15 10:32		
Sulfur, Hot Water Extractable	**1.10**	% (w/w)	0.050	1		01/26/15 10:32		
Sulfur, Residual	**0.141**	% (w/w)	0.050	1		01/26/15 10:32		
Total Sulfur	**1.17**	% (w/w)	0.050	1		01/26/15 10:32		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-6(10-11.5) **Lab ID: 10294014001** Collected: 01/07/15 11:35 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**459**	tons/1000		1		01/27/15 15:00		
Acid Potential	**21**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-6(20-21.5) **Lab ID: 10294014002** Collected: 01/07/15 12:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.5**	mg/kg	0.54	20	01/20/15 10:44	01/21/15 10:41	7440-36-0	
Arsenic	**5.9**	mg/kg	0.54	20	01/20/15 10:44	01/21/15 10:41	7440-38-2	
Cadmium	**25.8**	mg/kg	0.086	20	01/20/15 10:44	01/21/15 10:41	7440-43-9	
Copper	**18.9**	mg/kg	1.1	20	01/20/15 10:44	01/21/15 10:41	7440-50-8	
Lead	**335**	mg/kg	10.8	2000	01/20/15 10:44	01/21/15 19:55	7439-92-1	
Zinc	**11700**	mg/kg	540	2000	01/20/15 10:44	01/21/15 19:55	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 9.59; Final pH: 2.14							
Arsenic	**<0.0025**	mg/L	0.0025	1	03/04/15 14:10	03/05/15 09:39	7440-38-2	
Cadmium	**0.068**	mg/L	0.00040	1	03/04/15 14:10	03/05/15 09:39	7440-43-9	
Lead	**2.3**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 10:13	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.86; Final pH: 8.86							
Antimony	**0.0024**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:47	7440-36-0	
Arsenic	**0.00095**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:47	7440-38-2	
Cadmium	**<0.000080**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 11:47	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 11:47	7440-50-8	
Lead	**0.0024**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 11:47	7439-92-1	
Zinc	**0.019**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 11:47	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.86; Final pH: 8.86							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:34	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 9.59; Final pH: 2.14							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:36	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0032**	mg/L	0.00020	1	01/20/15 12:02	01/21/15 13:07	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**11.0**	%	0.10	1		01/16/15 13:48		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**400**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 11:10		
Sulfur, HNO3 Extractable	**0.321**	% (w/w)	0.050	1		01/26/15 11:10		
Sulfur, Hot Water Extractable	**0.862**	% (w/w)	0.050	1		01/26/15 11:10		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 11:10		
Total Sulfur	**0.885**	% (w/w)	0.050	1		01/26/15 11:10		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-6(20-21.5) **Lab ID: 10294014002** Collected: 01/07/15 12:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**389**	tons/1000		1		01/27/15 15:00		
Acid Potential	**11**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-6(30-31.5) **Lab ID: 10294014003** Collected: 01/07/15 12:30 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.56**	mg/kg	0.56	20	01/20/15 10:44	01/21/15 19:58	7440-36-0	
Arsenic	**0.76**	mg/kg	0.56	20	01/20/15 10:44	01/21/15 19:58	7440-38-2	
Cadmium	**<0.090**	mg/kg	0.090	20	01/20/15 10:44	01/21/15 19:58	7440-43-9	
Copper	**3.2**	mg/kg	1.1	20	01/20/15 10:44	01/21/15 19:58	7440-50-8	
Lead	**5.4**	mg/kg	0.11	20	01/20/15 10:44	01/21/15 19:58	7439-92-1	
Zinc	**45.6**	mg/kg	5.6	20	01/20/15 10:44	01/21/15 19:58	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.023**	mg/kg	0.023	1	01/20/15 12:02	01/21/15 13:09	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**12.4**	%	0.10	1		01/16/15 13:48		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-5(10-11.5) **Lab ID: 10294014008** Collected: 01/08/15 08:30 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.56**	mg/kg	0.56	20	01/20/15 10:44	01/21/15 11:12	7440-36-0	
Arsenic	**5.9**	mg/kg	0.56	20	01/20/15 10:44	01/21/15 11:12	7440-38-2	
Cadmium	**5.7**	mg/kg	0.089	20	01/20/15 10:44	01/21/15 11:12	7440-43-9	
Copper	**32.4**	mg/kg	1.1	20	01/20/15 10:44	01/21/15 11:12	7440-50-8	
Lead	**146**	mg/kg	1.1	200	01/20/15 10:44	01/21/15 20:01	7439-92-1	
Zinc	**2890**	mg/kg	55.7	200	01/20/15 10:44	01/21/15 20:01	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 9.14; Final pH: 5.72							
Arsenic	**<0.012**	mg/L	0.012	5	03/04/15 14:16	03/05/15 10:58	7440-38-2	
Cadmium	**0.11**	mg/L	0.0020	5	03/04/15 14:16	03/05/15 10:58	7440-43-9	
Lead	**1.6**	mg/L	0.0025	5	03/04/15 14:16	03/05/15 10:58	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.51; Final pH: 8.51							
Antimony	**0.0018**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:52	7440-36-0	
Arsenic	**0.00051**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 11:52	7440-38-2	
Cadmium	**0.000090**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 11:52	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 11:52	7440-50-8	
Lead	**0.0029**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 11:52	7439-92-1	
Zinc	**0.027**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 11:52	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.51; Final pH: 8.51							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:36	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 9.14; Final pH: 5.72							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:38	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0011**	mg/L	0.00025	1	01/20/15 12:02	01/21/15 13:11	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**19.1**	%	0.10	1		01/16/15 13:48		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**510**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 11:26		
Sulfur, HNO3 Extractable	**0.151**	% (w/w)	0.050	1		01/26/15 11:26		
Sulfur, Hot Water Extractable	**0.476**	% (w/w)	0.050	1		01/26/15 11:26		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 11:26		
Total Sulfur	**0.482**	% (w/w)	0.050	1		01/26/15 11:26		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-5(10-11.5) **Lab ID: 10294014008** Collected: 01/08/15 08:30 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**500**	tons/1000		1		01/27/15 15:00		
Acid Potential	**5.3**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-5(20-21.5) **Lab ID: 10294014009** Collected: 01/08/15 09:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.79**	mg/kg	0.61	20	01/20/15 10:44	01/21/15 11:15	7440-36-0	
Arsenic	**7.7**	mg/kg	0.61	20	01/20/15 10:44	01/21/15 11:15	7440-38-2	
Cadmium	**9.5**	mg/kg	0.097	20	01/20/15 10:44	01/21/15 11:15	7440-43-9	
Copper	**149**	mg/kg	1.2	20	01/20/15 10:44	01/21/15 11:15	7440-50-8	
Lead	**716**	mg/kg	1.2	200	01/20/15 10:44	01/21/15 20:04	7439-92-1	
Zinc	**4340**	mg/kg	60.6	200	01/20/15 10:44	01/21/15 20:04	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 8.94; Final pH: 5.54							
Arsenic	**<0.012**	mg/L	0.012	5	03/04/15 14:16	03/05/15 11:01	7440-38-2	
Cadmium	**0.088**	mg/L	0.0020	5	03/04/15 14:16	03/05/15 11:01	7440-43-9	
Lead	**2.1**	mg/L	0.0025	5	03/04/15 14:16	03/05/15 11:01	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.15; Final pH: 8.15							
Antimony	**0.0046**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:29	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:29	7440-38-2	
Cadmium	**0.00022**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:29	7440-43-9	
Copper	**0.0055**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:29	7440-50-8	
Lead	**0.0042**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:29	7439-92-1	
Zinc	**0.033**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:29	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.15; Final pH: 8.15							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:44	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 8.94; Final pH: 5.54							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:41	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0043**	mg/L	0.00024	1	01/20/15 12:02	01/21/15 13:17	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**23.6**	%	0.10	1		01/16/15 13:49		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**580**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 11:45		
Sulfur, HNO3 Extractable	**0.325**	% (w/w)	0.050	1		01/26/15 11:45		
Sulfur, Hot Water Extractable	**0.175**	% (w/w)	0.050	1		01/26/15 11:45		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 11:45		
Total Sulfur	**0.175**	% (w/w)	0.050	1		01/26/15 11:45		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-5(20-21.5) **Lab ID: 10294014009** Collected: 01/08/15 09:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**570**	tons/1000		1		01/27/15 15:00		
Acid Potential	**11**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-5(30-31.5) **Lab ID: 10294014010** Collected: 01/08/15 09:25 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.41**	mg/kg	0.41	20	01/20/15 10:44	01/21/15 20:15	7440-36-0	
Arsenic	**0.66**	mg/kg	0.41	20	01/20/15 10:44	01/21/15 20:15	7440-38-2	
Cadmium	**<0.066**	mg/kg	0.066	20	01/20/15 10:44	01/21/15 20:15	7440-43-9	
Copper	**2.8**	mg/kg	0.83	20	01/20/15 10:44	01/21/15 20:15	7440-50-8	
Lead	**4.2**	mg/kg	0.083	20	01/20/15 10:44	01/21/15 20:15	7439-92-1	
Zinc	**49.2**	mg/kg	4.1	20	01/20/15 10:44	01/21/15 20:15	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.019**	mg/kg	0.019	1	01/20/15 12:02	01/21/15 13:19	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.7**	%	0.10	1		01/16/15 13:49		

ANALYTICAL RESULTS

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10294014

Sample: HSA-1(20-21.5) **Lab ID: 10294014012** Collected: 01/08/15 12:30 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.7**	mg/kg	0.53	20	01/20/15 10:44	01/21/15 11:21	7440-36-0	
Arsenic	**10.6**	mg/kg	0.53	20	01/20/15 10:44	01/21/15 11:21	7440-38-2	
Cadmium	**32.3**	mg/kg	0.085	20	01/20/15 10:44	01/21/15 11:21	7440-43-9	
Copper	**23.3**	mg/kg	1.1	20	01/20/15 10:44	01/21/15 11:21	7440-50-8	
Lead	**814**	mg/kg	10.6	2000	01/20/15 10:44	01/21/15 20:18	7439-92-1	
Zinc	**12600**	mg/kg	530	2000	01/20/15 10:44	01/21/15 20:18	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 9.06; Final pH: 4.59							
Arsenic	**0.0032**	mg/L	0.0025	1	03/04/15 14:10	03/05/15 09:30	7440-38-2	
Cadmium	**0.18**	mg/L	0.00040	1	03/04/15 14:10	03/05/15 09:30	7440-43-9	
Lead	**9.3**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 09:48	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.36; Final pH: 8.36							
Antimony	**0.0025**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:33	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:33	7440-38-2	
Cadmium	**0.00027**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:33	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:33	7440-50-8	
Lead	**0.00088**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:33	7439-92-1	
Zinc	**0.0069**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:33	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.36; Final pH: 8.36							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:46	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 9.06; Final pH: 4.59							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:43	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0065**	mg/L	0.00022	1	01/20/15 12:02	01/21/15 13:21	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**18.7**	%	0.10	1		01/20/15 13:48		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**580**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 11:57		
Sulfur, HNO3 Extractable	**0.232**	% (w/w)	0.050	1		01/26/15 11:57		
Sulfur, Hot Water Extractable	**0.331**	% (w/w)	0.050	1		01/26/15 11:57		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 11:57		
Total Sulfur	**0.338**	% (w/w)	0.050	1		01/26/15 11:57		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-1(20-21.5) **Lab ID: 10294014012** Collected: 01/08/15 12:30 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**570**	tons/1000		1		01/27/15 15:00		
Acid Potential	**7.8**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-1(30-31.5) **Lab ID: 10294014013** Collected: 01/08/15 13:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.7**	mg/kg	0.62	20	01/20/15 10:44	01/21/15 11:23	7440-36-0	
Arsenic	**20.6**	mg/kg	0.62	20	01/20/15 10:44	01/21/15 11:23	7440-38-2	
Cadmium	**105**	mg/kg	0.099	20	01/20/15 10:44	01/21/15 11:23	7440-43-9	
Copper	**152**	mg/kg	1.2	20	01/20/15 10:44	01/21/15 11:23	7440-50-8	
Lead	**3780**	mg/kg	12.4	2000	01/20/15 10:44	01/21/15 20:21	7439-92-1	
Zinc	**35300**	mg/kg	621	2000	01/20/15 10:44	01/21/15 20:21	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 8.97; Final pH: 5.54							
Arsenic	**<0.012**	mg/L	0.012	5	03/04/15 14:16	03/05/15 11:04	7440-38-2	
Cadmium	**0.91**	mg/L	0.0020	5	03/04/15 14:16	03/05/15 11:04	7440-43-9	
Lead	**23.6**	mg/L	0.025	50	03/04/15 14:16	03/05/15 11:15	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.09; Final pH: 8.09							
Antimony	**0.00061**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:38	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:38	7440-38-2	
Cadmium	**0.0012**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:38	7440-43-9	
Copper	**0.0014**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:38	7440-50-8	
Lead	**0.026**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:38	7439-92-1	
Zinc	**0.065**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:38	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.09; Final pH: 8.09							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:49	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 8.97; Final pH: 5.54							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:50	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.043**	mg/L	0.0012	5	01/20/15 12:02	01/21/15 13:23	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**24.7**	%	0.10	1		01/20/15 13:49		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**480**	tons/1000	0.50	1		01/26/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 12:09		
Sulfur, HNO3 Extractable	**0.223**	% (w/w)	0.050	1		01/26/15 12:09		
Sulfur, Hot Water Extractable	**0.416**	% (w/w)	0.050	1		01/26/15 12:09		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 12:09		
Total Sulfur	**0.427**	% (w/w)	0.050	1		01/26/15 12:09		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-1(30-31.5) **Lab ID: 10294014013** Collected: 01/08/15 13:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**470**	tons/1000		1		01/27/15 15:00		
Acid Potential	**8.4**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-1(40-41.5) **Lab ID: 10294014014** Collected: 01/08/15 13:20 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.42**	mg/kg	0.42	20	01/20/15 10:44	01/21/15 20:24	7440-36-0	
Arsenic	**0.75**	mg/kg	0.42	20	01/20/15 10:44	01/21/15 20:24	7440-38-2	
Cadmium	**0.097**	mg/kg	0.067	20	01/20/15 10:44	01/21/15 20:24	7440-43-9	
Copper	**10.1**	mg/kg	0.84	20	01/20/15 10:44	01/21/15 20:24	7440-50-8	
Lead	**8.6**	mg/kg	0.084	20	01/20/15 10:44	01/21/15 20:24	7439-92-1	
Zinc	**38.2**	mg/kg	4.2	20	01/20/15 10:44	01/21/15 20:24	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.018**	mg/kg	0.018	1	01/20/15 12:02	01/21/15 13:25	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**8.3**	%	0.10	1		01/20/15 13:49		

ANALYTICAL RESULTS

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10294014

Sample: HSA-2(10-11.5) **Lab ID: 10294014019** Collected: 01/09/15 08:15 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**0.60**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 11:59	7440-36-0	
Arsenic	**3.8**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 11:59	7440-38-2	
Cadmium	**17.6**	mg/kg	0.082	20	01/20/15 10:44	01/21/15 11:59	7440-43-9	
Copper	**23.3**	mg/kg	1.0	20	01/20/15 10:44	01/21/15 11:59	7440-50-8	
Lead	**179**	mg/kg	2.6	500	01/20/15 10:44	01/21/15 20:26	7439-92-1	
Zinc	**9180**	mg/kg	128	500	01/20/15 10:44	01/21/15 20:26	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.71; Final pH: 2.2							
Arsenic	**<0.0025**	mg/L	0.0025	1	03/04/15 14:10	03/05/15 09:33	7440-38-2	
Cadmium	**0.17**	mg/L	0.00040	1	03/04/15 14:10	03/05/15 09:33	7440-43-9	
Lead	**0.19**	mg/L	0.00050	1	03/04/15 14:10	03/05/15 09:33	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.38; Final pH: 8.38							
Antimony	**0.00090**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:43	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:43	7440-38-2	
Cadmium	**0.00023**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:43	7440-43-9	
Copper	**0.0015**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:43	7440-50-8	
Lead	**0.0082**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:43	7439-92-1	
Zinc	**0.078**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:43	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.38; Final pH: 8.38							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:51	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.71; Final pH: 2.2							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:53	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0014**	mg/L	0.00018	1	01/20/15 12:02	01/21/15 13:28	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.9**	%	0.10	1		01/20/15 15:10		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**430**	tons/1000	0.50	1		01/27/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 12:30		
Sulfur, HNO3 Extractable	**0.0773**	% (w/w)	0.050	1		01/26/15 12:30		
Sulfur, Hot Water Extractable	**0.194**	% (w/w)	0.050	1		01/26/15 12:30		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 12:30		
Total Sulfur	**0.195**	% (w/w)	0.050	1		01/26/15 12:30		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-2(10-11.5) **Lab ID: 10294014019** Collected: 01/09/15 08:15 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**430**	tons/1000		1		01/27/15 15:00		
Acid Potential	**<4.3**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-2(15-16.5) **Lab ID: 10294014020** Collected: 01/09/15 09:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.49**	mg/kg	0.49	20	01/20/15 10:44	01/21/15 20:29	7440-36-0	
Arsenic	**<0.49**	mg/kg	0.49	20	01/20/15 10:44	01/21/15 20:29	7440-38-2	
Cadmium	**<0.079**	mg/kg	0.079	20	01/20/15 10:44	01/21/15 20:29	7440-43-9	
Copper	**<0.99**	mg/kg	0.99	20	01/20/15 10:44	01/21/15 20:29	7440-50-8	
Lead	**1.9**	mg/kg	0.099	20	01/20/15 10:44	01/21/15 20:29	7439-92-1	
Zinc	**57.9**	mg/kg	4.9	20	01/20/15 10:44	01/21/15 20:29	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.019**	mg/kg	0.019	1	01/20/15 12:02	01/21/15 13:30	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**3.4**	%	0.10	1		01/20/15 15:10		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-2(20-21.5) **Lab ID: 10294014021** Collected: 01/09/15 09:10 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.50**	mg/kg	0.50	20	01/20/15 10:44	01/21/15 20:32	7440-36-0	
Arsenic	**0.53**	mg/kg	0.50	20	01/20/15 10:44	01/21/15 20:32	7440-38-2	
Cadmium	**0.14**	mg/kg	0.080	20	01/20/15 10:44	01/21/15 20:32	7440-43-9	
Copper	**19.8**	mg/kg	0.99	20	01/20/15 10:44	01/21/15 20:32	7440-50-8	
Lead	**3.5**	mg/kg	0.099	20	01/20/15 10:44	01/21/15 20:32	7439-92-1	
Zinc	**86.8**	mg/kg	5.0	20	01/20/15 10:44	01/21/15 20:32	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.020**	mg/kg	0.020	1	01/20/15 12:02	01/21/15 13:36	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**4.2**	%	0.10	1		01/20/15 15:10		

REPORT OF LABORATORY ANALYSIS

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-3(10-11.5) **Lab ID: 10294014024** Collected: 01/09/15 11:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.0**	mg/kg	0.50	20	01/20/15 10:44	01/21/15 12:07	7440-36-0	
Arsenic	**3.3**	mg/kg	0.50	20	01/20/15 10:44	01/21/15 12:07	7440-38-2	
Cadmium	**19.4**	mg/kg	0.080	20	01/20/15 10:44	01/21/15 12:07	7440-43-9	
Copper	**21.8**	mg/kg	1.0	20	01/20/15 10:44	01/21/15 12:07	7440-50-8	
Lead	**329**	mg/kg	2.5	500	01/20/15 10:44	01/21/15 20:35	7439-92-1	
Zinc	**8290**	mg/kg	125	500	01/20/15 10:44	01/21/15 20:35	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 7.99; Final pH: 5.01							
Arsenic	**<0.012**	mg/L	0.012	5	03/04/15 14:16	03/05/15 11:30	7440-38-2	
Cadmium	**0.020**	mg/L	0.0020	5	03/04/15 14:16	03/05/15 11:30	7440-43-9	
Lead	**0.73**	mg/L	0.0025	5	03/04/15 14:16	03/05/15 11:30	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.47; Final pH: 7.47							
Antimony	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:48	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:48	7440-38-2	
Cadmium	**0.00019**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:48	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:48	7440-50-8	
Lead	**0.0035**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:48	7439-92-1	
Zinc	**0.092**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:48	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.47; Final pH: 7.47							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:53	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:05 Initial pH: 7.99; Final pH: 5.01							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:55	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0023**	mg/L	0.00021	1	01/20/15 12:02	01/21/15 13:38	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**6.5**	%	0.10	1		01/20/15 15:11		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**380**	tons/1000	0.50	1		01/27/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 12:42		
Sulfur, HNO3 Extractable	**0.113**	% (w/w)	0.050	1		01/26/15 12:42		
Sulfur, Hot Water Extractable	**0.354**	% (w/w)	0.050	1		01/26/15 12:42		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 12:42		
Total Sulfur	**0.355**	% (w/w)	0.050	1		01/26/15 12:42		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-3(10-11.5) **Lab ID: 10294014024** Collected: 01/09/15 11:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**380**	tons/1000		1		01/27/15 15:00		
Acid Potential	**<4.3**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-3(20-21.5) **Lab ID: 10294014025** Collected: 01/09/15 11:15 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**2.6**	mg/kg	0.48	20	01/20/15 10:44	01/21/15 12:10	7440-36-0	
Arsenic	**7.8**	mg/kg	0.48	20	01/20/15 10:44	01/21/15 12:10	7440-38-2	
Cadmium	**37.8**	mg/kg	0.076	20	01/20/15 10:44	01/21/15 12:10	7440-43-9	
Copper	**25.5**	mg/kg	0.96	20	01/20/15 10:44	01/21/15 12:10	7440-50-8	
Lead	**934**	mg/kg	9.6	2000	01/20/15 10:44	01/21/15 20:38	7439-92-1	
Zinc	**16200**	mg/kg	478	2000	01/20/15 10:44	01/21/15 20:38	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.55; Final pH: 4.55							
Arsenic	**<0.0025**	mg/L	0.0025	1	03/04/15 14:10	03/05/15 09:56	7440-38-2	
Cadmium	**0.15**	mg/L	0.00040	1	03/04/15 14:10	03/05/15 09:56	7440-43-9	
Lead	**9.0**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 10:02	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.98; Final pH: 7.98							
Antimony	**0.0019**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:53	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:53	7440-38-2	
Cadmium	**0.00014**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:53	7440-43-9	
Copper	**0.0011**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:53	7440-50-8	
Lead	**0.011**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:53	7439-92-1	
Zinc	**0.037**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:53	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.98; Final pH: 7.98							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:56	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.55; Final pH: 4.55							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 11:58	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0056**	mg/L	0.00020	1	01/20/15 12:02	01/21/15 13:40	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.4**	%	0.10	1		01/20/15 15:11		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**570**	tons/1000	0.50	1		01/27/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 12:59		
Sulfur, HNO3 Extractable	**0.178**	% (w/w)	0.050	1		01/26/15 12:59		
Sulfur, Hot Water Extractable	**0.230**	% (w/w)	0.050	1		01/26/15 12:59		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 12:59		
Total Sulfur	**0.230**	% (w/w)	0.050	1		01/26/15 12:59		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-3(20-21.5) **Lab ID: 10294014025** Collected: 01/09/15 11:15 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**560**	tons/1000		1		01/27/15 15:00		
Acid Potential	**5.9**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-3(30-31.5) **Lab ID: 10294014026** Collected: 01/09/15 11:40 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.51**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 20:49	7440-36-0	
Arsenic	**2.1**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 20:49	7440-38-2	
Cadmium	**0.096**	mg/kg	0.081	20	01/20/15 10:44	01/21/15 20:49	7440-43-9	
Copper	**3.7**	mg/kg	1.0	20	01/20/15 10:44	01/21/15 20:49	7440-50-8	
Lead	**5.2**	mg/kg	0.10	20	01/20/15 10:44	01/21/15 20:49	7439-92-1	
Zinc	**448**	mg/kg	5.1	20	01/20/15 10:44	01/21/15 20:49	7440-66-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.022**	mg/kg	0.022	1	01/20/15 12:02	01/21/15 13:42	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**7.0**	%	0.10	1		01/20/15 15:11		

REPORT OF LABORATORY ANALYSIS

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-4(10-11.5) **Lab ID: 10294014030** Collected: 01/09/15 14:40 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**1.0**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 12:16	7440-36-0	
Arsenic	**3.0**	mg/kg	0.51	20	01/20/15 10:44	01/21/15 12:16	7440-38-2	
Cadmium	**14.4**	mg/kg	0.081	20	01/20/15 10:44	01/21/15 12:16	7440-43-9	
Copper	**21.3**	mg/kg	1.0	20	01/20/15 10:44	01/21/15 12:16	7440-50-8	
Lead	**439**	mg/kg	2.5	500	01/20/15 10:44	01/21/15 20:52	7439-92-1	
Zinc	**5780**	mg/kg	126	500	01/20/15 10:44	01/21/15 20:52	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.93; Final pH: 4.94							
Arsenic	**<0.0025**	mg/L	0.0025	1	03/04/15 14:10	03/05/15 09:59	7440-38-2	
Cadmium	**0.069**	mg/L	0.00040	1	03/04/15 14:10	03/05/15 09:59	7440-43-9	
Lead	**3.9**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 10:05	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.67; Final pH: 8.67							
Antimony	**0.0015**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:58	7440-36-0	
Arsenic	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 12:58	7440-38-2	
Cadmium	**<0.000080**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 12:58	7440-43-9	
Copper	**<0.0010**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 12:58	7440-50-8	
Lead	**0.00078**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 12:58	7439-92-1	
Zinc	**0.0080**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 12:58	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 8.67; Final pH: 8.67							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 10:58	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 8.93; Final pH: 4.94							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 12:00	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**0.0011**	mg/L	0.00020	1	01/20/15 12:02	01/21/15 13:44	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**8.4**	%	0.10	1		01/20/15 15:11		
Sobek Acid Base Potential	Analytical Method: Modified Sobek 3.2							
Neutralization Potential	**580**	tons/1000	0.50	1		01/27/15 13:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2							
Sulfur, HCl Extractable	**<0.050**	% (w/w)	0.050	1		01/26/15 13:11		
Sulfur, HNO3 Extractable	**0.244**	% (w/w)	0.050	1		01/26/15 13:11		
Sulfur, Hot Water Extractable	**0.287**	% (w/w)	0.050	1		01/26/15 13:11		
Sulfur, Residual	**<0.050**	% (w/w)	0.050	1		01/26/15 13:11		
Total Sulfur	**0.299**	% (w/w)	0.050	1		01/26/15 13:11		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-4(10-11.5) **Lab ID: 10294014030** Collected: 01/09/15 14:40 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Calculations	Analytical Method: Modified Sobek 3.2							
Acid/Base Potential	**570**	tons/1000		1		01/27/15 15:00		
Acid Potential	**8.1**	tons/1000	4.3	1		01/27/15 15:00		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-4(20-21.5) **Lab ID: 10294014031** Collected: 01/09/15 15:00 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.49**	mg/kg	0.49	20	01/20/15 10:44	01/21/15 20:55	7440-36-0	
Arsenic	**2.0**	mg/kg	0.49	20	01/20/15 10:44	01/21/15 20:55	7440-38-2	
Cadmium	**0.11**	mg/kg	0.079	20	01/20/15 10:44	01/21/15 20:55	7440-43-9	
Copper	**2.9**	mg/kg	0.99	20	01/20/15 10:44	01/21/15 20:55	7440-50-8	
Lead	**11.8**	mg/kg	0.099	20	01/20/15 10:44	01/21/15 20:55	7439-92-1	
Zinc	**19.0**	mg/kg	4.9	20	01/20/15 10:44	01/21/15 20:55	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 7.72; Final pH: 1.88							
Arsenic	**<0.025**	mg/L	0.025	10	03/04/15 14:10	03/05/15 10:34	7440-38-2	D3
Cadmium	**<0.0040**	mg/L	0.0040	10	03/04/15 14:10	03/05/15 10:34	7440-43-9	D3
Lead	**0.11**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 10:34	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.48; Final pH: 7.48							
Antimony	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 13:02	7440-36-0	
Arsenic	**0.0011**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 13:02	7440-38-2	
Cadmium	**<0.000080**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 13:02	7440-43-9	
Copper	**0.0014**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 13:02	7440-50-8	
Lead	**0.0097**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 13:02	7439-92-1	
Zinc	**0.013**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 13:02	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.48; Final pH: 7.48							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 11:01	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 7.72; Final pH: 1.88							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 12:08	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.00021**	mg/L	0.00021	1	01/20/15 12:02	01/21/15 13:46	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**3.3**	%	0.10	1		01/20/15 15:12		

ANALYTICAL RESULTS

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Sample: HSA-4(25-26) **Lab ID: 10294014032** Collected: 01/09/15 15:20 Received: 01/13/15 10:00 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050							
Antimony	**<0.47**	mg/kg	0.47	20	01/20/15 10:44	01/21/15 20:58	7440-36-0	
Arsenic	**0.63**	mg/kg	0.47	20	01/20/15 10:44	01/21/15 20:58	7440-38-2	
Cadmium	**0.12**	mg/kg	0.075	20	01/20/15 10:44	01/21/15 20:58	7440-43-9	
Copper	**9.2**	mg/kg	0.94	20	01/20/15 10:44	01/21/15 20:58	7440-50-8	
Lead	**6.4**	mg/kg	0.094	20	01/20/15 10:44	01/21/15 20:58	7439-92-1	
Zinc	**62.9**	mg/kg	4.7	20	01/20/15 10:44	01/21/15 20:58	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 7.91; Final pH: 1.52							
Arsenic	**<0.025**	mg/L	0.025	10	03/04/15 14:10	03/05/15 10:37	7440-38-2	D3
Cadmium	**<0.0040**	mg/L	0.0040	10	03/04/15 14:10	03/05/15 10:37	7440-43-9	D3
Lead	**0.15**	mg/L	0.0050	10	03/04/15 14:10	03/05/15 10:37	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.75; Final pH: 7.75							
Antimony	**<0.00050**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 13:07	7440-36-0	
Arsenic	**0.0012**	mg/L	0.00050	1	03/08/15 20:48	03/09/15 13:07	7440-38-2	
Cadmium	**<0.000080**	mg/L	0.000080	1	03/08/15 20:48	03/09/15 13:07	7440-43-9	
Copper	**0.031**	mg/L	0.0010	1	03/08/15 20:48	03/09/15 13:07	7440-50-8	
Lead	**0.0047**	mg/L	0.00010	1	03/08/15 20:48	03/09/15 13:07	7439-92-1	
Zinc	**0.048**	mg/L	0.0050	1	03/08/15 20:48	03/09/15 13:07	7440-66-6	
7470 Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 03/06/15 16:31 Initial pH: 7.75; Final pH: 7.75							
Mercury	**<0.00020**	mg/L	0.00020	1	03/08/15 19:55	03/09/15 11:03	7439-97-6	
7470 Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 03/04/15 12:09 Initial pH: 7.91; Final pH: 1.52							
Mercury	**<0.00060**	mg/L	0.00060	1	03/04/15 16:15	03/05/15 12:10	7439-97-6	
7471 Mercury	Analytical Method: EPA 7471 Preparation Method: EPA 7471							
Mercury	**<0.00020**	mg/L	0.00020	1	01/20/15 12:02	01/21/15 13:48	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974							
Percent Moisture	**8.3**	%	0.10	1		01/21/15 10:28		

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MERP/12911
Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A
Analysis Description: 7470 Mercury SPLP
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1913460 Matrix: Water
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00020	0.00020	03/09/15 10:19	

METHOD BLANK: 1911657 Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00020	0.00020	03/09/15 10:24	

LABORATORY CONTROL SAMPLE: 1913461

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.005	0.0050	100	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1913470 1913471

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	<0.00020	.005	.005	0.0052	0.0049	103	99	75-125	4	20	

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QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MERP/12880 Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A Analysis Description: 7470 Mercury TCLP
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1911109 Matrix: Water
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00060	0.00060	03/05/15 11:23	

METHOD BLANK: 1909964 Matrix: Water
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00060	0.00060	03/05/15 12:20	

METHOD BLANK: 1910677 Matrix: Water
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00060	0.00060	03/05/15 12:22	

LABORATORY CONTROL SAMPLE: 1911110

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.015	0.015	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1911111 1911112

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	<0.00020	.015	.015	0.015	0.014	101	94	75-125	7	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MERP/12555
Analysis Method: EPA 7471
QC Batch Method: EPA 7471
Analysis Description: 7471 Mercury
Associated Lab Samples: 10294014001, 10294014002, 10294014003, 10294014008, 10294014009, 10294014010, 10294014012, 10294014013, 10294014014, 10294014019, 10294014020, 10294014021, 10294014024, 10294014025, 10294014026, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1882390
Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014003, 10294014008, 10294014009, 10294014010, 10294014012, 10294014013, 10294014014, 10294014019, 10294014020, 10294014021, 10294014024, 10294014025, 10294014026, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	mg/L	<0.00017	0.00017	01/21/15 12:57	

LABORATORY CONTROL SAMPLE: 1882391

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.0043	0.0047	109	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1882392 1882393

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	0.0019	.0052	.005	0.0074	0.0068	105	97	75-125	8	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/51857
Analysis Method: EPA 6020A
QC Batch Method: EPA 3050
Analysis Description: 6020A Solids UPD4
Associated Lab Samples: 10294014001, 10294014002, 10294014003, 10294014008, 10294014009, 10294014010, 10294014012, 10294014013, 10294014014, 10294014019, 10294014020, 10294014021, 10294014024, 10294014025, 10294014026, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1882364
Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014003, 10294014008, 10294014009, 10294014010, 10294014012, 10294014013, 10294014014, 10294014019, 10294014020, 10294014021, 10294014024, 10294014025, 10294014026, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/kg	<0.48	0.48	01/21/15 10:35	
Arsenic	mg/kg	<0.48	0.48	01/21/15 10:35	
Cadmium	mg/kg	<0.076	0.076	01/21/15 10:35	
Copper	mg/kg	<0.95	0.95	01/21/15 10:35	
Lead	mg/kg	<0.095	0.095	01/21/15 10:35	
Zinc	mg/kg	<4.8	4.8	01/21/15 10:35	

LABORATORY CONTROL SAMPLE: 1882365

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	18.5	20.2	109	80-120	
Arsenic	mg/kg	18.5	19.2	104	80-120	
Cadmium	mg/kg	18.5	20.3	110	80-120	
Copper	mg/kg	18.5	20.8	113	80-120	
Lead	mg/kg	18.5	18.9	102	80-120	
Zinc	mg/kg	18.5	20.0	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1882366 1882367

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/kg	0.82	21.3	20.2	16.3	16.9	72	80	75-125	4	20	M6
Arsenic	mg/kg	6.3	21.3	20.2	24.6	26.5	86	100	75-125	7	20	
Cadmium	mg/kg	13.0	21.3	20.2	31.5	36.3	87	115	75-125	14	20	
Copper	mg/kg	27.9	21.3	20.2	40.0	43.3	56	76	75-125	8	20	M6
Lead	mg/kg	240	21.3	20.2	240	266	-2	126	75-125	10	20	M6
Zinc	mg/kg	5410	21.3	20.2	4830	6260	-2700	4210	75-125	26	20	E,M6, R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/52740
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A TCLP UPD4
Associated Lab Samples: 10294014001, 10294014008, 10294014009, 10294014013, 10294014024

METHOD BLANK: 1910973
Matrix: Water
Associated Lab Samples: 10294014001, 10294014008, 10294014009, 10294014013, 10294014024

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.00050	0.00050	03/05/15 10:52	
Cadmium	mg/L	<0.000080	0.000080	03/05/15 10:52	
Lead	mg/L	<0.00010	0.00010	03/05/15 10:52	

METHOD BLANK: 1910677
Matrix: Water
Associated Lab Samples: 10294014001, 10294014008, 10294014009, 10294014013, 10294014024

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.012	0.012	03/05/15 11:32	
Cadmium	mg/L	<0.0020	0.0020	03/05/15 11:32	
Lead	mg/L	0.0042	0.0025	03/05/15 11:32	

LABORATORY CONTROL SAMPLE: 1910974

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	.08	0.078	98	80-120	
Cadmium	mg/L	.08	0.080	101	80-120	
Lead	mg/L	.08	0.079	98	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1910975 1910976

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	<0.00050	.4	.4	0.40	0.40	99	98	75-125	1	20	
Cadmium	mg/L	<0.000080	.4	.4	0.49	0.49	103	104	75-125	1	20	
Lead	mg/L	0.0012	.4	.4	3.3	3.3	160	166	75-125	1	20	M6

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/52744
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A TCLP UPD4
Associated Lab Samples: 10294014002, 10294014012, 10294014019, 10294014025, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1911060 Matrix: Water
Associated Lab Samples: 10294014002, 10294014012, 10294014019, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.00050	0.00050	03/05/15 09:21	
Cadmium	mg/L	<0.000080	0.000080	03/05/15 09:21	
Lead	mg/L	<0.00010	0.00010	03/05/15 09:21	

METHOD BLANK: 1909964 Matrix: Water
Associated Lab Samples: 10294014002, 10294014012, 10294014019, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Arsenic	mg/L	<0.025	0.025	03/05/15 10:31	
Cadmium	mg/L	<0.0040	0.0040	03/05/15 10:31	
Lead	mg/L	0.0098	0.0050	03/05/15 10:31	

LABORATORY CONTROL SAMPLE: 1911062

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	.08	0.078	98	80-120	
Cadmium	mg/L	.08	0.082	103	80-120	
Lead	mg/L	.08	0.081	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1911063 1911064

Parameter	Units	10294014002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	0.00095	.4	.4	0.41	0.42	102	105	75-125	3	20	
Cadmium	mg/L	<0.000080	.4	.4	0.47	0.46	100	99	75-125	1	20	
Lead	mg/L	0.0024	.4	.4	2.8	2.7	120	107	75-125	2	20	

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QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/52807
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A SPLP UPD4
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

METHOD BLANK: 1913414
Matrix: Water
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/L	<0.00050	0.00050	03/09/15 11:07	
Arsenic	mg/L	<0.00050	0.00050	03/09/15 11:07	
Cadmium	mg/L	<0.000080	0.000080	03/09/15 11:07	
Copper	mg/L	<0.0010	0.0010	03/09/15 11:07	
Lead	mg/L	<0.00010	0.00010	03/09/15 11:07	
Zinc	mg/L	<0.0050	0.0050	03/09/15 11:07	

METHOD BLANK: 1911657
Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030, 10294014031, 10294014032

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	mg/L	<0.00050	0.00050	03/09/15 11:17	
Arsenic	mg/L	<0.00050	0.00050	03/09/15 11:17	
Cadmium	mg/L	<0.000080	0.000080	03/09/15 11:17	
Copper	mg/L	<0.0010	0.0010	03/09/15 11:17	
Lead	mg/L	<0.00010	0.00010	03/09/15 11:17	
Zinc	mg/L	<0.0050	0.0050	03/09/15 11:17	

LABORATORY CONTROL SAMPLE: 1913415

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	.08	0.084	106	80-120	
Arsenic	mg/L	.08	0.083	103	80-120	
Cadmium	mg/L	.08	0.085	106	80-120	
Copper	mg/L	.08	0.085	106	80-120	
Lead	mg/L	.08	0.086	108	80-120	
Zinc	mg/L	.08	0.086	107	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1913418 1913419

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	0.0022	.08	.08	0.084	0.089	103	108	75-125	5	20	
Arsenic	mg/L	<0.00050	.08	.08	0.081	0.085	101	106	75-125	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1913418 1913419

Parameter	Units	10294014001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	mg/L	<0.000080	.08	.08	0.082	0.085	102	106	75-125	3	20	
Copper	mg/L	<0.0010	.08	.08	0.080	0.084	100	104	75-125	5	20	
Lead	mg/L	0.0012	.08	.08	0.083	0.087	102	108	75-125	5	20	
Zinc	mg/L	0.011	.08	.08	0.092	0.096	101	106	75-125	4	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/51863 Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974 Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10294014001, 10294014002, 10294014003, 10294014008, 10294014009, 10294014010

SAMPLE DUPLICATE: 1882520

Parameter	Units	10294014001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	10	9.8	1	30	

SAMPLE DUPLICATE: 1882521

Parameter	Units	10294147008 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	16.9	16.6	1	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/51908
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10294014012, 10294014013, 10294014014

SAMPLE DUPLICATE: 1884292

Parameter	Units	10293337001 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	98.1	98.1	0	30	

SAMPLE DUPLICATE: 1884293

Parameter	Units	10294370002 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	20.4	20.4	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/51909
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10294014019, 10294014020, 10294014021, 10294014024, 10294014025, 10294014026, 10294014030, 10294014031

SAMPLE DUPLICATE: 1884305

Parameter	Units	10294014019 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	7.9	8.2	4	30	

SAMPLE DUPLICATE: 1884308

Parameter	Units	10294443020 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	11.3	11.7	4	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MPRP/51926
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture
Associated Lab Samples: 10294014032

SAMPLE DUPLICATE: 1884750

Parameter	Units	10294014032 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	8.3	8.6	4	30	

SAMPLE DUPLICATE: 1884751

Parameter	Units	10294382012 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	11.9	11.2	6	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MT/18009 Analysis Method: Modified Sobek 3.2
QC Batch Method: Modified Sobek 3.2 Analysis Description: Sobek Acid Base Potential
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030

METHOD BLANK: 1885362 Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Neutralization Potential	tons/1000	1.1	0.50	01/26/15 11:00	P8

SAMPLE DUPLICATE: 1885363

Parameter	Units	10294014001 Result	Dup Result	RPD	Max RPD	Qualifiers
Neutralization Potential	tons/1000	480	490			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

QC Batch: MT/18008
Analysis Method: Modified Sobek 3.2
QC Batch Method: Modified Sobek 3.2
Analysis Description: Sobek Extractable Sulfur
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030

METHOD BLANK: 1885360
Matrix: Solid
Associated Lab Samples: 10294014001, 10294014002, 10294014008, 10294014009, 10294014012, 10294014013, 10294014019, 10294014024, 10294014025, 10294014030

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Sulfur	% (w/w)	<0.050	0.050	01/26/15 10:23	

LABORATORY CONTROL SAMPLE: 1888796

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Sulfur	% (w/w)	1.06	1.12	105	70-130	

SAMPLE DUPLICATE: 1885361

Parameter	Units	10294014001 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfur, HCl Extractable	% (w/w)	<0.050	<0.050		20	
Sulfur, HNO3 Extractable	% (w/w)	0.521	0.475	9	20	
Sulfur, Hot Water Extractable	% (w/w)	1.10	1.24	12	20	
Sulfur, Residual	% (w/w)	0.141	0.115	20	20	
Total Sulfur	% (w/w)	1.17	1.33	13	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALIFIERS

Project:	0504-100-00 Van Stone Mine
Pace Project No.:	10294014

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis
PASI-MT	Pace Analytical Services - Montana

ANALYTE QUALIFIERS

D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
P8	Analyte was detected in the method blank. All associated samples had concentrations of at least ten times greater than the blank or were below the reporting limit.
R1	RPD value was outside control limits.

METHOD CROSS REFERENCE TABLE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Parameter	Matrix	Analytical Method	Preparation Method
7470 Mercury, SPLP	Solid	SW-846 7470A	SW-846 1312/7470A
7470 Mercury, TCLP	Solid	SW-846 7470A	SW-846 1311/7470A
7471 Mercury	Solid	SW-846 7471B	SW-846 7471B

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10294014001	**HSA-6(10-11.5)**		ASB/6305		
10294014002	**HSA-6(20-21.5)**		ASB/6305		
10294014024	**HSA-3(10-11.5)**		ASB/6305		
10294014025	**HSA-3(20-21.5)**		ASB/6305		
10294014001	**HSA-6(10-11.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014002	**HSA-6(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014003	**HSA-6(30-31.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014008	**HSA-5(10-11.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014009	**HSA-5(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014010	**HSA-5(30-31.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014012	**HSA-1(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014013	**HSA-1(30-31.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014014	**HSA-1(40-41.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014019	**HSA-2(10-11.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014020	**HSA-2(15-16.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014021	**HSA-2(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014024	**HSA-3(10-11.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014025	**HSA-3(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014026	**HSA-3(30-31.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014030	**HSA-4(10-11.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014031	**HSA-4(20-21.5)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014032	**HSA-4(25-26)**	EPA 3050	MPRP/51857	EPA 6020A	ICPM/23008
10294014001	**HSA-6(10-11.5)**	EPA 3020	MPRP/52740	EPA 6020A	ICPM/23390
10294014002	**HSA-6(20-21.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014008	**HSA-5(10-11.5)**	EPA 3020	MPRP/52740	EPA 6020A	ICPM/23390
10294014009	**HSA-5(20-21.5)**	EPA 3020	MPRP/52740	EPA 6020A	ICPM/23390
10294014012	**HSA-1(20-21.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014013	**HSA-1(30-31.5)**	EPA 3020	MPRP/52740	EPA 6020A	ICPM/23390
10294014019	**HSA-2(10-11.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014024	**HSA-3(10-11.5)**	EPA 3020	MPRP/52740	EPA 6020A	ICPM/23390
10294014025	**HSA-3(20-21.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014030	**HSA-4(10-11.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014031	**HSA-4(20-21.5)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014032	**HSA-4(25-26)**	EPA 3020	MPRP/52744	EPA 6020A	ICPM/23389
10294014001	**HSA-6(10-11.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014002	**HSA-6(20-21.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014008	**HSA-5(10-11.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014009	**HSA-5(20-21.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014012	**HSA-1(20-21.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014013	**HSA-1(30-31.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014019	**HSA-2(10-11.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014024	**HSA-3(10-11.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014025	**HSA-3(20-21.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014030	**HSA-4(10-11.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10294014031	**HSA-4(20-21.5)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014032	**HSA-4(25-26)**	EPA 3020	MPRP/52807	EPA 6020A	ICPM/23417
10294014001	**HSA-6(10-11.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014002	**HSA-6(20-21.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014008	**HSA-5(10-11.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014009	**HSA-5(20-21.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014012	**HSA-1(20-21.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014013	**HSA-1(30-31.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014019	**HSA-2(10-11.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014024	**HSA-3(10-11.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014025	**HSA-3(20-21.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014030	**HSA-4(10-11.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014031	**HSA-4(20-21.5)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014032	**HSA-4(25-26)**	EPA 7470A	MERP/12911	EPA 7470A	MERC/14977
10294014001	**HSA-6(10-11.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014002	**HSA-6(20-21.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014008	**HSA-5(10-11.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014009	**HSA-5(20-21.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014012	**HSA-1(20-21.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014013	**HSA-1(30-31.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014019	**HSA-2(10-11.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014024	**HSA-3(10-11.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014025	**HSA-3(20-21.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014030	**HSA-4(10-11.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014031	**HSA-4(20-21.5)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014032	**HSA-4(25-26)**	EPA 7470A	MERP/12880	EPA 7470A	MERC/14951
10294014001	**HSA-6(10-11.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014002	**HSA-6(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014003	**HSA-6(30-31.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014008	**HSA-5(10-11.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014009	**HSA-5(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014010	**HSA-5(30-31.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014012	**HSA-1(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014013	**HSA-1(30-31.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014014	**HSA-1(40-41.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014019	**HSA-2(10-11.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014020	**HSA-2(15-16.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014021	**HSA-2(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014024	**HSA-3(10-11.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014025	**HSA-3(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014026	**HSA-3(30-31.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014030	**HSA-4(10-11.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014031	**HSA-4(20-21.5)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014032	**HSA-4(25-26)**	EPA 7471	MERP/12555	EPA 7471	MERC/14564
10294014001	**HSA-6(10-11.5)**	ASTM D2974	MPRP/51863		
10294014002	**HSA-6(20-21.5)**	ASTM D2974	MPRP/51863		
10294014003	**HSA-6(30-31.5)**	ASTM D2974	MPRP/51863		

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 Van Stone Mine
Pace Project No.: 10294014

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10294014008	**HSA-5(10-11.5)**	ASTM D2974	MPRP/51863		
10294014009	**HSA-5(20-21.5)**	ASTM D2974	MPRP/51863		
10294014010	**HSA-5(30-31.5)**	ASTM D2974	MPRP/51863		
10294014012	**HSA-1(20-21.5)**	ASTM D2974	MPRP/51908		
10294014013	**HSA-1(30-31.5)**	ASTM D2974	MPRP/51908		
10294014014	**HSA-1(40-41.5)**	ASTM D2974	MPRP/51908		
10294014019	**HSA-2(10-11.5)**	ASTM D2974	MPRP/51909		
10294014020	**HSA-2(15-16.5)**	ASTM D2974	MPRP/51909		
10294014021	**HSA-2(20-21.5)**	ASTM D2974	MPRP/51909		
10294014024	**HSA-3(10-11.5)**	ASTM D2974	MPRP/51909		
10294014025	**HSA-3(20-21.5)**	ASTM D2974	MPRP/51909		
10294014026	**HSA-3(30-31.5)**	ASTM D2974	MPRP/51909		
10294014030	**HSA-4(10-11.5)**	ASTM D2974	MPRP/51909		
10294014031	**HSA-4(20-21.5)**	ASTM D2974	MPRP/51909		
10294014032	**HSA-4(25-26)**	ASTM D2974	MPRP/51926		
10294014001	**HSA-6(10-11.5)**	Modified Sobek 3.2	MT/18009		
10294014002	**HSA-6(20-21.5)**	Modified Sobek 3.2	MT/18009		
10294014008	**HSA-5(10-11.5)**	Modified Sobek 3.2	MT/18009		
10294014009	**HSA-5(20-21.5)**	Modified Sobek 3.2	MT/18009		
10294014012	**HSA-1(20-21.5)**	Modified Sobek 3.2	MT/18009		
10294014013	**HSA-1(30-31.5)**	Modified Sobek 3.2	MT/18009		
10294014019	**HSA-2(10-11.5)**	Modified Sobek 3.2	MT/18009		
10294014024	**HSA-3(10-11.5)**	Modified Sobek 3.2	MT/18009		
10294014025	**HSA-3(20-21.5)**	Modified Sobek 3.2	MT/18009		
10294014030	**HSA-4(10-11.5)**	Modified Sobek 3.2	MT/18009		
10294014001	**HSA-6(10-11.5)**	Modified Sobek 3.2	MT/18008		
10294014002	**HSA-6(20-21.5)**	Modified Sobek 3.2	MT/18008		
10294014008	**HSA-5(10-11.5)**	Modified Sobek 3.2	MT/18008		
10294014009	**HSA-5(20-21.5)**	Modified Sobek 3.2	MT/18008		
10294014012	**HSA-1(20-21.5)**	Modified Sobek 3.2	MT/18008		
10294014013	**HSA-1(30-31.5)**	Modified Sobek 3.2	MT/18008		
10294014019	**HSA-2(10-11.5)**	Modified Sobek 3.2	MT/18008		
10294014024	**HSA-3(10-11.5)**	Modified Sobek 3.2	MT/18008		
10294014025	**HSA-3(20-21.5)**	Modified Sobek 3.2	MT/18008		
10294014030	**HSA-4(10-11.5)**	Modified Sobek 3.2	MT/18008		
10294014001	**HSA-6(10-11.5)**	Modified Sobek 3.2	MT/18057		
10294014002	**HSA-6(20-21.5)**	Modified Sobek 3.2	MT/18057		
10294014008	**HSA-5(10-11.5)**	Modified Sobek 3.2	MT/18057		
10294014009	**HSA-5(20-21.5)**	Modified Sobek 3.2	MT/18057		
10294014012	**HSA-1(20-21.5)**	Modified Sobek 3.2	MT/18057		
10294014013	**HSA-1(30-31.5)**	Modified Sobek 3.2	MT/18057		
10294014019	**HSA-2(10-11.5)**	Modified Sobek 3.2	MT/18057		
10294014024	**HSA-3(10-11.5)**	Modified Sobek 3.2	MT/18057		
10294014025	**HSA-3(20-21.5)**	Modified Sobek 3.2	MT/18057		
10294014030	**HSA-4(10-11.5)**	Modified Sobek 3.2	MT/18057		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10294014 10294014

Page: 1 of 3

1734257

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhiney@geoengineers.com
Phone: 509-363-3125
Fax: 509-363-3126
Requested Due Date/TAT:

Section B
Required Project Information:

Report To: John Haney
Copy To:
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ______

Site Location
STATE: ______

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes
MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	↓Analysis Test↓	Acid Base Potential/Acid Pot	Sulfur Forms/Neutraliz	Asbestos (PLM)	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	HSA-6 (10-11.5)	SL		1/8/15	1135				4	X									X			X				001
2	HSA-6 (20-21.5)				1200				4										X			X				002
3	HSA-6 (30-31.5)				1230				4													X				003
4	HSA-6 (35-36.5)				1300				3																	004
5	HSA-6 (40-41)				1315				2																	005
6	HSA-6 (45-46.5)				1330				2																	006
7	HSA-6 (50-51.5)				1400				4																	007
8	HSA-5 (10-11.5)			1/8/15	0830				4										X			X				008
9	HSA-5 (20-21.5)				0900				4										X			X				009
10	HSA-5 (30-31.5)				0925				4													X				010
11	HSA-1 (10-11.5)				1200				4																	011
12	HSA-1 (20-21.5)				1230				4										X			X				012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
* Sb, As, Cd, Cu, Pb, Zn / Hg	(Geo)	1/12/2015	1500	Pace	1/13/15	10:00	-0.1 -0.4 -0.7			
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 01/12

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

Pace Analytical

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10294014

Page : 2 of 3

Section A
Required Client Information:
Company: GeoEngineers
Address: 523 East Second Street
Spokane, WA 99202
Email To: cvoss@geoengineers.com
Phone: 5093633125 Fax
Requested Due Date/TAT: 10 Day (Standard)

Section B
Required Project Information:
Report To: Chelsea Voss
Copy To:
Purchase Order No.
Client Project ID: Van Stone Mine
Container Order Number:

Section C
Invoice Information:
Attention: Accounts Payable
Company Name: GeoEngineers
Address: 523 E. 2nd Ave, Spokane, WA 99202
Pace Quote Reference:
Pace Project Manager: Jenni Gross
Pace Profile #: 34631 # 1

Regulatory Agency:
State / Location: WA

SAMPLE ID
One Character per box.
(A-Z, 0-9 / , -)
Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

Requested Analysis Filtered (Y/N)

ITEM#	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Y/N Analyses Test	Acid Base Potential/ Acid Potential	Sulfur Forms / Neutralization Potential	Asbestos (PLM)	~~NWTPHDx (Diesel only)~~	~~NWTPHG*~~	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*	Residual Chlorine (Y/N)	
1	HSA-1 (30-31.5)	SL		1/8/15	1300				4	X									X					X				013
2	HSA-1 (40-41.5)	|		|	1320				4	|														X				014
3	HSA-1 (45-46.5)	|		|	1340				2	|																		015
4	HSA-1 (50-51.5)	|		|	1350				4	|																		016
5	HSA-1 (55-56.5)	|		|	1400				2	|																		017
6	HSA-1 (60-61.5)	|		↓	1415				4	|																		018
7	HSA-2 (10-11.5)	|		1/9/15	0815				4	|									X					X				019
8	HSA-2 (15-16.5)	|		|	0900				4	|														X				020
9	HSA-2 (20-21.5)	|		|	0910				2	|														X				021
10	HSA-2 (25-26)	|		|	0920				4	|																		022
11	HSA-2 (30-31.5)	|		|	0940				2	|																		023
12	HSA-3 (10-11.5)	↓		↓	1100				4	↓									X					X				024

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*AOI-1 / AOI-2 = Sb, As, Cd, Cu, Pb, Zn / Hg	(GEO)	1/12/2015	1500	Pace	1/13/15	10:00	-0.1 -0.6 -0.7			
~~*AOI-3 = Sb, As, Cd, Cr, Cu, Pb, Ni, Zn (Hg not needed)~~										
							TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Le
SIGNATURE of SAMPLER:
DATE Signed:

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

10894014

Page: 3 of 3

1734259

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhoney@GeoEngineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT:

Section B
Required Project Information:

Report To: John Honey
Copy To:
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location
STATE:

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID (A-Z, 0-9 / ,-) Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Acid Base Potential/Acid Base	Sulfur Forms/Neutralization Pot	Asbestos (PLM)	Total 6020/7471*	SPLP 6020/7470*	TCLP 6020/7470*							Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	HSA-3(20-21.5)	SL		1-9-15	1115				4	X									X			X										025
2	HSA-3(30-31.5)				1140				4													X										026
3	HSA-3(35-36.5)				1200				2																							027
4	HSA-3(40-41.5)				1240				4																							028
5	HSA-3(43-44.5)				1310				2																							029
6	HSA-4(10-11.5)				1440				4										X			X										030
7	HSA-4(20-21.5)				1500				4													X										031
8	HSA-4(25-26)				1520				2													X										032
9	HSA-4(30-30.5)	↓		↓	1540				1	↓																						033
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Sb, As, Cd, Cu, Pb, Zn/Hg	(Geo)	1/12/2015	1500	Pace	1/13/15	10:00	0.1 -0.6 -0.7			

ORIGINAL

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 01/12/2015

Temp in °C | Received on Ice (Y/N) | Custody Sealed Cooler (Y/N) | Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical®	Document Name: Sample Condition Upon Receipt Form	Document Revised: 28Feb2014 Page 1 of 1
	Document No.: F-MN-L-213-rev.09	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: GeoEngineers

Project #: WO# : 10294014

10294014

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 577983327464; 7475; 7453

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☑ None ☐ Other:

Temp Blank? ☑ Yes ☐ No

Thermom. Used: ☑ B88A9130516413 ☐ B88A912167504 ☐ B88A9132521491

Type of Ice: ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 0.0; -0.4; -0.5 **Cooler Temp Corrected (°C):** -0.1; -0.6; -0.7 **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** -0.1, -0.2 **Date and Initials of Person Examining Contents:** ZT 1/13/15

				Comments:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11.
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: SL	☑ Yes	☐ No	☐ N/A	12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☑ No		Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☑ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: Erin Gross **Date:** 1/15/15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

Pace Analytical	Document Name: MN to MT Sample Transfer Form	Revised Date: 14Jul2014 Page: 1 of 1
	Document Number: F-MN-C-043-rev.11	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS [✓ Fed Ex]
Tracking #:	6146 1788 3220
Client:	Geoengineers
Due Date:	27-Jan-2015
Pace WO:	10294014
Project Manager:	Jenni Gross

MN to MT Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	**Container Type**	**# of Bottles**	**Lab ID's**	**Preservative Yes or No**	**Verify Arrival Date & Initials**
Tests					
SOBEK ABA/SULFUR/CALC	JGCU	4	-001, -002, -008, -009	No	
SOBEK ABA/SULFUR/CALC	JGCU	4	-012, -013, -019, -024	No	
SOBEK ABA/SULFUR/CALC	JGCU	2	-025, -030	No	1/17 MT

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

Acid Base Potential, Acid Potential, Sulfur Forms, Neutralization Potential

MONTANA SAMPLE RECEIPT INFORMATION

IR Gun: B88A0140728348, Correction Factor: 0

Cooler Temp Read (°C): 1.6 Cooler Temp Corrected (°C): 1.6

Arrived on Ice:	[✓ Yes] No	Sample Matrix:	SL
Custody Seal Present:	[✓ Yes] No	Filtred volume rec'd for dissolved tests:	Yes No [✓ NA]
Short Hold Time Requested < 72 Hours:	Yes [✓ No]	Samples pH have been checked:	Yes No [✓ NA]
Rush TAT Requested:	Yes [✓ No]	Trip Blank Present:	Yes No [✓ NA]
Sufficient Sample Volume:	[✓ Yes] No	Trip Blank Custody Seals Present:	Yes No [✓ NA]
Samples Arrived within Hold Time:	[✓ Yes] No	Pace Trip Blank Lot #:	NA
Containers Intact:	[✓ Yes] No	Sample Composites Required:	Yes [✓ No] NA
		Report Samples:	Wet Wt. __ Dry Wt.__
		Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	**Date**	**Time**	**Accepted By Affiliation**	**Date**	**Time**
Casey Sparks Pace MN FedEx	1-16-15	0837	[illegible] /Pace	1/17/15	1040

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: ____________ Date: ____________

Comments/Resolution: ____________

Project Manager Review: Casey Sparks Date: 1-20-15

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

REPORT TO:	John Haney GeoEngineers, Inc - WA 523 East Second Ave. Spokane, WA 99202	**DATE:**	**March 03, 2015**
		PACE PROJECT NO:	**10294014**
		PAGE:	**1 of 6**
REPORT OF:	Bulk Material Analysis - 0504-100-00 Van Stone Mine		

CASE NARRATIVE:

On January 13, 2015, our laboratory received 4 bulk material sample(s) from the client. The asbestos analysis was performed in accordance with EPA 600/M4-82-020 and EPA/600/R-93/116 official test methods as outlined in 40CFR763.109 appendix A.

The samples will be held for sixty (60) days from the date of this report.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described.
Concentrations of analyte, if present, below this were not quantifiable.

Pace Analytical Services, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for conducting asbestos analysis (NVLAP Lab Code 101292-0). Each result listed in the report applies only to the sample analyzed. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government nor may it be reproduced except in full without written approval of Pace Analytical Services, Inc.

Project Manager

Vivianne Rhonda Johnson for
Jennifer Gross - Project Manager
jennifer.gross@pacelabs.com

Analyst/Approved Signatory

Michael J. Otness

Michael Otness - Laboratory Analyst

REPORT OF LABORATORY ANALYSIS

Building Material Analysis
Asbestos Content

GeoEngineers
VAN STONE/0504-100-00

Lab Number	Date Analyzed	Sample Identification	Sample Description			Asbestos Identification and Estimated Quantity %		Non-Asbestos Material Identification %	
			Layers	Color	Matrix				
10294014001	3/3/2015	HSA-6(10-11.5)	1/1	Gray	Sand (100%)(1)	Trace	Actinolite	100%	Nonfibrous Binder
10294014002	3/3/2015	HSA-6(20-21.5)	1/1	Gray	Sand (100%)(1)	Trace	Actinolite	100%	Nonfibrous Binder
10294014024	3/3/2015	HSA-3(10-11.5)	1/1	Tan	Sand (100%)(1)	Trace	Actinolite	100%	Nonfibrous Binder
10294014025	3/3/2015	HSA-3(20-21.5)	1/1	Gray	Sand (100%)(1)	Trace	Actinolite	100%	Nonfibrous Binder

Analyst - Michael Otness

(1) Cannot point count sample

Pace Analytical	Document Name: MN to MT Sample Transfer Form	Revised Date: 14Jul2014 Page: 1 of 1
	Document Number: F-MN-C-043-rev.11	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS [✓ Fed Ex]
Tracking #:	6146 1788 3220
Client:	Geoengineers
Due Date:	27-Jan-2015
Pace WO:	10294014
Project Manager:	Jenni Gross

MN to MT Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	Container Type	# of Bottles	Lab ID's	Preservative Yes or No	Verify Arrival Date & Initials
Tests					
SOBEK ABA/SULFUR/CALC	JGCU	4	-001, -002, -008, -009	No	
SOBEK ABA/SULFUR/CALC	JGCU	4	-012, -013, -019, -024	No	
SOBEK ABA/SULFUR/CALC	JGCU	2	-025, -030	No	1/17 MT

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

Acid Base Potential, Acid Potential, Sulfur Forms, Neutralization Potential

MONTANA SAMPLE RECEIPT INFORMATION

IR Gun: B88A0140728348, Correction Factor: 0		Sample Matrix:	SL
Cooler Temp Read (°C): 1.6	Cooler Temp Corrected (°C): 1.6	Filtred volume rec'd for dissolved tests:	Yes __ No__ [✓ NA]
Arrived on Ice:	[✓ Yes] No__	Samples pH have been checked:	Yes __ No__ [✓ NA]
Custody Seal Present:	[✓ Yes] No__	Trip Blank Present:	Yes __ No__ [✓ NA]
Short Hold Time Requested < 72 Hours:	Yes __ [✓ No]	Trip Blank Custody Seals Present:	Yes __ No__ [✓ NA]
Rush TAT Requested:	Yes __ [✓ No]	Pace Trip Blank Lot #:	NA
Sufficient Sample Volume:	[✓ Yes] No__	Sample Composites Required:	Yes __ [✓ No] NA __
Samples Arrived within Hold Time:	[✓ Yes] No__	Report Samples:	Wet Wt. __ Dry Wt.__
Containers Intact:	[✓ Yes] No__	Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	Date	Time	Accepted By Affiliation	Date	Time
Casey Sparks Pace MN FedEx	1-16-15	0837	[illegible] / Pace	1/17/15	1040

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: ______ Date: ______

Comments/Resolution: ______

Project Manager Review: Casey Sparks Date: 1-20-15

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

January 28, 2016

John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

RE: Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Dear John Haney:

Enclosed are the analytical results for sample(s) received by the laboratory on October 17, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenni Gross

Jennifer Gross
jennifer.gross@pacelabs.com
Project Manager

Enclosures

cc: Joshua Lee, GeoEngineers

CERTIFICATIONS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909

Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

Montana Certification IDs

150 N. 9th Street, Billings, MT 59101
Colorado Asbestos #: 17119
A2LA Certification #: 3590.01
EPA Region 8 Certification #: 8TMS-L
Idaho Certification #: MT00012

Minnesota Dept of Health Certification #: 030-999-442
Montana Certification #: MT CERT0040
North Dakota Dept. Of Health #: R-209
NVLAP Certification #: 101292-0
Washington Department of Ecology #: C993

Indiana Certification IDs

7726 Moller Road, Indianapolis, IN 46268
Illinois Certification #: 200074
Indiana Certification #: C-49-06
Kansas Certification #:E-10177
Kentucky UST Certification #: 0042
Kentucky WW Certification #:98019
Louisiana Certification #: 04076

Ohio VAP Certification #: CL-0065
Oklahoma Certification #: 2014-148
Texas Certification #: T104704355-15-9
West Virginia Certification #: 330
Wisconsin Certification #: 999788130
USDA Soil Permit #: P330-10-00128

SAMPLE SUMMARY

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10326596001	**LT-NS-1 (0.5-1)**	Solid	10/12/15 11:30	10/17/15 09:30
10326596002	**LT-NS-2 (0.5-1)**	Solid	10/12/15 11:40	10/17/15 09:30
10326596003	**MS-36 (3-5)**	Solid	10/12/15 14:15	10/17/15 09:30
10326596004	**MS-29 (6-7)**	Solid	10/12/15 15:10	10/17/15 09:30
10326596005	**MS-35 (6-8)**	Solid	10/12/15 15:50	10/17/15 09:30
10326596006	**MS-34 (4-5)**	Solid	10/12/15 16:10	10/17/15 09:30
10326596007	**MS-33 (4-5)**	Solid	10/12/15 16:50	10/17/15 09:30
10326596008	**MS-32 (4-5)**	Solid	10/13/15 09:30	10/17/15 09:30
10326596009	**MS-30 (4-5)**	Solid	10/13/15 10:00	10/17/15 09:30
10326596010	**MS-31 (6-8)**	Solid	10/13/15 10:40	10/17/15 09:30
10326596011	**MS-19 (0.5-1)**	Solid	10/13/15 11:00	10/17/15 09:30
10326596012	**MS-20 (0.5-1)**	Solid	10/13/15 11:15	10/17/15 09:30
10326596013	**MS-21 (0.5-1)**	Solid	10/13/15 11:30	10/17/15 09:30
10326596014	**MS-22 (0.5-1)**	Solid	10/13/15 11:40	10/17/15 09:30
10326596015	**MS-23 (0.5-1)**	Solid	10/13/15 11:50	10/17/15 09:30
10326596016	**MS-24 (0.5-1)**	Solid	10/13/15 12:00	10/17/15 09:30
10326596017	**MS-25 (0.5-1)**	Solid	10/13/15 12:10	10/17/15 09:30
10326596018	**MS-26 (0.5-1)**	Solid	10/13/15 12:20	10/17/15 09:30
10326596019	**MS-27 (0.5-1)**	Solid	10/13/15 12:30	10/17/15 09:30
10326596020	**MS-28 (0.5-1)**	Solid	10/13/15 12:40	10/17/15 09:30

SAMPLE ANALYTE COUNT

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10326596001	**LT-NS-1 (0.5-1)**	EPA 6020A	TT3	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		EPA 7196A	JRS	1	PASI-I
10326596002	**LT-NS-2 (0.5-1)**	EPA 6020A	TT3	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
		EPA 7196A	JRS	1	PASI-I
10326596003	**MS-36 (3-5)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
10326596004	**MS-29 (6-7)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
10326596005	**MS-35 (6-8)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
10326596006	**MS-34 (4-5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596007	**MS-33 (4-5)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596008	**MS-32 (4-5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596009	**MS-30 (4-5)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
10326596010	**MS-31 (6-8)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
		Modified Sobek 3.2	WT1	2	PASI-MT
		Modified Sobek 3.2	WT1	1	PASI-MT
		Modified Sobek 3.2	WT1	5	PASI-MT
10326596011	**MS-19 (0.5-1)**	EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596012	**MS-20 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596013	**MS-21 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M
		EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596014	**MS-22 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M
		EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596015	**MS-23 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M
		EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596016	**MS-24 (0.5-1)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596017	**MS-25 (0.5-1)**	EPA 6020A	RJS	8	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596018	**MS-26 (0.5-1)**	EPA 6020A	RJS	8	PASI-M

SAMPLE ANALYTE COUNT

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596019	**MS-27 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M
		EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M
10326596020	**MS-28 (0.5-1)**	NWTPH-Dx	MT	4	PASI-M
		NWTPH-Gx	KMZ	2	PASI-M
		EPA 6020A	RJS	8	PASI-M
		EPA 6020A	TT3	4	PASI-M
		EPA 6020A	TT3	6	PASI-M
		EPA 7470A	LMW	1	PASI-M
		EPA 7470A	JDD	1	PASI-M
		EPA 7471B	JDD	1	PASI-M
		ASTM D2974	JDL	1	PASI-M

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Date: January 28, 2016

This report was revised on January, 14th 2016. TCLP / SPLP were analyzed per client request:

TCLP As, Cd, Cr, Pb, Hg
SPLP Sb, As, Cd, Cu, Pb, Hg, Zn
MS-19 (0.5-1)
MS-20 (0.5-1)
MS-21 (0.5-1)
MS-23 (0.5-1)
MS-26 (0.5-1)
MS-27 (0.5-1)
MS-28 (0.5-1)
MS-30 (4-5)
MS-32 (4-5)
MS-34 (4-5)

Per client request the sample IDs were updated for 10326596-01, -002, -003, -005 as per revised COC from client.

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **NWTPH-Dx**
Description: NWTPH-Dx GCS
Client: GeoEngineers
Date: January 28, 2016

General Information:
6 samples were analyzed for NWTPH-Dx. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3550 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **NWTPH-Gx**
Description: NWTPH-Gx GCV
Client: GeoEngineers
Date: January 28, 2016

General Information:
6 samples were analyzed for NWTPH-Gx. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with NWTPH-Gx with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: GCV/14560

1M: Sample preserved in lab; results are from sample aliquot taken from a glass jar with headspace.

- MS-22 (0.5-1) (Lab ID: 10326596014)
  - TPH as Gas

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers
Date: January 28, 2016

General Information:
20 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3050 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/58952

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10326596003

M6: Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

- MS (Lab ID: 2118200)
  - Arsenic
  - Lead
  - Zinc
- MSD (Lab ID: 2118201)
  - Cadmium
  - Copper
  - Lead
  - Nickel
  - Zinc

R1: RPD value was outside control limits.

- MSD (Lab ID: 2118201)
  - Arsenic

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers
Date: January 28, 2016

QC Batch: MPRP/58952

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10326596003

R1: RPD value was outside control limits.

- Cadmium
- Lead
- Zinc

QC Batch: MPRP/59169

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10326897001

M6: Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.

- MS (Lab ID: 2120831)
  - Antimony
  - Arsenic
  - Cadmium
  - Chromium
  - Copper
  - Lead
  - Nickel
  - Zinc
- MSD (Lab ID: 2120832)
  - Antimony
  - Arsenic
  - Cadmium
  - Chromium
  - Copper
  - Lead
  - Nickel
  - Zinc

R1: RPD value was outside control limits.

- MSD (Lab ID: 2120832)
  - Antimony
  - Arsenic
  - Cadmium
  - Chromium
  - Copper
  - Lead
  - Nickel
  - Zinc

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers
Date: January 28, 2016

Analyte Comments:

QC Batch: MPRP/58952

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MS (Lab ID: 2118200)
  - Zinc
- MSD (Lab ID: 2118201)
  - Zinc

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS, TCLP
Client: GeoEngineers
Date: January 28, 2016

General Information:
10 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: MPRP/61043

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

- MS-19 (0.5-1) (Lab ID: 10326596011)
  - Arsenic
  - Chromium
- MS-20 (0.5-1) (Lab ID: 10326596012)
  - Arsenic
  - Chromium
- MS-21 (0.5-1) (Lab ID: 10326596013)
  - Arsenic
  - Chromium
- MS-23 (0.5-1) (Lab ID: 10326596015)
  - Arsenic

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS, TCLP
Client: GeoEngineers
Date: January 28, 2016

Analyte Comments:

QC Batch: MPRP/61043

D3: Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.

- MS-23 (0.5-1) (Lab ID: 10326596015)
  - Chromium
- MS-26 (0.5-1) (Lab ID: 10326596018)
  - Arsenic
  - Chromium
- MS-27 (0.5-1) (Lab ID: 10326596019)
  - Arsenic
  - Chromium
- MS-30 (4-5) (Lab ID: 10326596009)
  - Arsenic
  - Chromium
- MS-32 (4-5) (Lab ID: 10326596008)
  - Arsenic
  - Chromium
- MS-34 (4-5) (Lab ID: 10326596006)
  - Arsenic
  - Chromium

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS, SPLP
Client: GeoEngineers
Date: January 28, 2016

General Information:
10 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: MPRP/61089

2M: The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

- MS-19 (0.5-1) (Lab ID: 10326596011)
  - Arsenic
  - Cadmium
  - Copper
  - Lead
  - Antimony
  - Zinc
- MS-20 (0.5-1) (Lab ID: 10326596012)
  - Arsenic
  - Cadmium
  - Copper

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS, SPLP
Client: GeoEngineers
Date: January 28, 2016

Analyte Comments:

QC Batch: MPRP/61089

2M: The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

- MS-20 (0.5-1) (Lab ID: 10326596012)
    - Lead
    - Antimony
    - Zinc
- MS-21 (0.5-1) (Lab ID: 10326596013)
    - Arsenic
    - Cadmium
    - Copper
    - Lead
    - Antimony
    - Zinc
- MS-23 (0.5-1) (Lab ID: 10326596015)
    - Arsenic
    - Cadmium
    - Copper
    - Lead
    - Antimony
    - Zinc
- MS-26 (0.5-1) (Lab ID: 10326596018)
    - Arsenic
    - Cadmium
    - Copper
    - Lead
    - Antimony
    - Zinc
- MS-27 (0.5-1) (Lab ID: 10326596019)
    - Arsenic
    - Cadmium
    - Copper
    - Lead
    - Antimony
    - Zinc
- MS-28 (0.5-1) (Lab ID: 10326596020)
    - Arsenic
    - Cadmium
    - Copper
    - Lead
    - Antimony
    - Zinc
- MS-30 (4-5) (Lab ID: 10326596009)
    - Arsenic
    - Cadmium
    - Copper

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 6020A**
Description: 6020A MET ICPMS, SPLP
Client: GeoEngineers
Date: January 28, 2016

Analyte Comments:

QC Batch: MPRP/61089

2M: The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

- MS-30 (4-5) (Lab ID: 10326596009)
  - Lead
  - Antimony
  - Zinc
- MS-32 (4-5) (Lab ID: 10326596008)
  - Arsenic
  - Cadmium
  - Copper
  - Lead
  - Antimony
  - Zinc
- MS-34 (4-5) (Lab ID: 10326596006)
  - Arsenic
  - Cadmium
  - Copper
  - Lead
  - Antimony
  - Zinc

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 7470A**
Description: 7470A Mercury, SPLP
Client: GeoEngineers
Date: January 28, 2016

General Information:
10 samples were analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Analyte Comments:

QC Batch: MERP/15804

2M: The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

- MS-19 (0.5-1) (Lab ID: 10326596011)
    - Mercury
- MS-20 (0.5-1) (Lab ID: 10326596012)
    - Mercury
- MS-21 (0.5-1) (Lab ID: 10326596013)
    - Mercury
- MS-23 (0.5-1) (Lab ID: 10326596015)
    - Mercury
- MS-26 (0.5-1) (Lab ID: 10326596018)
    - Mercury
- MS-27 (0.5-1) (Lab ID: 10326596019)
    - Mercury
- MS-28 (0.5-1) (Lab ID: 10326596020)
    - Mercury

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **EPA 7470A**
Description: 7470A Mercury, SPLP
Client: GeoEngineers
Date: January 28, 2016

Analyte Comments:

QC Batch: MERP/15804

2M: The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.

- MS-30 (4-5) (Lab ID: 10326596009)
  - Mercury
- MS-32 (4-5) (Lab ID: 10326596008)
  - Mercury
- MS-34 (4-5) (Lab ID: 10326596006)
  - Mercury

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 7470A**
Description: 7470A Mercury, TCLP
Client: GeoEngineers
Date: January 28, 2016

General Information:
10 samples were analyzed for EPA 7470A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7470A with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Method: **EPA 7471B**
Description: 7471B Mercury
Client: GeoEngineers
Date: January 28, 2016

General Information:
20 samples were analyzed for EPA 7471B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 7471B with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **Modified Sobek 3.2**
Description: Sobek Calculations
Client: GeoEngineers
Date: January 28, 2016

General Information:
7 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **Modified Sobek 3.2**
Description: Sobek Neutralization Potential
Client: GeoEngineers
Date: January 28, 2016

General Information:
7 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **Modified Sobek 3.2**
Description: Sobek Extractable Sulfur
Client: GeoEngineers
Date: January 28, 2016

General Information:
7 samples were analyzed for Modified Sobek 3.2. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Surrogates:
All surrogates were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Method: **EPA 7196A**
Description: 7196 Chromium, Hexavalent
Client: GeoEngineers
Date: January 28, 2016

General Information:
2 samples were analyzed for EPA 7196A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3060A with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: LT-NS-1 (0.5-1) **Lab ID: 10326596001** Collected: 10/12/15 11:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.48	0.19	20	10/28/15 20:12	10/29/15 09:26	7440-36-0	
Arsenic	**0.82**	mg/kg	0.48	0.12	20	10/28/15 20:12	10/29/15 09:26	7440-38-2	
Cadmium	**0.10**	mg/kg	0.077	0.026	20	10/28/15 20:12	10/29/15 09:26	7440-43-9	
Chromium	**1.6**	mg/kg	0.48	0.18	20	10/28/15 20:12	10/29/15 09:26	7440-47-3	
Copper	**5.6**	mg/kg	0.96	0.31	20	10/28/15 20:12	10/29/15 09:26	7440-50-8	
Lead	**2.2**	mg/kg	0.096	0.042	20	10/28/15 20:12	10/29/15 09:26	7439-92-1	
Nickel	**1.7**	mg/kg	0.48	0.15	20	10/28/15 20:12	10/29/15 09:26	7440-02-0	
Zinc	**13.2**	mg/kg	4.8	1.3	20	10/28/15 20:12	10/29/15 09:26	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	ND	mg/kg	0.019	0.0064	1	10/28/15 18:01	10/28/15 20:17	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**1.8**	%	0.10	0.10	1		10/28/15 15:31		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**0.0**	tons/1000			1		10/30/15 10:41		
Acid Potential	ND	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	ND	tons/1000	0.50	0.50	1		10/28/15 10:35		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:33		
Sulfur, HNO3 Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:33		
Sulfur, Hot Water Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:33		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 06:33		
Total Sulfur	ND	% (w/w)	0.050	0.018	1		10/29/15 06:33		
7196 Chromium, Hexavalent	Analytical Method: EPA 7196A Preparation Method: EPA 3060A								
Chromium, Hexavalent	ND	mg/kg	2.0	0.44	1	10/27/15 10:30	10/28/15 11:07	18540-29-9	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: LT-NS-2 (0.5-1) **Lab ID: 10326596002** Collected: 10/12/15 11:40 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.50	0.20	20	10/28/15 20:12	10/29/15 09:28	7440-36-0	
Arsenic	**0.78**	mg/kg	0.50	0.12	20	10/28/15 20:12	10/29/15 09:28	7440-38-2	
Cadmium	**0.10**	mg/kg	0.080	0.027	20	10/28/15 20:12	10/29/15 09:28	7440-43-9	
Chromium	**1.6**	mg/kg	0.50	0.19	20	10/28/15 20:12	10/29/15 09:28	7440-47-3	
Copper	**8.8**	mg/kg	1.0	0.32	20	10/28/15 20:12	10/29/15 09:28	7440-50-8	
Lead	**7.5**	mg/kg	0.10	0.043	20	10/28/15 20:12	10/29/15 09:28	7439-92-1	
Nickel	**1.7**	mg/kg	0.50	0.15	20	10/28/15 20:12	10/29/15 09:28	7440-02-0	
Zinc	**27.6**	mg/kg	5.0	1.3	20	10/28/15 20:12	10/29/15 09:28	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	ND	mg/kg	0.018	0.0061	1	10/28/15 18:01	10/28/15 20:19	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**2.9**	%	0.10	0.10	1		10/28/15 15:26		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**6.2**	tons/1000			1		10/30/15 10:41		
Acid Potential	ND	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**6.19**	tons/1000	0.50	0.50	1		10/28/15 10:39		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:48		
Sulfur, HNO3 Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:48		
Sulfur, Hot Water Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 06:48		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 06:48		
Total Sulfur	ND	% (w/w)	0.050	0.018	1		10/29/15 06:48		
7196 Chromium, Hexavalent	Analytical Method: EPA 7196A Preparation Method: EPA 3060A								
Chromium, Hexavalent	ND	mg/kg	2.0	0.44	1	10/27/15 10:30	10/28/15 11:20	18540-29-9	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-36 (3-5) **Lab ID: 10326596003** Collected: 10/12/15 14:15 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.47	0.19	20	10/26/15 22:42	10/27/15 22:59	7440-36-0	
Arsenic	**14.4**	mg/kg	0.47	0.12	20	10/26/15 22:42	10/27/15 22:59	7440-38-2	M6,R1
Cadmium	**3.6**	mg/kg	0.076	0.026	20	10/26/15 22:42	10/27/15 22:59	7440-43-9	M6,R1
Chromium	ND	mg/kg	0.47	0.18	20	10/26/15 22:42	10/27/15 22:59	7440-47-3	
Copper	**1.3**	mg/kg	0.95	0.31	20	10/26/15 22:42	10/27/15 22:59	7440-50-8	M6
Lead	**58.9**	mg/kg	0.95	0.41	200	10/26/15 22:42	10/29/15 11:30	7439-92-1	M6,R1
Nickel	**3.2**	mg/kg	0.47	0.14	20	10/26/15 22:42	10/27/15 22:59	7440-02-0	M6
Zinc	**1540**	mg/kg	47.4	12.7	200	10/26/15 22:42	10/29/15 11:30	7440-66-6	M6,R1
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.038**	mg/kg	0.020	0.0070	1	10/25/15 18:54	10/25/15 19:22	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**4.2**	%	0.10	0.10	1		10/28/15 15:26		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**92.0**	tons/1000			1		10/30/15 10:41		
Acid Potential	ND	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**92.0**	tons/1000	0.50	0.50	1		10/28/15 10:44		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:06		
Sulfur, HNO3 Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:06		
Sulfur, Hot Water Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:06		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 07:06		
Total Sulfur	ND	% (w/w)	0.050	0.018	1		10/29/15 07:06		

ANALYTICAL RESULTS

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Sample: MS-29 (6-7) **Lab ID: 10326596004** Collected: 10/12/15 15:10 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.77**	mg/kg	0.47	0.19	20	10/26/15 22:42	10/29/15 11:55	7440-36-0	
Arsenic	**7.0**	mg/kg	0.47	0.12	20	10/26/15 22:42	10/29/15 11:55	7440-38-2	
Cadmium	**30.9**	mg/kg	0.076	0.026	20	10/26/15 22:42	10/29/15 11:55	7440-43-9	
Chromium	**3.2**	mg/kg	0.47	0.18	20	10/26/15 22:42	10/29/15 11:55	7440-47-3	
Copper	**3.3**	mg/kg	0.95	0.31	20	10/26/15 22:42	10/29/15 11:55	7440-50-8	
Lead	**11.5**	mg/kg	0.095	0.041	20	10/26/15 22:42	10/29/15 11:55	7439-92-1	
Nickel	**6.9**	mg/kg	0.47	0.14	20	10/26/15 22:42	10/29/15 11:55	7440-02-0	
Zinc	**2930**	mg/kg	475	127	2000	10/26/15 22:42	10/28/15 16:40	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	ND	mg/kg	0.019	0.0065	1	10/25/15 18:54	10/25/15 19:30	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.2**	%	0.10	0.10	1		10/28/15 15:27		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**92.0**	tons/1000			1		10/30/15 10:41		
Acid Potential	ND	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**92.0**	tons/1000	0.50	0.50	1		10/28/15 10:49		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:20		
Sulfur, HNO3 Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:20		
Sulfur, Hot Water Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:20		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 07:20		
Total Sulfur	ND	% (w/w)	0.050	0.018	1		10/29/15 07:20		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-35 (6-8) **Lab ID: 10326596005** Collected: 10/12/15 15:50 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.49	0.19	20	10/26/15 22:42	10/27/15 21:22	7440-36-0	
Arsenic	**13.5**	mg/kg	0.49	0.12	20	10/26/15 22:42	10/27/15 21:22	7440-38-2	
Cadmium	**10.0**	mg/kg	0.079	0.027	20	10/26/15 22:42	10/27/15 21:22	7440-43-9	
Chromium	**2.3**	mg/kg	0.49	0.19	20	10/26/15 22:42	10/27/15 21:22	7440-47-3	
Copper	**3.3**	mg/kg	0.99	0.32	20	10/26/15 22:42	10/27/15 21:22	7440-50-8	
Lead	**186**	mg/kg	0.099	0.043	20	10/26/15 22:42	10/27/15 21:22	7439-92-1	
Nickel	**4.4**	mg/kg	0.49	0.15	20	10/26/15 22:42	10/27/15 21:22	7440-02-0	
Zinc	**3950**	mg/kg	49.3	13.2	200	10/26/15 22:42	10/28/15 16:45	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.079**	mg/kg	0.020	0.0070	1	10/25/15 18:54	10/25/15 19:32	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**3.3**	%	0.10	0.10	1		10/28/15 15:27		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**91.7**	tons/1000			1		10/30/15 10:41		
Acid Potential	ND	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**91.7**	tons/1000	0.50	0.50	1		10/28/15 10:56		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	**0.0525**	% (w/w)	0.050	0.018	1		10/29/15 07:31		
Sulfur, HNO3 Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:31		
Sulfur, Hot Water Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 07:31		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 07:31		
Total Sulfur	ND	% (w/w)	0.050	0.018	1		10/29/15 07:31		

ANALYTICAL RESULTS

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Sample: MS-34 (4-5) **Lab ID: 10326596006** Collected: 10/12/15 16:10 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.51	0.20	20	10/26/15 22:42	10/27/15 21:27	7440-36-0	
Arsenic	**5.5**	mg/kg	0.51	0.12	20	10/26/15 22:42	10/27/15 21:27	7440-38-2	
Cadmium	**5.3**	mg/kg	0.081	0.028	20	10/26/15 22:42	10/27/15 21:27	7440-43-9	
Chromium	**3.8**	mg/kg	0.51	0.19	20	10/26/15 22:42	10/27/15 21:27	7440-47-3	
Copper	**4.7**	mg/kg	1.0	0.33	20	10/26/15 22:42	10/27/15 21:27	7440-50-8	
Lead	**158**	mg/kg	0.10	0.044	20	10/26/15 22:42	10/27/15 21:27	7439-92-1	
Nickel	**5.2**	mg/kg	0.51	0.15	20	10/26/15 22:42	10/27/15 21:27	7440-02-0	
Zinc	**3200**	mg/kg	50.9	13.6	200	10/26/15 22:42	10/28/15 16:49	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.94; Final pH: 1.53								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 13:56	7440-38-2	D3
Cadmium	**0.092**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 13:56	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 13:56	7440-47-3	D3
Lead	**0.18**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 13:56	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.67								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 13:37	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 13:37	7440-38-2	2M
Cadmium	**0.0011**	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 13:37	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 13:37	7440-50-8	2M
Lead	**0.042**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 13:37	7439-92-1	2M
Zinc	**0.60**	mg/L	0.25	0.12	5	01/24/16 16:47	01/26/16 08:20	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.67								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 20:48	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.94; Final pH: 1.53								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:34	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.067**	mg/kg	0.020	0.0070	1	10/25/15 18:54	10/25/15 19:35	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**9.0**	%	0.10	0.10	1		10/28/15 15:27		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-33 (4-5) **Lab ID: 10326596007** Collected: 10/12/15 16:50 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.50	0.19	20	10/26/15 22:42	10/27/15 21:32	7440-36-0	
Arsenic	**1.8**	mg/kg	0.50	0.12	20	10/26/15 22:42	10/27/15 21:32	7440-38-2	
Cadmium	**0.56**	mg/kg	0.079	0.027	20	10/26/15 22:42	10/27/15 21:32	7440-43-9	
Chromium	**4.0**	mg/kg	0.50	0.19	20	10/26/15 22:42	10/27/15 21:32	7440-47-3	
Copper	**3.6**	mg/kg	0.99	0.32	20	10/26/15 22:42	10/27/15 21:32	7440-50-8	
Lead	**63.0**	mg/kg	0.50	0.22	100	10/26/15 22:42	10/29/15 12:00	7439-92-1	
Nickel	**3.3**	mg/kg	0.50	0.15	20	10/26/15 22:42	10/27/15 21:32	7440-02-0	
Zinc	**269**	mg/kg	5.0	1.3	20	10/26/15 22:42	10/27/15 21:32	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	ND	mg/kg	0.019	0.0065	1	10/25/15 18:54	10/25/15 19:37	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**4.9**	%	0.10	0.10	1		10/28/15 15:28		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-32 (4-5) **Lab ID: 10326596008** Collected: 10/13/15 09:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.57**	mg/kg	0.50	0.20	20	10/26/15 22:42	10/27/15 21:37	7440-36-0	
Arsenic	**10.7**	mg/kg	0.50	0.12	20	10/26/15 22:42	10/27/15 21:37	7440-38-2	
Cadmium	**28.6**	mg/kg	0.080	0.027	20	10/26/15 22:42	10/27/15 21:37	7440-43-9	
Chromium	**2.2**	mg/kg	0.50	0.19	20	10/26/15 22:42	10/27/15 21:37	7440-47-3	
Copper	**4.1**	mg/kg	1.0	0.32	20	10/26/15 22:42	10/27/15 21:37	7440-50-8	
Lead	**438**	mg/kg	0.10	0.043	20	10/26/15 22:42	10/27/15 21:37	7439-92-1	
Nickel	**5.4**	mg/kg	0.50	0.15	20	10/26/15 22:42	10/27/15 21:37	7440-02-0	
Zinc	**5930**	mg/kg	499	134	2000	10/26/15 22:42	10/30/15 10:40	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.97; Final pH: 4.62								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 13:51	7440-38-2	D3
Cadmium	**0.66**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 13:51	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 13:51	7440-47-3	D3
Lead	**1.8**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 13:51	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.74								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 13:40	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 13:40	7440-38-2	2M
Cadmium	**0.0017**	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 13:40	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 13:40	7440-50-8	2M
Lead	**0.035**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 13:40	7439-92-1	2M
Zinc	**0.57**	mg/L	0.25	0.12	5	01/24/16 16:47	01/26/16 08:22	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.74								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 20:52	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.97; Final pH: 4.62								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:41	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.35**	mg/kg	0.019	0.0066	1	10/25/15 18:54	10/25/15 19:45	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**9.8**	%	0.10	0.10	1		10/28/15 15:28		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-30 (4-5) **Lab ID: 10326596009** Collected: 10/13/15 10:00 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.48	0.19	20	10/26/15 22:42	10/27/15 21:41	7440-36-0	
Arsenic	**26.5**	mg/kg	0.48	0.12	20	10/26/15 22:42	10/27/15 21:41	7440-38-2	
Cadmium	**36.7**	mg/kg	0.077	0.026	20	10/26/15 22:42	10/27/15 21:41	7440-43-9	
Chromium	ND	mg/kg	0.48	0.18	20	10/26/15 22:42	10/27/15 21:41	7440-47-3	
Copper	**2.4**	mg/kg	0.97	0.31	20	10/26/15 22:42	10/27/15 21:41	7440-50-8	
Lead	**423**	mg/kg	0.097	0.042	20	10/26/15 22:42	10/27/15 21:41	7439-92-1	
Nickel	**3.4**	mg/kg	0.48	0.15	20	10/26/15 22:42	10/27/15 21:41	7440-02-0	
Zinc	**13200**	mg/kg	484	129	2000	10/26/15 22:42	10/30/15 10:44	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 9.22; Final pH: 2.19								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:23	7440-38-2	D3
Cadmium	**0.21**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:23	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:23	7440-47-3	D3
Lead	**2.9**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 10:23	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.95								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 13:42	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 13:42	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 13:42	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 13:42	7440-50-8	2M
Lead	ND	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 13:42	7439-92-1	2M
Zinc	ND	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 13:42	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.95								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 20:54	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 9.22; Final pH: 2.19								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:44	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.13**	mg/kg	0.020	0.0071	1	10/25/15 18:54	10/25/15 19:47	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**7.7**	%	0.10	0.10	1		10/28/15 15:28		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**45.0**	tons/1000			1		10/30/15 10:41		
Acid Potential	**47.6**	tons/1000	4.3	4.3	1		10/30/15 10:41		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-30 (4-5) **Lab ID: 10326596009** Collected: 10/13/15 10:00 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**92.6**	tons/1000	0.50	0.50	1		10/28/15 11:00		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	**0.563**	% (w/w)	0.050	0.018	1		10/29/15 07:46		
Sulfur, HNO3 Extractable	**1.08**	% (w/w)	0.050	0.018	1		10/29/15 07:46		
Sulfur, Hot Water Extractable	**0.532**	% (w/w)	0.050	0.018	1		10/29/15 07:46		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 07:46		
Total Sulfur	**2.20**	% (w/w)	0.050	0.018	1		10/29/15 07:46		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-31 (6-8) **Lab ID: 10326596010** Collected: 10/13/15 10:40 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.45**	mg/kg	0.45	0.18	20	10/26/15 22:42	10/27/15 21:46	7440-36-0	
Arsenic	**5.3**	mg/kg	0.45	0.11	20	10/26/15 22:42	10/27/15 21:46	7440-38-2	
Cadmium	**4.7**	mg/kg	0.072	0.024	20	10/26/15 22:42	10/27/15 21:46	7440-43-9	
Chromium	**5.9**	mg/kg	0.45	0.17	20	10/26/15 22:42	10/27/15 21:46	7440-47-3	
Copper	**6.3**	mg/kg	0.90	0.29	20	10/26/15 22:42	10/27/15 21:46	7440-50-8	
Lead	**293**	mg/kg	0.090	0.039	20	10/26/15 22:42	10/27/15 21:46	7439-92-1	
Nickel	**6.2**	mg/kg	0.45	0.14	20	10/26/15 22:42	10/27/15 21:46	7440-02-0	
Zinc	**1580**	mg/kg	45.0	12.0	200	10/26/15 22:42	10/28/15 17:18	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.048**	mg/kg	0.022	0.0077	1	10/25/15 18:54	10/25/15 19:49	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**15.1**	%	0.10	0.10	1		10/28/15 15:28		
Sobek Calculations	Analytical Method: Modified Sobek 3.2								
Acid/Base Potential	**39.9**	tons/1000			1		10/30/15 10:41		
Acid Potential	**4.8**	tons/1000	4.3	4.3	1		10/30/15 10:41		
Sobek Neutralization Potential	Analytical Method: Modified Sobek 3.2								
Neutralization Potential	**44.6**	tons/1000	0.50	0.50	1		10/28/15 11:07		
Sobek Extractable Sulfur	Analytical Method: Modified Sobek 3.2								
Sulfur, HCl Extractable	ND	% (w/w)	0.050	0.018	1		10/29/15 08:03		
Sulfur, HNO3 Extractable	**0.115**	% (w/w)	0.050	0.018	1		10/29/15 08:03		
Sulfur, Hot Water Extractable	**0.173**	% (w/w)	0.050	0.018	1		10/29/15 08:03		
Sulfur, Residual	ND	% (w/w)	0.050	0.018	1		10/29/15 08:03		
Total Sulfur	**0.329**	% (w/w)	0.050	0.018	1		10/29/15 08:03		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-19 (0.5-1) **Lab ID: 10326596011** Collected: 10/13/15 11:00 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

6020A MET ICPMS Analytical Method: EPA 6020A Preparation Method: EPA 3050

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Antimony	**1.8**	mg/kg	0.47	0.18	20	10/26/15 22:42	10/27/15 22:01	7440-36-0	
Arsenic	**13.1**	mg/kg	0.47	0.12	20	10/26/15 22:42	10/27/15 22:01	7440-38-2	
Cadmium	**78.3**	mg/kg	0.076	0.026	20	10/26/15 22:42	10/27/15 22:01	7440-43-9	
Chromium	**0.76**	mg/kg	0.47	0.18	20	10/26/15 22:42	10/27/15 22:01	7440-47-3	
Copper	**6.9**	mg/kg	0.95	0.31	20	10/26/15 22:42	10/27/15 22:01	7440-50-8	
Lead	**6890**	mg/kg	9.5	4.1	2000	10/26/15 22:42	11/02/15 09:29	7439-92-1	
Nickel	**7.2**	mg/kg	0.47	0.14	20	10/26/15 22:42	10/27/15 22:01	7440-02-0	
Zinc	**29700**	mg/kg	473	127	2000	10/26/15 22:42	11/02/15 09:29	7440-66-6	

6020A MET ICPMS, TCLP Analytical Method: EPA 6020A Preparation Method: EPA 3020
Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 9.11; Final pH: 3.61

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:25	7440-38-2	D3
Cadmium	**0.35**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:25	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:25	7440-47-3	D3
Lead	**7.7**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 10:25	7439-92-1	

6020A MET ICPMS, SPLP Analytical Method: EPA 6020A Preparation Method: EPA 3020
Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.88

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:03	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:03	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:03	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:03	7440-50-8	2M
Lead	**0.0035**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:03	7439-92-1	2M
Zinc	ND	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:03	7440-66-6	2M

7470A Mercury, SPLP Analytical Method: EPA 7470A Preparation Method: EPA 7470A
Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.88

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 20:57	7439-97-6	2M

7470A Mercury, TCLP Analytical Method: EPA 7470A Preparation Method: EPA 7470A
Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 9.11; Final pH: 3.61

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:46	7439-97-6	

7471B Mercury Analytical Method: EPA 7471B Preparation Method: EPA 7471B

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Mercury	**0.34**	mg/kg	0.018	0.0063	1	10/25/15 18:54	10/25/15 19:52	7439-97-6	

Dry Weight Analytical Method: ASTM D2974

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
Percent Moisture	**5.7**	%	0.10	0.10	1		10/28/15 15:29		

ANALYTICAL RESULTS

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Sample: MS-20 (0.5-1) **Lab ID: 10326596012** Collected: 10/13/15 11:15 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	ND	mg/kg	15.8	0.85	1	10/22/15 07:13	10/28/15 12:52	68334-30-5	
Motor Oil Range	**91.3**	mg/kg	10.5	1.9	1	10/22/15 07:13	10/28/15 12:52		
Surrogates									
n-Triacontane (S)	87	%.	50-150		1	10/22/15 07:13	10/28/15 12:52	638-68-6	
o-Terphenyl (S)	81	%.	50-150		1	10/22/15 07:13	10/28/15 12:52	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.2	2.6	1	10/26/15 14:07	10/26/15 19:06		
Surrogates									
a,a,a-Trifluorotoluene (S)	83	%.	50-150		1	10/26/15 14:07	10/26/15 19:06	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**2.4**	mg/kg	0.45	0.18	20	10/26/15 22:42	10/27/15 22:06	7440-36-0	
Arsenic	**5.6**	mg/kg	0.45	0.11	20	10/26/15 22:42	10/27/15 22:06	7440-38-2	
Cadmium	**31.7**	mg/kg	0.072	0.025	20	10/26/15 22:42	10/27/15 22:06	7440-43-9	
Chromium	**1.9**	mg/kg	0.45	0.17	20	10/26/15 22:42	10/27/15 22:06	7440-47-3	
Copper	**15.2**	mg/kg	0.90	0.29	20	10/26/15 22:42	10/27/15 22:06	7440-50-8	
Lead	**14700**	mg/kg	9.0	3.9	2000	10/26/15 22:42	10/28/15 17:28	7439-92-1	
Nickel	**3.7**	mg/kg	0.45	0.14	20	10/26/15 22:42	10/27/15 22:06	7440-02-0	
Zinc	**7560**	mg/kg	451	121	2000	10/26/15 22:42	10/28/15 17:28	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.14; Final pH: 2.55								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:35	7440-38-2	D3
Cadmium	**0.54**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:35	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:35	7440-47-3	D3
Lead	**257**	mg/L	0.25	0.11	500	01/21/16 10:22	01/22/16 11:13	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.27								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:05	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:05	7440-38-2	2M
Cadmium	**0.00083**	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:05	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:05	7440-50-8	2M
Lead	**0.013**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:05	7439-92-1	2M
Zinc	ND	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:05	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.27								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:07	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.14; Final pH: 2.55								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:54	7439-97-6	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-20 (0.5-1) **Lab ID: 10326596012** Collected: 10/13/15 11:15 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.50**	mg/kg	0.019	0.0065	1	10/25/15 18:54	10/25/15 19:54	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**6.1**	%	0.10	0.10	1		10/28/15 15:29		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-21 (0.5-1) **Lab ID: 10326596013** Collected: 10/13/15 11:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	**123**	mg/kg	15.8	0.85	1	10/22/15 07:13	10/28/15 14:02	68334-30-5	
Motor Oil Range	**1020**	mg/kg	105	18.9	10	10/22/15 07:13	10/28/15 16:20		
Surrogates									
n-Triacontane (S)	96	%.	50-150		1	10/22/15 07:13	10/28/15 14:02	638-68-6	
o-Terphenyl (S)	81	%.	50-150		1	10/22/15 07:13	10/28/15 14:02	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.3	2.6	1	10/26/15 14:07	10/26/15 19:26		
Surrogates									
a,a,a-Trifluorotoluene (S)	86	%.	50-150		1	10/26/15 14:07	10/26/15 19:26	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.45**	mg/kg	0.39	0.15	20	10/26/15 22:42	10/27/15 22:11	7440-36-0	
Arsenic	**4.3**	mg/kg	0.39	0.094	20	10/26/15 22:42	10/27/15 22:11	7440-38-2	
Cadmium	**9.3**	mg/kg	0.062	0.021	20	10/26/15 22:42	10/27/15 22:11	7440-43-9	
Chromium	**3.7**	mg/kg	0.39	0.15	20	10/26/15 22:42	10/27/15 22:11	7440-47-3	
Copper	**175**	mg/kg	0.77	0.25	20	10/26/15 22:42	10/27/15 22:11	7440-50-8	
Lead	**1370**	mg/kg	0.77	0.33	200	10/26/15 22:42	10/29/15 12:19	7439-92-1	
Nickel	**3.1**	mg/kg	0.39	0.12	20	10/26/15 22:42	10/27/15 22:11	7440-02-0	
Zinc	**2980**	mg/kg	385	103	2000	10/26/15 22:42	10/28/15 17:32	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.03; Final pH: 1.62								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:47	7440-38-2	D3
Cadmium	**0.19**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:47	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:47	7440-47-3	D3
Lead	**17.4**	mg/L	0.012	0.0057	25	01/21/16 10:22	01/22/16 11:19	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.22								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:08	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:08	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:08	7440-43-9	2M
Copper	**0.011**	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:08	7440-50-8	2M
Lead	**0.051**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:08	7439-92-1	2M
Zinc	**0.20**	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:08	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.22								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:09	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.03; Final pH: 1.62								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:56	7439-97-6	

ANALYTICAL RESULTS

Project:	0504-100-00 VAN STONE Rev
Pace Project No.:	10326596

Sample: MS-21 (0.5-1) **Lab ID: 10326596013** Collected: 10/13/15 11:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.12**	mg/kg	0.020	0.0069	1	10/25/15 18:54	10/25/15 19:57	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.9**	%	0.10	0.10	1		10/28/15 15:29		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-22 (0.5-1) **Lab ID: 10326596014** Collected: 10/13/15 11:40 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	**76.4**	mg/kg	15.8	0.85	1	10/22/15 07:13	10/28/15 14:25	68334-30-5	
Motor Oil Range	**932**	mg/kg	105	18.9	10	10/22/15 07:13	10/28/15 15:57		
Surrogates									
n-Triacontane (S)	91	%.	50-150		1	10/22/15 07:13	10/28/15 14:25	638-68-6	
o-Terphenyl (S)	74	%.	50-150		1	10/22/15 07:13	10/28/15 14:25	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.2	2.6	1	10/26/15 14:07	10/26/15 19:46		1M
Surrogates									
a,a,a-Trifluorotoluene (S)	86	%.	50-150		1	10/26/15 14:07	10/26/15 19:46	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.77**	mg/kg	0.43	0.17	20	10/26/15 22:42	10/27/15 22:16	7440-36-0	
Arsenic	**8.2**	mg/kg	0.43	0.11	20	10/26/15 22:42	10/27/15 22:16	7440-38-2	
Cadmium	**17.2**	mg/kg	0.069	0.024	20	10/26/15 22:42	10/27/15 22:16	7440-43-9	
Chromium	**3.0**	mg/kg	0.43	0.16	20	10/26/15 22:42	10/27/15 22:16	7440-47-3	
Copper	**103**	mg/kg	0.86	0.28	20	10/26/15 22:42	10/27/15 22:16	7440-50-8	
Lead	**2400**	mg/kg	0.86	0.38	200	10/26/15 22:42	10/29/15 12:24	7439-92-1	
Nickel	**3.0**	mg/kg	0.43	0.13	20	10/26/15 22:42	10/27/15 22:16	7440-02-0	
Zinc	**5400**	mg/kg	432	116	2000	10/26/15 22:42	10/28/15 17:37	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.42**	mg/kg	0.021	0.0074	1	10/28/15 18:01	10/28/15 20:22	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.9**	%	0.10	0.10	1		10/28/15 15:29		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-23 (0.5-1) **Lab ID: 10326596015** Collected: 10/13/15 11:50 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	ND	mg/kg	15.9	0.86	1	10/22/15 07:13	10/28/15 15:11	68334-30-5	
Motor Oil Range	**139**	mg/kg	10.6	1.9	1	10/22/15 07:13	10/28/15 15:11		
Surrogates									
n-Triacontane (S)	88	%.	50-150		1	10/22/15 07:13	10/28/15 15:11	638-68-6	
o-Terphenyl (S)	84	%.	50-150		1	10/22/15 07:13	10/28/15 15:11	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.2	2.6	1	10/26/15 14:07	10/26/15 20:06		
Surrogates									
a,a,a-Trifluorotoluene (S)	87	%.	50-150		1	10/26/15 14:07	10/26/15 20:06	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.71**	mg/kg	0.42	0.16	20	10/26/15 22:42	10/27/15 22:21	7440-36-0	
Arsenic	**2.0**	mg/kg	0.42	0.10	20	10/26/15 22:42	10/27/15 22:21	7440-38-2	
Cadmium	**215**	mg/kg	0.067	0.023	20	10/26/15 22:42	10/27/15 22:21	7440-43-9	
Chromium	**0.91**	mg/kg	0.42	0.16	20	10/26/15 22:42	10/27/15 22:21	7440-47-3	
Copper	**57.7**	mg/kg	0.83	0.27	20	10/26/15 22:42	10/27/15 22:21	7440-50-8	
Lead	**3730**	mg/kg	0.83	0.36	200	10/26/15 22:42	10/29/15 12:28	7439-92-1	
Nickel	**1.8**	mg/kg	0.42	0.13	20	10/26/15 22:42	10/27/15 22:21	7440-02-0	
Zinc	**57200**	mg/kg	2080	558	10000	10/26/15 22:42	10/28/15 17:47	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.98; Final pH: 2.98								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:41	7440-38-2	D3
Cadmium	**0.35**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:41	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:41	7440-47-3	D3
Lead	**51.9**	mg/L	0.050	0.023	100	01/21/16 10:22	01/22/16 11:16	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.25								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:10	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:10	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:10	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:10	7440-50-8	2M
Lead	**0.0043**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:10	7439-92-1	2M
Zinc	ND	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:10	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.25								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:11	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.98; Final pH: 2.98								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 18:59	7439-97-6	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-23 (0.5-1) **Lab ID: 10326596015** Collected: 10/13/15 11:50 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.31**	mg/kg	0.020	0.0071	1	10/25/15 18:54	10/25/15 19:59	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.6**	%	0.10	0.10	1		10/28/15 15:30		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-24 (0.5-1) **Lab ID: 10326596016** Collected: 10/13/15 12:00 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.37	0.14	20	10/26/15 22:42	10/27/15 22:25	7440-36-0	
Arsenic	**4.0**	mg/kg	0.37	0.090	20	10/26/15 22:42	10/27/15 22:25	7440-38-2	
Cadmium	**7.7**	mg/kg	0.059	0.020	20	10/26/15 22:42	10/27/15 22:25	7440-43-9	
Chromium	**3.8**	mg/kg	0.37	0.14	20	10/26/15 22:42	10/27/15 22:25	7440-47-3	
Copper	**9.1**	mg/kg	0.73	0.24	20	10/26/15 22:42	10/27/15 22:25	7440-50-8	
Lead	**123**	mg/kg	0.073	0.032	20	10/26/15 22:42	10/27/15 22:25	7439-92-1	
Nickel	**4.2**	mg/kg	0.37	0.11	20	10/26/15 22:42	10/27/15 22:25	7440-02-0	
Zinc	**2130**	mg/kg	36.7	9.8	200	10/26/15 22:42	10/28/15 18:01	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.072**	mg/kg	0.018	0.0063	1	10/25/15 18:54	10/25/15 20:02	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**4.8**	%	0.10	0.10	1		10/28/15 15:30		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-25 (0.5-1) **Lab ID: 10326596017** Collected: 10/13/15 12:10 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**0.83**	mg/kg	0.53	0.21	20	10/26/15 22:42	10/27/15 22:30	7440-36-0	
Arsenic	**13.5**	mg/kg	0.53	0.13	20	10/26/15 22:42	10/27/15 22:30	7440-38-2	
Cadmium	**11.3**	mg/kg	0.084	0.029	20	10/26/15 22:42	10/27/15 22:30	7440-43-9	
Chromium	**1.1**	mg/kg	0.53	0.20	20	10/26/15 22:42	10/27/15 22:30	7440-47-3	
Copper	**3.2**	mg/kg	1.1	0.34	20	10/26/15 22:42	10/27/15 22:30	7440-50-8	
Lead	**272**	mg/kg	0.11	0.046	20	10/26/15 22:42	10/27/15 22:30	7439-92-1	
Nickel	**4.8**	mg/kg	0.53	0.16	20	10/26/15 22:42	10/27/15 22:30	7440-02-0	
Zinc	**1860**	mg/kg	52.8	14.1	200	10/26/15 22:42	10/28/15 18:06	7440-66-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.050**	mg/kg	0.019	0.0065	1	10/25/15 18:54	10/25/15 20:04	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.3**	%	0.10	0.10	1		10/28/15 15:30		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-26 (0.5-1) **Lab ID: 10326596018** Collected: 10/13/15 12:20 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	**3.2**	mg/kg	0.42	0.16	20	10/26/15 22:42	10/27/15 22:35	7440-36-0	
Arsenic	**9.4**	mg/kg	0.42	0.10	20	10/26/15 22:42	10/27/15 22:35	7440-38-2	
Cadmium	**105**	mg/kg	0.067	0.023	20	10/26/15 22:42	10/27/15 22:35	7440-43-9	
Chromium	**0.84**	mg/kg	0.42	0.16	20	10/26/15 22:42	10/27/15 22:35	7440-47-3	
Copper	**10.8**	mg/kg	0.84	0.27	20	10/26/15 22:42	10/27/15 22:35	7440-50-8	
Lead	**13900**	mg/kg	21.0	9.1	5000	10/26/15 22:42	10/29/15 12:33	7439-92-1	
Nickel	**2.9**	mg/kg	0.42	0.13	20	10/26/15 22:42	10/27/15 22:35	7440-02-0	
Zinc	**27400**	mg/kg	1050	282	5000	10/26/15 22:42	10/29/15 12:33	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.14; Final pH: 4.64								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:53	7440-38-2	D3
Cadmium	**0.56**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:53	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:53	7440-47-3	D3
Lead	**5.9**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 10:53	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.71								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:13	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:13	7440-38-2	2M
Cadmium	**0.00082**	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:13	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:13	7440-50-8	2M
Lead	**0.0031**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:13	7439-92-1	2M
Zinc	ND	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:13	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.71								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:13	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.14; Final pH: 4.64								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 19:01	7439-97-6	
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.056**	mg/kg	0.019	0.0065	1	10/25/15 18:54	10/25/15 20:12	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**5.0**	%	0.10	0.10	1		10/28/15 15:30		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-27 (0.5-1) **Lab ID: 10326596019** Collected: 10/13/15 12:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	ND	mg/kg	15.6	0.84	1	10/22/15 07:13	10/28/15 14:48	68334-30-5	
Motor Oil Range	**110**	mg/kg	10.4	1.9	1	10/22/15 07:13	10/28/15 14:48		
Surrogates									
n-Triacontane (S)	77	%.	50-150		1	10/22/15 07:13	10/28/15 14:48	638-68-6	
o-Terphenyl (S)	83	%.	50-150		1	10/22/15 07:13	10/28/15 14:48	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.0	2.5	1	10/26/15 14:07	10/26/15 20:26		
Surrogates									
a,a,a-Trifluorotoluene (S)	87	%.	50-150		1	10/26/15 14:07	10/26/15 20:26	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.46	0.18	20	10/26/15 22:42	10/27/15 22:40	7440-36-0	
Arsenic	**5.7**	mg/kg	0.46	0.11	20	10/26/15 22:42	10/27/15 22:40	7440-38-2	
Cadmium	**6.2**	mg/kg	0.073	0.025	20	10/26/15 22:42	10/27/15 22:40	7440-43-9	
Chromium	**3.0**	mg/kg	0.46	0.17	20	10/26/15 22:42	10/27/15 22:40	7440-47-3	
Copper	**8.6**	mg/kg	0.91	0.30	20	10/26/15 22:42	10/27/15 22:40	7440-50-8	
Lead	**608**	mg/kg	0.91	0.40	200	10/26/15 22:42	10/29/15 12:38	7439-92-1	
Nickel	**3.5**	mg/kg	0.46	0.14	20	10/26/15 22:42	10/27/15 22:40	7440-02-0	
Zinc	**3680**	mg/kg	45.6	12.2	200	10/26/15 22:42	10/29/15 12:38	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.76; Final pH: 2.07								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 10:55	7440-38-2	D3
Cadmium	**0.16**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 10:55	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 10:55	7440-47-3	D3
Lead	**4.8**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 10:55	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.5								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:15	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:15	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:15	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:15	7440-50-8	2M
Lead	**0.021**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:15	7439-92-1	2M
Zinc	**0.13**	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:15	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.5								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:15	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.76; Final pH: 2.07								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 19:04	7439-97-6	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-27 (0.5-1) **Lab ID: 10326596019** Collected: 10/13/15 12:30 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.095**	mg/kg	0.019	0.0066	1	10/25/15 18:54	10/25/15 20:14	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**3.8**	%	0.10	0.10	1		10/28/15 15:31		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-28 (0.5-1) **Lab ID: 10326596020** Collected: 10/13/15 12:40 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
NWTPH-Dx GCS	Analytical Method: NWTPH-Dx Preparation Method: EPA 3550								
Diesel Fuel Range	ND	mg/kg	15.5	0.84	1	10/22/15 07:13	10/28/15 15:34	68334-30-5	
Motor Oil Range	**30.2**	mg/kg	10.3	1.9	1	10/22/15 07:13	10/28/15 15:34		
Surrogates									
n-Triacontane (S)	76	%.	50-150		1	10/22/15 07:13	10/28/15 15:34	638-68-6	
o-Terphenyl (S)	87	%.	50-150		1	10/22/15 07:13	10/28/15 15:34	84-15-1	
NWTPH-Gx GCV	Analytical Method: NWTPH-Gx Preparation Method: NWTPH-Gx								
TPH as Gas	ND	mg/kg	5.1	2.5	1	10/26/15 14:07	10/26/15 20:46		
Surrogates									
a,a,a-Trifluorotoluene (S)	85	%.	50-150		1	10/26/15 14:07	10/26/15 20:46	98-08-8	
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3050								
Antimony	ND	mg/kg	0.40	0.16	20	10/26/15 22:42	10/27/15 22:45	7440-36-0	
Arsenic	**1.5**	mg/kg	0.40	0.097	20	10/26/15 22:42	10/27/15 22:45	7440-38-2	
Cadmium	**2.4**	mg/kg	0.064	0.022	20	10/26/15 22:42	10/27/15 22:45	7440-43-9	
Chromium	**3.3**	mg/kg	0.40	0.15	20	10/26/15 22:42	10/27/15 22:45	7440-47-3	
Copper	**7.1**	mg/kg	0.79	0.26	20	10/26/15 22:42	10/27/15 22:45	7440-50-8	
Lead	**330**	mg/kg	0.79	0.34	200	10/26/15 22:42	10/29/15 12:42	7439-92-1	
Nickel	**3.2**	mg/kg	0.40	0.12	20	10/26/15 22:42	10/27/15 22:45	7440-02-0	
Zinc	**746**	mg/kg	39.7	10.6	200	10/26/15 22:42	10/29/15 12:42	7440-66-6	
6020A MET ICPMS, TCLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.56; Final pH: 1.47								
Arsenic	ND	mg/L	0.012	0.0028	5	01/21/16 10:22	01/22/16 13:53	7440-38-2	
Cadmium	**0.029**	mg/L	0.0020	0.00061	5	01/21/16 10:22	01/22/16 13:53	7440-43-9	
Chromium	ND	mg/L	0.012	0.0042	5	01/21/16 10:22	01/22/16 13:53	7440-47-3	
Lead	**1.9**	mg/L	0.0025	0.0011	5	01/21/16 10:22	01/22/16 13:53	7439-92-1	
6020A MET ICPMS, SPLP	Analytical Method: EPA 6020A Preparation Method: EPA 3020 Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.77								
Antimony	ND	mg/L	0.0050	0.0015	1	01/24/16 16:47	01/25/16 14:18	7440-36-0	2M
Arsenic	ND	mg/L	0.0050	0.0011	1	01/24/16 16:47	01/25/16 14:18	7440-38-2	2M
Cadmium	ND	mg/L	0.00080	0.00024	1	01/24/16 16:47	01/25/16 14:18	7440-43-9	2M
Copper	ND	mg/L	0.010	0.0021	1	01/24/16 16:47	01/25/16 14:18	7440-50-8	2M
Lead	**0.015**	mg/L	0.0010	0.00046	1	01/24/16 16:47	01/25/16 14:18	7439-92-1	2M
Zinc	**0.063**	mg/L	0.050	0.024	1	01/24/16 16:47	01/25/16 14:18	7440-66-6	2M
7470A Mercury, SPLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1312; 01/22/16 14:41 Initial pH: ; Final pH: 7.77								
Mercury	ND	mg/L	0.00060	0.000065	1	01/24/16 18:50	01/24/16 21:17	7439-97-6	2M
7470A Mercury, TCLP	Analytical Method: EPA 7470A Preparation Method: EPA 7470A Leachate Method/Date: EPA 1311; 01/21/16 05:03 Initial pH: 8.56; Final pH: 1.47								
Mercury	ND	mg/L	0.00060	0.000065	1	01/21/16 09:00	01/21/16 19:06	7439-97-6	

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Sample: MS-28 (0.5-1) **Lab ID: 10326596020** Collected: 10/13/15 12:40 Received: 10/17/15 09:30 Matrix: Solid

Results reported on a "dry weight" basis and are adjusted for percent moisture, sample size and any dilutions.

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
7471B Mercury	Analytical Method: EPA 7471B Preparation Method: EPA 7471B								
Mercury	**0.028**	mg/kg	0.018	0.0062	1	10/25/15 18:54	10/25/15 20:17	7439-97-6	
Dry Weight	Analytical Method: ASTM D2974								
Percent Moisture	**4.0**	%	0.10	0.10	1		10/28/15 15:31		

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: GCV/14560 | Analysis Method: NWTPH-Gx
QC Batch Method: NWTPH-Gx | Analysis Description: NWTPH-Gx Solid GCV
Associated Lab Samples: 10326596012, 10326596013, 10326596014, 10326596015, 10326596019, 10326596020

METHOD BLANK: 2117867 Matrix: Solid
Associated Lab Samples: 10326596012, 10326596013, 10326596014, 10326596015, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
TPH as Gas	mg/kg	ND	5.0	2.5	10/26/15 18:06	
a,a,a-Trifluorotoluene (S)	%.	84	50-150		10/26/15 18:06	

METHOD BLANK: 2117868 Matrix: Solid
Associated Lab Samples: 10326596012, 10326596013, 10326596014, 10326596015, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
TPH as Gas	mg/kg	ND	5.0	2.5	10/26/15 18:26	
a,a,a-Trifluorotoluene (S)	%.	87	50-150		10/26/15 18:26	

LABORATORY CONTROL SAMPLE & LCSD: 2117869 2117870

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
TPH as Gas	mg/kg	50	45.1	40.2	90	80	75-125	12	20	
a,a,a-Trifluorotoluene (S)	%.				113	112	50-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MERP/15804
Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A
Analysis Description: 7470A Mercury SPLP
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2179650
Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00060	0.000065	01/24/16 20:44	

METHOD BLANK: 2178255
Matrix: Solid
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00060	0.000065	01/24/16 21:19	

LABORATORY CONTROL SAMPLE: 2179651

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.005	0.0056	111	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2179652 2179653

Parameter	Units	10326596011 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	.005	.005	0.0049	0.0048	98	96	80-120	2	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MERP/15789 Analysis Method: EPA 7470A
QC Batch Method: EPA 7470A Analysis Description: 7470A Mercury TCLP
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2178158 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00060	0.000065	01/21/16 18:29	

METHOD BLANK: 2176745 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00060	0.000065	01/21/16 19:31	

METHOD BLANK: 2176746 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/L	ND	0.00060	0.000065	01/21/16 19:34	

LABORATORY CONTROL SAMPLE: 2178159

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/L	.015	0.015	101	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2178160 2178161

Parameter	Units	10326596006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/L	ND	.015	.015	0.015	0.015	98	99	80-120	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MERP/15083
Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B
Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10326596003, 10326596004, 10326596005, 10326596006, 10326596007, 10326596008, 10326596009, 10326596010, 10326596011, 10326596012, 10326596013, 10326596015, 10326596016, 10326596017, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2114465
Matrix: Solid
Associated Lab Samples: 10326596003, 10326596004, 10326596005, 10326596006, 10326596007, 10326596008, 10326596009, 10326596010, 10326596011, 10326596012, 10326596013, 10326596015, 10326596016, 10326596017, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.018	0.0063	10/25/15 19:18	

LABORATORY CONTROL SAMPLE: 2114466

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.44	0.46	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117385 2117386

Parameter	Units	10326596003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	0.038	.49	.5	0.58	0.59	110	110	75-125	3	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MERP/15112
Analysis Method: EPA 7471B
QC Batch Method: EPA 7471B
Analysis Description: 7471B Mercury Solids
Associated Lab Samples: 10326596001, 10326596002, 10326596014

METHOD BLANK: 2117576
Matrix: Solid
Associated Lab Samples: 10326596001, 10326596002, 10326596014

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Mercury	mg/kg	ND	0.020	0.0070	10/28/15 20:12	

LABORATORY CONTROL SAMPLE: 2117577

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	mg/kg	.44	0.49	111	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117578 2117579

Parameter	Units	10326596014 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	mg/kg	0.42	.53	.46	0.87	0.82	83	88	75-125	5	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MPRP/58952
Analysis Method: EPA 6020A
QC Batch Method: EPA 3050
Analysis Description: 6020A Solids UPD4
Associated Lab Samples: 10326596003, 10326596004, 10326596005, 10326596006, 10326596007, 10326596008, 10326596009, 10326596010, 10326596011, 10326596012, 10326596013, 10326596014, 10326596015, 10326596016, 10326596017, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2114415
Matrix: Solid
Associated Lab Samples: 10326596003, 10326596004, 10326596005, 10326596006, 10326596007, 10326596008, 10326596009, 10326596010, 10326596011, 10326596012, 10326596013, 10326596014, 10326596015, 10326596016, 10326596017, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/kg	ND	0.48	0.19	10/27/15 21:08	
Arsenic	mg/kg	ND	0.48	0.12	10/27/15 21:08	
Cadmium	mg/kg	ND	0.076	0.026	10/27/15 21:08	
Chromium	mg/kg	ND	0.48	0.18	10/27/15 21:08	
Copper	mg/kg	ND	0.95	0.31	10/27/15 21:08	
Lead	mg/kg	ND	0.095	0.041	10/27/15 21:08	
Nickel	mg/kg	ND	0.48	0.14	10/27/15 21:08	
Zinc	mg/kg	ND	4.8	1.3	10/27/15 21:08	

LABORATORY CONTROL SAMPLE: 2114416

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	18.7	18.9	101	80-120	
Arsenic	mg/kg	18.7	19.3	103	80-120	
Cadmium	mg/kg	18.7	18.8	101	80-120	
Chromium	mg/kg	18.7	19.2	103	80-120	
Copper	mg/kg	18.7	19.7	105	80-120	
Lead	mg/kg	18.7	18.7	100	80-120	
Nickel	mg/kg	18.7	19.6	105	80-120	
Zinc	mg/kg	18.7	19.6	105	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2118200 2118201

Parameter	Units	10326596003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/kg	ND	18.7	18.3	16.8	17.1	88	91	75-125	1	20	
Arsenic	mg/kg	14.4	18.7	18.3	46.3	37.3	171	125	75-125	22	20	M6,R1
Cadmium	mg/kg	3.6	18.7	18.3	23.8	30.1	108	145	75-125	23	20	M6,R1
Chromium	mg/kg	ND	18.7	18.3	19.9	22.6	105	122	75-125	13	20	
Copper	mg/kg	1.3	18.7	18.3	21.5	24.5	108	127	75-125	13	20	M6
Lead	mg/kg	58.9	18.7	18.3	85.6	109	143	274	75-125	24	20	M6,R1
Nickel	mg/kg	3.2	18.7	18.3	23.1	26.6	106	128	75-125	14	20	M6
Zinc	mg/kg	1540	18.7	18.3	2060	2740	2780	6560	75-125	28	20	E,M6, R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MPRP/59169
QC Batch Method: EPA 3050
Analysis Method: EPA 6020A
Analysis Description: 6020A Solids UPD4
Associated Lab Samples: 10326596001, 10326596002

METHOD BLANK: 2119867
Matrix: Solid
Associated Lab Samples: 10326596001, 10326596002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/kg	ND	0.47	0.18	10/29/15 08:51	
Arsenic	mg/kg	ND	0.47	0.12	10/29/15 08:51	
Cadmium	mg/kg	ND	0.075	0.026	10/29/15 08:51	
Chromium	mg/kg	ND	0.47	0.18	10/29/15 08:51	
Copper	mg/kg	ND	0.94	0.31	10/29/15 08:51	
Lead	mg/kg	ND	0.094	0.041	10/29/15 08:51	
Nickel	mg/kg	ND	0.47	0.14	10/29/15 08:51	
Zinc	mg/kg	ND	4.7	1.3	10/29/15 08:51	

LABORATORY CONTROL SAMPLE: 2119868

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/kg	19	19.6	103	80-120	
Arsenic	mg/kg	19	19.5	102	80-120	
Cadmium	mg/kg	19	20.8	109	80-120	
Chromium	mg/kg	19	20.6	108	80-120	
Copper	mg/kg	19	20.9	110	80-120	
Lead	mg/kg	19	21.0	110	80-120	
Nickel	mg/kg	19	21.3	112	80-120	
Zinc	mg/kg	19	20.7	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2120831 2120832

Parameter	Units	10326897001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/kg	0.38J	20.5	19.2	9.6	6.0	45	29	75-125	47	20	M6,R1
Arsenic	mg/kg	5.3	20.5	19.2	20.0	13.5	71	43	75-125	39	20	M6,R1
Cadmium	mg/kg	13.3	20.5	19.2	26.7	18.4	66	27	75-125	37	20	M6,R1
Chromium	mg/kg	95.6	20.5	19.2	97.1	65.3	7	-158	75-125	39	20	M6,R1
Copper	mg/kg	111	20.5	19.2	112	78.6	4	-169	75-125	35	20	M6,R1
Lead	mg/kg	13.2	20.5	19.2	27.8	18.7	71	28	75-125	39	20	M6,R1
Nickel	mg/kg	150	20.5	19.2	140	101	-49	-258	75-125	33	20	M6,R1
Zinc	mg/kg	269	20.5	19.2	191	133	-379	-707	75-125	36	20	M6,R1

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MPRP/61043
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A TCLP UPD4
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2178154 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/L	ND	0.0025	0.00056	01/22/16 10:02	
Cadmium	mg/L	ND	0.00040	0.00012	01/22/16 10:02	
Chromium	mg/L	ND	0.0025	0.00084	01/22/16 10:02	
Lead	mg/L	ND	0.00050	0.00023	01/22/16 10:02	

METHOD BLANK: 2176745 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Arsenic	mg/L	ND	0.012	0.0028	01/25/16 14:00	
Cadmium	mg/L	ND	0.0020	0.00061	01/25/16 14:00	
Chromium	mg/L	ND	0.012	0.0042	01/25/16 14:00	
Lead	mg/L	ND	0.0025	0.0011	01/25/16 14:00	

LABORATORY CONTROL SAMPLE: 2178155

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Arsenic	mg/L	.4	0.40	100	80-120	
Cadmium	mg/L	.4	0.42	104	80-120	
Chromium	mg/L	.4	0.42	105	80-120	
Lead	mg/L	.4	0.41	104	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2178156 2178157

Parameter	Units	10326596006 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Arsenic	mg/L	ND	.4	.4	0.42	0.43	105	107	75-125	2	20	
Cadmium	mg/L	0.0011	.4	.4	0.49	0.52	99	106	75-125	6	20	
Chromium	mg/L	ND	.4	.4	0.41	0.43	103	108	75-125	5	20	
Lead	mg/L	0.042	.4	.4	0.56	0.60	97	107	75-125	7	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MPRP/61089 Analysis Method: EPA 6020A
QC Batch Method: EPA 3020 Analysis Description: 6020A SPLP UPD4
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

METHOD BLANK: 2179645 Matrix: Water
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0050	0.0015	01/25/16 13:32	
Arsenic	mg/L	ND	0.0050	0.0011	01/25/16 13:32	
Cadmium	mg/L	ND	0.00080	0.00024	01/25/16 13:32	
Copper	mg/L	ND	0.010	0.0021	01/25/16 13:32	
Lead	mg/L	ND	0.0010	0.00046	01/25/16 13:32	
Zinc	mg/L	ND	0.050	0.024	01/25/16 13:32	

METHOD BLANK: 2178255 Matrix: Solid
Associated Lab Samples: 10326596006, 10326596008, 10326596009, 10326596011, 10326596012, 10326596013, 10326596015, 10326596018, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	mg/L	ND	0.0050	0.0015	01/25/16 14:20	
Arsenic	mg/L	ND	0.0050	0.0011	01/25/16 14:20	
Cadmium	mg/L	ND	0.00080	0.00024	01/25/16 14:20	
Copper	mg/L	ND	0.010	0.0021	01/25/16 14:20	
Lead	mg/L	ND	0.0010	0.00046	01/25/16 14:20	
Zinc	mg/L	ND	0.050	0.024	01/25/16 14:20	

LABORATORY CONTROL SAMPLE: 2179646

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	mg/L	.08	0.088	110	80-120	
Arsenic	mg/L	.08	0.087	109	80-120	
Cadmium	mg/L	.08	0.088	110	80-120	
Copper	mg/L	.08	0.089	111	80-120	
Lead	mg/L	.08	0.090	112	80-120	
Zinc	mg/L	.08	0.086	108	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2179647 2179648

Parameter	Units	10326596009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	mg/L	ND	.08	.08	0.095	0.087	118	108	75-125	8	20	
Arsenic	mg/L	ND	.08	.08	0.093	0.087	115	108	75-125	7	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2179647 2179648

Parameter	Units	10326596009 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Cadmium	mg/L	ND	.08	.08	0.093	0.086	116	108	75-125	7	20	
Copper	mg/L	ND	.08	.08	0.092	0.085	115	106	75-125	8	20	
Lead	mg/L	ND	.08	.08	0.095	0.086	118	107	75-125	9	20	
Zinc	mg/L	ND	.08	.08	ND	ND	115	102	75-125		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MPRP/59178
Analysis Method: ASTM D2974
QC Batch Method: ASTM D2974
Analysis Description: Dry Weight/Percent Moisture

Associated Lab Samples: 10326596001, 10326596002, 10326596003, 10326596004, 10326596005, 10326596006, 10326596007, 10326596008, 10326596009, 10326596010, 10326596011, 10326596012, 10326596013, 10326596014, 10326596015, 10326596016, 10326596017, 10326596018, 10326596019, 10326596020

SAMPLE DUPLICATE: 2120354

Parameter	Units	10326596004 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	5.2	4.9	4	30	

SAMPLE DUPLICATE: 2120355

Parameter	Units	10326596020 Result	Dup Result	RPD	Max RPD	Qualifiers
Percent Moisture	%	4.0	3.8	6	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MT/21175
Analysis Method: Modified Sobek 3.2
QC Batch Method: Modified Sobek 3.2
Analysis Description: Sobek Neutralization Potential
Associated Lab Samples: 10326596001, 10326596002, 10326596003, 10326596004, 10326596005, 10326596009, 10326596010

METHOD BLANK: 2118027
Matrix: Solid
Associated Lab Samples: 10326596001, 10326596002, 10326596003, 10326596004, 10326596005, 10326596009, 10326596010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Neutralization Potential	tons/1000	ND	0.50	0.50	10/28/15 10:27	

LABORATORY CONTROL SAMPLE: 2118028

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Neutralization Potential	tons/1000	43.3	43.7	101	70-130	

SAMPLE DUPLICATE: 2118029

Parameter	Units	10326596009 Result	Dup Result	RPD	Max RPD	Qualifiers
Neutralization Potential	tons/1000	92.6	92.9	0	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: MT/21174
QC Batch Method: Modified Sobek 3.2
Analysis Method: Modified Sobek 3.2
Analysis Description: Sobek Extractable Sulfur
Associated Lab Samples: 10326596001, 10326596002, 10326596003, 10326596004, 10326596005, 10326596009, 10326596010

METHOD BLANK: 2118022
Matrix: Solid
Associated Lab Samples: 10326596001, 10326596002, 10326596003, 10326596004, 10326596005, 10326596009, 10326596010

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Sulfur, HCl Extractable	% (w/w)	ND	0.050	0.018	10/29/15 06:20	
Sulfur, HNO3 Extractable	% (w/w)	ND	0.050	0.018	10/29/15 06:20	
Sulfur, Hot Water Extractable	% (w/w)	ND	0.050	0.018	10/29/15 06:20	
Sulfur, Residual	% (w/w)	ND	0.050	0.018	10/29/15 06:20	
Total Sulfur	% (w/w)	ND	0.050	0.018	10/29/15 06:20	

LABORATORY CONTROL SAMPLE: 2118023

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Sulfur	% (w/w)	.89	0.860	97	90-110	

SAMPLE DUPLICATE: 2118024

Parameter	Units	10326596002 Result	Dup Result	RPD	Max RPD	Qualifiers
Sulfur, HCl Extractable	% (w/w)	ND	ND		20	
Sulfur, HNO3 Extractable	% (w/w)	ND	ND		20	
Sulfur, Hot Water Extractable	% (w/w)	ND	ND		20	
Sulfur, Residual	% (w/w)	ND	.0339J		20	
Total Sulfur	% (w/w)	ND	.0344J		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: OEXT/31331
Analysis Method: NWTPH-Dx
QC Batch Method: EPA 3550
Analysis Description: NWTPH-Dx GCS
Associated Lab Samples: 10326596012, 10326596013, 10326596014, 10326596015, 10326596019, 10326596020

METHOD BLANK: 2114511
Matrix: Solid
Associated Lab Samples: 10326596012, 10326596013, 10326596014, 10326596015, 10326596019, 10326596020

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Diesel Fuel Range	mg/kg	ND	15.0	0.81	10/28/15 12:07	
Motor Oil Range	mg/kg	ND	10.0	1.8	10/28/15 12:07	
n-Triacontane (S)	%.	83	50-150		10/28/15 12:07	
o-Terphenyl (S)	%.	85	50-150		10/28/15 12:07	

LABORATORY CONTROL SAMPLE: 2114512

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Diesel Fuel Range	mg/kg	50	38.8	78	50-150	
Motor Oil Range	mg/kg	50	47.3	95	50-150	
n-Triacontane (S)	%.			89	50-150	
o-Terphenyl (S)	%.			91	50-150	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2114513 2114514

Parameter	Units	10326596012 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Diesel Fuel Range	mg/kg	ND	53.2	53.2	63.5	62.6	94	92	50-150	1	30	
Motor Oil Range	mg/kg	91.3	53.2	53.2	151	161	112	131	50-150	7	30	
n-Triacontane (S)	%.						88	83	50-150			
o-Terphenyl (S)	%.						92	88	50-150			

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

QC Batch: WET/25179
Analysis Method: EPA 7196A
QC Batch Method: EPA 3060A
Analysis Description: 7196 Chromium, Hexavalent
Associated Lab Samples: 10326596001, 10326596002

METHOD BLANK: 1409262
Matrix: Solid
Associated Lab Samples: 10326596001, 10326596002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Chromium, Hexavalent	mg/kg	ND	2.0	0.43	10/28/15 11:04	

LABORATORY CONTROL SAMPLE: 1409263

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Chromium, Hexavalent	mg/kg	989	940	95	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1409264 1409265

Parameter	Units	10326596001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium, Hexavalent	mg/kg	ND	1020	1010	921	910	90	90	75-125	1	20	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 1409266 1409267

Parameter	Units	10326596001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Chromium, Hexavalent	mg/kg	ND	40.5	40.5	32.1	32.3	79	79	75-125	1	20	

SAMPLE DUPLICATE: 1409268

Parameter	Units	10326596002 Result	Dup Result	RPD	Max RPD	Qualifiers
Chromium, Hexavalent	mg/kg	ND	ND		20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALIFIERS

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.
ND - Not Detected at or above adjusted reporting limit.
J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.
MDL - Adjusted Method Detection Limit.
PQL - Practical Quantitation Limit.
RL - Reporting Limit.
S - Surrogate
1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.
Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.
LCS(D) - Laboratory Control Sample (Duplicate)
MS(D) - Matrix Spike (Duplicate)
DUP - Sample Duplicate
RPD - Relative Percent Difference
NC - Not Calculable.
SG - Silica Gel - Clean-Up
U - Indicates the compound was analyzed for, but not detected.
N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.
Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.
TNI - The NELAC Institute.

LABORATORIES

PASI-I	Pace Analytical Services - Indianapolis
PASI-M	Pace Analytical Services - Minneapolis
PASI-MT	Pace Analytical Services - Montana

ANALYTE QUALIFIERS

1M	Sample preserved in lab; results are from sample aliquot taken from a glass jar with headspace.
2M	The temperature in the TCLP/ZHE extraction area was outside the method required range of 21-25 degrees C.
D3	Sample was diluted due to the presence of high levels of non-target analytes or other matrix interference.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M6	Matrix spike and Matrix spike duplicate recovery not evaluated against control limits due to sample dilution.
R1	RPD value was outside control limits.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10326596001	**LT-NS-1 (0.5-1)**		ASB/6866		
10326596002	**LT-NS-2 (0.5-1)**		ASB/6866		
10326596003	**MS-36 (3-5)**		ASB/6866		
10326596004	**MS-29 (6-7)**		ASB/6866		
10326596005	**MS-35 (6-8)**		ASB/6866		
10326596006	**MS-34 (4-5)**		ASB/6866		
10326596007	**MS-33 (4-5)**		ASB/6866		
10326596008	**MS-32 (4-5)**		ASB/6866		
10326596009	**MS-30 (4-5)**		ASB/6866		
10326596010	**MS-31 (6-8)**		ASB/6866		
10326596012	**MS-20 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596013	**MS-21 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596014	**MS-22 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596015	**MS-23 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596019	**MS-27 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596020	**MS-28 (0.5-1)**	EPA 3550	OEXT/31331	NWTPH-Dx	GCSV/17118
10326596012	**MS-20 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596013	**MS-21 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596014	**MS-22 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596015	**MS-23 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596019	**MS-27 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596020	**MS-28 (0.5-1)**	NWTPH-Gx	GCV/14560	NWTPH-Gx	GCV/14561
10326596001	**LT-NS-1 (0.5-1)**	EPA 3050	MPRP/59169	EPA 6020A	ICPM/27191
10326596002	**LT-NS-2 (0.5-1)**	EPA 3050	MPRP/59169	EPA 6020A	ICPM/27191
10326596003	**MS-36 (3-5)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596004	**MS-29 (6-7)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596005	**MS-35 (6-8)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596006	**MS-34 (4-5)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596007	**MS-33 (4-5)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596008	**MS-32 (4-5)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596009	**MS-30 (4-5)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596010	**MS-31 (6-8)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596011	**MS-19 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596012	**MS-20 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596013	**MS-21 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596014	**MS-22 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596015	**MS-23 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596016	**MS-24 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596017	**MS-25 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596018	**MS-26 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596019	**MS-27 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596020	**MS-28 (0.5-1)**	EPA 3050	MPRP/58952	EPA 6020A	ICPM/27156
10326596006	**MS-34 (4-5)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596008	**MS-32 (4-5)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596009	**MS-30 (4-5)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596011	**MS-19 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10326596012	**MS-20 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596013	**MS-21 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596015	**MS-23 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596018	**MS-26 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596019	**MS-27 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596020	**MS-28 (0.5-1)**	EPA 3020	MPRP/61043	EPA 6020A	ICPM/28170
10326596006	**MS-34 (4-5)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596008	**MS-32 (4-5)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596009	**MS-30 (4-5)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596011	**MS-19 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596012	**MS-20 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596013	**MS-21 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596015	**MS-23 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596018	**MS-26 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596019	**MS-27 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596020	**MS-28 (0.5-1)**	EPA 3020	MPRP/61089	EPA 6020A	ICPM/28185
10326596006	**MS-34 (4-5)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596008	**MS-32 (4-5)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596009	**MS-30 (4-5)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596011	**MS-19 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596012	**MS-20 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596013	**MS-21 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596015	**MS-23 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596018	**MS-26 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596019	**MS-27 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596020	**MS-28 (0.5-1)**	EPA 7470A	MERP/15804	EPA 7470A	MERC/18511
10326596006	**MS-34 (4-5)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596008	**MS-32 (4-5)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596009	**MS-30 (4-5)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596011	**MS-19 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596012	**MS-20 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596013	**MS-21 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596015	**MS-23 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596018	**MS-26 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596019	**MS-27 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596020	**MS-28 (0.5-1)**	EPA 7470A	MERP/15789	EPA 7470A	MERC/18492
10326596001	**LT-NS-1 (0.5-1)**	EPA 7471B	MERP/15112	EPA 7471B	MERC/17700
10326596002	**LT-NS-2 (0.5-1)**	EPA 7471B	MERP/15112	EPA 7471B	MERC/17700
10326596003	**MS-36 (3-5)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596004	**MS-29 (6-7)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596005	**MS-35 (6-8)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596006	**MS-34 (4-5)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596007	**MS-33 (4-5)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596008	**MS-32 (4-5)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596009	**MS-30 (4-5)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596010	**MS-31 (6-8)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10326596011	**MS-19 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596012	**MS-20 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596013	**MS-21 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596014	**MS-22 (0.5-1)**	EPA 7471B	MERP/15112	EPA 7471B	MERC/17700
10326596015	**MS-23 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596016	**MS-24 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596017	**MS-25 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596018	**MS-26 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596019	**MS-27 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596020	**MS-28 (0.5-1)**	EPA 7471B	MERP/15083	EPA 7471B	MERC/17667
10326596001	**LT-NS-1 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596002	**LT-NS-2 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596003	**MS-36 (3-5)**	ASTM D2974	MPRP/59178		
10326596004	**MS-29 (6-7)**	ASTM D2974	MPRP/59178		
10326596005	**MS-35 (6-8)**	ASTM D2974	MPRP/59178		
10326596006	**MS-34 (4-5)**	ASTM D2974	MPRP/59178		
10326596007	**MS-33 (4-5)**	ASTM D2974	MPRP/59178		
10326596008	**MS-32 (4-5)**	ASTM D2974	MPRP/59178		
10326596009	**MS-30 (4-5)**	ASTM D2974	MPRP/59178		
10326596010	**MS-31 (6-8)**	ASTM D2974	MPRP/59178		
10326596011	**MS-19 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596012	**MS-20 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596013	**MS-21 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596014	**MS-22 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596015	**MS-23 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596016	**MS-24 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596017	**MS-25 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596018	**MS-26 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596019	**MS-27 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596020	**MS-28 (0.5-1)**	ASTM D2974	MPRP/59178		
10326596001	**LT-NS-1 (0.5-1)**	Modified Sobek 3.2	MT/21233		
10326596002	**LT-NS-2 (0.5-1)**	Modified Sobek 3.2	MT/21233		
10326596003	**MS-36 (3-5)**	Modified Sobek 3.2	MT/21233		
10326596004	**MS-29 (6-7)**	Modified Sobek 3.2	MT/21233		
10326596005	**MS-35 (6-8)**	Modified Sobek 3.2	MT/21233		
10326596009	**MS-30 (4-5)**	Modified Sobek 3.2	MT/21233		
10326596010	**MS-31 (6-8)**	Modified Sobek 3.2	MT/21233		
10326596001	**LT-NS-1 (0.5-1)**	Modified Sobek 3.2	MT/21175		
10326596002	**LT-NS-2 (0.5-1)**	Modified Sobek 3.2	MT/21175		
10326596003	**MS-36 (3-5)**	Modified Sobek 3.2	MT/21175		
10326596004	**MS-29 (6-7)**	Modified Sobek 3.2	MT/21175		
10326596005	**MS-35 (6-8)**	Modified Sobek 3.2	MT/21175		
10326596009	**MS-30 (4-5)**	Modified Sobek 3.2	MT/21175		
10326596010	**MS-31 (6-8)**	Modified Sobek 3.2	MT/21175		
10326596001	**LT-NS-1 (0.5-1)**	Modified Sobek 3.2	MT/21174		
10326596002	**LT-NS-2 (0.5-1)**	Modified Sobek 3.2	MT/21174		

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 VAN STONE Rev
Pace Project No.: 10326596

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10326596003	**MS-36 (3-5)**	Modified Sobek 3.2	MT/21174		
10326596004	**MS-29 (6-7)**	Modified Sobek 3.2	MT/21174		
10326596005	**MS-35 (6-8)**	Modified Sobek 3.2	MT/21174		
10326596009	**MS-30 (4-5)**	Modified Sobek 3.2	MT/21174		
10326596010	**MS-31 (6-8)**	Modified Sobek 3.2	MT/21174		
10326596001	**LT-NS-1 (0.5-1)**	EPA 3060A	WET/25179	EPA 7196A	WET/25231
10326596002	**LT-NS-2 (0.5-1)**	EPA 3060A	WET/25179	EPA 7196A	WET/25231

REVISED 01/20/16 per client

Test Pits/Soil
10326596

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 2

1986465

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhenry@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: Standard

Section B
Required Project Information:

Report To: jhenry@geoengineers.com
Copy To: jmlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-30

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ____________

Site Location
STATE: ____________

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

COLLECTED: ~~COMPOSITE START~~ Grab / COMPOSITE END/GRAB

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	DATE	TIME	DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	↓Analysis Test↓ Y/N	Metals*	SPLP	ABA	TCLP	Asbestos	Tph-Dx	TPH-Gx	Cr III/Cr VI					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	~~LT-NS-1 (0.5-1)~~ LT-NS-1(0.5-1)	SL	G	10/12	1130				1	X									X	X	X	X	X			X						001
2	~~LT-NS-2 (0.5-1)~~ LT-NS-2(0.5-1)	SL	G		1140				1	X									X	X	X	X	X			X						002
3	~~MS-28 (3-5)~~ MS-36 (3-5)	SL	G		1415				2	X									X	X	X	X	X									003
4	MS-29 (6-7)	SL	G		1510				2	X									X	X	X	X	X									004
5	~~MS-27 (6-8)~~ MS-35 (6-8)	SL	G		1550				2	X									X	X	X	X	X									005
6	MS-34 (4-5)	SL	G		1620				2	X									X	[illegible]	[illegible]	[illegible]	X									Metals & asbestos only 006
7	MS-33 (4-5)	SL	G		1650				2	X									X	[illegible]	[illegible]	[illegible]	X									007
8	MS-32 (4-5)	SL	G	10/13	0930				2	X									X	[illegible]	[illegible]	[illegible]	X									008
9	MS-30 (4-5)	SL	G		1000				2	X									X	X	X	X	X									009
10	MS-31 (6-8)	SL	G		1040				2	X									X	X	X	X	X									010
11	MS-19 (0.5-1)	SL	G		1100				1	X									X													011
12	MS-20 (0.5-1)	SL	G		1115				1	X									X					X	X							012

JML
1/20/2016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Antimony, Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/ GEI	10/16/15	1100	PASI	10/17/15	9:30	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

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www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Test Pits/Soil
10326596

Page: 1 of 2

1986465

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhaney@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: Standard

Section B
Required Project Information:

Report To: jhaney@geoengineers.com
Copy To: jlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ____________

Site Location STATE: ________

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED ~~COMPOSITE START~~ Grab DATE	TIME	COMPOSITE END/GRAB DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	SPLP	ABA	TCLP	Asbestos	TPH-Dx	TPH-Gx	Cr III/Cr VI					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	LT-113-1 (0.5-1)	SL	G	10/12	1130				1	X									X	X	X	X	X			X						001
2	LT-113-2 (0.5-1)	SL	G		1140				1	X									X	X	X	X	X			X						002
3	MS-28 (3-5)	SL	G		1415				2	X									X	X	X	X	X									003
4	MS-29 (6-7)	SL	G		1510				2	X									X	X	X	X	X									004
5	MS-27 (6-8)	SL	G		1550				2	X									X	X	X	X	X									005
6	MS-34 (4-5)	SL	G		1620				2	X									X	~~X~~	~~X~~	~~X~~	X									Metals & asbestos only 006
7	MS-33 (4-5)	SL	G	↓	1650				2	X									X	~~X~~	~~X~~	~~X~~	X									↓ 007
8	MS-32 (4-5)	SL	G	10/13	0930				2	X									X	~~X~~	~~X~~	~~X~~	X									↓ ↓ ↓ 008
9	MS-30 (4-5)	SL	G		1000				2	X									X	X	X	X	X									009
10	MS-31 (6-8)	SL	G		1040				2	X									X	X	X	X	X									010
11	MS-19 (0.5-1)	SL	G		1100				1	X									X													011
12	MS-20 (0.5-1)	SL	G	↓	1115				1	X									X					X	X							012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Antimony, Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/GEI	10/16/15	1100	PACE	10/17/15	9:30	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 2 of 2

1986467

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhaney@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: STD

Section B
Required Project Information:

Report To: jhaney@geoengineers.com
Copy To: jmlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location
STATE:

Section D
Required Client Information

Matrix Codes
MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START Grab DATE	COLLECTED COMPOSITE START Grab TIME	COLLECTED COMPOSITE END/GRAB DATE	COLLECTED COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	↓Analysis Test↓ Y/N	Metals *	TPH-Dx	TPH-Gx										Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ms-21 (0.5-1)	SL	G	10/[illegible]15	1130				1	X									X	X	X											013
2	ms-22 (0.5-1)	↓	↓	↓	1140				↓	↓									X	X	X											014
3	ms-23 (0.5-1)	↓	↓	↓	1150				↓	↓									X	X	X											015
4	ms-24 (0.5-1)	↓	↓	↓	1200				↓	↓									X													016
5	ms-25 (0.5-1)	↓	↓	↓	1210				↓	↓									X													017
6	ms-26 (0.5-1)	↓	↓	↓	1220				↓	↓									X													018
7	ms-27 (0.5-1)	↓	↓	↓	1230				↓	↓									X	X	X											019
8	ms-28 (0.5-1)	↓	↓	↓	1240				↓	↓									X	X	X											020
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
* Antimony, Arsenc, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/ GEI	10/16/15	1100		10-17-15	930	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical®	Document Name: Sample Condition Upon Receipt Form	Document Revised: 23Feb2015 Page 1 of 1
	Document No.: F-MN-L-213-rev.13	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Geo Engineers.

Project #: **WO#:10326596**

10326596

Courier: ☒ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 7815 2941 1806

Custody Seal on Cooler/Box Present? ☐ Yes ☒ No **Seals Intact?** ☐ Yes ☒ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☒ Bubble Wrap ☐ Bubble Bags ☐ None ☒ Other: Cardboard **Temp Blank?** ☐ Yes ☒ No

Thermometer Used: ☐ B88A9130516413 ☒ B88A912167504 ☐ B88A0143310098 **Type of Ice:** ☒ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 3.9 **Cooler Temp Corrected (°C):** 3.9 **Biological Tissue Frozen?** ☐ Yes ☐ No ☒ N/A

Temp should be above freezing to 6°C **Correction Factor:** +0.0 **Date and Initials of Person Examining Contents:** KAC 10/17/15

USDA Regulated Soil (☐ **N/A, water sample)**

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☒ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☒ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☒ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☒ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☒ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☒ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☒ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☒ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☒ No	☐ N/A	7.
Sufficient Volume?	☒ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☒ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☒ Yes	☐ No	☐ N/A	
Containers Intact?	☒ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☒ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	☒ Yes	☐ No	☐ N/A	12.
-Includes Date/Time/ID/Analysis Matrix: SL				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☒ N/A	13. ☐ HNO₃ ☐ H₂SO₄ ☐ NaOH ☐ HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO₃, H₂SO₄, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☒ N/A	Sample #
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☒ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☒ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☒ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☒ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: **Date/Time:**

Comments/Resolution:

Project Manager Review: DAN **Date:** 10-22-15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Pace Analytical®	Document Name: Regulated Soil Checklist	Document Revised: 13Feb2015 Page 1 of 1
	Document No.: F-MN-Q-338-Rev.00	Issuing Authority: Pace Minnesota Quality Office

USDA REGULATED AND DOMESTIC SOIL CHECKLIST

To Be Completed by SR Staff:

Project: GeoEngineers **Date:** 10/17/15 **Initials:** KAC

Sample Origin (circle one): DOMESTIC FOREIGN

(Note: soil samples from Hawaii and Puerto Rico are considered to be of a Foreign Source)

If Domestic, circle State of Origin: AL AR AZ CA FL GA ID LA MS NC NM NY OK OR SC TN TX [✓ WA]

If Foreign, list County of Origin:

REQUIREMENT	ACTION	COMPLETED		
"Special Handling" stickers are to be placed on all samples.	Did "special handling" stickers get placed on all sample containers?	[✓ YES]	NO	
Samples must be segregated and stored in designated bins, shelves and coolers.	Were samples placed in a designated cooler, containers and shelves?	[✓ YES]	NO	
Samples must be double contained to prevent accidental release.	Were there any signs of breakage or leakage (check for broken glass and/or loose soil in the cooler)? *If NO, Ice and melt water can be disposed of by normal process (down the drain).*	YES	[✓ NO]	
	If YES, were ice and melt water separated from the cooler and disposed of properly? **Any broken glass and/or loose soil are to be bagged and placed in a USDA Regulated satellite container or active drum (see Waste Coordinator).** **Ice and melt water should be baked at a temperature range of 121-154°F for 2 hours and then cooled before going down the drain.**	[✓ YES]	NO	N/A
Equipment and supplies that have come into contact samples must be decontaminated.	Was the cooler(s) and/or countertop(s) decontaminated using either a fresh 10% bleach solution or 70% ethanol? *(Gloves and other lab supplies will be bagged and placed in the SR USDA Regulated satellite container).*	[✓ YES]	NO	

To Be Completed by PM/PC:

Sample Analysis to be conducted (circle all that apply): [✓ MN] [✓ Subcontract Lab]

Name of Subcontract Lab: Pace Indy + Pace MT

REQUIREMENT	ACTION	COMPLETED		
Permission to ship untreated soil must be on file prior to shipping to any subcontract lab, including IR Pace Labs.	Go to: J:\SHARE\PRJ_MGR\10_Client Services Department Documents\Regulated Soils Permits – If permission to ship letter is not there, contact the Waste Coordinator.	[✓ YES]	NO	N/A
Shipment must include a valid copy of the receiving lab's permit as well as permission to ship letter.	Is a copy of all needed paperwork included with the COC? Do NOT ship samples until all necessary paperwork is compiled.	[✓ YES]	NO	N/A

Comments:

Project Manager Signature: OAO **Date:** 10-22-15

Pace Analytical	Document Name: MT to MN Sample Transfer Form	Revised Date: 01May2014 Page: 1 of 1
	Document Number: F-MT-C-179-rev.06	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS [✓ Fed Ex]
Tracking #:	6021 2789 1196
Client:	GeoEng
Due Date:	
Pace WO:	10326596
Project Manager:	Carol Davy

MT to MN Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	Container Type	# of Bottles	Lab ID's	Preservative Yes or No	Verify Arrival Date & Initials
Tests					
	JGFU	2	001 & 002	N	BM 10/28/15

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

MINNESOTA SAMPLE RECEIPT INFORMATION

IR Gun (circle): **80512447**, ~~**B88A912167504**~~, **72337080** Correction Factor: -0.1 Sample Matrix: SL

Cooler Temp Read (°C): 2.4	Cooler Temp Corrected (°C): 2.3	Filtred volume rec'd for dissolved tests:	Yes __ No__ [✓ NA]
Arrived on Ice:	[✓ Yes] No__	Samples pH have been checked:	Yes __ No__ [✓ NA]
Custody Seal Present:	[✓ Yes] No__	Trip Blank Present:	Yes __ No__ [✓ NA]
Short Hold Time Requested < 72 Hours:	Yes __ [✓ No]	Trip Blank Custody Seals Present:	Yes __ No__ [✓ NA]
Rush TAT Requested:	Yes __ [✓ No]	Pace Trip Blank Lot #:	
Sufficient Sample Volume:	[✓ Yes] No__	Sample Composites Required:	Yes __ No__ [✓ NA]
Samples Arrived within Hold Time:	[✓ Yes] No__	Report Samples:	Wet Wt. __ Dry Wt.__
Containers Intact:	[✓ Yes] No__	Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	Date	Time	Accepted By Affiliation	Date	Time
MWalter - Pace	10/27/15	1600	BM Pace	10/28/15	1000

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: ____________ **Date:** ____________

Comments/Resolution: ____________

Project Manager Review: AnnAsp for CAD **Date:** 10/29/15

USDA
United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

USDA APHIS PPQ
1220 Cole Avenue
Helena, MT 59601

Voice: 406-449-5210
Cell: 406-431-6531
Fax: 406-449-5212
Email: gary.d.adams@aphis.usda.gov

October 15, 2015
Page 1 of 2

Approval to Transfer (Ship and Receive):
Untreated USDA-APHIS-PPQ Regulated Soil and associated materials to Ms. Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

Expiration Date: July 23, 2016 (expiration date of Sarah Cherney's soil permit)

Vivianne Rhonda Johnson
Pace Analytical Services, Inc. - Montana
150 9th Street N
Billings, MT 59101

Dear Vivianne Rhonda Johnson:

This communication serves as prior approval from the Montana PPQ office and the State Plant Regulatory Official of the Montana Department of Agriculture to ship and receive transfers of untreated USDA-APHIS-PPQ regulated soil and associated materials to/from the USDA-APHIS-PPQ-authorized soil lab facility of Ms. Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414 for the purpose of conducting non-biological soil analyses.

These transfers must be in accordance with all permit conditions and compliance agreement stipulations of the relevant documents listed below, including but not limited to all record keeping requirements, the requirement for both parties to maintain file copies of the documents, for a copy of the recipient's permit to accompany each shipment.

Authorized Individuals and Relevant Documents

Permittee: Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

Permit: P330-13-00225	Expiration Date: 07/23/2016
Soil Compliance Agreement: Soil-MN-Lab-2013-03	Date of Agreement: 07/10/2013

Permittee: Ms. Vivianne Rhonda Johnson, Pace Analytical Services, Inc. – Montana, 150 9th Street N, Billings, MT 59101

Permit: P330-15-00120	Expiration Date: 04/29/2018
Soil Compliance Agreement: MT-SL-2015-01	Date of Agreement: 03/25/2015

All packaging and labeling requirements must be met and shipment(s) must be by commercially bonded carrier.

Transfers are authorized as confirmation of the associated transfer approval by the Montana Department of Agriculture has been conveyed to our PPQ MT office by Andy Gray, Montana Department of Agriculture, Helena, MT.

Transfers of soil regulated under domestic Federal quarantines for imported fire ants (*Solenopsis richteri* and *S. invicta)*, golden nematode (*Globodera rostochiensis)*, and witchweed (*Striga* spp.) are authorized.

This approval **does not authorize** any soil regulated under domestic Federal quarantines for *Phytophthora ramorum* (sudden oak death), pale cyst nematode (*Globodera pallida*), or fruit flies (various species in the family Tephrididae); movement of these soils requires regulatory instruments other than a soil compliance agreement [Certificates (PPQ Form 540) or Limited Permits (PPQ FORM 530)] other than or in addition to a soil compliance agreement. Certificates would authorize movement from quarantine areas of *Phytophthora ramorum*, *Globodera palida*, or fruit flies and Limited Permits would authorize movement from quarantine areas of *Globodera pallida* or fruit flies. There is no limited permit option for movement from a *Phytophthora ramorum* quarantine area.

If there are any samples moving or have been moved under the authorization of a Certificate (PPQ Form 540) or Limited Permit (PPQ Form 530), documentation associating those documents with their authorized samples must accompany the shipment to/from this approved soil lab, such as any soil samples originating from a *Phytophthora ramorum* quarantine area or a Globodera palida Pale Cyst Nematode quarantine area.

This approval is valid until the expiration of Vivianne Rhonda Johnson's soil permit on **April 29, 2018** providing the permits and compliance agreements listed above remain active. PPQ reserves the right to modify or cancel this approval at any time.

A transfer of regulated material scheduled after the expiration of this approval will require the issuance of new transfer approvals which in turn necessitates the issuance of a new soil permit for your soil lab.

Retain a copy of this approval with the shipping records associated with any authorized transfer.

Thank you for your cooperation in this matter and do not hesitate to contact our office if additional information or clarification is required.

Sincerely,

Lori Witham

Lori Witham
Plant Health Trade Compliance Officer
USDA, APHIS, PPQ- MT Field Operations

Andy Gray
Commodity Services Bureau Chief
MT Dept. of Agriculture, Plant Protection Division

cc: Mark Hollister, Acting State Plant Health Director – MN and IA
Gary Adams, State Plant Health Director – MT
Pamela Deerwood, PPQ Officer / Plant Health Safeguarding Specialist - MN

Pace Analytical	Document Name: **Sample Condition Upon Receipt Form** Document No.: **F-MN-L-213-rev.13**	Document Revised: 23Feb2015 Page 1 of 1 Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Pace IN

Project #:

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 6467 4544 3761

Optional: Proj. Due Date: Proj. Name:

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other: **Temp Blank?** ☑ Yes ☐ No

Thermometer Used: ☐ B88A9130516413 ☐ B88A912167504 ☑ B88A0143310098 **Type of Ice:** ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 1.0 **Cooler Temp Corrected (°C):** 1.0 **Biological Tissue Frozen?** ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C **Correction Factor:** true **Date and Initials of Person Examining Contents:** 10-28-15

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☐ Yes	☑ No	☐ N/A	1. Returned samples, no COC, only special handling Soil paperwork
Chain of Custody Filled Out?	☐ Yes	☐ No	☑ N/A	2.
Chain of Custody Relinquished?	☐ Yes	☐ No	☑ N/A	3.
Sampler Name and/or Signature on COC?	☐ Yes	☐ No	☑ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC? -Includes Date/Time/ID/Analysis Matrix: SL	☑ Yes	☐ No	☐ N/A	12.
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO$_3$ ☐ H$_2$SO$_4$ ☐ NaOH ☐ HCl Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO$_3$, H$_2$SO$_4$, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION **Field Data Required?** ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: **Date:** 10/29/15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

APHIS Animal and Plant Health Inspection Service

Plant Protection & Quarantine

United States Department of Agriculture
Animal and Plant Health Inspection Service
4700 River Road
Riverdale, MD 20737

Permit to Receive Soil

Regulated by 7 CFR 330

This permit was generated electronically via the ePermits system.

PERMITTEE NAME:	Sarah Cherney	**PERMIT NUMBER:**	P330-13-00225
COMPANY:	Pace Analytical Services, Inc. - Minneapolis	**APPLICATION NUMBER:**	P525-130116-004
RECEIVING ADDRESS:	1700 Elm Street SE, Suite 200 Minneapolis, MN 55414	**DATE ISSUED:**	07/23/2013
MAILING ADDRESS:	1700 Elm Street SE, Suite 200 Minneapolis, MN 55414		
PHONE:	(612) 607-1700		
FAX:		**EXPIRES:**	**07/23/2016**

PORTS OF ARRIVAL/PLANT INSPECTION STATIONS: AK, Anchorage; AL, Huntsville; AL, Mobile; AZ, Douglas; AZ, Lukeville; AZ, Naco; AZ, Nogales; AZ, Phoenix; AZ, San Luis; AZ, Tucson; CA, Calexico; CA, Fresno; CA, Hawthorne; CA, Hawthorne; CA, Long Beach; CA, Oakland; CA, Ontario; CA, Otay Mesa; CA, Port Hueneme; CA, Sacramento; CA, San Diego; CA, San Francisco; CA, San Jose; CA, San Ysidro; CA, Tecate; CO, Denver; CT, Hartford; CT, New Haven; DE, Dover; DE, Wilmington; FL, Ft. Lauderdale; FL, Ft. Myers; FL, Ft. Pierce; FL, Jacksonville; FL, Key West; FL, Miami; FL, Orlando; FL, Pensacola; FL, Port Canaveral; FL, Port Everglades; FL, Sanford; FL, Tampa; FL, West Palm Beach; GA, Atlanta; GA, Savannah; GU, Agana; HI, Hilo; HI, Honolulu; HI, Kahului; HI, Kailua-Kona; HI, Lihue; ID, Eastport; IL, Chicago; IN, Indianapolis; KY, Louisville; MA, South Boston; MD, Baltimore; MD, Beltsville; ME, Bangor; ME, Calais; ME, Houlton; ME, Portland; MI, Detroit; MI, Port Huron; MI, Romulus; MI, Sault Saint Marie; MN, Duluth; MN, Grand Portage; MN, International Falls; MN, Minneapolis; MO, Kansas City; MO, St. Louis; MP, Commonwealth of the Northern Mariana Islands; MS, Gulfport; MS, Port Bienville; MT, Raymond; MT, Roosville; MT, Sweetgrass; NC, Raleigh; NC, Wilmington; ND, Dunseith; ND, Pembina; ND, Portal; NJ, Linden; NJ, Newark; NM, Albuquerque; NM, Columbus; NM, SantaTeresa; NV, Las Vegas; NY, Albany; NY, Alexandria Bay; NY, Brooklyn; NY, Buffalo; NY, Champlain, Rouses Point; NY, Jamaica; NY, Jamaica; NY, Newburgh; OH, Ashtabula; OH, Cincinnati; OH, Cleveland; OH, Columbus; OH, Toledo; OH, Wilmington; OK, Oklahoma City; OR, Portland; PA, Allentown; PA, Harrisburg; PA, Philadelphia; PA, Pittsburgh; PA, Scranton; PR, Aguadilla; PR, Carolina; PR, Fajardo; PR, Mayaguez; PR, Ponce; RI, Warwick/Providence; SC, Charleston; TN, Memphis; TN, Nashville; TX, Austin; TX, Brownsville; TX, Corpus Christi; TX, Dallas; TX, Del Rio; TX, Eagle Pass; TX, El Paso; TX, Fabens; TX, Falcon; TX, Fort Hancock; TX, Galveston; TX, Hidalgo; TX, Humble; TX, Laredo; TX, Los Indios; TX, Pharr; TX, Port Arthur; TX, Presidio; TX, Progresso; TX, Rio Grande City; TX, Roma; TX, San Antonio; TX, Victoria; UT, Salt Lake City; VA, Dulles; VA, Norfolk; VI, St. Croix; VI, St. Thomas; VT, Berlin; WA, Blaine; WA, Oroville; WA, Port Angeles; WA, SeaTac; WA, Sumas; WI, Green Bay; WI, Milwaukee

HAND CARRY: No

Under the conditions specified, this permit authorizes the following:

Quantity of Soil per Shipment and Treatment

Over 3 lbs - Your facility MUST be inspected and approved to receive this soil

SPECIAL INSTRUCTIONS TO INSPECTORS

See permit conditions below

Permit Number P330-13-00225

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS. Osmond Baron	DATE 07/23/2013

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

INSTRUCTIONS TO DHS CBP INSPECTORS FOR IMPORTED SOIL SHIPMENTS ROUTED TO RECEIVING FACILITY:

For hand carry of soil, an official of CBP Agricultural Programs and Trade Liaison (APTL) would have been notified to document and facilitate the entry of the soil (See hand carry conditions below if stipulated). Otherwise:

1. Validate the permit in ePermits using the CBP search feature by logging on to: https://epermits.aphis.usda.gov/epermits
2. Confirm that the shipment is being routed directly to a USDA APHIS PPQ Inspected Facility authorized to receive soil by logging on to: https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform
3. Confirm that the imported shipment has a valid USDA PPQ Form 550 Black/White label.
4. Confirm that the carrier of the shipment imported under this USDA PPQ 525 permit is commercially bonded.
5. For questions or concerns, contact the USDA APHIS PPQ Permit Unit in Riverdale, MD, at 866-524-5421 and ask to speak with a compliance officer.

PERMIT GUIDANCE

Receipt or use of foreign isolates or samples from countries under sanctions requires specific permission from the U.S. Department of Treasury (see http://www.treasury.gov/resource-center/sanctions/Programs/Pages/Programs.aspx. for current country/regional listings) for current country listings.

This permit does not authorize importation, interstate movement, possession, and/or use of strains of genetically engineered regulated organisms (created by the use of recombinant DNA technology).

If an animal pathogen is identified in your shipment, to ensure appropriate safeguarding, please refer to http://www.aphis.usda.gov/import_export/animals/animal_import/animal_imports_anproducts.shtml.

If a human pathogen is identified, please see the CDC Etiologic Agent Import Permit Program at http://www.cdc.gov/od/eaipp/

This permit does not fulfill the requirements of other federal or state regulatory authorities. As appropriate, please contact the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, the U.S. Food and Drug Administration, the Centers for Disease Control and Prevention, the APHIS Veterinary Services unit, or your State's Department of Agriculture to ensure proper permitting.

If you are considering renewal of this permit, an application should be submitted at least 90 days prior to the expiration date of this permit to ensure continued coverage. Permits requiring containment facilities may take a longer period of time to process.

Approved Sterilization Methods:
All soil residues must be dry-heated, incinerated, hydroclaved or autoclaved.

DRY HEAT Treatment: use one of the following schedules:
110- 120.5 degrees C (230-249 F) for 16 hours
121-154 degrees C (250-309 F) for 2 hours
154.4 - 192.5 degrees C (310-379 F) for 30 minutes
193-220 degrees C (380-429 F) for 4 minutes
221-232 degrees C (430-450) for 2 minutes
Time starts when the entire sample reaches the required temperature, and a suitable temperature probe must be used for verification.

INCINERATION: With the exception of metal and glass containers, all regulated and associated material must be

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Osmond Baron	07/23/2013

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reduced completely to ash at the end of the incineration cycle.

AUTOCLAVE soil and other material using the following conditions:
a. Soil must be autoclaved at 121 degrees Centigrade (250 degrees Fahrenheit) for a minimum of 30 minutes at 15 psi.
b. Autoclave tape or other indicators must be placed on each bag or sharps container prior to treatment. The autoclave tape or other indicator on each container must be checked to verify color change before disposal.
c. The autoclave log must be completed by each user for each autoclave cycle. All parameters must be noted as listed on the log for each autoclave load.
d. If the autoclave does not attain the minimum time and/or temperature or the autoclave tape does not change color, a notation must be made in the comment section of the autoclave log. The load must then be re-autoclaved after placing new tape on the material. If minimum time and temperature is not attained on the second cycle, users must contact the person responsible for maintaining the unit to initiate repairs. Waste must then be treated at an alternate autoclave facility that is approved by USDA.
e. Thermometers on the autoclave must be calibrated annually, and a written record must be maintained. This must be done by an authorized autoclave service company during routine servicing.
f. Every 6 months, you should use a commercially available test indicator kit that uses bacterial spores Bacillus stearothermophilus that are rendered unviable at 250 degrees F or 121 degrees C. For the test, ampules of B. stearothermophilus are autoclaved along with a load of waste. Upon completion of the cycle, the ampules are incubated for 48 hours and then observed for any sign of growth, which indicates insufficient sterilization.

HYDROCLAVE: Soil must be hydroclaved at 121oC/250oF for a minimum of 30 minutes or 1

PERMIT CONDITIONS

This permit authorizes the importation of soil from all foreign sources (except countries with sanctions or embargoes by U.S. State Department) only for chemical/ physical analysis in a controlled laboratory environment at the named facility on the permit.

1. This permit is issued only for the named permit holder at the address(s) identified on this permit. This permit cannot be transferred or assigned.

2. The permit holder verifies United States residency by initialing and accepting these permit conditions. If you are not a United States resident, it is unlawful for you to initial or accept these permit conditions because a USDA 525 soil Permit can only be issued to United States residents.

3. The permit holder is solely responsible for ensuring compliance with all statutory requirements and specifically listed permit conditions. Failure to comply with the terms and conditions of this permit is cause for the following: (a) cancellation of this permit, (b) cancellation of other permits issued to the permit holder, (c) seizure and/or destruction of regulated organisms, (d) denial of future permit applications by this permit holder, (e) liability for civil penalties, and (f) criminal prosecution under provisions in the Plant Protection Act.

4. Any alteration, forgery, unauthorized use of this permit and/or associated Federal Forms are subject to civil and criminal penalties including fines and imprisonment.

5. This permit must not be used for the movement or use of plant pathogens listed in the Public Health Security and Bioterrorism Preparedness and Response Act of 2002. If any organism listed as a Select Agent is identified from materials associated with this research, the permit holder is required to notify APHIS, Agricultural Select Agent Program (ASAP) within one business day by phone at 301-851-3300, and within seven (7) days submit APHIS/CDC Form 4 (Report of Identification of a Select Agent or Toxin in a Clinical or Diagnostic Laboratory) to APHIS, ASAP; 4700 River Rd, Unit 2, Riverdale, MD 20737 (see instructions at: http://www.aphis.usda.gov/programs/ag_selectagent/index.shtml). Failure to comply with this requirement is a violation of the Agricultural Bioterrorism Protection Act of 2002.

Permit Number P330-13-00225

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS.	DATE
Osmond Baron	07/23/2013

WARNING: Any alteration, forgery or unauthorized use of this Federal Form is subject to civil penalties of up to $250,000 (7 U.S.C.s 7734(b)) or punishable by a fine of not more than $10,000, or imprisonment of not more than 5 years, or both (18 U.S.C.s 1001)

6. If a regulated organism is received in this shipment, the permit holder must take all prudent measures to contain the organism(s) and notify the permit unit within one business day by calling 866-524-5421 or by e-mail to pest.permits@aphis.usda.gov. The permit holder must immediately notify the permit unit of the destruction of regulated organisms received under this permit, as above. Similarly, the permit holder must immediately notify the permit unit if facilities are destroyed or decommissioned for any reason.

7. You as the permit holder are responsible for maintaining a valid permit for as long as the soil is in your possession. APHIS does not issue extensions or renewals of existing permits; the permit holder must submit a new permit application at least three months prior to the expiration of this permit, and obtain a new permit to continue uninterrupted authorization for the soil approved under this permit.

8. If an accidental release into the environment occurs, notification must be made within one business day to APHIS, PPQ, 4700 River Rd., unit 133; Riverdale, MD 20737; 866-524-5421. A written report of the incident must be submitted identifying: (a) the name of the permit holder (responsible person), (b) the permit number, (c) the country or State of origin of the soil, (d) the nature of the release, and (e) measures already taken to contain, reduce or limit the effects of the accidentally released soil. Any plans prepared to contain, reduce or limit the effects of the accidentally released soil may be submitted as developed.

9. Without prior notice and during reasonable hours, authorized PPQ and/or State regulatory officials shall be allowed to inspect the conditions associated with the regulated soil authorized under this permit.

10. The permit holder must maintain an official permanent work assignment at the address identified on this permit. If the permit holder ceases assignment/affiliation at the address identified on this permit, or personnel circumstances change in any way, then a compliance officer must be notified at the PPQ permit unit immediately (that is, within one business day) by either (a) email to pest.permits@aphis.usda.gov, (b) fax to 301-734-4300 or 8700/5392, or (c) conventional mail to USDA PPQ Permit Unit, 4700 River Road, Riverdale, MD 20737. Should the permit holder depart from the organization/facility, the permit holder must either (a) request cancellation of this permit and comply with all permit-specific termination conditions, (b) apply for and receive a permit to move the soil to a new facility, or (c) relinquish control of the regulated soil to a qualified individual who obtained a permit for the continued use of this regulated soil prior to this permit holder's departure.

11. A copy of this permit must accompany all shipments authorized under this permit.

12. CBP-AI and PPQ have the authority to order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets, packaging, and means of conveyance). If an official of CBP-AI or PPQ determines that the shipment requires treatment as a condition of entry, is contaminated with a quarantine plant pest or pests, is commingled with prohibited plant material or the required documentation is incomplete or missing, then that official may order and approve treatment, re-exportation or destruction of a shipment, a portion of a shipment or any other material associated with the shipment (i.e. pallets, packaging, means of conveyance).

13. All solid wood packing material (SWPM) accompanying the shipment must be in compliance with ISPM 15 treatment regulations and IPPC stamp requirements and enforcement. Noncompliant shipments will be treated, re-exported or destroyed at the consignee's expense.

14. All costs and arrangements for safeguarding and transportation of the cargo are the responsibility of the importer, broker or other parties associated with the shipment.

15. All operations must be consistent with information submitted in association with the above listed APHIS-PPQ inspected facility and subject to the conditions below.

16. Soil must be shipped in a securely closed, watertight container (primary container, test tube, vial, etc.) which must be enclosed in a second, durable watertight container (secondary container).

17. The shipment must be free from foreign matter or debris, plants and plant parts including noxious weeds and infestations by other macroorganisms such as insects, Cyst nematode nematodes, mollusks and acari. Authorized material found to be commingled with unauthorized material will be subject to the same action (i.e. re-export, destruction) as unauthorized material.

18. The imported article can be released without treatment at the port of entry to the permittee's address listed on the permit or label or to an authorized user only if the final destination is an approved facility listed at https://web01.aphis.usda.gov/PPQ/AuthSoilLabs.nsf/web?openform.

Permit Number P330-13-00225

THIS PERMIT HAS BEEN APPROVED ELECTRONICALLY BY THE FOLLOWING PPQ HEADQUARTER OFFICIAL VIA EPERMITS. **Osmond Baron**	DATE 07/23/2013

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19. The soil must not be used in field research or release into the environment before sterilization.

The soil must not be used for isolation or culture of organisms, or for extracting and concentrating organisms from the soil.

The soil must not be used as a growing medium.

20. Further distribution of soil is not allowed without prior approval from Federal officials [State Plant Health Director or designee] (or from Federal officials with State concurrence): Access the website at http://www.aphis.usda.gov/ppq/sphd/ for a list of State Plant Health Offices. Access the website at http://nationalplantboard.org/member/index.html for a list of State Plant Regulatory Officials.

21. While in storage, all soil must be kept locked (e.g. in freezer, cabinet) in the approved lab with access limited to authorized personnel or they will be in a restricted access building that requires a key card entry and access is restricted to authorized personnel only; or it must be in locked room restricted to authorized personnel only.

22. The soil must be handled as quarantined material until sterilized. This will include keeping the soil enclosed in containers when not in use and labeling all containers and/or storage areas: "Quarantine Soil- Sterilize Before Disposal"

23. All packing material, media, substrate, and shipping containers must be sterilized or destroyed as approved and prescribed by the permit conditions after removing the soil.

24. All unconsumed soil, containers and effluent must be autoclaved, incinerated or properly sterilized by the permittee at the conclusion of the project as approved and prescribed by the permit conditions.

25. Any water residues (effluent) from the processing of soil samples must be treated by an approved sterilization procedure such as hydroclave or autoclave.

26. All soil residues must be dry-heated, incinerated, hydroclaved or autoclaved.

Dry Heat Treatment: use one of the following schedules:

110- 120.5 degrees C (230-249 F) for 16 hours
121-154 degrees C (250-309 F) for 2 hours
154.4 - 192.5 degrees C (310-379 F) for 30 minutes
193-220 degrees C (380-429 F) for 4 minutes
221-232 degrees C (430-450) for 2 minutes

Time starts when the entire sample reaches the required temperature, and a suitable temperature probe must be used for verification.

27. Incineration: With the exception of metal and glass containers, all regulated and associated material must be reduced completely to ash at the end of the incineration cycle.

28. Equipment and supplies used to conduct operations or that have contacted the soil must be decontaminated using one of the following methods:

(a) Material can be soaked in a fresh bleach solution of 10 percent (1:10) for at least 30 minutes. (1:10 is a convention that means 1 in 10 or1 part 9 parts = 10 parts total, which is a 10 percent solution)
(b) Material can be soaked in 70 percent ethanol
(c) Flamed with ethanol
(d) Treated with quaternary ammonium compounds.
Note also that autoclaving, hydroclave, incineration, and dry heat sterilization are also acceptable sterilization/decontamination methods.

Permit Number P330-13-00225

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29. You must attach a PPQ Form 550 Black/White label to the exterior of each shipment being imported under this permit. If you are e-authenticated, you are instructed to request labels using the My shipment/my label option within ePermits at least 7 days in advance. Labels also may be requested by email at: BlackWhiteGreenYellow.labelrequest@aphis.usda.gov. All email requests must come from the permit holder or their authorized contact, if requested by an authorized contact the permit holder must be copied on all requests. You must specify PPQ Form 550 Black/White labels, the specific port(s) of entry and number of labels for each port when requesting labels. The requested labels will be sent to you through a bonded carrier.

30. Underlying packaging/wrapping must carry the address, billing, and any other information required to direct the shipment to its final destination (i.e., the permit holder's address; Please note: USDA APHIS does not defray any additional shipping costs incurred for transiting the shipment through an inspection station as the initial US destination).

END OF PERMIT CONDITIONS

Permit Number P330-13-00225

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Pace Analytical	Document Name: MN to MT Sample Transfer Form	Revised Date: 14Jul2014 Page: 1 of 1
	Document Number: F-MN-C-043-rev.11	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS [✓ Fed Ex]
Tracking #:	6484 8692 8900
Client:	GeoEngineers
Due Date:	2-Nov-2015
Pace WO:	10326596
Project Manager:	CAD

MN to MT Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	Container Type	# of Bottles	Lab ID's	Preservative Yes or No	Verify Arrival Date & Initials
Tests					
ABAccounting	none	7	001-005, 009, 010	none	Received 1 Jar/Sample 001-010 10/23 WT
Asbestos	JGFU	10	001-010	none	

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

MONTANA SAMPLE RECEIPT INFORMATION

IR Gun: B88A0140728348, Correction Factor: -0.1		Sample Matrix:	SL
Cooler Temp Read (°C): 17.8	Cooler Temp Corrected (°C): 17.7	Filtred volume rec'd for dissolved tests:	Yes __ No__ NA X
Arrived on Ice:	Yes __ No X	Samples pH have been checked:	Yes __ No__ NA X
Custody Seal Present:	Yes X No__	Trip Blank Present:	Yes __ No__ NA ✓
Short Hold Time Requested < 72 Hours:	Yes __ No X	Trip Blank Custody Seals Present:	Yes __ No__ NA ✓
Rush TAT Requested:	Yes __ No X	Pace Trip Blank Lot #:	NA
Sufficient Sample Volume:	Yes ✓ No__	Sample Composites Required:	Yes __ No ✓ NA __
Samples Arrived within Hold Time:	Yes X No__	Report Samples:	Wet Wt. __ Dry Wt.__
Containers Intact:	Yes X No__	Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	Date	Time	Accepted By Affiliation	Date	Time
/Pace Fed Ex	10/22/15	1315	/Pace	10/23/15	0945

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: ____________________ Date: ____________

Comments/Resolution: ____________________

Project Manager Review: AF Date: 10/23/15

USDA
United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

USDA APHIS PPQ
900 American Blvd East
Suite 204
Bloomington, MN 55420

Voice: 952-814-1079
Cell: 612-741-1157
Fax: 952-814-1076
Email:
pamela.m.deerwood@aphis.usda.gov

October 19, 2015
Page 1 of 2

Approval to Transfer (Ship and Receive):
Untreated USDA-APHIS-PPQ Regulated Soil and associated materials to/from Ms. Vivianne Rhonda Johnson, Pace Analytical Services, Inc. - Montana, 150 9th Street N, Billings, MT 59101

Expiration Date: July 23, 2016 (expiration date of Sarah Cherney's soil permit)

Sarah Cherney
Pace Analytical Services, Inc. - Minneapolis
1700 Elm Street SE, Suite 200
Minneapolis, MN 55414

Dear Sarah Cherney:

This communication serves as prior approval from the Minnesota PPQ office and the State Plant Regulatory Official of the Minnesota Department of Agriculture to ship and receive transfers of untreated USDA-APHIS-PPQ regulated soil and associated materials to/from the USDA-APHIS-PPQ-authorized soil lab facility of Ms. Vivianne Rhonda Johnson, Pace Analytical Services, Inc. - Montana, 150 9th Street N, Billings, MT 59101 for the purpose of conducting non-biological soil analyses.

These transfers must be in accordance with all permit conditions and compliance agreement stipulations of the relevant documents listed below, including but not limited to all record keeping requirements, the requirement for both parties to maintain file copies of the documents, for a copy of the recipient's permit to accompany each shipment.

Authorized Individuals and Relevant Documents

Permittee: Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

Permit: P330-13-00225	Expiration Date: 07/23/2016
Soil Compliance Agreement: Soil-MN-Lab-2013-03	Date of Agreement: 07/10/2013

Permittee: Ms. Vivianne Rhonda Johnson, Pace Analytical Services, Inc. – Montana, 150 9th Street N, Billings, MT 59101

Permit: P330-15-00120	Expiration Date: 04/29/2018
Soil Compliance Agreement: MT-SL-2015-01	Date of Agreement: 03/25/2015

All packaging and labeling requirements must be met and shipment(s) must be by commercially bonded carrier.

Transfers are authorized as confirmation of the associated transfer approval by PPQ Montana and Montana Department of Agriculture has been conveyed to our PPQ MN office by copy of transfer approval letter to Pace Analytical Services, Inc. – Montana received from Lori Witham, PPQ-MT.

Transfers are authorized as confirmation of the associated transfer approval by the Minnesota Department of Agriculture and has been conveyed to our PPQ MN office by Jeanne Ciborowski, Minnesota Department of Agriculture, Plant Protection Division, St. Paul, MN.

Transfers of soil regulated under domestic Federal quarantines for imported fire ants (*Solenopsis richteri* and *S. invicta)*, golden nematode (*Globodera rostochiensis),* and witchweed (*Striga* spp.) are authorized.

This approval **does not authorize** any soil regulated under domestic Federal quarantines for *Phytophthora ramorum* (sudden oak death), pale cyst nematode (*Globodera pallida*), or fruit flies (various species in the family Tephrididae); movement of these soils requires regulatory instruments other than a soil compliance agreement [Certificates (PPQ Form 540) or Limited Permits (PPQ FORM 530)] other than or in addition to a soil compliance agreement. Certificates would authorize movement from quarantine areas of *Phytophthora ramorum, Globodera palida*, or fruit flies and Limited Permits would authorize movement from quarantine areas of *Globodera pallida* or fruit flies. There is no limited permit option for movement from a *Phytophthora ramorum* quarantine area.

If there are any samples moving or that have been moved under the authorization of a Certificate (PPQ Form 540) or Limited Permit (PPQ Form 530), these documents must accompany the authorized shipment of samples to/from this approved soil lab. This includes but is not limited to any soil samples originating from a *Phytophthora ramorum* quarantine area or a *Globodera palida* Pale Cyst Nematode quarantine area.

This approval is valid until the expiration of Sarah Cherney's soil permit on **July 23, 2016** providing the permits and compliance agreements listed above remain active. PPQ reserves the right to modify or cancel this approval at any time.

A transfer of regulated material scheduled after the expiration of this approval will require the issuance of new transfer approvals which in turn necessitates the issuance of a new soil permit for your soil lab.

Retain a copy of this approval with the shipping records associated with any authorized transfer.

Thank you for your cooperation in this matter and please do not hesitate to contact our office if additional information or clarification is required.

Sincerely,

Pamela M Deerwood
Pamela M. Deerwood
PPQ Officer/ Plant Health Safeguarding Specialist
USDA, APHIS, PPQ- MN Field Operations

J. Ciborowski
Jeanne Ciborowski
Research Scientist
MN Dept. of Agriculture, Plant Protection Division

cc: Kathryn Kromroy, Minnesota Department of Agriculture, Plant Protection Division
Jeanne Ciborowski, Minnesota Department of Agriculture, Plant Protection Division
Gary Adams, State Plant Health Director – MT
Lori Witham, Plant Health Trade Compliance Officer - MT
Erin Stiers, State Plant Health Director - MN
Mark Hollister, Acting State Plant Health Director – MN and IA

Pace Analytical	Document Name: MT to MN Sample Transfer Form	Revised Date: 01May2014 Page: 1 of 1
	Document Number: F-MT-C-179-rev.06	Issuing Authority: Pace Minnesota Quality Office

Shipping (circle):	UPS [✓ Fed Ex]
Tracking #:	6021 2789 1196
Client:	GeoEng
Due Date:	
Pace WO:	10326596
Project Manager:	Carol Davy

MT to MN Sample Transfer Condition Upon Receipt Form

ANALYSIS REQUESTED

Method Number & Description	Container Type	# of Bottles	Lab ID's	Preservative Yes or No	Verify Arrival Date & Initials
Tests					
	JGFU	2	001 & 002	N	BM 10/28/15

REPORTING REQUIREMENTS/ADDITIONAL COMMENTS

MINNESOTA SAMPLE RECEIPT INFORMATION

IR Gun (circle): 80512447, [✓ B88A912167504], 72337080 Correction Factor: -0.1 Sample Matrix: SL

Cooler Temp Read (°C): 2.4	Cooler Temp Corrected (°C): 2.3	Filtred volume rec'd for dissolved tests:	Yes __ No__ NA X
Arrived on Ice:	Yes X No__	Samples pH have been checked:	Yes __ No__ NA X
Custody Seal Present:	Yes X No__	Trip Blank Present:	Yes __ No__ NA X
Short Hold Time Requested < 72 Hours:	Yes __ No X	Trip Blank Custody Seals Present:	Yes __ No__ NA X
Rush TAT Requested:	Yes __ No X	Pace Trip Blank Lot #:	
Sufficient Sample Volume:	Yes X No__	Sample Composites Required:	Yes __ No__ NA X
Samples Arrived within Hold Time:	Yes X No__	Report Samples:	Wet Wt. __ Dry Wt.__
Containers Intact:	Yes X No__	Reporting Units:	

CUSTODY TRANSFER

Relinquished by/Affiliation	Date	Time	Accepted By Affiliation	Date	Time
[illegible] - Pace	10/27/15	1600	[illegible] Pace	10/28/15	1000

CLIENT NOTIFICATION/RESOLUTION

Person Contacted: ______________ **Date:** ______________

Comments/Resolution: ______________

Project Manager Review: Ann Asp for CAD **Date:** 10/29/15

Mary Walter - Fwd: sample containers for 10326596

From: Rhonda Johnson
To: Corder, Carol; Davy, Carol; Thomas, Will; Walter, Mary
Date: 10/26/2015 3:28 PM
Subject: Fwd: sample containers for 10326596

All,

See below. Try to spare some for MN. Give to Mary or Nikki when complete.

>>> Carol Davy 10/26/2015 3:15 PM >>>
Rhonda,

Do you have any extra sample for samples 001 and 002 for the above? We received an 8 oz jar for each and were to send you just one 4oz for each, but now we have no sample at all for these two. You need to run asbestos and ABA. Please send back any sample you can spare for 001 and 002.

Thanks

Carol Davy
Sr. Project Manager
My hours are M-F 9:00 to 4:30 central.
Pace Analytical®
Pace Analytical Services
MN Laboratory, 1700 Elm St SE, Minneapolis, MN 55414
Direct 612-607-6436
email: carol.davy@pacelabs.com
For after hours help, email or call Shawn Davis at shawn.davis@pacelabs.com or 612-607-6378.
****

USDA
United States Department of Agriculture

Animal and Plant Health Inspection Service

Plant Protection and Quarantine

USDA APHIS PPQ
1220 Cole Avenue
Helena, MT 59601

Voice: 406-449-5210
Cell: 406-431-6531
Fax: 406-449-5212
Email: gary.d.adams@aphis.usda.gov

October 15, 2015
Page 1 of 2

Approval to Transfer (Ship and Receive):
Untreated USDA-APHIS-PPQ Regulated Soil and associated materials to Ms. Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

Expiration Date: July 23, 2016 (expiration date of Sarah Cherney's soil permit)

Vivianne Rhonda Johnson
Pace Analytical Services, Inc. - Montana
150 9th Street N
Billings, MT 59101

Dear Vivianne Rhonda Johnson:

This communication serves as prior approval from the Montana PPQ office and the State Plant Regulatory Official of the Montana Department of Agriculture to ship and receive transfers of untreated USDA-APHIS-PPQ regulated soil and associated materials to/from the USDA-APHIS-PPQ-authorized soil lab facility of Ms. Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414 for the purpose of conducting non-biological soil analyses.

These transfers must be in accordance with all permit conditions and compliance agreement stipulations of the relevant documents listed below, including but not limited to all record keeping requirements, the requirement for both parties to maintain file copies of the documents, for a copy of the recipient's permit to accompany each shipment.

Authorized Individuals and Relevant Documents

Permittee: Sarah Cherney, Pace Analytical Services, Inc. - Minneapolis, 1700 Elm Street SE, Suite 200, Minneapolis, MN 55414

Permit: P330-13-00225 Expiration Date: 07/23/2016
Soil Compliance Agreement: Soil-MN-Lab-2013-03 Date of Agreement: 07/10/2013

Permittee: Ms. Vivianne Rhonda Johnson, Pace Analytical Services, Inc. – Montana, 150 9th Street N, Billings, MT 59101

Permit: P330-15-00120 Expiration Date: 04/29/2018
Soil Compliance Agreement: MT-SL-2015-01 Date of Agreement: 03/25/2015

All packaging and labeling requirements must be met and shipment(s) must be by commercially bonded carrier.

Transfers are authorized as confirmation of the associated transfer approval by the Montana Department of Agriculture has been conveyed to our PPQ MT office by Andy Gray, Montana Department of Agriculture, Helena, MT.

Transfers of soil regulated under domestic Federal quarantines for imported fire ants (*Solenopsis richteri* and *S. invicta)*, golden nematode (*Globodera rostochiensis)*, and witchweed (*Striga* spp.) are authorized.

This approval **does not authorize** any soil regulated under domestic Federal quarantines for *Phytophthora ramorum* (sudden oak death), pale cyst nematode (*Globodera pallida*), or fruit flies (various species in the family Tephrididae); movement of these soils requires regulatory instruments other than a soil compliance agreement [Certificates (PPQ Form 540) or Limited Permits (PPQ FORM 530)] other than or in addition to a soil compliance agreement. Certificates would authorize movement from quarantine areas of *Phytophthora ramorum*, *Globodera palida*, or fruit flies and Limited Permits would authorize movement from quarantine areas of *Globodera pallida* or fruit flies. There is no limited permit option for movement from a *Phytophthora ramorum* quarantine area.

If there are any samples moving or have been moved under the authorization of a Certificate (PPQ Form 540) or Limited Permit (PPQ Form 530), documentation associating those documents with their authorized samples must accompany the shipment to/from this approved soil lab, such as any soil samples originating from a *Phytophthora ramorum* quarantine area or a Globodera palida Pale Cyst Nematode quarantine area.

This approval is valid until the expiration of Vivianne Rhonda Johnson's soil permit on **April 29, 2018** providing the permits and compliance agreements listed above remain active. PPQ reserves the right to modify or cancel this approval at any time.

A transfer of regulated material scheduled after the expiration of this approval will require the issuance of new transfer approvals which in turn necessitates the issuance of a new soil permit for your soil lab.

Retain a copy of this approval with the shipping records associated with any authorized transfer.

Thank you for your cooperation in this matter and do not hesitate to contact our office if additional information or clarification is required.

Sincerely,

Lori Witham

Lori Witham
Plant Health Trade Compliance Officer
USDA, APHIS, PPQ- MT Field Operations

Andy

Andy Gray
Commodity Services Bureau Chief
MT Dept. of Agriculture, Plant Protection Division

cc: Mark Hollister, Acting State Plant Health Director – MN and IA
Gary Adams, State Plant Health Director – MT
Pamela Deerwood, PPQ Officer / Plant Health Safeguarding Specialist - MN

REVISED 01/20/16 per client.

Chain of Custody

Pace Analytical®
www.pacelabs.com

Workorder: 10326596

Report To

Pace Analytical Services, Inc.
1700 Elm Street, Suite 200
Minneapolis, MN 55414
Phone (612)607-1700
Fax (612)607-6444

Subcontract To

Pace Indy

50130651

						Preserved Containers						Requested Analysis												
Item	Sample ID	Sample Type	Collect Date/Time	Lab ID	Matrix	None						Hex Cr												LAB USE ONLY
1	LT-N3-1 (0.5-1)*	SL	10-12 1130	001	SL	1						X												
2	LT-N3-2 (0.5-1)*	SL	" 1140	002	SL	1						X												
3																								
4																								
5																								

Transfers	Released By	Date/Time	Received By	Date/Time
1	Daniel Davy/Pace Pls	10-21-15	Fedex (MB 10/23/15)	
2		1500		
3	Fedex (MB 10/23/15)	10/23/15 9:25	Marcia Bennett/Pace	10/23/15 9:25

Comments

*Sample IDs updated per client request on January 20th, 2016.
LT-NS-1(0.5-1)
LT-NS-2(0.5-1)
JMG 01/20/16

Cooler Temperature on Receipt 2.4 °C

Custody Seal [✓ Y] or N

Received on Ice [✓ Y] or N

Samples Intact Y or N

****In order to maintain client confidentiality, location/name of the sampling site, sampler's name and signature may not be provided on this COC document. This chain of custody is considered complete as is since this information is available in the owner laboratory.*

Sample Condition Upon Receipt

Pace Analytical

Client Name: Pace MN

Project # 50130651

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace Other

Tracking #: 648486928873

Custody Seal on Cooler/Box Present: ☑ yes ☐ no Seals intact: ☑ yes ☐ no

Date/Time 5035A kits placed in freezer

Packing Material: ☑ Bubble Wrap ☑ Bubble Bags ☐ None ☐ Other

Thermometer 1 2 3 4 5 6 A B [✓ C] D E F Type of Ice: [✓ Wet] Blue None ☑ Samples on ice, cooling process has begun

Cooler Temperature (Initial/Corrected) 2.4°C Ice Visible in Sample Containers: ☐ yes ☑ no

Temp should be above freezing to 6°C

Date and Initials of person examining contents: MB 10/23/15

		Comments:
Are samples from West Virginia? Document any containers out of temp.	☐Yes ☑No	1.
Chain of Custody Present:	☑Yes ☐No ☐N/A	2.
Chain of Custody Filled Out:	☑Yes ☐No ☐N/A	3.
Chain of Custody Relinquished:	☑Yes ☐No ☐N/A	4.
Sampler Name & Signature on COC:	☐Yes ☑No ☐N/A	5.
Short Hold Time Analysis (<72hr):	☐Yes ☐No ☑N/A	6.
Rush Turn Around Time Requested:	☐Yes ☐No ☑N/A	7.
Containers Intact:	☑Yes ☐No ☐N/A	8.
Sample Labels match COC: -Includes date/time/ID/Analysis	☑Yes ☐No ☐N/A	9.
All containers needing acid/base pres. have been checked? exceptions: VOA, coliform, TOC, O&G All containers needing preservation are found to be in compliance with EPA recommendation (<2, >9, >12) unless otherwise noted.	☐Yes ☐No ☑N/A	10 (Circle) HNO3 H2SO4 NaOH NaOH/ZnAc
Residual Chlorine Check (SVOC 625 Pest/PCB 608)	[✓ NA]	11. Present Absent
Residual Chlorine Check (Total/Amenable/Free Cyanide)	[✓ NA]	12. Present Absent
Headspace in VOA Vials (>6mm):	☐Yes ☐No ☑N/A	13
Headspace Wisconsin Sulfide	☐Yes ☐No [✓ NA]	14
Trip Blank Present: Trip Blank Custody Seals Present	☐Yes ☐No ☑N/A ☐Yes ☐No ☑N/A	15
Project Manager Review		
Samples Arrived within Hold Time:	☑Yes ☐No ☐N/A	15.
Sufficient Volume:	☑Yes ☐No ☐N/A	16.
Correct Containers Used:	☑Yes ☐No ☐N/A	17.

Client Notification/ Resolution: Field Data Required? Y / N

Person Contacted: __________ Date/Time: __________

Comments/ Resolution:

Project Manager Review: __________ **Date:** 10/23/15

Form F-IN-Q-290-rev.09, 13Oct2015

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

REPORT TO: John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

REPORT OF: Bulk Material Analysis - 0504-100-00 VAN STONE_REV

DATE: **January 20, 2016**
PACE PROJECT NO: **10326596**
PAGE: **1 of 6**

CASE NARRATIVE:

On October 17, 2015, our laboratory received 10 bulk material sample(s) from the client. The asbestos analysis was performed in accordance with EPA 600/M4-82-020 and EPA/600/R-93/116 official test methods as outlined in 40CFR763.109 appendix A.

The samples will be held for sixty (60) days from the date of this report.

A < sign indicates the value reported was the practical quantitation limit for this sample using the method described.
Concentrations of analyte, if present, below this were not quantifiable.

Pace Analytical Services, Inc. is accredited by the National Voluntary Laboratory Accreditation Program (NVLAP) for conducting asbestos analysis (NVLAP Lab Code 101292-0). Each result listed in the report applies only to the sample analyzed. This report may not be used to claim product endorsement by NVLAP or any agency of the U.S. Government nor may it be reproduced except in full without written approval of Pace Analytical Services, Inc.

The COC and Report were revised on January 20th, 2016, per client request to update the sample IDs.

Project Manager

Beverly Faraday for
Carol Davy - Project Manager
carol.davy@pacelabs.com

Analyst/Approved Signatory

Michael J. Otness

Michael Otness - Laboratory Analyst

Building Material Analysis
Asbestos Content

GeoEngineers
Van Stone/0504-100-00

Lab Number	Date Analyzed	Sample Identification	Sample Description			Asbestos Identification and Estimated Quantity %	Non-Asbestos Material Identification %
			Layers	Color	Matrix		
10326596001	10/26/2015	LT-NS-1 (0.5-1)	1/1	Tan	Sand (100%)	None Detected	100% Nonfibrous Binder
10326596002	10/26/2015	LT-NS-2 (0.5-1)	1/1	Tan	Sand (100%)	None Detected	100% Nonfibrous Binder
10326596003	10/26/2015	MS-36 (3-5)	1/1	Tan Gray	Sand (100%) Rocks	None Detected	100% Nonfibrous Binder
10326596004	10/26/2015	MS-29 (6-7)	1/1	Tan	Sand (100%)	None Detected	100% Nonfibrous Binder
10326596005	10/26/2015	MS-35 (6-8)	1/1	Brown Brown	Sand (100%) Gravel	None Detected	100% Nonfibrous Binder
10326596006	10/26/2015	MS-34 (4-5)	1/1	Brown	Soil (100%)	None Detected	100% Nonfibrous Binder
10326596007	10/26/2015	MS-33 (4-5)	1/1	Brown	Soil (100%)	None Detected	100% Nonfibrous Binder
10326596008	10/26/2015	MS-32 (4-5)	1/1	Brown	Soil (100%)	None Detected	100% Nonfibrous Binder
10326596009	10/26/2015	MS-30 (4-5)	1/1	Brown	Soil (100%)	None Detected	100% Nonfibrous Binder
10326596010	10/26/2015	MS-31 (6-8)	1/1	Brown	Soil (100%)	None Detected	100% Nonfibrous Binder

Analyst - Michael Otness

REVISED 01/20/16 per client

Test Pits/Soil
10326596

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www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 of 2

1986465

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhenry@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: Standard

Section B
Required Project Information:

Report To: jhenry@geoengineers.com
Copy To: jmlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ________

Site Location
STATE: ________

Section D
Required Client Information

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Matrix Codes
MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED ~~COMPOSITE START~~ Grab DATE	TIME	COMPOSITE END/GRAB DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	↓Analysis Test↓ Y/N	Metals*	SPLP	ABA	TCLP	Asbestos	TPH-Dx	TPH-Gx	Cr III/Cr VI					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	~~LT-NS-1 (0.5-1)~~ LT-NS-1 (0.5-1)	SL	G	10/12	1130				1	X									X	X	X	X	X			X						001
2	~~LT-NS-2 (0.5-1)~~ LT-NS-2 (0.5-1)	SL	G		1140				1	X									X	X	X	X	X			X						002
3	~~MS-28 (3-5)~~ MS-36 (3-5)	SL	G		1415				2	X									X	X	X	X	X									003
4	MS-29 (6-7)	SL	G		1510				2	X									X	X	X	X	X									004
5	~~MS-27 (6-8)~~ MS-35 (6-8)	SL	G		1550				2	X									X	X	X	X	X									005
6	MS-34 (4-5)	SL	G		1620				2	X									X				X									Metals & asbestos only 006
7	MS-33 (4-5)	SL	G		1650				2	X									X				X									007
8	MS-32 (4-5)	SL	G	10/13	0930				2	X									X				X									008
9	MS-30 (4-5)	SL	G		1000				2	X									X	X	X	X	X									009
10	MS-31 (6-8)	SL	G		1040				2	X									X	X	X	X	X									010
11	MS-19 (0.5-1)	SL	G		1100				1	X									X													011
12	MS-20 (0.5-1)	SL	G		1115				1	X									X					X	X							012

JML
1/20/2016

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Antimony, Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/ GEI	10/16/15	1100	/ PASI	10/17/15	9:30	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

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www.pacelabs.com

CHAIN-OF-CUSTODY / Analytical Request Document

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Test Pits/Soil
10326596

Page: 1 of 2

1986465

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhuey@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: Standard

Section B
Required Project Information:

Report To: jhuey@geoengineers.com
Copy To: jnlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ________

Site Location
STATE: ________

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED ~~COMPOSITE START~~ Grab DATE	TIME	COMPOSITE END/GRAB DATE	TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test (Y/N)	Metals*	SPLP	ABA	TCLP	Asbestos	Tph-Dx	TPH-Gx	Cr III/Cr VI					Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	LT-113-1 (0.5-1)	SL	G	10/12	1130				1	X									X	X	X	X	X			X						001
2	LT-113-2 (0.5-1)	SL	G		1140				1	X									X	X	X	X	X			X						002
3	MS-28 (3-5)	SL	G		1415				2	X									X	X	X	X	X									003
4	MS-29 (6-7)	SL	G		1510				2	X									X	X	X	X	X									004
5	MS-27 (6-8)	SL	G		1550				2	X									X	X	X	X	X									005
6	MS-34 (4-5)	SL	G		1620				2	X									X				X									Metals & asbestos only 006
7	MS-33 (4-5)	SL	G		1650				2	X									X				X									007
8	MS-32 (4-5)	SL	G	10/13	0930				2	X									X				X									008
9	MS-30 (4-5)	SL	G		1000				2	X									X	X	X	X	X									009
10	MS-31 (6-8)	SL	G		1040				2	X									X	X	X	X	X									010
11	MS-19 (0.5-1)	SL	G		1100				1	X									X													011
12	MS-20 (0.5-1)	SL	G		1115				1	X									X					X	X							012

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Antimony, Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/ GEI	10/16/15	1100	PACE	10/17/15	9:30	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE
PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 2 of 2

1986467

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhaney@geoengineers.com
Phone: 509-363-3125
Fax: 509-363-3126
Requested Due Date/TAT: STD

Section B
Required Project Information:

Report To: jhaney@geoengineers.com
Copy To: jmlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER ______

Site Location
STATE: ______

Section D
Required Client Information

Matrix Codes
MATRIX / CODE
Drinking Water DW
Water WT
Waste Water WW
Product P
Soil/Solid SL
Oil OL
Wipe WP
Air AR
Tissue TS
Other OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START (Grab) DATE	COLLECTED COMPOSITE START (Grab) TIME	COMPOSITE END/GRAB DATE	COMPOSITE END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives: Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test ↓ Y/N ↓	Metals *	TPH-Dx	TPH-Gx	Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	ms-21 (0.5-1)	SL	G	10/[illegible]15	1130				1	Y									X	X	X		013
2	ms-22 (0.5-1)	↓	↓	↓	1140				↓	↓									X	X	X		014
3	ms-23 (0.5-1)	↓	↓	↓	1150				↓	↓									X	X	X		015
4	ms-24 (0.5-1)	↓	↓	↓	1200				↓	↓									X				016
5	ms-25 (0.5-1)	↓	↓	↓	1210				↓	↓									X				017
6	ms-26 (0.5-1)	↓	↓	↓	1220				↓	↓									X				018
7	ms-27 (0.5-1)	↓	↓	↓	1230				↓	↓									X	X	X		019
8	ms-28 (0.5-1)	↓	↓	↓	1240				↓	↓									X	X	X		020
9																							
10																							
11																							
12																							

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
* Antimony, Arsenic, Cadmium, Copper, Chromium, Lead, Mercury, Nickel, Zinc	/ GEI	10/16/15	1100	/ PACE	10/17/15	930	3.9	Y	N	Y
							Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed (MM/DD/YY): 10/16/15

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical	Document Name: Sample Condition Upon Receipt Form	Document Revised: 23Feb2015 Page 1 of 1
	Document No.: F-MN-L-213-rev.13	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Geo Engineers

Project #:

WO# : 10326596

10326596

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 7815 2941 1806

Custody Seal on Cooler/Box Present? ☐ Yes ☑ No   Seals Intact? ☐ Yes ☑ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☑ Bubble Wrap ☐ Bubble Bags ☐ None ☑ Other: Cardboard   Temp Blank? ☐ Yes ☑ No

Thermometer Used: ☐ B88A9130516413 ☑ B88A912167504 ☐ B88A0143310098   Type of Ice: ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 3.9   Cooler Temp Corrected (°C): 3.9   Biological Tissue Frozen? ☐ Yes ☐ No ☑ N/A

Temp should be above freezing to 6°C   Correction Factor: +0.0   Date and Initials of Person Examining Contents: KAC 10/17/15

USDA Regulated Soil (☐ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☑ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☑ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12.
-Includes Date/Time/ID/Analysis Matrix: SL				
All containers needing acid/base preservation have been checked?	☐ Yes	☐ No	☑ N/A	13. ☐ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl Sample #
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☐ Yes	☐ No	☑ N/A	
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION   Field Data Required? ☐ Yes ☐ No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: DWD   Date: 10-22-15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

Pace Analytical®	Document Name: Regulated Soil Checklist	Document Revised: 13Feb2015 Page 1 of 1
	Document No.: F-MN-Q-338-Rev.00	Issuing Authority: Pace Minnesota Quality Office

USDA REGULATED AND DOMESTIC SOIL CHECKLIST

To Be Completed by SR Staff:

Project: GeoEngineers Date: 10/17/15 Initials: KAC

Sample Origin (circle one): DOMESTIC FOREIGN

(Note: soil samples from Hawaii and Puerto Rico are considered to be of a Foreign Source)

If Domestic, circle State of Origin: AL AR AZ CA FL GA ID LA MS NC NM NY OK OR SC TN TX [✓ WA]

If Foreign, list County of Origin:

REQUIREMENT	ACTION	COMPLETED
"Special Handling" stickers are to be placed on all samples.	Did "special Handling" stickers get placed on all sample containers?	[✓ YES] NO
Samples must be segregated and stored in designated bins, shelves and coolers.	Were samples placed in a designated cooler, containers and shelves?	[✓ YES] NO
Samples must be double contained to prevent accidental release.	Were there any signs of breakage or leakage (check for broken glass and/or loose soil in the cooler)? *If NO, ice and melt water can be disposed of by normal process (down the drain).*	YES [✓ NO]
	If YES, were ice and melt water separated from the cooler and disposed of properly? Any broken glass and/or loose soil are to be bagged and placed in a USDA Regulated satellite container or active drum (see Waste Coordinator). Ice and melt water should be baked at a temperature range of 121-154°F for 2 hours and then cooled before going down the drain.	[✓ YES] NO N/A
Equipment and supplies that have come into contact samples must be decontaminated.	Was the cooler(s) and/or countertop(s) decontaminated using either a fresh 10% bleach solution or 70% ethanol? *(Gloves and other lab supplies will be bagged and placed in the SR USDA Regulated satellite container).*	[✓ YES] NO

To Be Completed by PM/PC:

Sample Analysis to be conducted (circle all that apply): [✓ MN] [✓ Subcontract Lab]

Name of Subcontract Lab: Pace Indy + Pace MT

REQUIREMENT	ACTION	COMPLETED
Permission to ship untreated soil must be on file prior to shipping to any subcontract lab, including IR Pace Labs.	Go to: J:\SHARE\PRJ_MGR\10_Client Services Department Documents\Regulated Soils Permits – If permission to ship letter is not there, contact the Waste Coordinator.	[✓ YES] NO N/A
Shipment must include a valid copy of the receiving lab's permit as well as permission to ship letter.	Is a copy of all needed paperwork included with the COC? Do NOT ship samples until all necessary paperwork is compiled.	[✓ YES] NO N/A

Comments:

Project Manager Signature: OMO Date: 10-22-15

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

November 03, 2015

John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

RE: Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Dear John Haney:

Enclosed are the analytical results for sample(s) received by the laboratory on October 17, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Carol Davy

Carol Davy
carol.davy@pacelabs.com
Project Manager

Enclosures

cc: Joshua Lee, GeoEngineers

CERTIFICATIONS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

SAMPLE SUMMARY

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10326601001	**W1-101415**	Water	10/14/15 13:01	10/17/15 09:30
10326601002	**DH-2-101415**	Water	10/14/15 14:07	10/17/15 09:30
10326601003	**MW-3-101415**	Water	10/14/15 16:23	10/17/15 09:30
10326601004	**W-2-101415**	Water	10/14/15 17:09	10/17/15 09:30
10326601005	**MW-2-101515**	Water	10/15/15 11:51	10/17/15 09:30
10326601006	**MW-5-101515**	Water	10/15/15 13:37	10/17/15 09:30
10326601007	**DUP-1-101515**	Water	10/15/15 08:00	10/17/15 09:30
10326601008	**Mill Pipe-GW-101315**	Water	10/13/15 13:00	10/17/15 09:30

SAMPLE ANALYTE COUNT

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10326601001	**W1-101415**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601002	**DH-2-101415**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601003	**MW-3-101415**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601004	**W-2-101415**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601005	**MW-2-101515**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	TLM	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601006	**MW-5-101515**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	TLM	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601007	**DUP-1-101515**	EPA 6010C	DM	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	TLM	1	PASI-M
		SM 2540D	TLM	1	PASI-M
10326601008	**Mill Pipe-GW-101315**	EPA 6010C	DM	6	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	MW	1	PASI-M

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE
Pace Project No.:	10326601

Method: **EPA 6010C**
Description: 6010C MET ICP
Client: GeoEngineeers
Date: November 03, 2015

General Information:
8 samples were analyzed for EPA 6010C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3010 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/58910

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10326601001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2112774)
  - Calcium
  - Magnesium

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE
Pace Project No.:	10326601

Method: **SM 2320B**
Description: 2320B Alkalinity
Client: GeoEngineeers
Date: November 03, 2015

General Information:
8 samples were analyzed for SM 2320B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE
Pace Project No.:	10326601

Method: **SM 2540C**
Description: 2540C Total Dissolved Solids
Client: GeoEngineeers
Date: November 03, 2015

General Information:
8 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100-00 VAN STONE
Pace Project No.:	10326601

Method: **SM 2540D**
Description: 2540D Total Suspended Solids
Client: GeoEngineeers
Date: November 03, 2015

General Information:
8 samples were analyzed for SM 2540D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: W1-101415 **Lab ID: 10326601001** Collected: 10/14/15 13:01 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 10:34	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 10:34	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 10:34	7440-43-9	
Calcium	**185000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 10:34	7440-70-2	M1
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 10:34	7439-92-1	
Magnesium	**149000**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 10:34	7439-95-4	M1
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 10:34	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 10:34	7440-28-0	
Total Hardness by 2340B	**1070000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 10:34		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**244**	mg/L	5.0	2.5	1		10/26/15 14:19		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**1520**	mg/L	10.0	5.0	1		10/20/15 13:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: DH-2-101415 **Lab ID: 10326601002** Collected: 10/14/15 14:07 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 10:49	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 10:49	7440-38-2	
Cadmium	**4.2**	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 10:49	7440-43-9	
Calcium	**333000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 10:49	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 10:49	7439-92-1	
Magnesium	**320000**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 10:49	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 10:49	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 10:49	7440-28-0	
Total Hardness by 2340B	**2150000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 10:49		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**328**	mg/L	5.0	2.5	1		10/26/15 14:23		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**3000**	mg/L	10.0	5.0	1		10/20/15 13:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**12.0**	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: MW-3-101415 **Lab ID: 10326601003** Collected: 10/14/15 16:23 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 10:59	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 10:59	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 10:59	7440-43-9	
Calcium	**80400**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 10:59	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 10:59	7439-92-1	
Magnesium	**20600**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 10:59	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 10:59	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 10:59	7440-28-0	
Total Hardness by 2340B	**286000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 10:59		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**223**	mg/L	5.0	2.5	1		10/28/15 12:11		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**409**	mg/L	10.0	5.0	1		10/20/15 13:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: W-2-101415 **Lab ID: 10326601004** Collected: 10/14/15 17:09 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 11:02	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 11:02	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 11:02	7440-43-9	
Calcium	**88900**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 11:02	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 11:02	7439-92-1	
Magnesium	**20000**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 11:02	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 11:02	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 11:02	7440-28-0	
Total Hardness by 2340B	**304000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 11:02		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**218**	mg/L	5.0	2.5	1		10/28/15 12:26		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**412**	mg/L	10.0	5.0	1		10/20/15 13:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	ND	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: MW-2-101515 **Lab ID: 10326601005** Collected: 10/15/15 11:51 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 11:05	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 11:05	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 11:05	7440-43-9	
Calcium	**343000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 11:05	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 11:05	7439-92-1	
Magnesium	**112000**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 11:05	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 11:05	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 11:05	7440-28-0	
Total Hardness by 2340B	**1320000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 11:05		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**321**	mg/L	5.0	2.5	1		10/28/15 12:54		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**1970**	mg/L	10.0	5.0	1		10/21/15 11:12		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**145**	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: MW-5-101515 **Lab ID: 10326601006** Collected: 10/15/15 13:37 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 11:08	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 11:08	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 11:08	7440-43-9	
Calcium	**121000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 11:08	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 11:08	7439-92-1	
Magnesium	**46900**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 11:08	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 11:08	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 11:08	7440-28-0	
Total Hardness by 2340B	**494000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 11:08		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**155**	mg/L	5.0	2.5	1		10/28/15 12:58		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**692**	mg/L	10.0	5.0	1		10/21/15 11:12		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**200**	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: DUP-1-101515 **Lab ID: 10326601007** Collected: 10/15/15 08:00 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Antimony	ND	ug/L	20.0	3.0	1	10/23/15 14:15	10/27/15 11:11	7440-36-0	
Arsenic	ND	ug/L	20.0	4.0	1	10/23/15 14:15	10/27/15 11:11	7440-38-2	
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 11:11	7440-43-9	
Calcium	**335000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 11:11	7440-70-2	
Lead	ND	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 11:11	7439-92-1	
Magnesium	**110000**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 11:11	7439-95-4	
Nickel	ND	ug/L	20.0	1.5	1	10/23/15 14:15	10/27/15 11:11	7440-02-0	
Thallium	ND	ug/L	20.0	5.0	1	10/23/15 14:15	10/27/15 11:11	7440-28-0	
Total Hardness by 2340B	**1290000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 11:11		
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**323**	mg/L	5.0	2.5	1		10/28/15 13:01		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**1960**	mg/L	10.0	5.0	1		10/21/15 11:12		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**135**	mg/L	10.0	5.0	1		10/21/15 12:07		

ANALYTICAL RESULTS

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Sample: Mill Pipe-GW-101315 **Lab ID: 10326601008** Collected: 10/13/15 13:00 Received: 10/17/15 09:30 Matrix: Water

Parameters	Results	Units	Report Limit	MDL	DF	Prepared	Analyzed	CAS No.	Qual
6010C MET ICP	Analytical Method: EPA 6010C Preparation Method: EPA 3010								
Cadmium	ND	ug/L	3.0	0.65	1	10/23/15 14:15	10/27/15 11:14	7440-43-9	
Calcium	**114000**	ug/L	500	67.0	1	10/23/15 14:15	10/27/15 11:14	7440-70-2	
Lead	**50.4**	ug/L	10.0	2.0	1	10/23/15 14:15	10/27/15 11:14	7439-92-1	
Magnesium	**40900**	ug/L	500	20.0	1	10/23/15 14:15	10/27/15 11:14	7439-95-4	
Total Hardness by 2340B	**453000**	ug/L	3300	1650	1	10/23/15 14:15	10/27/15 11:14		
Zinc	**236**	ug/L	20.0	4.4	1	10/23/15 14:15	10/27/15 11:14	7440-66-6	
2320B Alkalinity	Analytical Method: SM 2320B								
Alkalinity, Total as CaCO3	**176**	mg/L	5.0	2.5	1		10/26/15 10:01		
2540C Total Dissolved Solids	Analytical Method: SM 2540C								
Total Dissolved Solids	**609**	mg/L	10.0	5.0	1		10/20/15 13:16		
2540D Total Suspended Solids	Analytical Method: SM 2540D								
Total Suspended Solids	**30.0**	mg/L	10.0	5.0	1		10/20/15 13:53		

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: MPRP/58910
Analysis Method: EPA 6010C
QC Batch Method: EPA 3010
Analysis Description: 6010C Water
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601005, 10326601006, 10326601007, 10326601008

METHOD BLANK: 2112772
Matrix: Water
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601005, 10326601006, 10326601007, 10326601008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Antimony	ug/L	ND	20.0	3.0	10/27/15 10:27	
Arsenic	ug/L	ND	20.0	4.0	10/27/15 10:27	
Cadmium	ug/L	ND	3.0	0.65	10/27/15 10:27	
Calcium	ug/L	ND	500	67.0	10/27/15 10:27	
Lead	ug/L	ND	10.0	2.0	10/27/15 10:27	
Magnesium	ug/L	ND	500	20.0	10/27/15 10:27	
Nickel	ug/L	ND	20.0	1.5	10/27/15 10:27	
Thallium	ug/L	ND	20.0	5.0	10/27/15 10:27	
Zinc	ug/L	ND	20.0	4.4	10/27/15 10:27	

LABORATORY CONTROL SAMPLE: 2112773

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	1000	1000	100	80-120	
Arsenic	ug/L	1000	999	100	80-120	
Cadmium	ug/L	1000	1010	101	80-120	
Calcium	ug/L	10000	9910	99	80-120	
Lead	ug/L	1000	1010	101	80-120	
Magnesium	ug/L	10000	10000	100	80-120	
Nickel	ug/L	1000	999	100	80-120	
Thallium	ug/L	1000	1010	101	80-120	
Zinc	ug/L	1000	1020	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2112774 2112775

Parameter	Units	10326601001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	ND	1000	1000	1020	1000	101	100	75-125	1	20	
Arsenic	ug/L	ND	1000	1000	1020	1010	102	101	75-125	1	20	
Cadmium	ug/L	ND	1000	1000	1000	994	100	99	75-125	1	20	
Calcium	ug/L	185000	10000	10000	200000	196000	150	113	75-125	2	20	M1
Lead	ug/L	ND	1000	1000	970	962	97	96	75-125	1	20	
Magnesium	ug/L	149000	10000	10000	163000	160000	137	109	75-125	2	20	M1
Nickel	ug/L	ND	1000	1000	952	943	95	94	75-125	1	20	
Thallium	ug/L	ND	1000	1000	956	943	96	94	75-125	1	20	
Zinc	ug/L	ND	1000	1000	976	965	97	96	75-125	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44881
Analysis Method: SM 2320B
QC Batch Method: SM 2320B
Analysis Description: 2320B Alkalinity
Associated Lab Samples: 10326601008

METHOD BLANK: 2117620
Matrix: Water
Associated Lab Samples: 10326601008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	ND	5.0	2.5	10/26/15 08:38	

LABORATORY CONTROL SAMPLE & LCSD: 2117621 2117622

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	40	43.2	43.0	108	107	90-110	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117623 2117624

Parameter	Units	10326463001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	328	40	40	366	367	93	98	80-120	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117625 2117626

Parameter	Units	10326463004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	378	40	40	421	422	107	111	80-120	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44882 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 10326601001, 10326601002

METHOD BLANK: 2117631 Matrix: Water
Associated Lab Samples: 10326601001, 10326601002

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	ND	5.0	2.5	10/26/15 11:22	

LABORATORY CONTROL SAMPLE & LCSD: 2117632 2117633

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	40	43.1	42.9	108	107	90-110	1	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117634 2117635

Parameter	Units	10326462002 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	351	40	40	391	390	99	99	80-120	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2117636 2117637

Parameter	Units	10326503001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	143	40	40	185	185	106	104	80-120	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44919 Analysis Method: SM 2320B
QC Batch Method: SM 2320B Analysis Description: 2320B Alkalinity
Associated Lab Samples: 10326601003, 10326601004, 10326601005, 10326601006, 10326601007

METHOD BLANK: 2119886 Matrix: Water
Associated Lab Samples: 10326601003, 10326601004, 10326601005, 10326601006, 10326601007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	ND	5.0	2.5	10/28/15 12:00	

LABORATORY CONTROL SAMPLE & LCSD: 2119887 2119888

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	40	43.1	42.9	108	107	90-110	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2119889 2119890

Parameter	Units	10326601003 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	223	40	40	259	261	89	95	80-120	1	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2119891 2119892

Parameter	Units	10326691001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	133	40	40	175	176	105	106	80-120	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44787
Analysis Method: SM 2540C
QC Batch Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601008

METHOD BLANK: 2112316
Matrix: Water
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	5.0	10/20/15 13:16	

LABORATORY CONTROL SAMPLE: 2112317

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	968	97	80-120	

SAMPLE DUPLICATE: 2112319

Parameter	Units	10326462002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	580	596	3	10	

SAMPLE DUPLICATE: 2112608

Parameter	Units	10326462011 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	290	289	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44815
Analysis Method: SM 2540C
QC Batch Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 10326601005, 10326601006, 10326601007

METHOD BLANK: 2113387
Matrix: Water
Associated Lab Samples: 10326601005, 10326601006, 10326601007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	ND	10.0	5.0	10/21/15 11:12	

LABORATORY CONTROL SAMPLE: 2113388

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	1020	102	80-120	

SAMPLE DUPLICATE: 2113389

Parameter	Units	10326601006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	692	697	1	10	

SAMPLE DUPLICATE: 2113390

Parameter	Units	10326601005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1970	1970	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44786
Analysis Method: SM 2540D
QC Batch Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10326601008

METHOD BLANK: 2112312
Matrix: Water
Associated Lab Samples: 10326601008

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	10.0	5.0	10/20/15 13:53	

LABORATORY CONTROL SAMPLE: 2112313

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	106	106	80-120	

SAMPLE DUPLICATE: 2112315

Parameter	Units	10326215008 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	<5.0	ND		10	

SAMPLE DUPLICATE: 2112341

Parameter	Units	10326317002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	224	227	1	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

QC Batch: WET/44813 Analysis Method: SM 2540D
QC Batch Method: SM 2540D Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601005, 10326601006, 10326601007

METHOD BLANK: 2113372 Matrix: Water
Associated Lab Samples: 10326601001, 10326601002, 10326601003, 10326601004, 10326601005, 10326601006, 10326601007

Parameter	Units	Blank Result	Reporting Limit	MDL	Analyzed	Qualifiers
Total Suspended Solids	mg/L	ND	10.0	5.0	10/21/15 12:07	

LABORATORY CONTROL SAMPLE: 2113373

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	50	53.0	106	80-120	

SAMPLE DUPLICATE: 2113374

Parameter	Units	10326358008 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	24.0	25.0	4	10	

SAMPLE DUPLICATE: 2113375

Parameter	Units	10326462002 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	ND		10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALIFIERS

Project:	0504-100-00 VAN STONE
Pace Project No.:	10326601

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100-00 VAN STONE
Pace Project No.: 10326601

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10326601001	**W1-101415**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601002	**DH-2-101415**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601003	**MW-3-101415**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601004	**W-2-101415**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601005	**MW-2-101515**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601006	**MW-5-101515**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601007	**DUP-1-101515**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601008	**Mill Pipe-GW-101315**	EPA 3010	MPRP/58910	EPA 6010C	ICP/25740
10326601001	**W1-101415**	SM 2320B	WET/44882		
10326601002	**DH-2-101415**	SM 2320B	WET/44882		
10326601003	**MW-3-101415**	SM 2320B	WET/44919		
10326601004	**W-2-101415**	SM 2320B	WET/44919		
10326601005	**MW-2-101515**	SM 2320B	WET/44919		
10326601006	**MW-5-101515**	SM 2320B	WET/44919		
10326601007	**DUP-1-101515**	SM 2320B	WET/44919		
10326601008	**Mill Pipe-GW-101315**	SM 2320B	WET/44881		
10326601001	**W1-101415**	SM 2540C	WET/44787		
10326601002	**DH-2-101415**	SM 2540C	WET/44787		
10326601003	**MW-3-101415**	SM 2540C	WET/44787		
10326601004	**W-2-101415**	SM 2540C	WET/44787		
10326601005	**MW-2-101515**	SM 2540C	WET/44815		
10326601006	**MW-5-101515**	SM 2540C	WET/44815		
10326601007	**DUP-1-101515**	SM 2540C	WET/44815		
10326601008	**Mill Pipe-GW-101315**	SM 2540C	WET/44787		
10326601001	**W1-101415**	SM 2540D	WET/44813		
10326601002	**DH-2-101415**	SM 2540D	WET/44813		
10326601003	**MW-3-101415**	SM 2540D	WET/44813		
10326601004	**W-2-101415**	SM 2540D	WET/44813		
10326601005	**MW-2-101515**	SM 2540D	WET/44813		
10326601006	**MW-5-101515**	SM 2540D	WET/44813		
10326601007	**DUP-1-101515**	SM 2540D	WET/44813		
10326601008	**Mill Pipe-GW-101315**	SM 2540D	WET/44786		

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CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

GW

10326000l

1019

Page: 1 of 1

1986466

Section A
Required Client Information:

Company: GeoEngineers
Address: 523 E Second Ave
Spokane, WA 99202
Email To: jhoney@geoengineers.com
Phone: 509-363-3125 Fax: 509-363-3126
Requested Due Date/TAT: STD

Section B
Required Project Information:

Report To: jhoney@geoengineers.com
Copy To: jmlee@geoengineers.com
Purchase Order No.:
Project Name: VAN STONE
Project Number: 0504-100-00

Section C
Invoice Information:

Attention:
Company Name:
Address:
Pace Quote Reference:
Pace Project Manager:
Pace Profile #:

REGULATORY AGENCY

☐ NPDES ☐ GROUND WATER ☐ DRINKING WATER
☐ UST ☐ RCRA ☐ OTHER

Site Location STATE:

Section D
Required Client Information

Matrix Codes
MATRIX / CODE

Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Tissue	TS
Other	OT

SAMPLE ID
(A-Z, 0-9 / ,-)
Sample IDs MUST BE UNIQUE

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED COMPOSITE START DATE	COLLECTED COMPOSITE START TIME	COLLECTED ~~COMPOSITE~~ END/GRAB DATE	COLLECTED ~~COMPOSITE~~ END/GRAB TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H_2SO_4	HNO_3	HCl	NaOH	$Na_2S_2O_3$	Methanol	Other	Analysis Test Y/N	Metals*	Hardness as CaCO3	TDS	TSS	Total Alkalinity	Total Metals**							Residual Chlorine (Y/N)	Pace Project No./ Lab I.D.
1	W1-101415	WT	G			10/14/15	1301		2	1		1							X	X	X	X	X									001
2	DH-2-101415	↓	↓			↓	1407		↓	↓		↓							↓	↓	↓	↓	↓									002
3	MW-3-101415	↓	↓			↓	1623		↓	↓		↓							↓	↓	↓	↓	↓									003
4	W-2-101415	↓	↓			↓	1709		↓	↓		↓							↓	↓	↓	↓	↓									004
5	MW-2-101515	↓	↓			10/15/15	1151		↓	↓		↓							↓	↓	↓	↓	↓									005
6	MW-5-101515	↓	↓			↓	1337		↓	↓		↓							↓	↓	↓	↓	↓									006
7	dup-1-101515	↓	↓			↓	0800		↓	↓		↓							↓	↓	↓	↓	↓									007
8	Mill Pipe-GW-101315	↓	↓			10/13/15	1300		2	1		1								X	X	X	X	X								TestAmerica bottles 008
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
*Antimony, Arsenic, Cadmium, Lead, Nickel, Thallium,	/ GEI	10/16/15	1100		10/17/15	~~[illegible]~~	1.3	Y	N	Y
						930				
** Cadmium, Lead, Zinc										

ORIGINAL

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee

SIGNATURE of SAMPLER:

DATE Signed (MM/DD/YY): 10/16/15

Temp in °C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)

*Important Note: By signing this form you are accepting Pace's NET 30 day payment terms and agreeing to late charges of 1.5% per month for any invoices not paid within 30 days.

F-ALL-Q-020rev.07, 15-May-2007

Pace Analytical®	Document Name: **Sample Condition Upon Receipt Form**	Document Revised: 23Feb2015 Page 1 of 1
	Document No.: **F-MN-L-213-rev.13**	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: GeoEngineers

Project #:

WO# : 10326601

10326601

Courier: ☒Fed Ex ☐UPS ☐USPS ☐Client ☐Commercial ☐Pace ☐SpeeDee ☐Other:

Tracking Number: 8079 6283 7579

Custody Seal on Cooler/Box Present? ☐Yes ☒No **Seals Intact?** ☐Yes ☒No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐Bubble Wrap ☒Bubble Bags ☐None ☐Other:

Temp Blank? ☒Yes ☐No

Thermometer Used: ☐B88A9130516413 ☒B88A912167504 ☐B88A0143310098

Type of Ice: ☒Wet ☐Blue ☐None ☐Samples on ice, cooling process has begun

Cooler Temp Read (°C): 1.3 **Cooler Temp Corrected (°C):** 1.3 **Biological Tissue Frozen?** ☐Yes ☐No ☒N/A

Temp should be above freezing to 6°C **Correction Factor:** 0.0 **Date and Initials of Person Examining Contents:** DW 10/17/15

USDA Regulated Soil (☒ N/A, water sample)

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☐Yes ☐No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐Yes ☐No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☒Yes	☐No	☐N/A	1.
Chain of Custody Filled Out?	☒Yes	☐No	☐N/A	2.
Chain of Custody Relinquished?	☒Yes	☐No	☐N/A	3.
Sampler Name and/or Signature on COC?	☒Yes	☐No	☐N/A	4.
Samples Arrived within Hold Time?	☒Yes	☐No	☐N/A	5.
Short Hold Time Analysis (<72 hr)?	☐Yes	☒No	☐N/A	6.
Rush Turn Around Time Requested?	☐Yes	☒No	☐N/A	7.
Sufficient Volume?	☒Yes	☐No	☐N/A	8.
Correct Containers Used?	☒Yes	☐No	☐N/A	9. Exception: Sample 8 has Test America bottles
-Pace Containers Used?	☒Yes	☐No	☐N/A	
Containers Intact?	☒Yes	☐No	☐N/A	10.
Filtered Volume Received for Dissolved Tests?	☐Yes	☐No	☒N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	☒Yes	☐No	☐N/A	12.
-Includes Date/Time/ID/Analysis Matrix: WT				
All containers needing acid/base preservation have been checked?	☒Yes	☐No	☐N/A	13. ☒HNO₃ ☐H₂SO₄ ☐NaOH ☐HCl
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☒Yes	☐No	☐N/A	Sample # 1-8
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐Yes	☒No	☐N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐Yes	☐No	☒N/A	14.
Trip Blank Present?	☒Yes	☐No	☐N/A	15.
Trip Blank Custody Seals Present?	☒Yes	☐No	☐N/A	
Pace Trip Blank Lot # (if purchased): 081015-3				

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐Yes ☐No

Person Contacted: Date/Time:

Comments/Resolution:

Project Manager Review: DAW **Date:** 10-19-15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers).

www.pacelabs.com

Pace Analytical Services, Inc.
1700 Elm Street - Suite 200
Minneapolis, MN 55414
(612)607-1700

February 12, 2016

John Haney
GeoEngineers, Inc - WA
523 East Second Ave.
Spokane, WA 99202

RE: Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Dear John Haney:

Enclosed are the analytical results for sample(s) received by the laboratory on February 04, 2016. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Jenni Gross

Jennifer Gross
jennifer.gross@pacelabs.com
Project Manager

Enclosures

cc: Chelsea Voss, GeoEngineers

CERTIFICATIONS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Minnesota Certification IDs

1700 Elm Street SE Suite 200, Minneapolis, MN 55414
525 N 8th Street, Salina, KS 67401
A2LA Certification #: 2926.01
Alaska Certification #: UST-078
Alaska Certification #MN00064
Alabama Certification #40770
Arizona Certification #: AZ-0014
Arkansas Certification #: 88-0680
California Certification #: 01155CA
Colorado Certification #Pace
Connecticut Certification #: PH-0256
EPA Region 8 Certification #: 8TMS-L
Florida/NELAP Certification #: E87605
Guam Certification #:14-008r
Georgia Certification #: 959
Georgia EPD #: Pace
Idaho Certification #: MN00064
Hawaii Certification #MN00064
Illinois Certification #: 200011
Indiana Certification#C-MN-01
Iowa Certification #: 368
Kansas Certification #: E-10167
Kentucky Dept of Envi. Protection - DW #90062
Kentucky Dept of Envi. Protection - WW #:90062
Louisiana DEQ Certification #: 3086
Louisiana DHH #: LA140001
Maine Certification #: 2013011
Maryland Certification #: 322
Michigan DEPH Certification #: 9909
Minnesota Certification #: 027-053-137
Mississippi Certification #: Pace
Montana Certification #: MT0092
Nevada Certification #: MN_00064
Nebraska Certification #: Pace
New Jersey Certification #: MN-002
New York Certification #: 11647
North Carolina Certification #: 530
North Carolina State Public Health #: 27700
North Dakota Certification #: R-036
Ohio EPA #: 4150
Ohio VAP Certification #: CL101
Oklahoma Certification #: 9507
Oregon Certification #: MN200001
Oregon Certification #: MN300001
Pennsylvania Certification #: 68-00563
Puerto Rico Certification
Saipan (CNMI) #:MP0003
South Carolina #:74003001
Texas Certification #: T104704192
Tennessee Certification #: 02818
Utah Certification #: MN000642013-4
Virginia DGS Certification #: 251
Virginia/VELAP Certification #: Pace
Washington Certification #: C486
West Virginia Certification #: 382
West Virginia DHHR #:9952C
Wisconsin Certification #: 999407970

SAMPLE SUMMARY

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Lab ID	Sample ID	Matrix	Date Collected	Date Received
10337632001	**Dup: 020116**	Water	02/01/16 08:00	02/04/16 09:40
10337632002	**MW-2: 020116**	Water	02/01/16 10:27	02/04/16 09:40
10337632003	**W1: 020116**	Water	02/01/16 12:19	02/04/16 09:40
10337632004	**DH-2: 020116**	Water	02/01/16 13:20	02/04/16 09:40
10337632005	**MW-1: 020116**	Water	02/01/16 15:54	02/04/16 09:40
10337632006	**MW-3: 020216**	Water	02/02/16 10:19	02/04/16 09:40
10337632007	**MW-5: 020216**	Water	02/02/16 13:20	02/04/16 09:40

SAMPLE ANALYTE COUNT

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
10337632001	**Dup: 020116**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632002	**MW-2: 020116**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632003	**W1: 020116**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632004	**DH-2: 020116**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632005	**MW-1: 020116**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632006	**MW-3: 020216**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M
10337632007	**MW-5: 020216**	EPA 6020A	TT3	9	PASI-M
		SM 2320B	MW	1	PASI-M
		SM 2540C	MW	1	PASI-M
		SM 2540D	JFP	1	PASI-M

PROJECT NARRATIVE

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers_WA
Date: February 12, 2016

General Information:
7 samples were analyzed for EPA 6020A. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Sample Preparation:
The samples were prepared in accordance with EPA 3020 with any exceptions noted below.

Initial Calibrations (including MS Tune as applicable):
All criteria were within method requirements with any exceptions noted below.

Continuing Calibration:
All criteria were within method requirements with any exceptions noted below.

Internal Standards:
All internal standards were within QC limits with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

QC Batch: MPRP/61315

A matrix spike and/or matrix spike duplicate (MS/MSD) were performed on the following sample(s): 10337632001

M1: Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

- MS (Lab ID: 2186700)
  - Calcium
  - Magnesium
- MSD (Lab ID: 2186701)
  - Calcium

Additional Comments:

Analyte Comments:

QC Batch: MPRP/61315

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MS (Lab ID: 2186700)
  - Calcium

PROJECT NARRATIVE

Project:	0504-100.00 Van Stone Mine GW
Pace Project No.:	10337632

Method: **EPA 6020A**
Description: 6020A MET ICPMS
Client: GeoEngineers_WA
Date: February 12, 2016

Analyte Comments:

QC Batch: MPRP/61315

E: Analyte concentration exceeded the calibration range. The reported result is estimated.

- MS (Lab ID: 2186700)
  - Magnesium
- MSD (Lab ID: 2186701)
  - Calcium
  - Magnesium

PROJECT NARRATIVE

Project:	0504-100.00 Van Stone Mine GW
Pace Project No.:	10337632

Method: **SM 2320B**
Description: 2320B Alkalinity
Client: GeoEngineers_WA
Date: February 12, 2016

General Information:
7 samples were analyzed for SM 2320B. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project:	0504-100.00 Van Stone Mine GW
Pace Project No.:	10337632

Method: **SM 2540C**
Description: 2540C Total Dissolved Solids
Client: GeoEngineers_WA
Date: February 12, 2016

General Information:
7 samples were analyzed for SM 2540C. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

Additional Comments:

PROJECT NARRATIVE

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Method: **SM 2540D**
Description: 2540D Total Suspended Solids
Client: GeoEngineers_WA
Date: February 12, 2016

General Information:
7 samples were analyzed for SM 2540D. All samples were received in acceptable condition with any exceptions noted below or on the chain-of custody and/or the sample condition upon receipt form (SCUR) attached at the end of this report.

Hold Time:
The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:
All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:
All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:
All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Duplicate Sample:
All duplicate sample results were within method acceptance criteria with any exceptions noted below.

QC Batch: WET/46352

D8: The sample and duplicate results for this parameter are less than 5 times the reporting limit, the RPD may not be statistically valid.

- DUP (Lab ID: 2187452)
  - Total Suspended Solids

Additional Comments:

This data package has been reviewed for quality and completeness and is approved for release.

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: Dup: 020116 **Lab ID: 10337632001** Collected: 02/01/16 08:00 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 15:57	7440-36-0	
Arsenic	**1.4**	ug/L	0.50	1	02/08/16 10:42	02/09/16 15:57	7440-38-2	
Cadmium	**0.13**	ug/L	0.080	1	02/08/16 10:42	02/09/16 15:57	7440-43-9	
Calcium	**355000**	ug/L	800	20	02/08/16 10:42	02/09/16 16:11	7440-70-2	M1
Lead	**0.98**	ug/L	0.10	1	02/08/16 10:42	02/09/16 15:57	7439-92-1	
Magnesium	**121000**	ug/L	200	20	02/08/16 10:42	02/09/16 16:11	7439-95-4	M1
Nickel	**1.0**	ug/L	0.50	1	02/08/16 10:42	02/09/16 15:57	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 15:57	7440-28-0	
Total Hardness by 2340B	**1380000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:11		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**302**	mg/L	5.0	1		02/11/16 11:52		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**1800**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**31.0**	mg/L	10.0	1		02/05/16 16:02		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: MW-2: 020116 **Lab ID: 10337632002** Collected: 02/01/16 10:27 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:24	7440-36-0	
Arsenic	**1.4**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:24	7440-38-2	
Cadmium	**0.10**	ug/L	0.080	1	02/08/16 10:42	02/09/16 16:24	7440-43-9	
Calcium	**345000**	ug/L	800	20	02/08/16 10:42	02/09/16 16:27	7440-70-2	
Lead	**0.99**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:24	7439-92-1	
Magnesium	**117000**	ug/L	200	20	02/08/16 10:42	02/09/16 16:27	7439-95-4	
Nickel	**1.0**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:24	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:24	7440-28-0	
Total Hardness by 2340B	**1340000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:27		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**301**	mg/L	5.0	1		02/11/16 12:04		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**1780**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**27.0**	mg/L	10.0	1		02/05/16 16:02		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: W1: 020116 **Lab ID: 10337632003** Collected: 02/01/16 12:19 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**0.65**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:30	7440-36-0	
Arsenic	**0.68**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:30	7440-38-2	
Cadmium	**0.45**	ug/L	0.080	1	02/08/16 10:42	02/09/16 16:30	7440-43-9	
Calcium	**197000**	ug/L	800	20	02/08/16 10:42	02/09/16 16:33	7440-70-2	
Lead	**0.64**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:30	7439-92-1	
Magnesium	**161000**	ug/L	200	20	02/08/16 10:42	02/09/16 16:33	7439-95-4	
Nickel	**1.1**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:30	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:30	7440-28-0	
Total Hardness by 2340B	**1160000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:33		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**244**	mg/L	5.0	1		02/11/16 12:08		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**1500**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**<10.0**	mg/L	10.0	1		02/05/16 16:02		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: DH-2: 020116 **Lab ID: 10337632004** Collected: 02/01/16 13:20 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:35	7440-36-0	
Arsenic	**1.1**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:35	7440-38-2	
Cadmium	**3.3**	ug/L	0.080	1	02/08/16 10:42	02/09/16 16:35	7440-43-9	
Calcium	**350000**	ug/L	800	20	02/08/16 10:42	02/09/16 16:38	7440-70-2	
Lead	**2.7**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:35	7439-92-1	
Magnesium	**341000**	ug/L	200	20	02/08/16 10:42	02/09/16 16:38	7439-95-4	
Nickel	**8.0**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:35	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:35	7440-28-0	
Total Hardness by 2340B	**2280000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:38		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**313**	mg/L	5.0	1		02/12/16 10:22		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**3020**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**17.0**	mg/L	10.0	1		02/05/16 16:02		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: MW-1: 020116 **Lab ID: 10337632005** Collected: 02/01/16 15:54 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:41	7440-36-0	
Arsenic	**2.0**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:41	7440-38-2	
Cadmium	**<0.080**	ug/L	0.080	1	02/08/16 10:42	02/09/16 16:41	7440-43-9	
Calcium	**92000**	ug/L	800	20	02/08/16 10:42	02/09/16 16:44	7440-70-2	
Lead	**0.34**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:41	7439-92-1	
Magnesium	**20600**	ug/L	10.0	1	02/08/16 10:42	02/09/16 16:41	7439-95-4	
Nickel	**0.68**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:41	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:41	7440-28-0	
Total Hardness by 2340B	**315000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:44		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**145**	mg/L	5.0	1		02/12/16 10:37		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**413**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**<10.0**	mg/L	10.0	1		02/05/16 16:02		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: MW-3: 020216 **Lab ID: 10337632006** Collected: 02/02/16 10:19 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:46	7440-36-0	
Arsenic	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:46	7440-38-2	
Cadmium	**<0.080**	ug/L	0.080	1	02/08/16 10:42	02/09/16 16:46	7440-43-9	
Calcium	**88800**	ug/L	800	20	02/08/16 10:42	02/09/16 16:49	7440-70-2	
Lead	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:46	7439-92-1	
Magnesium	**23800**	ug/L	200	20	02/08/16 10:42	02/09/16 16:49	7439-95-4	
Nickel	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 16:46	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 16:46	7440-28-0	
Total Hardness by 2340B	**320000**	ug/L	2820	20	02/08/16 10:42	02/09/16 16:49		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**210**	mg/L	5.0	1		02/12/16 10:45		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**410**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**<10.0**	mg/L	10.0	1		02/07/16 16:20		

ANALYTICAL RESULTS

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Sample: MW-5: 020216 **Lab ID: 10337632007** Collected: 02/02/16 13:20 Received: 02/04/16 09:40 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
6020A MET ICPMS	Analytical Method: EPA 6020A Preparation Method: EPA 3020							
Antimony	**<0.50**	ug/L	0.50	1	02/08/16 10:42	02/09/16 17:00	7440-36-0	
Arsenic	**1.4**	ug/L	0.50	1	02/08/16 10:42	02/09/16 17:00	7440-38-2	
Cadmium	**3.5**	ug/L	0.080	1	02/08/16 10:42	02/09/16 17:00	7440-43-9	
Calcium	**104000**	ug/L	800	20	02/08/16 10:42	02/10/16 14:22	7440-70-2	
Lead	**3.9**	ug/L	0.10	1	02/08/16 10:42	02/09/16 17:00	7439-92-1	
Magnesium	**39900**	ug/L	200	20	02/08/16 10:42	02/10/16 14:22	7439-95-4	
Nickel	**7.3**	ug/L	0.50	1	02/08/16 10:42	02/09/16 17:00	7440-02-0	
Thallium	**<0.10**	ug/L	0.10	1	02/08/16 10:42	02/09/16 17:00	7440-28-0	
Total Hardness by 2340B	**424000**	ug/L	2820	20	02/08/16 10:42	02/10/16 14:22		
2320B Alkalinity	Analytical Method: SM 2320B							
Alkalinity, Total as CaCO3	**152**	mg/L	5.0	1		02/12/16 10:49		
2540C Total Dissolved Solids	Analytical Method: SM 2540C							
Total Dissolved Solids	**653**	mg/L	10.0	1		02/08/16 11:01		
2540D Total Suspended Solids	Analytical Method: SM 2540D							
Total Suspended Solids	**190**	mg/L	10.0	1		02/07/16 16:20		

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: MPRP/61315
Analysis Method: EPA 6020A
QC Batch Method: EPA 3020
Analysis Description: 6020A Water UPD4
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005, 10337632006, 10337632007

METHOD BLANK: 2186698
Matrix: Water
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005, 10337632006, 10337632007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Antimony	ug/L	<0.50	0.50	02/09/16 15:52	
Arsenic	ug/L	<0.50	0.50	02/09/16 15:52	
Cadmium	ug/L	<0.080	0.080	02/09/16 15:52	
Calcium	ug/L	<40.0	40.0	02/09/16 15:52	
Lead	ug/L	<0.10	0.10	02/09/16 15:52	
Magnesium	ug/L	<10.0	10.0	02/09/16 15:52	
Nickel	ug/L	<0.50	0.50	02/09/16 15:52	
Thallium	ug/L	<0.10	0.10	02/09/16 15:52	

LABORATORY CONTROL SAMPLE: 2186699

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Antimony	ug/L	80	83.8	105	80-120	
Arsenic	ug/L	80	87.1	109	80-120	
Cadmium	ug/L	80	83.3	104	80-120	
Calcium	ug/L	1000	1050	105	80-120	
Lead	ug/L	80	82.1	103	80-120	
Magnesium	ug/L	1000	1070	107	80-120	
Nickel	ug/L	80	84.0	105	80-120	
Thallium	ug/L	80	82.4	103	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2186700 2186701

Parameter	Units	10337632001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Antimony	ug/L	<0.50	80	80	85.7	86.9	107	108	80-120	1	20	
Arsenic	ug/L	1.4	80	80	91.3	92.6	112	114	80-120	1	20	
Cadmium	ug/L	0.13	80	80	80.9	82.1	101	102	80-120	2	20	
Calcium	ug/L	355000	1000	1000	360000	361000	531	613	80-120	0	20	E,M1
Lead	ug/L	0.98	80	80	80.8	81.7	100	101	80-120	1	20	
Magnesium	ug/L	121000	1000	1000	121000	122000	-10	83	80-120	1	20	E,M1
Nickel	ug/L	1.0	80	80	79.8	81.2	98	100	80-120	2	20	
Thallium	ug/L	<0.10	80	80	80.6	81.2	101	101	80-120	1	20	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: WET/46418
Analysis Method: SM 2320B
QC Batch Method: SM 2320B
Analysis Description: 2320B Alkalinity
Associated Lab Samples: 10337632001, 10337632002, 10337632003

METHOD BLANK: 2189583
Matrix: Water
Associated Lab Samples: 10337632001, 10337632002, 10337632003

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<5.0	5.0	02/11/16 10:04	

LABORATORY CONTROL SAMPLE & LCSD: 2189584 2189585

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	40	41.2	41.2	103	103	90-110	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2189586 2189587

Parameter	Units	10337615001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	142	40	40	182	185	100	106	80-120	2	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2189588 2189589

Parameter	Units	10337632001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	302	40	40	346	345	111	107	80-120	0	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: WET/46446
Analysis Method: SM 2320B
QC Batch Method: SM 2320B
Analysis Description: 2320B Alkalinity
Associated Lab Samples: 10337632004, 10337632005, 10337632006, 10337632007

METHOD BLANK: 2190647
Matrix: Water
Associated Lab Samples: 10337632004, 10337632005, 10337632006, 10337632007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Alkalinity, Total as CaCO3	mg/L	<5.0	5.0	02/12/16 10:08	

LABORATORY CONTROL SAMPLE & LCSD: 2190648 2190649

Parameter	Units	Spike Conc.	LCS Result	LCSD Result	LCS % Rec	LCSD % Rec	% Rec Limits	RPD	Max RPD	Qualifiers
Alkalinity, Total as CaCO3	mg/L	40	41.2	41.1	103	103	90-110	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2190650 2190651

Parameter	Units	10337632004 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	313	40	40	357	356	110	108	80-120	0	30	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 2190652 2190653

Parameter	Units	10337666001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Alkalinity, Total as CaCO3	mg/L	87.8	40	40	128	128	99	101	80-120	1	30	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: WET/46355
Analysis Method: SM 2540C
QC Batch Method: SM 2540C
Analysis Description: 2540C Total Dissolved Solids
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005, 10337632006, 10337632007

METHOD BLANK: 2187462
Matrix: Water
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005, 10337632006, 10337632007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Dissolved Solids	mg/L	<10.0	10.0	02/08/16 11:01	

LABORATORY CONTROL SAMPLE: 2187463

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Dissolved Solids	mg/L	1000	968	97	80-120	

SAMPLE DUPLICATE: 2187464

Parameter	Units	10337632001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	1800	1800	0	10	

SAMPLE DUPLICATE: 2187465

Parameter	Units	10337632006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Dissolved Solids	mg/L	410	410	0	10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: WET/46334
Analysis Method: SM 2540D
QC Batch Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005

METHOD BLANK: 2186943
Matrix: Water
Associated Lab Samples: 10337632001, 10337632002, 10337632003, 10337632004, 10337632005

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	<10.0	10.0	02/05/16 16:02	

LABORATORY CONTROL SAMPLE: 2186944

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	96.0	96	80-120	

SAMPLE DUPLICATE: 2186945

Parameter	Units	10337389001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	ND	<10.0		10	

SAMPLE DUPLICATE: 2186946

Parameter	Units	10337632005 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	<10.0	<10.0		10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALITY CONTROL DATA

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

QC Batch: WET/46352
Analysis Method: SM 2540D
QC Batch Method: SM 2540D
Analysis Description: 2540D Total Suspended Solids
Associated Lab Samples: 10337632006, 10337632007

METHOD BLANK: 2187450
Matrix: Water
Associated Lab Samples: 10337632006, 10337632007

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Total Suspended Solids	mg/L	<10.0	10.0	02/07/16 16:20	

LABORATORY CONTROL SAMPLE: 2187451

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Total Suspended Solids	mg/L	100	98.0	98	80-120	

SAMPLE DUPLICATE: 2187452

Parameter	Units	10337784001 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	17.0	32.0	61	10	D8

SAMPLE DUPLICATE: 2187453

Parameter	Units	10337632006 Result	Dup Result	RPD	Max RPD	Qualifiers
Total Suspended Solids	mg/L	<10.0	<10.0		10	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

QUALIFIERS

Project:	0504-100.00 Van Stone Mine GW
Pace Project No.:	10337632

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

LABORATORIES

PASI-M	Pace Analytical Services - Minneapolis

ANALYTE QUALIFIERS

D8	The sample and duplicate results for this parameter are less than 5 times the reporting limit, the RPD may not be statistically valid.
E	Analyte concentration exceeded the calibration range. The reported result is estimated.
M1	Matrix spike recovery exceeded QC limits. Batch accepted based on laboratory control sample (LCS) recovery.

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: 0504-100.00 Van Stone Mine GW
Pace Project No.: 10337632

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
10337632001	**Dup: 020116**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632002	**MW-2: 020116**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632003	**W1: 020116**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632004	**DH-2: 020116**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632005	**MW-1: 020116**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632006	**MW-3: 020216**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632007	**MW-5: 020216**	EPA 3020	MPRP/61315	EPA 6020A	ICPM/28318
10337632001	**Dup: 020116**	SM 2320B	WET/46418		
10337632002	**MW-2: 020116**	SM 2320B	WET/46418		
10337632003	**W1: 020116**	SM 2320B	WET/46418		
10337632004	**DH-2: 020116**	SM 2320B	WET/46446		
10337632005	**MW-1: 020116**	SM 2320B	WET/46446		
10337632006	**MW-3: 020216**	SM 2320B	WET/46446		
10337632007	**MW-5: 020216**	SM 2320B	WET/46446		
10337632001	**Dup: 020116**	SM 2540C	WET/46355		
10337632002	**MW-2: 020116**	SM 2540C	WET/46355		
10337632003	**W1: 020116**	SM 2540C	WET/46355		
10337632004	**DH-2: 020116**	SM 2540C	WET/46355		
10337632005	**MW-1: 020116**	SM 2540C	WET/46355		
10337632006	**MW-3: 020216**	SM 2540C	WET/46355		
10337632007	**MW-5: 020216**	SM 2540C	WET/46355		
10337632001	**Dup: 020116**	SM 2540D	WET/46334		
10337632002	**MW-2: 020116**	SM 2540D	WET/46334		
10337632003	**W1: 020116**	SM 2540D	WET/46334		
10337632004	**DH-2: 020116**	SM 2540D	WET/46334		
10337632005	**MW-1: 020116**	SM 2540D	WET/46334		
10337632006	**MW-3: 020216**	SM 2540D	WET/46352		
10337632007	**MW-5: 020216**	SM 2540D	WET/46352		

L0337632

CHAIN-OF-CUSTODY / Analytical Request Document

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be completed accurately.

Page: 1 Of 1

Section A
Required Client Information:

Company: GeoEngineeers, Inc.
Address: 523 East Second Street
Spokane, WA 99202
Email: jhaney@geoengineers.com
Phone: 509-363-3125 Fax 509-363-3126
Requested Due Date: Std TAT

Section B
Required Project Information:

Report To: John Haney
Copy To: Chelsea- cvoss@geoengineers.com
Purchase Order #:
Project Name: Van Stone Mine GW Sampling
Project #: 0504-100-00

Section C
Invoice Information:

Attention: Joshua Lee
Company Name: GeoEngineers, Inc.
Address: 523 East Second Street, Spokane, WA 99202
Pace Quote:
Pace Project Manager: jennifer.gross@pacelabs.com,
Pace Profile #: ~~2482444~~ 34631/2 BO#110302

Regulatory Agency:
State / Location: WA / Onion Creek

Requested Analysis Filtered (Y/N)

SAMPLE ID
One Character per box.
(A-Z, 0-9 / , -)
Sample Ids must be unique

MATRIX	CODE
Drinking Water	DW
Water	WT
Waste Water	WW
Product	P
Soil/Solid	SL
Oil	OL
Wipe	WP
Air	AR
Other	OT
Tissue	TS

ITEM #	SAMPLE ID	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Preservatives Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analysis Test Y/N	Sb,As,Cd,Pb,Ni,Tl by 6020	Hardness(CaCO3) by 6020	TDS SM2540C	TSS SM2540D	Alkalinity SM2320B								Residual Chlorine (Y/N)	
1	dup:020116	WT	G	2/1/16	0800				2	1		1							X	Y	Y	X	X									001
2	mw-2:020116	↓	↓	↓	1027				↓	↓		↓							↓	↓	↓	↓	↓									002
3	W1:020116	↓	↓	↓	1219				↓	↓		↓							↓	↓	↓	↓	↓									003
4	DH-2:020116	↓	↓	↓	1320				↓	↓		↓							↓	↓	↓	↓	↓									004
5	MW-1:020116	↓	↓	↓	1554				↓	↓		↓							↓	↓	↓	↓	↓									005
6	MW-3:020216	↓	↓	2/2/16	1619				↓	↓		↓							↓	↓	↓	↓	↓									006
7	MW-5:020216	↓	↓	2/2/16	1320				↓	↓		↓							↓	↓	↓	↓	↓									007
8																																
9																																
10																																
11																																
12																																

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS: TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
	Josh Lee/GEI	2/3/2016		Pace	2/4/16	9:40	1.4	Y	Y	Y

SAMPLER NAME AND SIGNATURE

PRINT Name of SAMPLER: Josh Lee
SIGNATURE of SAMPLER:
DATE Signed: 2/3/2016

Pace Analytical®	Document Name: Sample Condition Upon Receipt Form	Document Revised: 05Jan2016 Page 1 of 1
	Document No.: F-MN-L-213-rev.15	Issuing Authority: Pace Minnesota Quality Office

Sample Condition Upon Receipt

Client Name: Geo Engineers

Project #:

WO# : 10337632

10337632

Courier: ☑ Fed Ex ☐ UPS ☐ USPS ☐ Client ☐ Commercial ☐ Pace ☐ SpeeDee ☐ Other:

Tracking Number: 6451 0664 E030

Custody Seal on Cooler/Box Present? ☑ Yes ☐ No **Seals Intact?** ☑ Yes ☐ No

Optional: Proj. Due Date: Proj. Name:

Packing Material: ☐ Bubble Wrap ☐ Bubble Bags ☐ None ☐ Other:

Temp Blank? ☑ Yes ☐ No

Thermometer Used: ☐ 151401163 ☐ 151401164 ☐ B88A912167504 ☑ B88A0143310098

Type of Ice: ☑ Wet ☐ Blue ☐ None ☐ Samples on ice, cooling process has begun

Cooler Temp Read (°C): 1.3 **Cooler Temp Corrected (°C):** 1.4 **Biological Tissue Frozen?** ☐ Yes ☑ No ☐ N/A

Temp should be above freezing to 6°C **Correction Factor:** +0.1 **Date and Initials of Person Examining Contents:** 2/4/16

USDA Regulated Soil (☑ **N/A, water sample)**

Did samples originate in a quarantine zone within the United States: AL, AR, AZ, CA, FL, GA, ID, LA, MS, NC, NM, NY, OK, OR, SC, TN, TX or WA (check maps)? ☐ Yes ☐ No

Did samples originate from a foreign source (internationally, including Hawaii and Puerto Rico)? ☐ Yes ☐ No

If Yes to either question, fill out a Regulated Soil Checklist (F-MN-Q-338) and include with SCUR/COC paperwork.

				COMMENTS:
Chain of Custody Present?	☑ Yes	☐ No	☐ N/A	1.
Chain of Custody Filled Out?	☑ Yes	☐ No	☐ N/A	2.
Chain of Custody Relinquished?	☑ Yes	☐ No	☐ N/A	3.
Sampler Name and/or Signature on COC?	☑ Yes	☐ No	☐ N/A	4.
Samples Arrived within Hold Time?	☑ Yes	☐ No	☐ N/A	5.
Short Hold Time Analysis (<72 hr)?	☐ Yes	☑ No	☐ N/A	6.
Rush Turn Around Time Requested?	☐ Yes	☑ No	☐ N/A	7.
Sufficient Volume?	☑ Yes	☐ No	☐ N/A	8.
Correct Containers Used?	☑ Yes	☐ No	☐ N/A	9.
-Pace Containers Used?	☑ Yes	☐ No	☐ N/A	
Containers Intact?	☑ Yes	☐ No	☐ N/A	10.
Filtered Volume Received for Dissolved Tests?	☐ Yes	☐ No	☑ N/A	11. Note if sediment is visible in the dissolved container
Sample Labels Match COC?	☑ Yes	☐ No	☐ N/A	12.
-Includes Date/Time/ID/Analysis Matrix: WT				
All containers needing acid/base preservation have been checked?	☑ Yes	☐ No	☐ N/A	13. ☑ HNO_3 ☐ H_2SO_4 ☐ NaOH ☐ HCl Sample # 7/7
All containers needing preservation are found to be in compliance with EPA recommendation? (HNO_3, H_2SO_4, HCl<2; NaOH >9 Sulfide, NaOH>12 Cyanide)	☑ Yes	☐ No	☐ N/A	
Exceptions: VOA, Coliform, TOC, Oil and Grease, DRO/8015 (water) DOC	☐ Yes	☐ No	☑ N/A	Initial when completed: Lot # of added preservative:
Headspace in VOA Vials (>6mm)?	☐ Yes	☐ No	☑ N/A	14.
Trip Blank Present?	☐ Yes	☐ No	☑ N/A	15.
Trip Blank Custody Seals Present?	☐ Yes	☐ No	☑ N/A	
Pace Trip Blank Lot # (if purchased):				

CLIENT NOTIFICATION/RESOLUTION

Field Data Required? ☐ Yes ☑ No

Person Contacted:

Date/Time:

Comments/Resolution:

Project Manager Review: JENN GROSS **Date:** 2/5/16

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e out of hold, incorrect preservative, out of temp, incorrect containers)

APPENDIX B

Additional Investigation Exploration Logs and Geotechnical Testing

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS		TYPICAL DESCRIPTIONS
			GRAPH	LETTER	
COARSE GRAINED SOILS MORE THAN 50% RETAINED ON NO. 200 SIEVE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	◯	**GW**	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
			○	**GP**	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▥	**GM**	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			▨	**GC**	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING ON NO. 4 SIEVE	CLEAN SANDS (LITTLE OR NO FINES)	░	**SW**	WELL-GRADED SANDS, GRAVELLY SANDS
			░	**SP**	POORLY-GRADED SANDS, GRAVELLY SAND
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	▥	**SM**	SILTY SANDS, SAND - SILT MIXTURES
			▨	**SC**	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING NO. 200 SIEVE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	**ML**	INORGANIC SILTS, ROCK FLOUR, CLAYEY SILTS WITH SLIGHT PLASTICITY
			▨	**CL**	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			▥	**OL**	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	▥	**MH**	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS SILTY SOILS
			▨	**CH**	INORGANIC CLAYS OF HIGH PLASTICITY
			▨	**OH**	ORGANIC CLAYS AND SILTS OF MEDIUM TO HIGH PLASTICITY
HIGHLY ORGANIC SOILS			◡	**PT**	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Multiple symbols are used to indicate borderline or dual soil classifications

Sampler Symbol Descriptions

▯	**2.4-inch I.D. split barrel**
◨	**Standard Penetration Test (SPT)**
■	**Shelby tube**
☰	**Piston**
◧	**Direct-Push**
☒	**Bulk or grab**
▥	**Continuous Coring**

Blowcount is recorded for driven samplers as the number of blows required to advance sampler 12 inches (or distance noted). See exploration log for hammer weight and drop.

"P" indicates sampler pushed using the weight of the drill rig.

"WOH" indicates sampler pushed using the weight of the hammer.

ADDITIONAL MATERIAL SYMBOLS

SYMBOLS		TYPICAL DESCRIPTIONS
GRAPH	LETTER	
■	**AC**	Asphalt Concrete
▨	**CC**	Cement Concrete
▩	**CR**	Crushed Rock/ Quarry Spalls
⩊	**SOD**	Sod/Forest Duff
░	**TS**	Topsoil

Groundwater Contact

▼	**Measured groundwater level in exploration, well, or piezometer**
▼	**Measured free product in well or piezometer**

Graphic Log Contact

——	**Distinct contact between soil strata**
╱	**Approximate contact between soil strata**

Material Description Contact

——	**Contact between geologic units**
– – – –	**Contact between soil of the same geologic unit**

Laboratory / Field Tests

%F	Percent fines
%G	Percent gravel
AL	Atterberg limits
CA	Chemical analysis
CP	Laboratory compaction test
CS	Consolidation test
DD	Dry density
DS	Direct shear
HA	Hydrometer analysis
MC	Moisture content
MD	Moisture content
Mohs	Mohs hardness scale
OC	Organic content
PM	Permeability or hydraulic conductivity
PI	Plasticity index
PP	Pocket penetrometer
SA	Sieve analysis
TX	Triaxial compression
UC	Unconfined compression
VS	Vane shear

Sheen Classification

NS	No Visible Sheen
SS	Slight Sheen
MS	Moderate Sheen
HS	Heavy Sheen

NOTE: The reader must refer to the discussion in the report text and the logs of explorations for a proper understanding of subsurface conditions. Descriptions on the logs apply only at the specific exploration locations and at the time the explorations were made; they are not warranted to be representative of subsurface conditions at other locations or times.

Key to Exploration Logs

GEOENGINEERS

Figure B-1

Drilled	Start 1/8/2015	End 1/8/2015	Total Depth (ft) 61.5	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger

Surface Elevation (ft) Vertical Datum	3172 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2297466 1261563	System Datum	WA State Plane South NAD83 (feet)	Groundwater observed at 42.5 feet at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Brown sandy silt (very soft to medium stiff, moist) (tailings)			
3170												
	5	■	16	5		1						
									Grades to gray			
3165												
	10	▥	18	14		2						Approximate SPT N-value is 6
3160												
	15	■	18	P		3 SA; AL; DS				14	108	SA (%F=50.7) AL (non-plastic)
3155												
	20	▥	18	12		4 CA HSA-1 (20-21.5) CA						Approximate SPT N-value is 5
3150												
	25	■	18	P		5 AL; TX; CS				22	93	AL (non-plastic)
3145												
	30	▥	18	1		6 CA HSA-1 (30-31.5) CA						Approximate SPT N-value is 0
3140												
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-1

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-2
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
		Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
	35		18	1		7						
3135												
	40		18	48		8 CA HSA (40-41.5) CA		SW-SM	Brown fine to coarse sand with silt and occasional gravel (medium dense, moist)			Approximate SPT N-value is 20
3130												
	45		18	21		9 MD; SA; DS				6	99	Approximate SPT N-value is 8 SA (%F=8.4)
								ML	Gray silt (medium stiff to stiff, wet)	24	101	
3125												
	50		16	12		10 AL			Grades to light brown	28		Approximate SPT N-value is 5 AL (non-plastic)
3120												
								SP-SM	Brown fine to medium sand with silt (medium dense, wet)			
	55		11	20		11						
3115												
								SM	Brown silty fine to medium sand (dense, moist)			
	60		18	89		12						Approximate SPT N-value is 36

Log of Boring HSA-1 (continued)

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-2
Sheet 2 of 2

Drilled	Start 1/9/2015	End 1/9/2015	Total Depth (ft) 32	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 3175 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Mobile B-90	
Easting (X) 2297718 Northing (Y) 1261989		System Datum WA State Plane South NAD83 (feet)		Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Gray sandy silt (medium stiff, moist) (tailings)			
3170	5		14	13		1 MD				5	103	Approximate SPT N-value is 5
3165	10		18	18		2 CA HSA-2 (10-11.5) CA			Grades to brown			Approximate SPT N-value is 7
								SP	Brown fine to medium sand with trace silt (medium dense, moist)			
3160	15		18	40		3 CA HSA-2 (15-16.5) CA						Approximate SPT N-value is 16
3155	20		16	37		4 CA; MD HSA-2 (20-21.5) CA				2	117	Approximate SPT N-value is 15
								SP-SM	Brown fine to medium sand with silt (very dense, moist)			
3150	25		12	50/6"		5						Blow count not representative
3145	30		16	58		6		ML	Gray sandy silt (hard, moist)			Rock encountered at 32 feet

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-2

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-3
Sheet 1 of 1

Drilled	Start 1/9/2015	End 1/9/2015	Total Depth (ft) 44.5	Logged By JML Checked By JWR	Driller Environmental West
Drilling Method	Hollow-Stem Auger				
Surface Elevation (ft) Vertical Datum	3182 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2297864 1262082	System Datum	WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Light brown sandy silt (stiff, moist) (tailings)			
3180												
	5	■	15	8		1 %F						%F = 50.1
3175												
								SM	Light brown silty fine sand (loose, moist) (tailings)			
	10	▥	18	19		2 CA HSA-3 (10-11.5) CA						Approximate SPT N-value is 8
3170												
	15	■	18	P		3 DS; TX				85	108	
3165												
								ML	Gray sandy silt (stiff, moist) (tailings)			
	20	▥	18	16		4 CA HSA-3 (20-21.5) CA						Approximate SPT N-value is 6
3160												
								SM	Dark gray fine to coarse sand with silt and gravel (medium dense, moist)			
	25	▥	18	24		5 %F; MD				8	106	Approximate SPT N-value is 10 %F=30
3155												
	30	▥	18	64		6 CA HSA-3 (30-31.5) CA						Approximate SPT N-value is 26
3150												
								ML	Brown silt with sand (hard, moist)			
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-3

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-4
Sheet 1 of 2

		FIELD DATA										
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	35	■	16	71		7						
3145												
	40	▥	18	81		8 SA; AL	▨	SC	Clayey fine to coarse sand with occasional gravel (dense to very dense, moist)	4		Approximate SPT N-value is 33 SA (%F=40) AL (LL=30; PI=16)
3140												
		■	16	56		9	▨					Drilling on rocks

Log of Boring HSA-3 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-4
Sheet 2 of 2

Drilled Start 1/9/2015 End 1/9/2015	Total Depth (ft) 30.5	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 3182 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Mobile B-90
Easting (X) 2298025 Northing (Y) 1262403		System Datum WA State Plane South NAD83 (feet)		Groundwater observed at 25 feet at time of exploration
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							SM	Brown silty fine sand (loose, moist) (tailings)			
3180												
	5		16	22		1 MD; SA				6	102	Approximate SPT N-value is 9 SA (%F=28)
3175												
								ML	Gray sandy silt (soft to medium stiff, moist) (tailings)			
	10		18	11		2 CA; %F; AL HSA-4 (10-11.5) CA						Approximate SPT N-value is 4 %F=56 AL (non-plastic)
3170												
	15		9	2		3 MC			With debris/organic matter (wood chips)	25		
3165												
								SP-SM	Brown fine to coarse sand with silt and gravel (loose to medium dense, moist) (native)			
	20		18	23		4 CA; SA HSA-4 (20-21.5) CA				4		Approximate SPT N-value is 9 SA (%F=5.7)
3160												
	25		12	50/6"		5 CA HSA-4 (25-26) CA			Becomes very dense, wet			Approximate SPT N-value is 42 Blow count not representative
3155												
			2	85		6			With pulverized granite rock			Approximate SPT N-value is 35 Blow count not representative Drilling difficult, possible rock
	30											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-4

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Drilled	Start 1/8/2015	End 1/8/2015	Total Depth (ft) 40	Logged By JML Checked By JWR	Driller Environmental West
Drilling Method	Hollow-Stem Auger				
Surface Elevation (ft) Vertical Datum	3180 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2297620 1261519	System Datum	WA State Plane South NAD83 (feet)	Groundwater observed at 29 feet at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0						ML	Gray sandy silt (soft, moist) (tailings)			
3175	5	16	4		1						
3170	10	14	4		2 CA HSA-5 (10-11.5) CA						Approximate SPT N-value is 2
3165	15	14	2		3 AL						AL (non-plastic)
3160	20	18	1		4 CA; MC HSA-5 (20-21.5) CA		CL	Gray clay (very soft, moist to wet) (tailings)	32		Approximate SPT N-value is 0
3155	25	14	2		5 MD; AL				30	101	Approximate SPT N-value is 1 AL (LL=25; PL=20)
3150	30	12	50/6"		6 CA HSA-5 (30-31.5 CA			Becomes hard, wet			Blow count not representative
							SP	Brown fine to coarse sand, trace silt (dense, wet)			
							SM	Brown silty fine to medium sand with occasional gravel (dense, moist)			
3145	35										

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-5

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-6
Sheet 1 of 2

		FIELD DATA										
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	35		2	50/2"		7		GRAN	Brown decomposed granite			Drilling slow through decomposed rock
3140	40											

Log of Boring HSA-5 (continued)

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-6
Sheet 2 of 2

Drilled Start 1/7/2015 End 1/7/2015	Total Depth (ft) 51.5	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 3173 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Mobile B-90
Easting (X) 2297549 Northing (Y) 1261349		System Datum WA State Plane South NAD83 (feet)		Groundwater observed at 20 feet at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Brown sandy silt (stiff, moist) (tailings)			
3170												
	5		14	13		1 %F						%F=59
3165												
								SM	Gray fine to coarse silty sand (loose, moist) (tailings)			
	10		12	16		2 CA; SA HSA-6 (10-11.5) CA						Approximate SPT N-value is 6 SA (%F=16)
3160												
								ML	Gray sandy silt (medium stiff, moist) (tailings)			
	15		14	17		3 MD; AL				10	112	Approximate SPT N-value is 7 AL (non-plastic)
3155												
	20		18	12		4 CA HSA-6 (20-21.5) CA						Approximate SPT N-value is 5
3150												
	25		18	7		5 AL			Grades to wet			AL (non-plastic)
								ML	Gray silt with trace sand (medium stiff, wet) (tailings)			
3145												
	30		14	21		6 CA HSA-6 (30-31.5) CA		SP	Light brown fine to coarse sand with gravel, trace silt (loose, wet)			Approximate SPT N-value is 8
3140												
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-6

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-7
Sheet 1 of 2

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	35		14	43		7 MD; SA; DS		SM	Brown silty fine to coarse sand, occasional gravel (medium dense, wet) (native)	8	120	Approximate SPT N-value is 18 SA (%F=33)
3135												
	40		12	50/6"		8						Blow count not representative
3130												
	45		14	59		9						
								CL	Dark gray sandy clay with occasional gravel (hard, moist)			
3125												
	50		16	84		10 %F; AL				15		Approximate SPT N-value is 34 %F=60 AL (LL=34; PI=14)

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Log of Boring HSA-6 (continued)

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-7
Sheet 2 of 2

Drilled	Start 12/8/2014	End 12/8/2014	Total Depth (ft) 97	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger

Surface Elevation (ft) Vertical Datum	2735 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2291851 1267801	System Datum	WA State Plane South NAD83 (feet)	Groundwater observed at 94 feet at time of exploration	

Notes:

		FIELD DATA										
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Gray sandy silt (medium stiff to stiff, moist)			
2730	5		15	10		1						
2725	10		18	9		2 HSA-7 (10-11.5) CA						Approximate SPT N-value is 4
2720	15		18	30		3						Approximate SPT N-value is 12
2715	20		13	11		4						
2710	25		18	22		5						Approximate SPT N-value is 9
2705	30		18	P		6 %F; AL; CS; TX		CL	Gray silty clay (stiff, moist) (tailings)			%F=88 AL (LL=38; PI=26)
2700	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

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Log of Boring HSA-7

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-8
Sheet 1 of 3

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	35		18	26		7 HSA-7 (35-36.5) CA		ML	Gray sandy silt (very stiff, moist) (tailings)			Approximate SPT N-value is 10
2695	40		16	13		8			Becomes stiff			
2690	45		18	29		9						Approximate SPT N-value is 12
2685	50		18	29		10 MD; %F; AL		SM	Gray silty fine sand (medium dense, moist) (tailings)	12	111	Approximate SPT N-value is 12 %F=48 AL (non-plastic)
2680	55		18	18		11						
2675	60		18	23		12 HSA-7 (60-61.5) CA		ML	Gray silt with sand (stiff, moist) (tailings)			Approximate SPT N-value is 9
2670	65		18	31		13 MD; AL				15	107	Approximate SPT N-value is 13 AL (non-plastic)
								ML	Gray sandy silt (medium stiff to stiff, moist) (tailings)			
2665	70		18	34		14 HSA-7 (70-71.5) CA						Approximate SPT N-value is 14
2660	75		16	6		15 HSA-7		ML	Black sandy silt with organic matter (wood, branches,			

Log of Boring HSA-7 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

		FIELD DATA										
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
			18	29		(76.1-76.5) CA 16		SW-SM	grass) (medium stiff, moist) Brown fine to coarse sand with silt and occasional gravel (medium dense, moist)			Approximate SPT N-value is 12
2655	80											
			16	68		17 MD; SA; DS				3	118	Approximate SPT N-value is 28 SA (%F=8.1)
			18	69		18						Approximate SPT N-value is 28
2650	85		18	64		19		ML	Brown sandy silt with occasional gravel (very stiff, moist)			Approximate SPT N-value is 26
								SP-SM	Brown fine to coarse sand with silt (medium dense, moist)			
2645	90		14	28		20		ML	Brown sandy silt (very stiff, moist to wet)			
				38		21		SM	Brown silty fine to medium sand (medium dense, moist to wet)			Approximate SPT N-value is 16
								CL-ML	Brown silty clay with sand and occasional gravel (stiff, wet)			
2640	95		16	33		22 SA; AL				17		Approximate SPT N-value is 14 SA (%F=57) AL (LL=24; PI=5)

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Log of Boring HSA-7 (continued)

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-8
Sheet 3 of 3

Drilled	Start 12/9/2014	End 12/9/2014	Total Depth (ft) 86	Logged By JML Checked By JWR
Driller	Environmental West		Drilling Method	Hollow-Stem Auger
Surface Elevation (ft) Vertical Datum	2731 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment: Mobile B-90
Easting (X) Northing (Y)	2291526 1267688	System Datum	WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration
Notes:				

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	FIELD DATA: Recovered (in)	FIELD DATA: Blows/foot	FIELD DATA: Collected Sample	FIELD DATA: Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
2730	0							ML	Gray sandy silt (very loose, wet) (tailings)			
2725	5		6	1		1						
2720	10		18	19		2 HSA-8 (10-11.5) CA			Grades to stiff, moist			Approximate SPT N-value is 8
2715	15		10	19		3 MD; %F; AL		SM	Gray silty fine sand (loose, moist) (tailings)	3	105	Approximate SPT N-value is 8 %F=17 AL (non-plastic)
2710	20		18	15		4						Approximate SPT N-value is 6
2705	25		13	9		5						
2700	30		18	23		6						Approximate SPT N-value is 9
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_GEOTECH_STANDARD_DD_NO_GW

Log of Boring HSA-8

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

		FIELD DATA										
Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
2695	35		18	25		7			Becomes medium dense			Approximate SPT N-value is 10
2690	40		18	27		8 HSA-8 (40-41.5) CA						Approximate SPT N-value is 11
2685	45		18	27		9 MD; %F; AL		ML	Gray sandy silt (very stiff, moist) (tailings)	13	95	Approximate SPT N-value is 11 %F=50.0 AL (non-plastic)
2680	50		18	31		10						Approximate SPT N-value is 13
								CL	Gray clay with sand (stiff, moist) (tailings)			
2675	55		16	14		11 MC; AL				21		AL (LL=28; PL=21)
2670	60		18	40		12		ML	Gray sandy silt (very stiff, moist) (tailings)			Approximate SPT N-value is 16
2665	65			P		13						
2660	70		18	39		14 HSA-8 (70-71.5) CA						Approximate SPT N-value is 16
								ML	Gray silt with sand (medium stiff, moist) (tailings)			
2655	75		14	17		15 AL						Approximate SPT N-value is 7 AL (non-plastic)

Log of Boring HSA-8 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Elevation (feet)	Depth (feet)	Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
						HSA-8 (76.4-76.5) CA		ML	Brown sandy silt (hard, moist) (native)			
2650	80		18	70		16 SA; AL HSA-8 (80-81.5) CA		SM	Gray silty fine to coarse sand with occasional gravel (medium dense, moist)	13		Approximate SPT N-value is 29 SA (%F=46) AL (non-plastic)
2645	85		5	50/5"		17						Blow count not representative Broken pieces with granite rock at bottom of sampler

Log of Boring HSA-8 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-9
Sheet 3 of 3

Drilled Start 12/9/2014 End 12/10/2014	Total Depth (ft) 89.5	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) 2731 Vertical Datum NAVD88		Hammer Data Autohammer 140 (lbs) / 30 (in) Drop		Drilling Equipment Mobile B-90
Easting (X) 2291377 Northing (Y) 1267320		System Datum WA State Plane South NAD83 (feet)		Groundwater not observed at time of exploration

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
2730	0							ML	Gray sandy silt (very soft, wet) (tailings)			
2725	5		1	1		1						
2720	10		18	49		2 HSA-9 (10-11.5) CA			Graces to stiff to very stiff, moist			Approximate SPT N-value is 20
2715	15		18	19		3						Approximate SPT N-value is 8
2710	20		18	20		4						Approximate SPT N-value is 8
2705	25		18	26		5 MD; %F		SM	Gray silty fine sand (loose to medium dense, moist) (tailings)	4	115	Approximate SPT N-value is 10 %F=21
2700	30		16	23		6						Approximate SPT N-value is 9
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-9

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-10
Sheet 1 of 3

Elevation (feet)	Depth (feet)	FIELD DATA Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
2695	35	■	16	13		7						
2690	40	▥	18	30		8						Approximate SPT N-value is 12
2685	45	▥	18	28		9						Approximate SPT N-value is 11
2680	50	▥	18	41		10 HSA-9 (50-51.5) CA						Approximate SPT N-value is 17
2675	55	■	16	18		11 %F; AL				5	110	%F=43 AL (non-plastic)
2670	60	▥	18	40		12		CL SM	Gray sandy clay (very stiff, moist) (tailings) Gray silty sand (medium dense, moist) (tailings)			Approximate SPT N-value is 16
2665	65	▥	18	49		13 MD; %F; AL				5	110	Approximate SPT N-value is 20 %F=30 AL (non-plastic)
2660	70	▥	18	46		14						Approximate SPT N-value is 19
								CL	Gray sandy clay (stiff, moist) (tailings)			
2655	75	■	18	13		15 MC; AL				27		AL (LL=33; PI=12)

Log of Boring HSA-9 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Elevation (feet)	Depth (feet)	FIELD DATA					Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
		Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing						
								ML	Gray sandy silt (very stiff, moist) (tailings)			
2650	80		18	50		16 MC HSA-9 (80-81.5) CA				9		Approximate SPT N-value is 21
								SM	Dark brown silty fine to coarse sand with gravel and organic matter (wood chips) (medium dense, moist)			
2645	85		18	28		17 SA HSA-9 (85-86.5) CA				10		Approximate SPT N-value is 11 SA (%F=28)
			12	50/6"		18						Blow count not representative

Log of Boring HSA-9 (continued)

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Drilled	Start 12/10/2014	End 12/11/2014	Total Depth (ft) 63.25	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger

Surface Elevation (ft) Vertical Datum	2747 NAVD88	Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2291882 1267367	System Datum	WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA: Interval	Recovered (in)	Blows/foot	Collected Sample	Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0							ML	Gray sandy silt (very soft, moist to wet) (tailings)			
2745												
	5		12	2		1 AL						Approximate SPT N-value is 1 AL (non-plastic)
2740												
								ML	Light brown sandy silt (very stiff, moist) (tailings)			
	10		18	59		2 HSA-10 (10-11.5) CA						Approximate SPT N-value is 24
2735												
	15		18	57		3 MC; %F; AL		SM	Light brown silty fine sand (medium dense, moist) (tailings)	7		Approximate SPT N-value is 23 %F=38 AL (non-plastic)
2730												
	20		18	25		4						Approximate SPT N-value is 10
2725												
	25		18	P		5 %F; AL; CS		CL	Gray clay (very soft to soft, moist) (tailings)			%F=99 AL (LL=41; PI=19)
2720												
	30		18	6		6 HSA-10 (30-31.5) CA						Approximate SPT N-value is 2
2715												
	35											

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Boring HSA-10

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-11
Sheet 1 of 2

Elevation (feet)	Depth (feet)	FIELD DATA Interval	FIELD DATA Recovered (in)	FIELD DATA Blows/foot	FIELD DATA Collected Sample	FIELD DATA Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	35	■	18	2		7	▨					
2710							▨					
	40	▥	18	2		8	▨					Approximate SPT N-value is 1
							▨	CL	Gray clay with sand (very soft, moist) (tailings)			
2705							▨					
	45	▥	18	4		9 MC; %F; AL	▨		Grades to soft	39		Approximate SPT N-value is 2 %F=98 AL (LL=38; PI=22)
2700							▨					
	50	▥	18	6		10 HSA-10 (50-51.5) CA	▨					Approximate SPT N-value is 2
2695							▨					
	55	■	18	5		11	▨					
							▨		Grades to medium stiff			
2690							▨					
	60	▥	16	41		12 HSA-10 (60-61.5) CA	⁘	SM	Black silty fine to medium sand with organic matter (wood chips) (medium dense, moist)			Approximate SPT N-value is 17
2685							⁘					
						HSA-10 (63-63.5) CA						

Log of Boring HSA-10 (continued)

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-11
Sheet 2 of 2

Drilled	Start 12/11/2014	End 12/11/2014	Total Depth (ft) 27.25	Logged By JML Checked By JWR	Driller Environmental West	Drilling Method Hollow-Stem Auger
Surface Elevation (ft) Vertical Datum	2761 NAVD88		Hammer Data	Autohammer 140 (lbs) / 30 (in) Drop	Drilling Equipment	Mobile B-90
Easting (X) Northing (Y)	2292062 1267122		System Datum	WA State Plane South NAD83 (feet)	Groundwater not observed at time of exploration	

Notes:

Elevation (feet)	Depth (feet)	FIELD DATA Interval / Recovered (in)	Blows/foot	Collected Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
	0						ML	Gray sandy silt (very soft, moist to wet) (tailings)			
2760											
2755	5	12	1		1						
							CL	Gray sandy clay (very soft, moist) (tailings)			
2750	10	18	1		2						Approximate SPT N-value is 0
2745	15	18	45		3						Approximate SPT N-value is 18
							ML	Gray sandy silt (very stiff, moist) (tailings)			
2740	20	18	23		4 HSA-11 (20-21.5) CA		SP-SM	Gray fine sand with silt (loose, moist) (tailings)			Approximate SPT N-value is 9
2735	25	14	62		5 HSA-11 (25-26.5) CA						
							SP-SM	Dark brown fine to medium sand with silt and organic matter (wood chips) (very dense, moist)			
		2	50/2"		6						Blow count not representative Granite rock in bottom of sampler shoe

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_GEOTECH_STANDARD_DD_NO_GW

Log of Boring HSA-11

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-12
Sheet 1 of 1

Date Excavated 10/12/2015	Total Depth (ft) 8	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft) 3630 Vertical Datum NAVD88	Easting (X) 2301673 Northing (Y) 1263645	Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name / Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
				○	GP	Light brown/light gray coarse gravel with sand, cobbles, trace silt and occasional boulders (medium dense, moist) (native)			
			MS-27 (0.5-1) CA	○					
3629	1			○					
3628	2			○					
3627	3			○					
3626	4			○					
3625	5			○					
3624	6	☒	MS-27 (6-8)	○					
3623	7			○					
3622	8								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_TESTPIT_1P_GEOTEC_DD

Log of Test Pit MS-29

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-13
Sheet 1 of 1

Date Excavated	10/12/2015	Total Depth (ft)	7	Logged By JML Checked By EBD	Excavator Equipment Backhoe

<u>Observed at time of excavation</u>
Groundwater not observed
Caving not observed

Surface Elevation (ft) Vertical Datum	3635 NAVD88	Easting (X) Northing (Y)	2301748 1263768	Coordinate System Horizontal Datum	WA State Plane South NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE		Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
		Testing Sample	Sample Name Testing						
			MS-28 (0.5-1) CA		GP	Gray fine to coarse gravel with sand, trace silt, cobbles and boulders (medium dense, moist) (waste rock)			
3634	1								
3633	2								
3632	3	☒	MS-28 (3-5)						
3631	4								
3630	5								
3629	6								
3628	7								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Test Pit MS-30

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-14
Sheet 1 of 1

Date Excavated 10/12/2015	Total Depth (ft) 11	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft) 3680 Vertical Datum NAVD88	Easting (X) 2302012 Northing (Y) 1262243	Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)	

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
					GP	Gray fine to coarse gravel with cobbles and boulders (loose, moist) (waste rock)			
3679	1								
3678	2								
3677	3								
3676	4								
3675	5								
3674	6	☒	MS-29 (6-7)		SP	Light brown fine sand with trace silt and occasional gravel (loose, moist)			
3673	7								
3672	8								
3671	9								
3670	10								
3669	11								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Test Pit MS-31

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-15
Sheet 1 of 1

Date Excavated	10/11/2015	Total Depth (ft)	9	Logged By	JML
				Checked By	EBD
Excavator Equipment	Backhoe				

Observed at time of excavation
Groundwater not observed
Caving not observed

Surface Elevation (ft)	3630	Easting (X)	2301469	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	1262785	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	 Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
					GP	Gray fine to coarse gravel with sand, cobbles, boulders and trace silt (loose, moist) (waste rock)			
3629	1								
3628	2								
3627	3								
3626	4	☒	MS-30 (4-5)						
3625	5								
3624	6								
3623	7								
3622	8								
3621	9								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Test Pit MS-32

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-16
Sheet 1 of 1

Date Excavated 10/13/2015	Total Depth (ft) 11	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft) 3663 Vertical Datum NAVD88	Easting (X) 2301616 Northing (Y) 1262988	Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	SAMPLE Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
	0			○	GP	Gray fine to coarse gravel with waste rock (angular broken rock) with brown fine to medium sand and trace silt (medium dense, moist) (tailings)			
3662	1								
3661	2								
3660	3								
3659	4								
3658	5								
3657	6	☒	MS-31 (6-8)	⋯	SP	Brown fine to coarse sand with occasional gravel (medium dense, moist)			
3656	7								
3655	8								
3654	9								
3653	10								
3652	11								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Test Pit MS-33

GEOENGINEERS

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-17
Sheet 1 of 1

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_TESTPIT_1P_GEOTEC_DD

Date Excavated 10/13/2015	Total Depth (ft) 10	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft)	3712	Easting (X)	2301998	Coordinate System	WA State Plane South
Vertical Datum	NAVD88	Northing (Y)	1262961	Horizontal Datum	NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	 Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
					GP	Gray fine to coarse gravel with sand, cobbles, boulders and trace silt (medium dense, moist) (waste rock)			
3711	1								
3710	2								
3709	3								
3708	4	☒	MS-32 (4-5)						
3707	5								
3706	6								
3705	7								
3704	8								
3703	9								
3702	10								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Log of Test Pit MS-34

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-18
Sheet 1 of 1

Date Excavated 10/12/2015	Total Depth (ft) 8	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft) 3752 Vertical Datum NAVD88	Easting (X) 2302294 Northing (Y) 1262971	Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)

Elevation (feet)	Depth (feet)	SAMPLE Testing Sample	 Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
					GP	Gray fine to coarse gravel with sand, cobbles, boulders, and trace silt (medium dense, moist) (waste rock)			
3751	1								
3750	2				SP	Brown fine to medium sand, occasional gravel, and cobbles and trace silt (medium dense, moist)			
3749	3								
3748	4	☒	MS-33 (4-5)						
3747	5								
3746	6								
3745	7								
3744	8								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_TESTPIT_1P_GEOTEC_DD

Log of Test Pit MS-35

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-19
Sheet 1 of 1

Date Excavated 10/12/2015	Total Depth (ft) 12	Logged By JML Checked By EBD	Excavator Equipment Backhoe	Observed at time of excavation Groundwater not observed Caving not observed

Surface Elevation (ft) 3770 Vertical Datum NAVD88	Easting (X) 2302312 Northing (Y) 1262843	Coordinate System WA State Plane South Horizontal Datum NAD83 (feet)

		SAMPLE							
Elevation (feet)	Depth (feet)	Testing Sample	Sample Name Testing	Graphic Log	Group Classification	MATERIAL DESCRIPTION	Moisture Content (%F)	Dry Density (pcf)	REMARKS
					SP	Brown fine to medium sand with trace silt, and occasional gravel and cobbles (medium dense, moist)			
3769	1								
3768	2								
3767	3								
3766	4	☒	MS-34 (4-5)						
3765	5								
3764	6								
3763	7								
3762	8								
3761	9								
3760	10								
3759	11								
3758	12								

Note: See Figure A-1 for explanation of symbols.
The depths on the test pit logs are based on an average of measurements across the test pit and should be considered accurate to 0.5 foot.
Coordinates Data Source: Horizontal approximated based on Aerial Imagery, Vertical approximated based on DEM

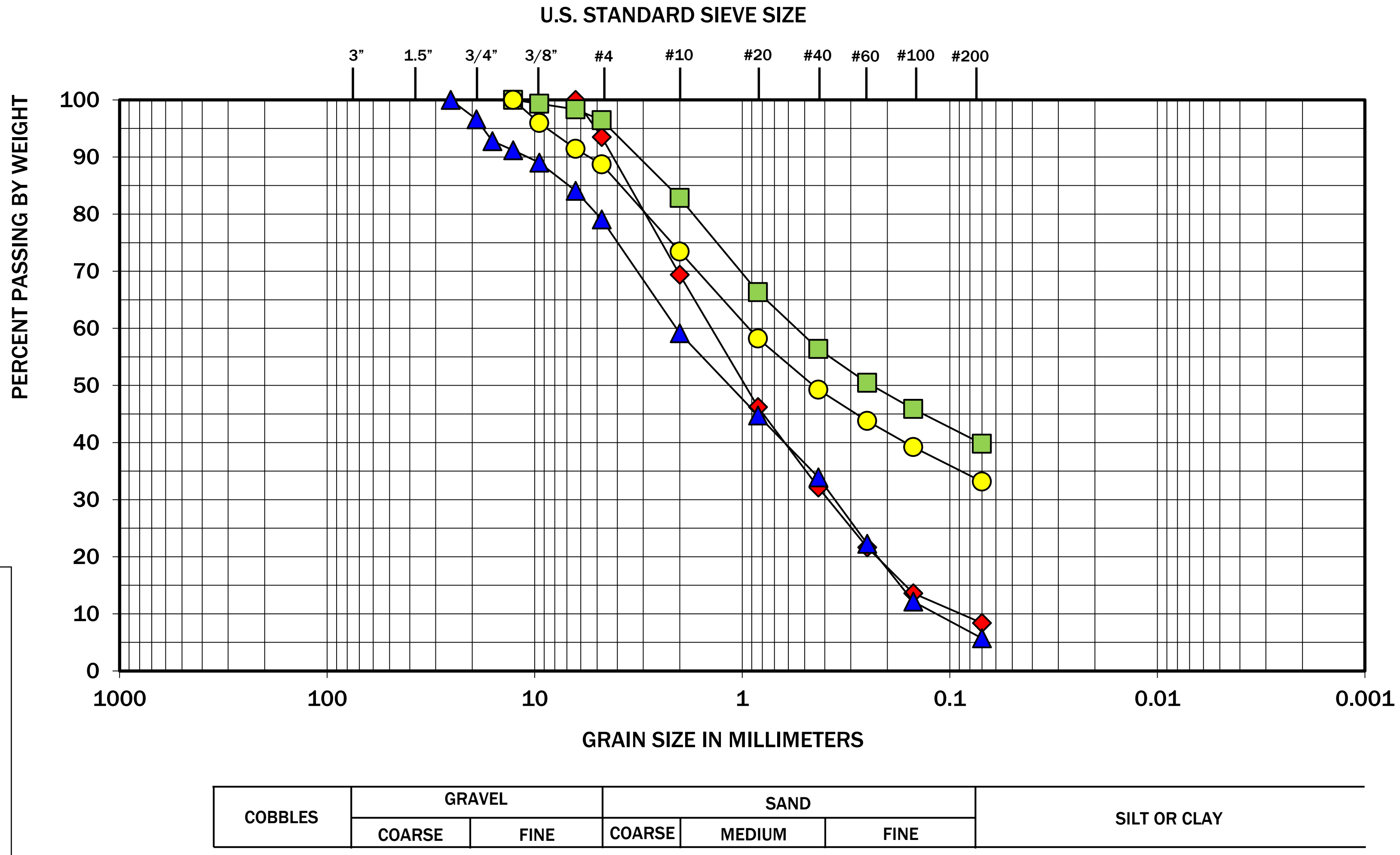
Log of Test Pit MS-36

GeoEngineers

Project: Van Stone Mine
Project Location: Onion Creek, Washington
Project Number: 0504-100-00

Figure B-20
Sheet 1 of 1

Spokane: Date:5/2/17 Path:P:\0\0504100\GINT\050410000.GPJ DBTemplate/LibTemplate:GEOENGINEERS_DF_STD_US_2017.GDT/GEI8_TESTPIT_1P_GEOTEC_DD



Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
◆	HSA-1	45	6	Fine to coarse sand with silt and occasional fine gravel
■	HSA-3	40	4	Clayey fine to coarse sand with occasional gravel
▲	HSA-4	20	4	Fine to coarse sand with silt and fine gravel
●	HSA-6	35	8	Silty fine to coarse sand with trace silt

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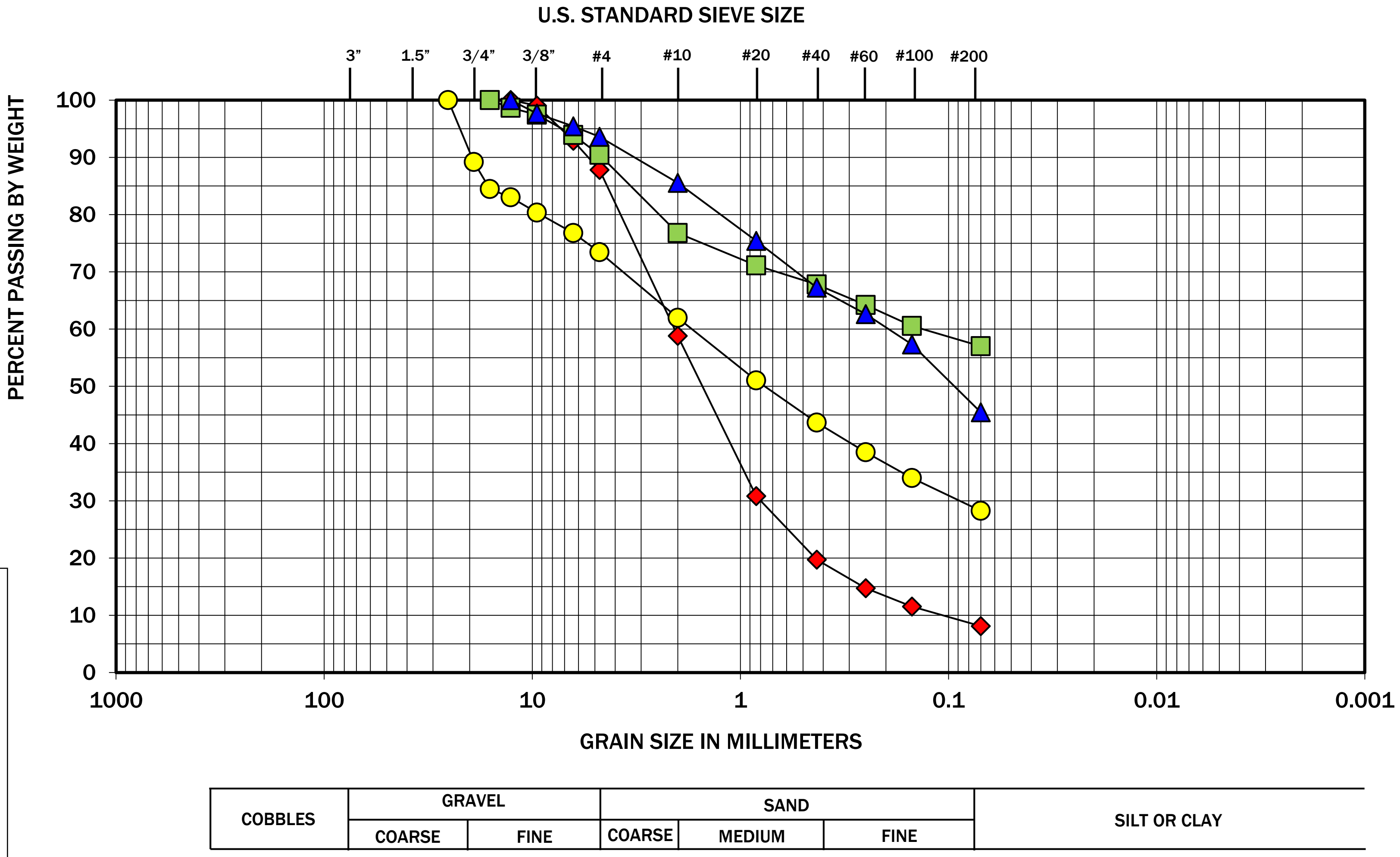
The grain size analysis results were obtained in general accordance with ASTM D 6913.

GeoEngineers

Van Stone Mine
Onion Creek, Washington

Sieve Analysis Results

Figure B-21



Symbol	Boring Number	Depth (feet)	Moisture (%)	Soil Description
♦	HSA-7	18½	2	Fine to coarse sand with silt and trace fine gravel
🟩	HSA-7	95	17	Sandy lean clay with occasional fine gravel
▲	HSA-8	80	13	Silty fine to medium sand with occasional fine gravel
🟡	HSA-9	85	10	Silty fine to coarse sand with gravel

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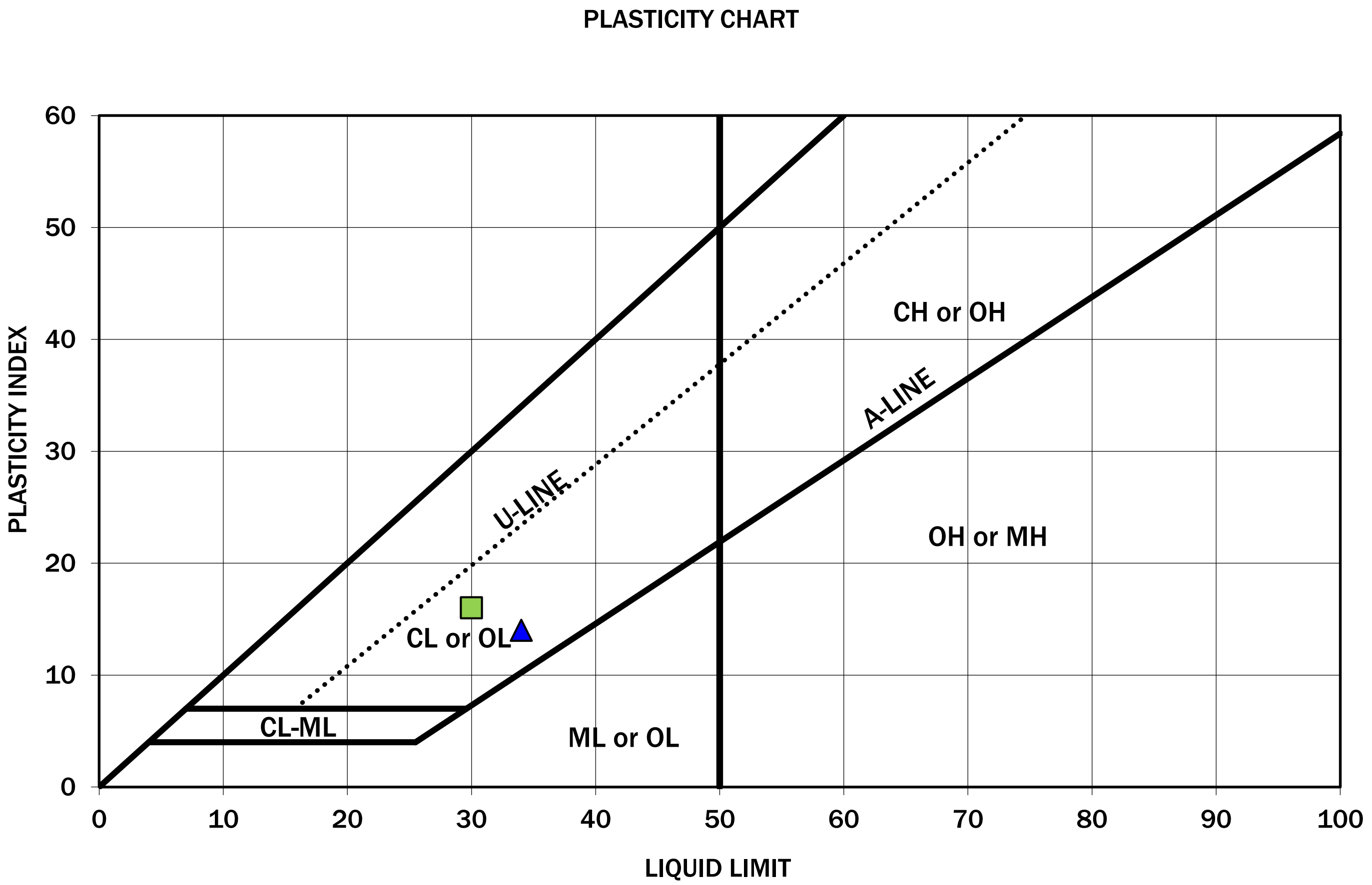
The grain size analysis results were obtained in general accordance with ASTM D 6913.

Sieve Analysis Results

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure B-22



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	HSA-1	50	28	n/a	n/a	Soil is nonplastic
🟩	HSA-3	40	4	30	16	Lean clay
▲	HSA-6	50	15	34	14	Sandy lean clay

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The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

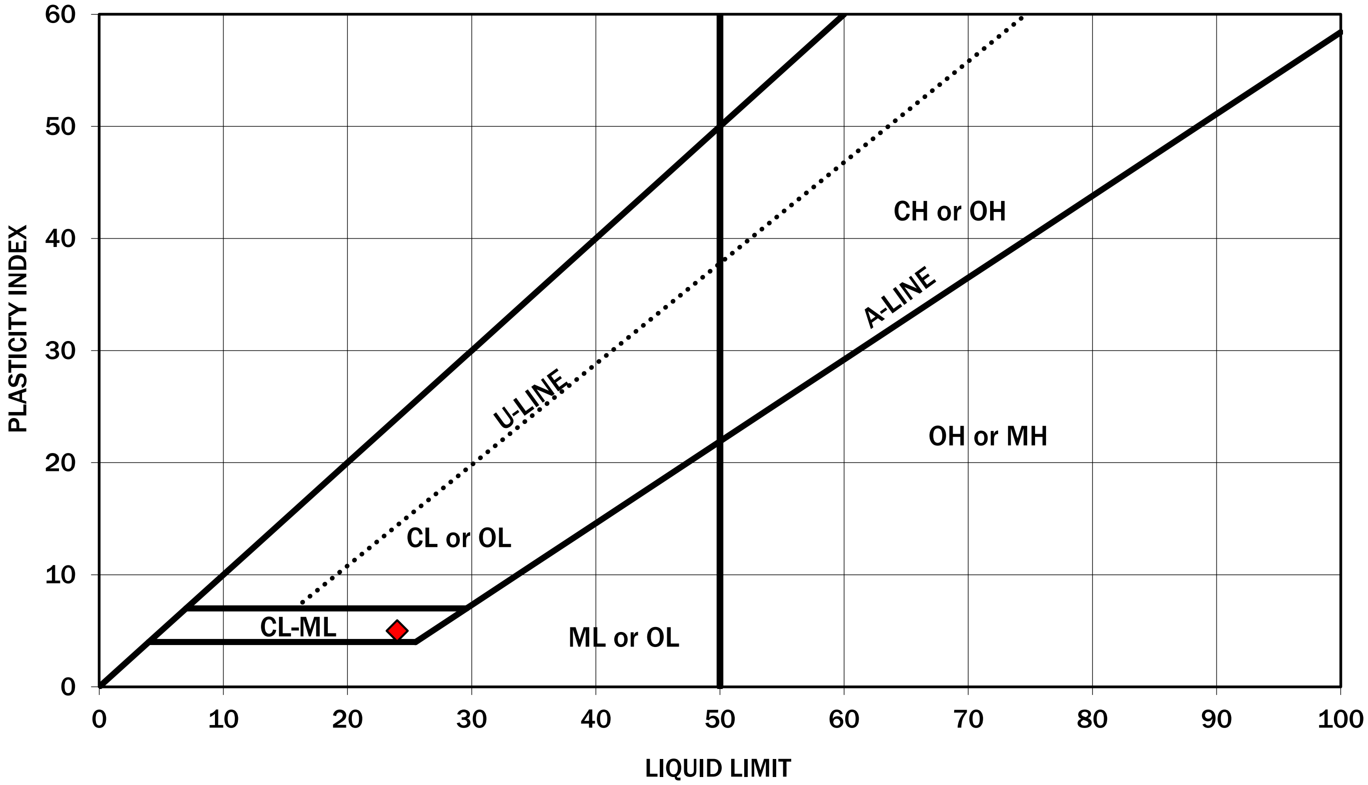
Atterberg Limits Test Results

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure B-23

PLASTICITY CHART



Symbol	Boring Number	Depth (feet)	Moisture Content (%)	Liquid Limit (%)	Plasticity Index (%)	Soil Description
◆	HSA-7	95	17	24	5	Silty clay
🟩	HSA-8	80	13	n/a	n/a	Soil is nonplastic

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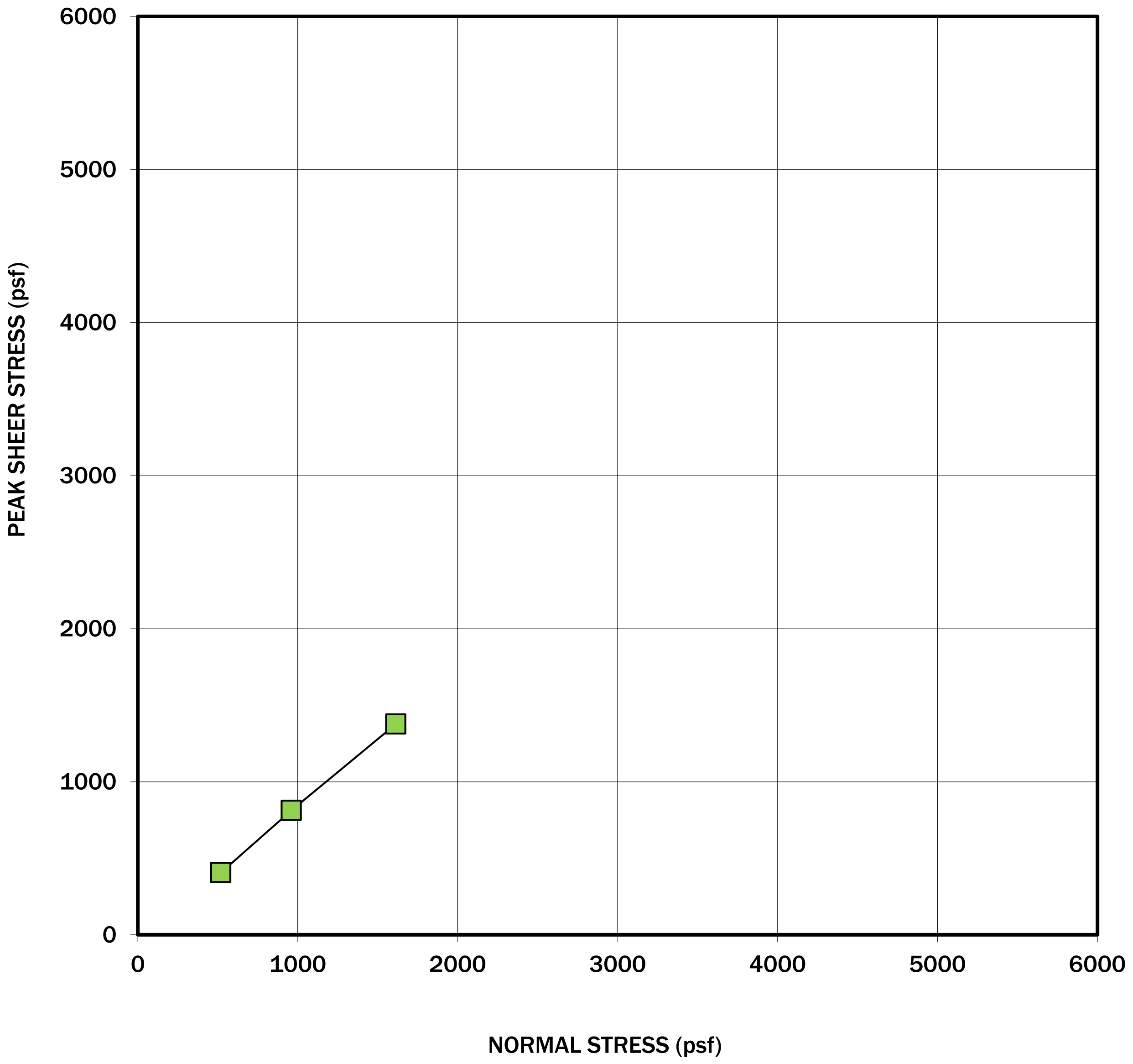
The liquid limit and plasticity index were obtained in general accordance with ASTM D 4318.

Atterberg Limits Test Results

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure B-24



Boring Number	Depth (feet)	Soil Description	Initial Moisture (%)	Initial Dry Density (lbs/ft^3)
HSA-1	45	Fine to coarse sand with silt and occasional fine gravel	5.8	97.6

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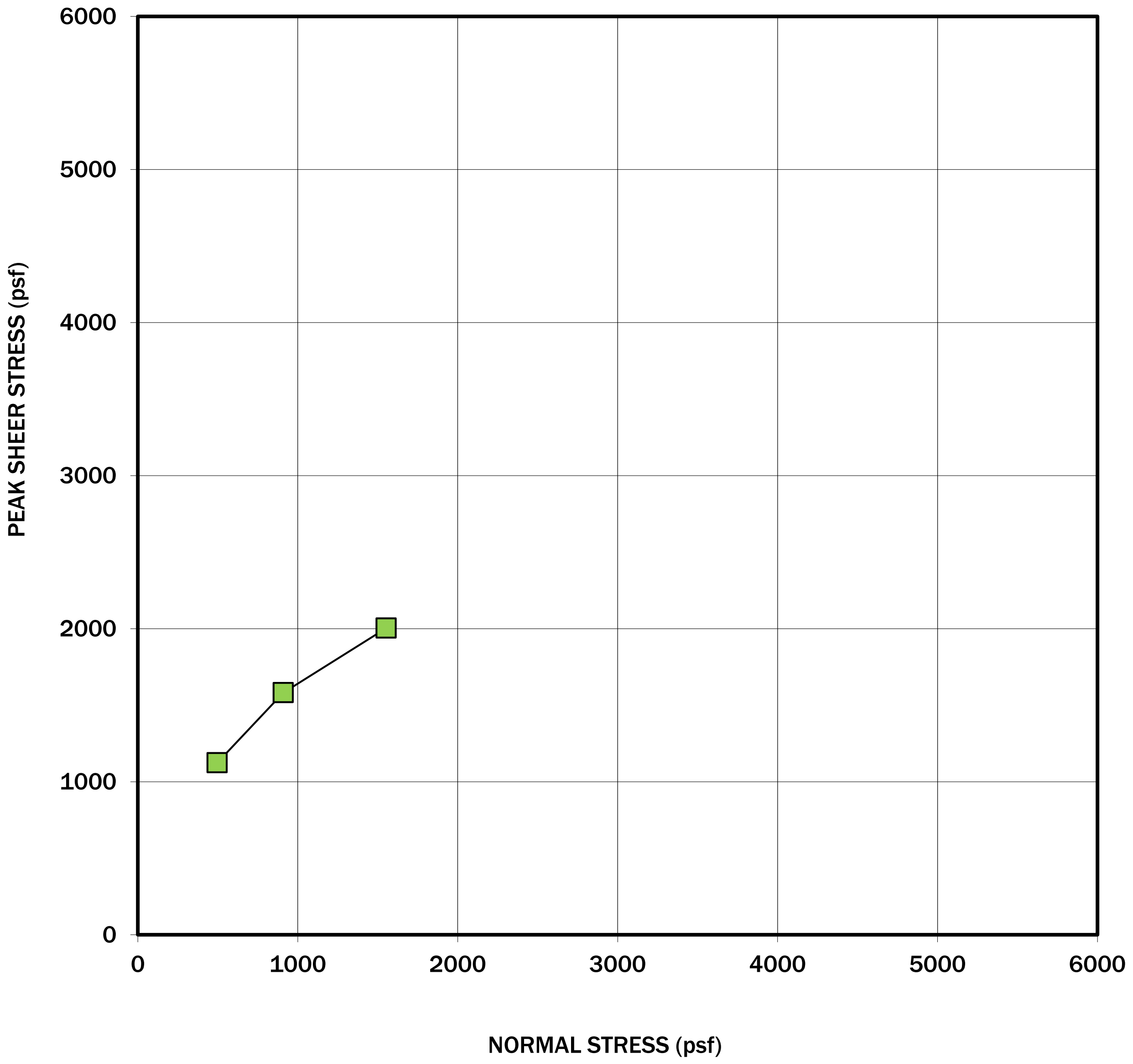
The direct shear results were obtained in general accordance with ASTM D 3080.

Direct Shear Test Results

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure B-25



Boring Number	Depth (feet)	Soil Description	Initial Moisture (%)	Initial Dry Density (lbs/ft^3)
HSA-6	35	Silty fine to coarse sand with trace fine gravel	8	102.2

Direct Shear Test Results

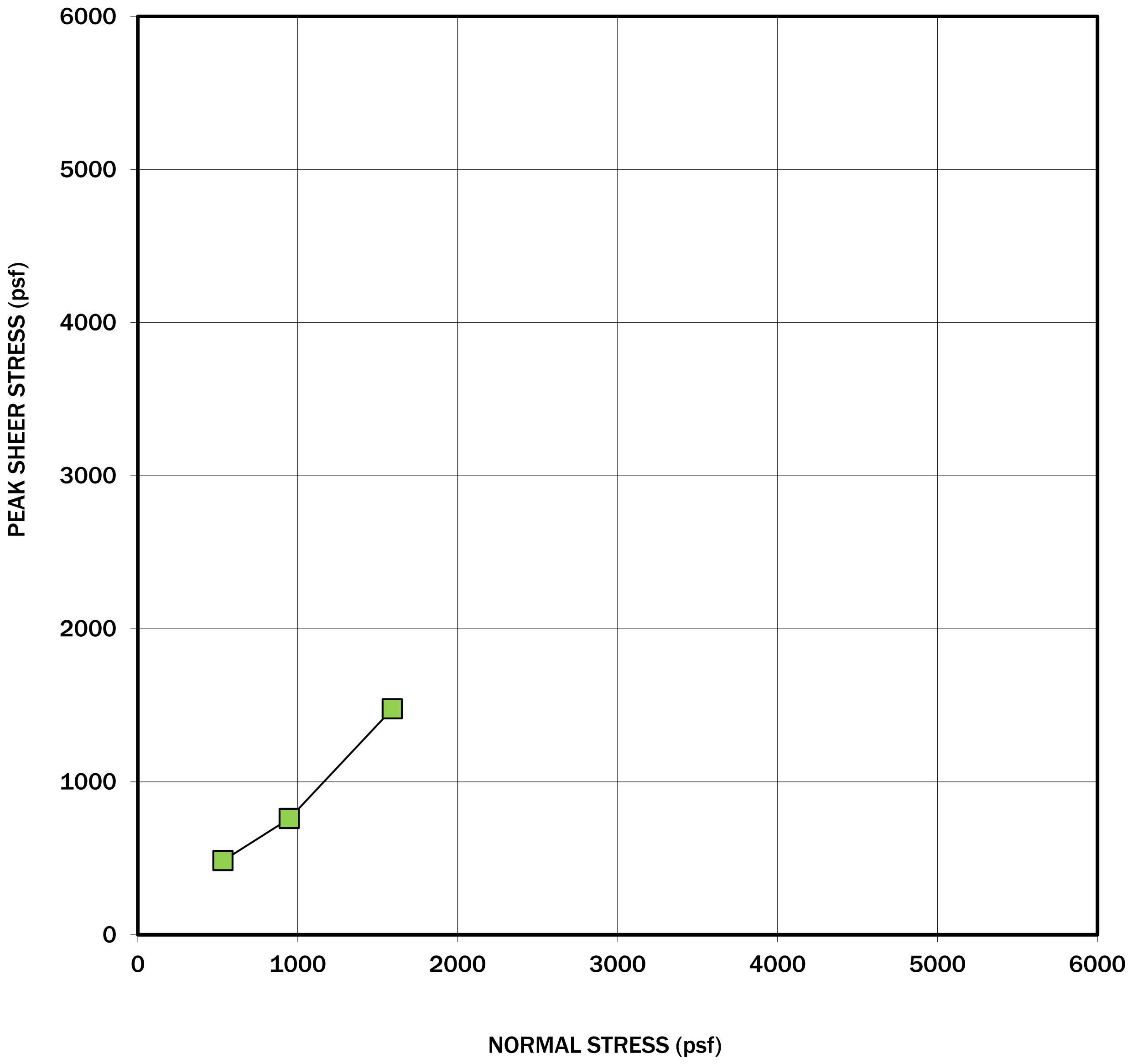
Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure B-26

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

The direct shear results were obtained in general accordance with ASTM D 3080.



Boring Number	Depth (feet)	Soil Description	Initial Moisture (%)	Initial Dry Density (lbs/ft^3)
HSA-7	81½	Fine to coarse sand with silt and fine gravel	2.5	96.9

Note: This report may not be reproduced, except in full, without written approval of GeoEngineers, Inc. Test results are applicable only to the specific sample on which they were performed, and should not be interpreted as representative of any other samples obtained at other times, depths or locations, or generated by separate operations or processes.

The direct shear results were obtained in general accordance with ASTM D 3080.

Direct Shear Test Results

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure B-27

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

MTC

REMEMBER...ONE TEST IS WORTH A THOUSAND EXPERT OPINIONS

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 12, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: various

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
X	Moisture Content	see attached			
	pH				
	Minimum Resistivity				
	Organic Content				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: B. Goble

Moisture Content - ASTM C-566, ASTM D-2216 & AASHTO T-265

Sample #	Client Sample #	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
T15-0869	HSA-4-3-15	1.6	69.5	56.0	13.5	54.4	24.8%
T15-0871	HSA-5-4-20	1.5	65.1	49.6	15.5	48.1	32.2%
T15-0888	HSA-9-16-80	1.5	63.6	58.6	4.9	57.1	8.7%

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: May 15, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: Various

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	See attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Penetrometer/Torvane	See attached
	Moisture Content		X	Percent Fines	See attached
	pH				
	Minimum Resistivity				
	Organic Content				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015
Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0866	HSA-3-5-25	9.8	67.8	50.2	17.6	30.3%
T15-0884	HSA-9-5-25	10.6	137.3	110.4	26.9	21.2%

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Density, Moisture Content

MTC Sample #	Client Sample #	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0863	HSA-2 at 5	107.4	4.7%	102.6
T15-0866	HAS-3 at 25	114.7	8.3%	106.0
T15-0884	HAS-9 at 25	119.3	3.7%	115.0

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Pocket Penetrometer and Torvane Testing

Project: Van Stone Mine Project
Project #: 15T009
Client : GeoEngineers
Source: HSA-2-1-5, HSA-3-5-25, HSA-9-5-25
Sample#: T15-0863, T15-0866, T15-0884

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

MTC ID	Client ID	Pocket Penetrometer, tsf	Torvane, tsf
T15-0863	HAS-2 at 5	1.75	0
T15-0866	HAS-3 at 25	0.75	1
15T-0884	HAS-9 at 25	2.5	0.5

Comments: ____________________

Reviewed by: ____________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 12, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HAS-3 at 5, HAS-6 at 5

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See attached
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project

Project #: 15T009

Date Received: June 3, 2015

Date Tested: June 9, 2015

Client: GeoEngineers

Sampled by: Others

Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0864	HSA-3-1-5	9.8	87.6	48.6	39.0	50.1%
T15-0873	HSA-6-1-5	10.3	85.6	41.6	44.0	58.5%

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: May 15, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HAS-4 at 5

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	See attached		Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	See attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Penetrometer/Torvane	See attached
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-4-1-5
Sample#: T15-0867

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04

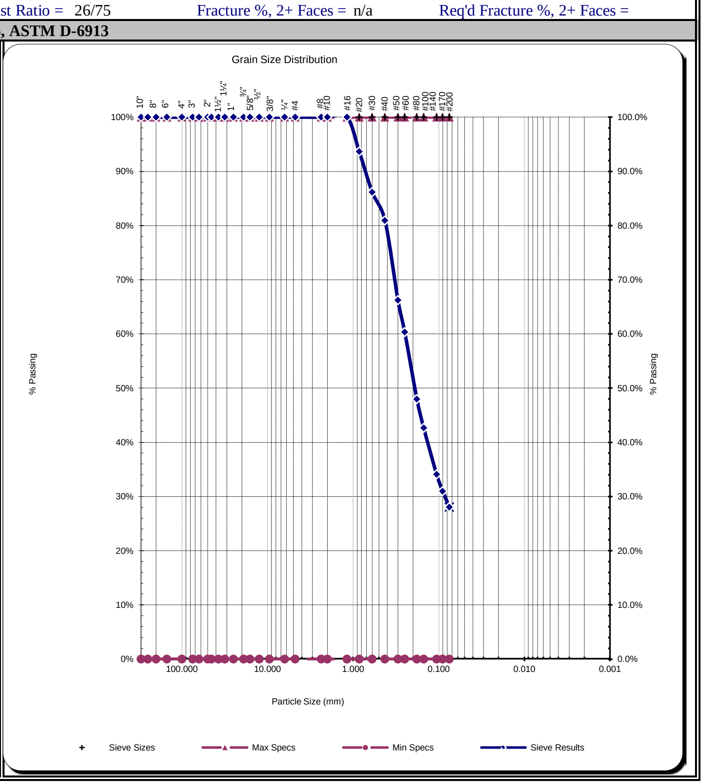
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.013 mm	% Gravel =	0.0%	Coeff. of Curvature, C_C =	1.09
$D_{(10)}$ =	0.027 mm	% Sand =	71.9%	Coeff. of Uniformity, C_U =	9.28
$D_{(15)}$ =	0.040 mm	% Silt & Clay =	28.1%	Fineness Modulus =	1.05
$D_{(30)}$ =	0.085 mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.192 mm	Plasticity Index =	n/a	Moisture %, as sampled =	n/a
$D_{(60)}$ =	0.248 mm	Sand Equivalent =	0	Req'd Sand Equivalent =	0
$D_{(90)}$ =	0.728 mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	26/75	Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913

Sieve Size US	Metric	Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00		100%	100.0%	0.0%
3/4"	19.00		100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50		100%	100.0%	0.0%
3/8"	9.50		100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75		100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00		100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850	94%	94%	100.0%	0.0%
#30	0.600		86%	100.0%	0.0%
#40	0.425	81%	81%	100.0%	0.0%
#50	0.300		66%	100.0%	0.0%
#60	0.250	60%	60%	100.0%	0.0%
#80	0.180		48%	100.0%	0.0%
#100	0.150	43%	43%	100.0%	0.0%
#140	0.106		34%	100.0%	0.0%
#170	0.090		31%	100.0%	0.0%
#200	0.075	28.1%	28.1%	100.0%	0.0%



Comments:

Reviewed by: HBaum

Pocket Penetrometer and Torvane Testing

Project: Van Stone Mine Project
Project #: 15T009
Client : GeoEngineers
Source: HSA-4 at 5
Sample#: T15-0867

Date Received June 3, 2015
Sampled By: Others
Date Tested: June 9, 2015
Tested By: A. Urban, B. Goble

MTC ID	Client ID	Pocket Penetrometer, tsf	Torvane, tsf
T15-0867	HAS-4 at 5	3.75	0

Comments:

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Density and Moisture Content

MTC Sample #	Client Sample #	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0867	HAS-4 at 5	107.6	5.5%	102.0

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 17, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: T15-0868, HSA-4 at 10 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		**X**	Percent Fines	See Attached
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

Notes: The sample slipped in the cup on the Atterberg limits test, and tore during grooving and could not be tested at 25 blows.

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers

Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0868	HSA-4-2-10	10.1	95.4	47.6	47.8	56.1%

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 17, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: T15-0870, HAS-5 at 15 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

Notes: The sample slipped in the cup on the Atterberg limits test, and tore during grooving and could not be tested at 25 blows.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	GeoEngineers	**Date:**	June 22, 2015
Address:	Spokane	**Project:**	Van Stone Mine Project
		Project #:	15T009
Attn:	John Haney, PE	**Sample #:**	HAS-5 at 25 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		**X**	Bulk Density of Soils	See Attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		**X**	Penetrometer	0.75 tsf
	Moisture Content		**X**	Torvane	1.5 tsf
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	See Attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble, C. Laramie

Density, Moisture Content

Sample #	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0872	130.8	29.4%	101.0

Reviewed by: ______________________

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-5-5-25
Sample #: T15-0872

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble, C. Lara

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

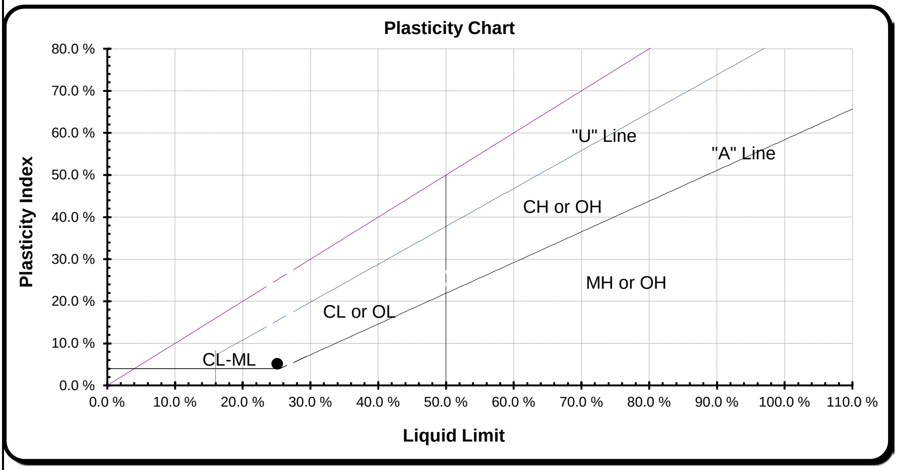
Liquid Limit Determination

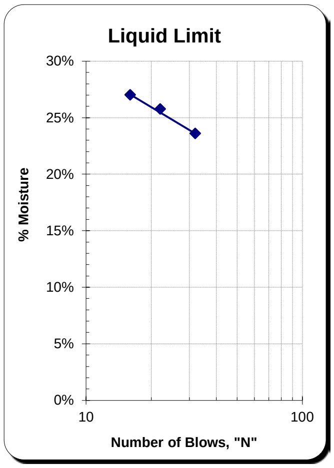
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	16.46	17.81	13.14			
Weight of Dry Soils + Pan:	13.61	14.47	10.67			
Weight of Pan:	1.53	1.51	1.53			
Weight of Dry Soils:	12.08	12.96	9.14			
Weight of Moisture:	2.85	3.34	2.47			
% Moisture:	23.6 %	25.8 %	27.0 %			
Number of Blows:	32	22	16			

Liquid Limit @ 25 Blows:	25.1 %
Plastic Limit:	20.0 %
Plasticity Index, I_P:	5.1 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	19.34	21.29				
Weight of Dry Soils + Pan:	16.33	18.05				
Weight of Pan:	1.51	1.54				
Weight of Dry Soils:	14.82	16.51				
Weight of Moisture:	3.01	3.24				
% Moisture:	20.3 %	19.6 %				





Comments: ______________________

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers

Address: Spokane

Attn: John Haney PE

Date: June 22, 2015

Project: Van Stone Mine Project

Project #: 15T009

Sample #: HAS-6 at 10 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
X	Sieve Analysis	see attached		Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
	Atterberg Limits				
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Sieve Report

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-6-2-10
Sample#: T15-0874

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

ASTM D-2487 Unified Soils Classification System
SM, Silty Sand
Sample Color:
Gray

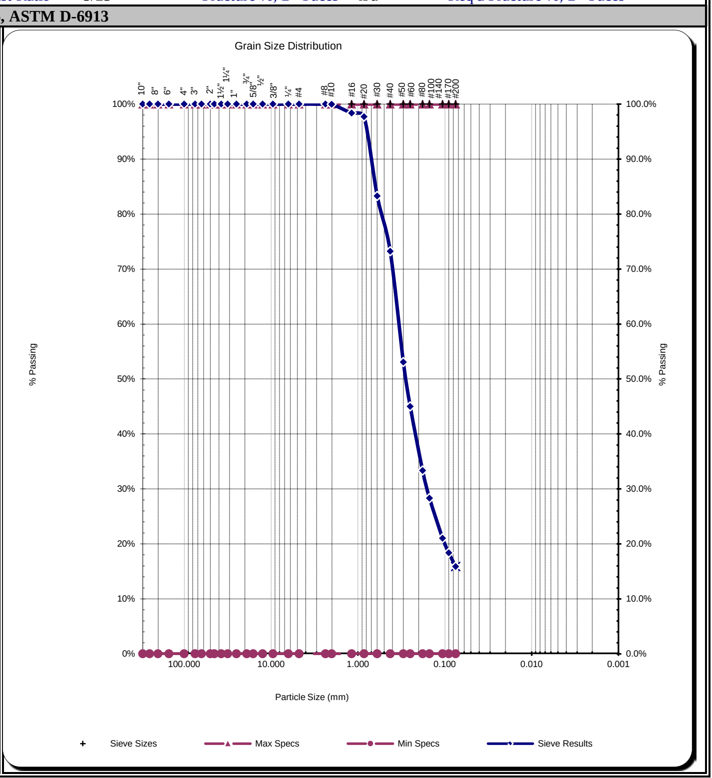
ASTM D-2216, ASTM D-2419, ASTM D-4318, ASTM D-5821

Specifications
No Specs
Sample Meets Specs ? N/A

$D_{(5)}$ =	0.024	mm	% Gravel =	0.0%	Coeff. of Curvature, C_C =	1.58
$D_{(10)}$ =	0.047	mm	% Sand =	84.1%	Coeff. of Uniformity, C_U =	7.27
$D_{(15)}$ =	0.071	mm	% Silt & Clay =	15.9%	Fineness Modulus =	1.37
$D_{(30)}$ =	0.160	mm	Liquid Limit =	n/a	Plastic Limit =	n/a
$D_{(50)}$ =	0.281	mm	Plasticity Index =	n/a	Moisture %, as sampled =	n/a
$D_{(60)}$ =	0.343	mm	Sand Equivalent =	n/a	Req'd Sand Equivalent =	
$D_{(90)}$ =	0.716	mm	Fracture %, 1 Face =	n/a	Req'd Fracture %, 1 Face =	
Dust Ratio =	5/23		Fracture %, 2+ Faces =	n/a	Req'd Fracture %, 2+ Faces =	

ASTM C-136, ASTM D-6913

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs Max	Specs Min
US	Metric				
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00		100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00		100%	100.0%	0.0%
3/4"	19.00		100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50		100%	100.0%	0.0%
3/8"	9.50		100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75		100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		98%	100.0%	0.0%
#20	0.850	98%	98%	100.0%	0.0%
#30	0.600		83%	100.0%	0.0%
#40	0.425	73%	73%	100.0%	0.0%
#50	0.300		53%	100.0%	0.0%
#60	0.250	45%	45%	100.0%	0.0%
#80	0.180		33%	100.0%	0.0%
#100	0.150	28%	28%	100.0%	0.0%
#140	0.106		21%	100.0%	0.0%
#170	0.090		18%	100.0%	0.0%
#200	0.075	15.9%	15.9%	100.0%	0.0%



Comments: ______________________________

Reviewed by: ______________________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 22, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-6 at 15 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	see attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Penetrometer	0.25 tsf
	Moisture Content		X	Torvane	0.0 tsf
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Density, Porosity, Void Ratio, % Saturation

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0875	HSA-6 at 15 ft	122.7	9.8%	111.8

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 22, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-6 at 25 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-6-5-25
Sample #: T15-0876

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: C. Laramie

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

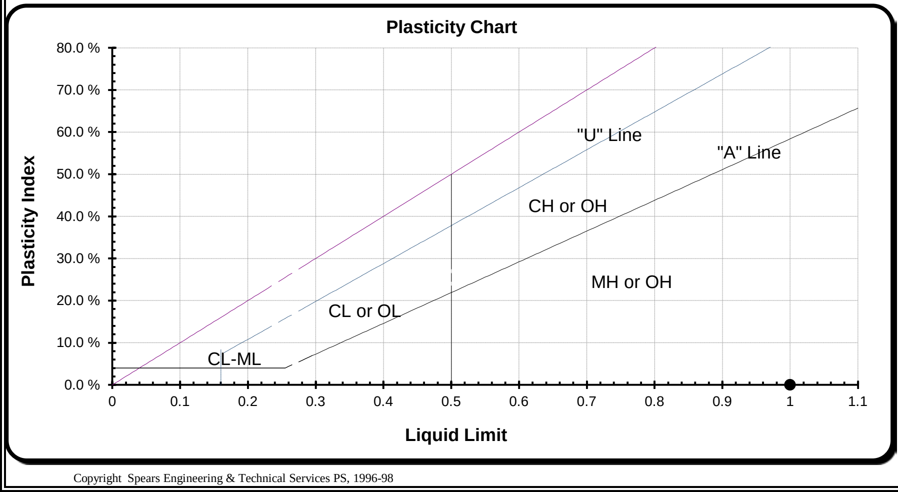
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

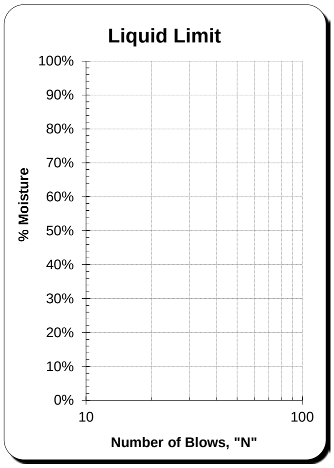
Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: The sample tears in the cup during grooving and can't be run.

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers

Address: Spokane

Attn: John Haney, PE

Date: June 22, 2015

Project: Van Stone Mine Project

Project #: 15T009

Sample #: HSA-7 at 50 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	
	Moisture Content		X	Penetrometer	1.5 tsf
	pH		X	Torvane	1.5 tsf
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Density, Moisture Content

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0878	HSA-7 at 50 ft	124.7	11.9%	111.4

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-7-10-50
Sample #: T15-0878

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

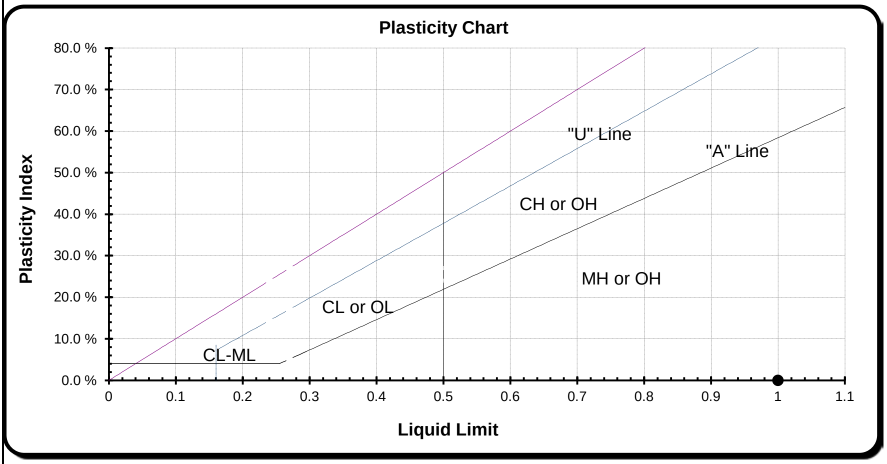
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

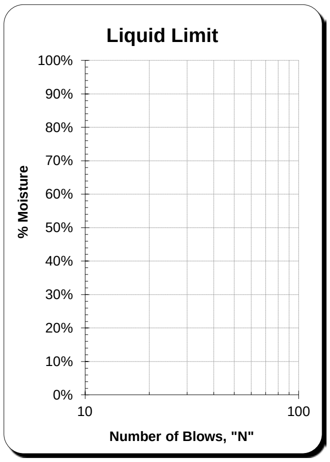
Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Sample slips in the cup and can't be brought to a moisture content corresponding to 25 blows.

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0878	HSA-7-10-50	10.4	156.3	86.3	70.0	48.0%

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 22, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-7 at 65 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		**X**	Bulk Density of Soils	see attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		**X**	Penetrometer	3.0 tsf
	Moisture Content		**X**	Torevane	1.0 tsf
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-7-13-65
Sample #: T15-0879

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

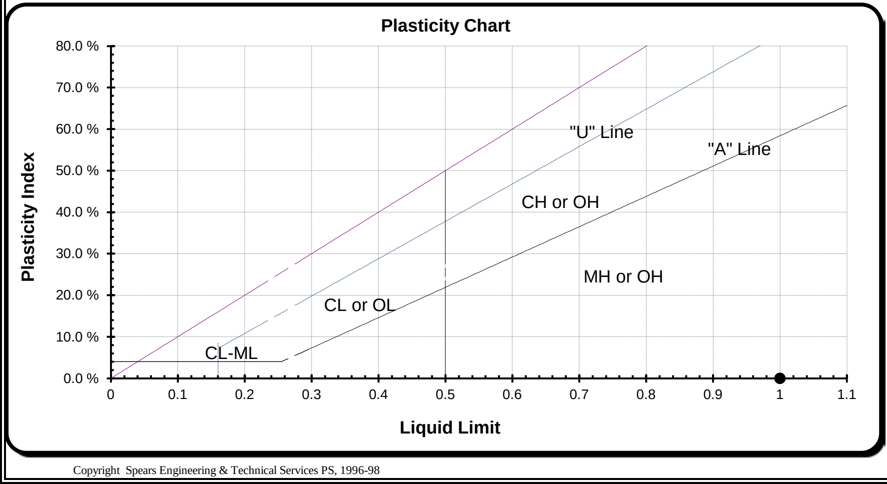
Liquid Limit Determination

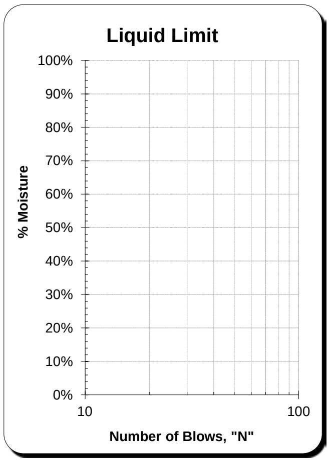
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						





Comments: Sample slips in cup.

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project

Project #: 15T009

Date Received: June 3, 2015

Date Tested: June 9, 2015

Client: GeoEngineers

Sampled by: Others

Tested by: A. Urban, B. Goble

Density, Porosity, Void Ratio, % Saturation

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0879	HSA-7 at 65 ft	122.8	15.3%	106.5

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	GeoEngineers	**Date:**	June 22, 2015
Address:	Spokane	**Project:**	Van Stone Mine Project
		Project #:	15T009
Attn:	John Haney, PE	**Sample #:**	HSA-8 at 15 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	See attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	
	Moisture Content		X	Penetrometer	2.25 tsf
	pH		X	Torvane	0
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project

Project #: 15T009

Date Received: June 3, 2015

Date Tested: June 9, 2015

Client: GeoEngineers

Sampled by: Others

Tested by: A. Urban, B. Goble

Density, Porosity, Void Ratio, % Saturation

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0880	HSA-8 at 15 ft	108.4	3.0%	105.3

Reviewed by: ______________________

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-8-3-15
Sample #: T15-0880

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

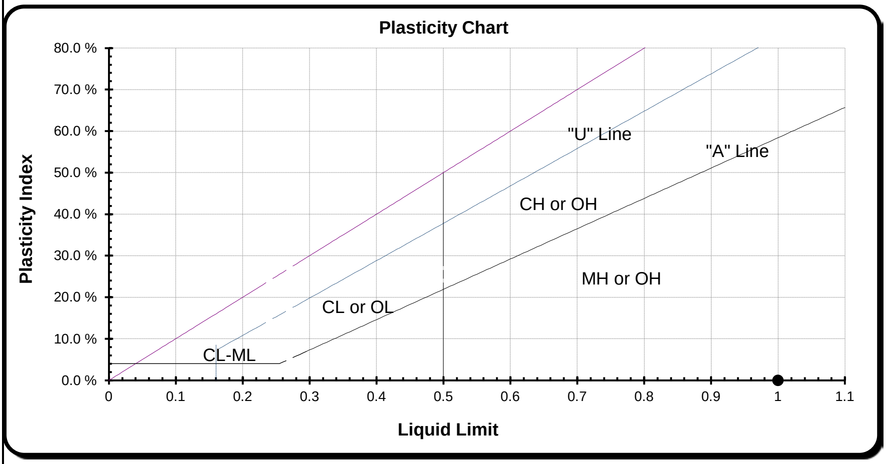
Liquid Limit Determination

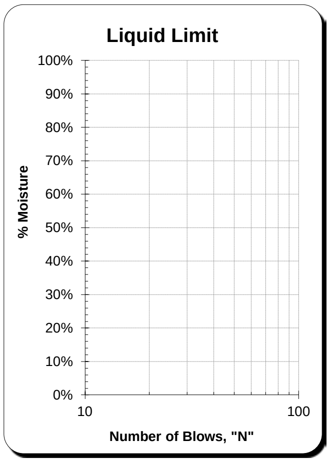
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						





Comments: Sample tears in the cup, Non-Plastic

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

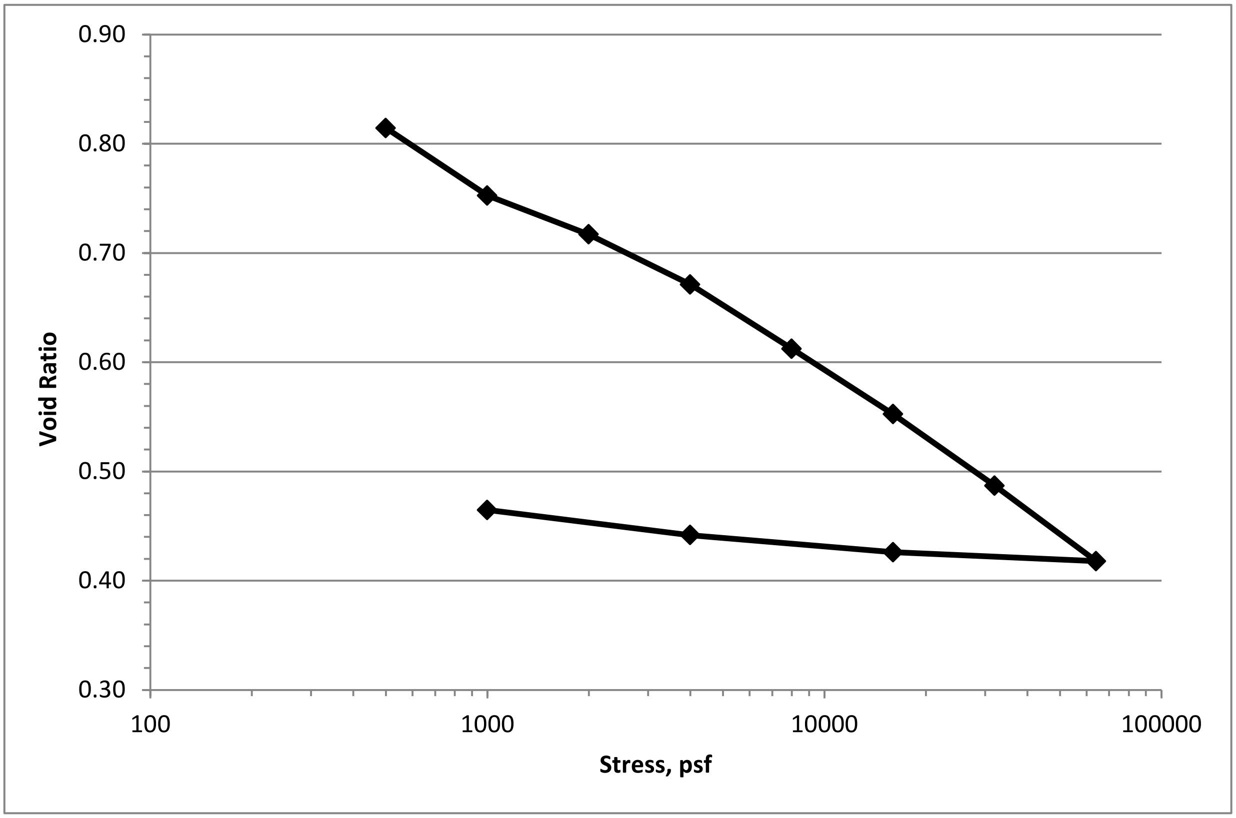
Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0880	HSA-8-3-15	10.6	128.5	107.9	20.6	17.4%

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Van Stone Mine Project	**Date Received:**	3-Jun-15
Project #:	15T009	**Sampled By:**	Client
Client:	GeoEngineers, Spokane	**Date Tested:**	8-Jun-15
Source:	HAS-10 @ 25 ft.	**Tested By:**	CL
Sample #:	T15-0891		

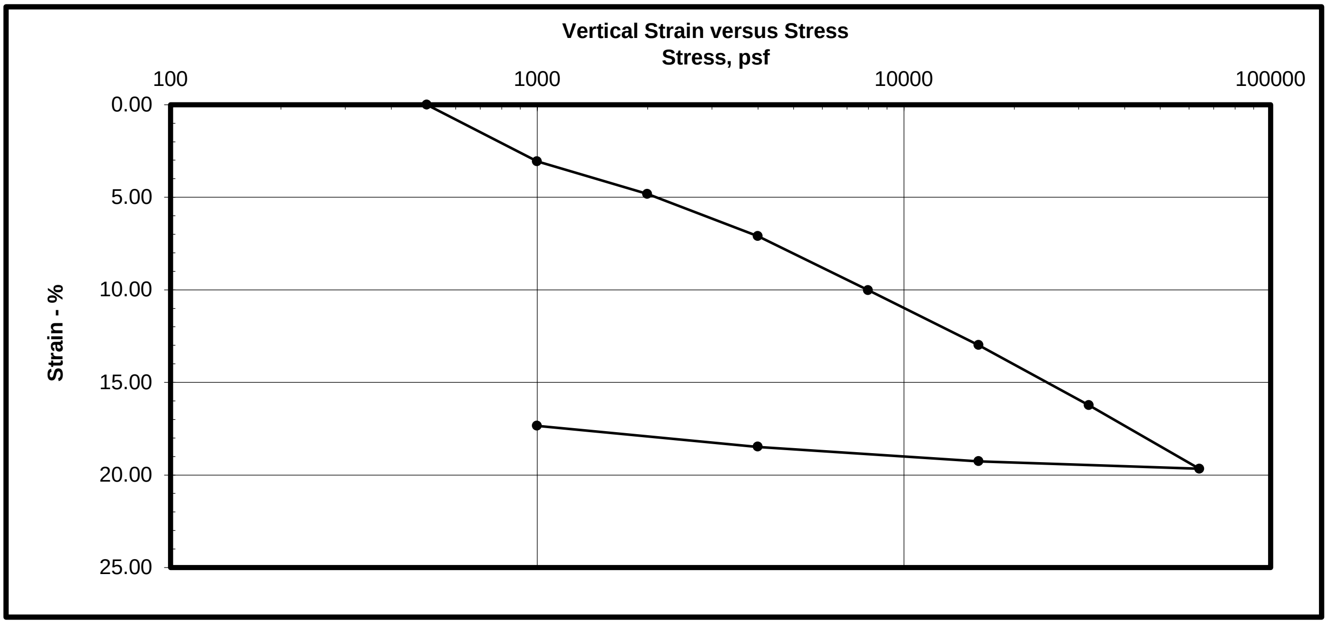


Stress, psf	500	1000	2000	4000	8000	16000	32000	64000
Void Ratio	0.81	0.75	0.72	0.67	0.61	0.55	0.49	0.42

Comments:

Reviewed by: H Berry

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers, Spokane
Source: HAS-10 @ 25 ft.
Sample #: T15-0891
Date Received: 3-Jun-15
Sampled By: Client
Date Tested: 8-Jun-15
Tested By: CL



Load, psf	Strain, %	t_{50}	$C_{v,}$ ft^2/day
1000	3.06	1.4	0.3
2000	4.83	1.2	0.3
4000	7.10	1.0	0.4
8000	10.02	0.8	0.4
16000	12.99	0.3	1.2
32000	16.24	0.2	1.4
64000	19.67	0.2	1.7

Comments:

Reviewed by: H Berry

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-8 at 45 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	See attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See attached
	Moisture Content		X	Penetrometer	1.25 tsf
	pH		X	Torvane	0 tsf
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-8-9-45
Sample #: T15-0881

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

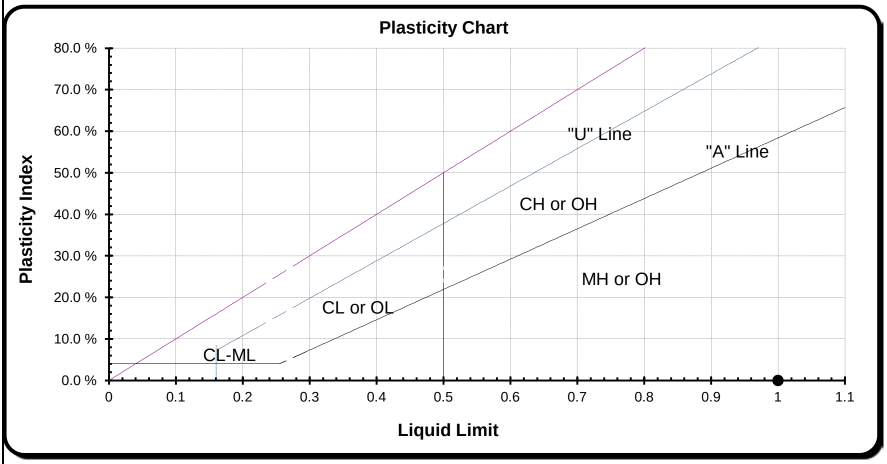
Liquid Limit Determination

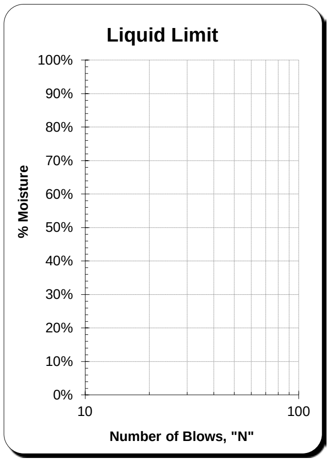
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						


Plasticity Chart


Liquid Limit

Comments: Tears in cup, Non-Plastic

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 11, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0881	HSA-8-9-45	9.8	129.2	69.5	59.8	50.0%

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project

Project #: 15T009

Date Received: June 3, 2015

Date Tested: June 9, 2015

Client: GeoEngineers

Sampled by: Others

Tested by: A. Urban, B. Goble

Density, Moisture Content

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0881	HSA-8 at 45 ft	107.5	13.3%	94.9

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-8 at 55 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
X	Moisture Content	See attached			
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	See attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project:	Van Stone Mine Project	**Date Received:**	3-Jun-15
Project #:	15T009	**Sampled By:**	Others
Client:	GeoEngineers	**Date Tested:**	10-Jun-15
Source:	HSA-8-11-55	**Tested By:**	C. Laramie
Sample #:	T15-0882		

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

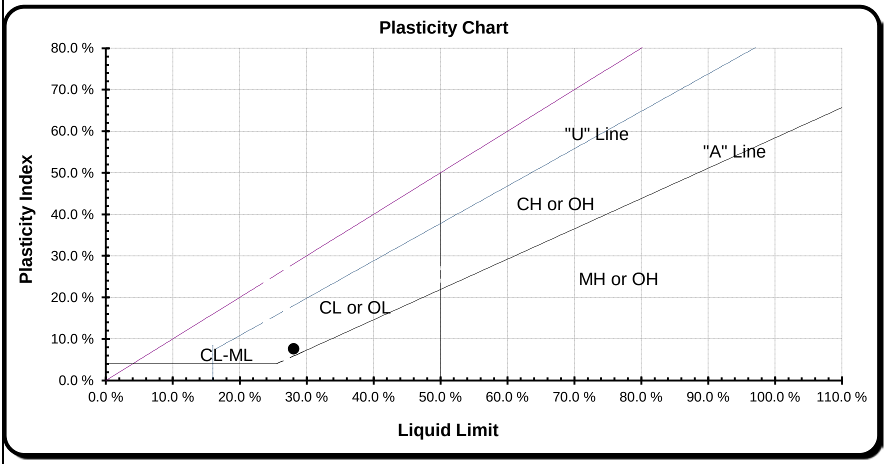
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.83	19.36	17.36			
Weight of Dry Soils + Pan:	20.29	15.51	13.99			
Weight of Pan:	1.52	1.52	1.52			
Weight of Dry Soils:	18.77	13.99	12.47			
Weight of Moisture:	5.54	3.85	3.37			
% Moisture:	29.5 %	27.5 %	27.0 %			
Number of Blows:	15	26	35			

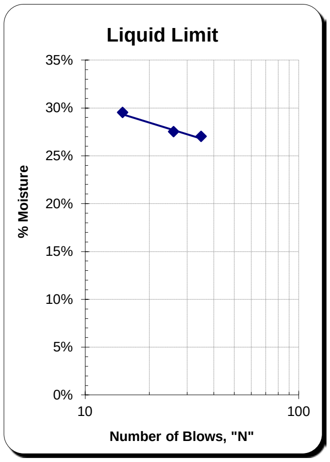
Liquid Limit @ 25 Blows:	28.1 %
Plastic Limit:	20.5 %
Plasticity Index, I_P:	7.6 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	13.36	13.13				
Weight of Dry Soils + Pan:	11.35	11.16				
Weight of Pan:	1.53	1.52				
Weight of Dry Soils:	9.82	9.64				
Weight of Moisture:	2.01	1.97				
% Moisture:	20.5 %	20.4 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: ____________________

Reviewed by: ____________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 10, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: C. Laramie

Moisture Content - ASTM C-566, ASTM D-2216 & AASHTO T-265

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
T15-0882	HSA-8-11-55	1.5	93.4	77.3	16.1	75.8	21.2%

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-8 at 75 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-8-15-75
Sample #: T15-0883

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 11-Jun-15
Tested By: C. Laramie

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

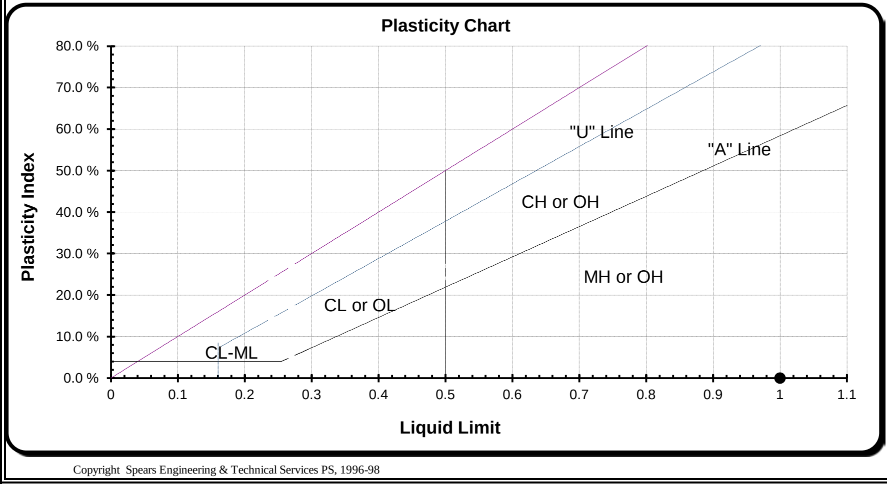
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

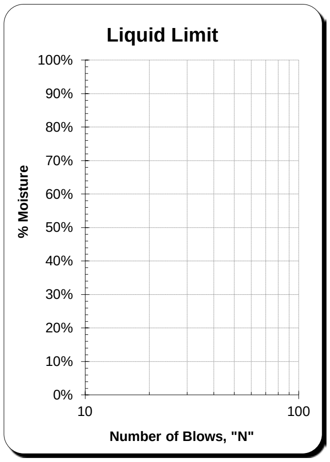
Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Tears during grooving, Non-Plastic

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client:	GeoEngineers	**Date:**	June 23, 2015
Address:	Spokane	**Project:**	Van Stone Mine Project
		Project #:	15T009
Attn:	John Haney, PE	**Sample #:**	HSA-9 at 55 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density of Soils	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		**X**	Percent Fines	See Attached
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-9-11-55
Sample #: T15-0885

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

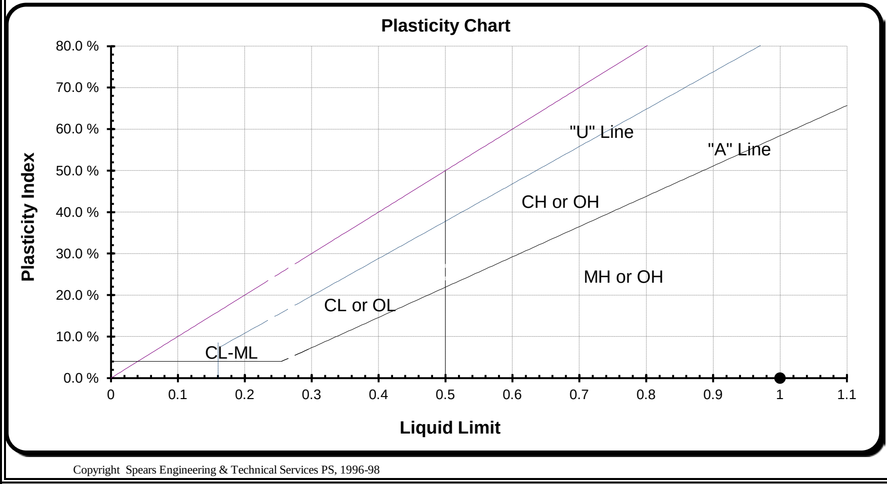
Liquid Limit Determination

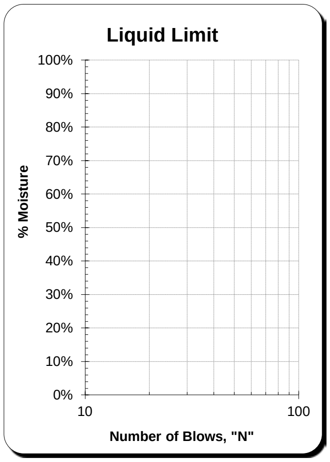
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						





Comments: Tears, slips in cup, Non-Plastic.

Reviewed by: H Berg

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0885	HSA-9-11-55	10.3	88.3	54.5	33.8	43.3%

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-9 at 65 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor		X	Bulk Density of Soils	See Attached
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See Attached
	Moisture Content		X	Penetrometer/Torvane	4.5 tsf
	pH		X	Torvane	2 tsf
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-9-13-65
Sample #: T15-0886

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

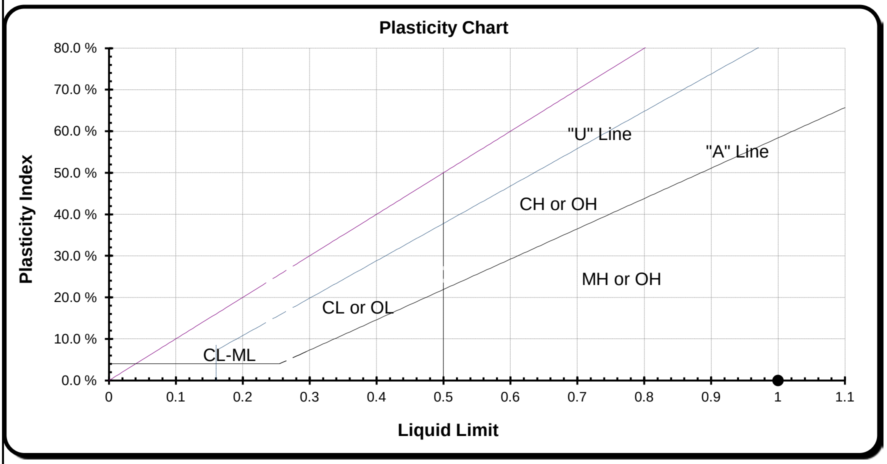
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

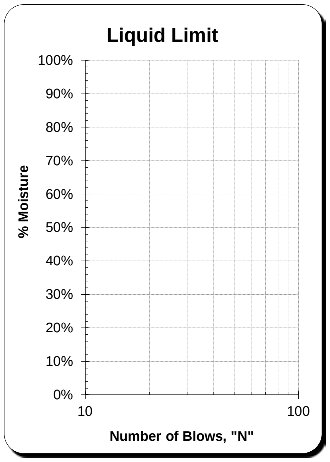
Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Non-Plastic

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Density, Moisture Content

MTC Sample ID	Client Sample ID	Wet Density, pcf	Moisture Content, %	Dry Density, pcf
T15-0886	HSA-9 at 65 ft	115.3	4.6%	110.2

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0886	HSA-9-13-65	10.0	137.5	99.5	37.9	29.8%

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-9 at 75 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
X	Moisture Content	See attached			
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	See attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-9-15-75
Sample #: T15-0887

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 11-Jun-15
Tested By: C. Laramie

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

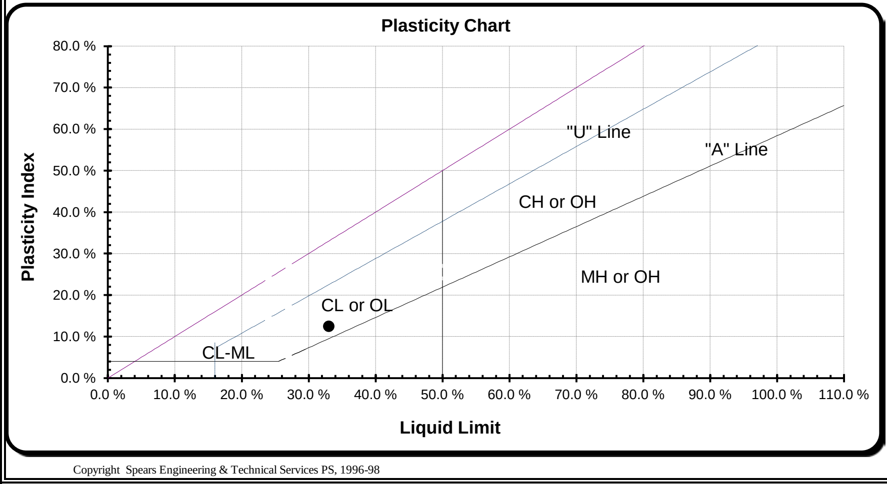
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	18.20	19.33	15.01			
Weight of Dry Soils + Pan:	13.95	14.97	11.76			
Weight of Pan:	1.51	1.52	1.51			
Weight of Dry Soils:	12.44	13.45	10.25			
Weight of Moisture:	4.25	4.36	3.25			
% Moisture:	34.2 %	32.4 %	31.7 %			
Number of Blows:	19	28	32			

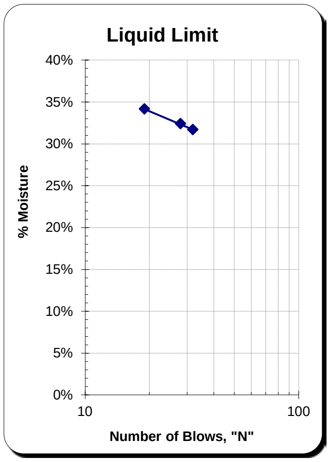
Liquid Limit @ 25 Blows: 33.0 %
Plastic Limit: 20.6 %
Plasticity Index, I_P: 12.5 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	11.42	13.26				
Weight of Dry Soils + Pan:	9.74	11.25				
Weight of Pan:	1.52	1.52				
Weight of Dry Soils:	8.22	9.73				
Weight of Moisture:	1.68	2.01				
% Moisture:	20.4 %	20.7 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: ____________________

Reviewed by: ____________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 11, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: C. Laramie

Moisture Content

Sample #	Client Sample #	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
T15-0887	HSA-9-15-75	10.2	356.7	282.5	74.2	272.3	27.2%

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-10 at 5 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-10-1-5
Sample #: T15-0889

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 11-Jun-15
Tested By: C. Laramie

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

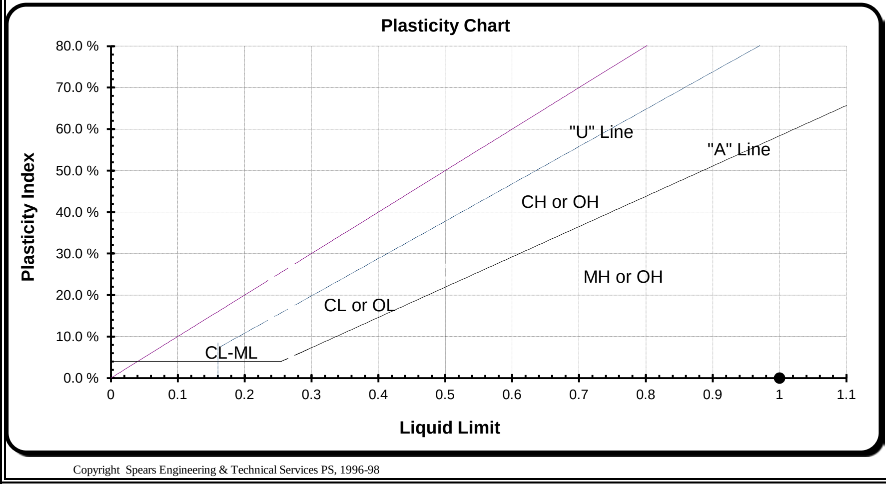
Liquid Limit Determination

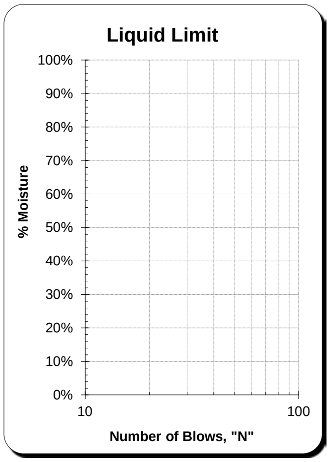
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						





Comments: Non-Plastic

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane

Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-10 at 15 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See attached
X	Moisture Content	See attached			
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	Non-Plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-10-3-15
Sample #: T15-0890

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

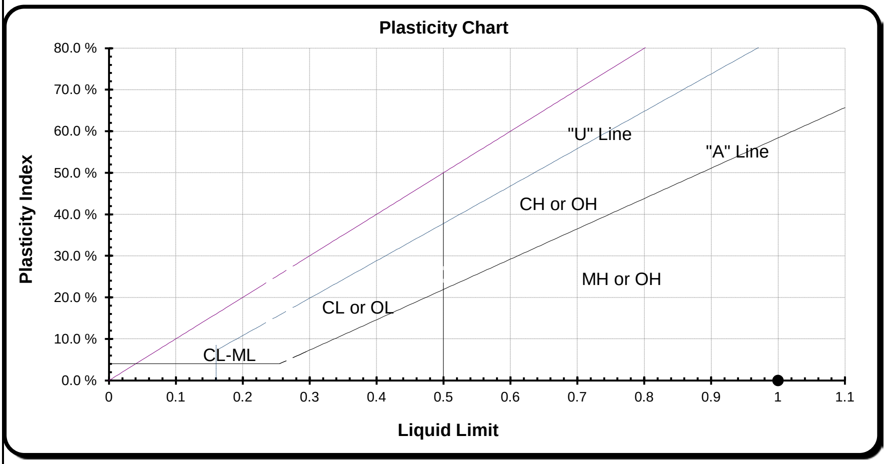
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

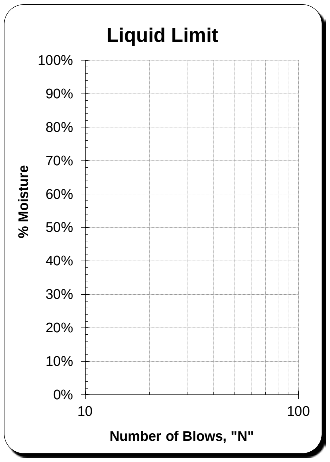
Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: Non-Plastic

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Moisture Content - ASTM C-566, ASTM D-2216 & AASHTO T-265

Sample #	Client Sample #	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
T15-0890	HSA-10-3-15	10.9	82.8	78.1	4.7	67.3	7.0%

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0890	HSA-10-3-15	10.9	78.1	52.5	25.7	38.2%

Reviewed by: H Berry

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-10 at 25 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See Attached
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	See Attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-10-5-25
Sample #: T15-0891

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, C. Laramie

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
0

Liquid Limit Determination

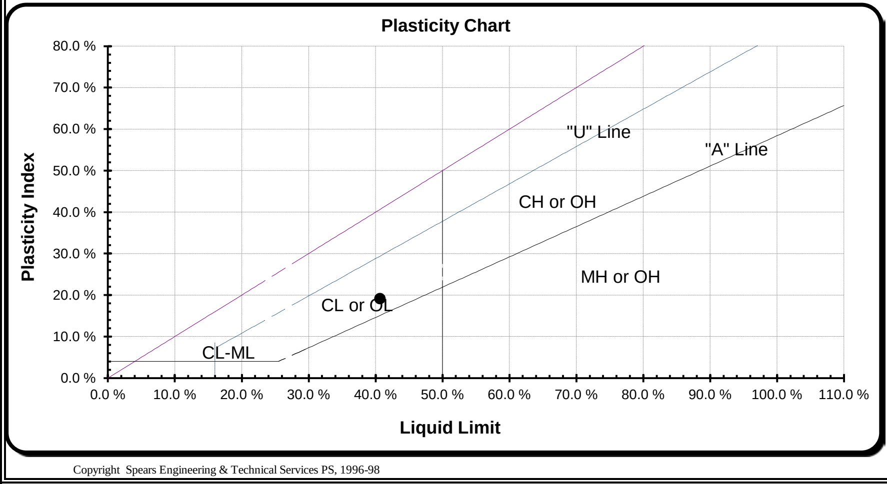
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	19.04	16.86	16.04			
Weight of Dry Soils + Pan:	13.86	12.49	11.91			
Weight of Pan:	1.51	1.52	1.53			
Weight of Dry Soils:	12.35	10.97	10.38			
Weight of Moisture:	5.18	4.37	4.13			
% Moisture:	41.9 %	39.8 %	39.8 %			
Number of Blows:	22	25	30			

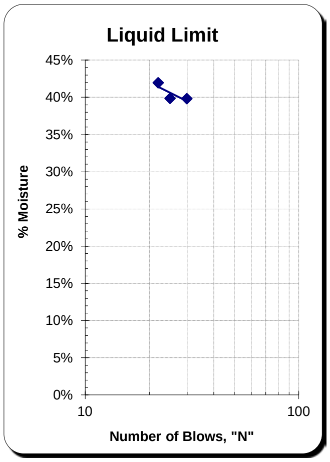
Liquid Limit @ 25 Blows:	40.7 %
Plastic Limit:	21.5 %
Plasticity Index, I_P:	19.1 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	9.70	9.66				
Weight of Dry Soils + Pan:	8.27	8.20				
Weight of Pan:	1.52	1.53				
Weight of Dry Soils:	6.75	6.67				
Weight of Moisture:	1.43	1.46				
% Moisture:	21.2 %	21.9 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: ______________________

Reviewed by: ______________________

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, C. Laramie

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0891	HSA-10-5-25	10.1	129.1	10.8	118.2	99.4%

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane
Attn: John Haney, PE

Date: June 23, 2015
Project: Van Stone Mine Project
Project #: 15T009
Sample #: HSA-10 at 45 ft

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count		X	Percent Fines	See Attached
X	Moisture Content	See Attached			
	pH				
	Minimum Resistivity				
	Organic Content				
X	Atterberg Limits	See Attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine Project
Project #: 15T009
Client: GeoEngineers
Source: HSA-10-9-45
Sample #: T15-0892

Date Received: 3-Jun-15
Sampled By: Others
Date Tested: 9-Jun-15
Tested By: A. Urban, B. Goble, C. Lara

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

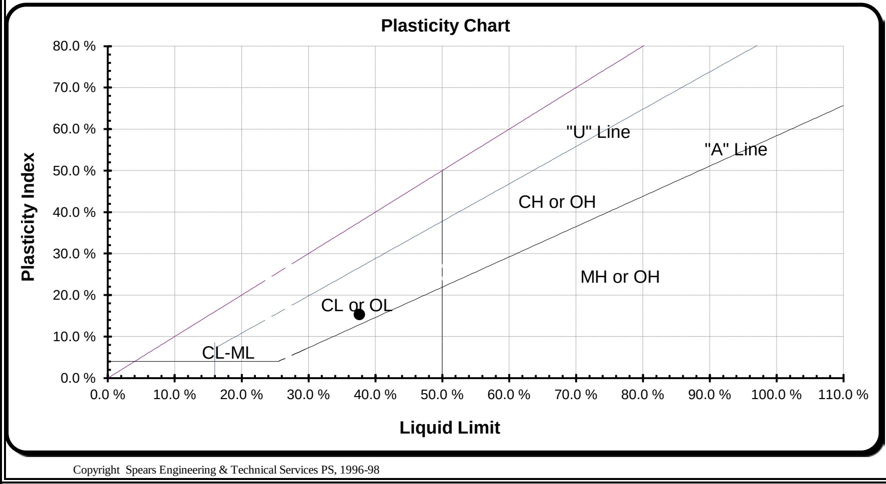
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	11.42	11.34	15.86			
Weight of Dry Soils + Pan:	8.74	8.67	11.93			
Weight of Pan:	1.53	1.53	1.51			
Weight of Dry Soils:	7.21	7.14	10.42			
Weight of Moisture:	2.68	2.67	3.93			
% Moisture:	37.2 %	37.4 %	37.7 %			
Number of Blows:	30	27	24			

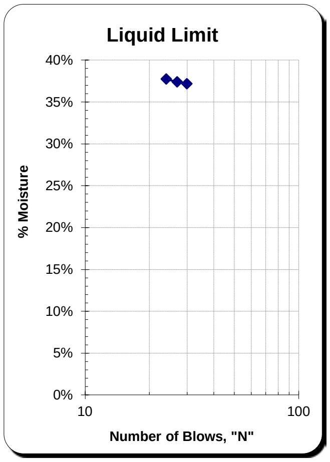
Liquid Limit @ 25 Blows:	37.6 %
Plastic Limit:	22.3 %
Plasticity Index, I_P:	15.3 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	13.19	14.91				
Weight of Dry Soils + Pan:	11.07	12.46				
Weight of Pan:	1.52	1.51				
Weight of Dry Soils:	9.55	10.95				
Weight of Moisture:	2.12	2.45				
% Moisture:	22.2 %	22.4 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: ____________________

Reviewed by: H Berry ____________________

Project: Van Stone Mine Project
Project #: 15T009
Date Received: June 3, 2019
Date Tested: June 9, 2015

Client: GeoEngineers
Sampled by: Others
Tested by: A. Urban, B. Goble

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Client Sample #	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0892	HSA-10-9-45	10.4	44.3	11.1	33.2	97.9%

Moisture Content - ASTM C-566, ASTM D-2216 & AASHTO T-265

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
T15-0892	HSA-10-9-45	10.4	57.5	44.27	13.2	33.9	39.1%

Reviewed by: H Berg

HWA GEOSCIENCES INC.
Geotechnical Engineering • Hydrogeology • Geoenvironmental • Inspection and Testing

July 2, 2015
HWA Project No. 2012-002-23 Task 27

Materials Testing & Consulting, Inc.
5451 NW Newberry Hill Road
Silverdale, WA 98233

Attention: Mr. Harold Benny

Subject: **MATERIALS LABORATORY REPORT**
Direct Shear Testing
Van Stone Mine

Dear Mr. Benny,

As requested, HWA GeoSciences Inc. (HWA) performed laboratory testing for the subject project. Herein we present the results of our laboratory analyses, which are summarized on the attached Figures. The laboratory testing program was performed in general accordance with your instructions and appropriate ASTM Standards as outlined below.

SAMPLE INFORMATION: Two samples were delivered to our laboratory on June 25, 2015 by MTC personnel. The samples were designated "T15-0861" and "T15-0865". "T15-0861" was delivered unextruded in a Shelby Tube and "T15-0865" was delivered in a one-gallon plastic bag having been previously extruded. Based on visual methods, the soil descriptions for the samples are as follows:

T15-0861	Gray, silty SAND (SM)
T15-0865	Yellowish brown, poorly graded SAND with silt (SP-SM)

MOISTURE CONTENT OF SOIL: The moisture content of the soil samples (percent by dry mass) were determined in general accordance with **ASTM D2216**. The results are shown on Figures 1 and 2, Direct Shear Test of Soils report.

SHEAR STRENGTH PARAMETERS OF SOIL: Direct shear tests were conducted on the samples in general accordance with **ASTM D3080**. Three test specimens were trimmed from each sample, maintaining the as-delivered density of the soil. The three specimens for each sample were sheared with normal stress increments of approximately 1.0, 2.0 and 3.0 ksf as requested by the client. The results of these tests are reported on Figures 1 and 2, Direct Shear Test of Soils report. The indicated shear stress at each point represents the maximum value obtained. The apparent cohesion and friction angle of the soil for the peak and residual conditions are inferred from a least-squares linear regression of the three test points, as indicated in Figures 1 and 2.

21312 30th Drive SE
Suite 110
Bothell, WA 98021-7010
Tel: 425.774.0106
Fax: 425.774.2714
www.hwageo.com

* * *

CLOSURE: Experience has shown that laboratory test values for soil and other natural materials vary with each representative sample. As such, HWA has no knowledge as to the extent and quantity of material the tested sample may represent. HWA also makes no warranty as to how representative either the sample tested or the test results obtained are to actual field conditions. It is a well established fact that sampling methods present varying degrees of disturbance or variance that affect sample representativeness.

No copy should be made of this report except in its entirety.

We appreciate the opportunity to provide laboratory testing services on this project. Should you have any questions or comments, or if we may be of further service, please call.

Sincerely,

HWA GEOSCIENCES INC.

Jessica Herrera Laboratory Manager	Steven E. Greene, L.G., L.E.G. Principal Engineering Geologist

Attachments:

Figure 1-2	Direct Shear Test of Soils

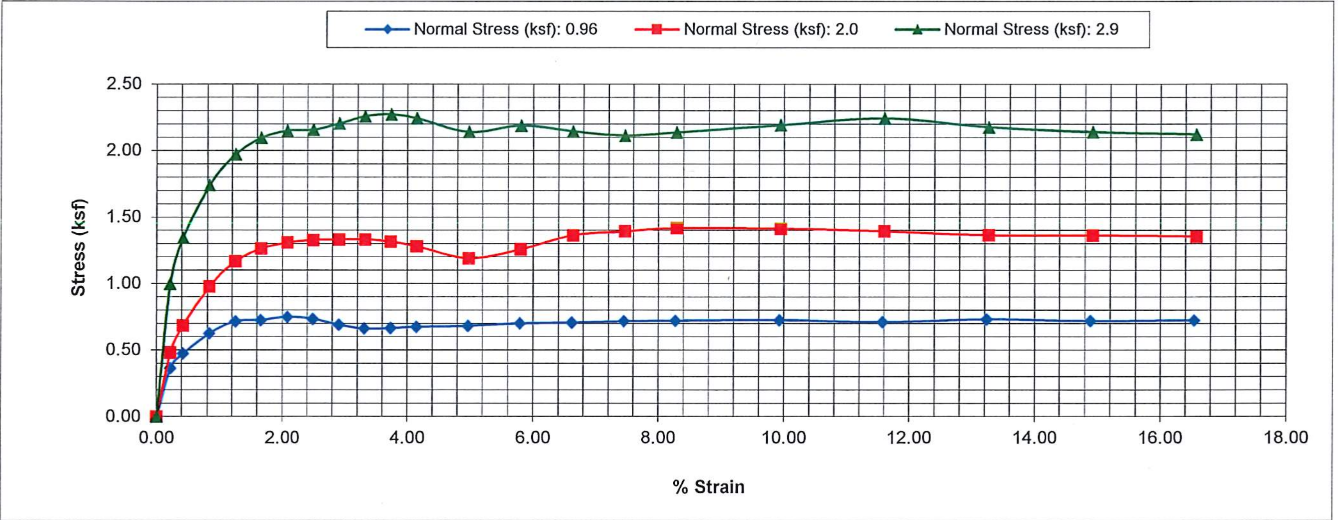
HWA GEOSCIENCES INC. Materials Testing Laboratory
Direct Shear Test of Soils Under Consolidated Drained Conditions (ASTM D 3080)

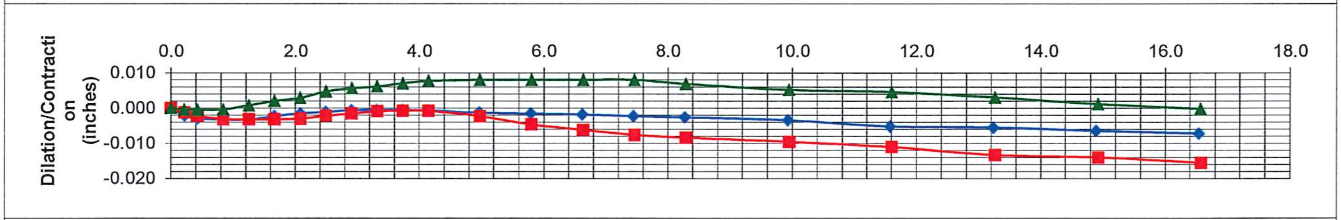
Project Name: MLT for MTC - Van Stone Mine
Project Number: 2012-002 T27
Sample Point: N/A
Sample No.: T15-0861
Sample Depth: Unavailable
Soil Description: silty SAND
Soil Color: Gray
Soil Group Symbol: SM
Strain rate: 0.2 % per min.
Soil Specific Gravity: 2.65 (assumed)

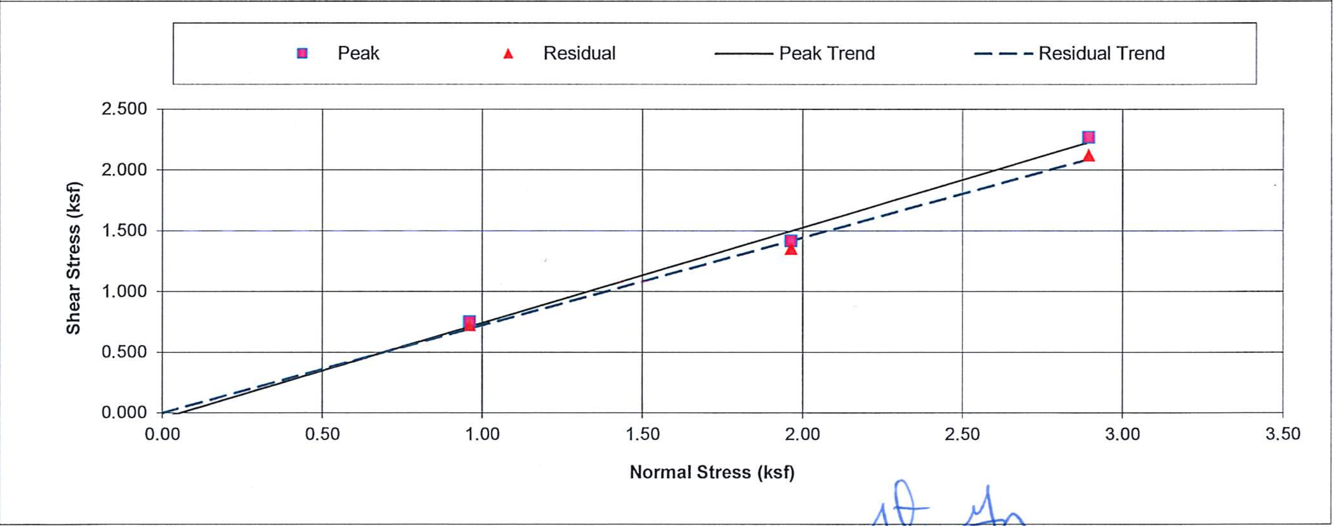
Normal Stress (ksf)	0.96	1.96	2.89	**Average**
Peak Stress (ksf)	0.750	1.417	2.271	
Residual Stress (ksf)	0.724	1.355	2.121	
Initial Moisture Content (%):	13.8	13.8	13.8	13.8
Wet Unit Weight (pcf):	126.1	120.0	121.7	122.6
Dry Unit Weight (pcf):	110.8	105.5	106.9	107.8
Calculated Void Ratio	0.492	0.567	0.546	0.535
Calculated Porosity	0.330	0.362	0.353	0.348
Calculated Saturation (%)	74.1	64.3	66.8	68.4

Indicated Strength Parameters

	Cohesion (ksf)	phi Angle (degrees)
Peak	0.0	38.1
Residual	0.0	35.8







Checked By:

Figure 1

HWA GEOSCIENCES INC. Materials Testing Laboratory

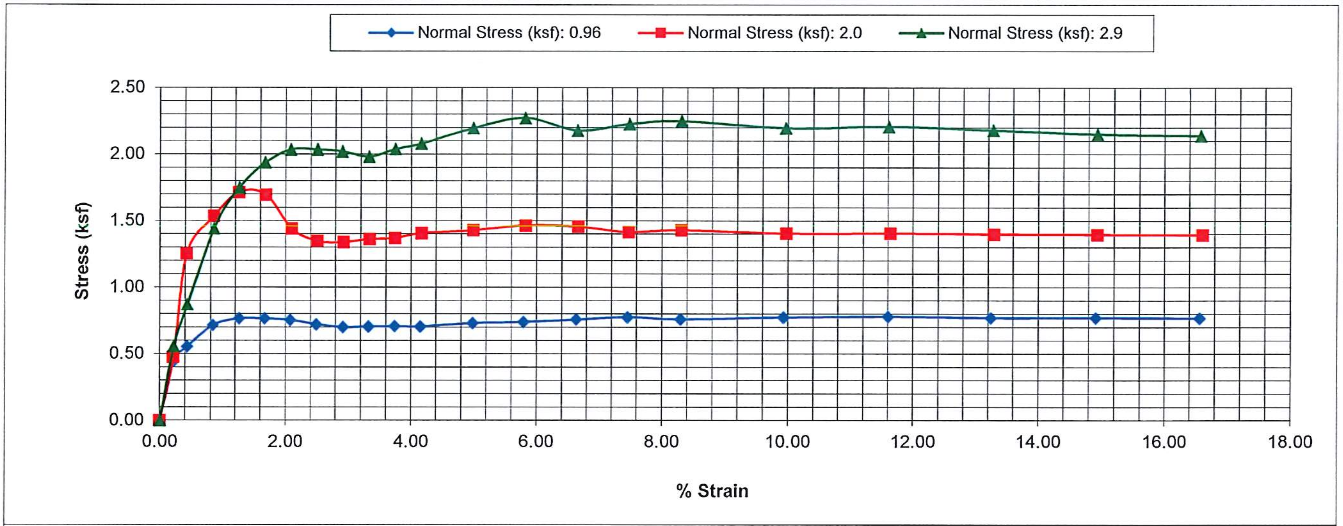
Direct Shear Test of Soils Under Consolidated Drained Conditions (ASTM D 3080)

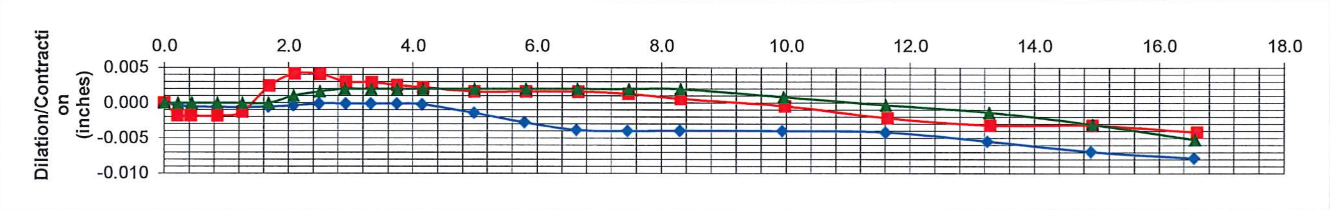
Project Name: MLT for MTC - Van Stone Mine
Project Number: 2012-002 T27
Sample Point: N/A
Sample No.: T15-0865
Sample Depth: Unavailable
Soil Description: poorly graded SAND with silt
Soil Color: Yellowish brown
Strain rate: 0.6 % per min.
Soil Group Symbol: SP-SM
Soil Specific Gravity: 2.65 (assumed)

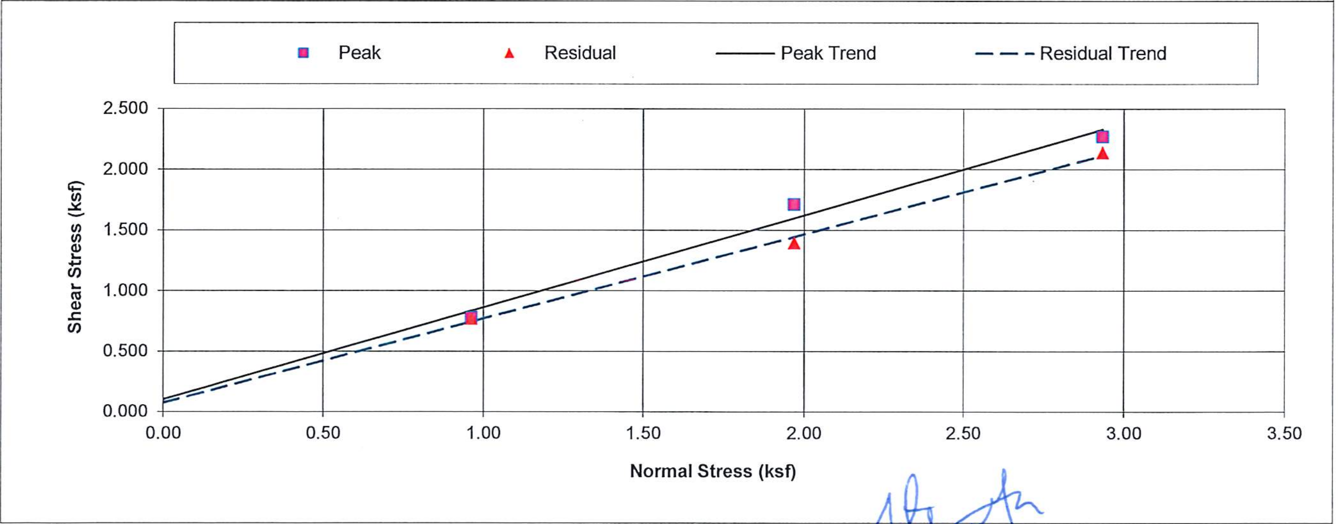
Normal Stress (ksf)	0.96	1.97	2.93	**Average**
Peak Stress (ksf)	0.779	1.714	2.272	
Residual Stress (ksf)	0.768	1.395	2.139	
Initial Moisture Content (%):	8.5	8.5	8.5	8.5
Wet Unit Weight (pcf):	111.4	120.3	118.7	116.8
Dry Unit Weight (pcf):	102.7	110.9	109.4	107.7
Calculated Void Ratio	0.611	0.491	0.511	0.538
Calculated Porosity	0.379	0.329	0.338	0.349
Calculated Saturation (%)	37.0	45.9	44.1	42.3

Indicated Strength Parameters

	Cohesion (ksf)	phi Angle (degrees)
Peak	0.1	37.2
Residual	0.1	34.8







Checked By:

Figure 2

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

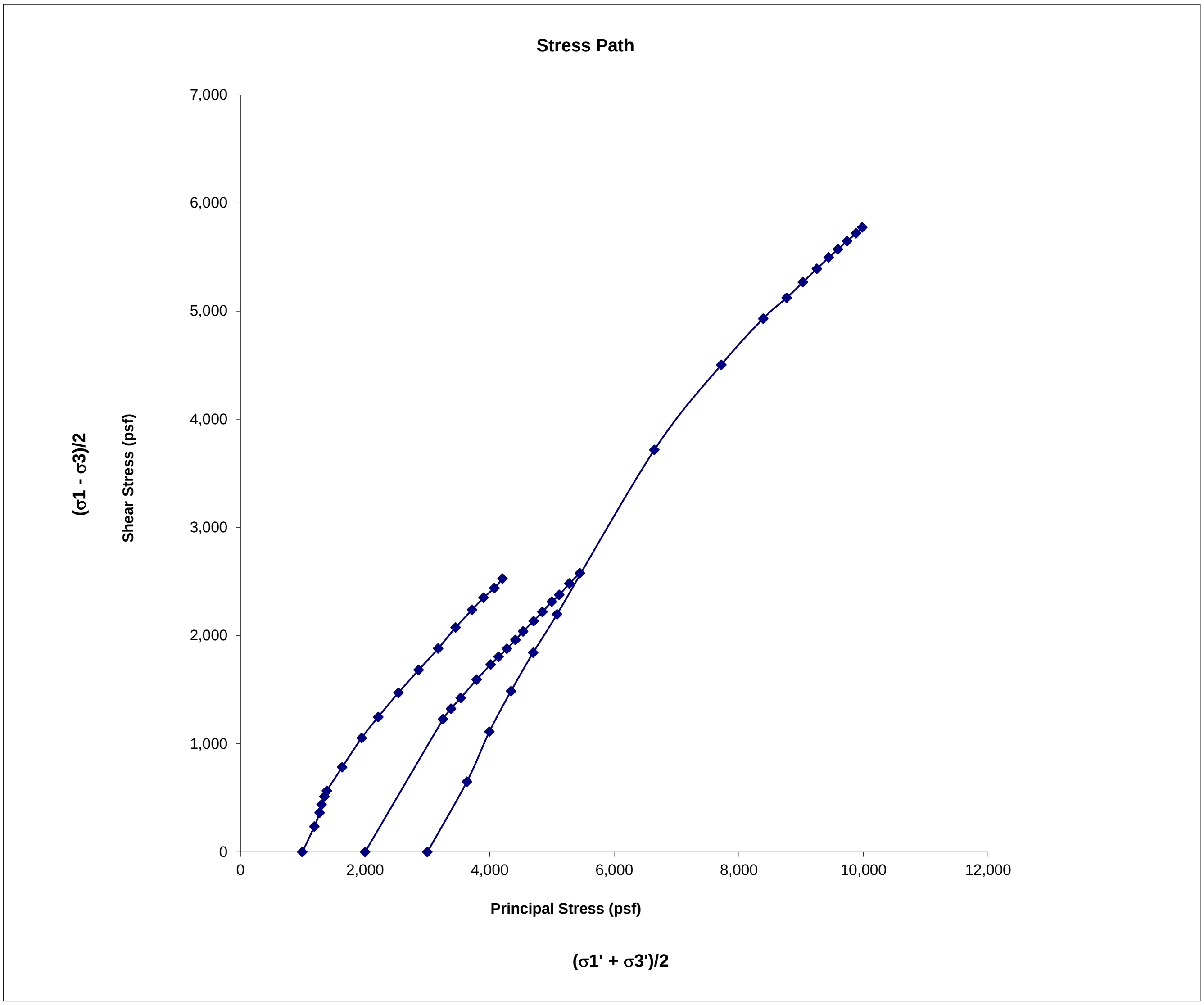
Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample ID H S A-1

Date Sampled: NA
Sampled By: Client
Date Tested: 7/12/2015
Tested by: H Benny

Project Number	15T009	LVDT	Load Cell	Strain Ratio	Corrected Area	Deviator Stress	Corrected Stress	Pore Pressure	Δ U	Induced Pore Pressure	σ'3	σ'1	σ'1/σ'3	(σ1−σ3)/2	(σ'1+σ'3)/2
Units		.001"	lbs		ft^2	psf	psf	psi	psi	psf	psf	psf			
Sample #	H S A-1	0	0	0	0.0468	0	0	23.0	0.0	0	994	994	1	0	994
Depth	25-27	5	22	0.001	0.0468	470	470	23.3	0.3	43	950	1420	1.49	235	1185
Cell pressure, stage 1	29.9	10	34	0.002	0.0468	726	725	23.6	0.6	86	907	1633	1.80	363	1270
Cell pressure, stage 2	36.9	15	41	0.003	0.0469	874	874	23.9	0.9	130	864	1738	2.01	437	1301
Cell pressure, stage 3	43.8	20	48	0.004	0.0469	1023	1022	24.1	1.1	158	835	1857	2.22	511	1346
Back Pressure	23	25	53	0.005	0.0470	1128	1127	24.2	1.2	173	821	1948	2.37	564	1384
Strain Rate	0.005	50	74	0.010	0.0472	1567	1565	24.0	1.0	144	850	2415	2.84	784	1632
Initial Platten Height	0	78	100	0.015	0.0475	2106	2103	23.7	0.7	101	893	2996	3.36	1053	1944
Initial Load Cell Reading	0	100	119	0.020	0.0477	2496	2492	23.2	0.2	29	965	3457	3.58	1248	2211
Initial Length	5.855	125	141	0.024	0.0479	2942	2938	22.5	-0.5	-72	1066	4003	3.76	1471	2534
Initial Area	0.0468	150	162	0.029	0.0482	3364	3358	21.7	-1.3	-187	1181	4539	3.84	1682	2860
Height after Saturation	5.121	175	182	0.034	0.0484	3760	3753	20.9	-2.1	-302	1296	5049	3.90	1880	3173
Height after Consolidation	5.121	200	202	0.039	0.0487	4152	4144	20.3	-2.7	-389	1382	5527	4.00	2076	3455
		225	219	0.044	0.0489	4479	4470	19.6	-3.4	-490	1483	5953	4.01	2239	3718
		250	231	0.049	0.0491	4700	4690	19.1	-3.9	-562	1555	6246	4.02	2350	3900
		275	241	0.054	0.0494	4878	4868	18.5	-4.5	-648	1642	6509	3.97	2439	4075
		300	251	0.059	0.0497	5054	5043	18.2	-4.8	-691	1685	6728	3.99	2527	4206
		300	0	0.059	0.0497	0	0	28.0	0.0	0	2002	2002	1	0	2000
		310	122	0.061	0.0498	2452	2440	22.8	-0.2	-29	2030	4470	2.20	1226	3250
		315	132	0.062	0.0498	2650	2638	22.6	-0.4	-58	2059	4697	2.28	1325	3378
		320	142	0.062	0.0499	2848	2836	22.2	-0.8	-115	2117	4952	2.34	1424	3535
		325	159	0.063	0.0499	3185	3173	21.6	-1.4	-202	2203	5376	2.44	1593	3790
		350	174	0.068	0.0502	3468	3454	21.0	-2.0	-288	2290	5744	2.51	1734	4017
		375	182	0.073	0.0504	3608	3594	20.6	-2.4	-346	2347	5941	2.53	1804	4144
		410	191	0.080	0.0508	3758	3743	20.2	-2.8	-403	2405	6148	2.56	1879	4276
		430	200	0.084	0.0510	3919	3903	19.8	-3.2	-461	2462	6365	2.59	1959	4414
		450	209	0.088	0.0513	4078	4061	19.5	-3.5	-504	2506	6567	2.62	2039	4536
		475	220	0.093	0.0515	4269	4252	19.0	-4.0	-576	2578	6830	2.65	2135	4704
		500	230	0.098	0.0518	4439	4421	18.6	-4.4	-634	2635	7057	2.68	2220	4846
		525	241	0.103	0.0521	4627	4608	18.2	-4.8	-691	2693	7300	2.71	2313	4997
		550	249	0.107	0.0524	4754	4734	17.8	-5.2	-749	2750	7485	2.72	2377	5118
		586	262	0.114	0.0528	4963	4942	17.4	-5.6	-806	2808	7750	2.76	2481	5279
		600	273	0.117	0.0530	5155	5134	16.9	-6.1	-878	2880	8014	2.78	2578	5447
		600	0	0.117	0.0530	0	0	23.0	0.0	0	2995	2995	1.00	0	3000
		605	69	0.118	0.0530	1302	1280	23.0	0.0	0	2995	4275	1.43	651	3635
		610	118	0.119	0.0531	2223	2202	23.7	0.7	101	2894	5096	1.76	1112	3995
		615	158	0.120	0.0531	2974	2952	23.9	0.9	130	2866	5818	2.03	1487	4342
		620	196	0.121	0.0532	3685	3663	23.9	0.9	130	2866	6529	2.28	1842	4697
		625	234	0.122	0.0532	4394	4372	23.7	0.7	101	2894	7267	2.51	2197	5081
		650	398	0.127	0.0535	7433	7410	23.4	0.4	58	2938	10348	3.52	3716	6643
		675	485	0.132	0.0538	9007	8983	21.4	-1.6	-230	3226	12209	3.79	4503	7717
		700	534	0.137	0.0542	9861	9837	19.7	-3.3	-475	3470	13307	3.83	4931	8389
		725	558	0.142	0.0545	10246	10221	18.4	-4.6	-662	3658	13879	3.79	5123	8768
		750	577	0.146	0.0548	10535	10509	17.6	-5.4	-778	3773	14282	3.79	5267	9027
		775	594	0.151	0.0551	10783	10757	16.9	-6.1	-878	3874	14630	3.78	5392	9252
		800	609	0.156	0.0554	10992	10965	16.3	-6.7	-965	3960	14925	3.77	5496	9442
		825	621	0.161	0.0557	11143	11116	15.8	-7.2	-1037	4032	15148	3.76	5572	9590
		850	633	0.166	0.0561	11293	11264	15.3	-7.7	-1109	4104	15368	3.74	5646	9736
		875	645	0.171	0.0564	11439	11410	14.8	-8.2	-1181	4176	15586	3.73	5720	9881
		900	655	0.176	0.0567	11548	11519	14.5	-8.5	-1224	4219	15738	3.73	5774	9979

Reviewed By:

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/12/2015
Sample #:	H S A-1	Tested by:	H Benny

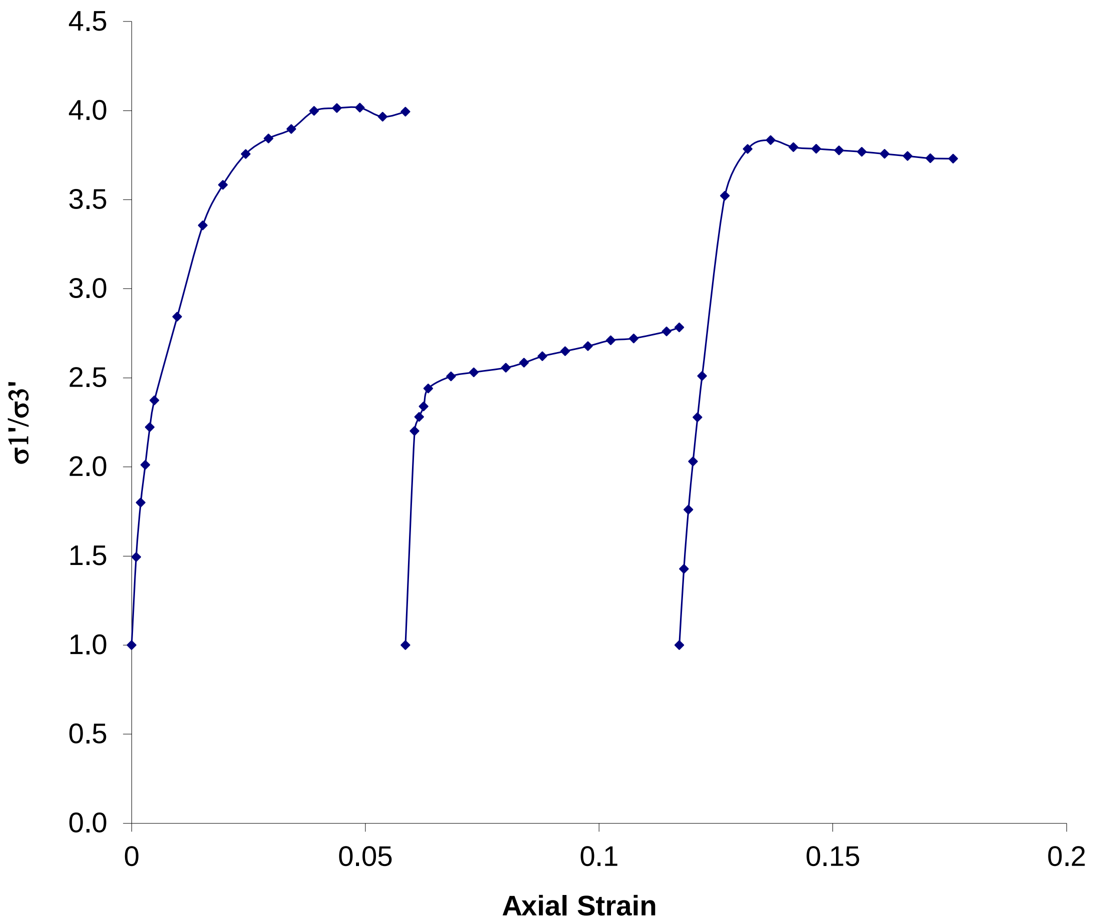


Reviewed By: HBenny

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample #: H S A-1

Date Sampled: NA
Sampled By: Client
Date Tested: 7/12/2015
Tested by: H Benny

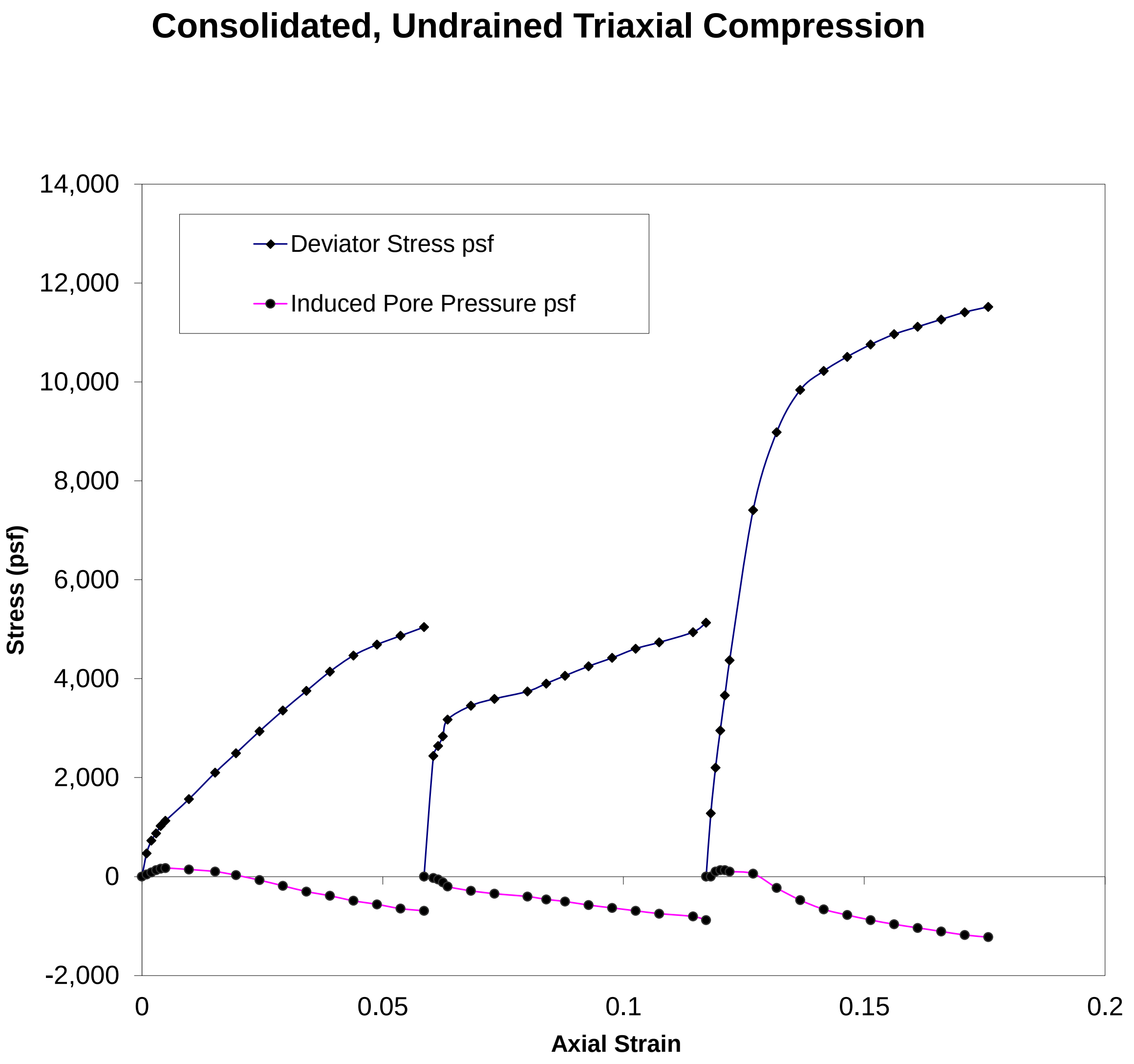
Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	
Number	Feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-1	25-27	16.3	22.0	0.620	0.573		0.695	1.019	118.7	97.3	6.9, 13.9, 20.8	23.0

Reviewed By:

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/12/2015
Sample #:	H S A-1	Tested by:	H Benny



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	(psi)
Number	feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-1	25-27	16.3	22.0	0.620	0.573		0.695	1.019	118.7	97.3	6.9, 13.9, 20.8	23.0

Reviewed By: HBenny

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

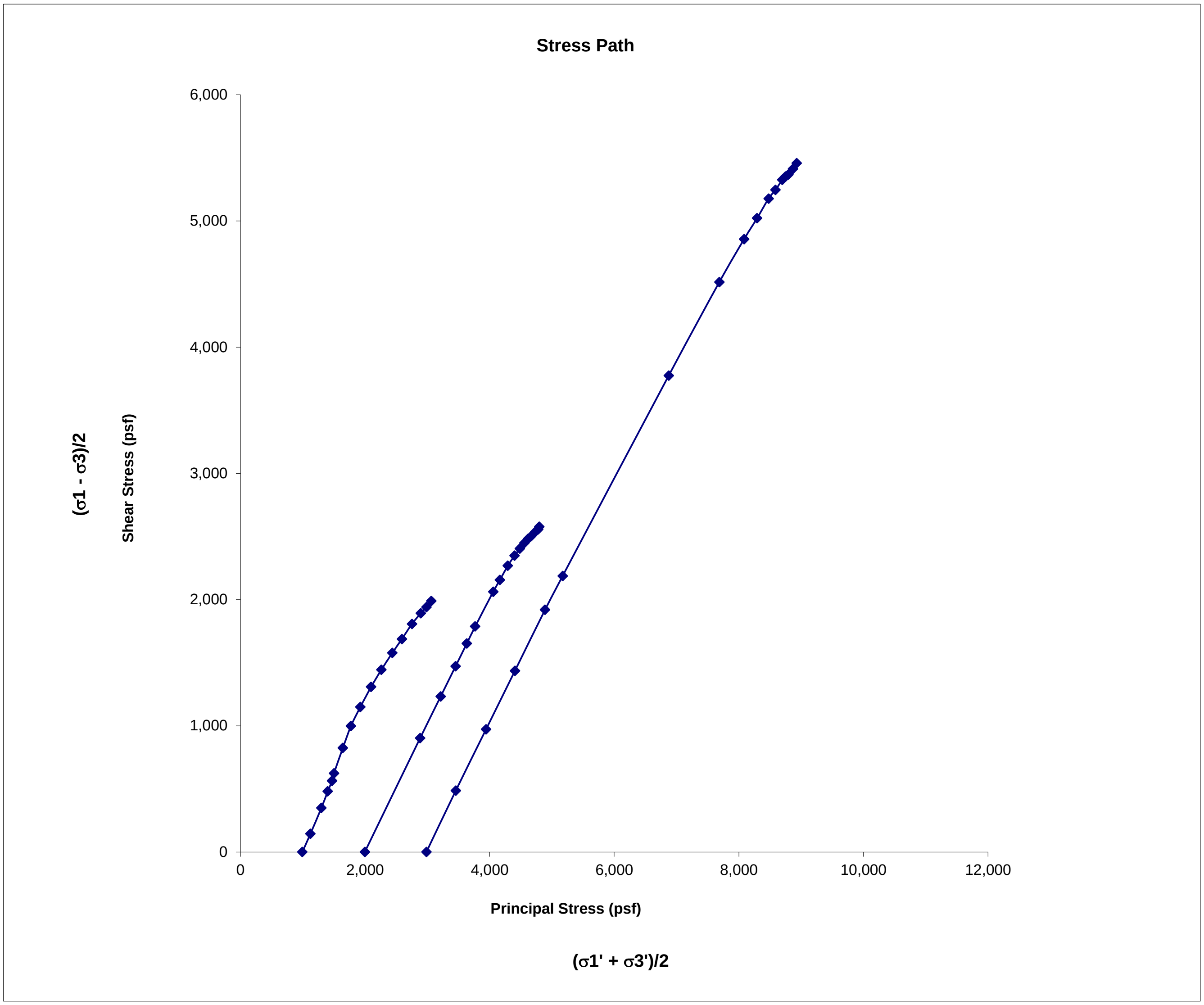
Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample ID H S A-3

Date Sampled: NA
Sampled By: Client
Date Tested: 7/12/2015
Tested by: H Benny

Project Number	15T009	LVDT	Load Cell	Strain Ratio	Corrected Area	Deviator Stress	Corrected Stress	Pore Pressure	Δ U	Induced Pore Pressure	σ'3	σ'1	σ'1/σ'3	(σ1−σ3)/2	(σ'1+σ'3)/2
Units		.001"	lbs		ft^2	psf	psf	psi	psi	psf	psf	psf			
Sample #	H S A-3	0	0	0	0.0415	0	0	23.0	0.0	0	994	994	1	0	994
Depth	15	5	12	0.001	0.0416	289	288	23.1	0.1	14	979	1268	1.29	144	1123
Cell pressure, stage 1	29.9	10	29	0.002	0.0416	697	697	23.3	0.3	43	950	1647	1.73	348	1299
Cell pressure, stage 2	36.9	15	40	0.003	0.0416	960	960	23.5	0.5	72	922	1882	2.04	480	1402
Cell pressure, stage 3	43.8	20	47	0.003	0.0417	1128	1127	23.6	0.6	86	907	2034	2.24	564	1471
Back Pressure	23	25	52	0.004	0.0417	1247	1246	23.8	0.8	115	878	2124	2.42	623	1501
Strain Rate	0.005	50	69	0.008	0.0419	1647	1645	24.2	1.2	173	821	2466	3.00	824	1643
Initial Platten Height	0	78	84	0.013	0.0421	1996	1993	24.5	1.5	216	778	2770	3.56	998	1774
Initial Load Cell Reading	0	100	97	0.017	0.0422	2296	2292	24.5	1.5	216	778	3070	3.95	1148	1924
Initial Length	6.017	125	111	0.021	0.0424	2616	2611	24.4	1.4	202	792	3403	4.30	1308	2098
Initial Area	0.0415	150	123	0.025	0.0426	2886	2881	24.2	1.2	173	821	3702	4.51	1443	2261
Height after Saturation	5.963	175	135	0.029	0.0428	3154	3148	23.9	0.9	130	864	4012	4.64	1577	2438
Height after Consolidation	5.963	200	145	0.034	0.0430	3373	3366	23.6	0.6	86	907	4273	4.71	1687	2590
		225	156	0.038	0.0432	3614	3605	23.3	0.3	43	950	4556	4.79	1807	2753
		250	164	0.042	0.0434	3782	3773	22.9	-0.1	-14	1008	4781	4.74	1891	2895
		275	169	0.046	0.0435	3881	3871	22.6	-0.4	-58	1051	4922	4.68	1940	2986
		300	174	0.050	0.0437	3978	3967	22.4	-0.6	-86	1080	5047	4.67	1989	3063
		300	0	0.050	0.0437	0	-11	23.0	0.0	0	2002	1991	0.99	0	1996
		305	79	0.051	0.0438	1804	1793	23.1	0.1	14	1987	3780	1.90	902	2884
		310	108	0.052	0.0438	2465	2453	23.1	0.1	14	1987	4441	2.23	1232	3214
		315	129	0.053	0.0439	2941	2930	23.1	0.1	14	1987	4917	2.47	1471	3452
		320	145	0.054	0.0439	3303	3292	23.1	0.1	14	1987	5279	2.66	1652	3633
		325	157	0.055	0.0439	3573	3562	23.1	0.1	14	1987	5549	2.79	1787	3768
		350	182	0.059	0.0441	4124	4111	23.0	0.0	0	2002	6113	3.05	2062	4057
		375	191	0.063	0.0443	4309	4295	22.9	-0.1	-14	2016	6311	3.13	2154	4164
		400	202	0.067	0.0445	4537	4522	22.8	-0.2	-29	2030	6552	3.23	2268	4291
		425	210	0.071	0.0447	4695	4680	22.6	-0.4	-58	2059	6739	3.27	2347	4399
		450	216	0.075	0.0449	4807	4791	22.4	-0.6	-86	2088	6879	3.29	2404	4484
		475	221	0.080	0.0451	4896	4879	22.2	-0.8	-115	2117	6996	3.31	2448	4556
		500	225	0.084	0.0453	4962	4944	22.0	-1.0	-144	2146	7090	3.30	2481	4618
		525	228	0.088	0.0456	5005	4987	21.8	-1.2	-173	2174	7161	3.29	2503	4668
		550	232	0.092	0.0458	5070	5050	21.6	-1.4	-202	2203	7254	3.29	2535	4728
		575	235	0.096	0.0460	5112	5091	21.4	-1.6	-230	2232	7323	3.28	2556	4778
		600	238	0.101	0.0462	5153	5132	21.4	-1.6	-230	2232	7364	3.30	2576	4798
		600	0	0.101	0.0462	0	-21	23.0	0.0	0	2995	2974	0.99	0	2985
		605	45	0.101	0.0462	973	952	23.1	0.1	14	2981	3933	1.32	487	3457
		610	90	0.102	0.0463	1945	1924	23.1	0.1	14	2981	4904	1.65	972	3943
		615	133	0.103	0.0463	2871	2850	23.1	0.1	14	2981	5831	1.96	1436	4406
		620	178	0.104	0.0464	3839	3818	23.1	0.1	14	2981	6799	2.28	1920	4890
		625	203	0.105	0.0464	4375	4353	23.0	0.0	0	2995	7348	2.45	2187	5172
		650	352	0.109	0.0466	7550	7528	22.2	-0.8	-115	3110	10638	3.42	3775	6874
		675	423	0.113	0.0468	9030	9007	21.7	-1.3	-187	3182	12189	3.83	4515	7686
		700	457	0.117	0.0471	9710	9686	21.3	-1.7	-245	3240	12926	3.99	4855	8083
		725	475	0.122	0.0473	10044	10020	21.0	-2.0	-288	3283	13303	4.05	5022	8293
		750	492	0.126	0.0475	10354	10329	20.8	-2.2	-317	3312	13641	4.12	5177	8476
		775	501	0.130	0.0477	10493	10467	20.5	-2.5	-360	3355	13822	4.12	5246	8589
		800	511	0.134	0.0480	10651	10624	20.3	-2.7	-389	3384	14008	4.14	5325	8696
		825	516	0.138	0.0482	10703	10675	20.1	-2.9	-418	3413	14088	4.13	5351	8751
		850	520	0.143	0.0484	10733	10705	19.9	-3.1	-446	3442	14147	4.11	5367	8794
		875	527	0.147	0.0487	10825	10796	19.7	-3.3	-475	3470	14266	4.11	5412	8868
		900	534	0.151	0.0489	10915	10885	19.6	-3.4	-490	3485	14370	4.12	5457	8927

Reviewed By:

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/12/2015
Sample #:	H S A-3	Tested by:	H Benny



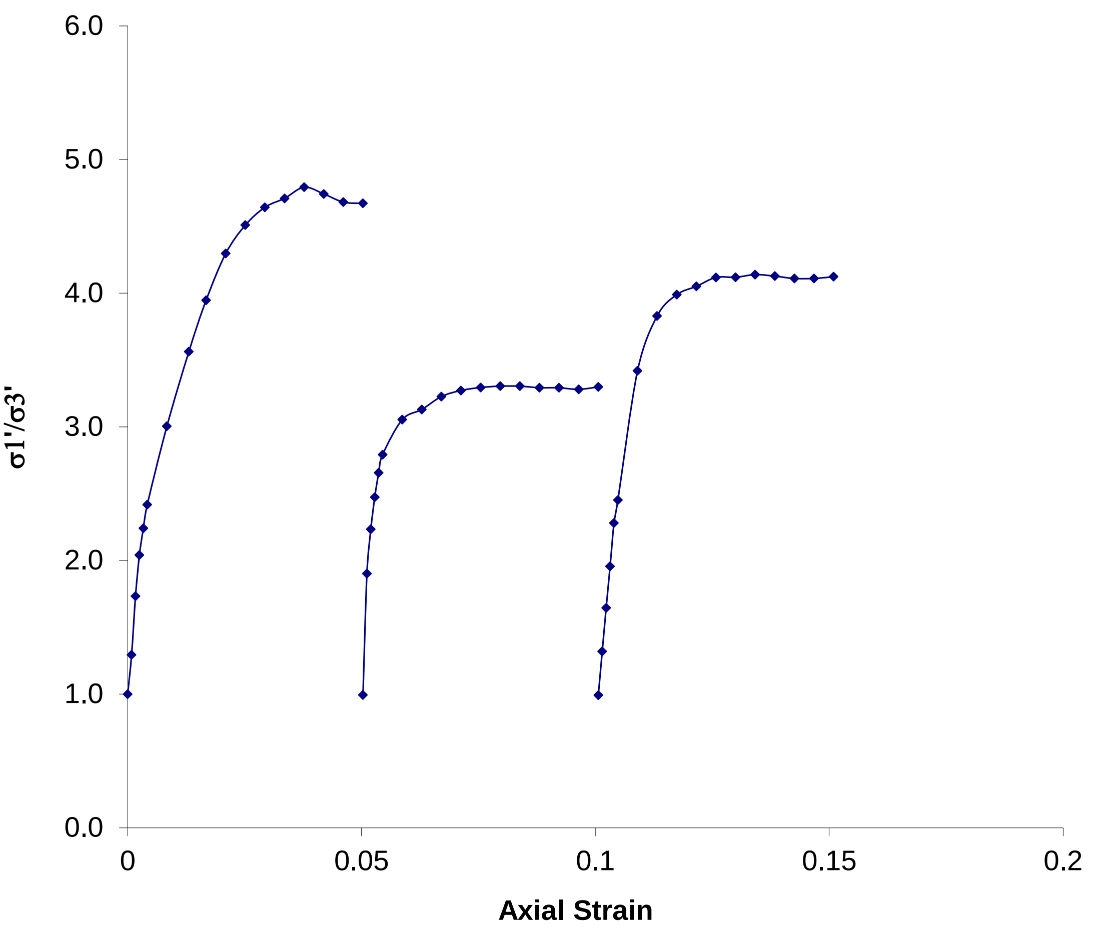
Reviewed By: H Benny

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/12/2015
Sample #:	H S A-3	Tested by:	H Benny

Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	
Number	Feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-3	15.0	7.6	22.2	0.623	0.578		0.325	1.015	109.7	89.8	6.9, 13.9, 20.8	23.0

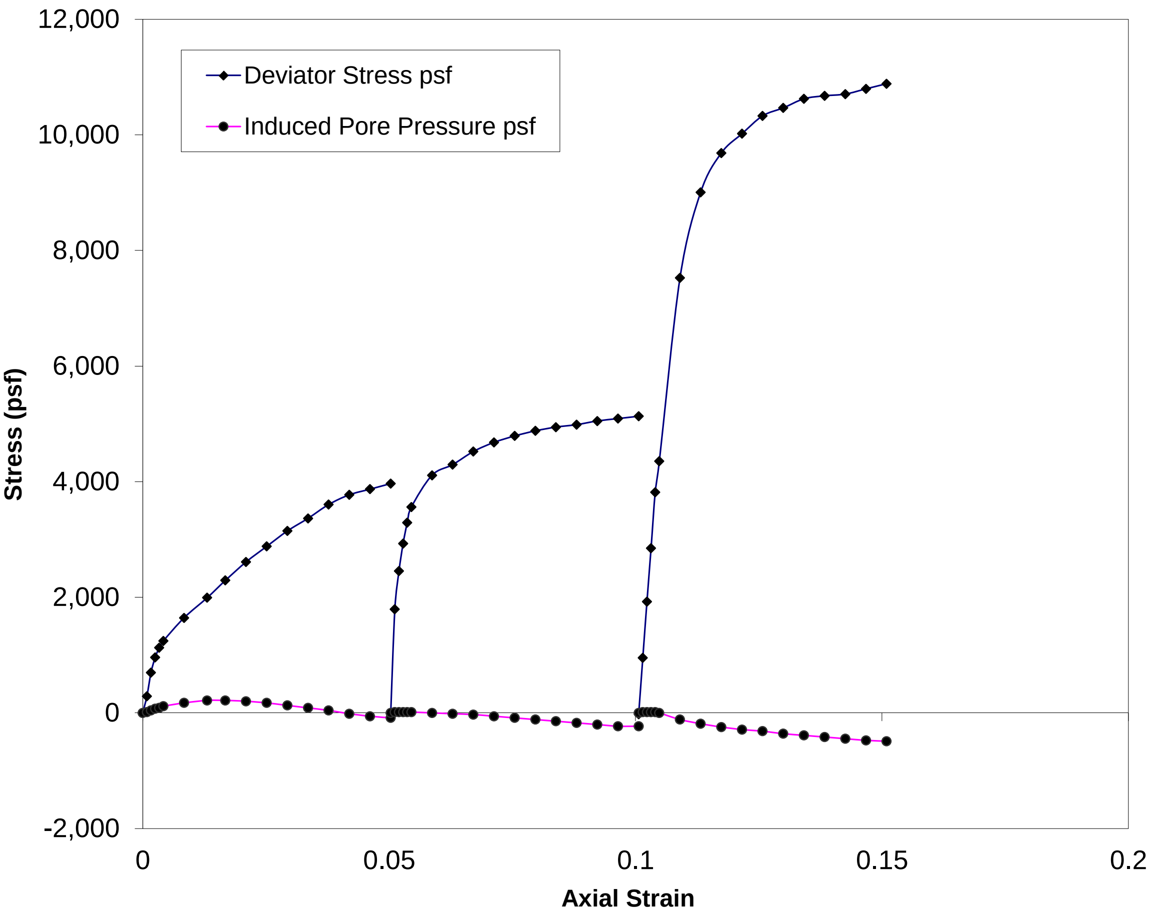
Reviewed By: HBenny

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/12/2015
Sample #:	H S A-3	Tested by:	H Benny

Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	(psi)
Number	feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-3	15	7.6	22.2	0.623	0.578		0.325	1.015	109.7	89.8	6.9, 13.9, 20.8	23.0

Reviewed By: HBenny

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

One-Dimensional Consolidation Report

Project: Van Stone Mine
Project #: 15K090
Client: GeoEngineers
Sample#: HSA7 at 30 ft

Date Received: 30-Jun-15
Sampled By: Client
Date Tested: 13-Jul-14
Tested By: C Laramie

One-Dimensional Consolidation performed in accordance with ASTM D2435/D2435M

Sample Description
Gray Silty Sand

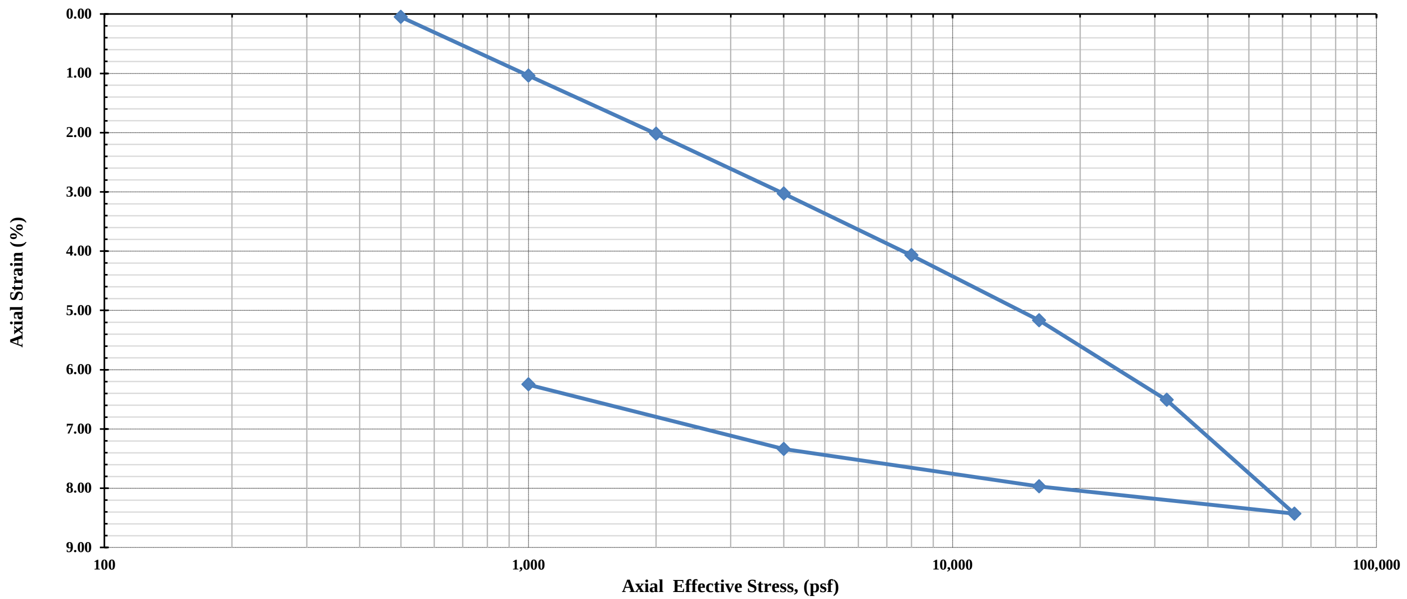
Equipment Used
GeoTac Sigma-1 Load Frame

Sample Preparation
○ Natural Moisture ● Inundated

Test Method Used
● Method A ○ Method B

Data Interpretation Procedure
○ Procedure 1 (Log) ● Procedure 2 (SqRt)

Axial Strain versus Axial Effective Stress



Step No.	Vertical Stress (psf)	Vertical Strain (%)		D_0	D_{90}	D_{100}	D_{50}	H_{100}	H_{50}	t_{50}	c_v
1	500	0.05			**Manual Calculations**			0.8995	-	-	N/A
2	1000	1.04		0.0024	0.0070	0.0075	0.0050	0.8907	0.8945	0.36	0.1095
3	2000	2.02		0.0042	0.0059	0.0061	0.0051	0.8818	0.8848	0.36	0.1071
4	4000	3.03		0.0560	0.0068	0.0013	0.0287	0.8727	0.8734	1.00	0.0376
5	8000	4.07		0.0050	0.0078	0.0081	0.0066	0.8633	0.8674	1.44	0.0257
6	16000	5.17		0.0052	0.0074	0.0076	0.0064	0.8534	0.8572	0.36	0.1005
7	32000	6.51		0.0064	0.0100	0.0104	0.0084	0.8414	0.8466	0.36	0.0981
8	64000	8.43		0.0090	0.0123	0.0127	0.0108	0.8241	0.8304	0.36	0.0943
9	16000	7.97						0.8283	0.8283		N/A
10	4000	7.34						0.8340	0.8340		N/A
11	1000	6.25						0.8437	0.8437		N/A

Comments:

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

One-Dimensional Consolidation Report

Project: Van Stone Mine
Project #: 15K090
Client: GeoEngineers
Sample#: HSA7 at 30 ft

Date Received: 30-Jun-15
Sampled By: Client
Date Tested: 13-Jul-14
Tested By: C Laramie

One-Dimensional Consolidation performed in accordance with ASTM D2435/D2435M

Sample Description
Gray Silty Sand

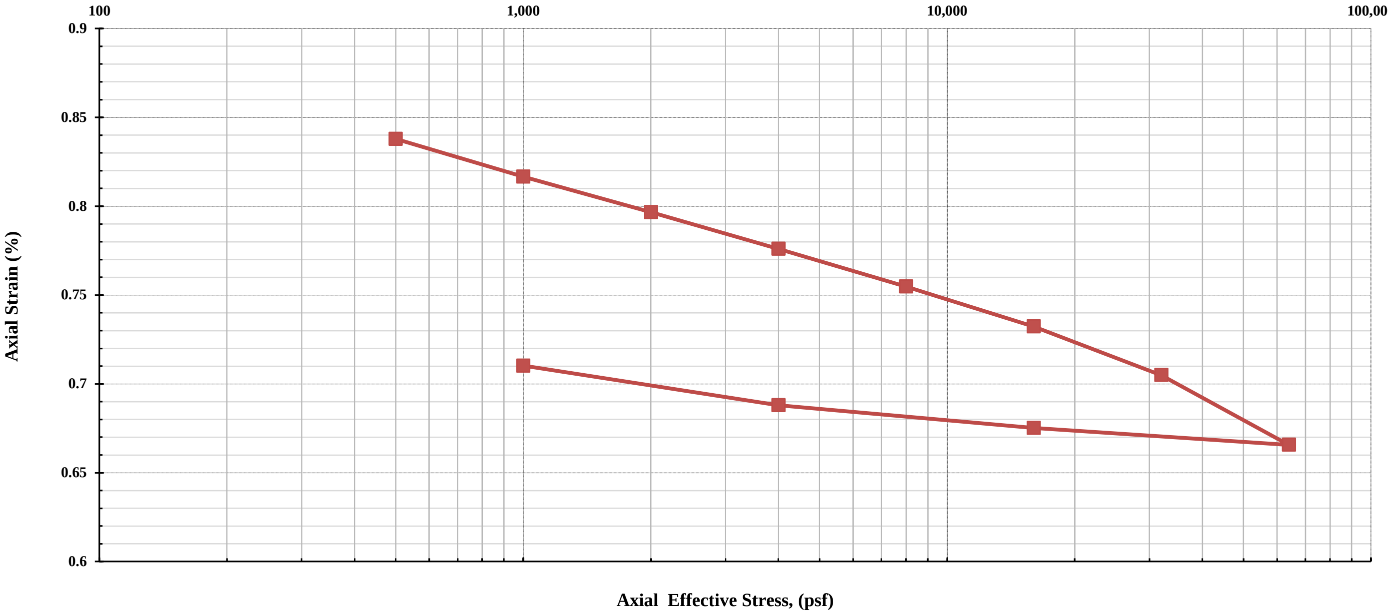
Equipment Used
GeoTac Sigma-1 Load Frame

Sample Preparation: ○ Natural Moisture ● Inundated

Test Method Used: ● Method A ○ Method B

Data Interpretation Procedure: ○ Procedure 1 (Log) ● Procedure 2 (SqRt)

Axial Strain versus Axial Effective Stress



Load, psf	Void Ratio
500	0.838
1000	0.817
2000	0.797
4000	0.776
8000	0.755
16000	0.732
32000	0.705
64000	0.666
16000	0.675
4000	0.688
1000	0.710

Comments: ______

Reviewed by: HBerry

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

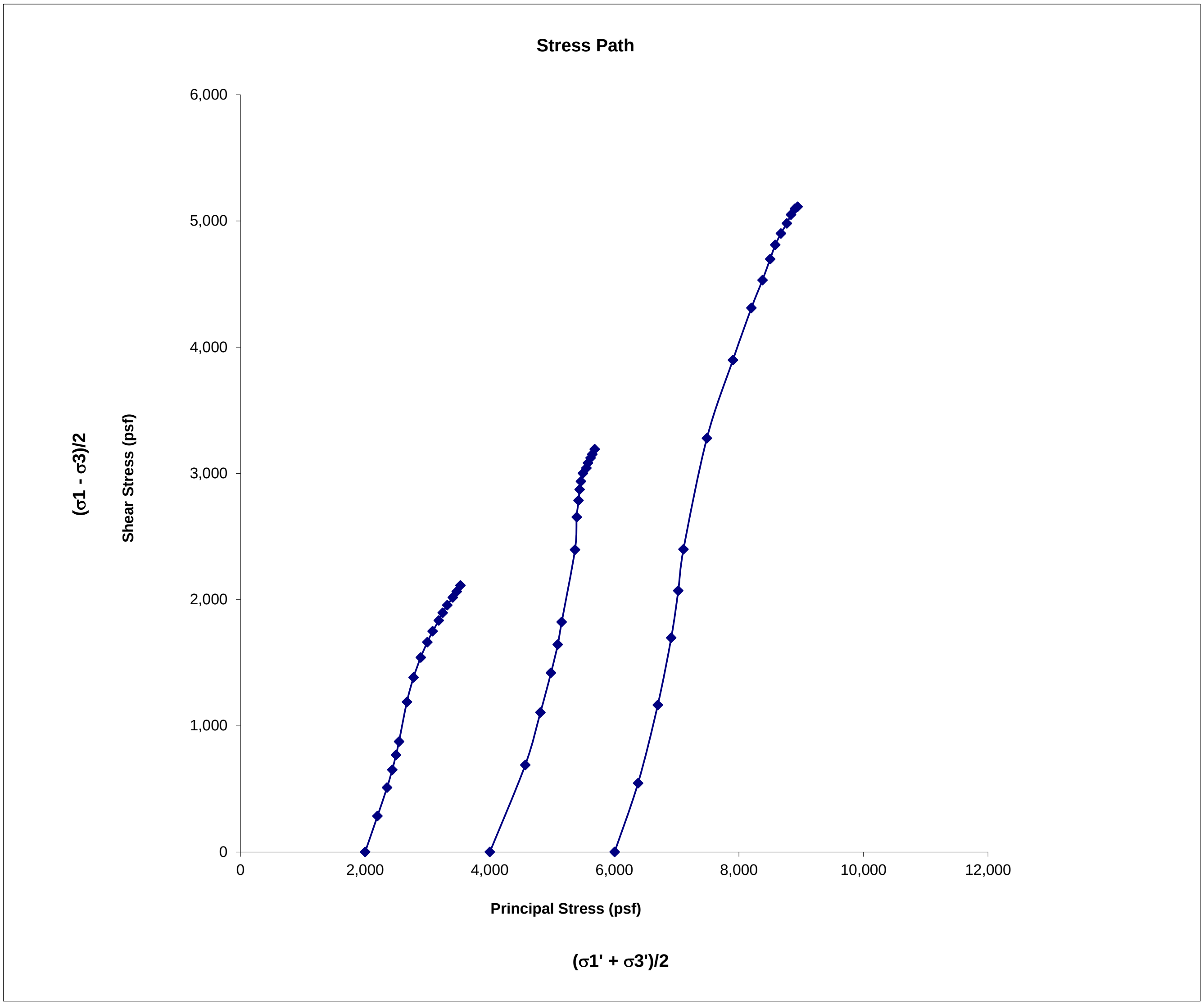
Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample ID H S A-7

Date Sampled: NA
Sampled By: Client
Date Tested: 7/22/2015
Tested by: H Benny

Project Number	15T009	LVDT	Load Cell	Strain Ratio	Corrected Area	Deviator Stress	Corrected Stress	Pore Pressure	Δ U	Induced Pore Pressure	σ'3	σ'1	σ'1/σ'3	(σ1−σ3)/2	(σ'1+σ'3)/2
Units		.001"	lbs		ft^2	psf	psf	psi	psi	psf	psf	psf			
Sample #	H S A-7	0	0	0	0.0421	0	0	23.0	0.0	0	2002	2002	1	0	2002
Depth	30	5	24	0.001	0.0421	569	569	23.6	0.6	86	1915	2484	1.30	285	2200
Cell pressure, stage 1	36.9	10	43	0.002	0.0422	1019	1019	24.1	1.1	158	1843	2862	1.55	510	2353
Cell pressure, stage 2	50.8	15	55	0.002	0.0422	1303	1302	24.5	1.5	216	1786	3088	1.73	651	2437
Cell pressure, stage 3	64.7	20	65	0.003	0.0422	1539	1538	24.9	1.9	274	1728	3266	1.89	769	2497
Back Pressure	23	25	74	0.004	0.0423	1750	1749	25.3	2.3	331	1670	3420	2.05	875	2545
Strain Rate	0.005	50	101	0.008	0.0425	2379	2377	26.6	3.6	518	1483	3860	2.60	1189	2672
Initial Platten Height	0	78	118	0.013	0.0427	2766	2764	27.2	4.2	605	1397	4160	2.98	1383	2779
Initial Load Cell Reading	0	100	132	0.016	0.0428	3083	3080	27.5	4.5	648	1354	4433	3.28	1542	2893
Initial Length	6.167	125	143	0.020	0.0430	3326	3322	27.6	4.6	662	1339	4661	3.48	1663	3000
Initial Area	0.0421	150	151	0.025	0.0432	3498	3492	27.6	4.6	662	1339	4832	3.61	1749	3085
Height after Saturation	6.107	175	159	0.029	0.0434	3668	3661	27.5	4.5	648	1354	5015	3.70	1834	3184
Height after Consolidation	6.107	200	165	0.033	0.0435	3790	3783	27.5	4.5	648	1354	5136	3.79	1895	3245
		225	171	0.037	0.0437	3911	3903	27.4	4.4	634	1368	5271	3.85	1956	3320
		250	177	0.041	0.0439	4031	4022	27.2	4.2	605	1397	5419	3.88	2016	3408
		275	182	0.045	0.0441	4127	4118	27.1	4.1	590	1411	5529	3.92	2064	3470
		300	187	0.049	0.0443	4223	4212	27.0	4.0	576	1426	5638	3.95	2111	3532
		300	0	0.049	0.0443	0	0	23.0	0.0	0	4003	4003	1	0	4003
		305	61	0.050	0.0443	1376	1365	23.8	0.8	115	3888	5253	1.35	688	4571
		310	98	0.051	0.0444	2209	2198	25.0	2.0	288	3715	5913	1.59	1105	4814
		315	126	0.052	0.0444	2838	2827	26.0	3.0	432	3571	6398	1.79	1419	4985
		320	146	0.052	0.0444	3285	3274	26.8	3.8	547	3456	6730	1.95	1643	5093
		325	162	0.053	0.0445	3642	3631	27.6	4.6	662	3341	6972	2.09	1821	5156
		350	214	0.057	0.0447	4791	4778	30.1	7.1	1022	2981	7759	2.60	2395	5370
		375	238	0.061	0.0449	5305	5292	31.7	8.7	1253	2750	8042	2.92	2652	5396
		400	251	0.065	0.0451	5570	5556	32.4	9.4	1354	2650	8206	3.10	2785	5428
		425	260	0.070	0.0453	5745	5730	32.9	9.9	1426	2578	8308	3.22	2872	5443
		450	267	0.074	0.0455	5873	5858	33.2	10.2	1469	2534	8392	3.31	2937	5463
		475	274	0.078	0.0457	6001	5984	33.4	10.4	1498	2506	8490	3.39	3000	5498
		500	279	0.082	0.0459	6083	6066	33.3	10.3	1483	2520	8586	3.41	3042	5553
		525	284	0.086	0.0461	6165	6147	33.4	10.4	1498	2506	8652	3.45	3082	5579
		550	289	0.090	0.0463	6245	6226	33.4	10.4	1498	2506	8732	3.48	3122	5619
		575	293	0.094	0.0465	6303	6283	33.4	10.4	1498	2506	8789	3.51	3151	5647
		600	298	0.098	0.0467	6382	6361	33.4	10.4	1498	2506	8867	3.54	3191	5686
		600	0	0.098	0.0467	0	0	23.0	0.0	0	6005	6005	1.00	0	6005
		605	51	0.099	0.0467	1091	1071	24.1	1.1	158	5846	6917	1.18	546	6382
		610	109	0.100	0.0468	2330	2309	26.2	3.2	461	5544	7853	1.42	1165	6699
		615	159	0.101	0.0468	3396	3375	28.4	5.4	778	5227	8602	1.65	1698	6915
		620	194	0.102	0.0469	4139	4119	30.2	7.2	1037	4968	9087	1.83	2070	7027
		625	225	0.102	0.0469	4796	4775	31.9	8.9	1282	4723	9499	2.01	2398	7111
		650	309	0.106	0.0471	6557	6535	35.4	12.4	1786	4219	10755	2.55	3278	7487
		675	369	0.111	0.0473	7794	7772	36.8	13.8	1987	4018	11790	2.93	3897	7904
		700	410	0.115	0.0476	8621	8597	37.6	14.6	2102	3902	12500	3.20	4310	8201
		725	433	0.119	0.0478	9062	9038	37.9	14.9	2146	3859	12897	3.34	4531	8378
		750	451	0.123	0.0480	9395	9370	38.2	15.2	2189	3816	13186	3.46	4697	8501
		775	464	0.127	0.0482	9621	9595	38.4	15.4	2218	3787	13383	3.53	4810	8585
		800	475	0.131	0.0485	9802	9777	38.4	15.4	2218	3787	13564	3.58	4901	8675
		825	485	0.135	0.0487	9962	9935	38.3	15.3	2203	3802	13737	3.61	4981	8769
		850	494	0.139	0.0489	10099	10071	38.3	15.3	2203	3802	13873	3.65	5049	8837
		875	501	0.143	0.0492	10193	10165	38.2	15.2	2189	3816	13981	3.66	5096	8898
		900	505	0.147	0.0494	10225	10197	38.0	15.0	2160	3845	14041	3.65	5113	8943

Reviewed By:

Project:	Van Stone Mine	Date Sampled:	NA
Project #:	15T009	Sampled By:	Client
Client:	GeoEngineers	Date Tested:	7/22/2015
Sample #:	H S A-7	Tested by:	H Benny



Reviewed By: HBenny

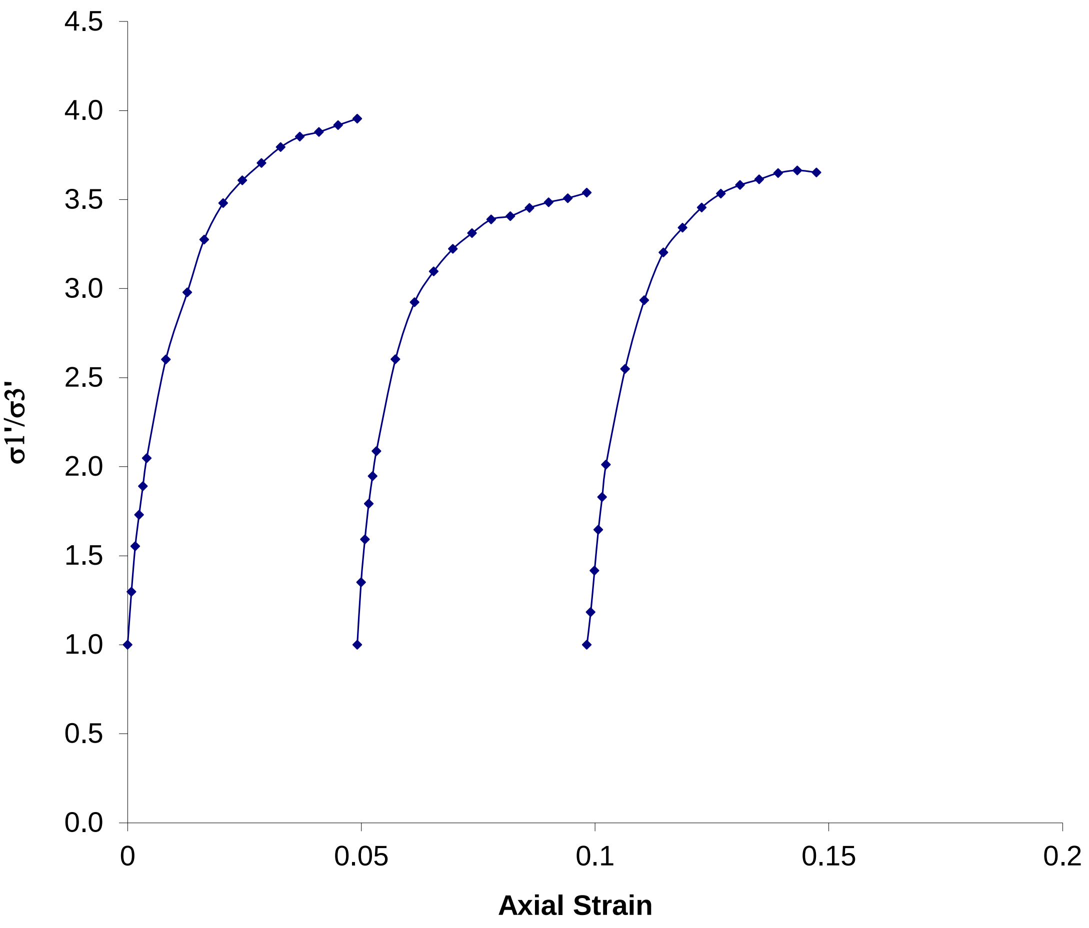
Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample #: H S A-7

Date Sampled: NA
Sampled By: Client
Date Tested: 7/22/2015
Tested by: H Benny

Consolidated, Undrained Triaxial Compression



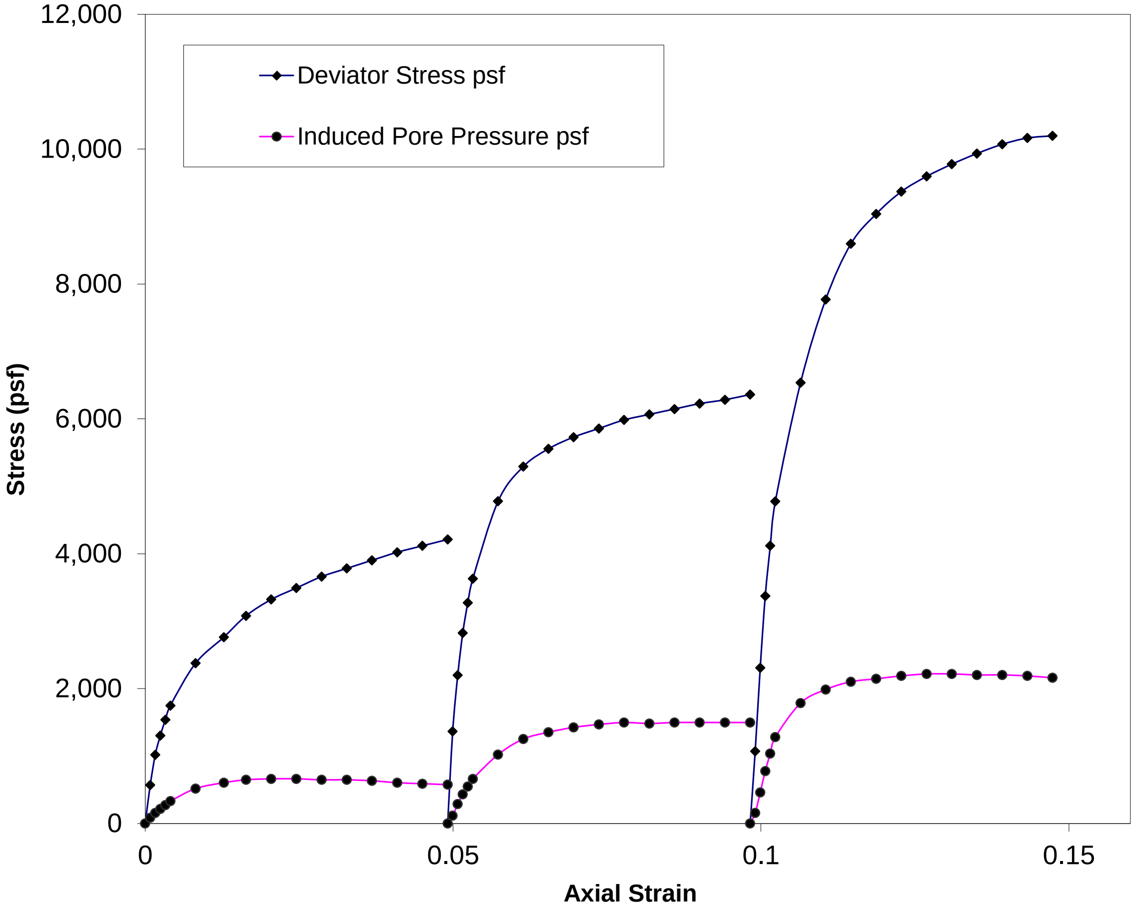
Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	
Number	Feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-7	30.0	25.6	26.7	0.768	0.706		0.893	1.012	118.9	93.8	13.9, 27.8, 41.7	23.0

Reviewed By: H Benny

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Sample #: H S A-7

Date Sampled: NA
Sampled By: Client
Date Tested: 7/22/2015
Tested by: H Benny

Consolidated, Undrained Triaxial Compression



Sample	Depth	Water Content		Void Ratio			Saturation		Unit Weight		Pressure	(psi)
Number	feet	Initial	Final	Initial	Final		Initial	Final	Initial Wet	Initial Dry	Consol	Back
H S A-7	30	25.6	26.7	0.768	0.706		0.893	1.012	118.9	93.8	13.9, 27.8, 41.7	23.0

Reviewed By: HBenny

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane, WA

Attn: Justin Rice

Date: May 15, 2015
Project: Van Stone Mine
Project #: 15T009
Sample #: T15-0861

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
x	Atterberg Limits	Non-plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Source: HSA-1-3-15-17
Sample #: T15-0861

Date Received: 3-Jun-15
Sampled By: Client
Date Tested: 24-Jun-15
Tested By: CL

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

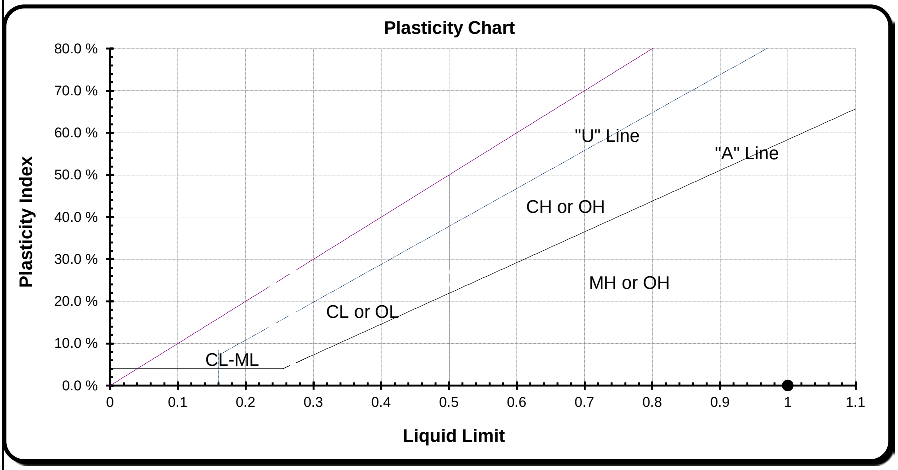
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

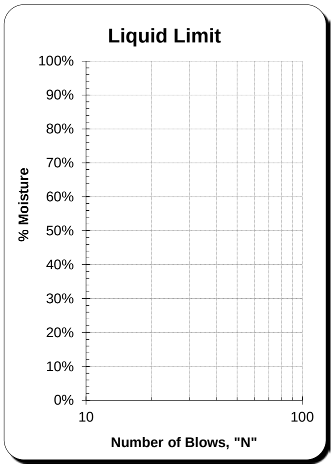
Liquid Limit @ 25 Blows:	N/A
Plastic Limit:	N/A
Plasticity Index, I_P:	N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04


Plasticity Chart


Liquid Limit

Comments: Sample is Non-plastic, slips in the cup and will not reach 25 blows

Reviewed by: H Berry

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine
Project #: 15T009
Client : GeoEngineers
Source: HSA-1 (15-17)
MTC Sample#: T15-0861

Date Received: June 3, 2015
Sampled By: Client
Date Tested: June 24, 2015
Tested By: CL

CASE NARRATIVE

1. One sample was submitted for Atterberg Limits, according to ASTM D4318, and hydrometer analysis, according to ASTM D422. The sample was prepared according to ASTM D421.
2. The sample was considered non-plastic, it slipped in the cup and could not reach 25 blows.
3. An assumed specific gravity of 2.65 was used in the hydrometer calculations.
4. A standard milkshake mixer type device was used to disperse the fine fraction sample for one minute.
5. The data is provided in summary tables and plots.
6. There were no noted anomalies in this project.

Reviewed by:

Materials Testing & Consulting, Inc.
Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 24, 2015

Client: GeoEngineers
Sampled by: Client
Tested by: CL

Percent Finer (Passing) Than the Indicated Size

Sieve Size (microns)	3"	2"	1 1/2"	1"	3/4"	1/2"	3/8"	#4 (4750)	#10 (2000)	#20 (850)	#40 (425)	#60 (250)	#100 (150)	#200 (75)	32	22	13	9	7	3.2	1.3
T15-0861	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.9	99.5	94.2	80.2	50.7	16.5	9.2	5.5	4.6	3.7	2.8	0.9

Testing performed according to ASTM D421/D422
Organics were not removed prior to analysis. The grain size distribution reported is the "apparent grain size distribution".

Reviewed by: ______________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine
Project #: 15T009
Date Received: June 3, 2015
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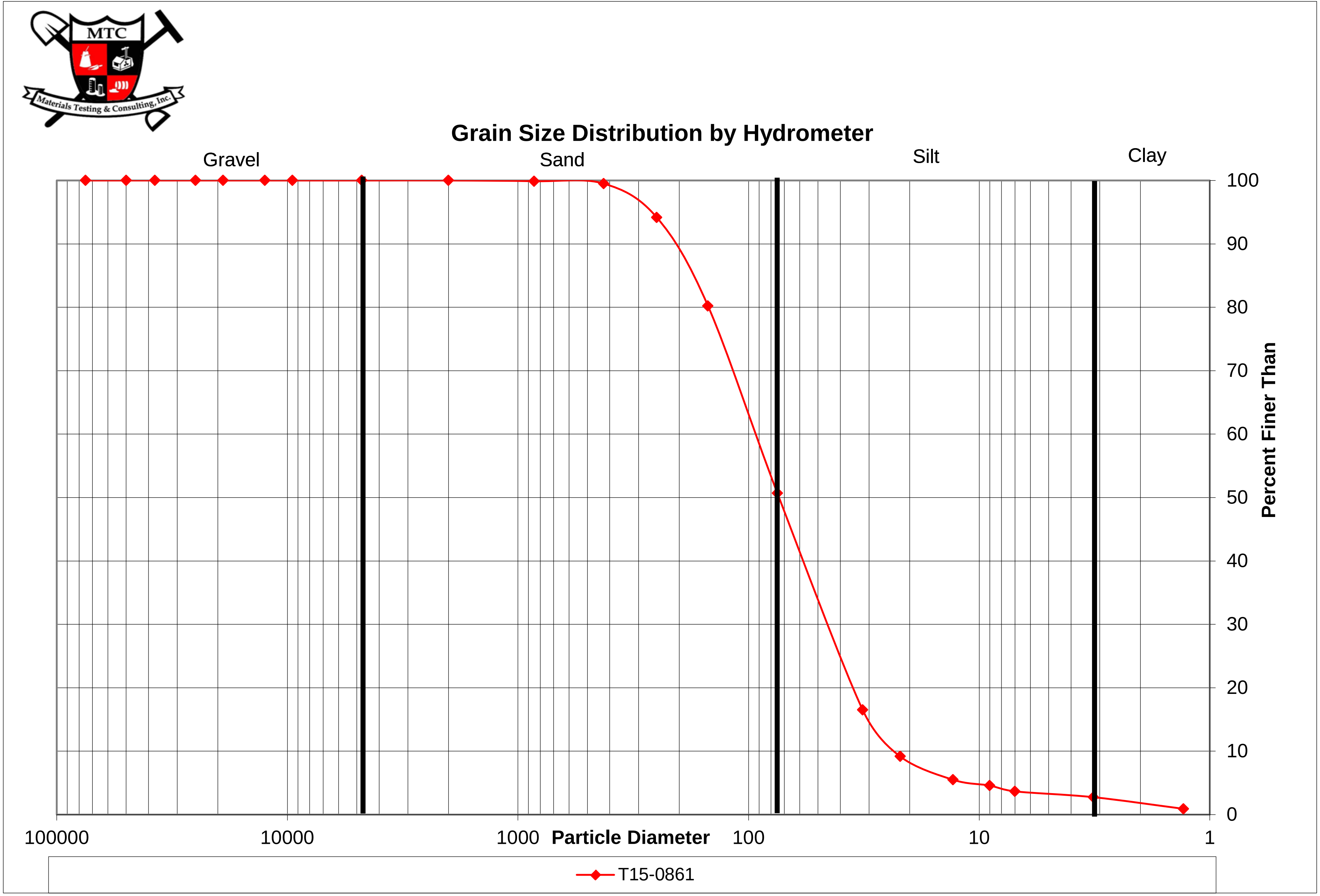
Percent Retained in Each Size Fraction

Description	% Coarse Gravel				% Gravel			% Coarse Sand	% Medium Sand		% Fine Sand			% Very Coarse Silt	% Coarse Silt	% Medium Silt	% Fine Silt	% Fine Silt	% Very Fine Silt	% Clay	
Particle Size (microns)	3-2"	2-1 1/2"	1 1/2"-1"	1-3/4"	3/4-1/2"	1/2-3/8"	3/8"-4750	4750-2000	2000-850	850-425	425-250	250-150	150-75	75-32	32-22	22-13	13-9	9-7	7-3.2	3.2-1.3	<1.3
T15-0861	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.4	5.3	13.9	29.5	34.2	7.3	3.7	0.9	0.9	0.9	1.8	0.9

Testing performed according to ASTM D421/D422

Organics were not removed prior to analysis. The grain size distribution reported is the "apparent grain size distribution".

Reviewed by: ______________________



Grain Size Distribution by Hydrometer

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane, WA
Attn: Justin Rice

Date: May 15, 2015
Project: Van Stone Mine
Project #: 15T009
Sample #: T15-0862

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
	Organic Content				
x	Atterberg Limits	Non-plastic			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Source: HSA-1-5-25-27
Sample #: T15-0862

Date Received: 3-Jun-15
Sampled By: Client
Date Tested: 24-Jun-15
Tested By: CL

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

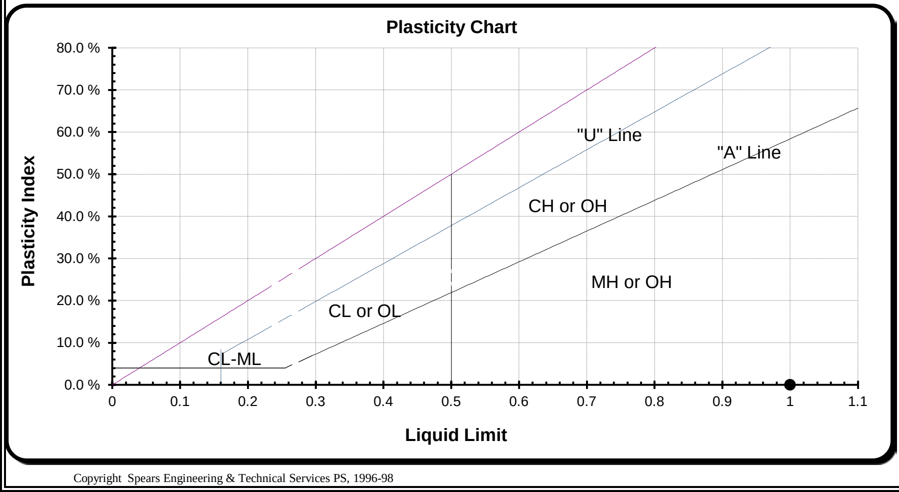
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

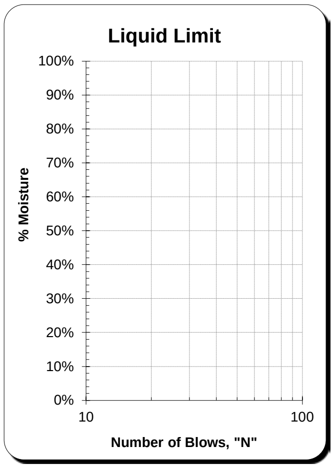
Liquid Limit @ 25 Blows: N/A
Plastic Limit: N/A
Plasticity Index, I_P: N/A

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:						
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04


Plasticity Chart


Liquid Limit

Comments: Sample is Non-plastic, slips in the cup and will not reach 25 blows

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Client: GeoEngineers
Address: Spokane, WA

Attn: Justin Rice

Date: May 15, 2015
Project: Van Stone Mine
Project #: 15T009
Sample #: T15-0877

As requested MTC, Inc. has performed the following test(s) on the sample referenced above. The testing was performed in accordance with current applicable AASHTO or ASTM standards as indicated below. The results obtained in our laboratory were as follows below or on the attached pages:

	Test(s) Performed:	Test Results		Test(s) Performed:	Test Results
	Sieve Analysis			Sulfate Soundness	
	Proctor			Bulk Density & Voids	
	Sand Equivalent			WSDOT Degradation	
	Fracture Count				
	Moisture Content				
	pH				
	Minimum Resistivity				
x	Fines Content	88.1%			
x	Atterberg Limits	See Attached			
	Asphalt Extraction/Gradation				
	Rice Density				

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call on us at the number below.

Respectfully Submitted,

H Benny

Harold Benny
WABO Supervising Laboratory Technician

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspections • Materials Testing • Environmental Consulting

ASTM D4318 - Liquid Limit, Plastic Limit and Plasticity Index of Soils

Project: Van Stone Mine
Project #: 15T009
Client: GeoEngineers
Source: HSA-7-6-30
Sample #: T15-0877

Date Received: 3-Jun-15
Sampled By: Client
Date Tested: 24-Jun-15
Tested By: CL / HB

Unified Soils Classification System, ASTM D-2487
No Data Provided
Sample Color
Gray

Liquid Limit Determination

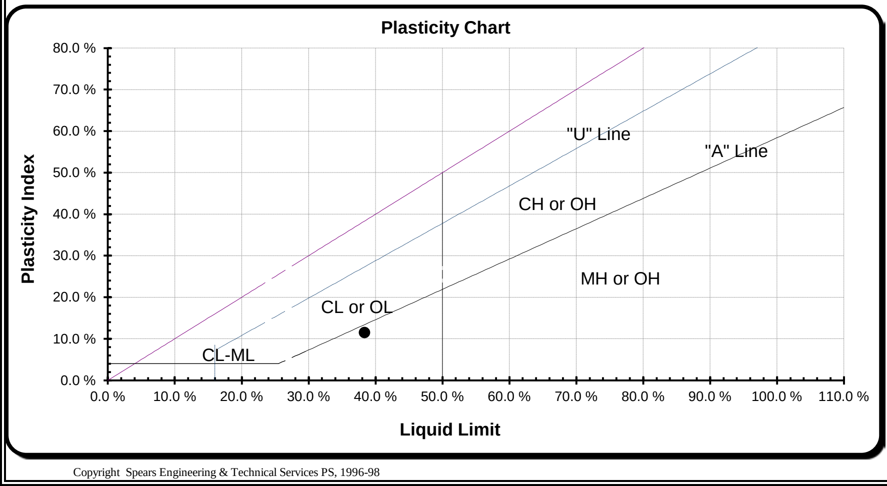
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	10.29	13.07	11.29			
Weight of Dry Soils + Pan:	7.93	9.93	8.51			
Weight of Pan:	1.53	1.54	1.52			
Weight of Dry Soils:	6.40	8.39	6.99			
Weight of Moisture:	2.36	3.14	2.78			
% Moisture:	36.9 %	37.4 %	39.8 %			
Number of Blows:	37	26	19			

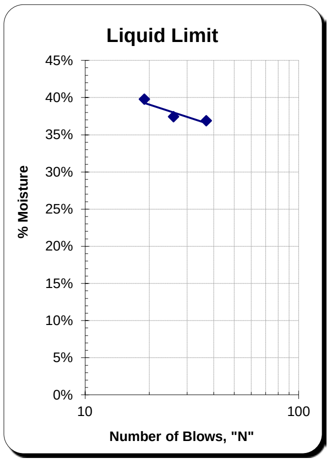
Liquid Limit @ 25 Blows: 38.4 %
Plastic Limit: 26.9 %
Plasticity Index, I_P: 11.5 %

Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	8.67	10.33				
Weight of Dry Soils + Pan:	7.18	8.45				
Weight of Pan:	1.57	1.53				
Weight of Dry Soils:	5.61	6.92				
Weight of Moisture:	1.49	1.88				
% Moisture:	26.6 %	27.2 %				

ACCREDITED
Certificate #: 1366.01, 1366.02 & 1366.04





Comments: ______________________________

Reviewed by: ______________________________

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

Project: Van Stone Mine
Project #: 15T009
Date Received: June 3, 2015
Date Tested: June 24, 2015

Client: GeoEngineers
Sampled by: Client
Tested by: CL / HB

Amount of Materials Finer Than #200 Sieve - ASTM C-117, ASTM D-1140 & AASHTO T-11

Sample #	Location	Tare	Before Wash + Tare	After Wash + Tare	Amount of Loss	% -#200
T15-0877	HSA-7-30	172.9	1130.1	286.6	843.5	88.1%

Reviewed by:

Materials Testing & Consulting, Inc.

Geotechnical Engineering • Special Inspection • Materials Testing • Environmental Consulting

One-Dimensional Consolidation Report

Project: Van Stone
Project #: 15T009 **Date Received:** 06/03/15
Client: GeoEngineers **Sampled By:** Client
Source: HAS-1 - S5 - 26 ft **Date Tested:** 10/01/15
Sample#: T15-0862 **Tested By:** CL/HB

One-Dimensional Consolidation performed in accordance with ASTM D2435/D2435M

Sample Description
Gray Sand

Equipment Used
GeoTac Sigma-1 Load Frame

Sample Parameters

Initial Moisture Content, %	21.7%	Final Moisture Content, %	26.7%
Initial Dry Unit Weight, lb/ft^3	93.0	Final Dry Unit Weight, lb/ft^3	99.4
Initial Void Ratio	0.867	Final Void Ratio	0.724
Initial Saturation	69.5%	Final Saturation	100.8%

These values are calculated from the initial sample parameters.

Test Data

Load, psf	Strain Ratio	D_0	D_{50}	D_{100}	D_f	t_{90} (min)	Sample Ht	Drainage Path	C_v (in^2/s)
500	0.51%	0.0000	0.0023	0.0046	0.0000		0.8999	0.4500	
1,000	0.85%	0.0000	0.0042	0.0084	0.0074	1.96	0.8925	0.4463	0.0014
2,000	1.36%	0.0074	0.0031	0.0136	0.0110	1.96	0.8889	0.4445	0.0014
4,000	2.18%	0.0110	0.0054	0.0218	0.0174	1.44	0.8825	0.4413	0.0019
8,000	3.13%	0.0174	0.0070	0.0313	0.0247	0.81	0.8752	0.4376	0.0033
16,000	4.36%	0.0247	0.0095	0.0436	0.0347	0.64	0.8652	0.4326	0.0041
32,000	5.81%	0.0347	0.0122	0.0592	0.0458	0.42	0.8541	0.4270	0.0061
64,000	8.04%	0.0458	0.0182	0.0822	0.0607	0.30	0.8392	0.4196	0.0082
16,000	7.67%								
4,000	7.14%								
1,000	6.87%								

Calculations:

The following equation was used to calculate the values shown in the table above: $C_v = TH_{D50}^2/t_{50}$

Where: T = The time factor for 50% consolidation, provided as 0.197 (per ASTM D2435).
H_{D50} = The length of the drainage path at 50% of primary consolidation (double drainage path).
t_{50} = The time corresponding to 50% of primary consolidation.

For the void ratio and saturation values, an assumed specific gravity of 2.65 was used.

Comments: __________

Reviewed by: __________

One-Dimensional Consolidation Report

Project: Van Stone
Project #: 15T009
Client: GeoEngineers
Source: HAS-1 - S5 - 26 ft
Sample#: T15-0862

Date Received: 06/03/15
Sampled By: Client
Date Tested: 10/01/15
Tested By: CL/HB

One-Dimensional Consolidation performed in accordance with ASTM D2435/D2435M

Sample Description
Gray Sand

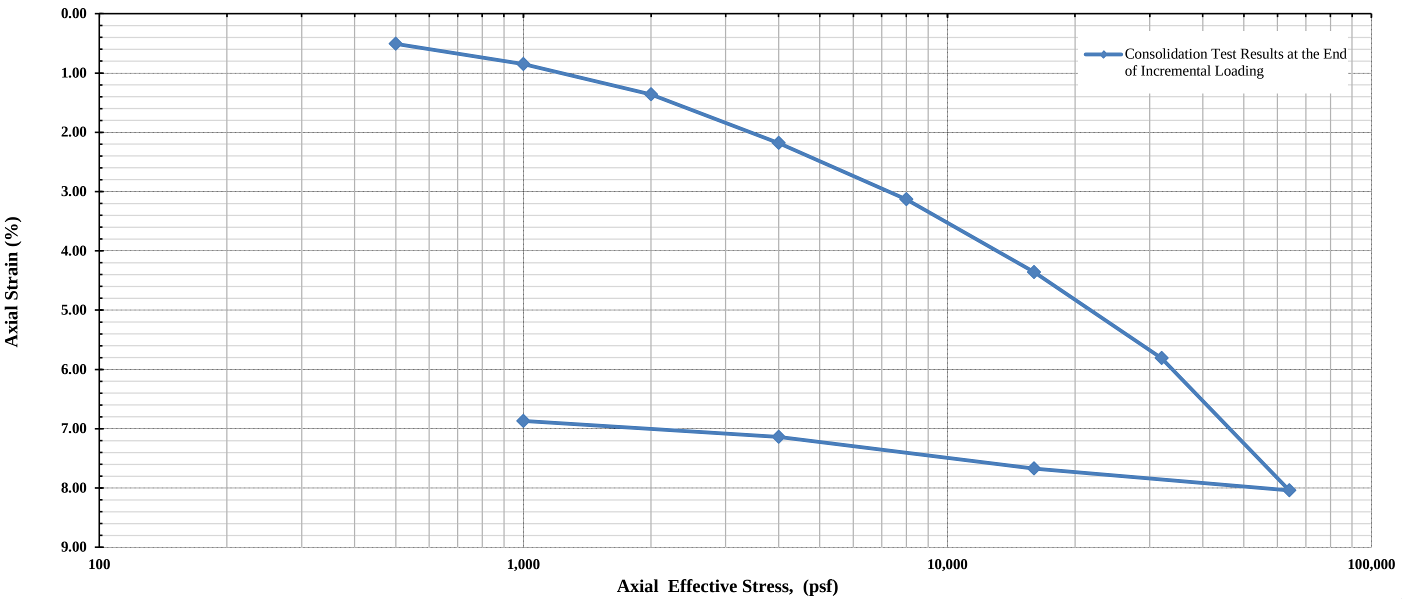
Equipment Used
GeoTac Sigma-1 Load Frame

Sample Preparation
○ Natural Moisture ● Inundated

Test Method Used
● Method A ○ Method B

Data Interpretation Procedure
○ Procedure 1 (Log) ● Procedure 2 (SqRt)

Axial Strain versus Axial Effective Stress



Step No.	Vertical Stress (psf)	Vertical Strain (%)	D_0 (in)	D_{90} (in)	D_{100} (in)	D_{50} (in)	H_{100} (in)	H_{50} (in)	t_{90} (min)	c_v (in^2/sec)
1	500	0.51			0.0000	0.0000	0.8954	0.0000		N/A
2	1000	0.85	0.0022	0.0034	0.0035	0.0029	0.8923	0.8925	1.96	0.00144
3	2000	1.36	0.0026	0.0040	0.0042	0.0034	0.8878	0.8889	1.96	0.00142
4	4000	2.18	0.0044	0.0060	0.0062	0.0053	0.8804	0.8825	1.44	0.00191
5	8000	3.13	0.0044	0.0058	0.0060	0.0052	0.8718	0.8752	0.81	0.00334
6	16000	4.36	0.0044	0.0084	0.0088	0.0066	0.8607	0.8652	0.64	0.00413
7	32000	5.81	0.0047	0.0082	0.0086	0.0066	0.8477	0.8541	0.42	0.00610
8	64000	8.04	0.0058	0.0106	0.0111	0.0085	0.8276	0.8392	0.30	0.00823

Comments: ______

Reviewed by: ______

One-Dimensional Consolidation Report

Project: Van Stone
Project #: 15T009
Client: GeoEngineers
Source: HAS-1 - S5 - 26 ft
Sample#: T15-0862

Date Received: 06/03/15
Sampled By: Client
Date Tested: 10/01/15
Tested By: CL/HB

One-Dimensional Consolidation performed in accordance with ASTM D2435/D2435M

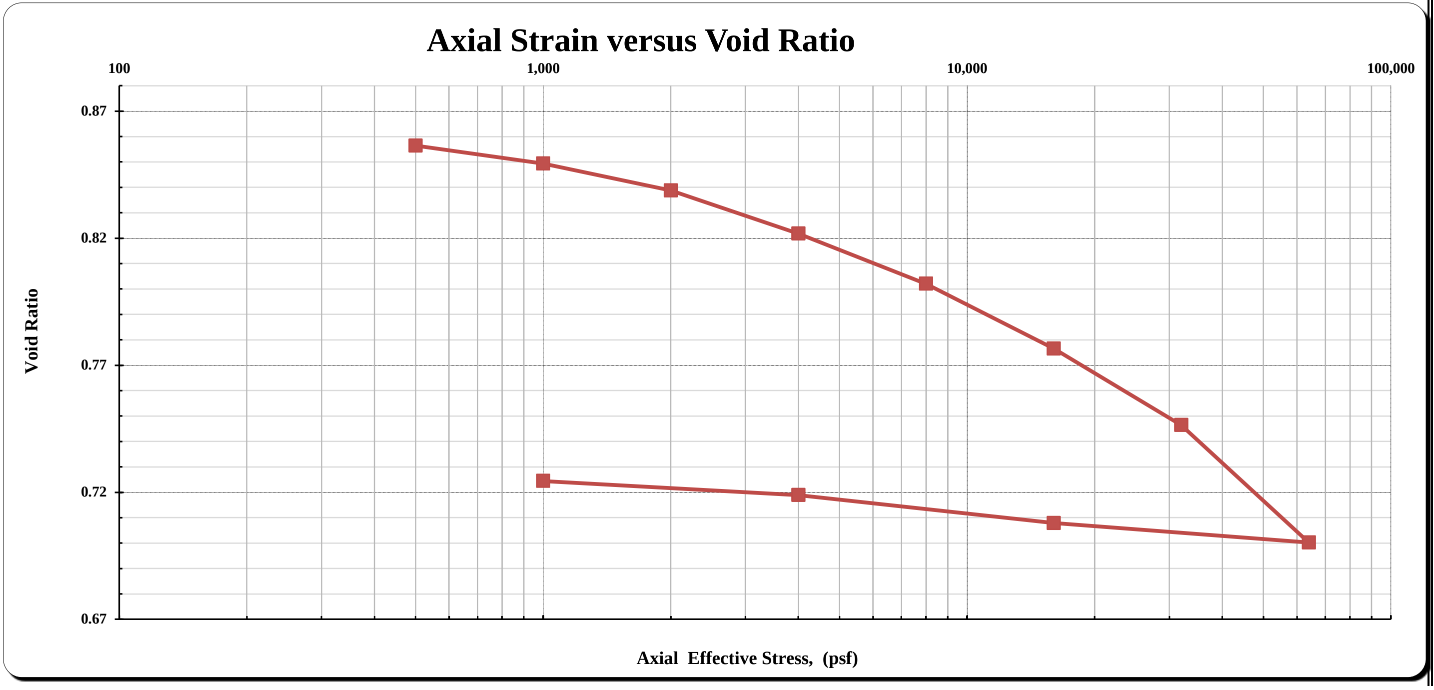
Sample Description
Gray Sand

Equipment Used
GeoTac Sigma-1 Load Frame

Sample Preparation
○ Natural Moisture ● Inundated

Test Method Used
● Method A ○ Method B

Data Interpretation Procedure
○ Procedure 1 (Log) ● Procedure 2 (SqRt)



Load, psf	Void Ratio
500	0.856
1000	0.849
2000	0.839
4000	0.822
8000	0.802
16000	0.777
32000	0.746
64000	0.700
16000	0.708
4000	0.719
1000	0.724

These values are calculated from the loading increments and may

Comments:

Reviewed by:

APPENDIX C

Upper and Lower Tailings Pile Stability Analysis

APPENDIX C
UPPER AND LOWER TAILINGS PILE STABILITY ANALYSIS

INTRODUCTION

General

We completed slope stability analyses of the Upper and Lower Tailings Pile embankments. Specifically, the existing slope, a 2H:1V (Horizontal:Vertical) reconstructed slope, and a proposed 3H:1V reconstructed slope were evaluated for general stability. Slope stability analyses were completed using the computer program SLOPE/W. SLOPE/W is used to evaluate the stability of the critical failure surfaces identified using vertical slice limit-equilibrium methods. Spencer's Method was used for this project, which solves for both force and moment equilibrium conditions. The model identifies the most critical failure surface for specified topography, subsurface conditions, soil properties, and groundwater profile. The stability of the soil mass is reported as a safety factor, which is the ratio of resisting forces to driving forces. A safety factor of 1.0 indicates that the resisting forces are equal to the driving forces and that the slope is at marginal stability. A safety factor less than 1.0 indicates that the resisting forces are smaller than the driving forces and that the slope is potentially at imminent risk of failure. A safety factor greater than 1.0 indicates that the resisting forces are greater than the driving forces. Safety factors greater than 1.0 are commonly required for long-term stability of slopes and when mitigating failed or marginally stable slopes. The desired factor of safety greater than 1.0 is dependent on many factors, including seismic environment, performance standards, consequences of failure, applicable regulations, and many other factors.

This report presents the results of our geotechnical engineering evaluation of the Upper and Lower Tailings Piles at the Van Stone Mine. Our specific scope of services included:

1. Reviewing information regarding subsurface soil and groundwater at the Upper and Lower Tailings Piles, including reports in our files, selected geologic maps, and other geotechnical engineering related information.
2. Coordinating and managing the subsurface exploration program including scheduling of subcontractors and GeoEngineers' field staff.
3. Exploring subsurface soil and groundwater conditions at the site by drilling six borings in the Upper Tailings Pile and five borings in the Lower Tailings Pile. Borings in the Upper Tailings Pile were drilled to depths between about 30 feet below ground surface (bgs) in HSA-4 to 62 feet bgs in HSA-1. Borings in the Lower Tailings Pile were drilled to depths between 27 feet bgs in HSA-11 to 97 feet bgs in HSA-7. The borings were backfilled as required by state law. Soil cuttings from the drilled borings were distributed on the ground surface near the boring locations.
4. Obtaining soil samples at representative intervals from the explorations, observing groundwater conditions and maintaining detailed logs in general accordance with ASTM International (ASTM) D 2488, the Standard Practice for Classification of Soils, Visual-Method Procedure. Qualified staff from our office observed and documented field activities.
5. Performing laboratory tests on selected soil samples obtained from the explorations to evaluate pertinent engineering characteristics. Specific laboratory tests are noted in the boring logs in Appendix A.

6. Providing slope stability analyses of the Upper and Lower Tailings Piles that address the following geotechnical components:
    a. Representative cross sections for the site topography, geology and subsurface conditions;
    b. A calculation of the safety factor against slope failure for the Upper and Lower Tailings using limit equilibrium software. Safety factor against static slope failure and seismic slope failure were analyzed;
    c. A calculation of reconstructed slope gradients to achieve suitable safety factors against static and seismic slope failure. Generally, values less than 1.5 for static and 1.1 for seismic conditions are considered unsatisfactory under conditions where there is an imminent danger to human life or major environmental impacts will occur if a slope fails.

LITERATURE REVIEW

Previous Investigations

The stability of the Lower Tailing Piles was previously evaluated by Klohn Leonoff, and summarized in their Tailings Disposal Design Report dated September 1990. The Klohn Leonoff slope stability evaluation was conducted in preparation of raising the height of the lower tailings pile. The Lower Tailings Pile was subsequently raised about 20 feet during mine operations in the 1990s. Additionally, Hart Crowser investigated the stability of the Upper and Lower Tailing Piles, and summarized their results in Appendix F of their Remedial Investigation report dated November 2013. A summary of engineering parameters for site soil materials investigated during previous evaluations are presented in Table 1.

TABLE C-1. ENGINEERING PARAMETERS OF SITE SOIL UNITS

Soil Type	Moist Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Klohn Leonoff			
New Tailings	110	30	0
Liner Interface	--	25	0
Tailings Sand	110	35	0
Sand Slimes	95	30	0
Slimes	70	23	0
Residual Soil	130	38	0
Granite	140	38	500
Hart Crowser[1]			
Tailings	110	36	0
Medium Dense Native Soil	125	32	0
Very Dense Native Soil	125	38	0

[1] Additional parameters reported included undrained and residual undrained shear strength of saturated tailings.

SITE EXPLORATIONS

General

We evaluated site conditions in December, 2014 by advancing six exploratory borings (HSA-1 through HSA-6) into the Upper Tailings Pile and underlying native material and five exploratory borings into the Lower Tailings Pile (HSA-7 through HSA-11) and underlying native material. The approximate boring locations are shown in Figures C-1 and C-2.

Soil samples were obtained from the borings for visual classification and laboratory testing. Soil samples collected from the tailing piles were transported to Materials Testing & Consulting, Inc. (MTC) in Tukwila, Washington for evaluation and testing to assess select physical and engineering characteristics; soil samples collected from the underlying native material were transported to GeoEngineers' Spokane laboratory for evaluation and testing. Descriptions of the field exploration equipment and procedures, logs of the explorations are provided in Appendix A and laboratory test results are provided in Appendix B, of GeoEngineers' Feasibility Study (2017).

Surface Conditions

GeoEngineers contracted with Quantum Spatial to conduct a LiDAR survey of the site. The LiDAR survey was used to develop a topographic map of the site. The results of the survey were used to identify existing slope gradients of the Upper and Lower Tailings Piles for slope stability analysis models.

Subsurface Conditions

Geologic Setting

The Washington State Department of Natural Resources, Geologic Map of the Colville 1:100,000 Quadrangle, Washington-Idaho, maps the project area as Quaternary Age Glacial Drift (Qgd) overlying bedrock consisting of dolomite of the Cambrian Age Metaline Formation and granite of the Cretaceous Age Spirit Pluton. Glacial drift consists of a mixture of stratified and unstratified deposits of clay, silt, sand, gravel, and boulders including glacial outwash, till and glaciolacustrine deposits.

Upper Tailings Pile

The Upper Tailings Pile occupies approximately 9½ acres and generally is divided into an east basin and west basin with a waste rock-lined drainage ditch between the two (see Figure C-1). The Upper Tailings Pile was constructed with slopes of approximately 1.5H:1V (horizontal to vertical) with maximum heights of approximately 35 feet above existing grade. Based on our observation of the Upper Tailing embankments, the Upper Tailings dike appear to have been raised using tailings sands.

Lower Tailings Pile

The Lower Tailings Pile occupies approximately 40 acres near the western boundary of the site (see Figure C-2). The Lower Tailings Pile was constructed with slopes of approximately 1.5H:1V with maximum heights of approximately 75 feet above existing grade. Based on our observation of the Lower Tailing embankments, the Lower Tailings dike appear to have been raised using tailing sands.

Glacial Drift

The native material underlying the Upper and Lower Tailings piles consists of glacial drift deposits. Observed thicknesses of the native soils underlying the Lower Tailings pile were approximately 2 feet (HSA-10) to 21 feet (HSA-7); thicknesses of the native soils underlying the Upper Tailings pile were approximately 5 feet (HSA-5) to over 22 feet (HSA-1 and HSA-6). Bedrock was encountered beneath the Upper Tailings at a depth of 35 feet bgs in HSA-5. Bedrock was encountered beneath the Lower Tailings at a depth of 62 feet bgs in HSA-10

ENGINEERING PARAMETERS OF SOIL UNITS AND ASSUMPTIONS

General

For each unit used in the slope stability model, we developed engineering parameters based upon the results of our subsurface explorations and laboratory testing, review of available information in the public domain including geologic maps, and data presented in the above mentioned geotechnical reports. The following unit descriptions state the assumptions we made in developing the engineering parameters for each unit. The selected engineering parameters are presented in Table C-1.

Glacial Drift

The glacial drift unit in our slope stability analyses represents the natural soil deposits encountered in our explorations beneath the Upper and Lower Tailings Piles. This unit generally consisted of medium dense to very dense fine to coarse sand with varying amounts of silt and gravel interbedded with stiff to hard silt and clay. Native soil samples were encountered beneath the Upper Tailings at depths ranging from 15 feet (HSA-2) to 40 feet (HSA-1) bgs and beneath the Lower Tailings at depths ranging from 10 feet (HSA-10) to 85 feet (HSA-9) bgs. Based on results of grain-size analyses on the fine to coarse sand unit samples we tested, the native soil fines content (silt- and clay-sized soil particles passing the U.S. No. 200 sieve) is in the range of about 5 to 46 percent.

SPT N-values from 39 sampling attempts ranged from about 5 to 71, with an average of about 26. The lower SPT N-values are associated with the upper soil profile and may represent a thin weathered zone or transition from the tailings. Note that these values include approximate N-values correlated from large-diameter samples, as indicated on the boring logs. Engineering parameters selected for the natural soil (see Table C-1) are based on laboratory tests of soil samples collected from soil borings (HSA-1 through HSA-11), results of previous investigations, correlations of relative density and friction angle with SPT N-values, and our experience in the area.

Tailings

The tailings unit represents the material observed in the tailings impoundment dikes and the retained mine tailings within the impoundments. Tailings generally consisted of loose to medium dense silty fine sand (tailings sands) interbedded with very soft to very stiff silt and clay (tailings slimes). The amount of tailings fines observed in samples generally increased with depth and in borings located near the center of the Upper and Lower Tailing’s basins. Because of this observation and our understanding of the construction of the tailing dikes and/or raises, it is our opinion that tailings slimes will not influence tailing’s engineering parameters within the zones of possible slope failure and were therefore not included in our model. Tailings thickness encountered in the Upper Tailings Pile ranged from 15 feet (HSA-2) to 40 feet (HSA-1). Tailings thickness encountered in the Lower Tailings Pile ranged from 10 feet (HSA-10) to 85 feet (HSA-9).

Based on grain-size analyses of samples of the silty sand, the fines content of the silty sand unit is in the range of about 15 to 49 percent. SPT N-values from 22 sampling attempts in the Upper Tailings Pile ranged from about 0 to 13, with an average of about 6. SPT N-values from 57 sampling attempts in the Lower Tailings Pile ranged from about 0 to 24, with an average of about 10. Note that these values include approximate N-values correlated from large-diameter samples, as indicated on the boring logs.

Strength Parameters

Engineering parameters selected for the tailings and native soil (see Table C-2) are based on laboratory tests of soil samples collected from soil borings (HSA-1 through HSA-11), results of previous investigations, correlations of relative density and friction angle with SPT N-values, our experience in the area, and our understanding of the construction of the tailing impoundments. Although low strength tailing slimes were encountered in our borings, they were generally isolated to areas more central within the tailing impoundments and therefore don't influence the strength of the overall mass within the zones of possible slope failure. Based on our understanding of the construction methods of the Tailings Piles and review of subsurface information, we modeled the tailings near the slope face as granular (cohesionless) soil. We used a range of friction angles to model the tailings, consistent with previous modeling. As previously mentioned, tailings slimes were not included and not considered to be a significant factor with regard to overall stability modeling.

TABLE C-2. ENGINEERING PARAMETERS OF SITE SOIL UNITS

Soil Type	Moist Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
Tailings	110	34 to 36	0
Glacial Drift	125	38	0

Notes:

pcf = pounds per cubic foot; psf = pounds per square foot

Seismic Parameters

Seismic hazard design parameter values were obtained from the United States Geological Survey's (USGS) U.S. Seismic Design Maps tool. Site values were determined based on the 2009 National Earthquake Hazards Reduction Program (NEHRP) which provides the design parameter peak ground acceleration (PGA). Based on our review of the geologic literature, it is our opinion that the glacial drift deposits and tailings classify as a Site Class D in accordance with NEHRP criteria. Peak horizontal accelerations were calculated using the peak horizontal bedrock acceleration and designated amplification factors. Based on data presented by the USGS, the site may experience a PGA equal to 19.1 percent of the acceleration due to gravity (0.191g) for the 2,475 event.

A common approach to determine seismic slope stability is to use a pseudo static analysis approach where the horizontal component of seismic shaking is modeled as a permanent body force added to a static limit equilibrium analysis. A drawback of the pseudo static analysis is that earthquake shaking being represented as a permanent, unidirectional body force is extremely conservative and does not provide any indication of relative movement. For this reason, pseudo static coefficients generally are selected as some fraction of the PGA. The pseudo static coefficient is typically assumed as about ½ of PGA, and in this case we used 0.1.

TABLE C-3. SEISMIC PARAMETERS

Peak Ground Acceleration (g)	Horizontal Acceleration Coefficient (g)
0.191	0.1

Groundwater

Based on groundwater elevations observed, the phreatic surface is located beneath the zones of influence for possible slope failures and was therefore not included in our models. Additionally, we anticipate that with the placement of a final cover and appropriate drainage facilities, the potential is low for development of a groundwater table within either the Upper or Lower Tailings Piles.

SLOPE STABILITY ANALYSIS

Slope stability analyses were completed at three sections across the Lower Tailings Pile embankment (Cross Section A-A' through C-C') and two sections across the Upper Tailings Pile embankment (Cross Section D-D' and E-E'). These sections were selected for analysis because they either represented greatest slope height and steepness (Section C-C' and D-D') or because they were representative of general slope configurations along the embankment profiles (Section A-A', B-B' and E-E'). The approximate locations of the cross sections are shown in Figures C-1 and C-2.

Results – Existing Conditions

The safety factor results against failure within the existing tailing embankments are presented in Table C-4. Results of the Slope/W analyses are provided in Figure C-5 to C-52. To differentiate from surficial slope failure or raveling conditions, from deeper seated failures, the slope stability analyses were completed for failure surfaces at least five feet deep and at least ten feet deep.

TABLE C-4. SLOPE STABILITY RESULTS

Slope	Static Safety Factor	Seismic Safety Factor
Lower Tailings Pile		
Cross Section A-A': minimum 5-foot-deep failure	1.18 to 1.27	0.95 to 1.02
Cross Section A-A': minimum 10-foot-deep failure	1.34 to 1.44	1.10 to 1.18
Cross Section B-B': minimum 5-foot-deep failure	1.07 to 1.15	0.88 to 0.94
Cross Section B-B': minimum 10-foot-deep failure	1.24 to 1.32	1.03 to 1.09
Cross Section C-C': minimum 5-foot-deep failure	0.95 to 1.02	0.78 to 0.84
Cross Section C-C': minimum 10-foot-deep failure	1.08 to 1.16	0.90 to 0.97
Upper Tailings Pile		
Cross Section D-D': minimum 5-foot-deep failure	1.10 to 1.18	0.92 to 0.99
Cross Section D-D': minimum 10-foot-deep failure	1.27 to 1.36	1.07 to 1.15

Slope	Static Safety Factor	Seismic Safety Factor
Cross Section E-E’: minimum 5-foot-deep failure	1.31 to 1.41	1.04 to 1.12
Cross Section E-E’: minimum 10-foot-deep failure	1.44 to 1.55	1.15 to 1.24

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Based on our analyses, it is our opinion that the existing tailing embankments do not provide a suitable safety factor against slope failures under static or seismic conditions. It is also our opinion that a suitable safety of factor can be achieved by regrading the existing Upper and Lower Tailings embankments. The final slope configuration will depend on several factors including: (1) design safety factors selected for this project; (2) requirements and design details for the final cover; and (3) subsurface conditions encountered during construction.

In general, safety factors of 1.5 have been used for “critical” slopes, where the consequences of slope failure could impact life safety or have a significant environmental impact. Lower static safety factors have been used for slopes where consequences of failure do not result in life safety concerns or significant environmental impact. Consideration when selecting the minimum slope stability safety factors include design of the final cover system.

Recommendations

Regrading of the Upper and Lower Tailings Pile's embankments is recommended due to the existing steep inclinations. We evaluated safety factors relative to regrading the slope gradients to 2H:1V and 3H:1V and the resultant safety factors are shown in Table C-5.

TABLE C-5. RECOMMENDED RECONFIGURED SLOPE INCLINATIONS

Slope Inclination	Static FS	Seismic FS
2H:1V	1.49 to 1.60	1.17 to 1.26
3H:1V	2.17 to 2.33	1.62 to 1.74

Selection of the target safety factors for slope stability for this project should be conducted in coordination with Ecology during final design. We suggest using a minimum static factor of safety of 1.5. To achieve a minimum static safety factor of 1.5, the existing slopes should be regraded to a minimum 2H:1V inclination. Final (design) slope inclinations also should be based on achieving a suitable factor of safety for the liner and cover system, which could result in a flatter slope inclination than required for overall (global) stability of the Tailings Piles.

The reconstructed slopes can be built by placing engineered structural fill along the face of the slope, which would need to be benched as described in the Earthwork section below. Structural fill should consist of material with an internal friction angle of at least 34 degrees when properly compacted and in-place unit weight of at least 110 pounds per cubic foot. If the slope geometries are constructed as described herein, the reconstructed slopes should have adequate long-term safety factors with a static safety factor and seismic safety factor as shown in Table C-5.

Given the lack of specific design and construction documentation for the existing Tailings Piles, and the relative uncertainty of the dimensions of the starter dams, consideration should be given to balancing the cuts and fills required to regrade the sites. For example, establishing final slope inclinations solely by cutting the slopes back to a flatter inclination increases the potential for exposing portions of the tailings with lower shear strength. An alternative to reduce this potential includes cutting near the top of the slope (to a lesser extent than cutting along) and extending the toe of the tailings piles by placing and compacting the excavated soil near the toe of the slope. The uniformly placed and compacted soil will provide some buttressing effect.

After construction, there remains a moderate risk of shallow surficial failures and raveling along the slopes due to erosion prior to construction of the cover system. Appropriate temporary erosion control techniques should be implemented as part of the slope design to reduce erosion and sediment transportation until is the permanent cover system is established.

Earthwork Consideration

Engineered structural fill used to reconfigure the impoundment slopes should be placed and compacted as described below:

1. Regrading and compacting tailings should be completed using loose lifts no thicker than 12 inches and compacted to at least 90 percent of the maximum dry density per ASTM D 1557. The regraded tailing material would have a minimum angle of internal friction of 34 degrees when compacted as recommended herein and therefore be consistent with our stability analysis assumptions. The regraded tailings should be benched into the face of the existing slopes. Benching should be in accordance with the WSDOT *Standard Specifications* and extend at least 5 feet into the existing slope. Earthwork activities should occur during the drier summer months.
2. Tailing fines might be encountered during regrading of the tailing embankments. Tailing fines encountered during construction might require removal or stabilization using a geosynthetic fabric or replaced with new fill material as approved by the geotechnical engineer.
3. Surface water should be intercepted and diverted away from the top of the reconstructed slopes to prevent scouring (rilling) on the slope face. Ideally, a surface water control ditch could be constructed along the top of the slopes to intercept surface water runoff and to direct it away from the face of the slopes.
4. A dozer should be used to track-walk the slope face and temporary erosion control and slope protection measures should be implemented until vegetation is established for permanent erosion control purposes.
5. Local surficial failures or general erosion could occur until a vegetation is established on the slopes. Some raveling and rilling of the slopes should be expected unless a temporary erosion control product is applied.

REFERENCES

Geo-Slope International, Inc. 2012. Slope/W, Geostudio, Version 8.14.1

Hart Crowser, 2013. Van Stone Mine Remedial Investigation. November 2013.

Klohn Leonoff, 1990. Tailings Disposal Design Report, Van Stone Mine. September 5, 1990.

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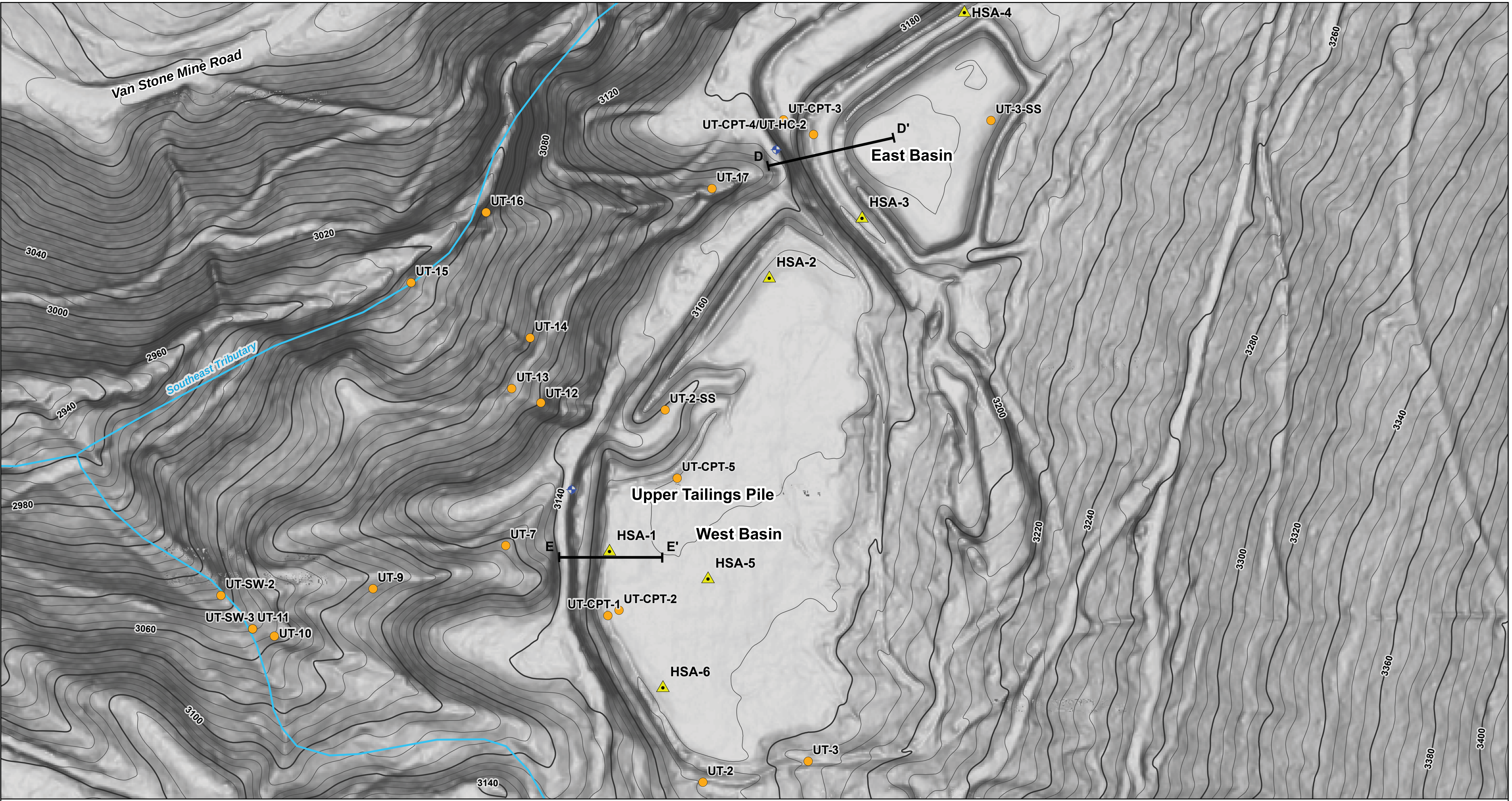

P:\0\0504100\GIS\MXD\0504100000_FA1_DSP_UpperTailings.mxd Date Exported: 03/17/17 by ccabrera

Notes:
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Data Source: Aerial from ArcGIS Online.
Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCroswer, Job No. 17800-11 3/13.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

▲ GeoEngineers Hollow Stem Auger Number and Location

● HartCrowser Remedial Investigation Sample Number and Location

⊕ Monitoring Well

D ├─┤ D' Cross Section

Minor Contour (5 foot)

Major Contour (20 foot)

N
W E
S

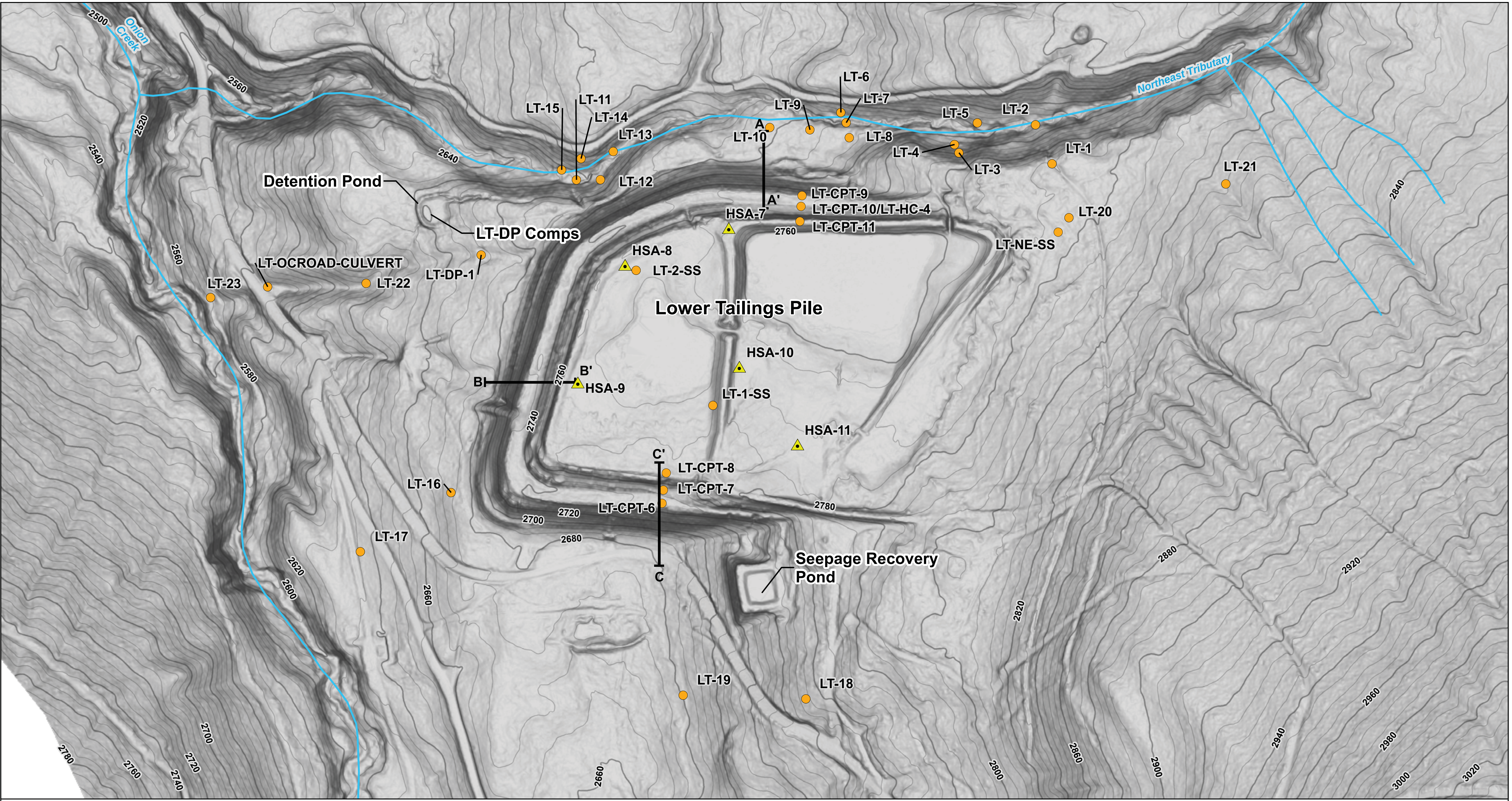
150 0 150
Feet

Detailed Site Plan -
Upper Tailings Area

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-1



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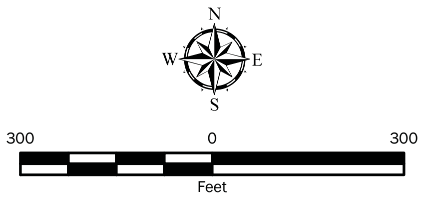
Data Source: Aerial from ArcGIS Online. Contours, surface tailings, tailings pipeline, monitoring wells and sample locations from HartCrowser, Job No. 17800-11 3/13.

Projection: NAD 1983 StatePlane Washington North FIPS 4601 Feet

Legend

▲	GeoEngineers Hollow Stem Auger Number and Location
●	HartCrowser Remedial Investigation Sample Number and Location
A —— A'	Cross Section
⌒	Minor Contour (5 foot)
⌒	Major Contour (20 foot)

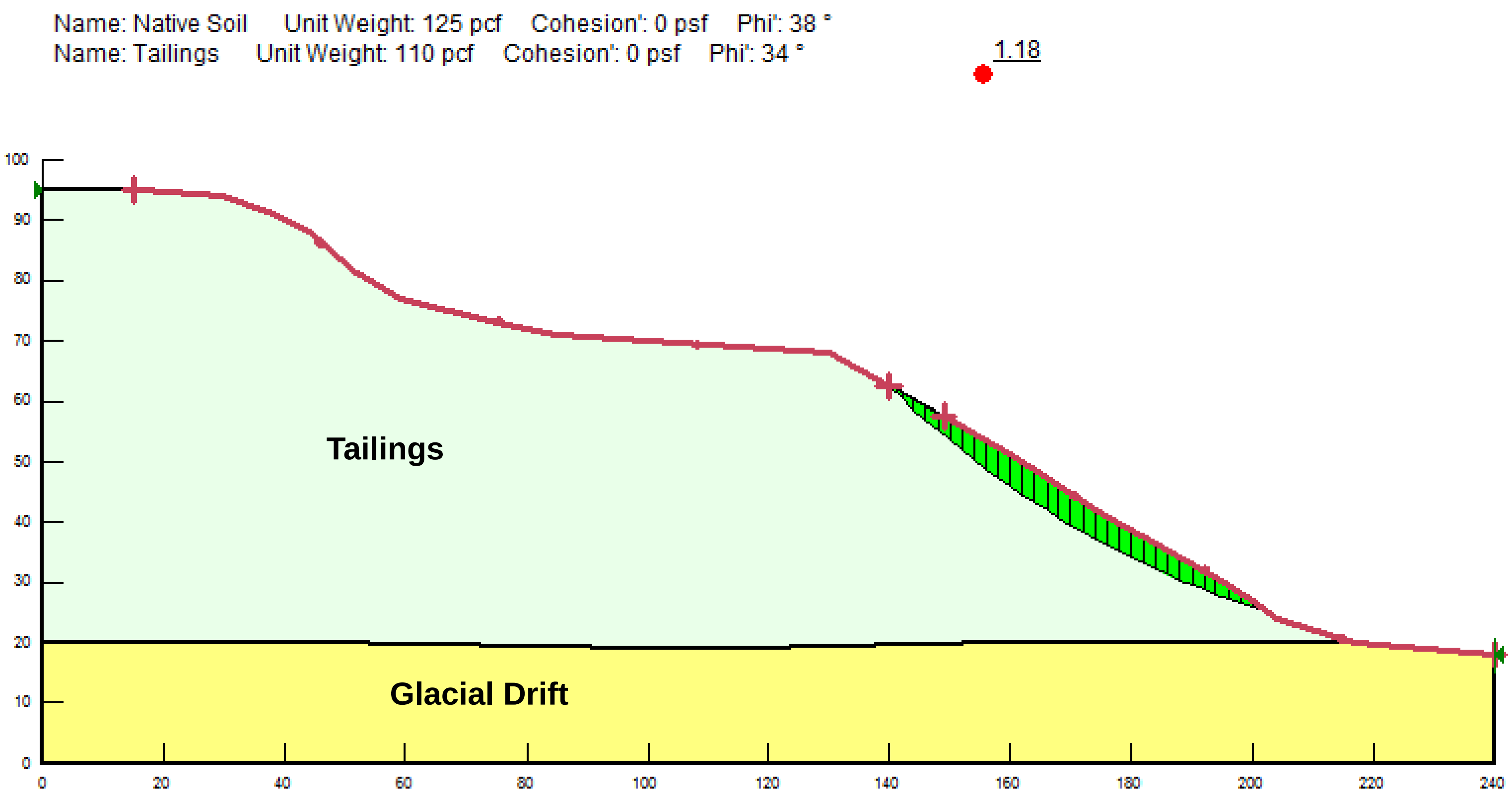


Detailed Site Plan - Lower Tailings Pile

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-2



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Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section A-A'

Van Stone Mine
Onion Creek, Washington

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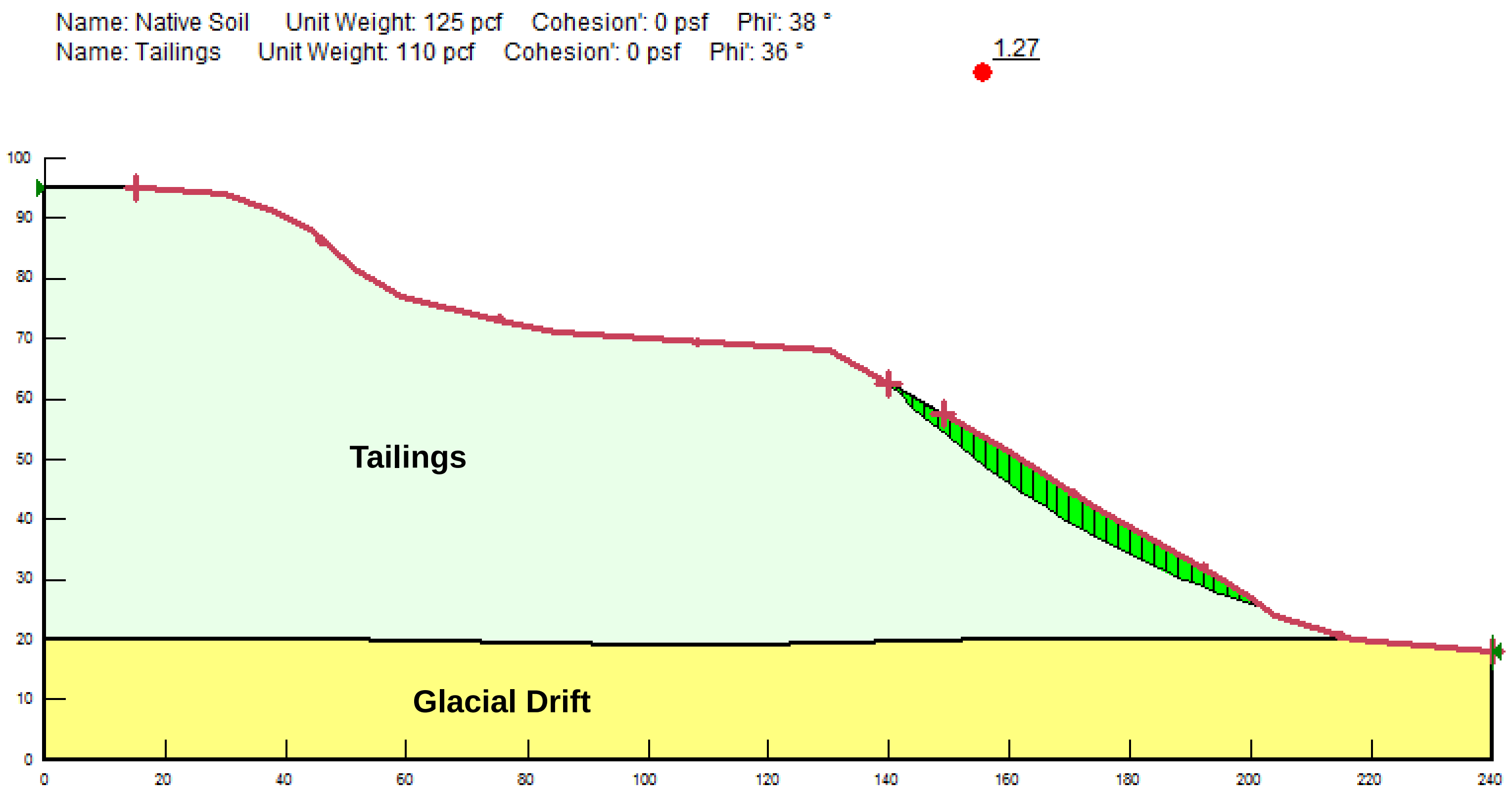
Figure C-3



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Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section A-A'

Van Stone Mine
Onion Creek, Washington

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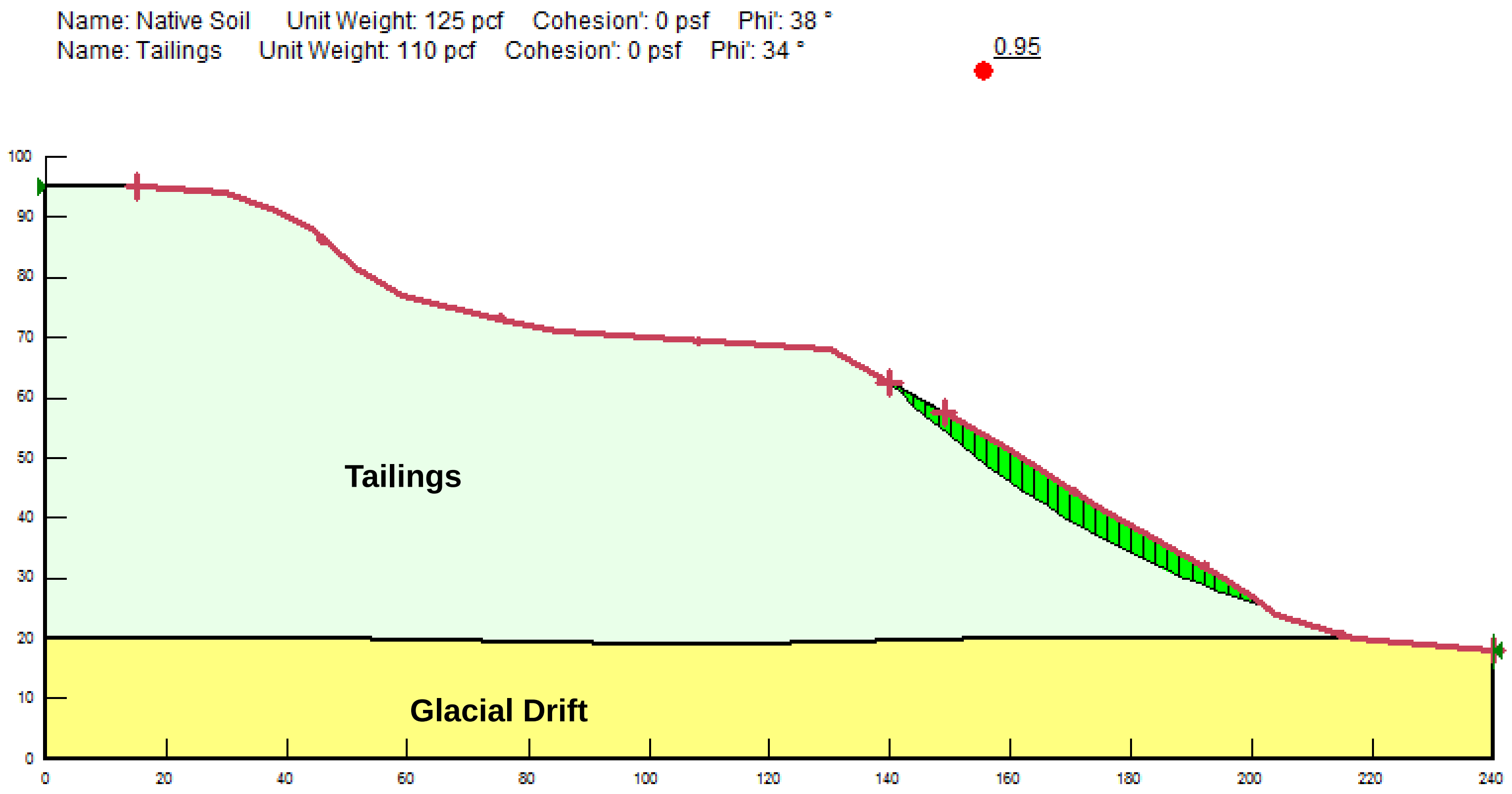
Figure C-4



Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section A-A'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-5

Notes:

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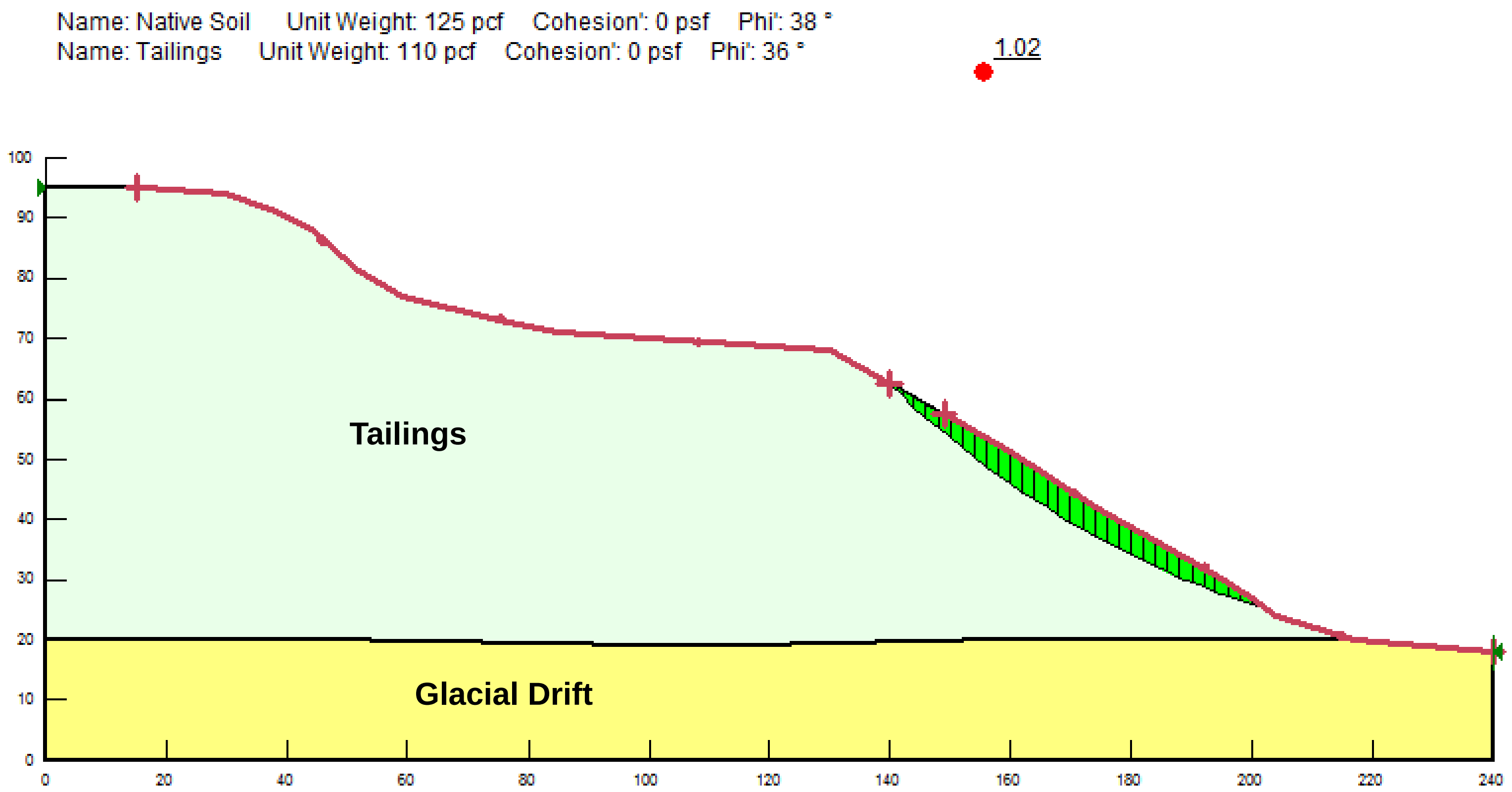

Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section A-A'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-6

Notes:
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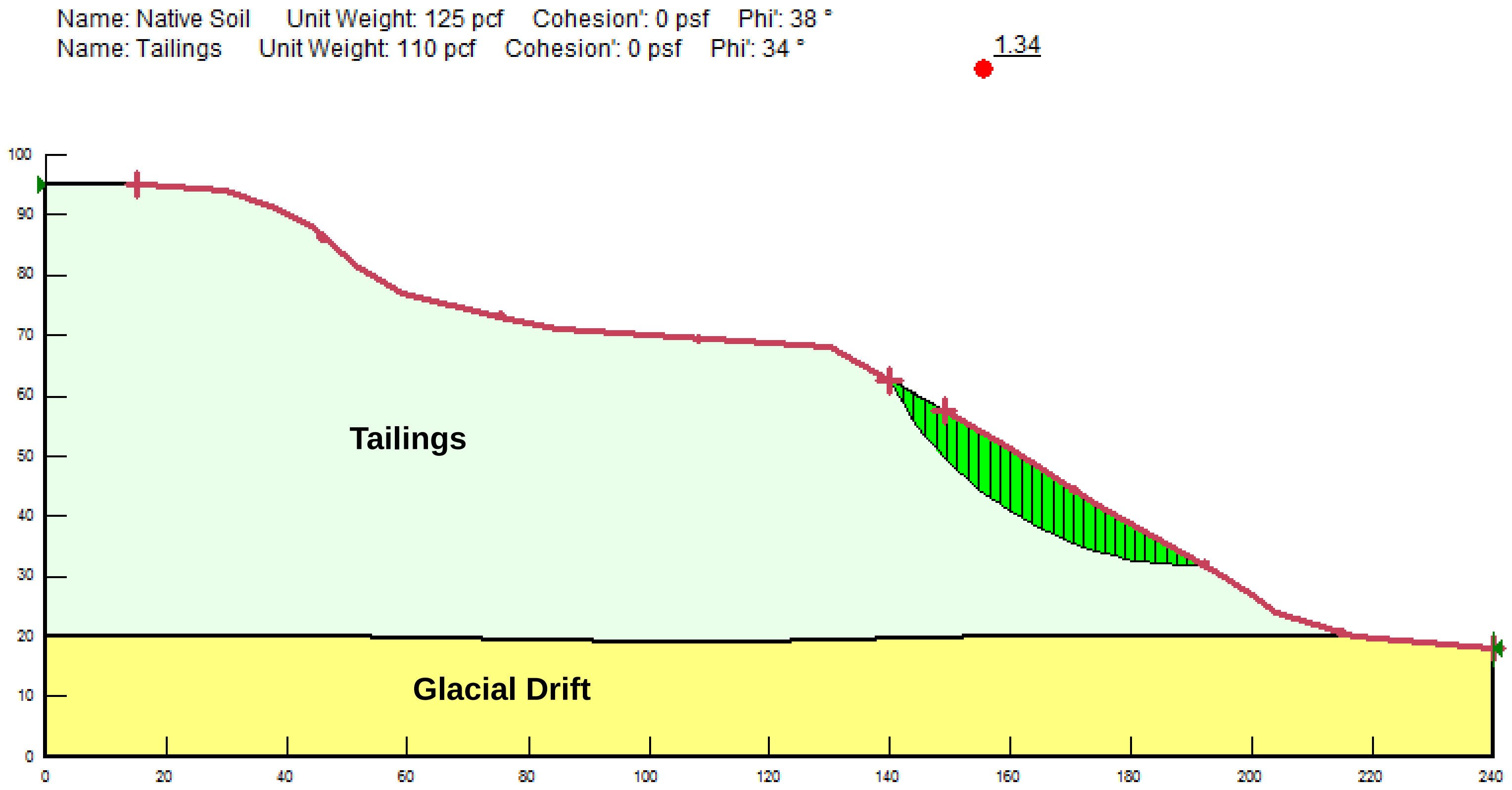

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Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section A-A'

Van Stone Mine
Onion Creek, Washington

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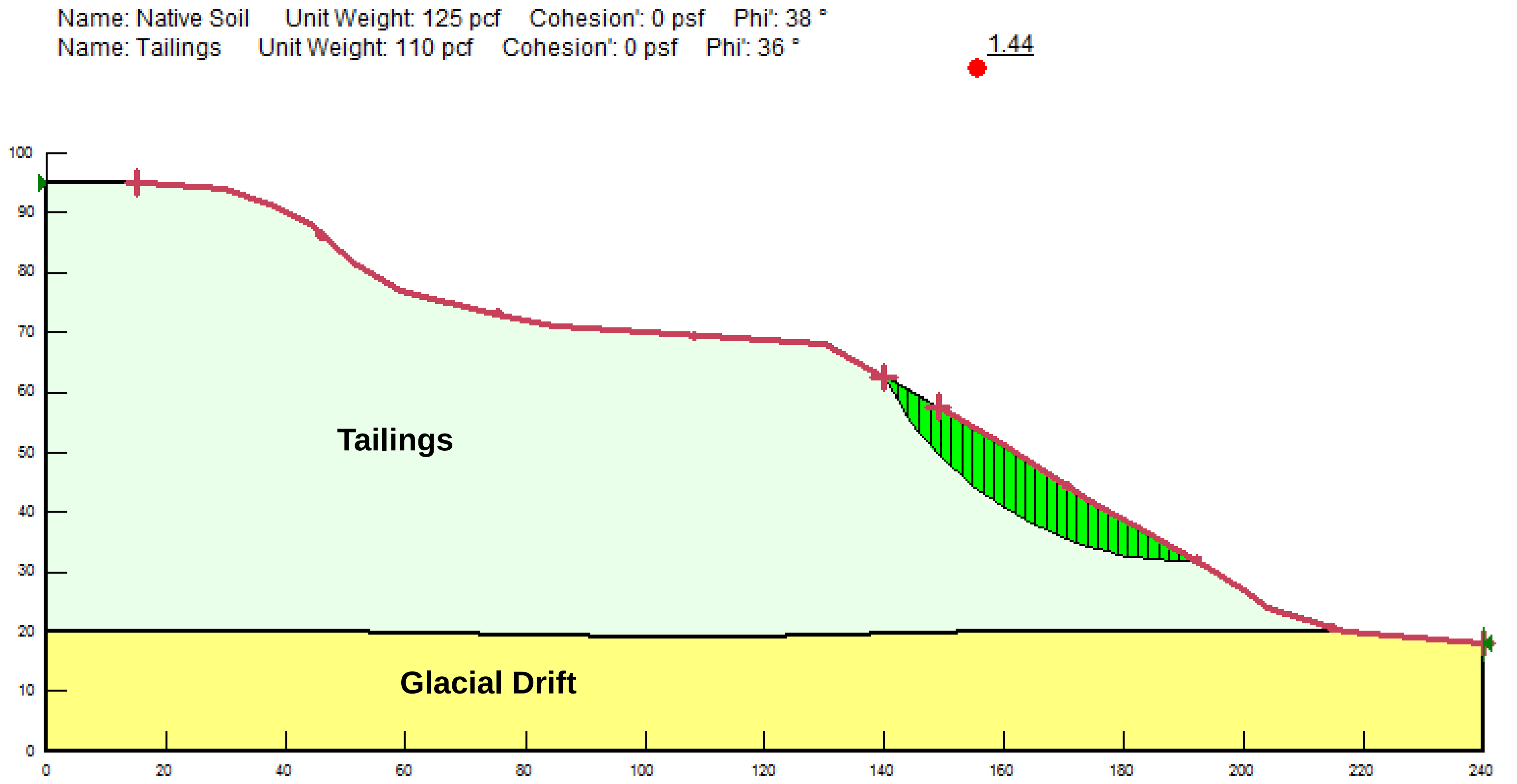
Figure C-7



Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section A-A'

Van Stone Mine
Onion Creek, Washington

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Figure C-8

Notes:

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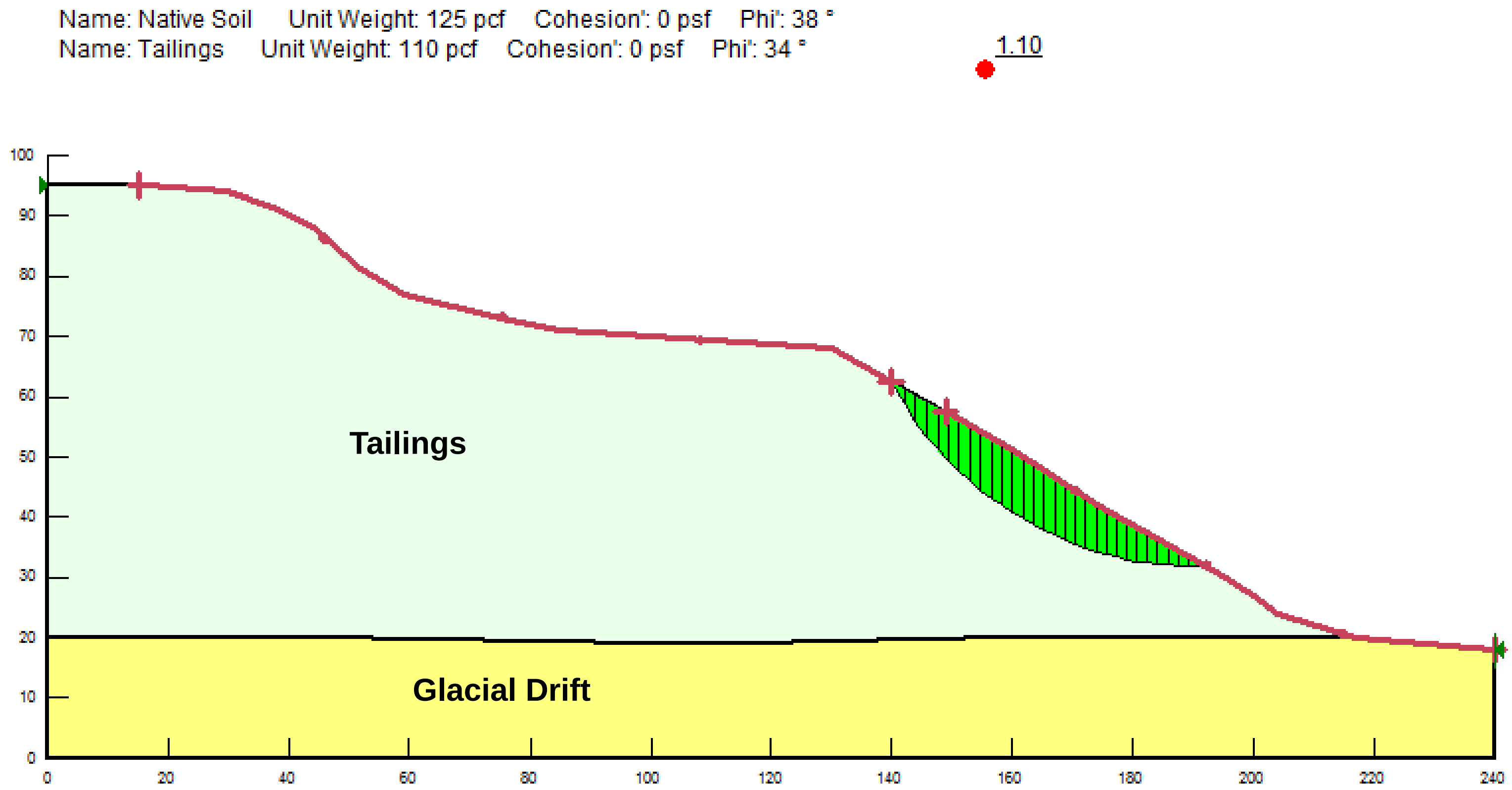

Lower Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section A-A'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-9

Notes:
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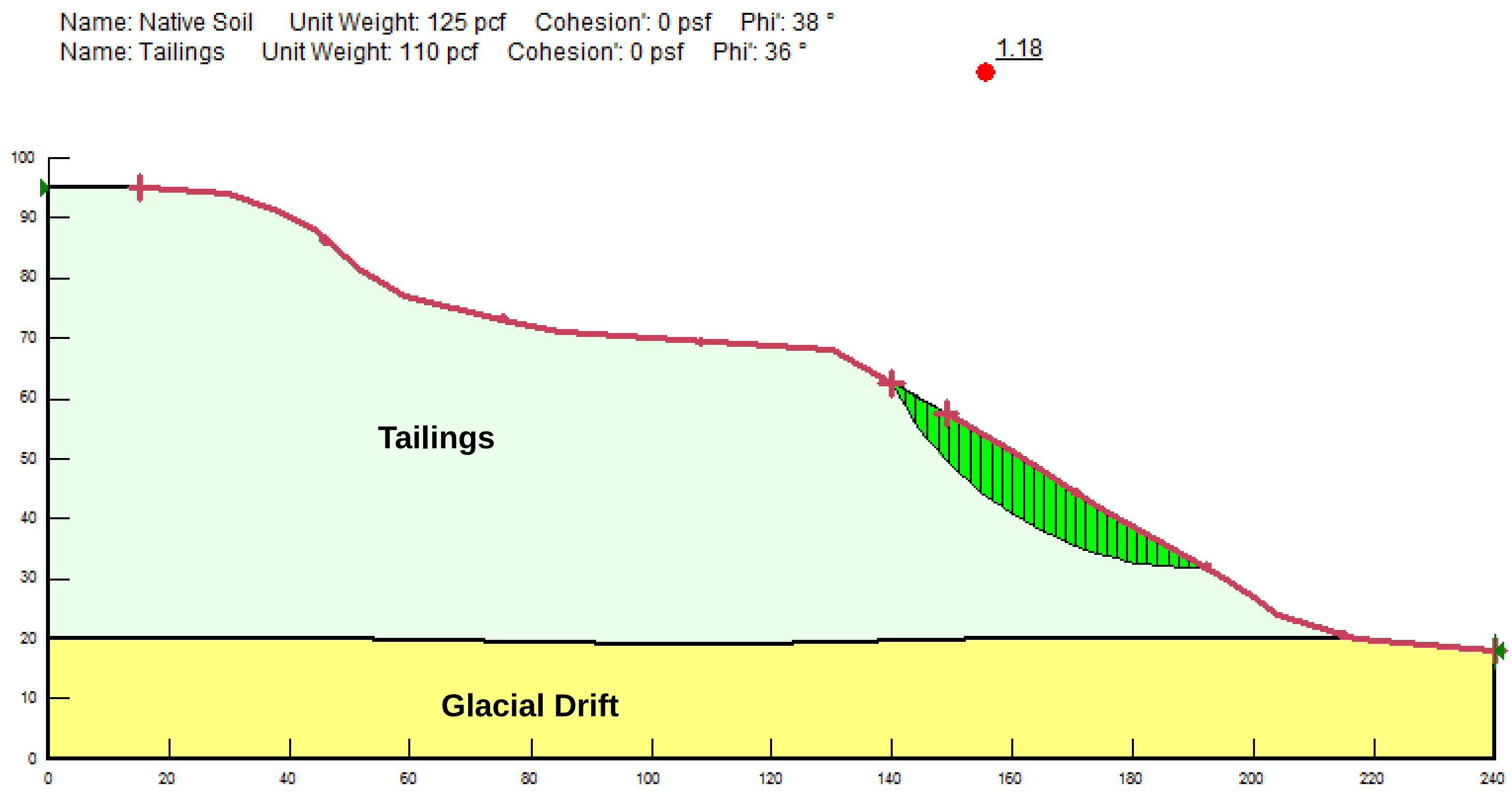

Lower Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section A-A'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-10

Notes:
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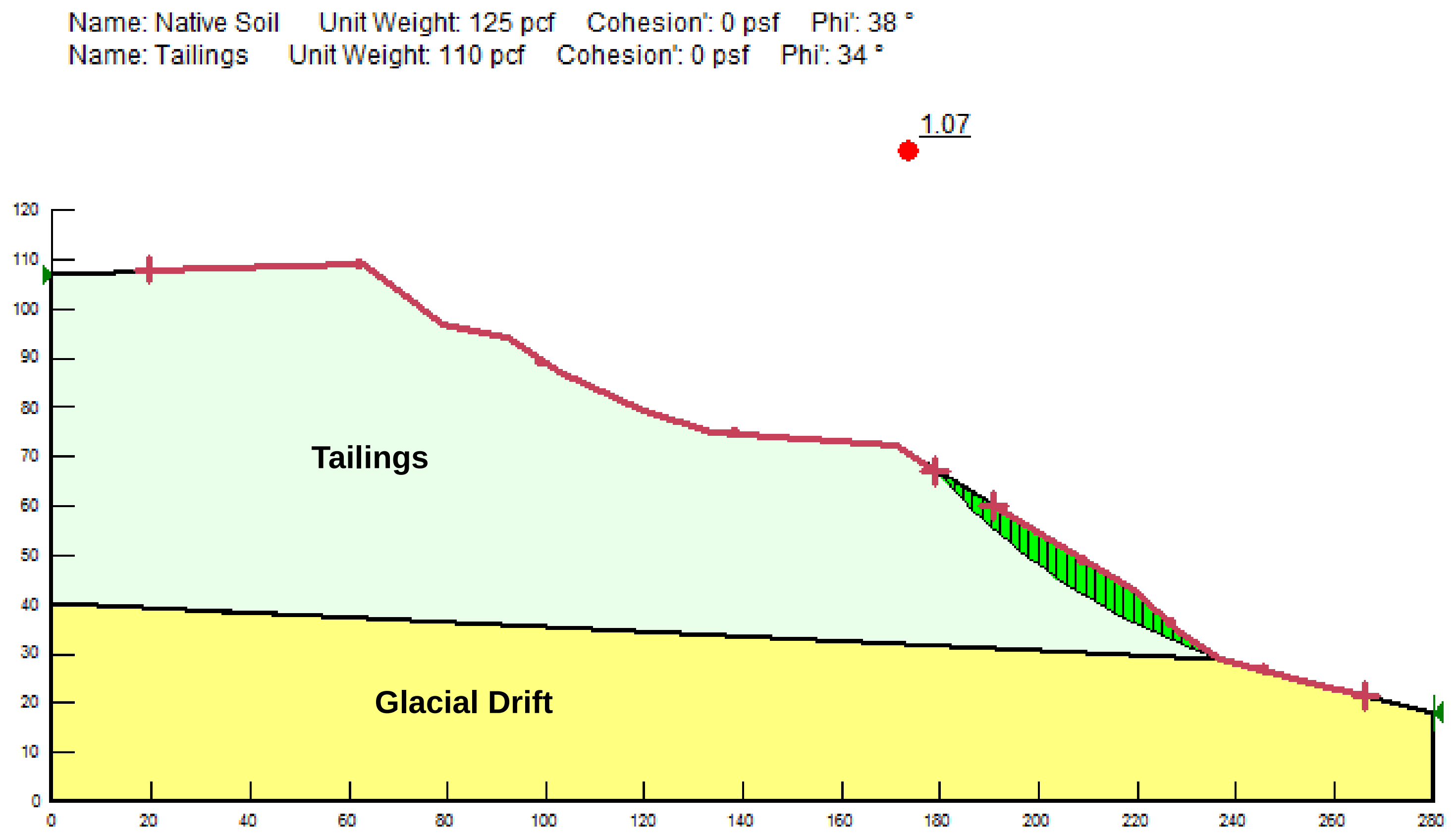

Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section B-B'

Van Stone Mine
Onion Creek, Washington

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Figure C-11

Notes:

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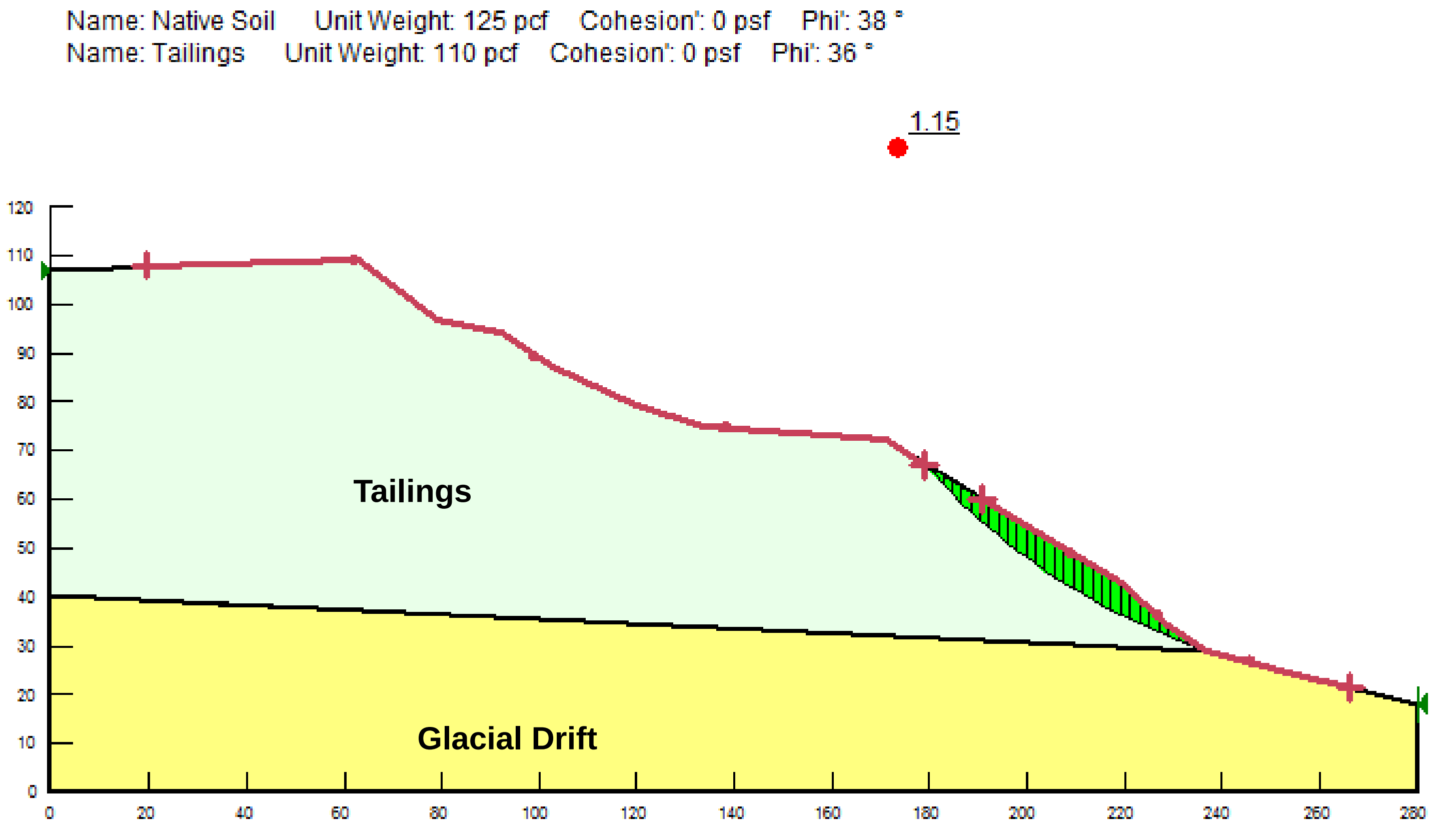

Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section B-B’

Van Stone Mine
Onion Creek, Washington

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Figure C-12

Notes:
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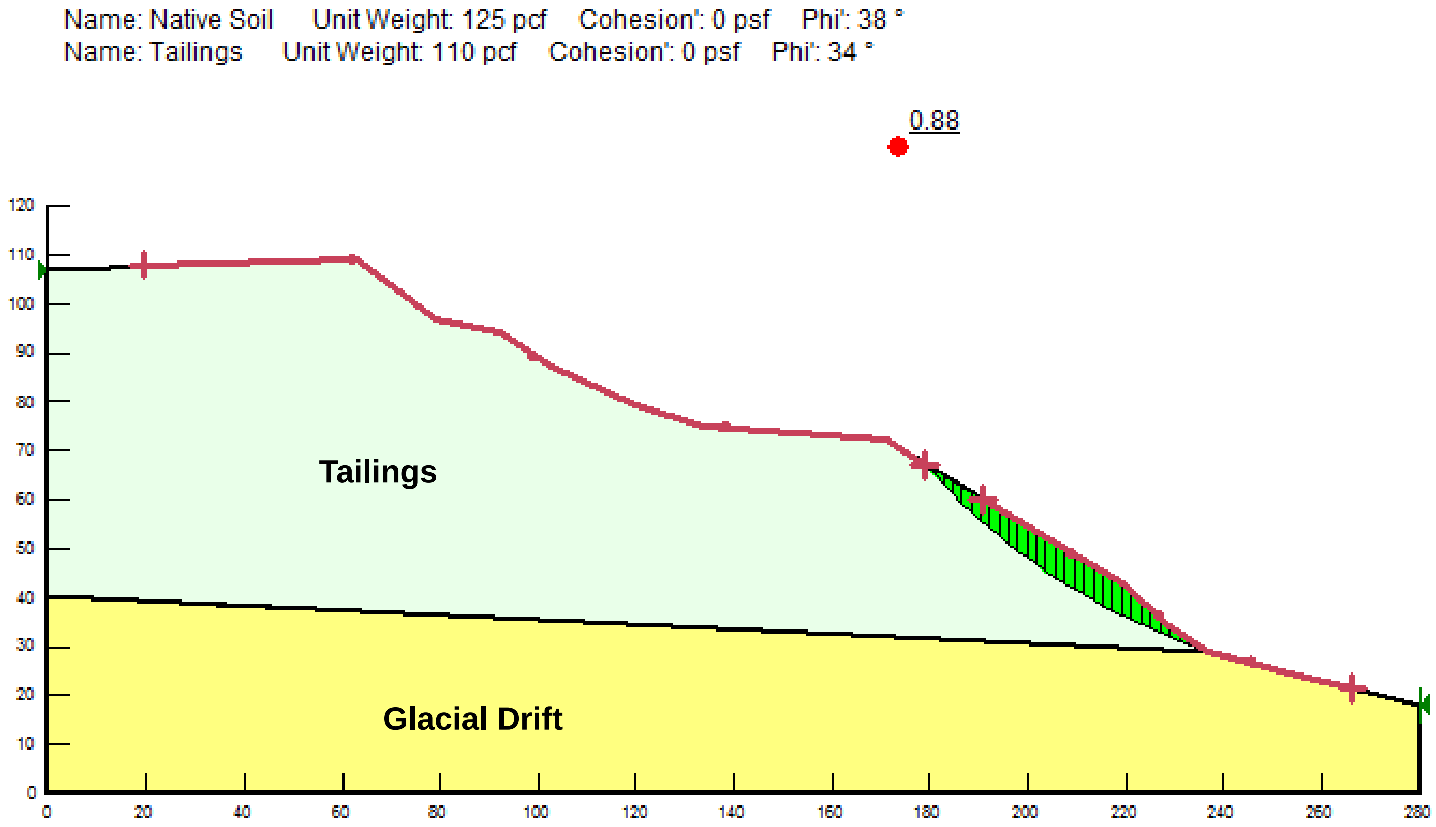

Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section B-B’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-13

Notes:
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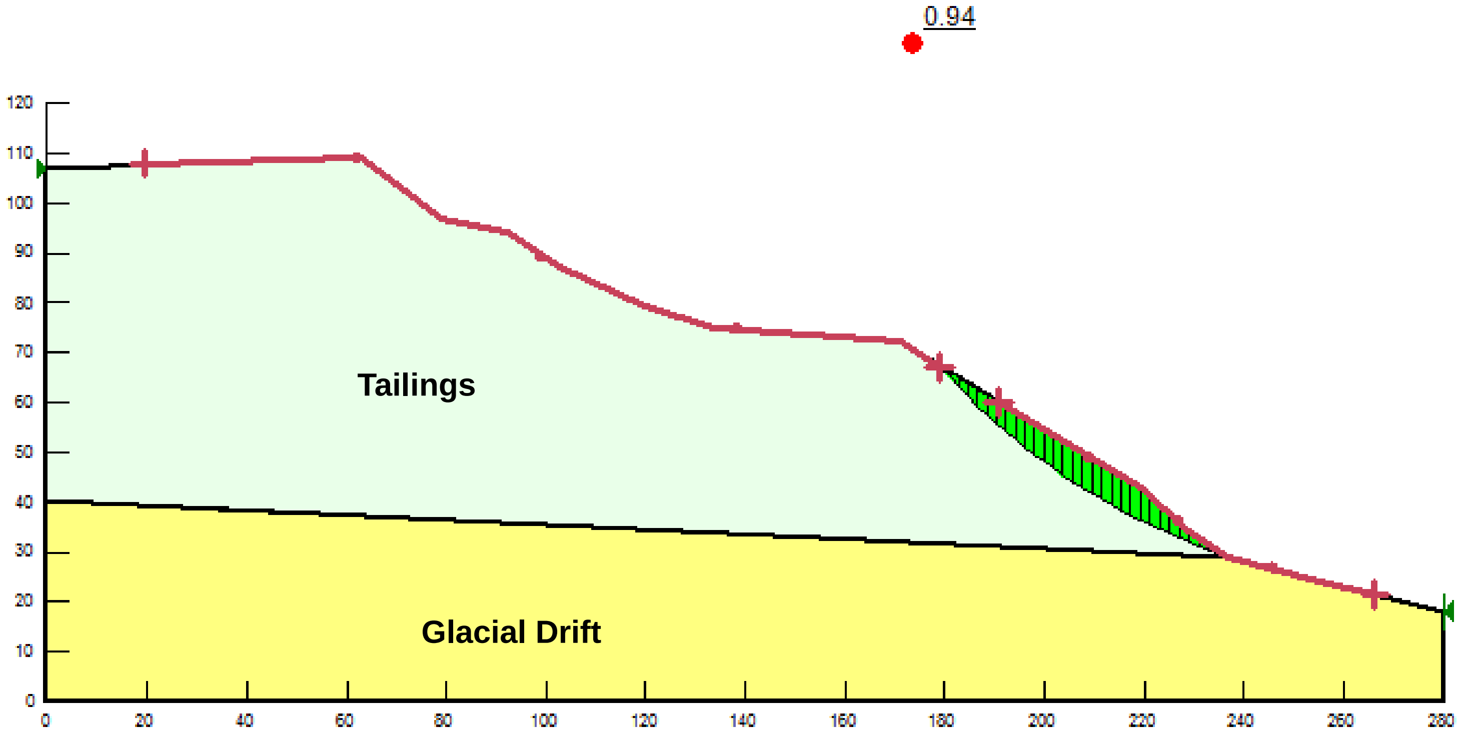
Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 36 °



Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section B-B'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-14

Notes:
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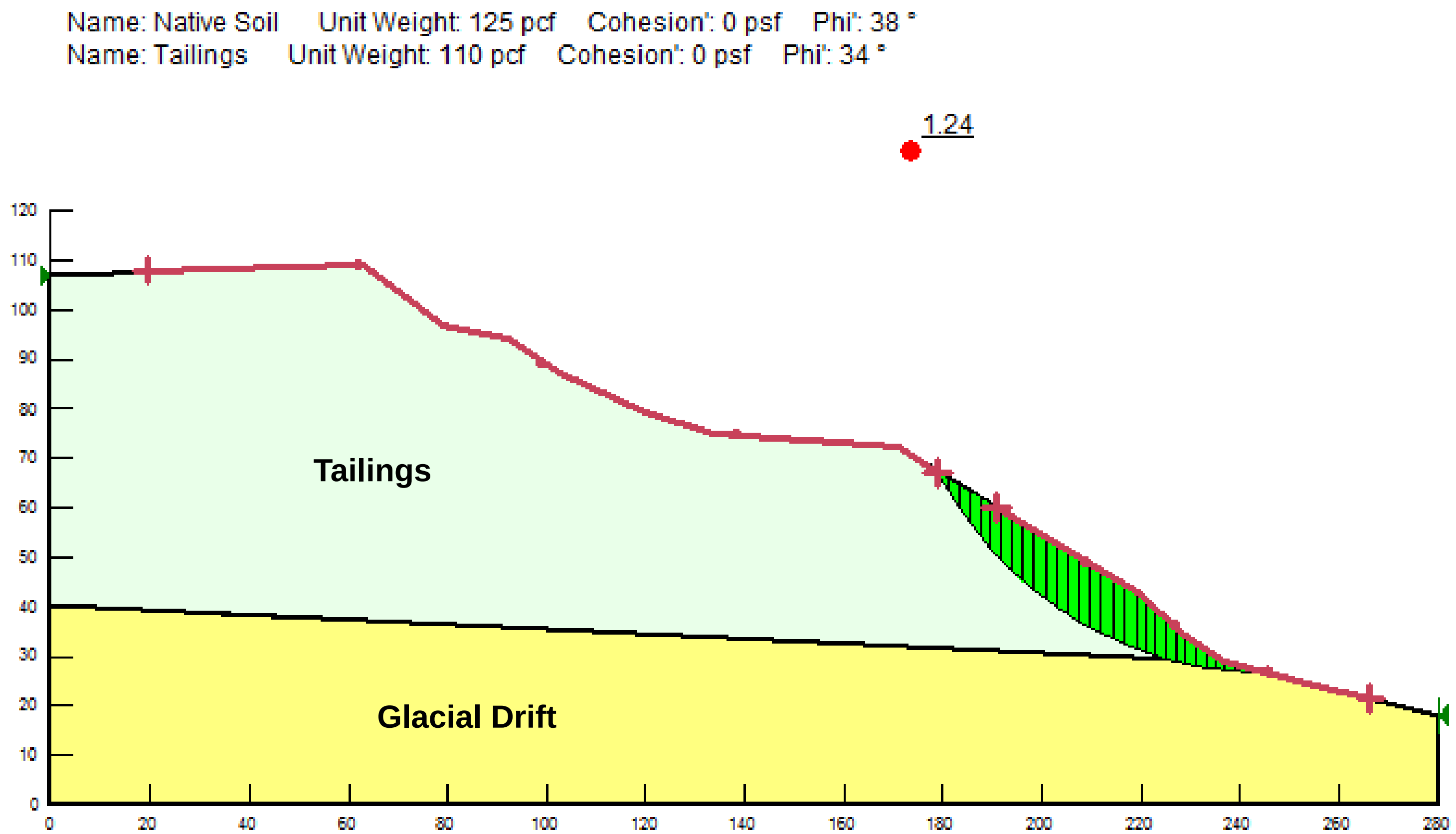

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Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section B-B'

Van Stone Mine
Onion Creek, Washington

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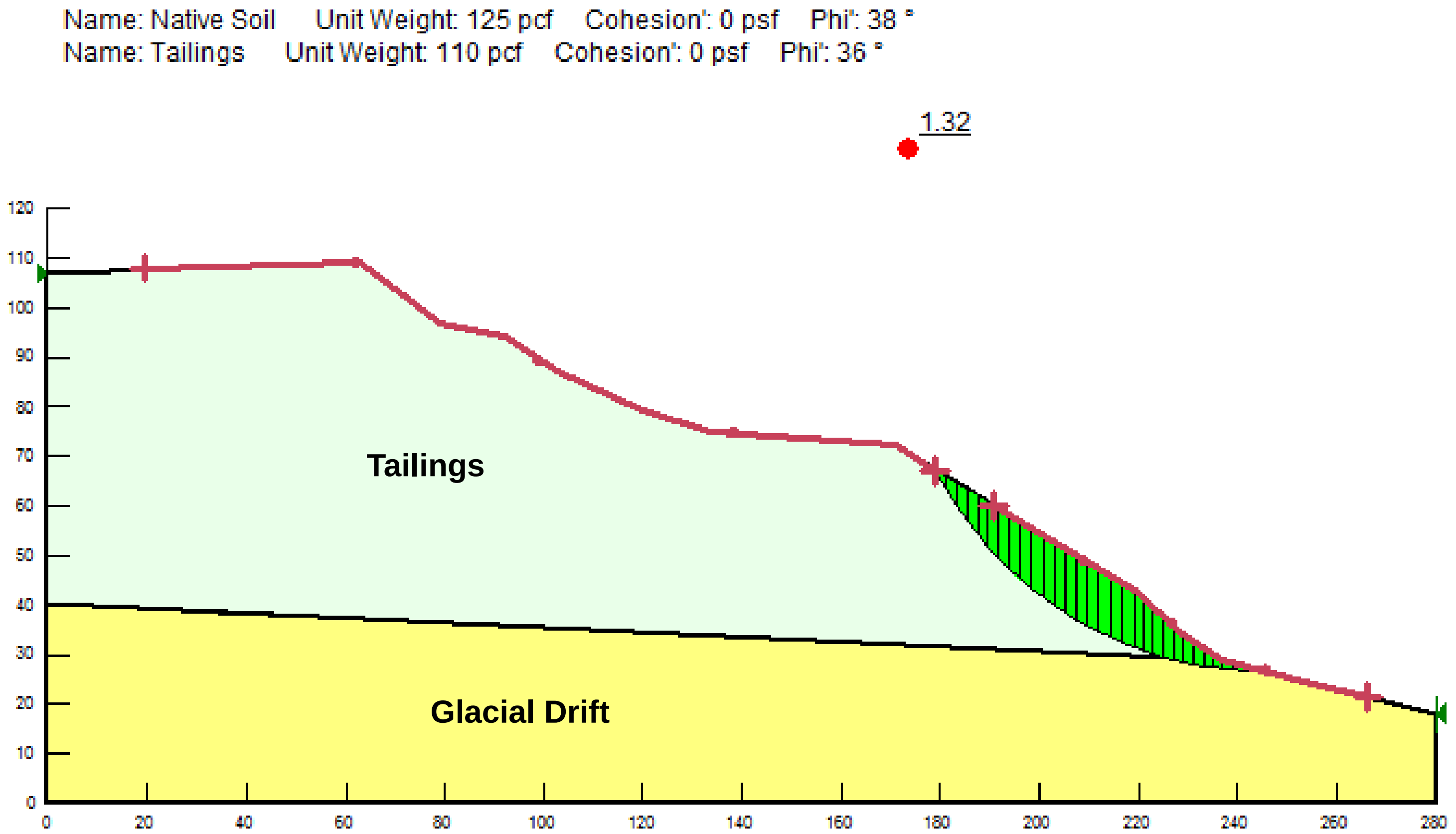
Figure C-15



Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section B-B'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-16

Notes:

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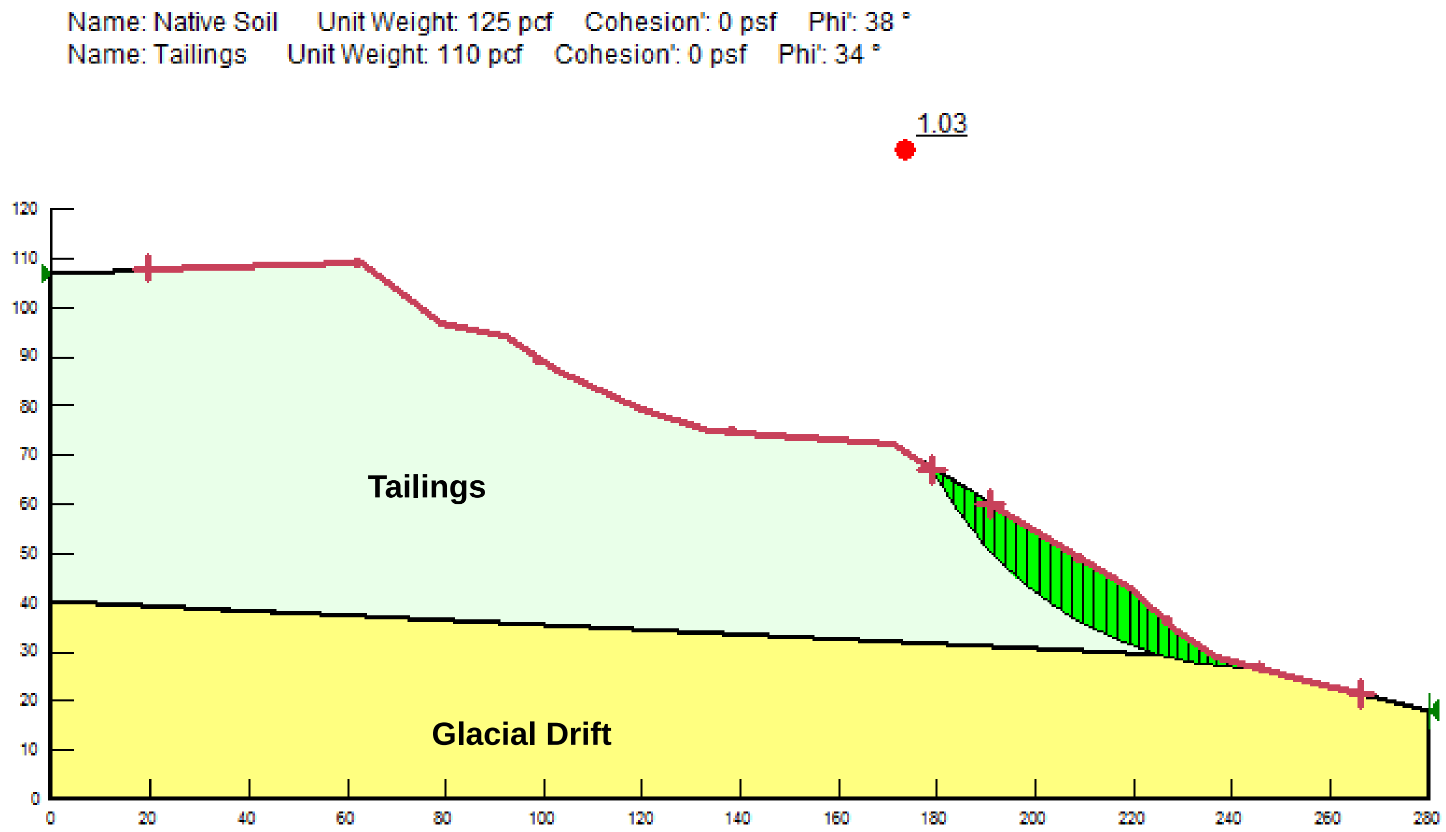

Lower Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section B-B'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-17

Notes:
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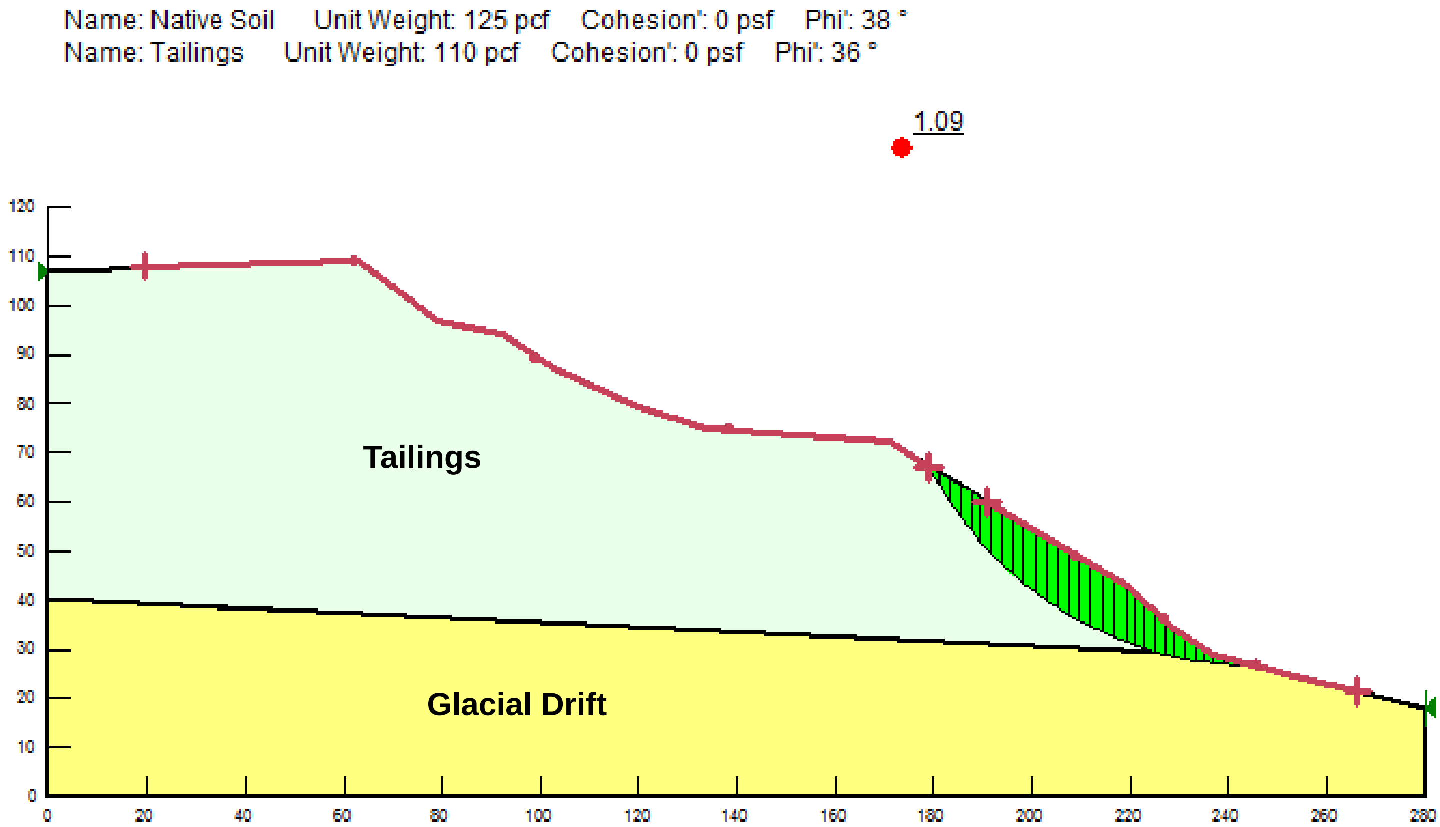

Lower Tailings Stability – Seismic Minimum 10 Foot Failure Plane Section B-B’ 2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-18

Notes:

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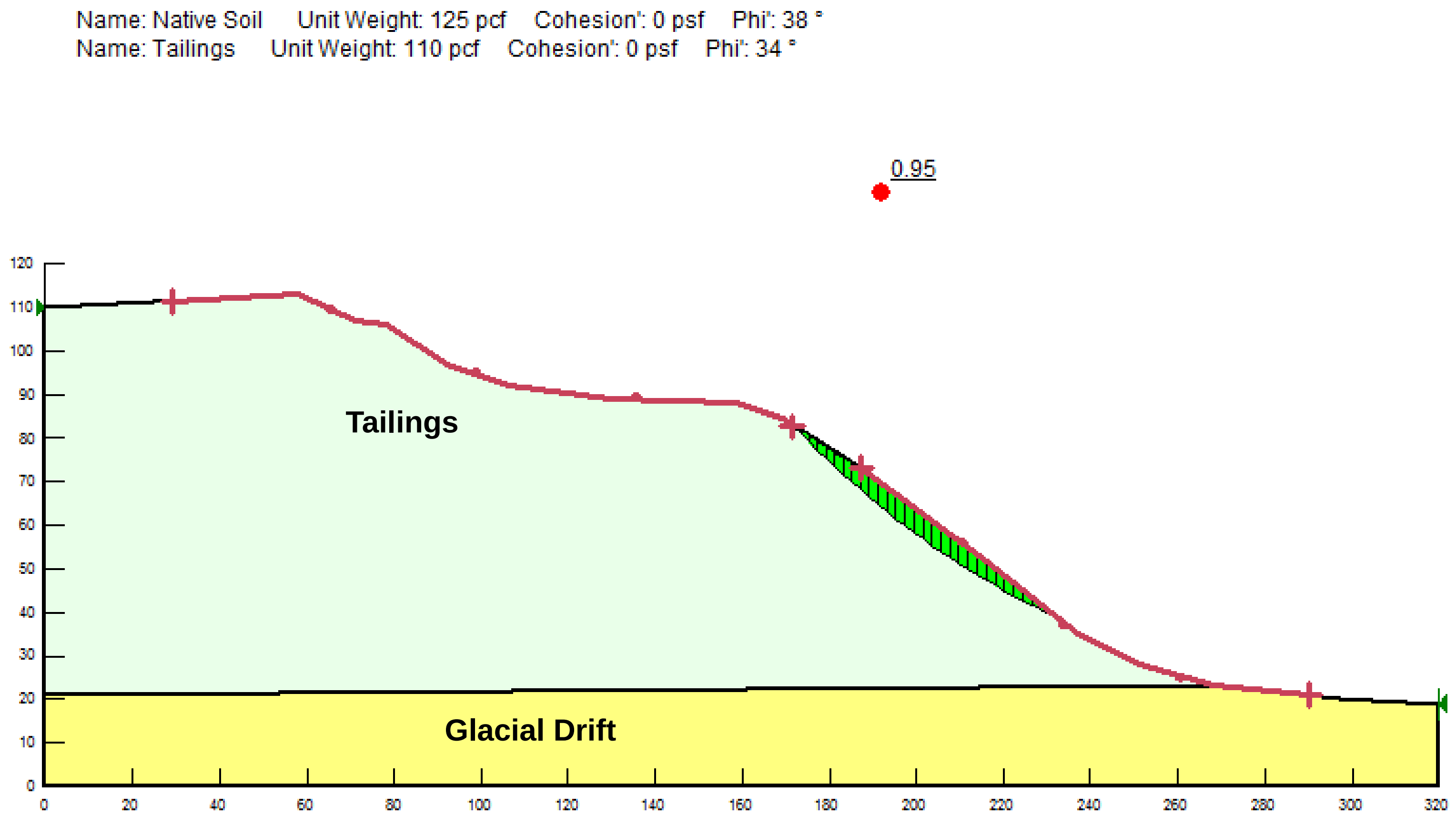

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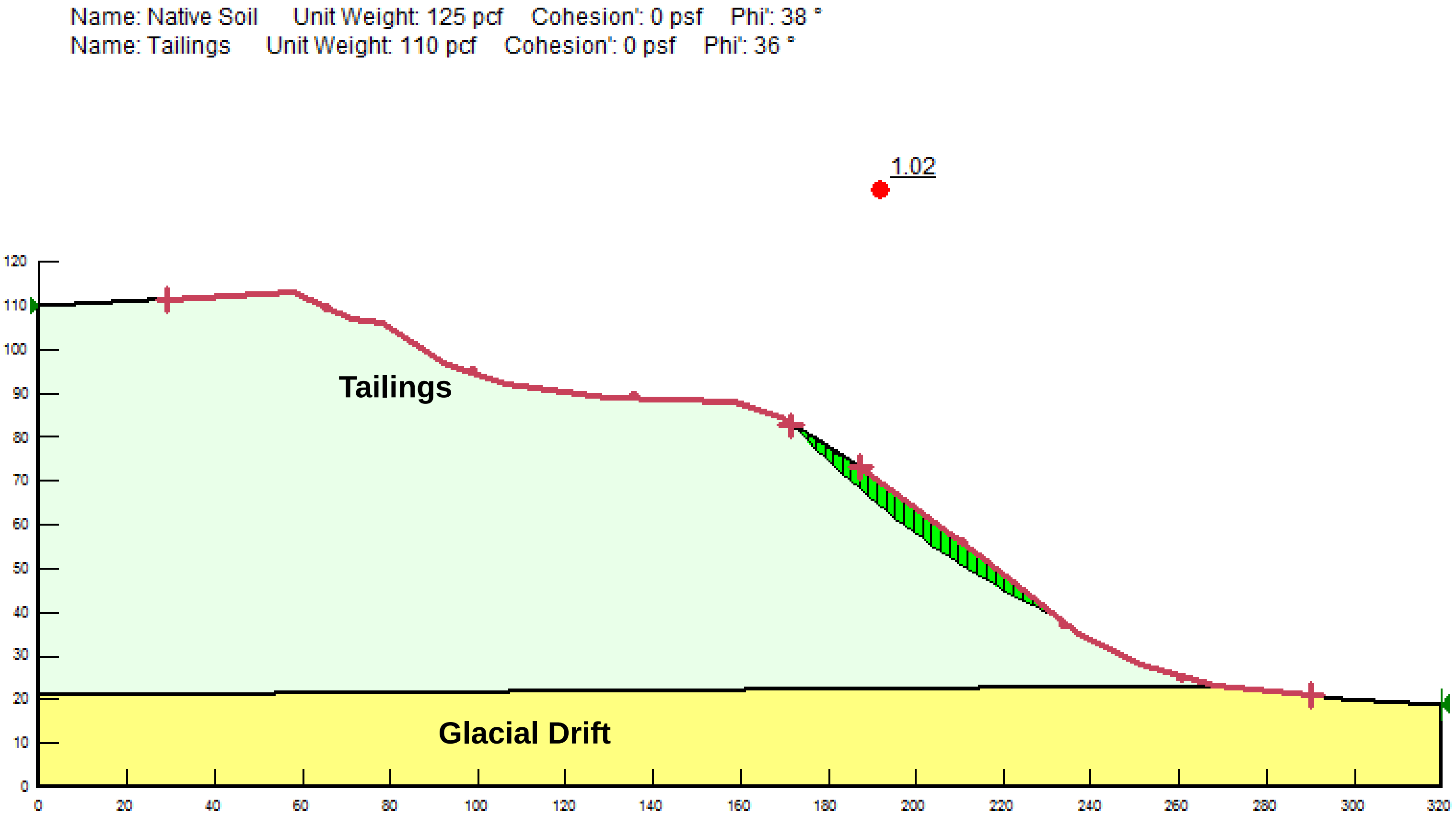
Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section C-C'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-19



Lower Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section C-C’

Van Stone Mine
Onion Creek, Washington

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Figure C-20

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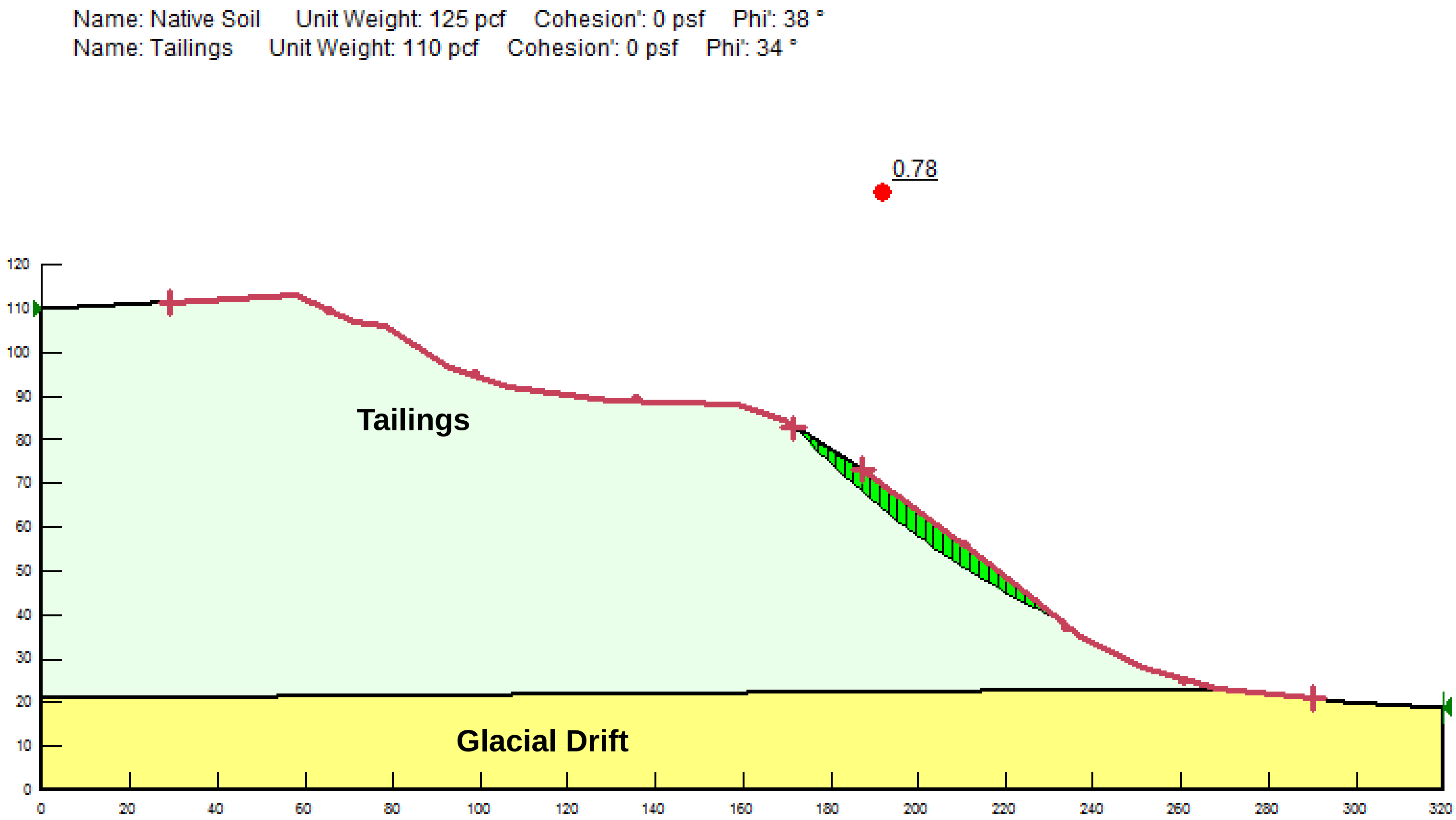

Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section C-C'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-21

Notes:

1. The locations of all features shown are approximate.
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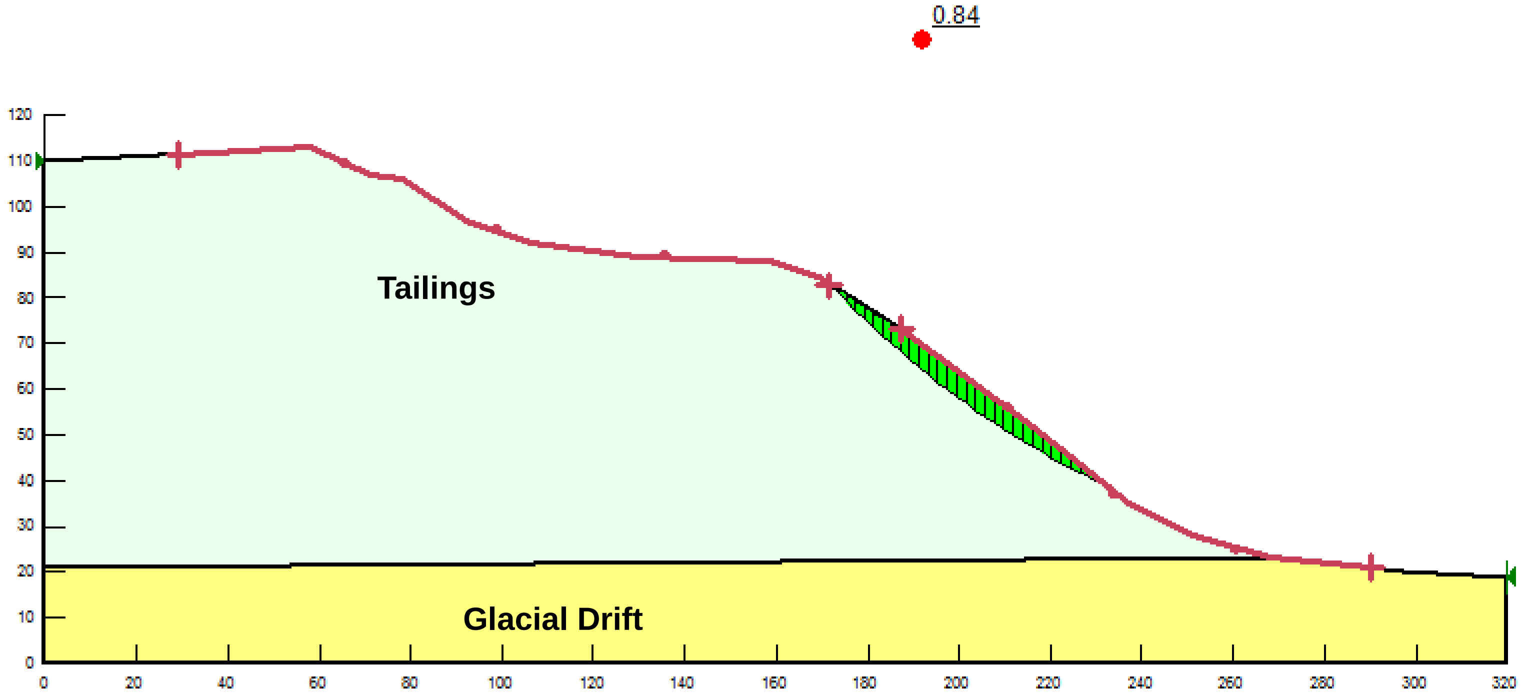
Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 36 °



Lower Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section C-C’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-22

Notes:
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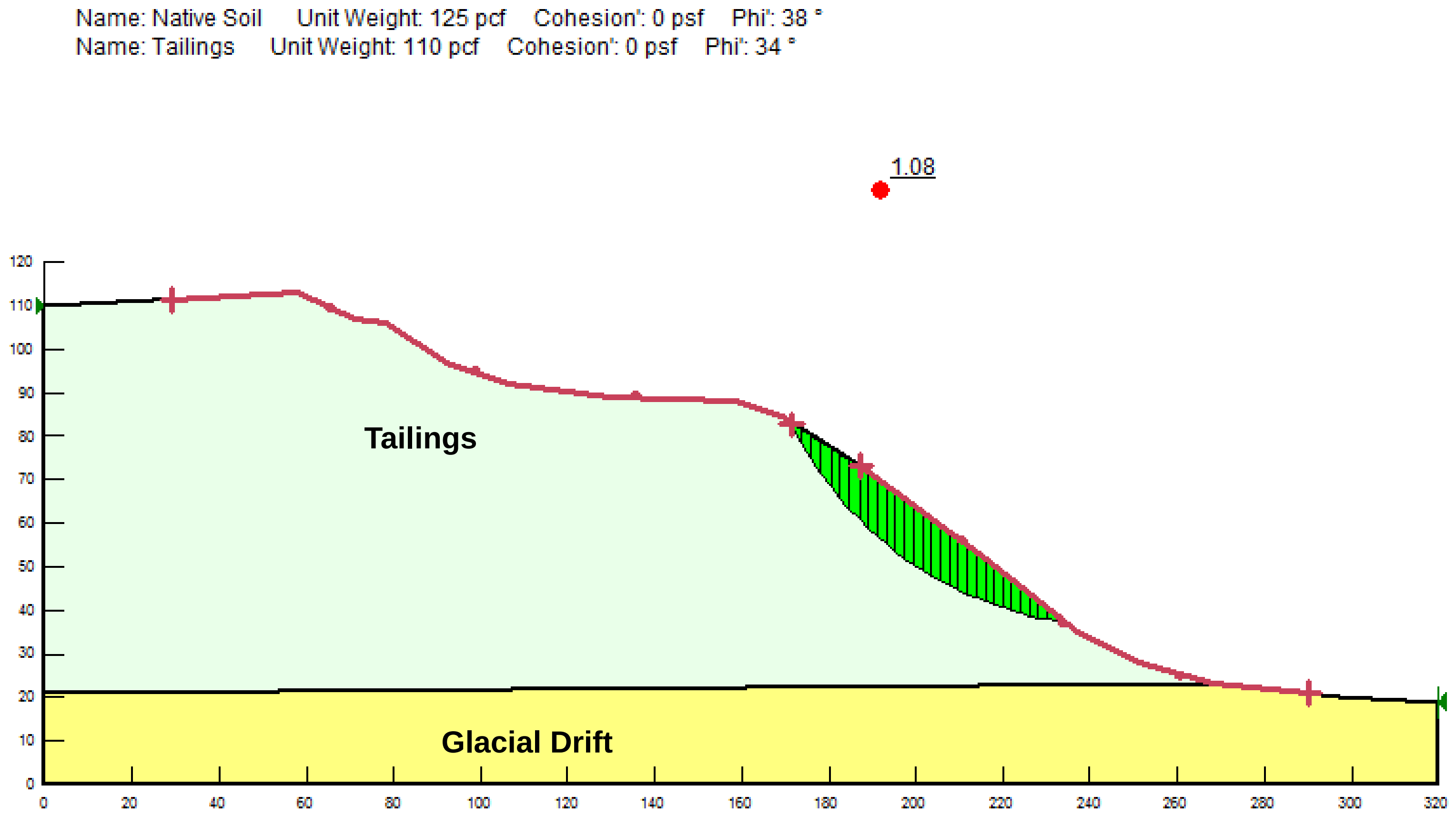

Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section C-C'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-23

Notes:

1. The locations of all features shown are approximate.
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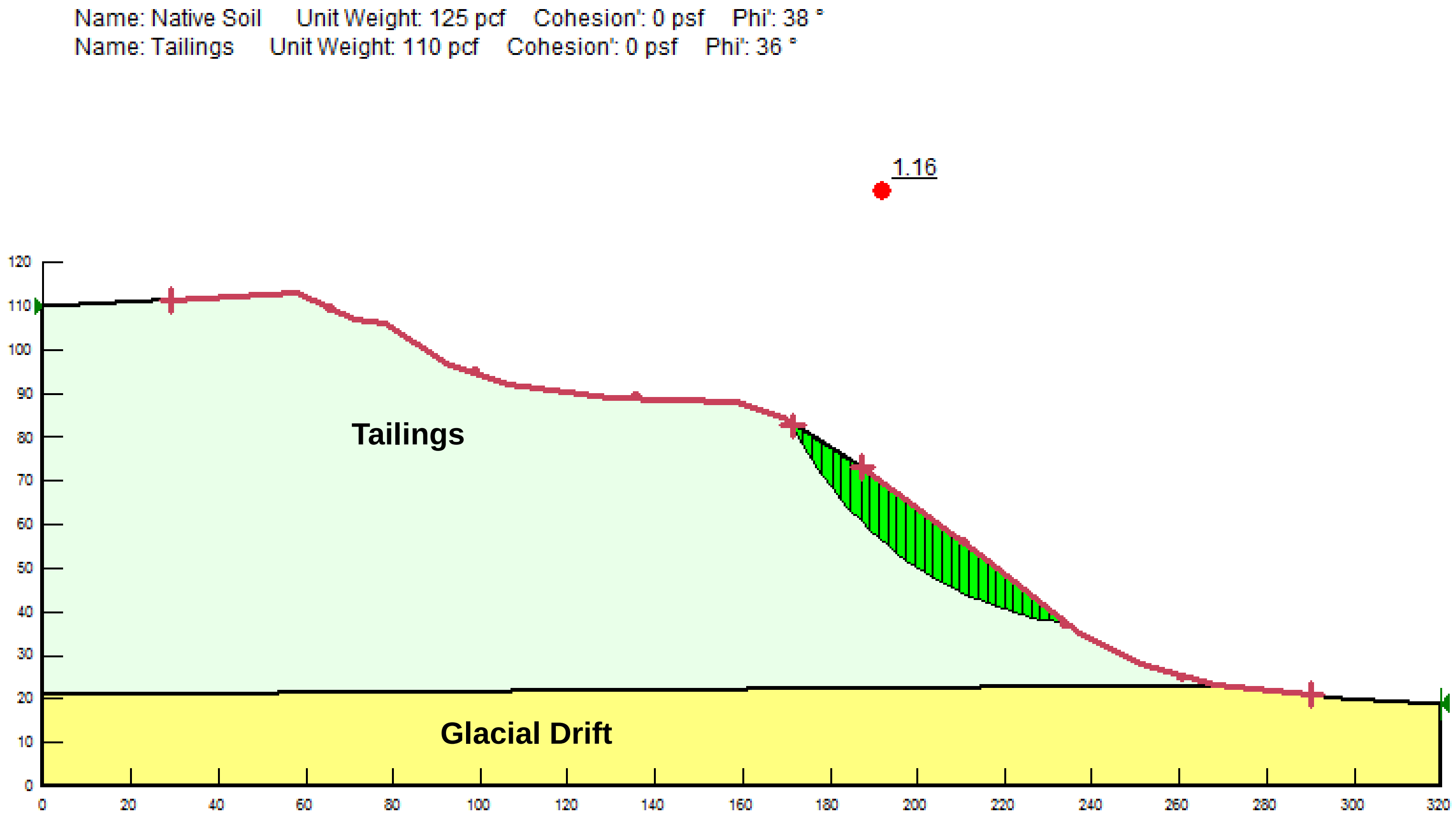

Notes:
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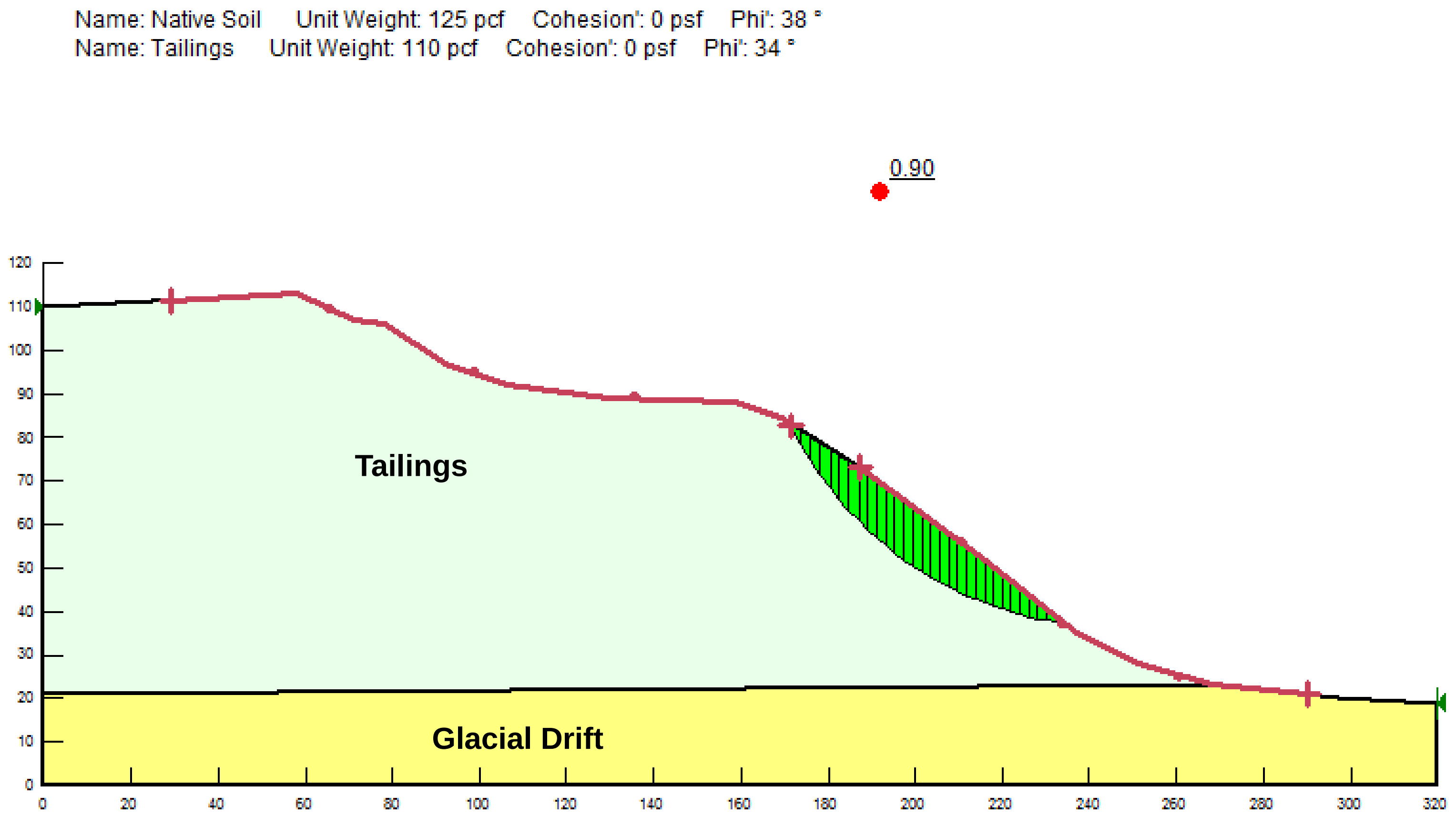
Lower Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section C-C'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-24



Lower Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section C-C'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-25

Notes:

1. The locations of all features shown are approximate.
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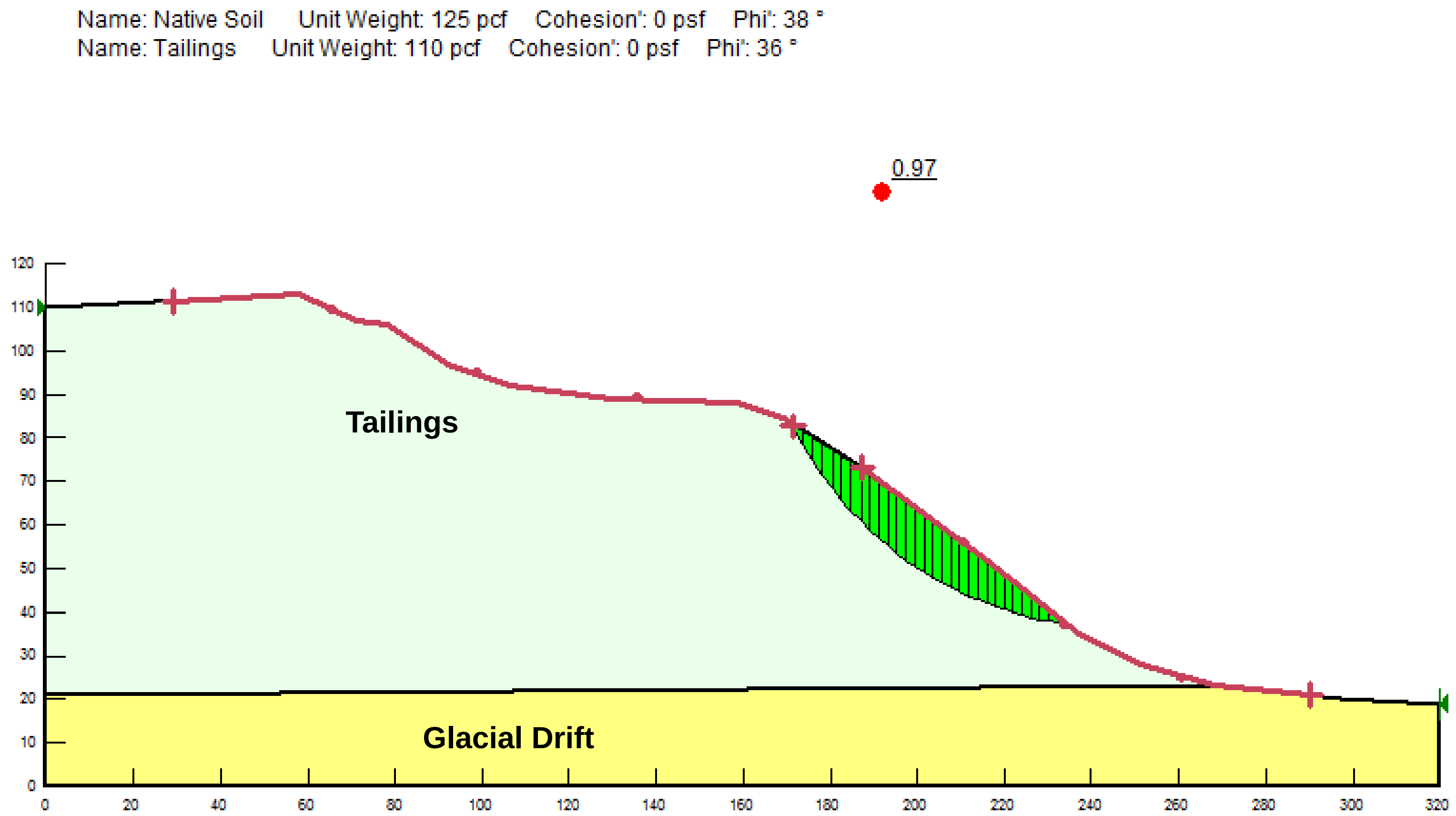

Lower Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section C-C’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-26

Notes:

1. The locations of all features shown are approximate.
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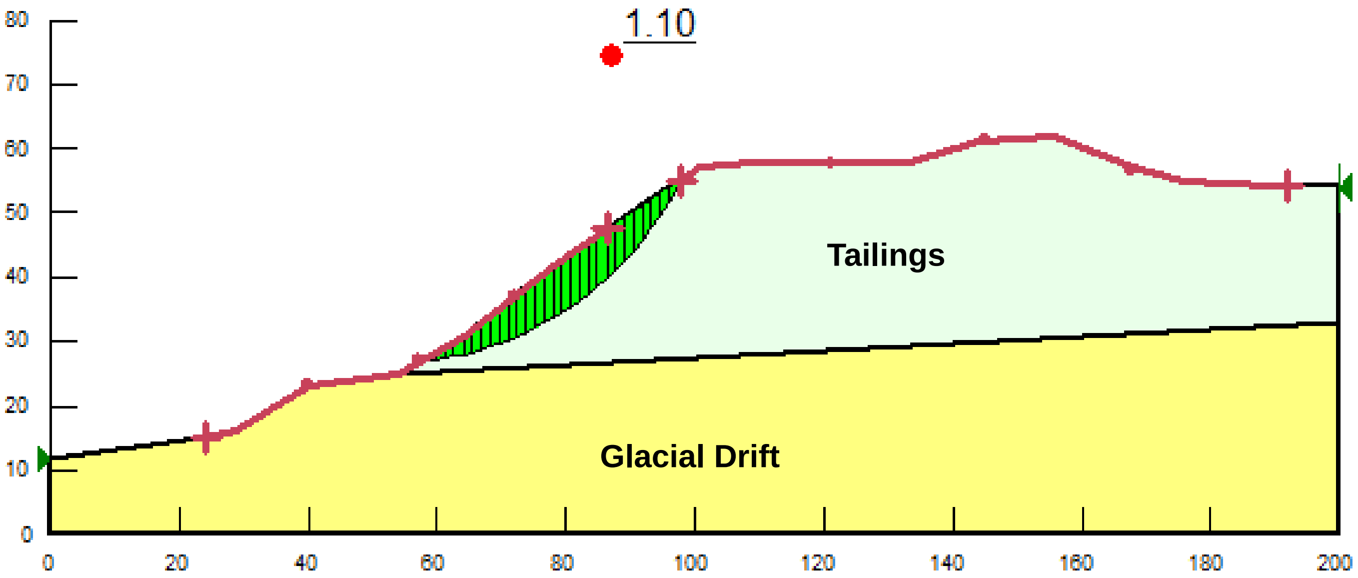
Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 34 °



Upper Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section D-D’

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-27

Notes:
1. The locations of all features shown are approximate.
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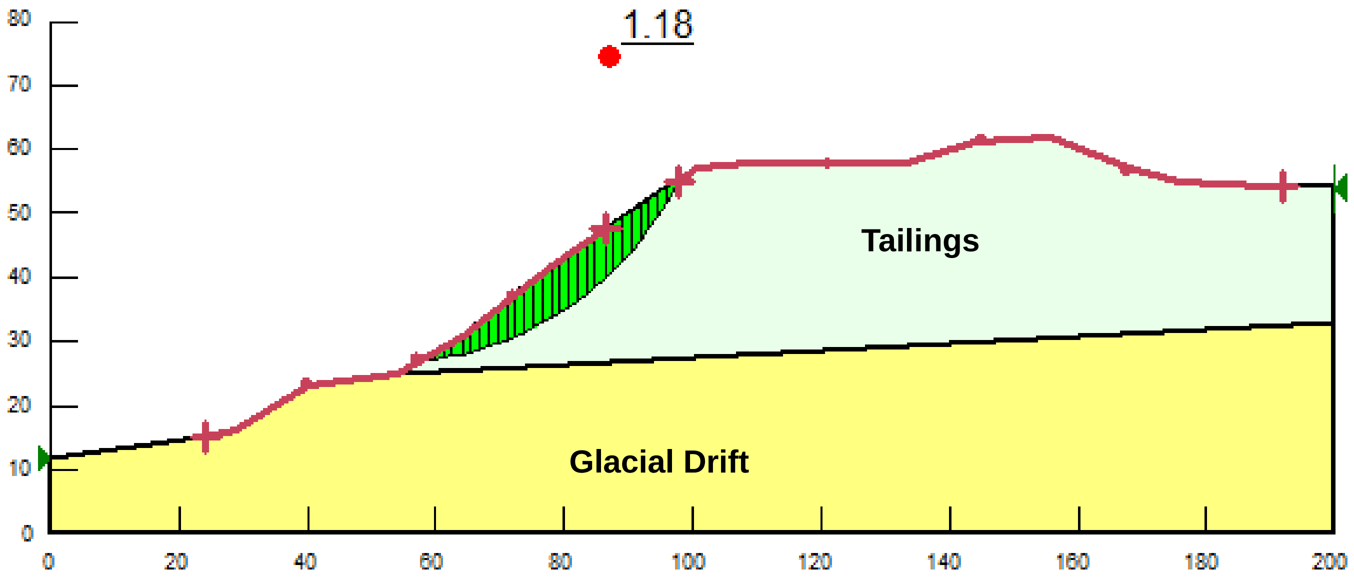
Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 36 °



Notes:
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Upper Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section D-D'

Van Stone Mine
Onion Creek, Washington

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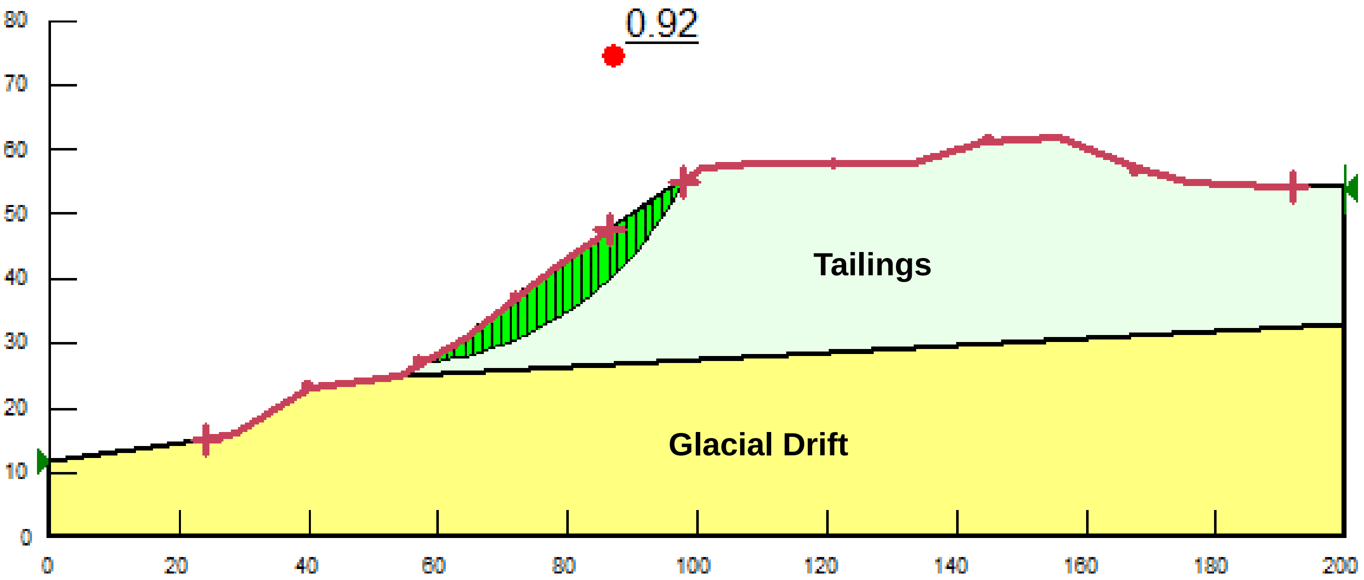
Figure C-28

Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 34 °



Notes:
1. The locations of all features shown are approximate.
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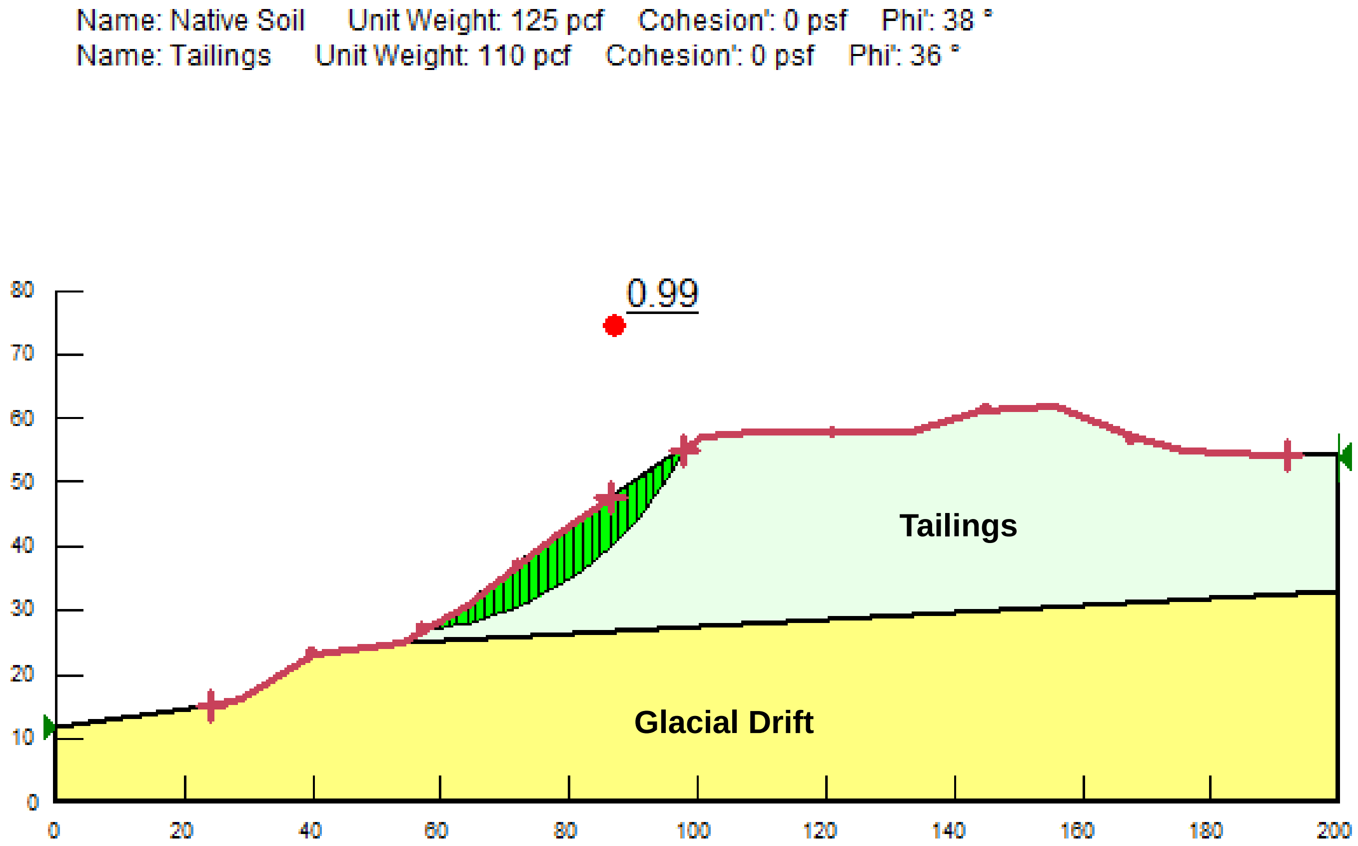
Upper Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section D-D'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-29



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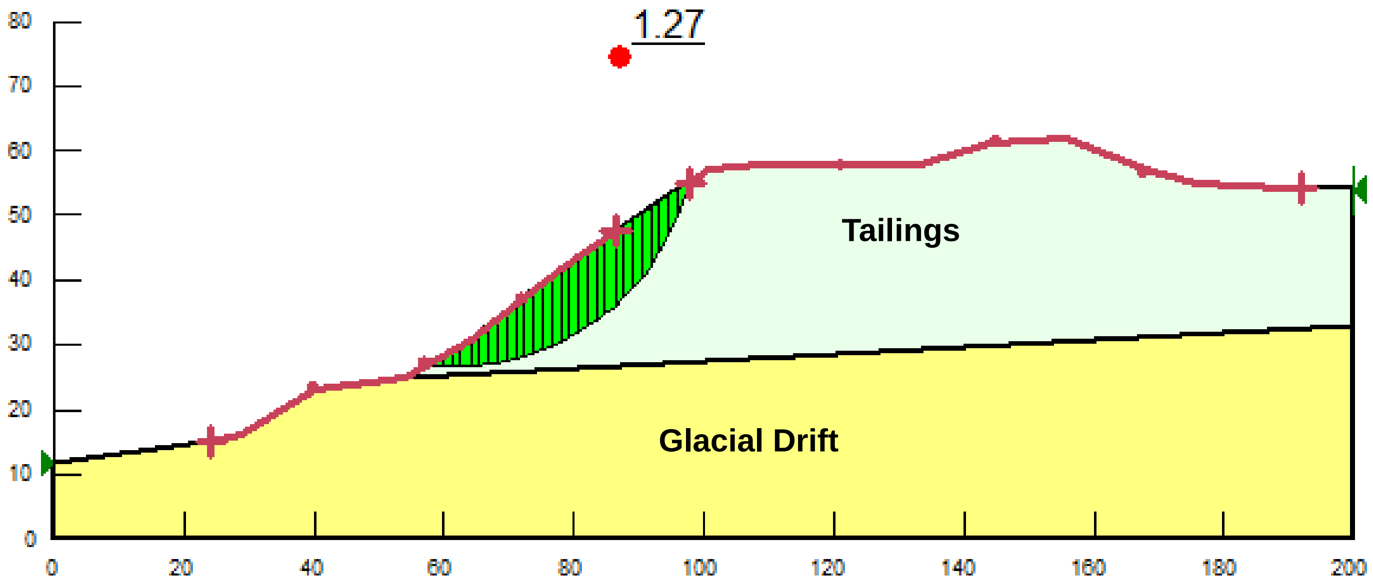
Upper Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section D-D'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-30

Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 34 °



Notes:
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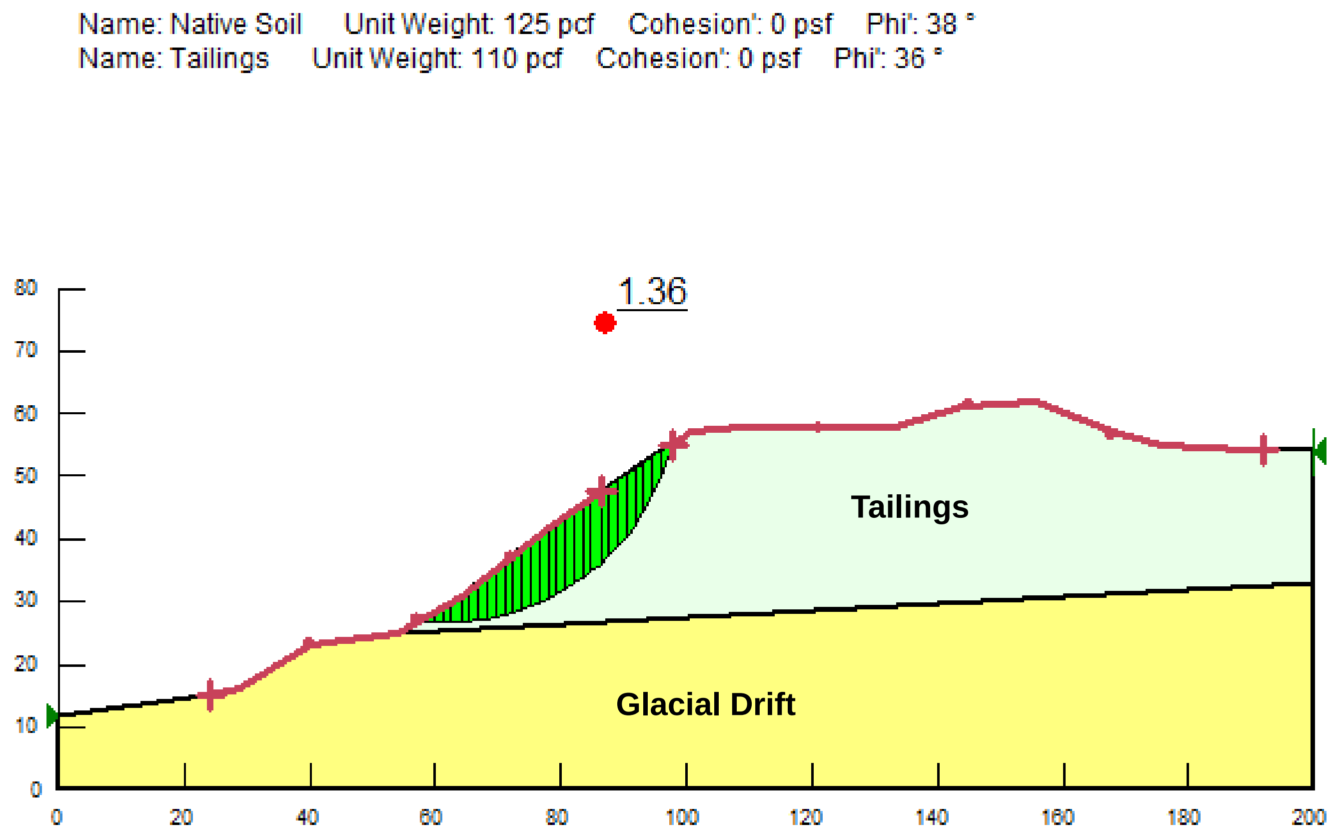
Upper Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section D-D’

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-31



Upper Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section D-D'

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-32

Notes:

1. The locations of all features shown are approximate.
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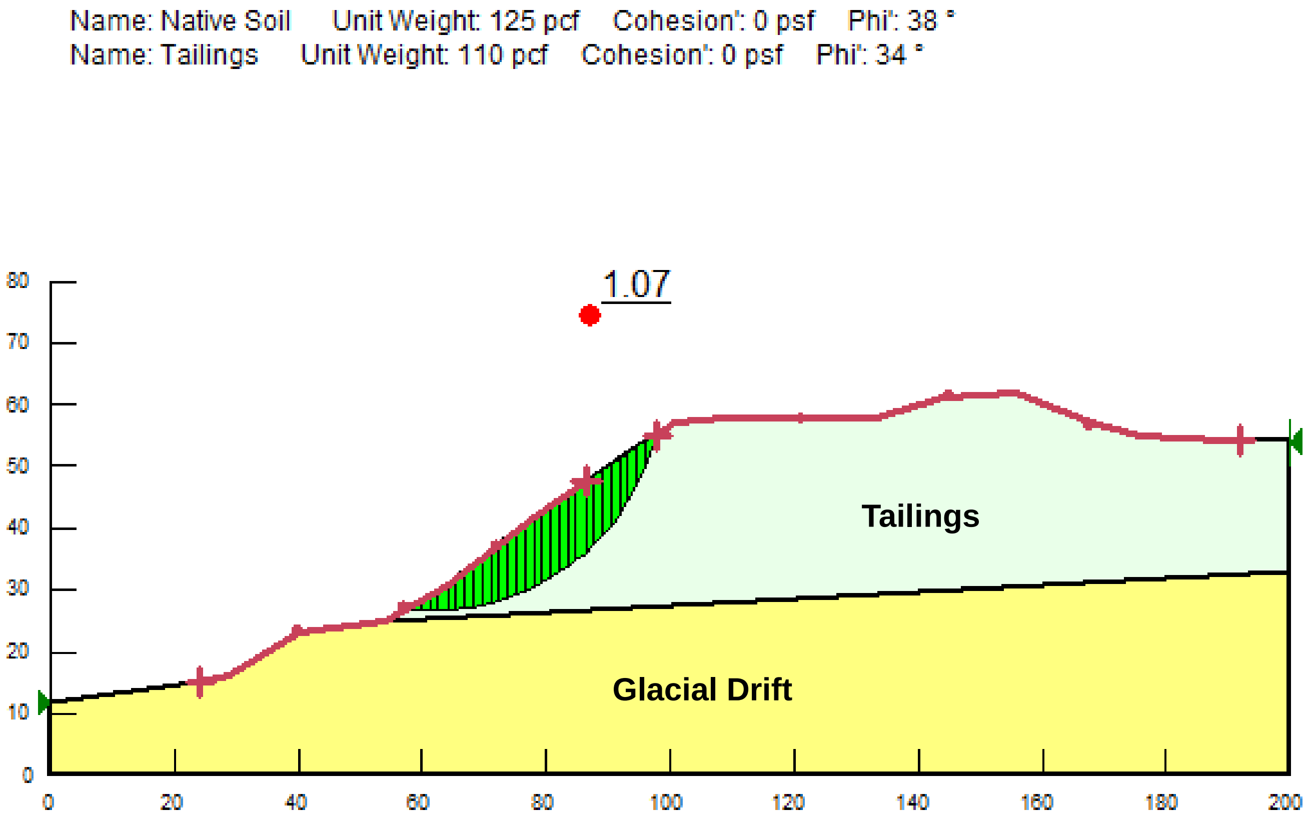

Notes:
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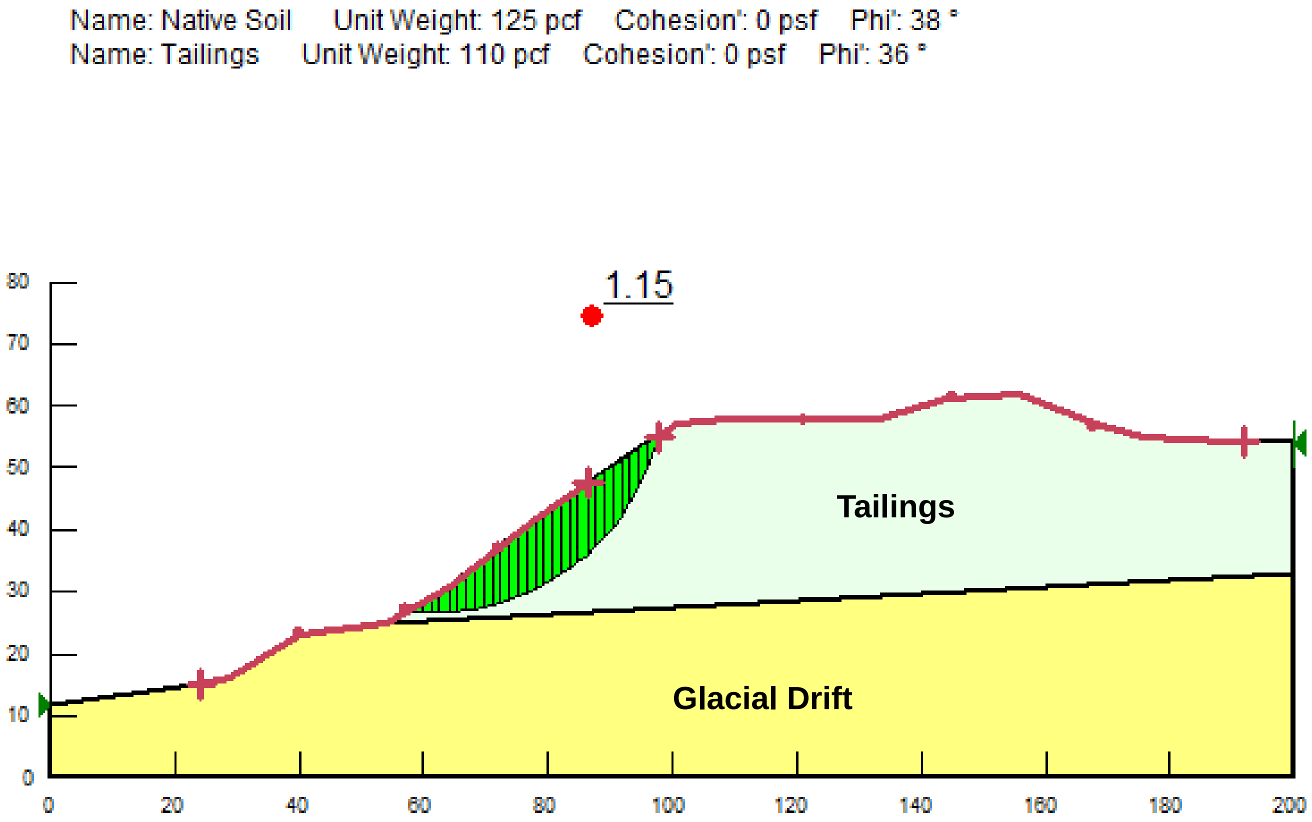
Upper Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section D-D’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-33



Upper Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section D-D'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-34

Notes:
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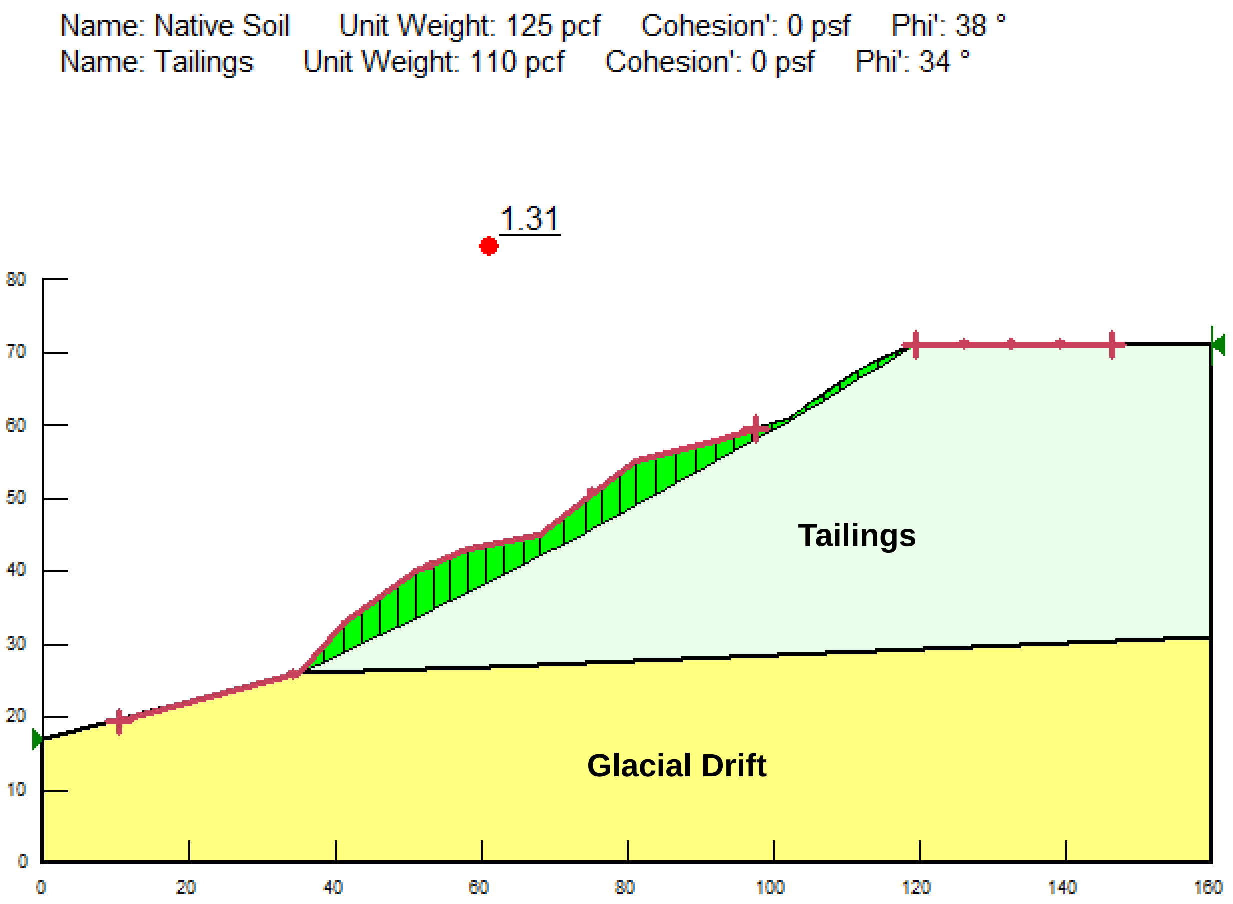

Notes:

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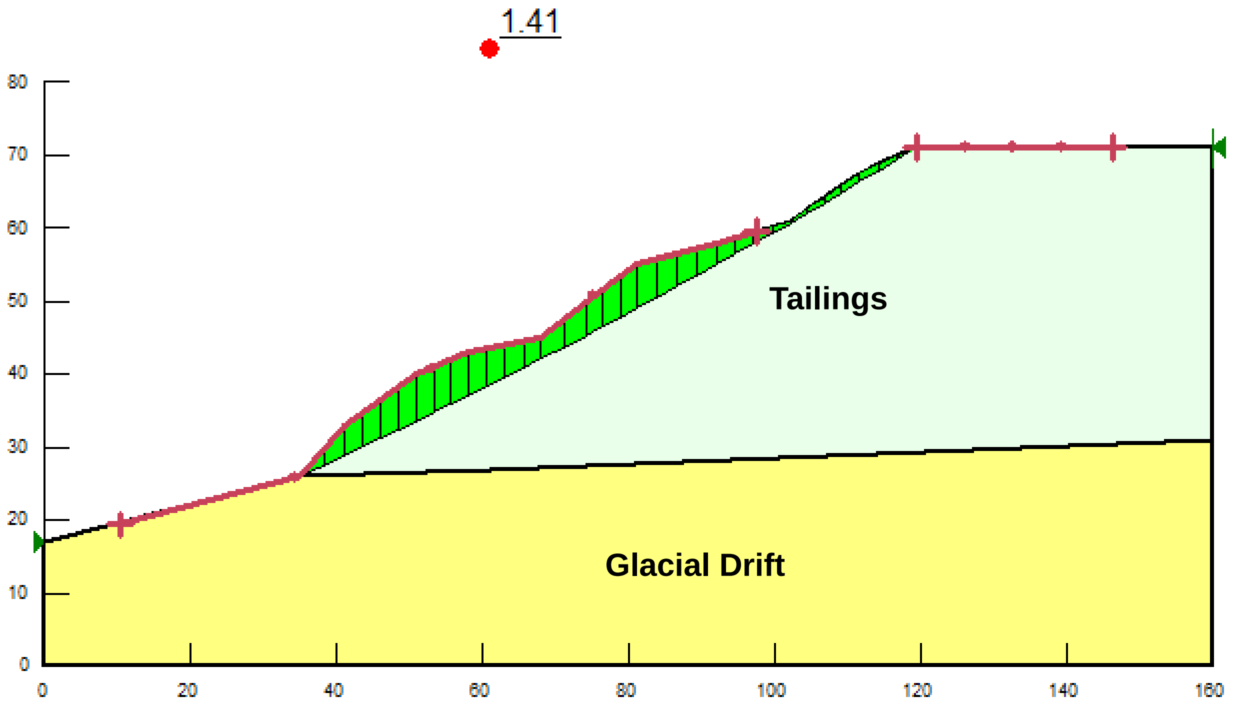
Upper Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section E-E’

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-35

Name: Native Soil Unit Weight: 125 pcf Cohesion': 0 psf Phi': 38 °
Name: Tailings Unit Weight: 110 pcf Cohesion': 0 psf Phi': 36 °



Upper Tailings Stability – Static
Minimum 5 Foot Failure Plane
Section E-E’

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-36

Notes:
1. The locations of all features shown are approximate.
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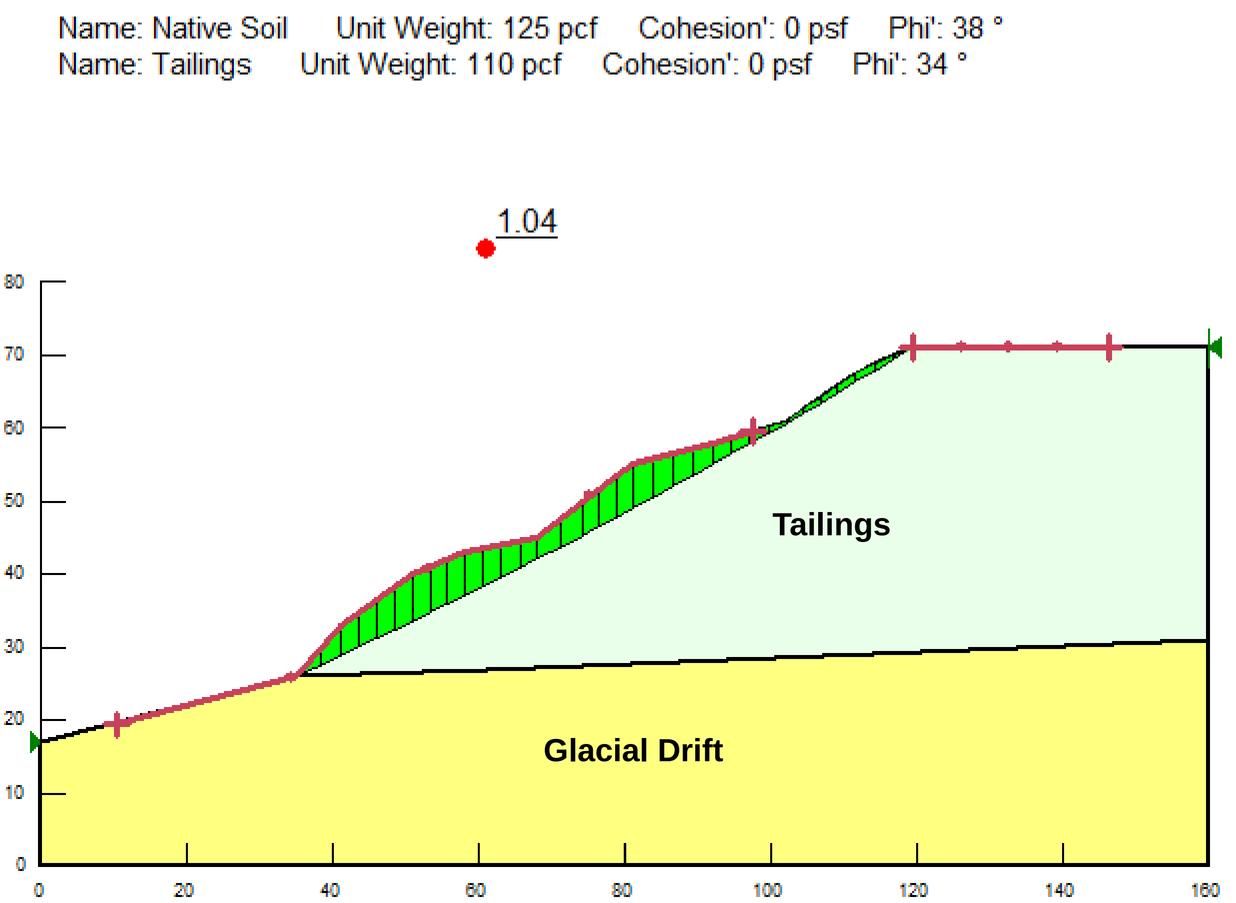

Upper Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section E-E'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-37

Notes:
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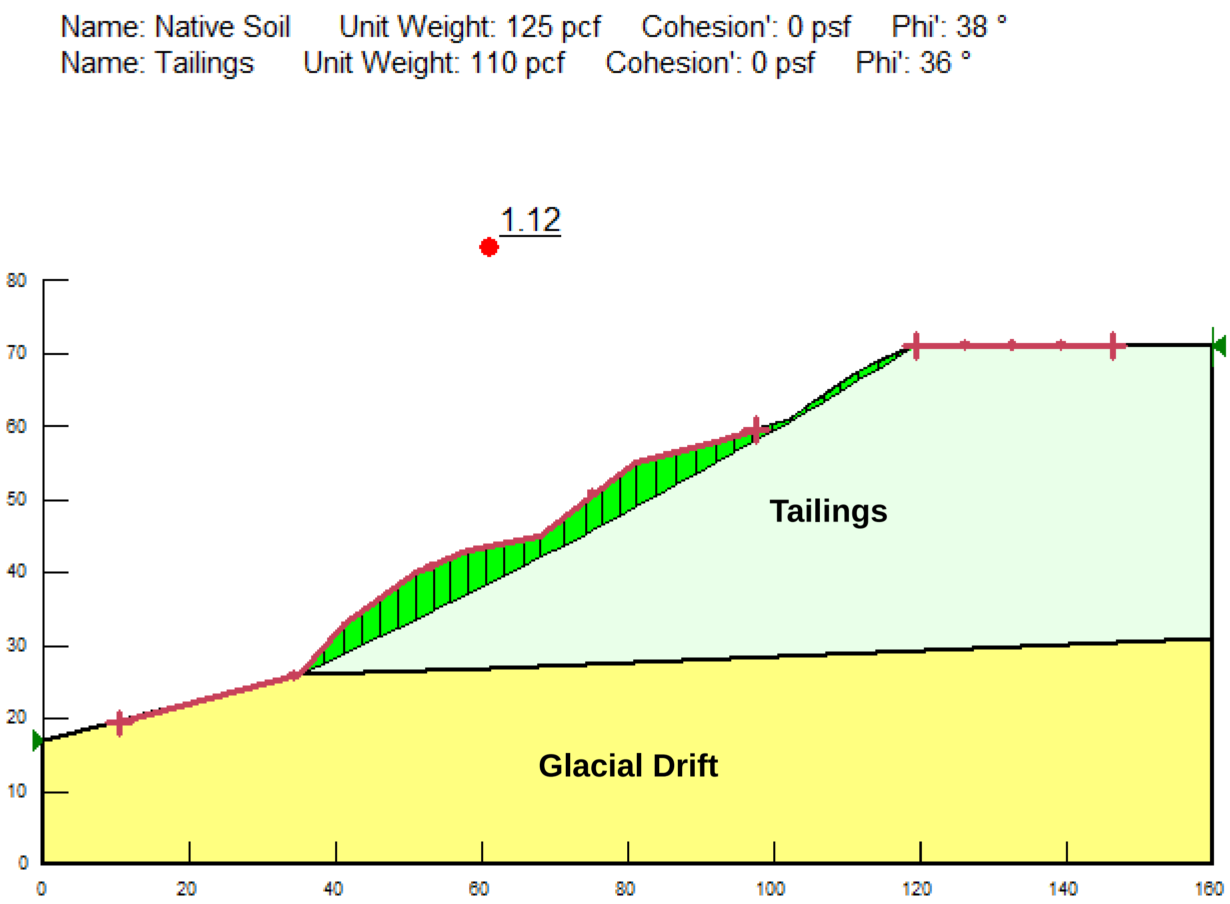

Upper Tailings Stability – Seismic
Minimum 5 Foot Failure Plane
Section E-E’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-38

Notes:

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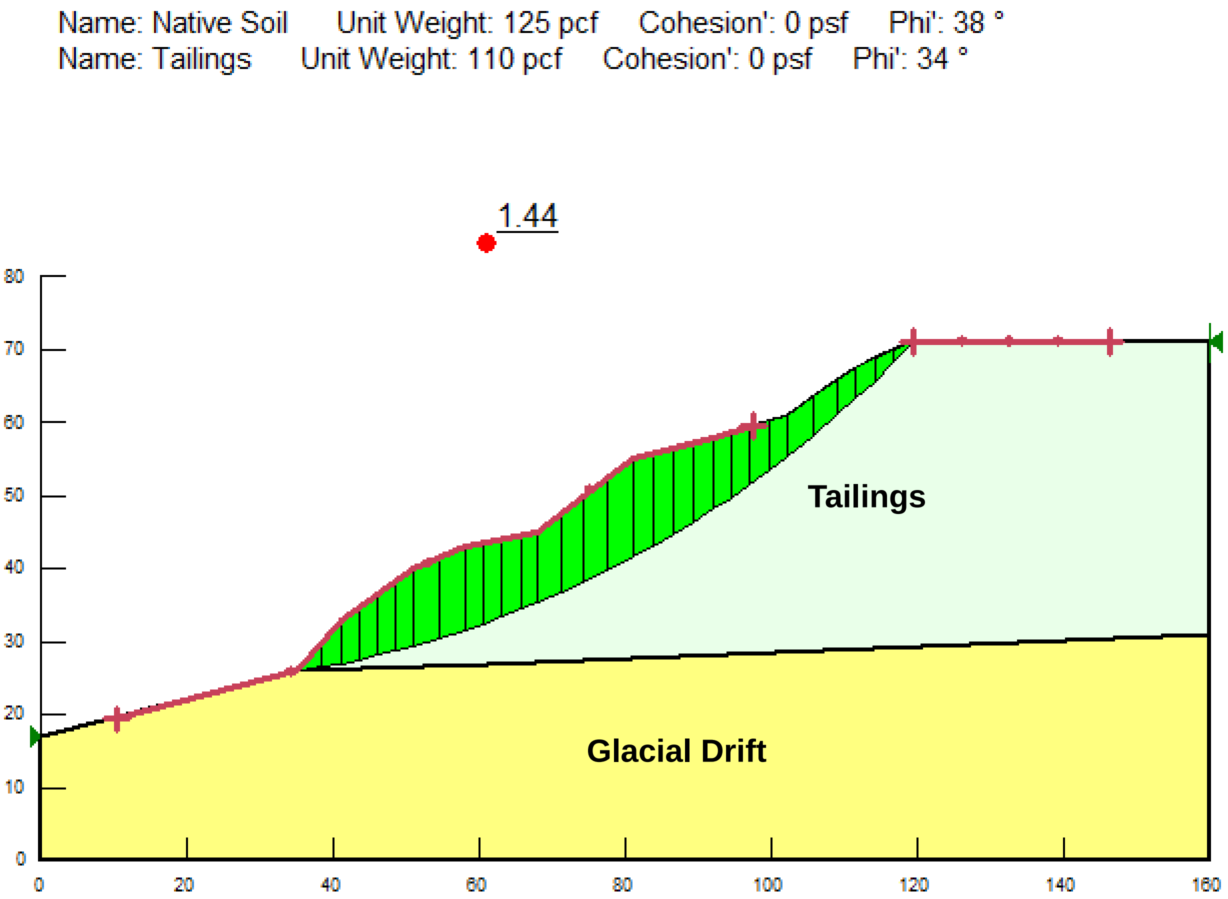

Upper Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section E-E'

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-39

Notes:

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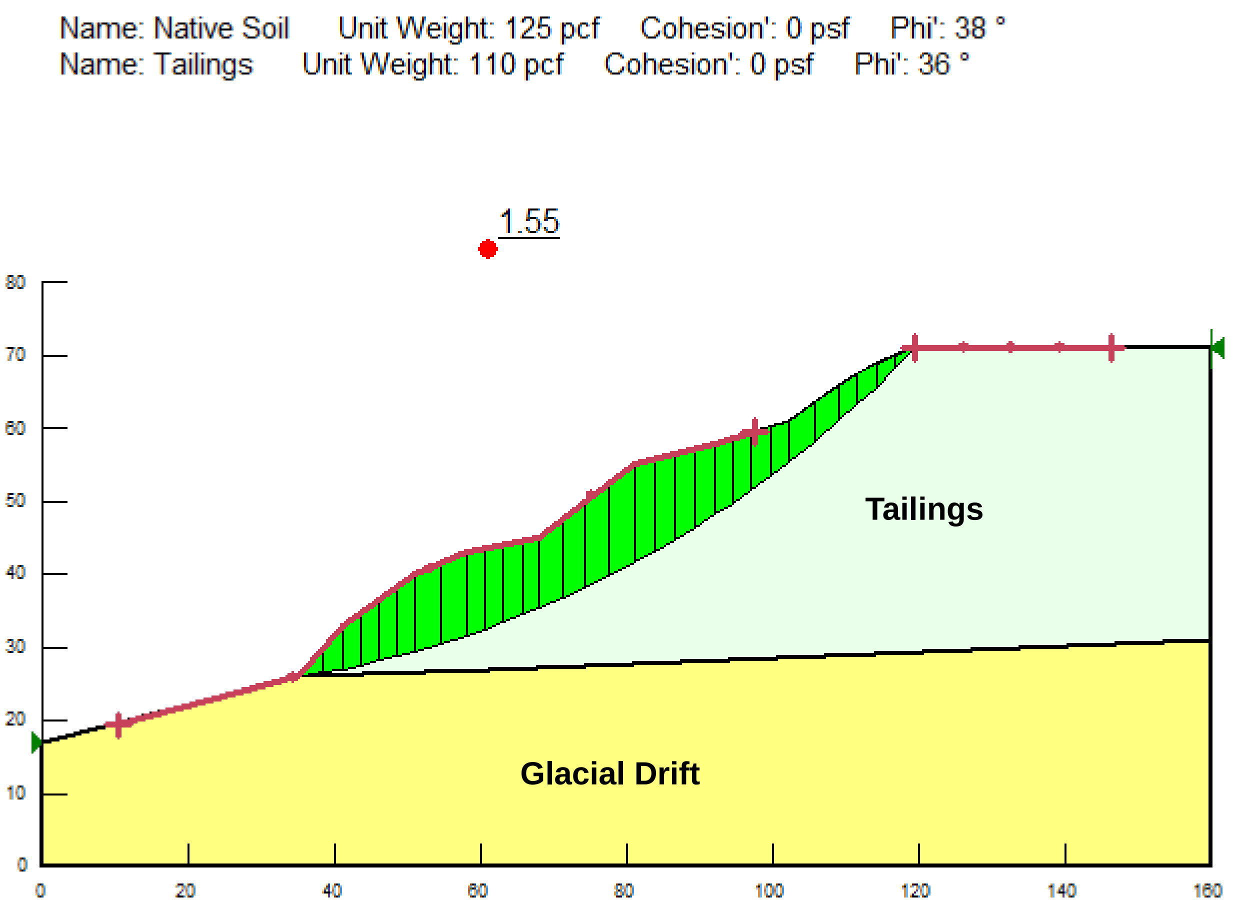

Notes:

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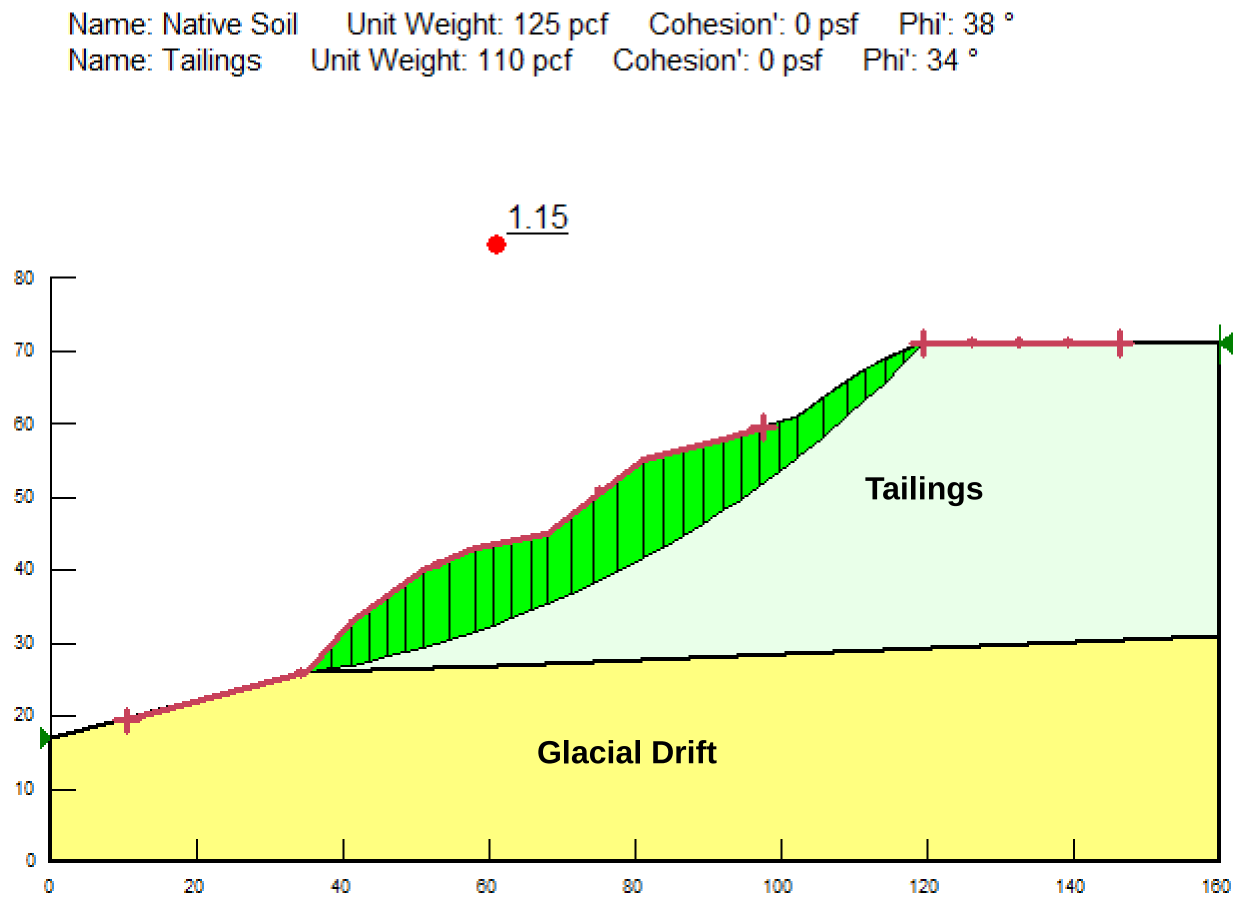
Upper Tailings Stability – Static
Minimum 10 Foot Failure Plane
Section E-E'

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-40



Notes:

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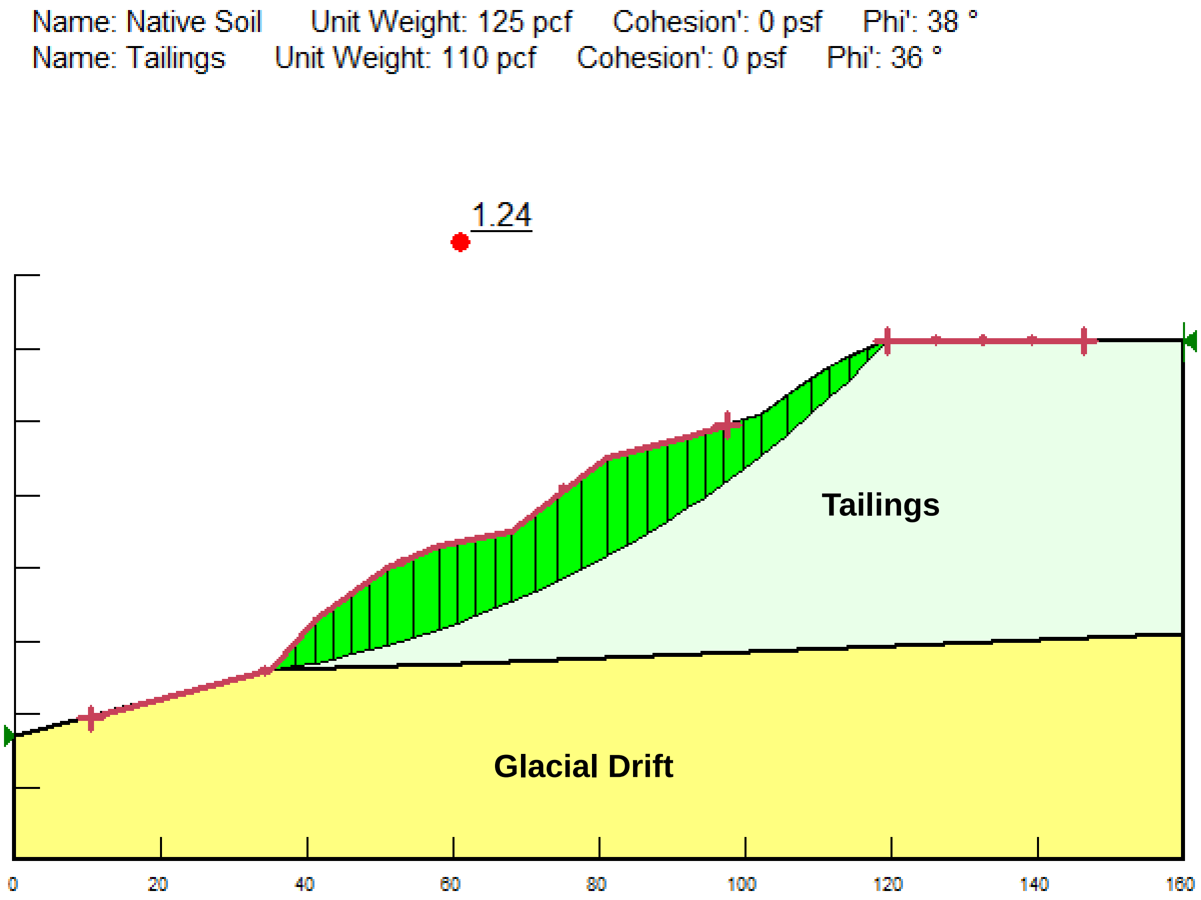
Upper Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section E-E'
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-41



Upper Tailings Stability – Seismic
Minimum 10 Foot Failure Plane
Section E-E’
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-42

Notes:

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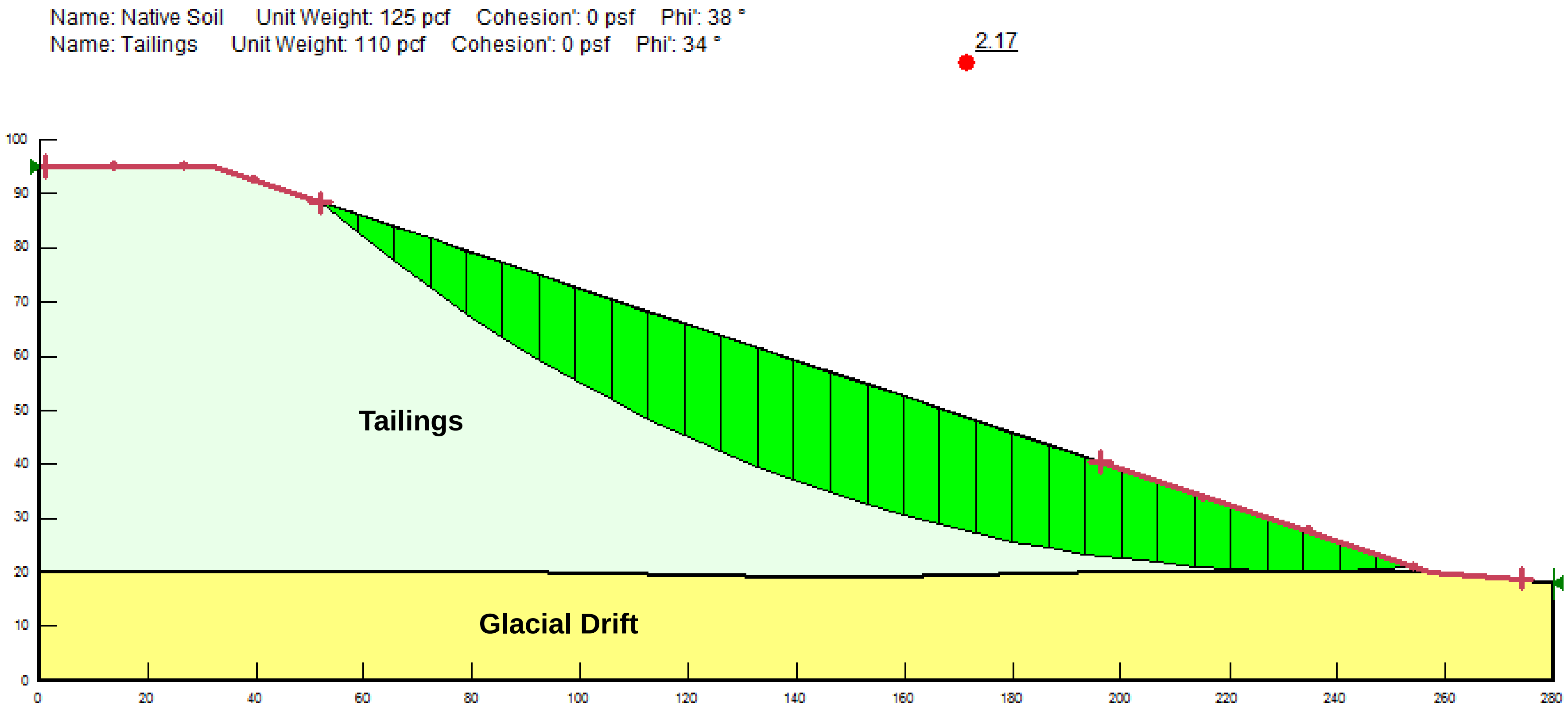

Notes:

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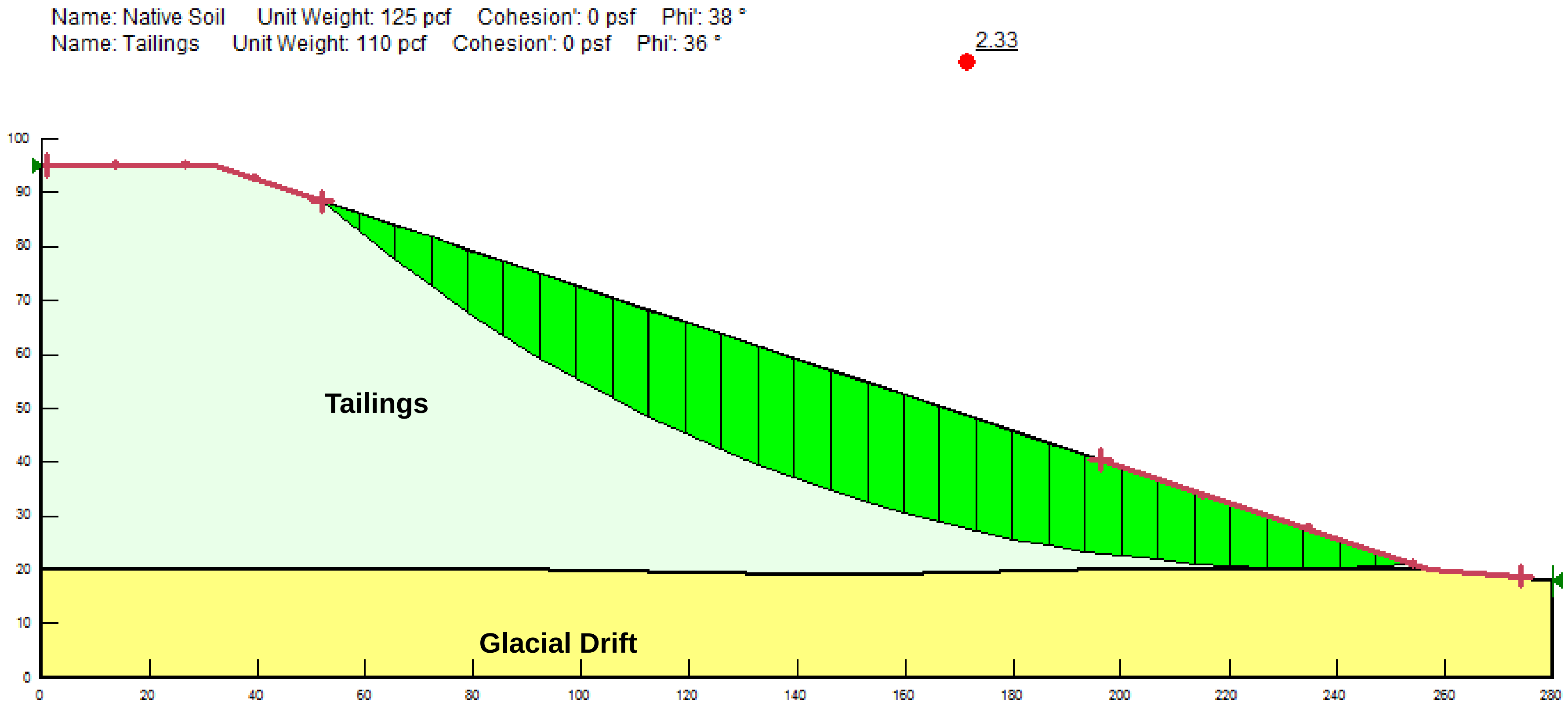
Reconstructed Slope – Static
3H:1V (Horizontal:Vertical)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-43



Notes:
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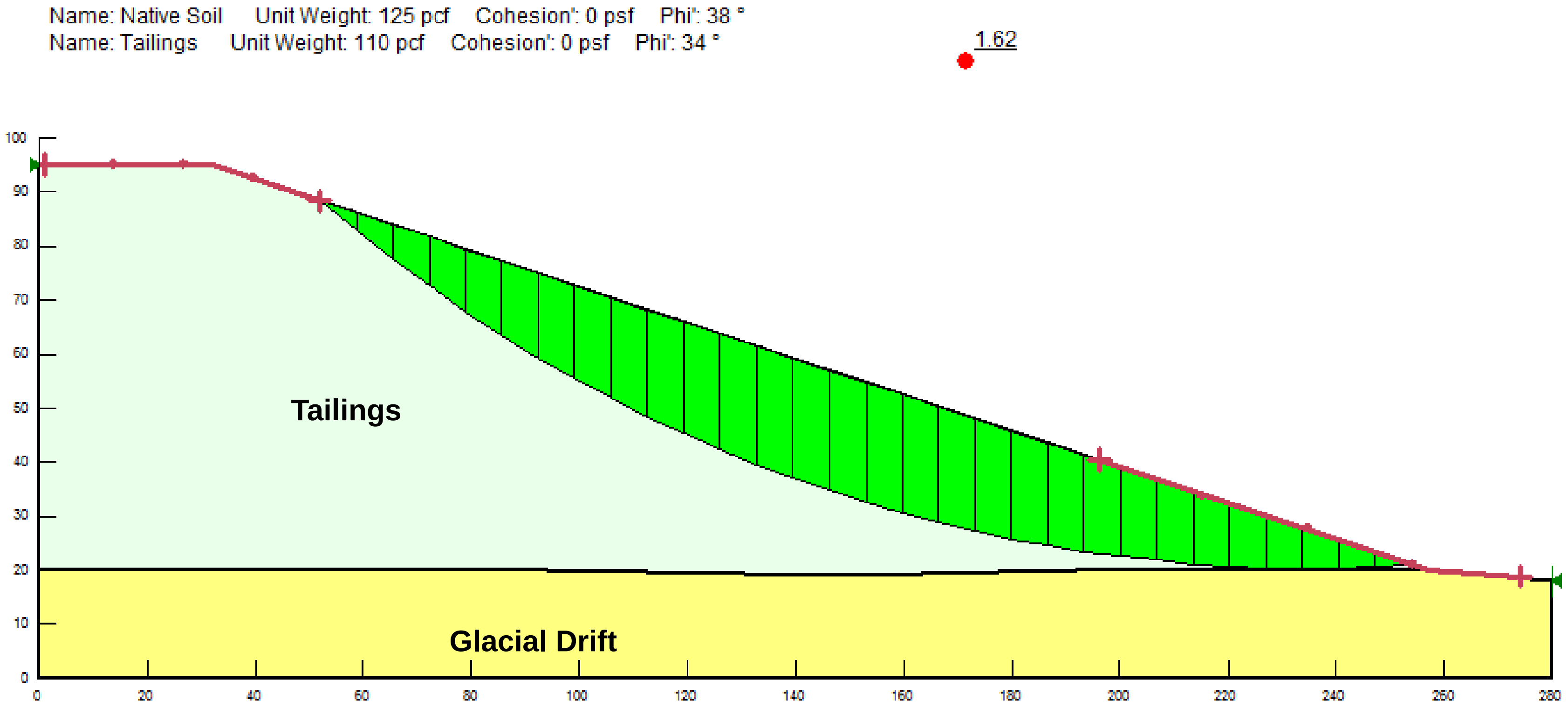
Reconstructed Slope – Static
3H:1V (Horizontal:Vertical)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-44



Reconstructed Slope – Seismic
3H:1V (Horizontal:Vertical)
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-45

Notes:
1. The locations of all features shown are approximate.
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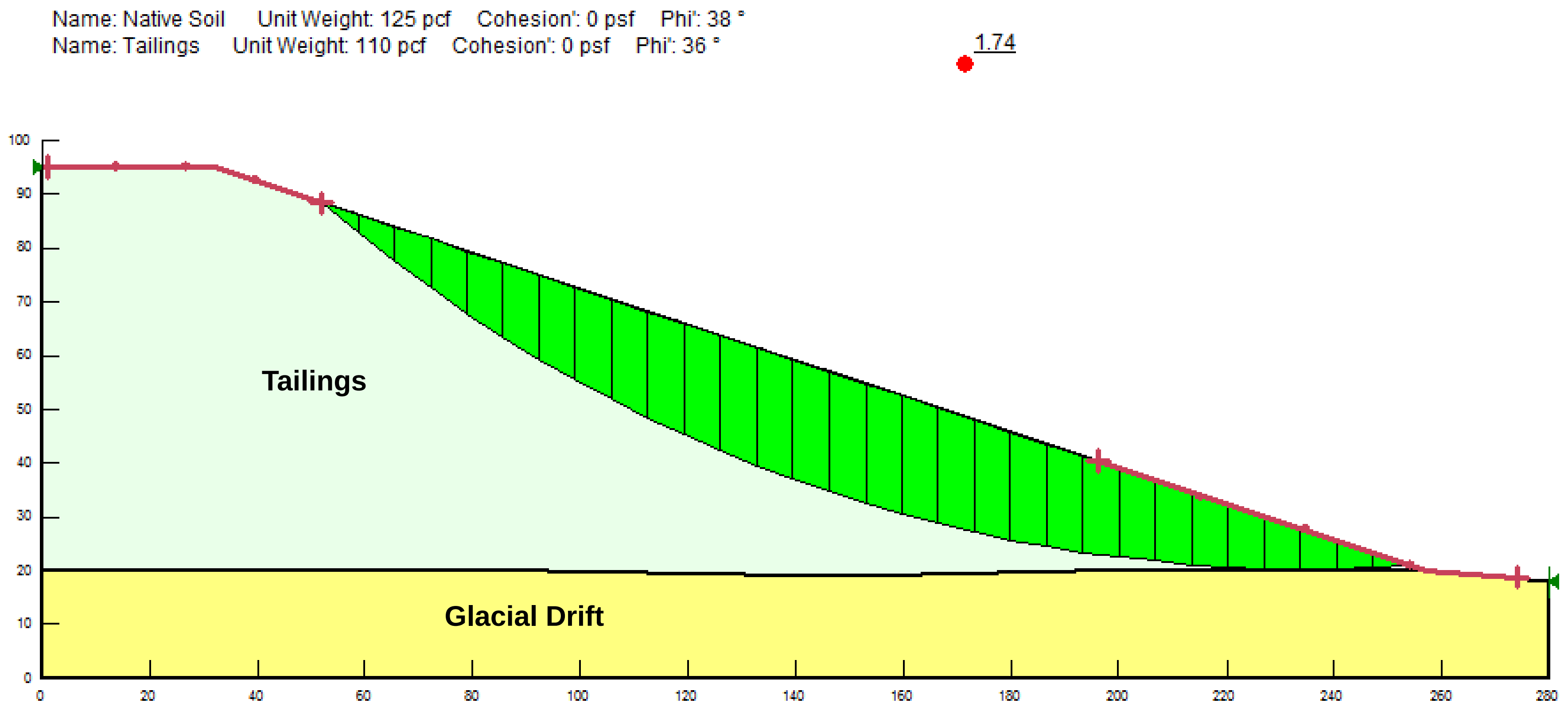

Notes:

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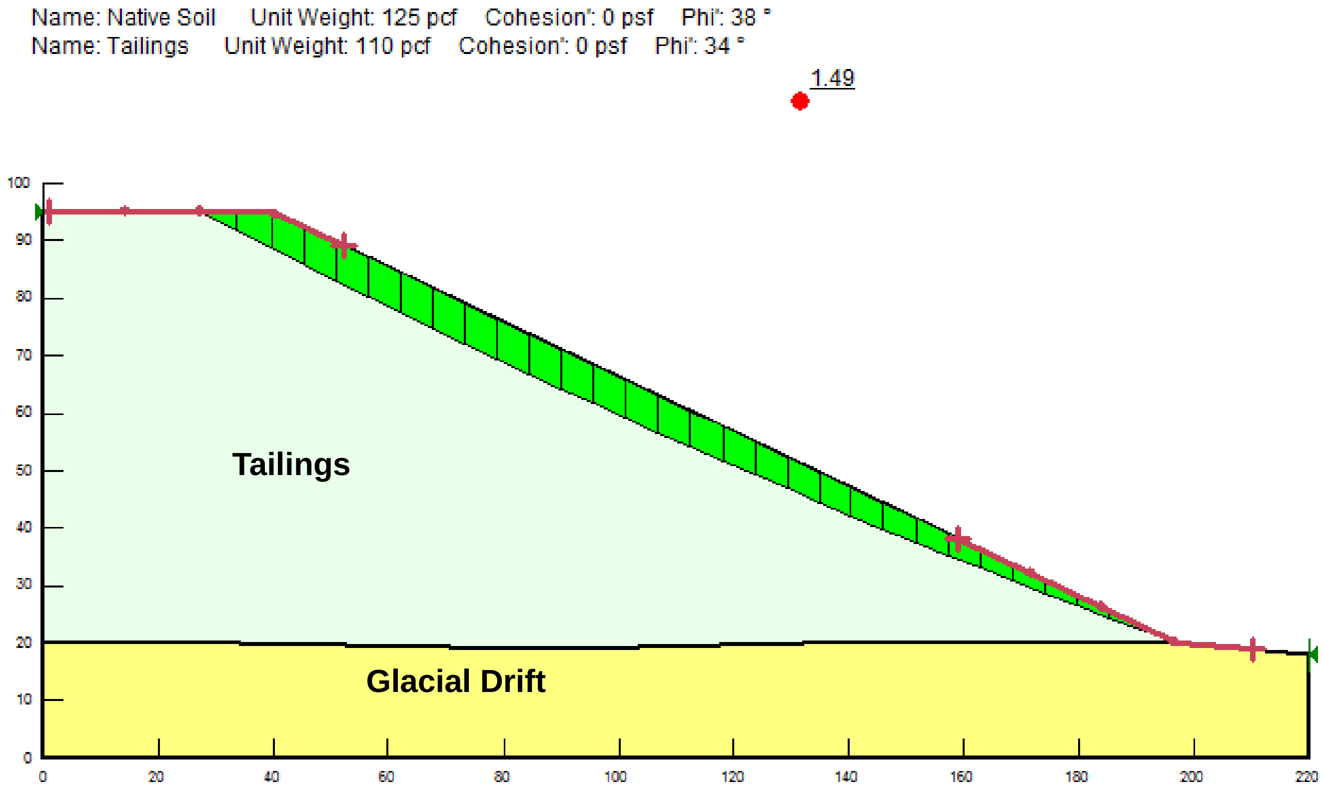
Reconstructed Slope – Seismic
3H:1V (Horizontal:Vertical)
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-46



Notes:

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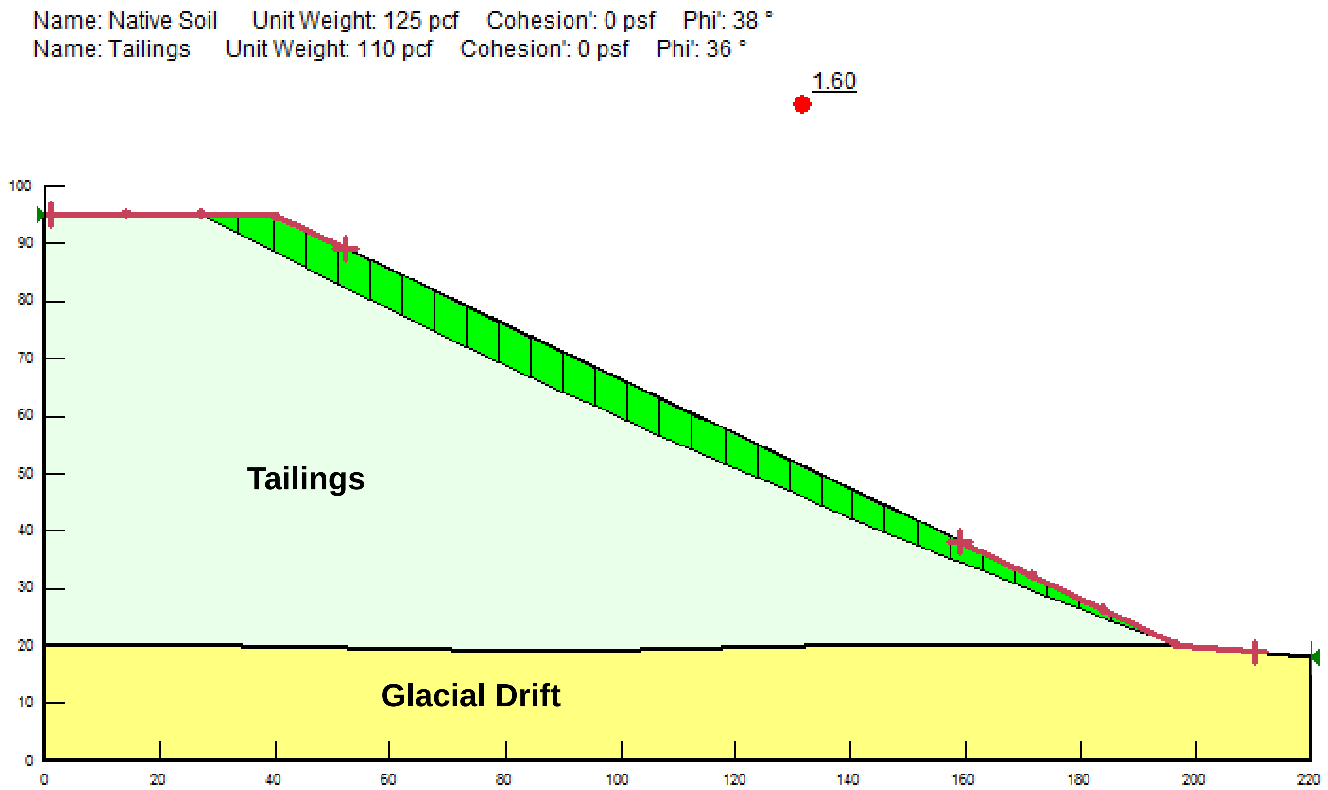
Reconstructed Slope – Static
2.1H:1V (Horizontal:Vertical)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-47



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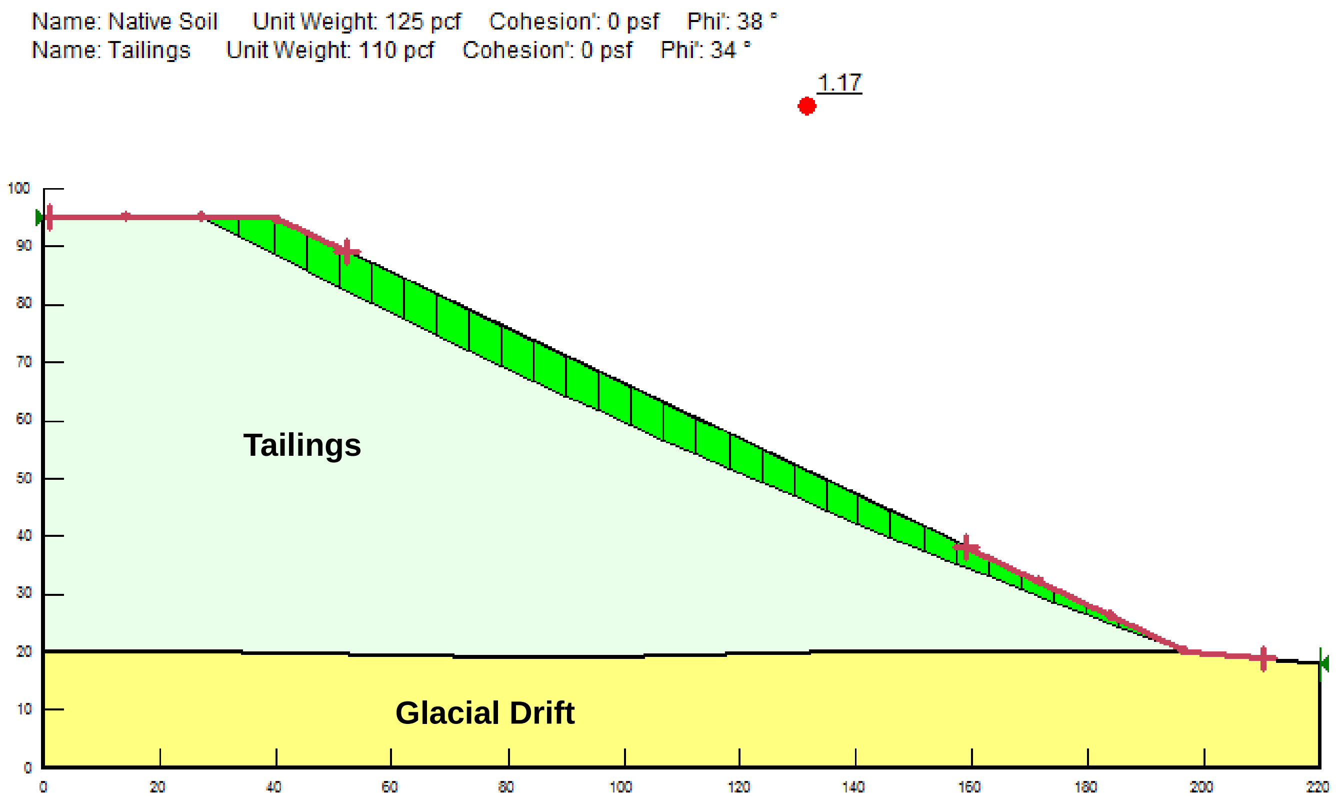
Reconstructed Slope – Static
2.1H:1V (Horizontal:Vertical)

Van Stone Mine
Onion Creek, Washington

GeoEngineers

Figure C-48



Notes:

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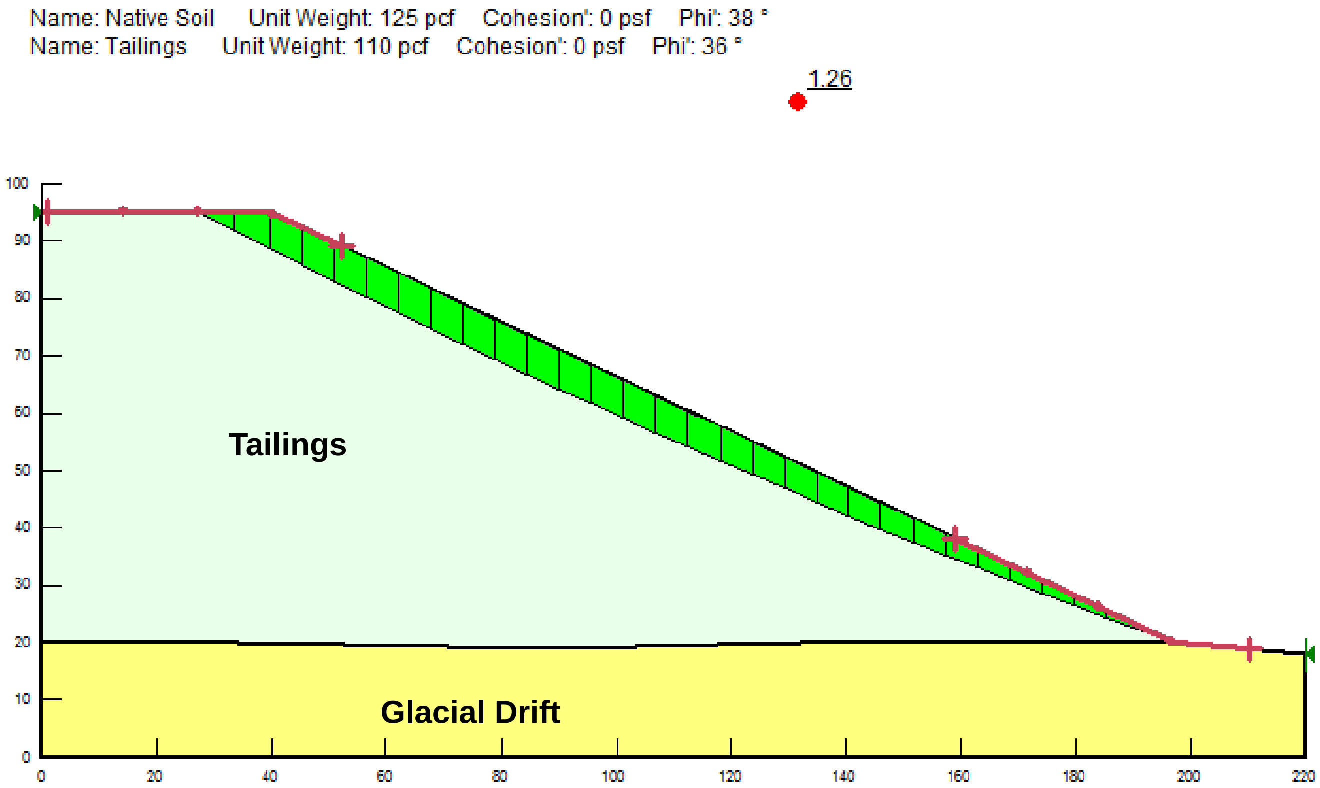
Reconstructed Slope – Seismic
2.1H:1V (Horizontal:Vertical)
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

GEOENGINEERS

Figure C-49



Notes:

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Reconstructed Slope – Seismic
2.1H:1V (Horizontal:Vertical)
2,500 YR Seismic (kh=0.1g)

Van Stone Mine
Onion Creek, Washington

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Figure C-50

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