Construction Documentation Report

Implementation of Cleanup Action Under Model Toxics Control Act (MTCA)

Soil Excavation/Groundwater Monitoring

Aladdin Plating
1657 Center Street
Tacoma, Washington
FSID 1277

February 2020

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Table of Contents

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A. Site Location and History

The property is located at 1657 Center Street in Tacoma, Washington (Figure 1). The Site is a corner lot on the northeast corner parcel at the intersection of Center Street and South Alaska Street measuring approximately 100 feet long and 30 feet wide, with no building structures currently standing on the parcel.

The Site was used historically for commercial electroplating between 1958 and 1994. Chemicals used at the Site have included chromium, nickel, lead, caustic soda, sulfuric acid, and alkaline cleaners. The Site is currently under Pierce County's management with no liability on their part. This property was obtained by Pierce County as a tax foreclosure.

The environmental cleanup work was managed and funded by the Washington State Department of Ecology (Ecology) as an orphan site. Several investigations were performed at the Site between 2005 and 2013 by Ecology, Landau Associates, and GeoEngineers to characterize the Site's soil and groundwater.

Site contaminants of concern (COC) have been identified as total chromium, hexavalent chromium, lead, and nickel in on-property soil, and total chromium, hexavalent chromium, and nickel in the shallow groundwater aquifer both on- and off-site. Several rounds of groundwater monitoring were conducted at the Site from 2006 to 2019, including both on-property and off-property wells.

The Remedial Investigation/Feasibility Study (RI/FS) was finalized on December 9, 2014; the Cleanup Action Plan (CAP) was finalized on December 10, 2014; and the Engineering Design Report (EDR) was finalized on August 15, 2015. The RI/FS, CAP, and EDR are stored in Ecology's Document Storage and Retrieval System (DSARS). All the documents have been prepared pursuant to the requirements of the Model Toxics Control Act (MTCA) administered by Ecology under chapter 173-340 of the Washington Administrative Code (WAC).

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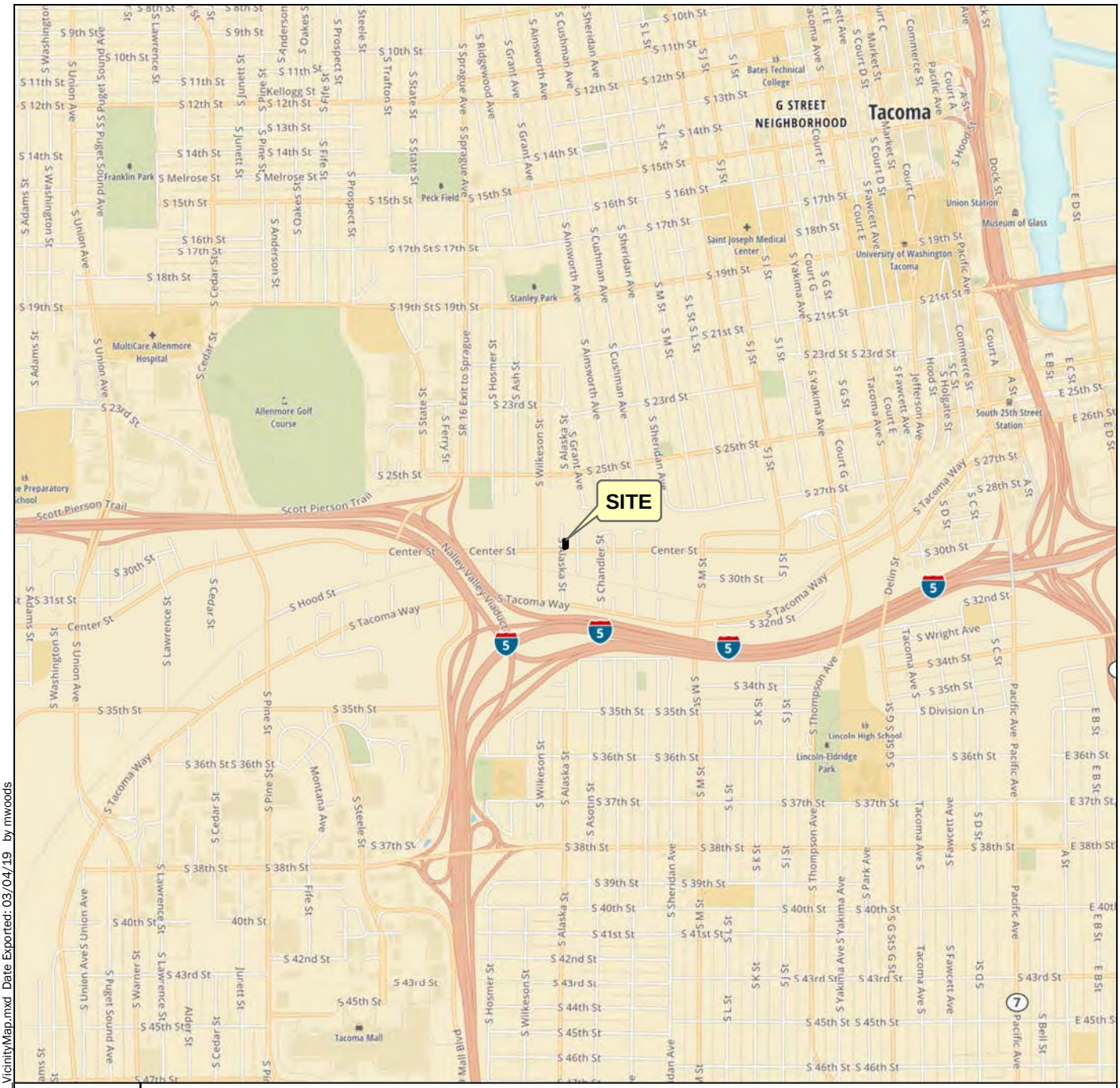

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Notes:

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.

Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Aladdin Plating
Tacoma, Washington

GeoEngineers

Figure 1

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B. Chemicals of Concern and Cleanup Values

The soil and groundwater cleanup levels as stated in the CAP are shown in Table 1:

Table 1: Selected Soil and Groundwater Cleanup Levels

Parameter	Soil Cleanup Level[1] (mg/kg)	Groundwater Cleanup Level[2] (µg/L)
Total Chromium	2000	50
Hexavalent Chromium	18.4	48
Trivalent Chromium	–	24,000
Lead	250	15
Nickel	417[3]	320

1 Soil cleanup levels are taken from MTCA Method A Soil Cleanup Levels for unrestricted land use and MTCA Method B carcinogen and non-carcinogen values for human health protection and for protection of groundwater as drinking water, taken from Ecology's CLARC database. In general, the lowest of the regulatory criteria listed were identified as the proposed cleanup levels.

2 Groundwater cleanup levels are taken from published values for the Safe Water Drinking Act and MTCA Method B carcinogen and non- carcinogen standard formula values for human health protection obtained from Ecology's CLARC database. In general, the lowest of the regulatory criteria listed were identified as the proposed cleanup levels.

3 Soil cleanup level derived by entering MTCA Method B groundwater cleanup level protective of drinking water into the MTCA fixed parameter three-phase partitioning model (Equation 747-1).

C. Selected Site Cleanup Action

The preferred Remedial Alternative in the CAP was removal of metals-contaminated soil at the subject property that exceeds MTCA Method A and B cleanup levels protective of direct human contact and MTCA Method B cleanup levels for soil protective of groundwater as drinking water (Table 1), and monitoring the attenuation of metals concentrations in groundwater after the contaminated soil was removed.

D. Implementation of Cleanup Action

The bids and specifications were prepared in May 2018 based on the 2015 EDR. The project was advertised for bid and a contractor was selected in June 2018.

The soil excavation project was started in August 2018 and concluded in November 2018. The contractor estimated a total of 619 tons (412 cubic yards, based on soil density of 1.5 tons/cubic yard) of soil was removed and disposed at Roosevelt Regional Landfill as a non-hazardous waste. The bid package specified for removal of 330 tons (220 cubic yards).

The discrepancy between the amount of contaminated soil removed by the contractor and the amount specified in the bid was a subject of a dispute between the contractor and Ecology. Eventually Ecology and Ecology's consultant decided the actual contaminated soil excavated was only 40 tons more than specified in the bid package. Therefore, the total contaminated soil removal was approximately 370 tons (250 cubic yards). See Figure 2 for excavation locations. These locations were developed based on information from RI/FS and the CAP.

E. Nickel Contaminated Soil Remaining in Place above Cleanup Level

After the excavation of the contaminated soil, the confirmational soil samplings showed, in some locations soil exceeding the Nickel soil cleanup level of 417 mg/kg remain in place. The range of depths of Nickel exceedance were 4 feet to 8 feet below ground surface (bgs) and the range of concentrations were 450 mg/kg – 4,500 mg/kg. Figure 2 shows the confirmational soil samples where exceedances occurred and the limits of the excavations.

Ecology determined that two areas with high concentrations of Nickel should be excavated. The concentrations measured at the depth of 8 feet bgs was 4,500 mg/kg at AP-TP13-5.5, and at the depth of 4 feet bgs was 1300 mg/kg at AP-TP4-2. The proposed areas for additional excavation are shown in Figure 3.

Ecology requested that the contractor provide an estimated cost for the removal of 20 cubic yards of soil from these areas. The contractor proposed cost of $110,000 to remove 20 cubic yards of Nickel contaminated soil.

Ecology decided that the cost to remove 20 cubic yards of Nickel contaminated for $110,000 was too high and rejected the contractor's proposal. Ecology made this determination based on the following:

1. The majority of Nickel contaminated soil (approximately 250 cubic yards) has been removed. Therefore, the majority of source to cause Nickel groundwater contamination has been removed.

2. The Nickel MTCA Method B soil cleanup level for direct contact unrestricted land use is 1,600 mg/kg and MTCA Method C industrial cleanup level is 70,000 mg/kg. Only one soil sample has a concentration above MTCA Method B Nickel soil cleanup level of 1,600 mg/kg with a concentration of 4,500 mg/kg at a depth of 8 feet bgs. Since this location is above the 15-foot MTCA Method B direct contact cleanup level of 1,600 mg/kg, an environmental deed restriction will be placed on the property. This property is zoned light industrial. Currently, the entire site is also covered by two feet of clean fill.

3. The Site is located in the South Tacoma Groundwater protection district. A City of Tacoma drinking water well is located one mile to the southwest of the Site. The groundwater flow direction at the site is to the south-southeast. The depth to groundwater in the shallow aquifer is 20-30 feet bgs. The shallow groundwater is impacted by Nickel contamination and the plume has moved approximately 120 feet down gradient from the Site's boundary. Based on this information, there does not appear to be the potential of Nickel contaminated groundwater to impact the City of Tacoma's drinking water well. As a result of the Nickel source removal, the groundwater contamination in future will likely decline over time.

F. Conclusions

The metals contaminated soils were removed in accordance with the plans and specifications for the project. The estimated contaminated soils removed was approximately 370 tons, which is 40 tons more than estimated in the plans and specifications. Ecology estimates that approximately 30 tons of nickel contaminated soil with concentrations above the MTCA Method B cleanup level remains in place to a maximum depth of approximately 8 feet bgs. The maximum extent of metals impacted groundwater is approximately 120 feet downgradient of the site. With the removal of most of the contaminated soils from the site, Ecology anticipates that the concentrations of metals in the groundwater will reduce over time.

Ecology does not anticipate the City of Tacoma pumping well will be impacted by the contaminated groundwater from the site anytime in the future due to the majority of the source being removed.

Ecology will continue to monitor the groundwater at the site to demonstrate metals concentration trends and that the site continues to be protective of human health and the environment.

An Environmental Covenant will be placed on the property informing of the metals contaminated soil and groundwater beneath the site and restrict the property to industrial site uses only.

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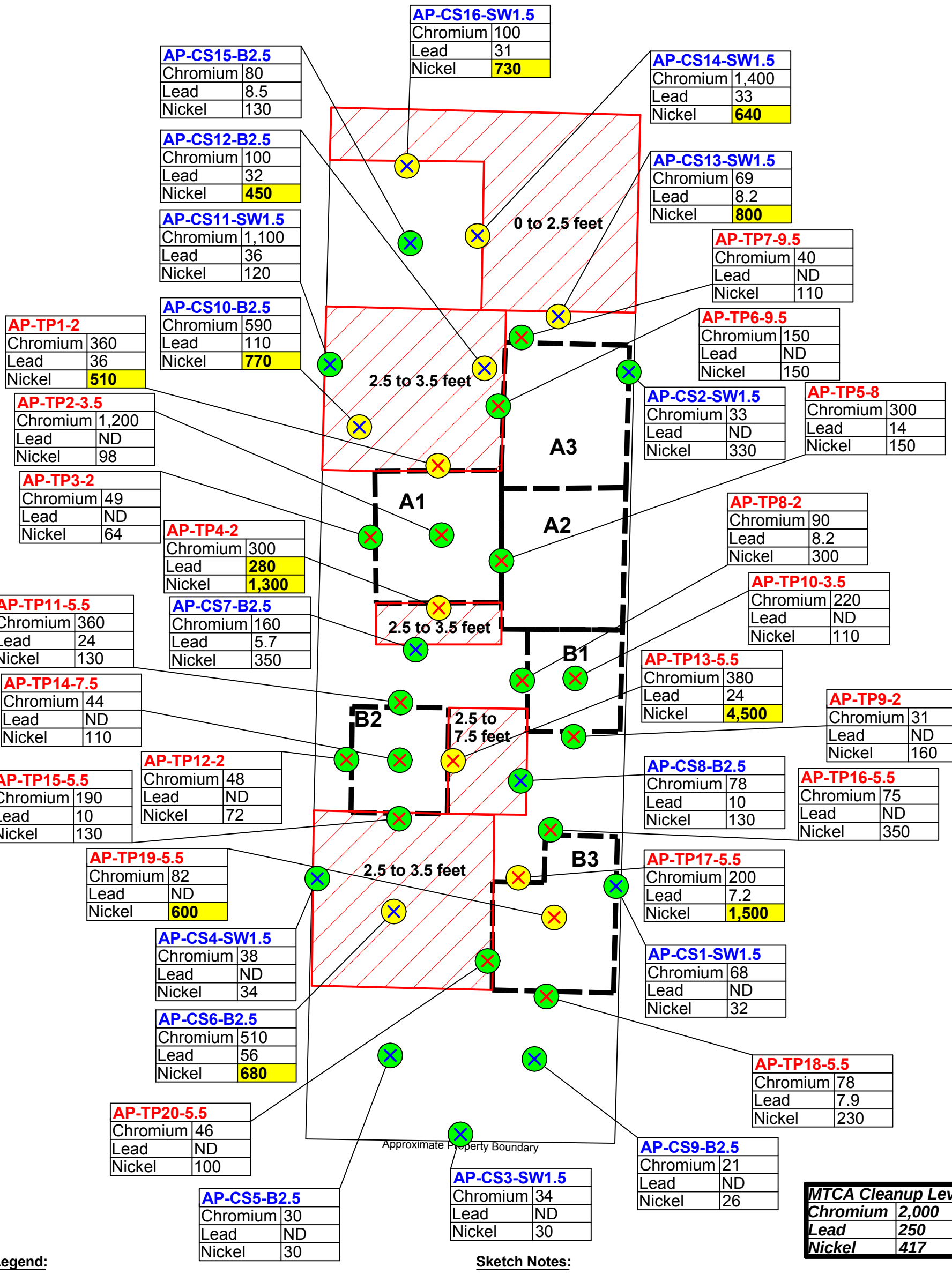
project **Ecology Aladdin Plating** project no. **0504-095-03**

by **Aaron Waggoner** date **10/08/2018** sheet **1** of **1** checked by **Iain Wingard**



Legend:

- Approximate Confirmation Sample Location Completed on 10/1/18
- Approximate Test Pit Location Completed on 10/2/18
- Approximate Location of Subsurface Excavation Areas with ID
- 680 Metal Concentration Greater Than MTCA Cleanup Levels
- Location of Metal Concentration Greater Than MTCA Cleanup Levels
- Location of Metal Concentration Less Than MTCA Cleanup Levels
- Area of Recommended Additional Excavation

Sketch Notes:

1. Test pit locations and depths shown are approximate and are based on field conditions, contractor survey of subsurface excavation locations and shoring plan.
2. Depths of test pits are from surface after excavation to 2.5 feet was completed.
3. Sample ID Definition: AP = Aladdin Plating, CS = Confirmation Sample, TP = Test Pit, SW = Side Wall, B = Base, 2.5 = Sample Depth.
4. All Concentrations in Milligrams per Kilogram (mg/kg)

Site Sketch: Confirmation Sampling and Test Pit Sample Locations with Preliminary Confirmation Sample Results

Figure 2

0 10 20
Approximate Scale

N W E S

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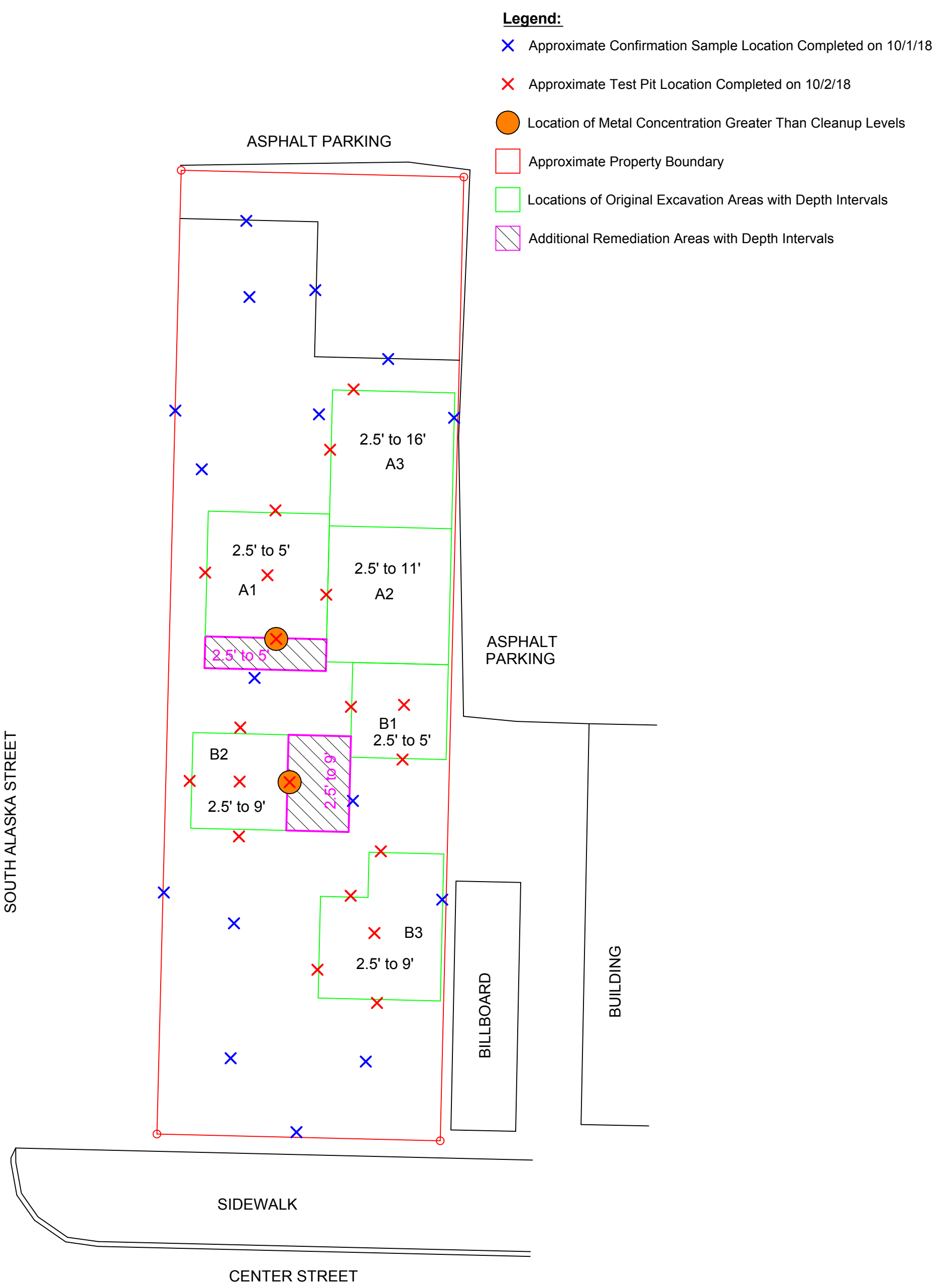
project **Ecology Aladdin Plating** project no. **0504-095-03**

by **Aaron Waggoner** date **10/09/2018** sheet **1** of **1** checked by **Iain Wingard**



Site Sketch: Original Excavation Layout and Additional Remediation Areas

Figure 3

0 10 20
Approximate Scale

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G. Groundwater Monitoring After the Excavation of Contaminated Soil

The groundwater was monitored one time immediately after the excavation. One well down gradient show high concentration of Nickel. Table 1 shows the results. The complete groundwater report is in Appendix A.

To evaluate the effect of contaminated soil removal on Nickel groundwater contamination, annual groundwater monitoring wells should be conducted.

The following Appendices have the project descriptions and documentations.

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Table 1

Analytical Results
Aladdin Plating Site
Tacoma, Washington

Exploration Location[1]	Date Sampled	Metals[2] (µg/L)	Total Chromium	Dissolved Chromium	Total Nickel	Dissolved Nickel	Hexavalent Chromium
		Groundwater Cleanup Levels[3]	50		320 [4]		48 [4]
		Sample ID					
MW4sR	2/6/2019	MW4sR-190206	**15**	**11**	**2,600**	**2,700**	**12**
MW5s	--	--	--	--	--	--	--
MW6s	2/6/2019	MW6s-190206	**8.1**	1.0 U	**12**	8.0 U	10 U
MW7s	2/6/2019	MW7s-190206	**2.1**	1.0 U	8.9 U	8.0 U	10 U
MW8s	2/6/2019	MW8s-190206	**32**	**27**	**13,000**	**13,000**	**31**
		DUP-1-190206	**32**	**28**	**14,000**	**13,000**	**32**

Notes:

[1] Exploration locations shown on Figure 4.

[2] Total and dissolved metals analyzed by United States Environmental Protection Agency (EPA) 200.7/6010C.

[3] Model Toxics Cleanup Act (MTCA) Method A Cleanup Level for groundwater.

[4] No Method A Value exists for this metal, MTCA Method B Value was used in its place.

µg/L = micrograms per liter

U = Not detected greater than laboratory reporting limit

-- = Not Analyzed

Bolding indicates analyte was detected.

Yellow highlighting indicates exceedance of MTCA cleanup level.

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Appendices

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Appendix A – Groundwater Monitoring (GeoEngineers Memorandum)

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GeoEngineers

Memorandum

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

To:	Mohsen Kourehdar, Washington State Department of Ecology, TCP Site Manager
From:	Aaron Waggoner, LG, LHG; Iain Wingard
Date:	March 29, 2019
File:	0504-095-04
Subject:	Aladdin Plating Groundwater Monitoring Event – February 2019

Introduction

This technical memorandum presents the results of groundwater monitoring completed by GeoEngineers on behalf of the Washington State Department of Ecology (Ecology) for the former Aladdin Plating Site located at 1657 Center Street in the Nalley Valley of Tacoma, Washington. A vicinity map showing the location of the site within the City of Tacoma is provided as Figure 1. The groundwater monitoring event was completed on February 6, 2019.

Background

The site was a metals plating facility that was shut down in the 1990s and was subsequently acquired by Pierce County. Ecology, on behalf of Pierce County coordinated the demolition of the site structures in 2005 and subsequently performed soil and groundwater investigations. Metals associated with the plating activities including total chromium, hexavalent chromium and nickel were identified as the contaminants of concern for site soil and groundwater.

The property underwent remedial action in 2018 using an Ecology-hired environmental contractor (Contractor) who excavated metals-contaminated soil within the limits of the former property to depths ranging from 2.5 feet below ground surface (bgs) to 16 feet bgs, transported the contaminated soil offsite for disposal, and backfilled and restored the property to near the original grade. Prior to initiating remedial excavation, the Contractor subcontracted Cascade Drilling to decommission the monitoring wells located on the property on September 18, 2018. The decommissioned wells included MW1s, MW2s, MW3s, MW4s and MW4d. Figure 2 shows the locations of all monitoring wells relative to the property boundaries and other surrounding features.

Following construction, two monitoring wells were installed, one on and one off the property, in December 2018. The well installed on the property was given the identification of MW4sR as a replacement well for MW4s and was installed in generally the same location as the original. The other well installed off the property, MW8s, was located west of South Asotin Street and east of the gated entrance to Bills Towing. MW8s was installed on private property with the permission of the property owner who signed an access agreement with Ecology.

Groundwater Monitoring Activities

GeoEngineers personnel visited the site on February 6, 2019 to collect depth to groundwater measurements from the five monitoring wells, MW4sR, MW-5s, MW-6s, MW7s and MW8s. In addition to the depth to groundwater, the total well depth and the depth of the top of the well casing below the ground surface was measured. The groundwater and well measurements are included in Table 1.

GeoEngineers subcontracted David Evans and Associates (DEA) of Tacoma, Washington to complete a professional survey of the well location and top of casing elevation of the five monitoring wells on

February 18, 2019. The top of casing elevation was surveyed from the north side of the PVC well casing. The location and elevation survey data are provided in Table 1. The groundwater elevation contours resulting from the depth to groundwater measurements and survey data are shown on Figure 3. Low-flow sampling equipment comprised of a pneumatic bladder pump rented from Field Environmental Instruments of Everett, Washington was used to purge groundwater, collect groundwater quality parameters and determine stabilization prior to sample collection from monitoring wells MW4sR, MW6s, MW7s and MW8s. Monitoring well MW-5s was not sampled due to its distant upgradient and somewhat cross gradient location relative to the site. Monitoring well MW6s was sampled using compressed nitrogen to lift water to the surface due to the well's location and depth. Groundwater was measured at 134.42 feet below the top of casing at MW-6s. The pneumatic compressor in the sampling equipment lacked the necessary pressure to lift water from this depth up to the ground surface for sampling. The groundwater monitoring field report and sampling forms are included in Attachment 1.

After the wells achieved stabilization, groundwater samples were collected from monitoring wells MW4sR, MW6s, MW7s and MW8s along with one duplicate sample from MW8s. The samples were transported under chain of custody to OnSite Environmental, Inc. of Renton, Washington (an Ecology-accredited laboratory) for chemical analysis of total and dissolved metals including chromium and nickel using Environmental Protection Agency (EPA) Method 200 series and hexavalent chromium by SM 3500-Cr B.

Groundwater that was purged during the monitoring event was placed in a 55 gallon drum that was labeled and stored within the fenced property. A sample was collected from the drum of purge water as well as the drums of decontamination water and well development water that were generated when monitoring wells MW4sR and MW8s were installed. The sample will be used to characterize and profile the drums for pickup and disposal at an approved disposal facility.

Groundwater Results

The groundwater monitoring results for wells MW4sR, MW6s, MW7s and MW8s are presented in Table 2 and summarized on Figure 4. The laboratory analytical report from OnSite Environmental, Inc. is included in Attachment 2. The memorandum presenting the results of the laboratory data validation is presented in Attachment 3. The results of the data validation indicate that the results are acceptable for the intended use.

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Attachments:
Figure 1. Vicinity Map
Figure 2. Site Plan
Figure 3. Groundwater Contour Map
Figure 4. Groundwater Analytical Results
Table 1. Groundwater and Well Measurements
Table 2. Analytical Results
Attachment 1. Field Files
Attachment 2. Laboratory Analytical Data
Attachment 3. Data Validation Report

Table 1

Groundwater and Well Measurements
Aladdin Plating Site
Tacoma, Washington

Exploration Location [1]	Date Measured	Top of Casing Elevation [4] (ft)	Depth to Groundwater (ft BTOC)	Groundwater Elevation (ft)	Horizontal Coordinates [4]	
					Northing (ft)	Easting (ft)
MW4sR [2]	2/6/2019	245.13	24.93	220.20	1154127.383	699228.804
MW5s	2/6/2019	248.01	27.03	220.98	1153783.195	699051.481
MW6s	2/6/2019	358.19	137.42	220.77	1154323.617	699665.392
MW7s	2/6/2019	242.57	23.53	219.04	1154572.961	699157.450
MW8s [3]	2/6/2019	242.96	23.01	219.95	1154237.648	699195.698

Notes:

[1] Exploration locations shown on Figures 2 and 3.

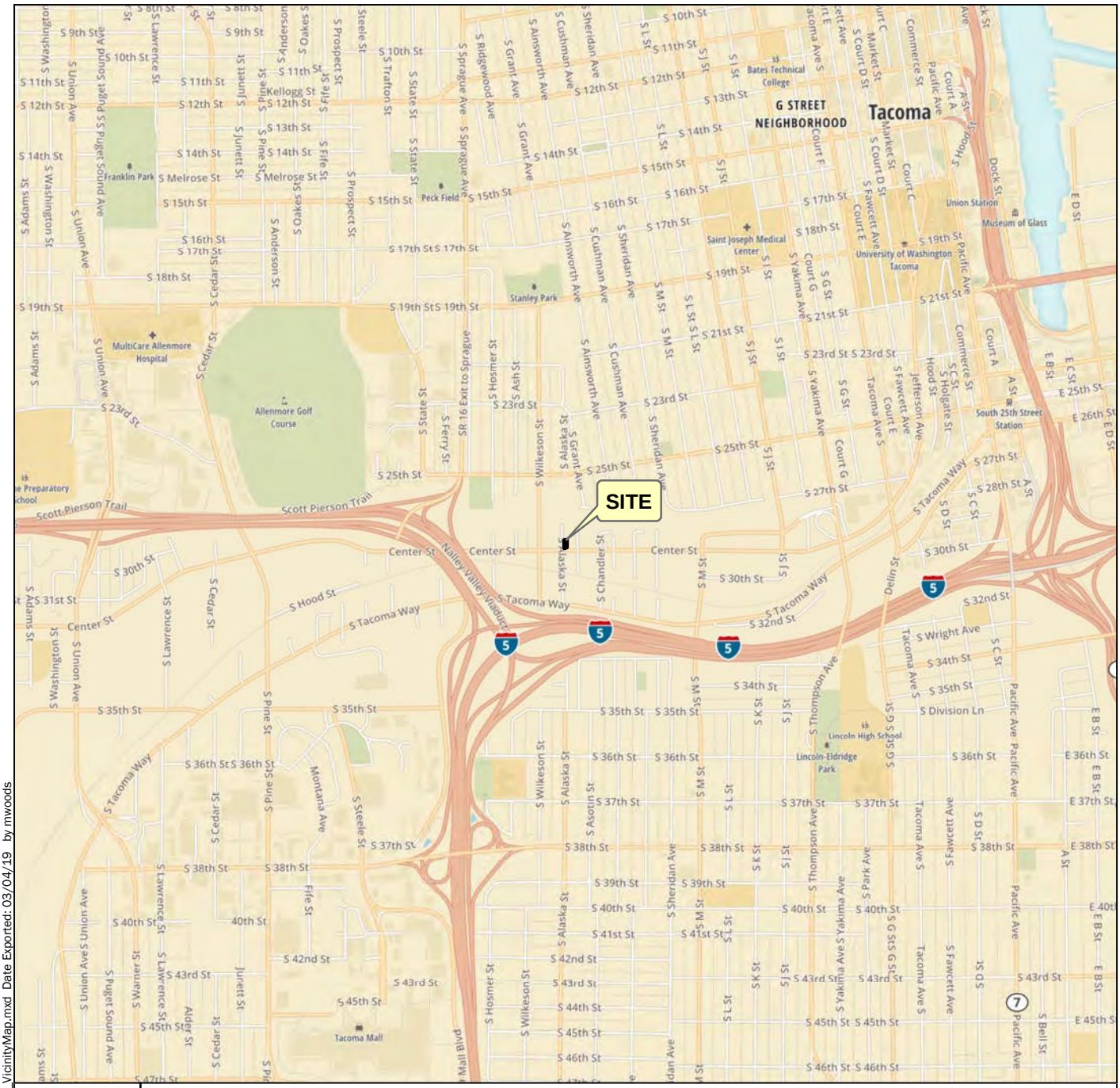
[2] MW4s replacement monitoring well installed in December 2018.

[3] New monitoring installed in December 2018.

[4] Top of casing elevations and horizontal coordinates based on professional land survey by David Evans and Associates of Tacoma, WA on February, 18, 2019. Datums: Horizontal NAD83, Vertical NGVD29

ft = feet

BTOC = below top of casing



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Data Source: Mapbox Open Street Map, 2016

Projection: NAD 1983 UTM Zone 10N

Vicinity Map

Aladdin Plating
Tacoma, Washington

GeoEngineers

Figure 1

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Legend

- Site Boundary
- MW4sR — Groundwater Monitoring Well
- MW1s* — Decommissioned Monitoring Well

*Monitoring Well Decommissioned During Remedial Excavation Activities on 9/18/2018

Notes:

1. The locations of all features shown are approximate.
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Data Source: Aerial from Google Earth Pro dated 5/13/2018.

Projection: NAD83 Washington State Planes, South Zone, US Foot

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Site Plan

Aladdin Plating
Tacoma, Washington

GeoEngineers

Figure 2

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Legend

- Site Boundary
- 220.2 — Groundwater Elevation Contour (0.2-foot interval)
- Groundwater Flow Direction
- MW4sR 220.20 — Monitoring Well and Groundwater Elevation

Notes:

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Data Source: Aerial from Google Earth Pro dated 5/13/2018.

Projection: NAD83 Washington State Planes, South Zone, US Foot

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Feet

Groundwater Contour Map

Aladdin Plating
Tacoma, Washington

GeoEngineers

Figure 3

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Legend

- Site Boundary
- MW4sR — Groundwater Monitoring Well
- µg/L = micrograms per liter

Bolding indicates analyte was detected.
Gray Shading indicates exceedance of MTCA cleanup level.

Notes:

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Data Source: Aerial from Google Earth Pro dated 5/13/2018.

Projection: NAD83 Washington State Planes, South Zone, US Foot

W S N E

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Feet

Groundwater Analytical Results

Aladdin Plating
Tacoma, Washington

GeoEngineers

Figure 4

\\geoengineers.com\WAN\Projects\0\05040095\CAD\04\Groundwater\050409504_F04_Groundwater Chemical Analytical Map.dwg TAB:F02 Date Exported: 03/18/19 - 16:46 by mwoods

ATTACHMENT 1
Field Files

GeoEngineers
1101 Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Field Report

			File Number: 0504-095-04
	Project: Aladdin Plating		Date: 02/06/2019
	Owner: Ecology	Time of Arrival: 0815	Report Number: FR1
Prepared by: Eric Knoedler	Location: Tacoma, Washington	Time of Departure: 1640	Page: 1 of 2
Purpose of visit: Groundwater Monitoring	Weather: Clear, 30's	Travel Time: 0.5 hrs	Permit Number: N/A

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by : ☒ Staying Alert to Construction and Equipment Hazards ☐ Other (describe):

GeoEngineers representatives Eric Knoedler (ENK), Roger Chang (RC), and Aaron Waggoner (AMW) arrived at the Aladdin Plating site (site) located at 1657 Center Street in Tacoma, Washington at about 8:15 AM. The purpose of this site visit was to obtain groundwater samples from site monitoring wells MW4sR, MW6s, MW7s, and MW8s and measure the water level at monitoring well MW5s. Photos taken during this sampling event are available on the P-drive at the following link: \\geoengineers.com\WAN\Projects\0\0504095\04\Photos\GW Sampling\20190206.

Each monitoring well was purged following standard low-flow techniques and groundwater quality parameters were recorded to determine stabilization. Groundwater parameters monitored included:

- Temperature,
- Oxidation-reduction potential,
- Dissolved oxygen,
- Conductivity (recorded in microsiemens per centimeter [µS/cm]),
- pH, and
- Turbidity.

Stabilization was considered achieved when water quality parameters (except for conductivity and turbidity) varied by less than 10% through three consecutive readings. The stabilization criteria allowed for a 3% variation in conductivity through three consecutive readings and one turbidity reading equal to, or less than 25 nephelometric turbidity units (NTUs). Water levels were measured to the nearest 0.01 feet from the north side of the top of well casing.

Equipment

Equipment used for the purge and sampling procedures included:

- YSI ProPlus water quality meter with flow-through cell,
- Hach 2100Q turbidity meter,
- Waterline M200 electric water level meter,
- QED SamplePro bladder pump,
- QED MP50 compressor/controller, and
- Compressed nitrogen gas (for monitoring well MW6s only).

Decontamination

Durable and reusable equipment that directly or indirectly contacted potentially contaminated groundwater was decontaminated using an Alconox® wash followed by a distilled-water rinse. New, plastic tubing was used for each monitoring

☐ **THIS FIELD REPORT IS PRELIMINARY** A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.	**FIELD REPRESENTATIVE** Eric Knoedler	**DATE** 2/07/19
☒ **THIS FIELD REPORT IS FINAL** A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.	**REVIEWED BY** Aaron Waggoner	**DATE** 02/07/19

Attachments: Lab COC, Groundwater Sampling Forms

Distribution: Project File

well. Disposable materials (e.g., nitrile gloves, paper towels, etc.) used throughout this sampling event were considered *de minimus* and disposed of in a municipal waste bin.

Sampling

Samples obtained during this sampling event are listed in Table 1. Monitoring well construction details and current conditions are summarized in Table 2. Groundwater samples were obtained from each monitoring well following parameter stabilization by removing the flow-through cell and filling laboratory-supplied bottles directly from the sample tubing. Each sample comprised two 500-mL polyethylene bottles with nitric acid preservative and one 500-mL polyethylene bottle with no preservative. Groundwater filling one of the nitric acid-preserved bottles for each sample was filtered using a 0.45-micron in-line filter.

Samples were stored in a cooler on ice and transported to OnSite Environmental of Redmond, Washington under standard chain-of-custody procedures. Samples were submitted for chemical analysis of total and dissolved nickel, total and dissolved chromium, and total hexavalent chromium on a standard turnaround request. Samples were direct-dropped at the lab to meet the 24-hour hold time for the requested hexavalent chromium analysis.

Investigation-Derived Waste

About 15 gallons of purge water was generated during this sampling event. Purge water was transferred to a labeled 55-gallon steel drum stored on site. There are currently six 55-gallon drums with soil cuttings, and three 55-gallon drums with purge and decontamination water (one water drum is about ¼ full) on site.

GeoEngineers departed the site at about 4:40 PM.

Table 1 – Groundwater sample summary.

Monitoring Well ID	Sample Name	Time	Date
MW4sR	MW4sR-190206	1320	02/06/2019
MW6s	MW6s-190206	1100	02/06/2019
MW7s	MW7s-190206	1415	02/06/2019
MW8s	MW8s-190206	1605	02/06/2019

Table 2 – Summary of monitoring well construction and current conditions.

Monitoring Well ID	Static Water Level (ft. BTOC)	Total Depth (ft. BTOC)	Stickup (ft. bgs)	Screened Interval[1] (ft. BTOC)	Monument and TOC Condition
MW4sR	24.93	37.11 (soft)	-0.40	24 to 39	Good
MW6s	137.42	153.29 (soft)	-0.28	144 to 145	Good
MW7s	23.53	41.65 (soft)	-0.41	32 to 42	Good
MW8s	23.01	39.26 (soft)	-0.44	24 to 39	Good
MW5s	27.03	-	-0.54	-	Missing one bolt

Notes:

[1] Screened interval for monitoring wells MW6s and MW7s are assumed. Screened interval for MW4sR and MW8s are reported on the respective boring logs.

ft. BTOC = feet below top of casing

ft. bgs = feet below ground surface

TOC = top of casing

"Good" condition indicates all monument bolts are accounted for and working, compression cap is functioning providing an adequate seal, and casing is not cracked or worn.

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating Job No. 0504-095-03 Collector ENK/RC Sample ID MW-4SR-190206

PURGE DATA

Well Condition: Secure [ ] Yes [X] No Describe Damage NONE (STICKUP = 0.4 ft)
(Padlock brand and number)

Depth to Water (from top of well casing) 24.93
Depth to Base of Well 37.11 Height of Water Column 12.18
Well Casing Type/Diameter 2in
One Casing Volume (gal.) 1 well = 2.07 3 well = 6.21
Purge Method Pump (type) Bladder Bailer (type) N/A
Gallons Purged
(Remove minimum of 3 well volumes or until field parameters stabilize)
Purge Water Storage/Disposal Drum on site
(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625	7.981	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 2/6/19
Sample Location and Depth 29 Time Collected 1320
Tidal Cycle NA [X] High Tide at Low Tide at Weather Clear/cloudy 30's
Sample type (Groundwater, Product, Other)
Sample Collected with [ ] Bailer [X] Pump [ ] Other
Made of [X] Stainless Steel [ ] PVC [ ] Teflon [ ] Disposable LDPE [ ] Other
Sampler Decon Procedure Alconox wash/rinse w/ DI water
Sample Description (color, free product thickness, odor, turbidity, etc.)

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (_____)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1218	24.93	Start	7.69	57.20	738	7.31	9.7	75.6			
1219	24.93		7.49	54.5	893	5.26	11.4	95.5			
1223	24.93		7.53	56.5	659	4.75	11.5	54.1			
1227	–	0.75	7.58	56.4	537	4.94	11.6	76.9			
1231	–		7.60	56.3	437	4.52	11.6	79.8			
1235	–		7.53	56.1	345	4.90	11.4	83.7			
1239	–	1.25	7.97	55.9	295	4.89	11.6	87.0			
1243	–		7.46	56.0	182	4.86	11.6	89.9			
1248	–		7.46	56.1	148	4.85	11.6	86.8			
1253	–	2.5	7.46	56.2	97.0	4.87	11.6	82.7			
1258	–		7.53	56.0	83.1	4.89	11.6	83.2			
1304	–		7.51	56.0	65.8	4.91	11.6	82.1			
1309	–		7.50	55.4	55.5	4.90	11.6	82.3			

Meters Used for Measurement YSI PRO Plus, Hach T-21
pH/Con./DO Instrument Calibration [X] Yes [ ] No E-Tape waterline meter

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance
Analyses, Number and Volume of Sample Containers 2x 500mL poly w/ HNO3 1x 500mL poly unpreserved
Duplicate Sample Number(s) N/A
Comments: (Filtered, Not Filtered, Calculations, etc.) ~150mL/min

Signature Date 2/6/19 Page 1 of 2
Check if additional information on back [ ]

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating Job No. 0504-095-03 Collector ENK/RC Sample ID MW4sR-190206

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (_____)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1307	—	3.25	7.50	55.9	43.8	4.89	11.6	81.9			
1310			7.51	55.6	36.9	4.86	11.6	81.0			
1313			7.50	56.6	38.3	4.87	11.6	81.1			
1316		4.0	7.54	56.8	35.6	4.86	11.7	81.5			
									Sample	1320	

Page ____ of ____

GROUNDWATER SAMPLE COLLECTION FORM

Project: Aladdin Plating | Job No. 0504-095-03 | Collector ENK/RC | Sample ID MW-65-190206

PURGE DATA

Well Condition: Secure [ ] Yes [X] No | Describe Damage: NONE (STICKUP = 0.28 ft)
(Padlock brand and number): 3 BOLTS - NO LOCK

Depth to Water (from top of well casing): 137.42 @ 0850 @ 0938
Depth to Base of Well: 153.29 (V. SOFT) | Height of Water Column:
Well Casing Type/Diameter: 2"
One Casing Volume (gal.):
Purge Method: Pump (type) Bladder | Bailer (type) N/A
Gallons Purged: ~4.5
(Remove minimum of 3 well volumes or until field parameters stabilize)

Diameter (in.)	OD	ID	Volume Gal./Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625	7.981	2.6

Purge Water Storage/Disposal: Drum on site
(Drum identification, sample analysis, sample results, storage location, etc.)

SAMPLING DATA

Date Collected (mo/dy/yr):
Sample Location and Depth: 145 ft. BTOC - MID SCREEN | Time Collected: 1100
Tidal Cycle: NA [X] | High Tide at | Low Tide at | Weather: CLEAR, 30's
Sample type (Groundwater, Product, Other)
Sample Collected with: [ ] Bailer [X] Pump [ ] Other — BLADDER - QED SAMPLE PRO
Made of: [X] Stainless Steel [ ] PVC [ ] Teflon [ ] Disposable LDPE [ ] Other
Sampler Decon Procedure: ALCONOX + RINSE & DEDICATED TUBING
Sample Description (color, free product thickness, odor, turbidity, etc.): CLEAR, NO ODOR

FIELD PARAMETERS

Time	Depth to Water (feet)	* Purge Volume (gallons)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
0902	- START PURGE - FAIL TO GET WATER TO										
0940	- RESTART PURGE - WATER AT 0945										
0945	137.42	0.25	7.62	201.7	321	7.61	8.5	46.7			
0950	137.42	1.0	7.98	210.3	247	5.42	10.3	27.4			
0955		1.25	8.18	211.0	183	2.52	10.5	8.1	WL STABLE		
1000		1.75	8.21	211.8	185	2.35	10.5	4.4			
1005		2.0	8.24	211.7	178	2.10	10.4	3.0			
1010		2.25	8.26	212.5	152	1.90	10.4	-1.8			
1015		2.5	8.25	214.1	117	1.75	10.5	-1.6			
1020		2.75	8.28	214.9	106	1.65	10.5	-1.5			
1025		3.0	8.32	215.9	85.2	1.56	10.6	-3.9			
1030		3.25	8.43	216.1	71.3	1.50	10.6	-12.0			
1035		3.50	8.50	216.2	65.0	1.43	10.4	-14.1			

Meters Used for Measurement: YSI ProPlus; Hach 2100
pH/Con./DO Instrument Calibration: [X] Yes [ ] No | E-Tape: WATERLINE

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance: ~115 mL/min
Analyses, Number and Volume of Sample Containers: 2x500mL POLYS w/ NITRIC (1 FILTERED); 1x500mL POLY UNPRESERVED

Duplicate Sample Number(s)
Comments: (Filtered, Not Filtered, Calculations, etc.) - DEDICATED BLADDER PUMP - ~~[illegible]~~ @ 80 PSI; CYCLE IS 19/11 - NO DEDICATED PUMP -
* ESTIMATED FROM PURGE BUCKET

Signature: [signature] | Date 2/6/19 | Page 1 of 2

Check if additional information on back [✓]

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GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating Job No. 0504-095-03 Collector ENK/RC Sample ID MW-6S-190206

FIELD PARAMETERS

Time	Depth to Water (feet)	* Purge Volume (gallons)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1040		3.75	8.54	217.2	55.4	1.30	10.6	-19.2			
1045		4.0	8.68	218.7	47.4	1.34	10.7	-26.9			
1050		4.25	8.63	219.6	41.7	1.36	10.6	-23.7			
1055		4.5	8.65	219.8	45.5	1.38	10.6	-24.4			

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating | Job No. 0504-095-03 | Collector ENK/RC | Sample ID MW7S-190206

PURGE DATA

Well Condition: Secure [ ] Yes [X] No | Describe Damage NONE (STICKUP = 0.43)
(Padlock brand and number) N/A

Depth to Water (from top of well casing) 23.53 @ 1538
Depth to Base of Well 41.65 | Height of Water Column 18.12
Well Casing Type/Diameter 2"
One Casing Volume (gal.) ~3.08 (x3 ≈ 9.24)
Purge Method | Pump (type) Bladder | Bailer (type) N/A
Gallons Purged
(Remove minimum of 3 well volumes or until field parameters stabilize)
Purge Water Storage/Disposal Drum on site
(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625	7.981	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 2/6/19
Sample Location and Depth ~MIDSCREEN AT 38.65 ft BTOC
Tidal Cycle NA [X] | High Tide at | Low Tide at | Time Collected 1415
Sample type (Groundwater, Product, Other) | Weather Cloudy, 30's
Sample Collected with [ ] Bailer [X] Pump [ ] Other
Made of [X] Stainless Steel [ ] PVC [ ] Teflon [ ] Disposable LDPE [ ] Other
Sampler Decon Procedure ALCONOX + RINSE; DEDICATED TUBING
Sample Description (color, free product thickness, odor, turbidity, etc.)

FIELD PARAMETERS

Time	Depth to Water (feet)	* Purge Volume (gallons)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1340	START PURGE —		LUNCH AT	1347							
1348		—	6.75	150.5	319	4.14	11.3				
1355	23.53	0.5	7.41	179.6	77.9	3.79	11.6	84.5			
1400	23.53	1.0	7.54	177.5	43.5	3.82	11.6	78.0			
1405	23.49	1.5	7.61	177.5	30.9	3.87	11.5	74.8			
1410	23.50	2.0	7.62	177.6	23.5	3.87	11.5	72.3			

Meters Used for Measurement YSI PROPLUS; HACH 2100Q
pH/Con./DO Instrument Calibration [X] Yes [ ] No | E-Tape WATERLINE M203

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance ~150 mL/min
Analyses, Number and Volume of Sample Containers 2x 500 mL POLY w/ NITRIC (1 - FILTERED); 1x 500 mL POLY UNPRESERVED
Duplicate Sample Number(s) N/A
Comments: (Filtered, Not Filtered, Calculations, etc.) 1x 500 mL POLY w/ NITRIC FILTERED

Signature | Date 2/6/19 | Page 1 of 1
Check if additional information on back [ ]

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating Job No. 0504-095-03 Collector ENK/RC Sample ID ______

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (______)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			

Page ______ of ______

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating | Job No. 0504-095-03 | Collector ENK/RC | Sample ID MW-BS-190206

PURGE DATA

Well Condition: Secure [ ] Yes [X] No | Describe Damage NONE (STICKUP = 0.44ft)
(Padlock brand and number)

Depth to Water (from top of well casing) 23.01
Depth to Base of Well 39.26 | Height of Water Column 16.25
Well Casing Type/Diameter 2in
One Casing Volume (gal.) 1well = 2.76 3well = 8.28
Purge Method | Pump (type) Bladder | Bailer (type) N/A
Gallons Purged ~5
(Remove minimum of 3 well volumes or until field parameters stabilize)
Purge Water Storage/Disposal Drum on site
(Drum identification, sample analysis, sample results, storage location, etc.)

Diameter (in.)	OD	ID	Volume Gal./ Linear Ft
2	2.375"	2.067"	0.17
3	3.500"	3.068"	0.38
4	4.500"	4.026"	0.66
6	6.625"	6.065"	1.5
8	8.625	7.981	2.6

SAMPLING DATA

Date Collected (mo/dy/yr) 2/6/19
Sample Location and Depth 34'
Time Collected 1605
Tidal Cycle NA [X] | High Tide at | Low Tide at
Weather Clear 30s
Sample type (Groundwater, Product, Other) GW
Sample Collected with [ ] Bailer [ ] Pump [ ] Other
Made of [X] Stainless Steel [ ] PVC [ ] Teflon [ ] Disposable LDPE [ ] Other
Sampler Decon Procedure Alconox wash / DI rinse
Sample Description (color, free product thickness, odor, turbidity, etc.)

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (µS/cm)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1446	23.01	Start	7.24	140.4	over	3.94	12.0	83.3			
1450	23.01		7.27	144.8	over	3.92	12.0	83.6			
1455	23.01		7.64	141.6	over	4.39	12.1	72.6			
1500	—		7.94	137.2	over	4.32	12.2	80.2			
1504	—	1.25	8.03	138.2		4.22	12.4	55.7			
1508	—		8.06	139.1	over	4.23	12.2	53.8			
1512	—		8.06	141.1	965	4.21	12.4	53.5			
1516	—		8.11	144.4	658	4.27	12.6	51.3			
1520	—		8.12	145.6	461	4.33	12.4	51.3			
1524	—	2.50	8.09	146.7	316	4.37	12.3	51.6			
1528	—		8.15	150.3	269	4.39	12.5	49.0			
1532	—		8.18	152.8	184	4.49	12.4	48.6			
1536	—	3.25	8.13	156.7	112	4.60	12.3	50.0			

Meters Used for Measurement YSI Pro Plus Hach T-21
pH/Con./DO Instrument Calibration [X] Yes [ ] No | E-Tape Waterline MW-BS

ADDITIONAL INFORMATION

Samples Composited Overtime, Distance
Analyses, Number and Volume of Sample Containers 2x 500ml poly w/ nitric acid 1x 500 ml poly
Duplicate Sample Number(s) DUP-1-190206 @ 2000
Comments: (Filtered, Not Filtered, Calculations, etc.) Stick up: 0.435 ~220ml/min

Signature | Date 2/6/19 | Page 1 of 2
Check if additional information on back [✓]

GROUNDWATER SAMPLE COLLECTION FORM

Project Aladdin Plating Job No. 0504-095-03 Collector ENK/RC Sample ID MW8s-190206

FIELD PARAMETERS

Time	Depth to Water (feet)	Purge Volume (gallons)	pH	Conductivity (uS/cm)	Turbidity (NTU)	Dissolved O_2 (ppm)	Temperature (F/C)	ORP (mV)			
1540			8.13	158.5	103	4.66	12.2	50.5			
1544			8.14	160.8	63.2	4.74	12.3	50.9			
1548			8.16	162.1	61.3	4.81	12.3	50.8			
1552			8.22	163.2	45.7	4.83	12.3	50.1			
1556		4.5	8.18	162.9	39.1	4.93	12.2	49.9			
1600			8.23	163.9	31.0	4.98	12.4	49.9			
1604			8.22	163.8	24.8	4.98	12.3	48.6			

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GeoEngineers

ATTACHMENT 2
Laboratory Analytical Data

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

February 14, 2019

Aaron Waggoner
GeoEngineers, Inc.
1101 Fawcett Avenue South, Suite 200
Tacoma, WA 98402

Re: Analytical Data for Project 504-095-04
Laboratory Reference No. 1902-037

Dear Aaron:

Enclosed are the analytical results and associated quality control data for samples submitted on February 6, 2019.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

Case Narrative

Samples were collected on February 6, 2019 and received by the laboratory on February 6, 2019. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

ANALYTICAL REPORT FOR SAMPLES

Client ID	Laboratory ID	Matrix	Date Sampled	Date Received	Notes
MW6s-190206	02-037-01	Water	2-6-19	2-6-19	
MW4sR-190206	02-037-02	Water	2-6-19	2-6-19	
MW7s-190206	02-037-03	Water	2-6-19	2-6-19	
MW8s-190206	02-037-04	Water	2-6-19	2-6-19	
DUP-1-190206	02-037-05	Water	2-6-19	2-6-19	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

HEXAVALENT CHROMIUM
SM 3500-Cr B

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW6s-190206**					
Laboratory ID:	02-037-01					
Hexavalent Chromium	**ND**	10	SM 3500-Cr B	2-7-19	2-7-19	
Client ID:	**MW4sR-190206**					
Laboratory ID:	02-037-02					
Hexavalent Chromium	**12**	10	SM 3500-Cr B	2-7-19	2-7-19	
Client ID:	**MW7s-190206**					
Laboratory ID:	02-037-03					
Hexavalent Chromium	**ND**	10	SM 3500-Cr B	2-7-19	2-7-19	
Client ID:	**MW8s-190206**					
Laboratory ID:	02-037-04					
Hexavalent Chromium	**31**	10	SM 3500-Cr B	2-7-19	2-7-19	
Client ID:	**DUP-1-190206**					
Laboratory ID:	02-037-05					
Hexavalent Chromium	**32**	10	SM 3500-Cr B	2-7-19	2-7-19	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

TOTAL METALS
EPA 200.8

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW6s-190206**					
Laboratory ID:	02-037-01					
Chromium	**8.1**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**12**	8.9	EPA 200.8	2-13-19	2-13-19	
Client ID:	**MW4sR-190206**					
Laboratory ID:	02-037-02					
Chromium	**15**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**2600**	220	EPA 200.8	2-13-19	2-13-19	
Client ID:	**MW7s-190206**					
Laboratory ID:	02-037-03					
Chromium	**2.1**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**ND**	8.9	EPA 200.8	2-13-19	2-13-19	
Client ID:	**MW8s-190206**					
Laboratory ID:	02-037-04					
Chromium	**32**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**13000**	890	EPA 200.8	2-13-19	2-13-19	
Client ID:	**DUP-1-190206**					
Laboratory ID:	02-037-05					
Chromium	**32**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**14000**	890	EPA 200.8	2-13-19	2-13-19	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

DISSOLVED METALS
EPA 200.8

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**MW6s-190206**					
Laboratory ID:	02-037-01					
Chromium	**ND**	1.0	EPA 200.8		2-12-19	
Nickel	**ND**	8.0	EPA 200.8		2-12-19	
Client ID:	**MW4sR-190206**					
Laboratory ID:	02-037-02					
Chromium	**11**	1.0	EPA 200.8		2-12-19	
Nickel	**2700**	200	EPA 200.8		2-13-19	
Client ID:	**MW7s-190206**					
Laboratory ID:	02-037-03					
Chromium	**ND**	1.0	EPA 200.8		2-12-19	
Nickel	**ND**	8.0	EPA 200.8		2-12-19	
Client ID:	**MW8s-190206**					
Laboratory ID:	02-037-04					
Chromium	**27**	1.0	EPA 200.8		2-12-19	
Nickel	**13000**	800	EPA 200.8		2-13-19	
Client ID:	**DUP-1-190206**					
Laboratory ID:	02-037-05					
Chromium	**28**	1.0	EPA 200.8		2-12-19	
Nickel	**13000**	800	EPA 200.8		2-13-19	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

HEXAVALENT CHROMIUM
SM 3500-Cr B
QUALITY CONTROL

Matrix: Water
Units: ug/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0207W1					
Hexavalent Chromium	**ND**	10	SM 3500-Cr B	2-7-19	2-7-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-037-02										
	ORIG	DUP									
Hexavalent Chromium	**12.3**	**13.0**	NA		NA	NA		NA	6	20	
MATRIX SPIKES											
Laboratory ID:	02-037-02										
	MS	MSD	MS	MSD		MS	MSD				
Hexavalent Chromium	**117**	**111**	100	100	12.3	105	99	75-125	5	20	
SPIKE BLANK											
Laboratory ID:	SB0207W1										
	SB		SB			SB					
Hexavalent Chromium	**99.9**		100		NA	100		85-115	NA	NA	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

TOTAL METALS
EPA 200.8
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0213WM1					
Chromium	**ND**	1.1	EPA 200.8	2-13-19	2-13-19	
Nickel	**ND**	8.9	EPA 200.8	2-13-19	2-13-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-005-08										
	ORIG	DUP									
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Nickel	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	02-005-08										
	MS	MSD	MS	MSD		MS	MSD				
Chromium	**272**	**257**	111	111	ND	**245**	**232**	75-125	5	20	
Nickel	**271**	**258**	111	111	ND	**244**	**233**	75-125	5	20	

Date of Report: February 14, 2019
Samples Submitted: February 6, 2019
Laboratory Reference: 1902-037
Project: 504-095-04

DISSOLVED METALS
EPA 200.8
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0212D1					
Chromium	**ND**	1.0	EPA 200.8		2-12-19	
Nickel	**ND**	8.0	EPA 200.8		2-12-19	

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-044-05										
	ORIG	DUP									
Chromium	**ND**	**ND**	NA	NA		NA		NA	NA	20	
Nickel	**ND**	**ND**	NA	NA		NA		NA	NA	20	
MATRIX SPIKES											
Laboratory ID:	02-044-05										
	MS	MSD	MS	MSD		MS	MSD				
Chromium	**183**	**183**	200	200	ND	**91**	**92**	75-125	0	20	
Nickel	**183**	**179**	200	200	ND	**92**	**89**	75-125	2	20	

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-naphthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a sulfuric acid/silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

Chain of Custody

Page 1 of 1

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: GEI
Project Number: 504-095-04
Project Name: ALADDIN PLATING
Project Manager: AARON WAGGONER
Sampled by: ENK/RC

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days)
☐ _____ (other)

Laboratory Number: 02-037

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	~~HEM (oil and grease) 1664A~~ HEX CHROMIUM	TOTAL Ni	DISSOLVED Ni	TOTAL Cr	DISSOLVED Cr	% Moisture
1	MW16S-190206	2/6/19	1100	W	3																	X	X	X	X	X	
2	MW4SR-190206		1320		3																	X	X	X	X	X	
3	MW7S-190206		1415		3																	X	X	X	X	X	
4	MW8S-190206		1605		3																	X	X	X	X	X	
5	DUP-1-190206	2/6/19	2000	W	3																	X	X	X	X	X	

	Signature	Company	Date	Time
Relinquished		GEI	2/6/19	1800
Received		CTE	2/6/19	1800
Relinquished				
Received				
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions

Data Package: Standard ☒ Level III ☐ Level IV ☐

Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

ATTACHMENT 3
Data Validation Report

GeoEngineers

1101 Fawcett Avenue, Suite 200, Tacoma, Washington 98402, Telephone: 253.383.4940, Fax: 253.383.4923 www.geoengineers.com

Data Validation Report

Project: WA State Department of Ecology – Aladdin Plating 2019 Post-Construction Groundwater Monitoring

GEI File No: 0504-095-04

Date: March 25, 2019

This report documents the results of a United States Environmental Protection Agency (USEPA) defined Stage 2A data validation (USEPA Document 540-R-08-005; USEPA 2009) of the analytical data for groundwater samples collected as part of the 2019 monitoring event and the associated laboratory and field quality control (QC) samples. The samples were obtained from the Aladdin Plating Site located at 1657 Center Street in Tacoma, Washington.

Objective and Quality Control Elements

GeoEngineers, Inc. (GeoEngineers) completed the data validation consistent with the USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Data Review (USEPA 2017) (National Functional Guidelines) to determine if the laboratory analytical results meet the project objectives and are usable for their intended purpose. Data usability was assessed by determining if:

- The samples were analyzed using well-defined and acceptable methods that provide reporting limits below applicable regulatory criteria;
- The precision and accuracy of the data are well-defined and sufficient to provide defensible data; and
- The quality assurance/quality control (QA/QC) procedures utilized by the laboratory meet acceptable industry practices and standards.

In accordance with the Soil and Groundwater Sampling and Analysis Plan (GeoEngineers 2014), the data validation included review of the following QC elements:

- Data Package Completeness
- Chain-of-Custody Documentation
- Holding Times and Sample Preservation
- Method Blanks
- Matrix Spikes/Matrix Spike Duplicates
- Laboratory Control Samples
- Laboratory/Field Duplicates

Validated Sample Delivery Groups

This data validation included review of the sample delivery group (SDG) listed below in Table 1.

TABLE 1. SUMMARY OF VALIDATED SAMPLE DELIVERY GROUPS

Laboratory SDG	Samples Validated
1902-037	MW4sR-190206, MW6s-190206, MW7s-190206, MW8s-190206, DUP-1-190206

Chemical Analysis Performed

OnSite Environmental, Inc. (OnSite), located in Redmond, Washington, performed laboratory analysis on the samples using the following methods:

- Total and Dissolved Metals by Method EPA200.8; and
- Hexavalent Chromium by Method SM3500-Cr B

Data Validation Summary

The results for each of the QC elements are summarized below.

Data Package Completeness

OnSite provided the required deliverables for the data validation according to the National Functional Guidelines. The laboratory followed adequate corrective action processes and the identified anomalies were discussed in the relevant laboratory case narrative.

Chain-of-Custody Documentation

Chain-of-custody (COC) forms were provided with the laboratory analytical reports. The COCs were accurate and complete when submitted to the laboratory, with the following exception:

SDG 1902-037: The laboratory noted that Sample DUP-1-190206 was not listed on the COC. The sample was added to the COC by the laboratory.

Holding Times and Sample Preservation

The sample holding time is defined as the time that elapses between sample collection and sample analysis. Maximum holding time criteria exist for each analysis to help ensure that the analyte concentrations found at the time of analysis reflect the concentration present at the time of sample collection. Established holding times were met for each analysis. The sample cooler arrived at the laboratory at the appropriate temperatures of between two and six degrees Celsius.

Method Blanks

Method blanks are analyzed to ensure that laboratory procedures and reagents do not introduce measurable concentrations of the analytes of interest. A method blank was analyzed with each batch of samples, at a frequency of 1 per 20 samples. For the sample batches, method blanks for the applicable methods were analyzed at the required frequency. None of the analytes of interest were detected above the reporting limits in the method blanks.

Matrix Spikes/Matrix Spike Duplicates

Since the actual analyte concentration in an environmental sample is not known, the accuracy of a particular analysis is usually inferred by performing a matrix spike (MS) analysis on one sample from the

associated batch, known as the parent sample. One aliquot of the sample is analyzed in the normal manner and then a second aliquot of the sample is spiked with a known amount of analyte concentration and analyzed. From these analyses, a percent recovery is calculated. Matrix spike duplicate (MSD) analyses are generally performed for analyses as a precision check and analyzed in the same sequence as a matrix spike. Using the result values from the MS and MSD, the relative percent difference (RPD) is calculated. The percent recovery control limits for MS and MSD analyses are specified in the laboratory documents, as are the RPD control limits for MS/MSD sample sets.

One MS/MSD analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery and RPD values were within the proper control limits.

Laboratory Control Samples

A laboratory control sample (LCS) is a blank sample that is spiked with a known amount of analyte and then analyzed. An LCS is similar to an MS, but without the possibility of matrix interference. Given that matrix interference is not an issue, the LCS control limits for accuracy are usually more rigorous than for MS analyses. Additionally, data qualification based on LCS analyses would apply to all samples in the associated batch, instead of just the parent sample. The percent recovery control limits are specified in the laboratory documents.

One LCS analysis should be performed for every analytical batch or every 20 field samples, whichever is more frequent. The frequency requirements were met for all analyses and the percent recovery values were within the proper control limits.

Laboratory Duplicates

Internal laboratory duplicate analyses are performed to monitor the precision of the analyses. Two separate aliquots of a sample are analyzed as distinct samples in the laboratory and the RPD between the two results is calculated. Duplicate analyses should be performed once per analytical batch. If one or more of the samples used has a concentration less than five times the reporting limit for that sample, the absolute difference is used instead of the RPD. The RPD control limits are specified in the laboratory documents. Laboratory duplicates were analyzed at the proper frequency and the specified acceptance criteria were met.

Field Duplicates

In order to assess precision, field duplicate samples are collected and analyzed along with the reviewed sample batches. The duplicate samples are analyzed for the same parameters as the associated parent samples. Precision is determined by calculating the RPD between each pair of samples. If one or more of the sample analytes has a concentration less than five times the reporting limit for that sample, then the absolute difference is used instead of the RPD. The RPD control for water is 35 percent.

SDG 1902-037: One field duplicate sample pair, MW8s-190206 and DUP-1-190206, was submitted with this SDG. The precision criteria for the target analytes were met for this sample pair.

Overall Assessment

As was determined by this data validation, the laboratory followed the specified analytical methods. Accuracy was acceptable, as demonstrated by the LCS and MS/MSD percent recovery values. Precision was acceptable, as demonstrated by the MS/MSD and laboratory/field duplicate RPD values.

No analytical results were qualified. The data are acceptable for the intended use.

References

U.S. Environmental Protection Agency (USEPA). "Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use," EPA-540-R-08-005. January 2009.

U.S. Environmental Protection Agency (USEPA). "Contract Laboratory Program National Functional Guidelines for Inorganic Superfund Methods Data Review," EPA-540-R-2017-001. January 2017.

GeoEngineers, Inc., "Soil and Groundwater Sampling and Analysis Plan", prepared for Washington State Department of Ecology. March 6, 2014.

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Appendix B – Final Report by GeoEngineers

GeoEngineers conducted the final walk through/warranty inspection (in accordance with the project manual) on October 30, 2019, and provided the following report. The report concluded that there were no issues related to this construction/excavation project left.

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GEOENGINEERS

1101 Fawcett Avenue, Suite 200
Tacoma, Washington 98402
253.383.4940

Field Report

	Project: Aladdin Plating		File Number: 00504-095-05
			Date: 10/30/2019
	Owner: Dept. of Ecology	Time of Arrival: 10:00	Report Number: 001
Prepared by: Aaron Waggoner	Location: 1657 Center St, Tacoma, WA	Time of Departure: 10:45	Page: 1 of 3
Purpose of visit: Warranty Inspection	Weather: Sunny, 40s F, Light Breeze	Travel Time: 0.25 hr	Permit Number: None

Upon arrival to the site I assessed personal safety hazards: ☒ Yes or ☐ Referred to Site Safety Plan and Safety Tailgate if applicable

Safety Hazards Were Addressed by: ☐ Staying Alert to Construction and Equipment Hazards ☐ Other (describe):

Photographed the current condition of the site. Aaron Waggoner, Iain Wingard and Ken Fellows of GeoEngineers on site.

Photo 1 – Inside Fence Looking Northwest

Photo 2 – Front 1/3rd of Lot Looking Southeast

Photo 3 – Gravel in Back 2/3rd of Lot Looking North

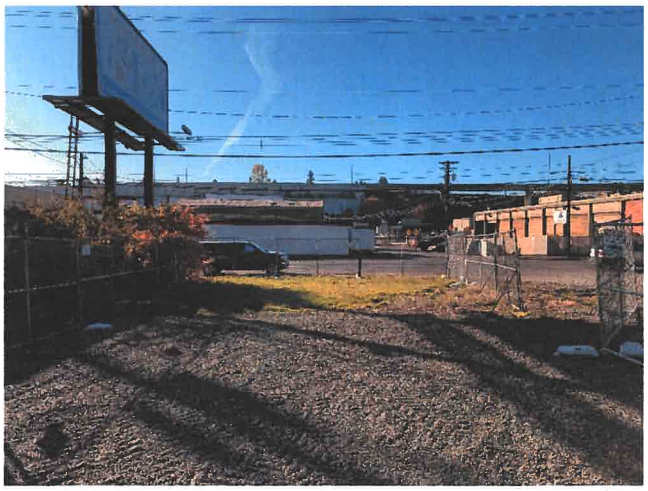

Photo 4 – Inside Fence Looking South

☐ **THIS FIELD REPORT IS PRELIMINARY**

A preliminary report is provided solely as evidence that field observation was performed. Observations and/or conclusions and/or recommendations conveyed in the final report may vary from and shall take precedence over those indicated in a preliminary report.

FIELD REPRESENTATIVE — **DATE** 10/30/19

☒ **THIS FIELD REPORT IS FINAL**

A final report is an instrument of professional service. Any conclusions drawn from this report should be discussed with and evaluated by the professional involved.

REVIEWED BY Iain Wingard — **DATE** 10/30/19

Attachments: None

Distribution: Ken Fellows, Iain Wingard, Mohsen Kourehdar, File

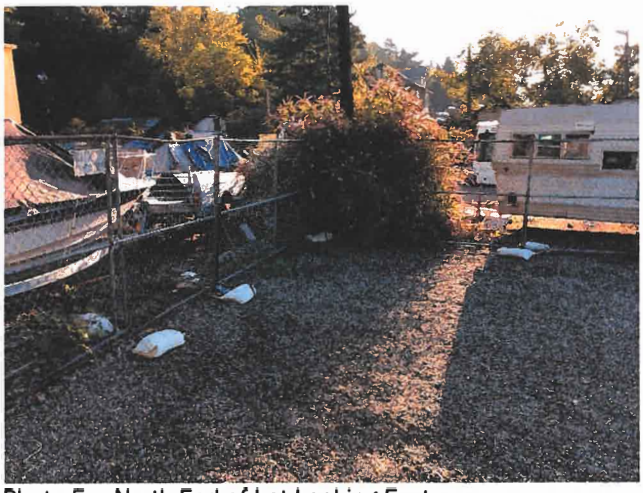

Photo 5 – North End of Lot Looking East

Photo 6 – Replacement Monitoring Well MW4sR

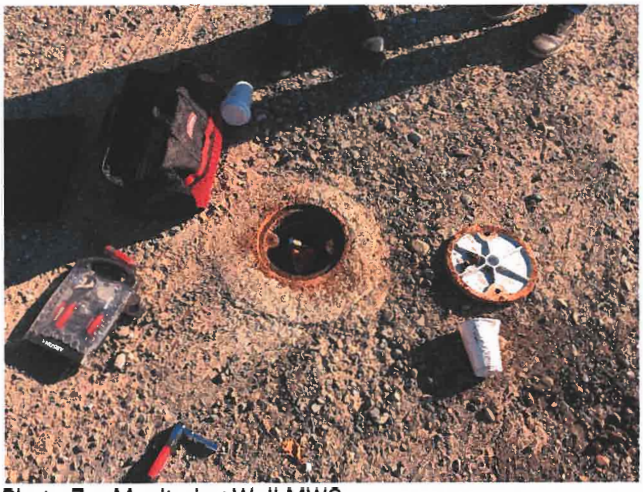

Photo 7 – Monitoring Well MW8s

Photo 8 – Billboard and Building East of Site

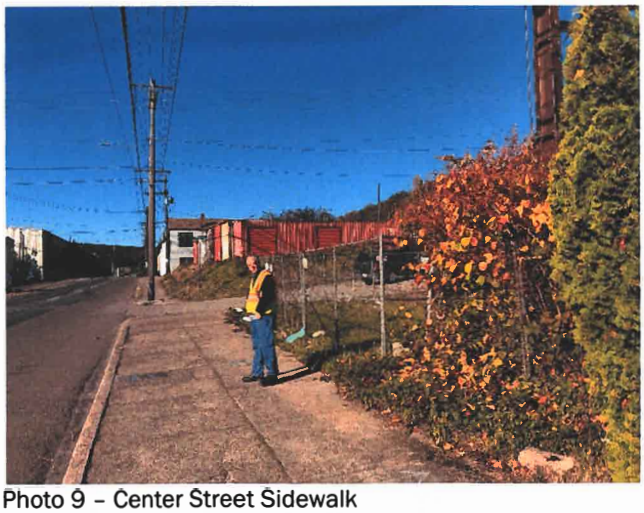

Photo 9 – Center Street Sidewalk

Photo 10 – Southwest Corner of Fencing and Alaska Street

There does not appear to be any visible settlement of the gravel covered portion of the site. There were tire tracks left on the surface of the gravel from the Waste Management forklift that was used to pick up the drums in August 2019. The forklift did not leave ruts in the gravel.

The topsoil covered portion of the site was observed to be sufficiently covered with grass.

There was no apparent accumulation of soil or sediment on the sidewalk adjacent to the site indicating that stormwater does not appear to be migrating off site after the TESC measures were removed following construction.

The fencing appeared to be secure and in good condition and preventing access to the site and the adjacent property. The feet of the fencing were secured with sandbags and there were bracing installed around the perimeter of the fencing preventing.

The replacement monitoring well MW4sR was visible and not covered with gravel, debris or vegetation and was secured in the well box. The offsite monitoring well MW8s located east of the site was visible and not covered with gravel, debris or vegetation and was secured in the well box. The well J-plug in MW4sR and MW8s were each secured with a padlock.

Only a minor amount of debris was present on the property inside the fenced area that appeared to have been thrown over the fence from the adjacent rights-of-ways.

It is our opinion that there are no apparent warranty related items requiring attention for this project.

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Appendix C – Electronic Documentation

The attached flash storage device has all the documentation for this project. It is approximately 2,000 pages. It contains all the project record, new well installation report, and letters of transmittal.

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Appendix D – Site Management

The Site is currently managed by Pierce County with no liability on their part. This property is being held by Pierce County in tax foreclosure.

The Contact name in Pierce County for the property is:

Michael D. Gonzales
Real Property Management Specialist
Pierce County Department of Facilities Management
1102 Broadway, Suite 302
Tacoma, WA 98402
Main: 253-798-7223
Tell: 253-798-6364
Fax: 253-798-7401

Ecology developed a fact sheet and shared this with Pierce County to be shared with potential buyers.

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Fact Sheet for a Potential Buyer

1657 South Center Street, Tacoma Washington

Tax Parcel No. 2855000010

Former Aladdin Plating (Ecology FSID 1277)

This fact sheet is to provide information to the potential buyer.

Work Performed

The Washington State Department of Ecology (Ecology) sponsored a cleanup project that removed approximately 500 cubic yards of contaminated soil and backfilled the site with clean fill. This work was concluded in November 2018. Ecology will conduct a one-time groundwater monitoring event on four existing groundwater monitoring wells in February 2019.

The environmental cleanup work was conducted in accordance with the Model Toxics Control Act (MTCA). To see the cleanup documents for the site, please go to: https://fortress.wa.gov/ecy/gsp/CleanupSiteDocuments.aspx?csid=3257.

Current Site Conditions

There is residual nickel contaminated soil beneath the site and nickel and chromium contaminated groundwater beneath the site and approximately 100 feet south of the property.

The remaining nickel contaminated soil concentrations are in the range of 450 milligrams per kilogram (mg/kg) – 4,500 mg/kg (cleanup level for nickel is 417 mg/kg) at depths between 4.0 feet – 8.0 feet below ground surface (bgs). All the excavated areas have been filled with clean fill and a cap of 2.5 feet of clean fill covers the property.

The highest groundwater concentration in 2014 for total nickel was 7,770 micrograms per liter (µg/l) (groundwater cleanup level is 320 µg/l) and for total chromium concentration was 96 µg/l (groundwater cleanup level is 50 µg/l).

Ecology Requirements for Property Purchase

The buyer of this property will be required by Ecology to commit to conduct the following:

1. The buyer will put an environmental (restrictive) covenant (EC) on this property which shall be recorded with Pierce County.

2. The EC will require annual groundwater monitoring of four groundwater monitoring wells. The EC will require a sampling and analysis plan to perform the groundwater monitoring. The groundwater shall be tested for total chromium and total nickel. The groundwater monitoring will be required to continue until these wells meet the cleanup levels for four consecutive groundwater monitoring events.

3. The EC will require capping (CAP) of the property. A building or an asphalt surface will qualify as a CAP. The CAP will require an operation and maintenance (O&M) manual, which will require annual inspection. The CAP will need to be repaired as needed in accordance with the approved O&M manual. The buyer could contact Ecology to get guidance in drafting the O&M manual.

4. When the groundwater meets the cleanup levels, the property owner may apply to Ecology's Voluntary Cleanup Program to have the site removed from Ecology's hazardous site list.

5. The Ecology approved boilerplate copy of an EC is attached to this fact sheet.

6. The buyer will be a Potential Liable Person under Revised Code of Washington (RCW) 70.105D.040. Ecology shall give notice to any person and allow an opportunity for comment before making that finding.

7. If you have any questions, please contact:

   Mohsen Kourehdar, P.E.
   Toxics Cleanup Program
   Southwest Regional Office
   PO Box 47775
   Olympia, WA 98504-7775
   Phone: 360-407-6256
   Fax: 360-407-6305
   mohsen.kourehdar@ecy.wa.gov