DRAFT

REMEDIAL INVESTIGATION/FEASIBILITY STUDY

North Star Casteel (Formerly Varicast Inc.)
1200 West 13th Street
Vancouver, Washington
VCP Identification: SW1712

March 3, 2021

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Geologic and Environmental Consulting Services

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ABBREVIATION AND ACRONYM LIST

AEG	Associated Environmental Group, LLC
AOPC	Area of Potential Concern
AST	Above Ground Storage Tank
bsg	Below Surface Grade
COCs	Constituents of Concern
COPCs	Constituents of Potential Concern
cPAHs	Carcinogenic Polycyclic Aromatic Hydrocarbons
CSM	Conceptual Site Model
CULs	Cleanup Levels
Ecology	Washington State Department of Ecology
Emerald	Emerald Petroleum Services
EPI	Environmental Partners, Inc.
GPR	Ground Penetrating Radar
HAZWOPER	Hazardous Waste Operations and Emergency Response
Magna	Magna Construction Services, Inc.
MDCs	Maximum Detected Concentrations
mm	Millimeters
MSBA	Martin S. Burck Associates, Inc.
MTCA	Model Toxics Control Act
NL	Northwest Landfill
NSC	North Star Casteel
Pace	Pace Analytical, of Mount Juliet Tennessee
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PCE	Tetrachloroethylene
PHCs	Petroleum Hydrocarbons
Phase I	Phase I Environmental Site Assessment
Phase II	Phase II Environmental Site Assessment
PID	Photo-Ionization Detector
ppb	Parts Per Billion
ppm	Parts Per Million
RCRA	Resource Conservation Recovery Act
RECs	Recognized Environmental Conditions
RL	Reporting Limit
SHASP	Site-Specific Health and Safety Plan
sq.ft.	Square Foot
TCLP	Toxicity Characteristic Leaching Procedure
TEFs	Toxicity Equivalent Factors
TEQ	Toxicity Equivalent Concentration
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Survey
UST	Underground Storage Tank
VOC	Volatile Organic Compound
WAC	Washington Administrative Code
Wasco	Wasco County Landfill
WRP	Water Resources Program

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1.0 INTRODUCTION

Martin S. Burck Associates, Inc. (MSBA) has prepared the following Remedial Investigation/Feasibility Study (RI/FS) on behalf of North Star Casteel (NSC) for the property referenced above. The site location is shown on Figure 1. Previous sampling activities documented elevated concentrations of petroleum hydrocarbons (PHCs), PHC constituents, metals, and polychlorinated biphenyls (PCBs) in shallow soil attributed to the site's historic operation as an industrial cast steel foundry. The following report presents a summary of previous site investigation activities, a site specific conceptual site model (CSM), an evaluation of cleanup options, and a description of the proposed remedial action strategy.

1.1 Site Background

The site has been reportedly operated as a cast steel foundry since the 1920's. Historic operations at the site may have included metal refining, smelting, alloying, and other related industrial processes. The site has been operated by several different owners and operators and was recently purchased by NSC in 2018, who continues to operate the cast steel foundry. The property was formerly operated as Swartz Steel Facility and Varicast Inc. The general site layout is illustrated on Figure 2.

In 2017 and 2018, site investigation activities were conducted as part of NSC's pre-purchase due diligence. Soil sampling activities determined that PHCs, PHC constituents, metals, and PCBs were present in shallow soil at concentrations exceeding the Model Toxics Control Act (MTCA) Method A cleanup levels (CULs) for unrestricted land uses.

1.2 Site Location and General Description

The site consists of 14 tax lots totaling 3.28 acres in Vancouver, Washington, northwest of the intersection of West 13th Street (W 13th St) and Lincoln Avenue (Lincoln Ave) (Figure 1). The property is located within the southeast quarter of the northeast quarter of Section 28, Township 2 North, Range 1 East and the tax parcel identification number is 59810000. The site is relatively flat, sloping gently downward to the south and west off-site.

There are currently five primary structures at the property consisting of: 1) a 25,000 square foot (sq. ft.) foundry building, 2) a 4,100 sq. ft. maintenance shop, 3) a 3,200 sq. ft. welding building, 4) a 450 sq. ft. residence, and 5) a 950 sq. ft. office. NSC plans to remove the residence in the near future, however, it was occupied at the time this report was prepared. Two Quonset hut style storage buildings approximately 800 and 1,200 sq. ft. in size are located near the northwest portion of the property. The Quonset buildings are used for sand and equipment storage. The buildings and general layout of the site are shown on Figure 2. NSC reported that there may be an underground storage tank (UST) of unknown size that was previously intended for use as reserve storage of transformer oil and that it has never been used. MSBA has not observed evidence of the potential UST and it does not appear on previous site maps and was not discussed in previous reports. The presence of the potential UST will be further investigated during future site work. The approximate reported location of the potential UST is shown on Figure 2. No additional known USTs or above ground storage tanks (ASTs) are located at the property. The previous owner reported that USTs were previously located at the property, however, their former locations, contents, and decommissioning details are unknown. MSBA will attempt to obtain additional information regarding the reported former USTs during future site work, which will include a ground penetrating radar survey (GPR).

Stormwater runoff from the foundry building roof is discharged to Grattix rain boxes prior to infiltrating into the ground. The Grattix rain boxes are designed to remove zinc in stormwater from galvanized metal roofs. The layout and discharge points associated with the stormwater system are not well understood at this time. Based on a review of previous stormwater documentation, there may be two dry wells, one located in the parking area near the southwest corner of the property in AOPC 6 and another is in AOPC 1, near the eastern property boundary. It is unclear whether the dry well in AOPC 1 is still active/present as it was not discussed in previous reports. The approximate dry well locations are shown on Figure 2; the locations are based on a review of photographs and will be field verified. MSBA will attempt to obtain additional information regarding the dry wells and the stormwater conveyance system layout during future site work, which will include a GPR survey.

The site is located in a industrial area with commercial and mixed use zoning to the east. The zoning for the site is Industrial. The site is bounded to the south by a former bulk fuel facility that is now operated by Emerald Petroleum Services (Emerald) as a used oil collection, treatment, and resale facility with numerous ASTs (Facility ID: 47231541). Confirmed releases of PHCs and chlorinated solvents have impacted soil and groundwater at this adjacent property. The site is bounded to the west by a Burlington Northern Sante Fe (BNSF) railway and several associated buildings. The site is bounded to the north by the Erwin O. Rieger Memorial Highway (WA-501) and residential properties north of the highway. The site is bounded to the east by Lincoln Avenue and the Lincoln Place Apartments and a commercial building across the street.

1.3 Subsurface Conditions and Hydrogeology

Subsurface conditions at the site were observed and documented by Environmental Partners Inc. (EPI) during pre-purchase due diligence investigations to a maximum approximate depth of 60 feet below surface grade (bsg). Soil at the site is comprised of fine to coarse grain alluvial sediments. EPI soil boring logs indicate that poorly graded sand with gravel (United Soil Classification System group symbol SP) was the most prevalent soil type encountered. Sandy silt and silty sand (ML) were also common. Groundwater was encountered at the site at depths ranging from 34.5 feet bsg to 54 feet bsg. Soil encountered within the uppermost aquifer was primarily comprised of poorly graded sand and poorly graded sand with gravel (SP). The inferred groundwater flow direction is to the south to southwest.

2.0 PREVIOUS ENVIRONMENTAL SITE WORK - EPI

The following sections present a summary of previous investigation activities conducted at the site.

2.1 Phase I Environmental Site Assessment - EPI

In October 2017, EPI completed a *Phase I Environmental Site Assessment* (Phase I) report, dated October 31, 2017. A link to an electronic copy of the Phase I is presented in Appendix A of this report. The Phase I was completed as pre-purchase due diligence on behalf of NSC.

The Phase I identified the following three recognized environmental conditions (RECs):

REC 1: Historical Operation as a Foundry: Fifteen areas of potential concern (AOPC) related to the foundry operation were identified on the property. The fifteen AOPCs are labeled on Figure 2 and identified as:

AOPC 1: Metal Receiving Area
AOPC 2: Electric Arc Furnace Area
AOPC 3: Foundry Buildings - Sands
AOPC 4: Stormwater Drain - Main Yard
AOPC 5: Southwest Compressor
AOPC 6: Southwest Drywell
AOPC 7: South Compressor
AOPC 8: Maintenance Shop Building
AOPC 9: Welding Station Building

AOPC 10: Stormwater Retention Structure
AOPC 11: Oil-Sand Storage and Baghouse
AOPC 12: Northwest Petroleum Storage
AOPC 13: Foundry Waste Material
AOPC 14: North Compressor
AOPC 15: Clark County Transformer

REC 2: Stormwater Compliance: EPI raised concerns regarding stormwater compliance at the property due to the potential for hazardous substances and petroleum products to enter the subsurface through the stormwater discharge system.

REC 3: Emerald Property South of the Site: A bulk petroleum and storage facility was operated since 1958. The facility has had confirmed releases of solvents and PHCs to soil and groundwater.

2.2 Phase II Environmental Site Assessment and Additional Subsurface Investigations - EPI

In 2017, EPI performed soil and groundwater sampling activities at the site to further evaluate the three RECs, including the fifteen AOPCs related to the historic foundry operations. The investigation activities were summarized in a *Phase II Environmental Site Assessment* (Phase II) report dated October 31, 2017, and the *Updated Subsurface Investigation Letter Report*, dated May 3, 2018. Links to electronic copies of the reports are presented in Appendix A of this report.

The investigation activities were primarily related to REC 1, which included AOPCs 1 through 15. EPI determined the constituents of potential concern (COPCs), which are any constituents detected and/or potentially present based on site uses and releases, were gasoline, diesel, oil, volatile organic compounds(VOCs), polycyclic aromatic hydrocarbons (PAHs), Resource Conservation Recovery Act (RCRA) 8 metals, and PCBs. The investigations identified several areas of impact, however, full delineation was not completed. Constituents of concern (COCs) were identified based on concentrations of COPCs exceeding the MTCA Method A CULs for unrestricted land uses. Based on the sampling activities, EPI concluded that AOPCs 3, 4, 6, 10, 11, 12, and 15 were in compliance with the applicable CULs. The COCs in the remaining non-compliant AOPCs are listed below:

AOPC 1 Metal Receiving Area: Lead, diesel, oil, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and PCBs
AOPC 2 Electronic Arc Furnace Area: Arsenic

AOPC 5 Southwest Compressor: Diesel, oil, cPAHs, and PCBs

AOPC 7 South Compressor: Oil

AOPC 8 Maintenance Shop Building: Oil and cPAHs

AOPC 9 Welding Station Building: Arsenic and chromium

AOPC 13 Foundry Waste Material: cPAHs

AOPC 14 North Compressor: Oil

Although the vertical extent of COCs was not defined at all locations, EPI determined the COCs were limited to a depth of 5 feet bsg or less based on the surficial nature of the releases. Selected soil data from the investigation activities are shown on Figure 3 of this report and selected groundwater data is shown on Figure 4. Soil sample laboratory analytical data are summarized in Tables 1 through 4. Concrete surface wipe sample laboratory data are summarized in Table 5. Groundwater sample laboratory analytical data are summarized in Tables 6 through 9. The COCs present in soil were attributed to historic site use as a foundry since the 1920's. The impacts to shallow soil were likely the cumulative result of various industrial operations. The PHC impacts were primarily attributed to leaking compressor equipment and drum storage.

During the investigations, hollow stem auger borings were advanced for the collection of groundwater samples. A total of nine groundwater samples were collected from AOPCs 1, 4, 5, 6, 7, 10, and 13. COPCs were not detected at concentrations exceeding the MTCA Method A CULs in any samples with the exception of cPAHs in sample ***SB-9:GW***, which was located within AOPC 1, the metal receiving area. The cPAH concentration in ***SB-9:GW*** (0.2134 parts per billion (ppb)) were attributed by EPI to high turbidity in the sample. Sample ***SB-10:GW*** was also located in AOPC 1 and cPAHs were an order of magnitude lower (0.02265 ppb). Based on the exceedance at boring SB-9, EPI subsequently directed the installation of groundwater monitoring well MW-1, approximately 15 feet to the east. Concentrations of cPAHs were significantly lower and below the CUL in sample ***MW-1:water*** (0.0453 ppb). Based on these results, it appears that groundwater containing concentrations exceeding the CULs may be the result of high turbidity in sample ***SB-9:GW***.

The exact location of the reported potential UST is not known, however, it appears that EPI soil samples ***APOC1-05*** and ***SB-9:5*** were collected in the vicinity of the UST (if present). Sample ***APOC1-05*** was collected from near surface soil, which contained PHCs most likely due to leaking equipment. Sample ***SB-9:5*** was collected from a depth of 5 feet bsg and no constituents were detected at regulatory concentrations in the sample. Groundwater sample ***SB-9:GW*** was also collected from the boring, which MSBA estimates is approximately 10 feet north of the potential UST location. As discussed above, regulatory concentrations of cPAHs were detected in the sample, however, EPI attributed the detections to turbidity.

In addition, on-site stormwater compliance, which EPI identified as REC 2 in the Phase I was retained for further evaluation since EPI was unable to confirm the configuration of the stormwater conveyance system or a precise discharge location. A groundwater sample (***SB-7:GW***) was collected at the approximate location of the stormwater retention area and no COCs were identified.

The adjacent Emerald site was identified by EPI as REC 3 in the Phase I. Based on soil and groundwater sampling completed near the adjacent site, EPI concluded there was no evidence contamination from the adjacent site has impacted the subject property. Therefore, EPI considered REC 3 resolved.

2.3 Excavation Cleanup Strategy - EPI

EPI prepared a proposal to complete excavation cleanup activities to remove COCs at the site for AOPCs 1, 2, 5, 7, 8, 9, 13, and 14. The anticipated excavation depths ranged from 3 to 5 feet bsg. EPI also proposed the collection of additional soil samples for waste profiling, confirmation sampling, and to document the cleanup.

3.0 INTERIM ACTION - 2018 EXCAVATION CLEANUP

The following presents a summary of excavation cleanup activities that were completed at the site as an interim action in 2018. A summary of the confirmation soil sampling and the analytical results is also presented.

3.1 Cleanup Strategy and Areas Excavated

Based on input from the property owner that the depths and areas were more limited than what was estimated by EPI, the proposed excavation areas and locations were modified. AOPCs 1, 5, and 7 were selected for excavation. AOPC 14 was also intended to be excavated but was excluded based on field observations, as discussed below. The remaining AOPCs were not excavated. The concrete at AOPC 8 and AOPC 9 was cleaned and resealed as part of the interim remedial action.

3.2 Excavation Cleanup and Concrete Cleaning/Resealing

In October and November 2018, Magna Construction Services, Inc. (Magna) completed excavation cleanup activities at AOPCs 1, 5, and 7. Associated Environmental Group, LLC (AEG), of Olympia, Washington, inspected the excavation areas when complete and collected confirmation soil samples. The excavated soil was temporarily stockpiled at the north end of the property, within AOPC 13 pending off-site disposal. The approximate excavation areas are illustrated on Figure 3 and

summarized below. The dimensions of the excavation areas, depths, and exact sample locations were not well documented and for the purpose of this report, are based on a review of photographs and a site plan map provided by AEG. In addition, a very limited level of confirmation was attained through a site visit by MSBA. The excavation areas will be verified during the proposed future site work using GPR and exploratory test pits. Following the cleanup activities, available documentation from Magna indicates that sand from on-site may have been used to backfill the excavation areas. The sand will be sampled and analyzed for COPCs during future site work to confirm the material was acceptable for re-use.

AOPC 1: Metal Receiving Area: The excavation area was approximately 800 sq. ft. and the estimated depths ranged from 1 to 1.5 feet bsg. MSBA estimates approximately 62 tons of soil were removed from this area (Figure 3).

AOPC 5: Southwest Compressor: The excavation area was approximately 1,580 sq. ft. and the estimated depths ranged from 1 to 3 feet bsg. MSBA estimates approximately 232 tons of soil were removed from this area (Figure 3).

AOPC 7: South Compressor: The excavation area was approximately 230 sq. ft. and the estimated depth was 1.5 feet bsg. MSBA estimates approximately 24 tons of soil were removed from this area (Figure 3).

In conjunction with the excavation cleanup activities, Magna removed overlying sediment/dirt from the surface of the concrete at areas AOPC 8 (Maintenance Shop Building) and AOPC 9 (Welding Station Building)(Figure 3). The sediment/dirt removed during the concrete cleaning was added to the stockpile for subsequent off-site disposal. After cleaning the surface of the concrete at these locations it was reportedly sealed.

The modified cleanup plan included excavation of soil surrounding the north compressor (AOPC 14) at the general location of EPI sample ***AOPC14-01***. However, based on field observations at the time, AEG concluded it did not appear that excavation was warranted. AEG collected a soil sample from the area also named ***AOPC14-01*** to verify that COPCs were not present.

3.3 Confirmation Soil Sampling and Results

In October 29 and November 14, 2018, AEG collected confirmation soil samples from the bottom of the three excavation cleanup areas, AOPCs 1, 5, and 7. In addition, AEG collected a sample from area AOPC 14 (north compressor). AEG collected a total of fourteen soil samples (twelve confirmation samples and two stockpile samples). Several of the samples had identical or similar names to some of the previous EPI samples, however, the sample locations did not directly correlate. Based on the available documentation, MSBA estimated the excavation and confirmation sample locations as accurately as possible. The approximate sample locations as estimated by MSBA and selected analytical results are illustrated on Figure 3. The samples were submitted to Pace Analytical, of Mount Juliet Tennessee (Pace) for laboratory analysis. The selected laboratory analyses were based on the COPCs for each AOPC, as determined by EPI during previous investigations.

AOPC 1 Metal Receiving Area: Five soil samples were collected from the bottom of the excavation within this area at estimated depths ranging from 1 to 1.5 feet bsg. The samples were labeled ***AOPC1-1***, ***AOPC1-2***, ***AOPC1-3***, ***AOPC1-4***, and ***AOPC1-5***. The samples were analyzed for gasoline, diesel, oil, VOCs, PAHs, PCBs, and RCRA 8 metals. Sample ***AOPC1-2*** was analyzed for hexavalent chromium in addition to total chromium. Hexavalent chromium was detected in sample ***AOPC1-2*** at a concentration just slightly above the Method A CULs (19.2 parts per million (ppm) versus the 19.0 ppm CUL) (Table 3). The remaining analytes were below the Method A CULs (Tables 1-4).

AOPC 5 Southwest Compressor: Four soil samples were collected from the bottom of the excavation within this area at estimated depths ranging from 2 to 3 feet bsg. The samples were labeled ***AOPC5-1***, ***AOPC5-2***, ***AOPC5-3***, and ***AOPC5-4***. The samples were analyzed for diesel, oil, VOCs, and PCBs. Tetrachloroethylene (PCE) was detected in sample ***AOPC5-3*** at a concentration above the Method A CULs (0.091 ppm versus the 0.05 ppm CUL)(Table 1). Oil was detected in sample ***AOPC-5-4*** at a concentration above the Method A CUL (5,460 ppm compared to the 2,000 ppm CUL)(Table 1). The remaining analytes were below the Method A CULs (Tables 1 and 4).

AOPC 7 South Compressor: Two soil samples were collected from the bottom of the excavation within this area at an estimated depth of 1.5 feet bsg. The samples were labeled ***AOPC7-1*** and ***AOPC7-2***. The samples were analyzed for diesel, oil, and PCBs. All analytes were below the Method A CULs (Tables 1 and 4).

AOPC 14 North Compressor: The modified plan included removal of soil at AOPC 14. However, AEG and Magna were unable to visibly locate any soil that appeared to require removal based on field observations. AEG collected sample ***AOPC14-1*** from this location to document the absence of PHCs. The sample was analyzed for diesel, oil, and PCBs. All analytes were below the Method A CULs (Tables 1 and 4).

Stockpile: Two composite samples were collected from the stockpile for landfill disposal authorization. The samples were labeled ***Stockpile-1*** and ***Stockpile-2***. The samples were analyzed gasoline, diesel, oil, VOCs, PAHs, PCBs, and RCRA 8 metals. Both samples were analyzed for hexavalent chromium in addition to total chromium. Carcinogenic PAHs were not detected in either stockpile sample, however, the reporting limits were elevated and exceeded the Method A CUL (Table 2). The remaining analytes were below the Method A CULs (Tables 1-4). Based on a review of the available documentation provided by Magna, approximately 317.58 tons of soil were disposed at the Wasco County Landfill in The Dalles, Oregon. The soil was disposed under special waste profile number 2042-18-204.

3.4 AEG Confirmation Sampling Report and Corrections

Following the sampling activities, AEG prepared a brief letter report summarizing the results. The report was titled *Summary of Selected Confirmational Soil Sampling*, dated December 5, 2018. The report stated that the analytical results indicated no COCs were present at concentrations above the MTCA CULs. MSBA reviewed the report in August 2019 on behalf of NSC and determined that the three confirmation soil samples (***AOPC1-2***, ***AOPC5-3***, and ***AOPC5-4***) did have results exceeding the CULs. MSBA discussed this discrepancy with AEG in a phone call and an email. AEG corrected the errors in the photo log and sample area map from the report and provided MSBA with revised copies. AEG also provided a missing lab report that had been mistakenly omitted from the original summary report. AEG confirmed that no additional information was available including field measurements of the excavation areas, depths, and sample locations. An electronic copy of the corrected version of the AEG report is presented in Appendix A. Supplemental soil disposal documentation is also included in Appendix A.

4.0 APPLICABLE CLEANUP LEVELS

MTCA Cleanup Regulations under Washington Administrative Code (WAC) 173-340 establish CULs that are protective of human health and safety and the environment. Various protective CULs for Methods A, B, and C have been established under MTCA based on the land use, constituents present, and concentrations. Method A and Method B CULs are for unrestricted land use and may be utilized at any residential or commercial site based on site conditions and circumstances. Method A CULs are protective of human health and safety and designed for cleanups that are relatively straight forward or involve few chemicals. Method A CULs were developed using the procedures in Method B and are considered protective of human health and safety for all exposure pathways. Method B CULs are divided into two tiers - standard and modified. Standard Method B CULs are derived using a set of defined generic assumptions. Modified Method B CULs utilize site and chemical specific information to modify default assumptions and calculate site-specific CULs.

Method C is a conditional method similar to Method B, in that it is also divided into two tiers - standard and modified. However, Method C CULs are intended exclusively for industrial use properties and are based on less stringent exposure parameters and lifetime cancer risks.

MSBA evaluated the zoning to determine if the site qualifies for use of Method C CULs. Based on the industrial zoning and the current and historic industrial use of the site and surrounding area, MSBA proposed the use of Method C CULs during phone conversations with the Washington State Department of Ecology (Ecology). However, due to the recent adjacent residential land use to the east (Lincoln Place Apartments), Ecology determined that the use of industrial CULs would not meet the requirements as presented in WAC 173-340-745(1)(a). Therefore, the applicable CULs for the site will be limited to MCTA Method A and Method B Standard CULs for unrestricted land uses. The Method A CULs will be used for most constituents and are listed at the bottom of each data table. The Method B Standard CULs will be used for cPAHs, as discussed below.

MSBA plans to evaluate cPAHs using Toxicity Equivalent Factors (TEFs) as presented in the Ecology *Implementation Memorandum #10*, dated April 20, 2015. The TEFs are used to evaluate the toxicity of a mixture of structurally similar chemicals. The individual concentrations of the cPAHs in the mixture are converted to equivalent concentrations of the reference chemical, benzo(a)pyrene. The equivalent concentrations are then used to determine the total toxicity equivalent concentration (TEQ) of the cPAH mixture. The total TEQ for the cPAH mixture is then compared to the MTCA Method B CUL of 0.19 ppm to determine if the sample is in regulatory compliance. The MTCA Method B CUL was presented in the May 2019 Ecology update titled *Polycyclic Aromatic Hydrocarbons and Benzo[a]pyrene: Changes to MTCA Default Cleanup Levels for 2017 (May 2019 Final).* A total TEQ of equal to or less than 0.19 ppm is considered acceptable.

5.0 REGULATORY STATUS

The following section presents an overview of the current regulatory status of the site based on the sampling and interim excavation cleanup activities summarized in Sections 2.0 and 3.0

5.1 Soil

Soil samples have been collected from areas throughout the site as summarized in Sections 2.0 and 3.0. Residual areas containing COCs are limited to AOPCs 1, 2, 5, 8, 9, and 14. AOPC 5 and AOPC 13 contain cPAHs at concentrations exceeding the Method A CUL of 0.1 ppm, however, they are below the Method B CUL of 0.19 ppm and therefore not considered regulatory exceedances. As a result of the excavation cleanup and confirmation sampling, some new COCs were documented and some previous COCs were removed. Following the interim excavation cleanup activities in 2018, the residual COCs for each AOPC are:

AOPC 1 Metal Receiving Area: Diesel, oil, cPAHs, arsenic, cadmium, lead, hexavalent chromium, and PCBs

AOPC 2 Electronic Arc Furnace Area: Arsenic

AOPC 5 Southwest Compressor: Oil and PCE

AOPC 8 Maintenance Shop Building: Oil and cPAHs

AOPC 9 Welding Station Building: Arsenic and total chromium (all exceedances are beneath building)

AOPC 14 North Compressor: Oil

Residual COCs in samples ***HA-1:1.0*** (AOPC 8), ***AOPC9-02*** (AOPC 9), and ***AOPC9-03*** (AOPC 9) are present beneath buildings and/or concrete, significantly reducing the potential risk to receptors. The inferred extent of residual soil exceeding the CULs at these locations is shown on Figure 5. The anticipated maximum depth of COCs in soil is 5 feet bsg. Although the vertical extent has not yet been fully defined at all locations, based on the nature of surface releases and delineation at nearby sample locations, the estimated depths are considered reliable. Additional site work will include the collection of confirmation soil samples to verify any estimated depths.

5.2 Groundwater

Groundwater has been encountered at the site during previous investigations at depths ranging from 34.5 feet bsg to 54 feet bsg. A total of nine groundwater samples have been collected by EPI from AOPCs 1, 4, 5, 6, 7, 10, and 13. COPCs were not detected at concentrations exceeding the MTCA Method A CULs in any samples with the exception of cPAHs in sample ***SB-9:GW***, which was located within AOPC 1, the metal receiving area. The cPAH concentration in ***SB-9:GW*** (0.2134 ppb) was attributed by EPI to high turbidity in the sample. Concentrations of cPAHs were significantly lower and below the CUL in the subsequent monitoring well sample ***MW-1:water*** (0.0453 ppb). Based on these results, it appears that groundwater containing concentrations exceeding the CULs may be the result of high turbidity in sample ***SB-9:GW***.

6.0 SITE CSM INVESTIGATION WORK

The following presents a summary of site information assembled to prepare a site-specific CSM.

6.1 Surface Water Assessment

MSBA performed a surface water assessment by reviewing the United States Geologic Survey (USGS) 7.5-minute series, Tacoma South, Oregon Topographic Quadrangle Map (Figure 1) and the U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory. The closest body of surface water is the Columbia River, the nearest point being approximately 1,500 feet southwest of the site (Figure 1). The USFWS National Wetland Inventory does not list any wetlands within a mile of the site, with the exception of the Columbia River, a riverine wetland.

6.2 Beneficial Groundwater Use Evaluation

The following presents a summary of beneficial water uses in the vicinity of the site. The evaluation included a review of well logs in the area as well as municipal water sources.

6.2.1 Water Resources Program Database Review

MSBA completed a review of well logs listed with the Ecology Water Resources Program (WRP) database to identify any potential drinking or irrigation wells within a one-half mile radius of the site. The review did not include monitoring wells or geotechnical holes. The search results listed one

well log potentially within the search radius (Well Report ID 237775). A printout of the search results and copy of the well log are included in Appendix B. The well log represents three water wells installed in 1947, 1948, and 1957 for the Columbia River Paper Mill. An address for the wells is not listed, however, they were likely installed at the historic paper mill property last operated by Boise Cascade, located along the Columbia River just west of the Interstate 5 bridge. This area is approximately 1,750 feet south of the site at it's nearest point. All mill structures were removed and the area was recently developed to include a waterfront park, offices, retail stores and restaurants, hotels, and condominiums. It is highly unlikely that the water wells were maintained during the significant development activities. MSBA reached out to the developer to confirm that the water wells are no longer in use, however, they have not yet responded. Based on the unlikeliness that the wells remain in use, distance from the site, and the on-site groundwater sample results, the historic water wells (if present) are not a concern with respect to the site.

6.2.2 City of Vancouver Municipal Water Supply

MSBA reviewed the City of Vancouver *2019 Water Quality Report* (the most recent available report) and spoke with Mr. Tyler Clary, Water Engineering Program Manager for the City of Vancouver on January 7, 2021, to evaluate the source of municipal water service supplied to the site and surrounding properties. Municipal water is supplied by a network of approximately 40 water wells, which pump water from three aquifers: the Orchards, Troutdale, and Sand-and-Gravel aquifers. The nearest water well is approximately 1.5 miles north (upgradient) of the site and there are no downgradient water wells. MSBA also reviewed the Vancouver Water Stations and Wellhead Protection Areas map and determined the site is at least 1 mile outside of any water well protection buffer or special wellhead protection areas. The site is within the critical aquifer recharge area, which includes the entire Vancouver city limit. A copy of the well protection areas map is included in Appendix B. Based on the distances and locations of the municipal water wells with respect to the groundwater flow direction, it appears there are no municipal wells of concern with respect to the site.

6.3 Land Use Zoning

The zoning for the site, as well as properties to the south and west is Industrial, consistent with the current land uses. Properties to the east (across Lincoln Ave) and north (across Mill Plain Blvd) of the site are zoned Commercial and Mixed Use, also consistent with the current land uses. A copy of the City of Vancouver zoning map for this area is included in Appendix B. On December 4, 2020, MSBA contacted Sandy Wozny, Associate Planner with the City of Vancouver to confirm the zoning at and near the site and verified that there are no proposals or pending changes to the land use and zoning for properties in this area.

7.0 CONCEPTUAL SITE MODEL AND EXPOSURE PATHWAY EVALUATION

A CSM is prepared to evaluate the three primary elements of a site assessment that include sources, receptors, and pathways. Together, these three elements could potentially cause a risk to human health and safety. If any one of these three elements are absent, incomplete, or not applicable, there is no potential risk to human health and safety. A general explanation of the three primary elements of a CSM is presented below:

1) **Sources** - represent the constituents and the media (soil, groundwater, and air) in which the constituents may be present. The constituents are independently evaluated as COPCs within each media they are present.

2) **Receptors** - include the representative segments of the human population (residents, occupational workers, construction workers, and excavation workers) that occupy or work in the vicinity of the site based on zoning, current and permitted land uses, and potential likely future uses of the property.

3) **Pathways** - represent the potential mechanisms of transport and routes of exposure (i.e. inhalation, ingestion, and dermal contact) that may provide a means of contact between the sources and the receptors.

The three primary elements of a CSM are discussed in greater detail in the following sections.

7.1 SOURCES - Constituents/Media and COC Evaluation

As discussed in Section 2.2, the majority of the constituents detected at the site are the result of various industrial operations, leaking compressor equipment, and drum storage. Industrial operations often result in multiple irregular point sources originating at or very near the surface. Therefore, the depth of COCs appears to be limited to approximately 5 feet bsg based on the nature of the releases, observations, and investigations. Additional site work will include the collection of confirmation soil samples to verify any estimated depths. COPCs at the site consist of any constituents detected in previous investigations and include gasoline, diesel, oil, VOCs, PAHs, RCRA 8 metals, and PCBs. A list of all COPCs/COCs and the maximum detected concentrations (MDCs) representative of remaining soil are presented in Table 10.

The MDCs listed on Table 10 were evaluated with respect to the applicable CULs, based on the following criteria, to determine whether individual COPCs should be further evaluated for risk as COCs:

- Individual COPCs will not be further evaluated as COCs if they are: 1) detected at a concentration below the respective CUL; 2) not detected and the laboratory reporting limit (RL), which was raised due to dilution required for analysis, is below the respective CULs; or, 3) not detected and the commonly achievable RL, which was not raised by sample dilution required for analysis, exceeds the respective CULs.

- Individual COPCs will be further evaluated as COCs if they are: 1) detected at a concentration exceeding the respective CUL; or 2) not detected and the RL, which was raised by sample dilution required for analysis, exceeds the CUL.

7.1.1 COC Evaluation - Soil

COPCs in the soil were assessed for further evaluation as COCs by comparing the MDCs to the CULs based on the criteria presented above (Section 7.1). Soil data representing remaining soil was used for this evaluation. Soil data is summarized on Tables 1 through 4 and selected results are illustrated on Figure 3. The following constituents in soil will be retained for further evaluation as COCs:

- Diesel
- Oil
- PCE
- cPAHs
- Arsenic
- Cadmium
- Total chromium
- Hexavalent chromium
- Lead

7.1.2 COC Evaluation - Groundwater

COPCs in the groundwater were assessed for further evaluation as COCs by comparing the MDCs to the screening levels based on the criteria presented above (Section 7.1). All groundwater data collected at the site were used for this evaluation. Groundwater data is summarized on Tables 6 through 9 and selected results are illustrated on Figure 4. As summarized in Section 5.2, COPCs were not detected at concentrations exceeding the MTCA Method A CULs in any samples with the exception of cPAHs in ***SB-9:GW***, which was located within AOPC 1, the metal receiving area. EPI attributed the cPAH concentration in ***SB-9:GW*** (0.2134 ppb) to high turbidity in the sample. Concentrations of cPAHs were significantly lower and below the CUL in the subsequent monitoring well sample ***MW-1:water*** (0.0453 ppb). Based on these results, it appears that groundwater containing concentrations exceeding the CULs may be the result of high turbidity in sample ***SB-9:GW***. An additional groundwater sample will be collected from monitoring well MW-1 during future site work to verify the absence of COCs in groundwater. No COPCs will be retained for further evaluation as COCs in groundwater.

7.2 RECEPTORS - Potential Receptor Evaluation

The potential receptors (residents, occupational workers, construction workers, and excavation workers) were evaluated by assessing the current and future land use and zoning (Section 6.3) and the potential future land use. The site has reportedly been operated as a foundry since the 1920s and based on the surrounding area it will most likely remain industrial in the foreseeable future. Although apartments are located east to the site across Lincoln Ave, the facility is enclosed within security fencing and the nearby receptors will not be in contact with residual COCs on-site. Therefore, based on the above site conditions, potential receptors are identified as industrial workers, construction workers, and excavation workers. However, since unrestricted CULs are being utilized, future remedial action will also be protective of residents. Ecological receptors will also be retained for further evaluation.

7.3 PATHWAYS - Potential Exposure Pathway Evaluation and Risk Determination

The primary potential exposure pathways at the site consist of the following:

- **Dermal Contact and Ingestion**: Dermal contact and/or ingestion of COCs in soil.
- **Vapor Inhalation**: Volatilization of COCs in soil into air and subsequent inhalation.
- **Ecological Risk**: Dermal contact and ingestion of COCs in soil by ecological receptors.

The potential exposure pathways were selected and evaluated with respect to the COCs and the receptors to determine the potential for risk to human health and safety. An exposure pathway is considered "complete" when site information indicates that a receptor could potentially contact a COC. A potential exposure pathway is considered "incomplete" when site data and information indicates that a potential receptor will not contact a COC. If a potential exposure pathway is considered complete, it is selected and further evaluated for potential risk.

MSBA determined that based on the absence of COCs in groundwater and the depth to groundwater, the Leaching to Groundwater and Ingestion and Inhalation of Groundwater exposure pathways are incomplete and do not require further evaluation. In addition, since the nearest body of surface water is approximately 1,500 feet away, raised railroad beds/tracks are located between the two, and stormwater is contained on-site, the Soil Runoff to Surface Water exposure pathway is also incomplete.

The following presents a preliminary evaluation of the remaining exposure pathways.

7.3.1 Dermal Contact and Ingestion

Elevated concentrations of COCs could potentially cause an unacceptable risk to human health if on-site soil is in contact with skin or ingested. Therefore, based on current site data and conditions, the potential Dermal Contact and Ingestion exposure pathway will require further evaluation and/or corrective action.

7.3.2 Vapor Inhalation

Elevated concentrations of COCs in soil could potentially cause an unacceptable risk to on-site receptors if the constituents volatilize into air and are subsequently inhaled. This exposure pathway is typically a concern with respect to gasoline and VOCs, especially if present under buildings. With the exception of the PCE detection in sample ***AOPC5-3***, VOCs were typically not detected at the site. However, since VOCs were not analyzed in sample ***AOPC1-05***, in which relatively high diesel and oil concentrations were detected, the Vapor Inhalation exposure pathway will require further evaluation and/or corrective action.

7.3.3 Ecological Risk

MTCA WAC 173-340-7490 establishes terrestrial ecological evaluation procedures. MSBA completed the MTCA Simplified Terrestrial Ecological Evaluation - Exposure Analysis Procedure and determined that at this time, the site does not qualify for an outright exclusion from an ecological evaluation using WAC 173-340-7491.

As established by WAC 173-340-7492(2)(b), the terrestrial ecological evaluation may be terminated if the there are no potential exposure pathways to soil biota, plants, or wildlife. The evaluation may also be terminated if residual COCs are present at concentrations that do not exceed the screening values provided in MTCA Table 749-2 (Appendix B). At this time, several COCs are present in soil at concentrations exceeding the applicable screening values for unrestricted land use. Following additional remedial actions, MSBA anticipates that residual concentrations in soil will be below the applicable screening values and/or under buildings or capped. Therefore, although a potential risk may be present at this time, additional remedial actions are expected to eliminate future potential risk to soil biota, plants, and wildlife.

8.0 EVALUATION OF POTENTIAL REMEDIAL OPTIONS

The CSM indicates that the Dermal Contact and Ingestion, Vapor Inhalation, and Ecological Risk pathways could potentially cause an unacceptable risk to human health and safety and the environment. MSBA assessed the feasibility of three cleanup options necessary to assure the protectiveness of the potential receptors.

8.1 Remedial Options

The following presents a summary of three remedial options that were selected for further evaluation.

Option 1: Targeted Soil Removal and Capping: This option consists of removing readily accessible soil containing COCs and capping or maintaining existing caps with respect to COCs under the welding station building (AOPC 9), concrete north of the maintenance shop (AOPC 8), and potentially the footings for the AOPC 1 baghouse filtration system (AOPC1 baghouse) (Figure 2). This option is favorable due to the following: 1) not removing soil beneath the welding station building will allow the facility to continue to operate during the remedial action, 2) groundwater is relatively deep and has not been impacted, 3) total costs associated with this option appear to be lower than complete removal, 4) the areas requiring capping are relatively small in area and volume, and 5) soil removal activities were initiated in 2018 and the remaining soil containing accessible COCs is relatively limited.

Option 2: Complete Soil Removal: This option consists of removing all soil containing COCs and would require removal of soil beneath the welding station building (AOPC 9), a portion of concrete in AOPC 8, and potentially the removal of semi-permanent features such as the AOPC 1 baghouse. COCs may not be able to be removed without jeopardizing the structural integrity of the welding station building, maintenance building, or the AOPC 1 baghouse footings. This option would also likely require temporary closure of all or part of the facility, resulting in lost revenue. In addition, this option would be prohibitively expensive. Therefore, based on the structural concerns and anticipated costs associated with this option, it is considered less favorable.

Option 3: Capping: This option consists of using asphalt and/or concrete to cap soil containing COCs and implementing institutional controls to limit groundwater use and the disturbance of soil. As part of the cap, the surface would be contoured for drainage which would require an engineered grading and storm drain utility plan with permitting and approvals and may not be feasible without significant additional infrastructure. Some soil removal would like be necessary for grading. In addition, this option is considered less permanent, would likely require long term groundwater monitoring, and costs associated with cap maintenance and unforseen complications. As a result, the uncertainties, limitations, and restrictions render this option less favorable and subject to unreliable cost projections.

8.2 Evaluation of Remedial Options

In general accordance with MTCA cleanup requirements listed in WAC 173-340-360(2), a remedial action must:

- Protect human health and the environment
- Comply with cleanup standards

- Comply with applicable state and federal laws
- Provide for compliance monitoring
- Provide a reasonable restoration time frame
- Use permanent solutions to the maximum extent practicable
- Consider public concerns

MSBA determined that all three remedial options met the minimum requirements above. MSBA ranked each of the remedial options based on these criteria in Table 11. Remedial Option 1, Targeted Soil Removal and Capping, ranked the highest of the three options, followed by Remedial Option 2, Complete Soil Removal. The rankings for Remedial Options 1 and 2 were similar, however, Option 1 ranked slightly higher since it would provides a more reasonable restoration time frame, as it would not require removal of soil beneath buildings or concrete. In addition, MSBA anticipates Option 2 would rank lower in consideration of public concerns since the additional time and construction activities associated with complete soil removal would likely have more impact on neighboring properties.

8.3 Disproportionate Cost Analysis

MSBA completed a disproportionate cost analysis for the three remedial options. In general accordance with MTCA requirements in WAC 173-340-360(3)(f), each remedial option should be evaluated based on the costs and benefits with respect to the following criteria:

- Protectiveness
- Permanence
- Cost
- Effectiveness over the long-term
- Management of short-term risks
- Technical and administrative implementability
- Consider public concerns

MSBA ranked each of the remedial options based on the above criteria in Table 12. Remedial option 1, Targeted Soil Removal and Capping, ranked the highest of the three options. Although Remedial Option 2, Complete Soil Removal, ranked highest in terms of protectiveness and permanence, the option has significantly higher remedial costs. The cost difference is primarily due to removal of soil beneath the welding station building (AOPC 9), concrete (AOPC 8), and potentially the baghouse footings (AOPC 1). In addition, the facility would could not continue operating during portions of the cleanup, resulting in a loss of revenue. Option 2 also ranked lower based on management of short-term risks due to the longer duration of the work and exposure to additional COCs while demolishing existing concrete. In addition, as discussed in Section 8.2, MSBA anticipates that Option 2 would rank lower in consideration of public concerns since the additional time and construction activities associated with complete soil removal would likely have more impact on neighboring properties.

9.0 RECOMMENDED REMEDIAL ACTIONS

Based on the evaluation of remedial options (Section 8.2) and disproportionate cost analysis (Section 8.3), MSBA determined that Remedial Option 1, Targeted Soil Removal and Capping, is most appropriate for this site. Remedial Option 1 eliminates risk to human health and safety and the environment and is a more feasible and cost effective option. The following presents a summary of the proposed remedial actions and associated sampling activities. The proposed activities will be performed in general accordance with the MSBA Field Methods and Procedures, presented in Appendix C.

9.1 Targeted Soil Removal

Soil removal activities will be performed to address soil containing concentrations of the identified COCs to levels below the CULs proposed in Section 4.0. The majority of the cleanup will consist of removing the upper 1 to 3 feet of soil from the surface. Soil removal activities will be completed at AOPCs 1, 2, 5, 8, and 14. Portions of the soil removal within AOPC 1 may require the use of a vacuum truck or air knife to avoid damage to infrastructure. The remaining soil removal will be completed using standard excavation equipment. The proposed removal areas are illustrated on Figure 5. Existing and additional laboratory data, as well as field screening using a photo-ionization detector (PID) and visual observations will be utilized to identify any potential areas that may require additional excavation. Removal activities will continue until observations, field screening, and confirmatory analyses verify that target CULs have been met. MSBA anticipates approximately 200 cubic yards of soil will require removal and off-site disposal.

During the additional excavation and sampling activities, MSBA will investigate the reported potential UST and it may be decommissioned, if present. MSBA will further evaluate the stormwater conveyance system layout and piping using a GPR survey. Additional soil samples will be collected in the vicinity of the UST (if present) and stormwater conveyance system as warranted based on the findings.

To ensure that dust from the soil removal does not affect nearby properties or on-site workers, water may be applied to the work area if needed. Excavation and sampling equipment will be decontaminated prior to leaving the site. Personnel entering the site will be required to use Level D personal protective equipment. Personnel will also use disposable Tyvek boot coverings or will manually clean boots at a designated decontamination area prior to leaving each individual cleanup area.

To ensure the health and safety of MSBA and it's agents and/or subcontractors during the proposed cleanup activities, MSBA has prepared a draft Specific Health and Safety Plan (SHASP). The SHASP was prepared in general accordance with Hazardous Waste Operations and Emergency Response (HAZWOPER) 29 CFR 1910.120 and Ecology Hazardous Waste Operations WAC Chapter 296-843. The SHASP provides an overview of potential site hazards, personal protective equipment, decontamination procedures, and contingency plans. A copy of the draft SHASP has been included in Appendix D.

9.2 Soil Disposal and Stockpiling

Soil removed from the excavation may be transported directly to an approved landfill or stockpiled on-site for subsequent disposal. The stockpile will be lined with 6 millimeter (mm) or thicker plastic sheeting to prevent potential vertical migration of constituents into underlying soil or asphalt. The stockpile will also be bermed and covered with plastic sheeting if precipitation is more than 20 percent likely to prevent rain and/or surface water incursion. The stockpile will be located within an area that is enclosed within security fencing and will not be accessible to the public.

MSBA anticipates that the excavated soil will be disposed at the Wasco County Landfill. An alternative approved landfill may also be selected. Based on current analytical data, soil at the site is considered non-hazardous waste in accordance with RCRA program regulations. If additional sample data indicates that areas of hazardous waste are present, soil will be disposed at the Chemical Waste Management, Northwest Landfill (NL) in Arlington, Oregon, as warranted.

9.3 Confirmation and Supplemental Sampling

In conjunction with the remedial activities, a groundwater sample will be collected from monitoring well MW-1 to confirm the absence of cPAHs in groundwater. The groundwater sample will be collected using a peristaltic pump and low-flow sampling techniques to minimize turbidity. The groundwater sample will be submitted for laboratory analysis of PAHs using method 8270C SIM.

During and following the completion of soil excavation removal activities, confirmation soil samples will be collected and submitted for laboratory analysis of COCs to verify that the remaining soil meets the target CULs. Additional supplemental soil samples will also be collected to further define the extent of COCs in soil. The anticipated approximate soil sample locations and depths are shown on Figure 5. Field screening and previous analytical data results will also be utilized in selecting confirmation soil sample locations. MSBA anticipates that a minimum of 20 soil samples will be necessary to verify that remaining soil meets the target CULs.

Soil samples selected for laboratory analysis will be submitted to Pace. The samples will be delivered to the laboratory under chain of custody protocol. Analytes will be selected based on the COCs identified for each area during previous sampling activities (see Sections 2.0 and 3.0). The anticipated analyses include the following:

- Diesel and Oil-Range Organics - Method NWTPH-Dx
- VOCs - Method 8260B
- PAHs - Method 8270C SIM
- Arsenic, Cadmium, Chromium, Lead - Methods 6020 - Total; Toxicity Characteristic Leaching Procedure (TCLP) (as needed for disposal authorization)
- Hexavalent Chromium - Method 3060A/7196A

Additional analyses may be added based on landfill disposal requirements and/or field observations. MSBA has verified that laboratory RLs for COCs using the above methods will be below the target CULs. A sampling and analysis plan presenting data quality objectives and laboratory RLs is presented as Appendix E.

9.4 Backfill and Site Restoration

Following cleanup and confirmation soil sampling activities, the site will be backfilled with clean imported soil and/or gravel and compacted. Soil beneath the stockpile(s) will also be tested to confirm compliance.

9.5 Remaining COCs and Capping

Soil containing regulatory concentrations of oil is present beneath the covered concrete patio at the north end of the maintenance shop building, within AOPC 8. The COCs in soil have an estimated area of 64 sq. ft. (Figure 5). MSBA anticipates that the depth of the COCs beneath the building is limited to approximately 2 feet, however, an additional sample(s) will be collected at former sample location ***HA-1:1.0*** to define the vertical extent (Figure 5).

Soil containing regulatory concentrations of chromium and arsenic is present beneath a portion of the concrete floor of the welding station building, within AOPC 9. The COCs in soil have an estimated area of 525 sq. ft. (Figure 5). MSBA anticipates that the depth of the COCs beneath the building is limited to approximately 2 feet, however, an additional sample(s) will be collected at former sample location ***AOPC9-03*** to define the vertical extent (Figure 5).

MSBA plans to remove soil around the footing of the AOPC 1 baghouse, however, all soil containing regulatory concentrations of arsenic, chromium, and lead may not be accessible. In the event that residual COCs are present in soil surrounding the baghouse footings, a 4 inch thick concrete cap will be constructed over the area(s). Following the cleanup activities, MSBA anticipates that the residual COCs and maximum concentrations will be limited to:

AOPC 8: Maintenance Shop Building: Oil (***HA-1:1.0*** = 8,500 ppm)

AOPC 9: Welding Station Building: Arsenic (***AOPC9-02*** = 26.1 ppm), total chromium (***AOPC9-03*** = 2,880 ppm)

In the event that all soil containing COCs cannot be removed surrounding the AOPC 1 baghouse footings, the remaining COCs may also include:

AOPC 1: Metal Receiving Area: Arsenic (***AOPC1-01*** = 63.1 ppm), cadmium (***AOPC1-01*** = 23.9 ppm), and lead (***AOPC1-01*** = 1,350 ppm)

If future construction or development activities render the soil beneath the proposed caps accessible, it will be excavated and removed. The requirements associated with future removal activities will be detailed in the environmental covenant that will be implemented with the no further action determination.

9.6 Scheduling

MSBA would like to initiate the proposed remedial activities as soon as possible following Ecology approval. The work is anticipated to be completed in spring or early summer 2021. Ecology will be notified if site conditions warrant any significant deviations from the proposed work.

10.0 SUMMARY AND CLOSING

Soil sampling investigation activities performed at the site revealed that COCs are present in shallow soil and appear to be the result of incidental surface releases. The depth to groundwater at the site ranged from 34.5 to 54 feet bsg. Based on sampling completed by EPI, it doesn't appear that regulatory concentrations of COCs are present in groundwater at the site.

Interim excavation cleanup activities were completed by AEG/Magna in 2018 at AOPCs 1, 5, and 7. Concrete at AOPCs 8 and 9 was also cleaned and resealed as part of the remedial action. Based on a review of the site data and the use of MTCA B CULs for PAHs, MSBA determined that residual COCs are limited to AOPCs 1, 2, 5, 8, 9, and 14.

MSBA evaluated three remedial options and selected Option 1, Targeted Soil Removal and Capping. The proposed remedial activities will be completed following Ecology approval of this report. Following the proposed corrective action activities, MSBA will prepare a report summarizing the remedial activities and include an evaluation of the post cleanup regulatory status of the site. Based on favorable results, the report will also include a recommendation for a no further action determination.

11.0 REMARKS AND SIGNATURES

The information/conclusions/recommendations/proposals contained in this report were arrived at in accordance with currently accepted professional geological and environmental practices at this time and location. No warranties are expressed or implied. This report was prepared solely for NSC. MSBA is not responsible for the independent conclusions or actions of others derived from the information presented herein.

Information and opinions presented in this report are based on the collection and review of data from limited portions of the site subsurface. MSBA is not responsible for conditions that may exist in portions of the site that were not investigated; for conditions that were not reported or properly presented to MSBA; and for future activities or investigations that may alter the current condition or understanding of the site.

Prepared By:
Martin S. Burck Associates, Inc.

_____ /

Josh Owen Date
Project Manager

Reviewed by:

_____ /

Martin S. Burck, LG/RG Date
Licensed/Registered Geologist; OR, WA, CA

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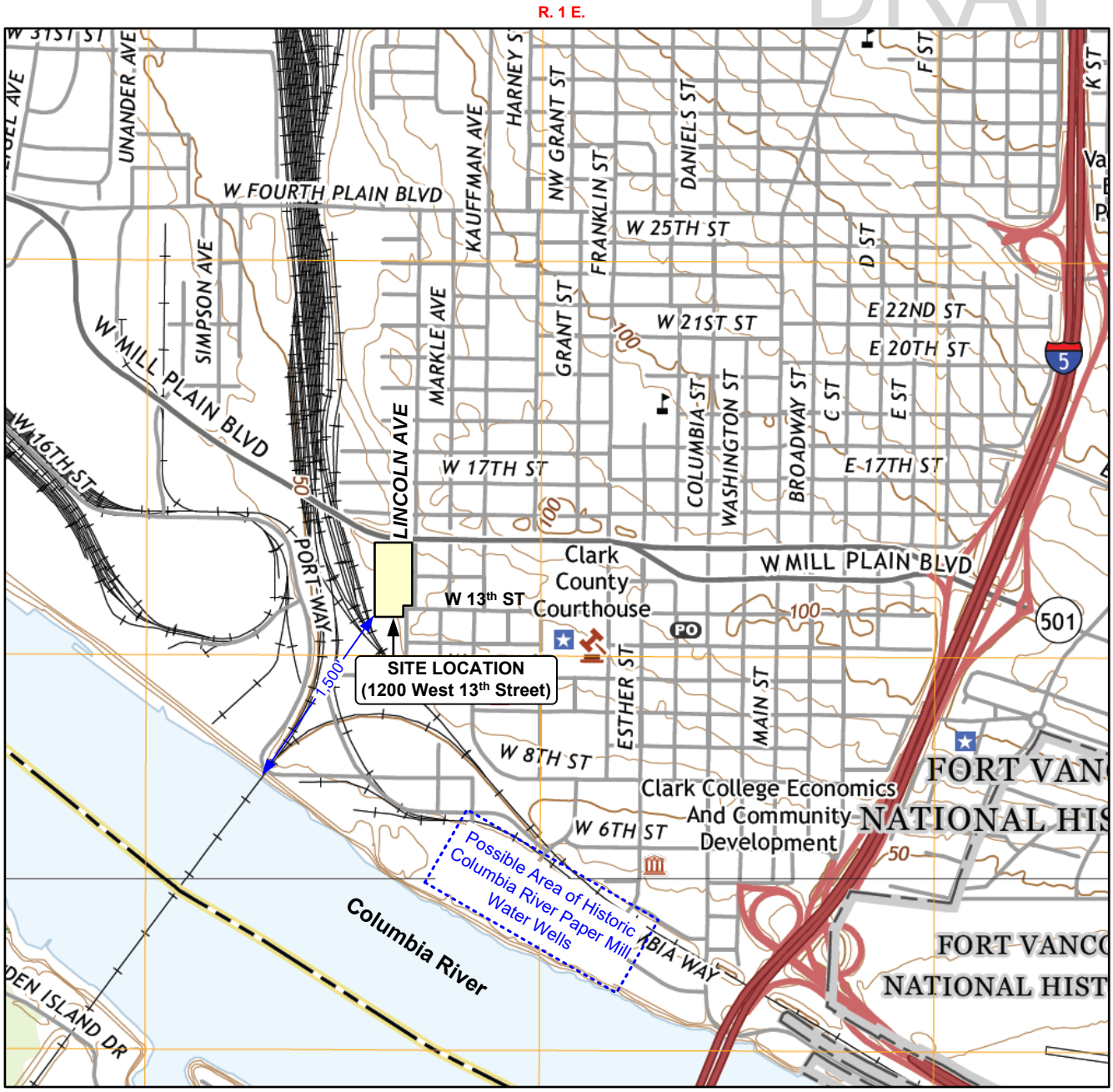
Figures



Adapted from: VANCOUVER and PORTLAND QUADRANGLES
7.5 Minute Series, Contour Interval 10 feet
USGS Topographic Maps, 2020
North American Vertical Datum of 1988
Revised: 2/18/2021 2:09 PM

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0 0.25 0.5
Approximate Scale (miles)

NORTH

FIGURE 1

SITE LOCATION MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

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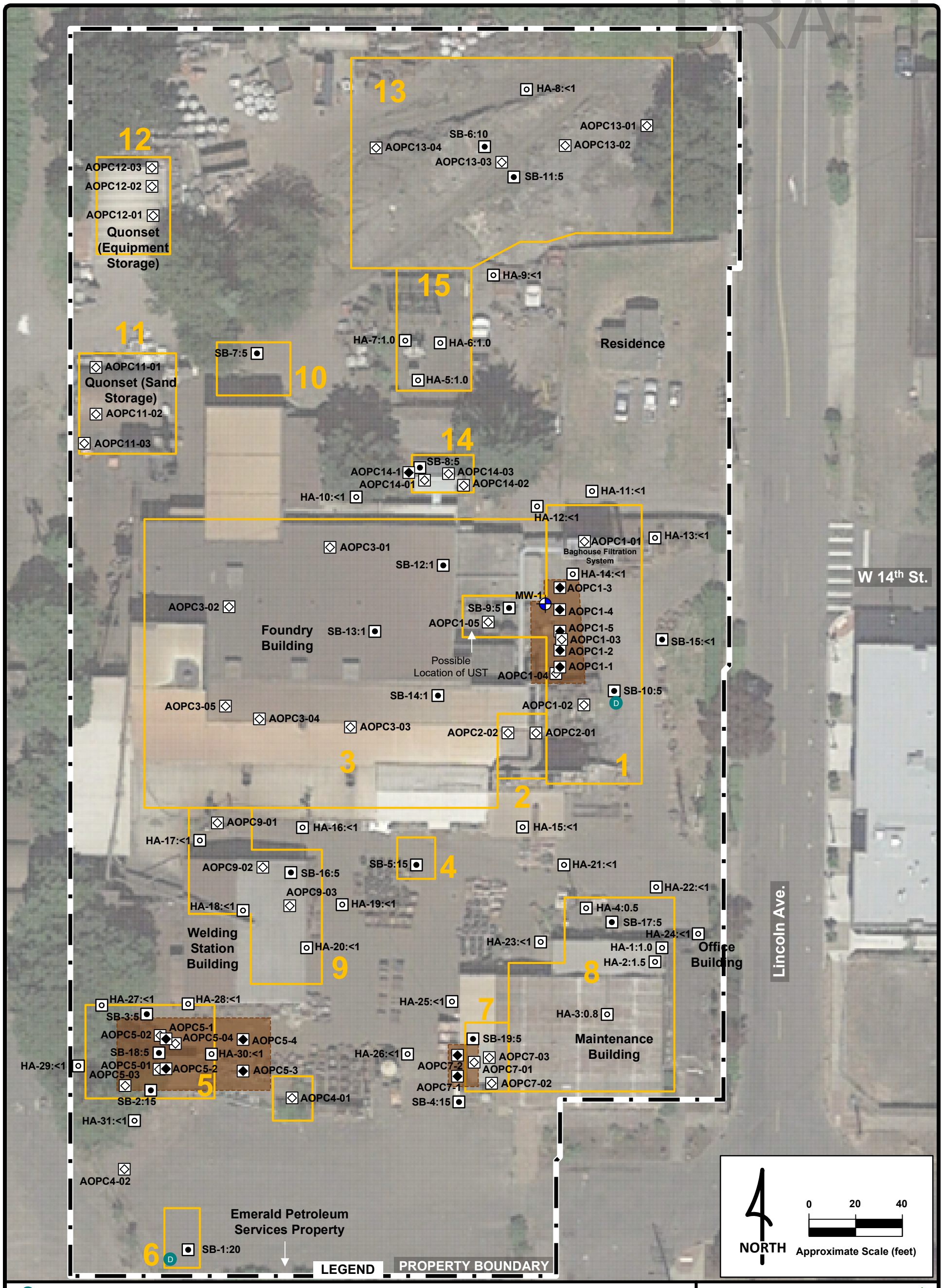

D	Possible Dry Well Location (Location is Approximate and will be Field Verified
SB-2	EPI Hollow Stem Auguer Soil Boring Sample Location and ID (2017-2018)
HA-31	EPI Hand Auguer Soil Boring Sample Location and ID (2017-2018)
AOPC4-02	EPI Near Surface Soil Sample Location and ID (2017)
AOPC5-01	AEG/Magna Soil Sample Location and ID (2018)
MW-1	Monitoring Well Location and ID
14	Area of Potential Concern and ID
	AEG/Magna Soil Removal Area

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FIGURE 2

SITE MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

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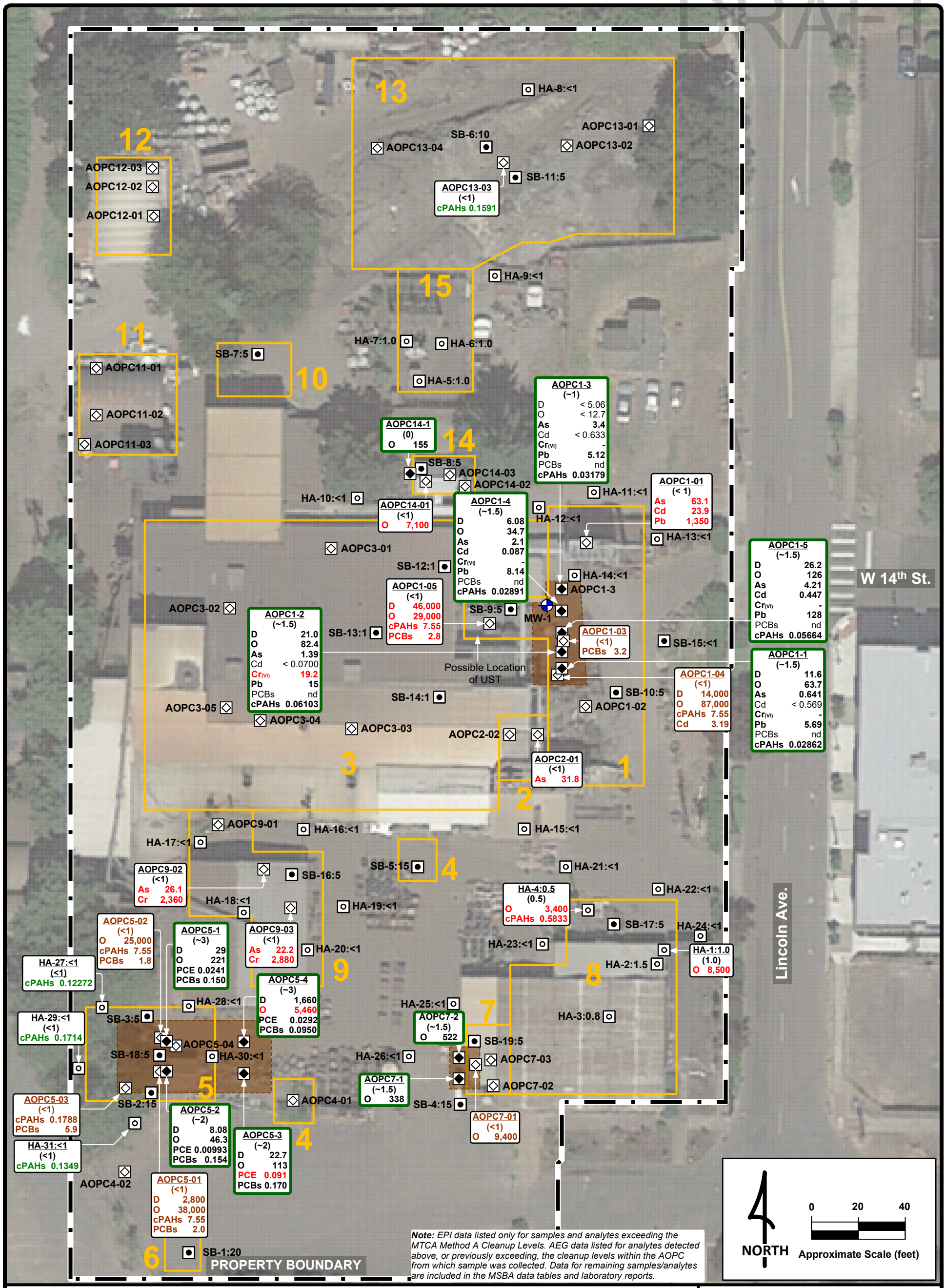

LEGEND

14	Area of Potential Concern (AOPC) and ID
MW-1	Monitoring Well Location and ID
	AEG/Magna Soil Removal Area
SB-2	EPI HSA Soil Boring Sample Location and ID (2017-2018)
HA-31	EPI Hand Auguer Soil Boring Sample Location and ID (2017-2018)
AOPC4-02	EPI Near Surface Soil Sample Location and ID (2017)
AOPC5-1	AEG/Magna Soil Sample Location and ID (2018)

AOPC5-01 (<1)	
D	2,800
O	38,000
cPAHs	7.55
PCBs	2.0

Soil Sample ID
Sample Depth (feet below surface grade)
Diesel (NWTPH-Dx) (ppm)
Oil (NWTPH-Dx) (ppm)
TEF Adjusted Total Carcinogenic PAHs (8270) (ppm)
Polychlorinated Biphenyls (8082A) (ppm)

PCE 0.091	Tetrachloroethylene (8260C) (ppm)
As 1.39	Arsenic (6020A) (ppm)
Cd < 0.0700	Cadmium (6020A) (ppm)
Cr(VI) 19.2	Hexavalent Chromium (3060A/7196A) (ppm)
Cr 2,880	Total Chromium (6020A) (ppm)
Pb 15	Lead (6020A) (ppm)
Green Outline	Sample Collected by AEG Following Excavation Cleanup
Bold Value	Analyte(s) Detected Above Method Detection Limit
Red Value	Concentration Exceeds MTCA Method A Cleanup Level
Green Value	Concentration Exceeds Method A Cleanup Level, but is Below Method B Cleanup Level
(<)	Not Detected Above Method Detection Limit, as listed
(nd)	None Detected
(-)	Not Analyzed

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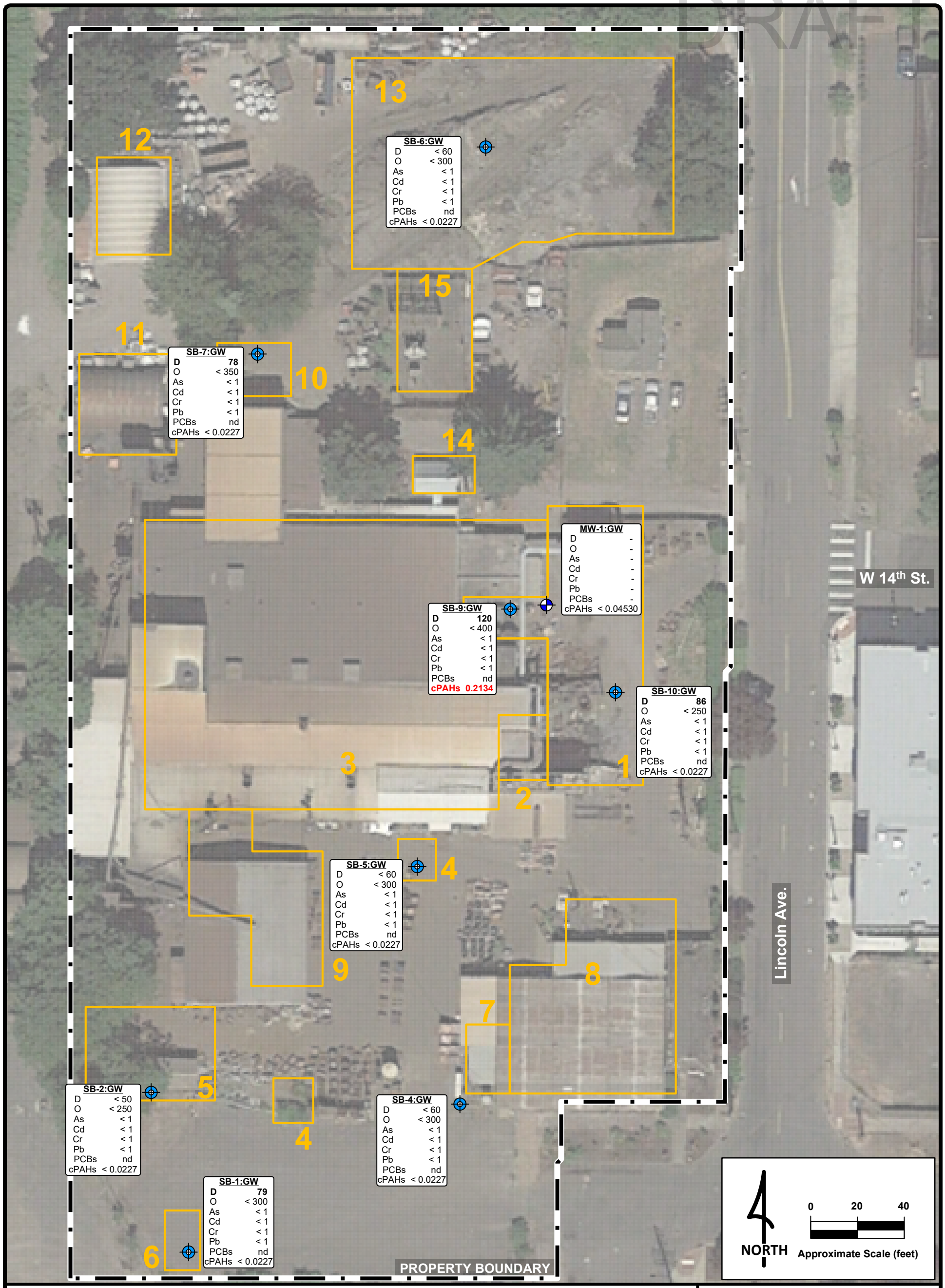
FIGURE 3

SOIL DATA MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

S:\Project Files\North Star Casteel\Figures\RIFS, Work Plan\F 3 Soil Data (J1).vsd



LEGEND

14 — Area of Potential Concern and ID

Monitoring Well Location

Temporary Well Location

SB-9:GW — Groundwater Sample ID
D 120 — Diesel (NWTPH-Dx) (ppb)
O < 400 — Oil (NWTPH-Dx) (ppb)
As < 1 — Arsenic (6020A) (ppb)
Cd < 1 — Cadmium (6020A) (ppb)
Cr < 1 — Total Chromium (6020A) (ppb)
Pb < 1 — Lead (6020A) (ppb)
PCBs nd — Polychlorinated Biphenyls (8082A) (ppb)
cPAHs 0.2134 — TEF Adjusted Carcinogenic PAHs (8270D) (ppb)

Bold Value — Indicates Analyte(s) Detected Above Method Detection Limit

Red Value — Concentration Exceeds MTCA Method A Cleanup Level

(<) — Not Detected Above Method Reporting Limit

\- — Not Analyzed

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FIGURE 4

GROUNDWATER DATA MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

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DRAFT

13
12
11
10
15
14
9
8
7
6
5
4
3
2
1

HA-8:<1
AOPC13-01
SB-6:10
AOPC13-04
AOPC13-02
SB-11:5
AOPC13-03
(<1)
cPAHs 0.1591
AOPC12-03
AOPC12-02
AOPC12-01
HA-9:<1
HA-7:1.0
HA-6:1.0
SB-7:5
AOPC11-01
HA-5:1.0
AOPC11-02
AOPC11-03
AOPC1-3
(~1)
D < 5.06
O < 12.7
As 3.4
Cd < 0.633
Cr(VI) -
Pb 5.12
PCBs nd
cPAHs 0.03179
AOPC14-1
(0)
O 155
SB-8:5
AOPC14-03
AOPC14-02
AOPC14-01
(<1)
O 7,100
HA-10:<1
AOPC1-4
(~1.5)
D 6.08
O 34.7
As 2.1
Cd 0.087
Cr(VI) -
Pb 8.14
PCBs nd
cPAHs 0.02891
HA-11:<1
HA-12:<1
AOPC1-01
(< 1)
As 63.1
Cd 23.9
Pb 1,350
HA-13:<1
AOPC3-01
SB-12:1
HA-14:<1
AOPC1-3
AOPC1-5
(~1.5)
D 26.2
O 126
As 4.21
Cd 0.447
Cr(VI) -
Pb 128
PCBs nd
cPAHs 0.05664
W 14th St.
AOPC3-02
AOPC1-05
(<1)
D 46,000
O 29,000
cPAHs 7.55
PCBs 2.8
SB-9:5
MW-1
AOPC1-2
(~1.5)
D 21.0
O 82.4
As 1.39
Cd < 0.0700
Cr(VI) 19.2
Pb 15
PCBs nd
cPAHs 0.06103
SB-13:1
AOPC1-03
(<1)
PCBs 3.2
SB-15:<1
Approximate
Location of UST
AOPC1-1
(~1.5)
D 11.6
O 63.7
As 0.641
Cd < 0.569
Cr(VI) -
Pb 5.69
PCBs nd
cPAHs 0.02862
AOPC1-04
(<1)
D 14,000
O 87,000
cPAHs 7.55
Cd 3.19
SB-10:5
AOPC1-02
SB-14:1
AOPC3-05
AOPC3-04
AOPC3-03
AOPC2-02
AOPC2-01
(<1)
As 31.8
AOPC9-01
HA-16:<1
HA-15:<1
HA-17:<1
SB-5:15
HA-21:<1
AOPC9-02
(<1)
As 26.1
Cr 2,360
SB-16:5
HA-4:0.5
(0.5)
O 3,400
cPAHs 0.5833
HA-22:<1
HA-18:<1
HA-19:<1
SB-17:5
HA-24:<1
HA-1:1.0
(1.0)
O 8,500
HA-23:<1
HA-2:1.5
AOPC5-02
(<1)
O 25,000
cPAHs 7.55
PCBs 1.8
AOPC5-1
(~3)
D 29
O 221
PCE 0.0241
PCBs 0.150
AOPC9-03
(<1)
As 22.2
Cr 2,880
HA-20:<1
HA-27:<1
(<1)
cPAHs 0.12272
AOPC5-4
(~3)
D 1,660
O 5,460
PCE 0.0292
PCBs 0.0950
HA-28:<1
HA-25:<1
HA-3:0.8
AOPC7-2
(~1.5)
O 522
SB-19:5
HA-29:<1
(<1)
cPAHs 0.1714
SB-3:5
AOPC5-04
SB-18:5
HA-26:<1
AOPC7-03
AOPC7-02
AOPC7-1
(~1.5)
O 338
AOPC5-03
(<1)
cPAHs 0.1788
PCBs 5.9
SB-2:15
AOPC5-2
(~2)
D 8.08
O 46.3
PCE 0.00993
PCBs 0.154
AOPC4-01
SB-4:15
AOPC7-01
(<1)
O 9,400
AOPC5-3
(~2)
D 22.7
O 113
PCE 0.091
PCBs 0.170
HA-31:<1
(<1)
cPAHs 0.1349
AOPC4-02
AOPC5-01
(<1)
D 2,800
O 38,000
cPAHs 7.55
PCBs 2.0
SB-1:20
PROPERTY BOUNDARY
Lincoln Ave.

Note: EPI data listed only for samples and analytes exceeding the MTCA Method A Cleanup Levels. AEG data listed for analytes detected above, or previously exceeding, the cleanup levels within the AOPC from which sample was collected. Data for remaining samples/analytes are included in the MSBA data tables and laboratory reports.

NORTH

0 20 40

Approximate Scale (feet)

LEGEND

- AEG/Magna Soil Removal Area
- Proposed Targeted Soil Removal Area
- Proposed Residual COCs Cap Area
- Additional Proposed Soil Sample Location
- **MW-1** Monitoring Well Location and ID
- **SB-2** EPI HSA Soil Boring Sample Location and ID (2017-2018)
- **HA-31** EPI Hand Auguer Soil Boring Sample Location and ID (2017-2018)
- **AOPC4-02** EPI Near Surface Soil Sample Location and ID (2017)
- **AOPC5-1** AEG/Magna Soil Sample Location and ID (2018)

AOPC5-01
(<1)
D 2,800 Soil Sample ID; Sample Depth (feet below surface grade); Diesel (NWTPH-Dx) (ppm)
O 38,000 Oil (NWTPH-Dx) (ppm)
cPAHs 7.55 TEF Adjusted Total Carcinogenic PAHs (8270) (ppm)
PCBs 2.0 Polychlorinated Biphenyls (8082A) (ppm)

PCE 0.091 Tetrachloroethylene (8260C) (ppm)
As 1.39 Arsenic (6020A) (ppm)
Cd < 0.0700 Cadmium (6020A) (ppm)
Cr(VI) 19.2 Hexavalent Chromium (3060A/7196A) (ppm)
Cr 2,880 Total Chromium (6020A) (ppm)
Pb 15 Lead (6020A) (ppm)

- **Green Outline** Sample Collected by AEG Following Excavation Cleanup
- **Brown Text** Represents Soil Removed During Excavation Cleanup
- **Red Value** Concentration Exceeds Method A Cleanup Level
- **Green Value** Concentration Exceeds Method A Cleanup Level, but is Below Method B Cleanup Level
- (<) Not Detected Above Method/Reporting Limit, as listed
- (nd) None Detected
- (-) Not Analyzed
- 14 Area of Potential Concern (AOPC) and ID

Revised: 3/10/2021 4:24 PM

MSBA
Martin S. Burck Associates, Inc.
Geologic and Environmental Consulting Services

FIGURE 5

REMEDIAL PLAN MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

S:\Project Files\North Star Casteel\Figures\RIFS, Work Plan\F 5 Remedial Plan.vsd

Tables

TABLE 1
SOIL SAMPLE ANALYTICAL DATA - PHCs and VOCs

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PHCs [b] (ppm) [c]			VOCs [d] (ppm)											
						BTEX [e] VOCs				Detected Additional VOCs							
			Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	Acetone	Methylene Chloride	Naphthalene	Tetrachloroethylene	Trichlorofluromethane	1,2,4-Trimethylbenzene	1,2,3-Trimethylbenzene	1,3,5-Trimethylbenzene
AOPC 1 - Metal Receiving Area Soil Samples																	
AOPC1-02	4/5/17	< 1	< 2 [f]	< 50	**290** [g]	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	- [h]	< 0.05
AOPC1-03 [i]	4/5/17	< 1	< 2	**200**	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC1-04	4/5/17	< 1	-	**14,000** [j k]	**87,000**	-	-	-	-	-	-	-	-	-	-	-	-
AOPC1-05	4/5/17	< 1	-	**46,000** [k]	**29,000**	-	-	-	-	-	-	-	-	-	-	-	-
SB-9:5	6/15/17	5	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-10:5	6/15/17	5	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-15:<1	4/3/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC1-1	10/29/18	~ 1.5 [l]	**1.27**	**11.6**	**63.7**	< 0.00114	**0.00143**	< 0.00284	< 0.00740	< 0.0284	< 0.0284	**0.0153**	< 0.00114	< 0.00284	**0.00282**	< 0.00569	< 0.00569
AOPC1-2	10/29/18	~ 1.5	**1.3**	**21.0**	**82.4**	**0.00194**	**0.0111**	**0.00281**	**0.0362**	< 0.0315	< 0.0315	**0.0086**	< 0.00315	< 0.00315	**0.00409**	< 0.00630	< 0.00630
AOPC1-3	11/14/18	~ 1	< 3.16	< 5.06	< 12.7	**0.000581**	< 0.00158	< 0.00316	< 0.00823	< 0.0316	**0.0194**	< 0.0158	< 0.00316	< 0.00316	< 0.00633	< 0.00633	< 0.00633
AOPC1-4	11/14/18	~ 1.5	< 2.97	**6.08**	**34.7**	**0.000576**	< 0.00594	< 0.00297	< 0.00772	< 0.0297	**0.0173**	< 0.0148	< 0.00297	< 0.00297	< 0.00594	< 0.00594	< 0.00594
AOPC1-5	11/14/18	~ 1.5	< 2.93	**26.2**	**126**	**0.000509**	< 0.00585	< 0.00293	< 0.00761	< 0.0293	**0.0170**	< 0.0146	< 0.00293	< 0.00293	< 0.00585	< 0.00585	< 0.00585
AOPC 3 - Foundry Building - Sands Soil Samples																	
AOPC3-01	4/5/17	< 1	-	**81**	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC3-03	4/5/17	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC3-01	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC3-01	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC3-03	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB:12-1	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB:13-1	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB14-1	4/3/18	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 4 - Stormwater Drain - Main Yard Soil Samples																	
AOPC4-01	4/5/17	< 1	< 2	**120** [k]	**890**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC4-02	4/5/17	< 1	< 2	**87** [k]	**980**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
SB-5:15	6/13/17	15	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05

TABLE 1 (Continued)

TABLE 1 (Continued)
SOIL SAMPLE ANALYTICAL DATA - PHCs and VOCs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PHCs [b] (ppm) [c]			VOCs [d] (ppm)											
						BTEX [e]				Detected Additional VOCs							
			Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	Acetone	Methylene Chloride	Naphthalene	Tetrachloroethylene	Trichlorofluromethane	1,2,4-Trimethylbenzene	1,2,3-Trimethylbenzene	1,3,5-Trimethylbenzene
AOPC 5 - Southwest Compressor Soil Samples																	
AOPC5-01	4/5/17	< 1	-	2,800 [k]	38,000	-	-	-	-	-	-	-	-	-	-	-	-
AOPC5-02	4/5/17	< 1	-	1,800 [k]	25,000	-	-	-	-	-	-	-	-	-	-	-	-
AOPC5-03	4/5/17	< 1	-	300 [k]	2,000	-	-	-	-	-	-	-	-	-	-	-	-
SB-2:15	6/12/17	15	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-3:5	6/13/17	5	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-18:5	4/3/18	5	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-27:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-28:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-29:<1	4/4/18	< 1	-	150 [k]	1,900	-	-	-	-	-	-	-	-	-	-	-	-
HA-30:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-31:<1	4/3/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC5-1	10/29/18	~ 3	-	29.0	221	< 0.00221	< 0.0111	< 0.00553	< 0.0144	< 0.0553	< 0.0553	< 0.0276	0.0241	< 0.00553	0.00509	< 0.0111	< 0.0111
AOPC5-2	10/29/18	~ 2	-	8.08	46.3	< 0.00106	< 0.00532	< 0.00266	< 0.00692	< 0.0266	< 0.0266	0.0047	0.00993	< 0.00266	0.00327	< 0.00532	< 0.00532
AOPC5-3	10/29/18	~ 2	-	22.7	113	0.000918	0.00309	< 0.00553	< 0.0144	< 0.0553	< 0.0553	0.0213	0.0910	< 0.00553	0.00346	< 0.0111	< 0.0111
AOPC5-4	10/29/18	~ 3	-	1,660	5,460	< 0.00110	< 0.00550	< 0.00275	< 0.00716	< 0.0275	< 0.0275	< 0.0138	0.0292	< 0.00275	< 0.00550	< 0.00550	< 0.00550
AOPC 6 - Southwest Drywell Soil Samples																	
SB-1:20	6/12/17	20	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC 7 - South Compressor Soil Samples																	
AOPC7-01	4/5/17	< 1	-	1,800 [k]	9,400 [k]	-	-	-	-	-	-	-	-	-	-	-	-
AOPC7-02	4/5/17	< 1	< 2	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-4:15	6/13/17	15	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
SB-19:5	4/3/18	5	-	190 [k]	580	-	-	-	-	-	-	-	-	-	-	-	-
HA-25:<1	4/3/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-26:<1	4/3/18	< 1	-	< 50	330	-	-	-	-	-	-	-	-	-	-	-	-
AOPC7-1	10/29/18	~ 1.5	-	97.6	338	-	-	-	-	-	-	-	-	-	-	-	-
AOPC7-2	10/29/18	~ 1.5	-	69.5	522	-	-	-	-	-	-	-	-	-	-	-	-

TABLE 1 (Continued)

TABLE 1 (Continued)
SOIL SAMPLE ANALYTICAL DATA - PHCs and VOCs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PHCs [b] (ppm) [c]			VOCs [d] (ppm)											
						BTEX [e]				Detected Additional VOCs							
			Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	Acetone	Methylene Chloride	Naphthalene	Tetrachloroethylene	Trichlorofluromethane	1,2,4-Trimethylbenzene	1,2,3-Trimethylbenzene	1,3,5-Trimethylbenzene
AOPC 8 - Maintenance Shop Building Soil Samples																	
HA-1:1.0	6/13/17	1	< 2	**1,600** [k]	**8,500**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
HA-2:1.5	6/13/17	1.5	**5.3**	**78**	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
HA-3:0.8	6/13/17	0.8	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
HA-4:0.5	6/13/17	0.5	< 2	**230** [k]	**3,400**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
SB-17:5	4/3/18	5	-	< 50	**350**	-	-	-	-	-	-	-	-	-	-	-	-
HA-21:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-22:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-23:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-24:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 9 - Welding Station Building Soil Samples																	
AOPC9-01	4/5/17	< 1	< 2	**130** [k]	**910**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC 10 - Stormwater Retention Structure Soil Samples																	
SB-7:5	6/14/17	5	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC 11 - Oil-Sand Storage and Bag House Soil Samples																	
AOPC11-01	4/5/17	< 1	-	**91** [k]	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC11-02	4/5/17	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 12 - Northwest Petroleum Storage Soil Samples																	
AOPC12-01	4/5/17	< 1	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC12-02	4/5/17	< 1	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC12-03	4/5/17	< 1	< 2	< 50	**670**	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC 13 - Foundry Waste Material Soil Samples																	
AOPC13-01	4/5/17	< 1	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	**0.14**	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC13-02	4/5/17	< 1	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC13-03	4/5/17	< 1	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05
AOPC13-04	4/5/17	< 1	**8.6**	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	**0.082**	< 0.025	< 0.5	**0.21**	-	**0.097**
SB-6:10	6/14/17	10	< 2	< 50	< 250	< 0.03	< 0.05	< 0.05	< 0.15	< 0.5	< 0.5	< 0.05	< 0.025	< 0.5	< 0.05	-	< 0.05

TABLE 1 (Continued)

TABLE 1 (Continued)
SOIL SAMPLE ANALYTICAL DATA - PHCs and VOCs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PHCs [b] (ppm) [c]			VOCs [d] (ppm)											
						BTEX [e]				Detected Additional VOCs							
			Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	Acetone	Methylene Chloride	Naphthalene	Tetrachloroethylene	Trichlorofluromethane	1,2,4-Trimethylbenzene	1,2,3-Trimethylbenzene	1,3,5-Trimethylbenzene
AOPC 14 - North Compressor Soil Samples																	
AOPC14-01	4/5/17	< 1	-	**120** [k]	**7,100** [k]	-	-	-	-	-	-	-	-	-	-	-	-
AOPC14-02	4/5/17	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
SB-8:5	6/15/17	5	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-10:<1	4/4/18	< 1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
AOPC14-1	10/29/18	0	-	**21.2**	**155**	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 15 - Clark County Transformer Compound Soil Samples																	
HA-5:1.0	6/13/17	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-6:1.0	6/13/17	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
HA-7:1.0	6/13/17	1	-	< 50	< 250	-	-	-	-	-	-	-	-	-	-	-	-
Stockpile Soil Samples																	
STOCKPILE 1	10/29/18	na [m]	**0.973**	**213**	**1,130**	**0.00333**	**0.0117**	**0.00353**	**0.0342**	**0.0218**	< 0.0271	**0.0067**	< 0.00271	**0.0753**	**0.00421**	**0.00231**	**0.0017**
STOCKPILE 2	10/29/18	na	**1.55**	**119**	**620**	**0.00215**	**0.00519**	< 0.000585	< 0.00718	**0.0240**	< 0.0276	**0.0137**	**0.00914**	< 0.00276	**0.00352**	**0.00186**	**0.0016**
MTCA Method A Soil Cleanup Levels																	
Unrestricted Land Uses			30 / 100 [n]	2,000	2,000	0.03	7	6	9	- - [o]	- -	5	0.05	- -	- -	- -	- -

a Depth of sample in feet below surface grade (bsg)
b Petroleum hydrocarbons (PHCs) were analyzed using NWTPH methods Gx (gasoline) and Dx (diesel and oil)
c Analytical results reported in parts per million (ppm)
d Volatile organic compounds (VOCs) were analyzed using EPA method 8260C. VOCs not listed in the table were not detected in any samples and are listed in the laboratory report
e Benzene, toluene, ethylbenzene, and xylenes (BTEX)
f (<) Analyte concentration not detected above the laboratory reporting limit, as listed
g Bold value indicates analyte concentration exceeded laboratory reporting limit
h (-) Not analyzed
i Brown text indicates samples represent soil that was removed and disposed during excavation cleanup activities
j Yellow shading indicates analyte concentration (or one-half the laboratory reporting limit) exceeds an RBC. The exceeded level is also shaded
k Laboratory Qualifier: The sample chromatographic pattern does not resemble the fuel standard used for quantitation
l (~) Sample depth estimated based on photographic log obtained from AEG Environmental Group, LLC
m (na) Not applicable
n MTCA Method A Soil Cleanup Level is 30 mg/kg when benzene is present in the sample and 100 mg/kg when benzene is not detected
o (- -) Not Available (Washington Department of Ecology has not established a Method A Soil Cleanup Level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T1 Soil - PHCs & VOCs.xlsx]PHCs & VOCs

TABLE 2
SOIL SAMPLE ANALYTICAL DATA - SVOCs
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	SVOCs [b] (ppm) [c]																			
			cPAHs [d]								Detected Additional SVOCs											
			Benzo(a)pyrene	Benz(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	TEF-Adjusted Total cPAHs [e]	Naphthalene	Acenaphthylene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzylbutyl phthalate	Bis(2-ethylhexyl)phthalate	Benzo(g,h,i)perylene	2-Methylnaphthalene	Phenol
AOPC 1 - Metal Receiving Area Soil Samples																						
AOPC1-02	4/5/17	< 1	< 0.01 [f]	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	**0.031** [g]	< 0.01	< 0.01	**0.012**	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
AOPC1-03 [h]	4/5/17	< 1	**0.053**	**0.070**	**0.061**	**0.020**	**0.091**	< 0.01	**0.030**	0.07251	**0.037**	**0.018**	**0.038**	**0.23**	**0.028**	**0.11**	**0.15**	< 0.5	< 0.8	**0.034**	< 0.05	< 0.5
AOPC1-04	4/5/17	< 1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 7.55 [i]	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 1,000	< 1,600	< 10	< 100	< 1,000
AOPC1-05	4/5/17	< 1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 7.55	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 500	< 800	< 10	< 50	< 500
SB-9:5	6/15/17	5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	**0.010**	**0.012**	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
SB-10:5	6/15/17	5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
SB-15:<1	4/3/18	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	- [j]	-	-	-	-	-	-	-	-	-	-	-
MW-1:10	4/4/18	10	< 0.01	< 0.01	**0.012**	< 0.01	< 0.01	< 0.01	< 0.01	0.00825	-	-	-	-	-	-	-	-	-	-	-	-
AOPC1-1	10/29/18	~ 1.5 [k]	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.02862	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.0379	< 0.379	**0.0174**	< 0.0379	-	< 0.379
AOPC1-2	10/29/18	~ 1.5	< 0.0839	< 0.0839	**0.0188**	< 0.0839	< 0.0839	< 0.0839	< 0.0839	0.06103	< 0.0839	< 0.0839	< 0.0839	< 0.0839	< 0.0839	**0.0156**	< 0.0839	< 0.839	< 0.839	< 0.0839	-	< 0.839
AOPC1-3	11/14/18	~ 1	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.03179	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.0421	< 0.421	< 0.421	< 0.0421	< 0.0418	< 0.0421
AOPC1-4	11/14/18	~ 1.5	< 0.0395	< 0.0395	**0.0106**	< 0.0395	< 0.0395	< 0.0395	< 0.0395	0.02891	**0.0193**	< 0.0395	< 0.0395	**0.00805**	< 0.0395	**0.0113**	< 0.0395	< 0.395	**0.0305**	< 0.0395	**0.0109**	**0.0377**
AOPC1-5	11/14/18	~ 1.5	< 0.0779	< 0.0779	**0.0172**	< 0.0779	< 0.0779	< 0.0779	< 0.0779	0.05664	**0.0286**	< 0.0157	< 0.0157	**0.0268**	< 0.0157	**0.0233**	< 0.0157	**0.0432**	**0.0500**	< 0.0157	**0.0254**	**0.0623**
AOPC 3 - Foundry Building - Sands Soil Samples																						
SB-12:1	4/3/18	1	**0.026**	**0.016**	**0.040**	**0.012**	**0.023**	< 0.01	< 0.01	0.02509	-	-	-	-	-	-	-	-	-	-	-	-
SB-13:1	4/3/18	1	**0.018**	**0.014**	**0.029**	< 0.01	**0.019**	< 0.01	**0.016**	0.03553	-	-	-	-	-	-	-	-	-	-	-	-
SB-14:1	4/3/18	1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 4 - Stormwater Drain - Main Yard Soil Samples																						
AOPC4-01	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 25	< 40	< 0.1	< 2.5	< 25
AOPC4-02	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 25	< 40	< 0.1	< 2.5	< 25
SB-5:15	6/13/17	15	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.1	< 0.16	< 0.01	< 0.01	< 0.1

Table 2 (Continued)

TABLE 2 (Continued)
SOIL SAMPLE ANALYTICAL DATA - SVOCs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	SVOCs [b] (ppm) [c]																				
			cPAHs [d]								Detected Additional SVOCs												
			Benzo(a)pyrene	Benz(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	TEF-Adjusted Total cPAHs [e]	Naphthalene	Acenaphthylene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzylbutyl phthalate	Bis(2ethylhexyl)phthalate	Benzo(g,h,i)perylene	2-Methylnaphthalene	Phenol
AOPC 5 - Southwest Compressor Soil Samples																							
AOPC5-01	4/5/17	< 1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 7.55	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 500	< 800	< 10	< 50	< 500
AOPC5-02	4/5/17	< 1	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 7.55	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 500	< 800	< 10	< 50	< 500
AOPC5-03	4/5/17	< 1	**0.12**	**0.12**	**0.21**	< 0.1	**0.18**	< 0.1	**0.14**	0.1788	< 0.1	< 0.1	< 0.1	**0.17**	< 0.1	**0.23**	**0.23**	< 120	< 200	**0.21**	< 12	< 120
SB-2:15	6/12/17	15	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.1	< 0.1	< 0.1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
SB-3:5	6/13/17	5	**0.015**	**0.014**	**0.020**	< 0.01	**0.017**	< 0.01	**0.014**	0.02097	< 0.1	< 0.1	< 0.1	**0.016**	< 0.01	**0.028**	**0.027**	< 0.5	< 0.8	**0.016**	< 0.05	< 0.5
SB-18:5	4/3/18	5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	-	-	-	-	-	-	-	-	-	-	-	-
HA-27:<1	4/4/18	< 1	**0.091** [l]	**0.068** [l]	**0.13**	**0.049** [l]	**0.092** [l]	**0.011** [l]	**0.050** [l]	0.12272	-	-	-	-	-	-	-	-	-	-	-	-
HA-29:<1	4/4/18	< 1	**0.11** [l]	**0.013** [l]	**0.31** [l]	< 0.1 [l]	**0.024** [l]	< 0.1 [l]	< 0.1 [l]	0.1714	-	-	-	-	-	-	-	-	-	-	-	-
HA-31:<1	4/3/18	< 1	**0.099**	**0.061**	**0.18**	**0.056**	**0.11**	**0.011**	**0.040**	0.1349	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 6 - Southwest Drywell Soil Samples																							
SB-1:20	6/12/17	20	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
AOPC 7 - South Compressor Soil Samples																							
SB-4:15	6/13/17	15	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
AOPC 8 - Maintenance Shop Building Soil Samples																							
HA-1:1.0	6/13/17	1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5	< 8	**0.25**	< 0.5	< 5
HA-2:1.5	6/13/17	1.5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
HA-3:0.8	6/13/17	0.8	**0.012**	< 0.01	**0.018**	< 0.01	**0.016**	< 0.01	**0.010**	0.01646	< 0.01	< 0.01	< 0.01	**0.014**	< 0.01	**0.021**	**0.022**	< 0.5	< 0.8	**0.012**	< 0.05	< 0.5
HA-4:0.5	6/13/17	0.5	**0.43** [l]	**0.18**	**0.83** [l]	**0.20** [l]	**0.53**	< 0.1 [l]	**0.22** [l]	0.5833	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**0.23**	**0.75**	< 50	< 80	< 0.28	< 5	< 50
SB-17:5	4/3/18	5	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	**0.027** [l]	< 0.01 [l]	< 0.01 [l]	0.00777	-	-	-	-	-	-	-	-	-	-	-	-
HA-21:<1	4/4/18	< 1	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.01 [l]	< 0.0755	-	-	-	-	-	-	-	-	-	-	-	-
HA-22:<1	4/4/18	< 1	**0.030** [l]	**0.023** [l]	**0.063** [l]	**0.021** [l]	**0.041** [l]	< 0.01 [l]	**0.023** [l]	0.04391	-	-	-	-	-	-	-	-	-	-	-	-
HA-23:<1	4/4/18	< 1	**0.071** [l]	**0.052** [l]	**0.14** [l]	**0.043** [l]	**0.068** [l]	< 0.01 [l]	**0.023** [l]	0.09798	-	-	-	-	-	-	-	-	-	-	-	-
AOPC 9 - Welding Station Building Soil Samples																							
AOPC9-01	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	**0.16**	< 0.1	**0.20**	**0.20**	< 25	< 40	< 0.1	< 2.5	< 25
AOPC 10 - Stormwater Retention Structure Soil Samples																							
SB-7:5	6/14/17	5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5

Table 2 (Continued)

TABLE 2 (Continued)
SOIL SAMPLE ANALYTICAL DATA - SVOCs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	SVOCs [b] (ppm) [c]																			
			cPAHs [d]								Detected Additional SVOCs											
			Benzo(a)pyrene	Benz(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	TEF-Adjusted Total cPAHs [e]	Naphthalene	Acenaphthylene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzylbutyl phthalate	Bis(2ethylhexyl)phthalate	Benzo(g,h,i)perylene	2-Methylnaphthalene	Phenol
AOPC 12 - Northwest Petroleum Storage Soil Samples																						
AOPC12-01	4/5/17	< 1	< 0.01	< 0.01	**0.014**	< 0.01	**0.011**	< 0.01	< 0.01	0.00851	**0.046**	< 0.01	< 0.01	**0.016**	< 0.01	**0.016**	**0.019**	< 0.5	**0.90** [l]	< 0.01	< 0.05	< 0.5
AOPC12-02	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5	< 8	< 0.1	< 0.5	< 5
AOPC12-03	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5	< 8	< 0.1	< 0.5	< 5
AOPC 13 - Foundry Waste Material Soil Samples																						
AOPC13-01	4/5/17	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	**0.22**	< 0.01	**0.012**	**0.048**	**0.017**	**0.025**	**0.023**	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
AOPC13-02	4/5/17	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	**0.056**	< 0.01	< 0.01	**0.017**	< 0.01	< 0.01	< 0.01	< 0.5	< 0.8	< 0.01	< 0.05	< 0.5
AOPC13-03	4/5/17	< 1	**0.12**	< 0.1	**0.18**	< 0.1	**0.11**	< 0.1	< 0.1	0.1591	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	**0.15**	**0.16**	< 5	< 8	**0.12**	< 0.5	< 5
AOPC13-04	4/5/17	< 1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.0755	**0.47**	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 5	< 8	< 0.1	< 0.5	< 5
SB-6:10	6/14/17	10	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.1	< 0.16	< 0.01	< 0.01	< 0.1
SB-11:5	4/3/18	5	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	-	-	-	-	-	-	-	-	-	-	-	-
HA-8:<1	4/4/18	< 1	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.00755	-	-	-	-	-	-	-	-	-	-	-	-
HA-9:<1	4/4/18	< 1	**0.072**	**0.054**	**0.14**	**0.042**	**0.079**	< 0.01	**0.027**	0.09959	-	-	-	-	-	-	-	-	-	-	-	-
Stockpile Soil Samples																						
STOCKPILE-1	10/29/18	na	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.272555	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 0.361	< 3.61	< 3.61	< 0.361	-	< 3.61
STOCKPILE-2	10/29/18	na	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 0.27784	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 0.368	< 3.68	**0.859**	< 0.368	-	**0.549**
MTCA Method A Soil Cleanup Levels																						
Unrestricted Land Uses			0.1								5	- - [m]	- -	- -	- -	- -	- -	- -	- -	- -	- -	- -

a Depth of sample in feet below surface grade (bsg)
b Semi-volatile organic compounds (SVOCs) were analyzed using EPA method 8270D. SVOCs not listed in the table were not detected in any samples and are listed in the laboratory report
c Analytical results reported in parts per million (ppm)
d (cPAHs) Carcinogenic Polycyclic Aromatic Hydrocarbons
e Toxicity Equivalency Factors (TEFs) calculated under WAC 173-340-708(e) in accordance with Table 708-2 (in WAC 173-340-900). TEF is shown with less than (<) symbol when no cPAHs were detected
f (<) Analyte concentration not detected above the laboratory reporting limit, as listed
g Bold value indicates analyte concentration exceeded laboratory reporting limit
h Brown text indicates samples represent soil that was removed and disposed during excavation cleanup activities
i Yellow shading indicates analyte concentration, one-half the laboratory reporting, or TEF-adjusted total cPAH concentration exceeds the MTCA Method A Cleanup Level.
j (-) Not analyzed
k (~) Sample depth estimated based on photographic log obtained from AEG Environmental Group, LLC.
l Laboratory Qualifier: The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
m (- -) Not Available (Washington Department of Ecology has not established a Method A Soil Cleanup Level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T2 Soil - SVOCs.xlsx]SVOCs

TABLE 3
SOIL SAMPLE ANALYTICAL DATA - METALS

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	RCRA 8 Metals [b] (ppm) [c]									
			Arsenic	Barium	Cadmium	Chromium (Total)	Chromium III	Chromium VI	Lead	Mercury	Selenium	Silver
AOPC 1 - Metal Receiving Area Soil Samples												
AOPC1-01	4/5/17	< 1	**63.1** [d e]	**20.0**	**23.9**	**1,360**	- [f]	-	**1,350**	< 1 [g]	**3.79**	**14.7**
AOPC1-02	4/5/17	< 1	< 5	**8.45**	< 1	**54.9**	-	-	**2.06**	< 1	< 1	< 1
AOPC1-03 [h]	4/5/17	< 1	< 5	**140**	< 1	**43.3**	-	-	**25.1**	< 1	< 1	< 1
AOPC1-04	4/5/17	< 1	**15.7**	**82.9**	**3.19**	**169**	-	-	**57.8**	< 1	**1.12**	< 1
AOPC1-05	4/5/17	< 1	< 5	**86.4**	**1.96**	**36.1**	-	-	**50.4**	< 1	< 1	< 1
SB-9:5	6/15/17	5	**2.64**	**162**	< 1	**11.4**	-	-	**19.7**	< 1	< 1	< 1
SB-10:5	6/15/17	5	**1.96**	**132**	< 1	**38.0**	-	-	**5.96**	< 1	< 1	< 1
SB-15:<1	4/3/18	< 1	-	-	< 1	-	-	-	-	-	-	-
HA-11:<1	4/4/18	< 1	**2.00**	-	< 1	-	-	-	**57.3**	-	-	-
HA-12:<1	4/4/18	< 1	**5.74**	-	< 1	-	-	-	**60.4**	-	-	-
HA-13:<1	4/4/18	< 1	**2.56**	-	< 1	-	-	-	**40.6**	-	-	-
AOPC1-1	10/29/18	~ 1.5 [i]	**0.641**	**231**	< 0.569	**13.5**	-	-	**5.69**	**0.0119**	< 2.28	< 1.14
AOPC1-2	10/29/18	~ 1.5	**1.39**	**172**	< 0.0700	**56.4**	**37.2**	**19.2**	**15**	**0.0172**	< 0.620	< 0.120
AOPC1-3	11/14/18	~ 1	**3.4**	**227**	< 0.633	**17.2**	-	-	**5.12**	**0.00697**	< 0.785	< 0.120
AOPC1-4	11/14/18	~ 1.5	**2.1**	**179**	**0.087**	**20.2**	-	-	**8.14**	**0.0109**	< 0.785	< 0.120
AOPC1-5	11/14/18	~ 1.5	**4.21**	**179**	**0.447**	**60.4**	-	-	**128**	**0.0114**	< 0.620	< 0.120
AOPC 2 - EAF Area Soil Samples												
AOPC2-01	4/5/17	< 1	**31.8**	**20.3**	**1.08**	**379**	-	-	**165**	< 1	< 1	**1.59**
AOPC2-02	4/5/17	< 1	< 5	**6.57**	< 1	**64.5**	-	-	**2.91**	< 1	< 1	< 1
HA-15:<1	4/4/18	< 1	**1.34**	-	-	-	-	-	-	-	-	-
AOPC 3 - Foundry Building - Sands Soil Samples												
AOPC3-01	4/5/17	< 1	< 5	**8.48**	< 1	**4.37**	-	-	**4.53**	< 1	< 1	< 1
AOPC3-02	4/5/17	< 1	< 5	**11.8**	< 1	**8.81**	-	-	**4.15**	< 1	< 1	< 1
AOPC3-03	4/5/17	< 1	**8.93**	**9.98**	< 1	**352**	-	-	**3.08**	< 1	< 1	< 1
AOPC3-04	4/5/17	< 1	< 5	**9.68**	< 1	**9.35**	-	-	**3.79**	< 1	< 1	< 1
AOPC3-05	4/5/17	< 1	**6.33**	**56.8**	**1.38**	**49.4**	-	-	**25.7**	< 1	< 1	< 1
SB-14:1	4/3/18	1	-	-	< 1	-	-	-	-	-	-	-
AOPC 4 - Stormwater Drain - Main Yard Soil Samples												
AOPC4-01	4/5/17	< 1	< 5	**36.4**	< 1	**52.0**	-	-	**6.54**	< 1	< 1	< 1
AOPC4-02	4/5/17	< 1	< 5	**34.7**	< 1	**76.2**	-	-	**20.9**	< 1	< 1	< 1
SB-5:15	6/13/17	15	< 1	**51.8**	< 1	**2.89**	-	-	**2.42**	< 1	< 1	< 1
AOPC 5 - Southwest Compressor Soil Samples												
SB-2:15	6/12/17	15	**1.04**	**52.6**	< 1	**4.27**	-	-	**2.61**	< 1	< 1	< 1
SB-3:5	6/13/17	5	**1.99**	**120**	< 1	**11.3**	-	-	**31.3**	< 1	< 1	< 1
AOPC 6 - Southwest Drywell Soil Samples												
SB-1:20	6/12/17	20	**5.04**	**80.7**	< 1	**8.60**	-	-	**9.07**	< 1	< 1	< 1
AOPC 7 - South Compressor Soil Samples												
SB-4:15	6/13/17	15	< 1	**72.1**	< 1	**3.81**	-	-	**2.79**	< 1	< 1	< 1
AOPC 8 - Maintenance Shop Building Soil Samples												
HA-1:1.0	6/13/17	1	**3.82**	**104**	< 1	**14.4**	-	-	**23.7**	< 1	< 1	**12.4**
HA-2:1.5	6/13/17	1.5	**1.5**	**80.7**	< 1	**8.11**	-	-	**15.6**	< 1	< 1	< 1
HA-3:0.8	6/13/17	0.8	**6.31**	**30.9**	< 1	**38.3**	-	-	**36.1**	< 1	< 1	< 1
HA-4:0.5	6/13/17	0.5	**3.20**	**54.0**	< 1	**23.2**	-	-	**11.5**	< 1	< 1	< 1

TABLE 3 (continued)

TABLE 3 (Continued)
SOIL SAMPLE ANALYTICAL DATA - METALS
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	RCRA 8 Metals [b]									
			Arsenic	Barium	Cadmium	Chromium (Total)	Chromium III	Chromium VI	Lead	Mercury	Selenium	Silver
AOPC 9 - Welding Station Building Soil Samples												
AOPC9-01	4/5/17	< 1	**6.76**	**12.8**	< 1	**306**	-	-	**4.58**	< 1	< 1	< 1
AOPC9-02	4/5/17	< 1	**26.1**	**1.21**	< 1	**2,360**	-	-	< 1	< 1	< 1	< 1
AOPC9-03	4/5/17	< 1	**22.2**	**10.4**	**1.17**	**2,880**	-	-	**7.24**	< 1	**1.04**	< 1
SB-16:5	4/3/18	5	**2.95**	-	-	**12.5**	-	-	-	-	-	-
HA-16:<1	4/4/18	< 1	**2.56**	-	-	**8.66 [j] / 10.2**	-	-	-	-	-	-
HA-17:<1	4/4/18	< 1	**1.33**	-	-	**8.93**	-	-	-	-	-	-
HA-18:<1	4/4/18	< 1	**12.5**	-	-	**57.8**	-	-	-	-	-	-
HA-19:<1	4/4/18	< 1	**8.61**	-	-	**39.6**	-	-	-	-	-	-
HA-20:>1	4/4/18	< 1	**16.5**	-	-	**23.6**	-	-	-	-	-	-
AOPC 10 - Stormwater Retention Structure Soil Samples												
SB-7:5	6/14/17	5	**1.90**	**127**	< 1	**10.4**	-	-	**11.2**	< 1	< 1	< 1
AOPC 11 - Oil-Sand Storage and Bag House Soil Samples												
AOPC11-01	4/5/17	< 1	< 5	**13.9**	< 1	**10.7**	-	-	**1.75**	< 1	< 1	< 1
AOPC11-02	4/5/17	< 1	< 5	**15.9**	< 1	**6.45**	-	-	**1.59**	< 1	< 1	< 1
AOPC11-03	4/5/17	< 1	< 5	**3.43**	< 1	**75.0**	-	-	**1.57**	< 1	< 1	< 1
AOPC 12 - Northwest Petroleum Storage Soil Samples												
AOPC12-01	4/5/17	< 1	< 5	**25.6**	< 1	**7.32**	-	-	**3.51**	< 1	< 1	< 1
AOPC12-02	4/5/17	< 1	**8.53**	**117**	< 1	**31.8**	-	-	**18.9**	< 1	< 1	< 1
AOPC12-03	4/5/17	< 1	**8.09**	**108**	< 1	**24.4**	-	-	**17.4**	< 1	< 1	< 1
AOPC 13 - Foundry Waste Material Soil Samples												
AOPC13-01	4/5/17	< 1	< 5	**10.0**	< 1	**107**	-	-	**4.38**	< 1	< 1	< 1
AOPC13-02	4/5/17	< 1	< 5	**10.6**	< 1	**21.0**	-	-	**2.99**	< 1	< 1	< 1
AOPC13-03	4/5/17	< 1	**12.7**	**40.3**	< 1	**92.9**	-	-	**115**	< 1	**1.15**	< 1
AOPC13-04	4/5/17	< 1	**6.35**	**49.7**	< 1	**76.4**	-	-	**36.6**	< 1	< 1	< 1
SB-6:10	6/14/17	10	< 1	**137**	< 1	**13.8**	-	-	**4.63**	< 1	< 1	< 1
Stockpile Soil Samples												
STOCKPILE 1	10/29/18	na [k]	**0.641**	**137**	**0.596**	**41.1**	**40.2**	**0.954**	**128**	**0.0505**	< 0.620	< 0.120
STOCKPILE 2	10/29/18	na	**0.938**	**49.4**	< 0.0700	**185**	**185**	< 0.64	**21.4**	**0.0072**	< 0.620	< 0.120
MTCA Method A Soil Cleanup Levels												
Unrestricted Land Uses			20	- - [l]	2	2,000		19	250	2	- -	- -

a Depth of sample in feet below surface grade (bsg)
b RCRA 8 Metals analyzed using EPA method 6010D or 6020A
c Analytical results reported in parts per million (ppm)
d Bold value indicates analyte concentration exceeded laboratory reporting limit
e Yellow shading indicates analyte concentration (or one-half the laboratory reporting limit) exceeds the MTCA Method A Cleanup Level. The exceeded level is also shaded.
f (-) Not analyzed
g (<) Analyte concentration not detected above the laboratory reporting limit, as listed
h Brown text indicates samples represent soil that was removed and disposed during excavation cleanup activities
i (~) Sample depth estimated based on photographic log obtained from AEG Environmental Group, LLC.
j Laboratory Qualifier: The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.
k (na) Not applicable
l (- -) Not Available (Washington Department of Ecology has not established a cleanup level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T3 Soil - RCRA 8 Metals.xlsx]Metals

TABLE 4
SOIL SAMPLE ANALYTICAL DATA - PCBs
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PCBs [b] (ppm) [c]								Total PCBs
			Aroclor 1221	Aroclor 1232	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	
AOPC 1 - Metal Receiving Area Soil Samples											
AOPC1-02	4/5/17	<1	< 0.2 [d]	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND [e]
AOPC1-03 [f]	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	**3.2** [g h]	< 0.2	**3.2**
AOPC1-04	4/5/17	<1	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	ND
AOPC1-05	4/5/17	<1	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	**2.8**	< 0.4	**2.8**
SB-9:5	6/15/17	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
SB-10:5	6/15/17	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
SB-15:<1	4/3/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-14:<1	4/4/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC1-1	10/29/18	~ 1.5 [i]	< 0.0193	< 0.0193	< 0.0193	< 0.0193	< 0.0193	< 0.0193	< 0.0193	- [j]	ND
AOPC1-2	10/29/18	~ 1.5	< 0.0214	< 0.0214	< 0.0214	< 0.0214	< 0.0214	< 0.0214	< 0.0214	-	ND
AOPC1-3	11/14/18	~ 1	< 0.00680	< 0.00528	< 0.00443	< 0.00403	< 0.00399	< 0.00597	< 0.00625	-	ND
AOPC1-4	11/14/18	~ 1.5	< 0.00637	< 0.00495	< 0.00415	< 0.00377	< 0.00374	< 0.00560	**0.0233**	-	**0.0233**
AOPC1-5	11/14/18	~ 1.5	< 0.00628	< 0.00488	< 0.00410	< 0.00372	< 0.00369	< 0.00552	< 0.00578	-	ND
AOPC 3 - Foundry Building - Sands Soil Samples											
SB-12:1	4/3/18	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
SB-13:1	4/3/18	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
SB-14:1	4/3/18	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC 4 - Stormwater Drain - Main Yard Soil Samples											
AOPC4-01	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC4-02	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
SB-5:15	6/13/17	15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC 5 - Southwest Compressor Soil Samples											
AOPC5-01	4/5/17	<1	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	**2**	< 0.4	**2.0**
AOPC5-02	4/5/17	<1	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	< 0.4	**1.8**	< 0.4	**1.8**
AOPC5-03	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	**1.2**	< 0.2	**4.7**	< 0.2	**5.9**
SB-2:15	6/12/17	15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
SB-3:5	6/13/17	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.17**	< 0.02	**0.17**
SB-18:5	4/3/18	5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-27:<1	4/4/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.6**	< 0.02	**0.6**
HA-28:<1	4/4/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.96**	< 0.02	**0.96**
HA-29:<1	4/4/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.24**	< 0.02	**0.24**
HA-30:<1	4/4/18	< 1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.079**	< 0.02	**0.079**
AOPC5-1	10/29/18	~ 3	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	**0.150**	-	**0.150**
AOPC5-2	10/29/18	~ 2	< 0.0181	< 0.0181	< 0.0181	< 0.0181	< 0.0181	< 0.0181	**0.154**	-	**0.154**
AOPC5-3	10/29/18	~ 2	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	**0.170**	-	**0.170**
AOPC5-4	10/29/18	~ 3	< 0.0187	< 0.0187	< 0.0187	< 0.0187	< 0.0187	< 0.0187	**0.0950**	-	**0.0950**

TABLE 4 (Continued)

TABLE 4 (Continued)
SOIL SAMPLE ANALYTICAL DATA - PCBs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PCBs [b] (ppm) [c]								Total PCBs
			Aroclor 1221	Aroclor 1232	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	
AOPC 6 - Sothwest Drywell Soil Samples											
SB-1:20	6/12/17	20	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC 7 - South Compressor Soil Samples											
AOPC7-01	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC7-02	4/5/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
SB-4:15	6/13/17	15	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC7-1	10/29/18	~ 1.5	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0186	-	ND
AOPC7-2	10/29/18	~ 1.5	< 0.0186	< 0.0186	< 0.0186	< 0.0186	< 0.0186	< 0.0186	< 0.0186	-	ND
AOPC 8 - Maintenance Shop Building Soil Samples											
HA-1:1.0	6/13/17	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-2:1.5	6/13/17	1.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-3:0.8	6/13/17	0.8	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	**0.020**	< 0.02	**0.020**
HA-4:0.5	6/13/17	0.5	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
AOPC 10 - Stormwater Retention Structure Soil Samples											
SB-7:5	6/14/17	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC 11 - Oil-Sand Storage and Bag House Soil Samples											
AOPC11-01	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC11-02	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC 12 - Northwest Petroleum Storage Soil Samples											
AOPC12-01	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC12-02	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC12-03	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC 13 - Foundry Waste Material Soil Samples											
AOPC13-01	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC13-02	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC13-03	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC13-04	4/6/17	<1	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
SB-6:10	6/14/17	10	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC 14 - North Compressor Soil Samples											
SB-8:5	6/15/17	5	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2	ND
AOPC14-1	10/29/18	0	< 0.0180	< 0.0180	< 0.0180	< 0.0180	< 0.0180	< 0.0180	**0.0135**	na	**0.0135**
AOPC 15 - Clack County Transformer Compound Soil Samples											
HA-5:1.0	6/13/17	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-6:1.0	6/13/17	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND
HA-7:1.0	6/13/17	1	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	ND

TABLE 4 (Continued)

TABLE 4 (Continued)
SOIL SAMPLE ANALYTICAL DATA - PCBs
North Star Casteel Property

Sample ID	Sample Date	Sample Depth (feet bsg) [a]	PCBs [b] (ppm) [c]								
			Aroclor 1221	Aroclor 1232	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Total PCBs
Stockpile Soil Samples											
STOCKPILE-1	10/29/18	na	< 0.0184	< 0.0184	< 0.0184	< 0.0184	< 0.0184	< 0.0184	**0.633**	-	**0.633**
STOCKPILE-2	10/29/18	na	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	< 0.0188	**0.0276**	-	**0.0276**
MTCA Method A Soil Cleanup Levels											
Unrestricted Land Uses			**1**								

a Depth of sample in feet below surface grade (bsg)
b Polychlorinated Biphenyls (PCBs) analyzed using EPA method 8082A
c Analytical results reported in parts per million (ppm)
d (<) Analyte concentration not detected above the laboratory reporting limit, as listed
e (ND) No PCBs were detected
f Brown text indicates samples represent soil that was removed and disposed during excavation cleanup activities
g Bold value indicates analyte concentration exceeded laboratory reporting limit
h Yellow shading indicates analyte concentration (or one-half the laboratory reporting limit) exceeds an RBC. The exceeded level is also shaded
i (~) Sample depth estimated based on photographic log obtained from AEG Environmental Group, LLC.
j (-) Not analyzed

S:\Project Files\North Star Casteel\Tables\[T4 Soil - PCBs.xlsx]2017 PCBs

TABLE 5
WIPE SAMPLE ANALYTICAL DATA - PCBs
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	PCBs [a] (µg/wipe) [b]								
		Aroclor 1221	Aroclor 1232	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Total PCBs
AOPC 5 - Southwest Compressor										
AOPC5-04 [c]	4/5/17	< 1 [d]	< 1	< 1	< 1	< 1	< 1	< 1	< 1	ND [e]
AOPC 7 - South Compressor										
AOPC7-03	4/5/17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	ND
AOPC 14 - North Compressor										
AOPC14-03	4/6/17	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	ND

a Polychlorinated Biphenyls (PCBs) analyzed using EPA method 8082A
b Analytical results reported in micrograms per wipe (µg/wipe), which were each 100 square centimeters (cm^2)
c Brown text indicates samples represent soil that was removed and disposed during excavation cleanup activities
d (<) Analyte concentration not detected above the laboratory reporting limit, as listed
e (ND) No PCBs were detected

S:\Project Files\North Star Casteel\Tables\[T5 Wipe - PCBs.xlsx]2017 PCBs

TABLE 6
GROUNDWATER SAMPLE ANALYTICAL DATA - PHCs and VOCs

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	PHCs [a] (ppb) [b]			VOCs [c] (ppb)											
					BTEX [d] VOCs				Detected Additional VOCs							
		Gasoline	Diesel	Oil	Benzene	Toluene	Ethylbenzene	Total Xylenes	Chloroform	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Tetrachloroethene	Trichloroethene	1,2,4-Trimethylbenzene	1,3,5-Trimethylbenzene	Vinyl chloride
AOPC 1 - Metals Receiving Area																
SB-9:GW	6/15/17	< 100 [e]	**120** [f g]	< 400	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.2
SB-10:GW	6/15/17	< 100	**86** [g]	< 250	< 0.35	< 1	< 1	< 3	**1.4**	< 1	< 1	< 1	< 1	< 1	< 1	< 0.2
AOPC 4 - Stormwater Drain - Main Yard																
SB-5:GW	6/13/17	< 100	< 60	< 300	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.2
AOPC 5 - Southwest Compressor																
SB-2:GW	6/12/17	< 100	< 50	< 250	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	**3.2**	< 1	< 1	< 1	< 0.2
AOPC 6 - Southwest Drywell																
SB-1:GW	6/12/17	< 100	**79** [g]	< 300	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	**1.6**	< 1	< 1	< 1	< 0.2
AOPC 7 - South Compressor																
SB-4:GW	6/13/17	< 100	< 60	< 300	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	**1.7**	< 1	< 1	< 1	< 0.2
AOPC 10 - Stormwater Retention Structure																
SB-7:GW	6/14/17	< 100	**78** [g]	< 350	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.2
AOPC 13 - Foundary Waste Material																
SB-6:GW	6/14/17	< 100	< 60	< 300	< 0.35	< 1	< 1	< 3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 0.2
MTCA Method A Groundwater Cleanup Levels																
Groundwater		800 / 1,000 [h]	500	500	5	1,000	700	1,000	- - [i]	- -	- -	5	5	- -	- -	0.2

a Petroleum hydrocarbons (PHCs) were analyzed using NWTPH methods Gx (gasoline) and Dx (diesel and oil)
b Analytical results reported in parts per billion (ppb)
c Volatile organic compounds (VOCs) were analyzed using EPA method 8260C. VOCs not listed in the table were not detected in any samples and are listed in the laboratory report
d Benzene, toluene, ethylbenzene, and xylenes (BTEX)
e (<) Analyte concentration not detected above the laboratory reporting limit, as listed
f Bold value indicates analyte concentration exceeded laboratory reporting limit
g The sample chromatographic pattern does not resemble the fuel standard used for quantitation
h MTCA Method A Groundwater Cleanup Level is 800 µg/kg when benzene is present in the groundwater and 1,000 µg/kg when benzene is not detected.
i (- -) Not Available (Washington Department of Ecology has not established a Method A Cleanup Level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T6 GW - PHCs & VOCs.xlsx]PHCs & VOCs

TABLE 7
GROUNDWATER SAMPLE ANALYTICAL DATA - SVOCs

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	SVOCs [a] (ppb) [b]																		
		Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs) [c]								Detected Additional SVOCs										
		Benzo(a)pyrene	Benz(a)anthracene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	TEF-Adjusted Total cPAHs [d]	Naphthalene	Benzoic acid	Acenaphthylene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Bis(2ethylhexyl)phthalate	Benzo(g,h,i)perylene
AOPC 1 - Metals Receiving Area																				
SB-9:GW	6/15/17	**0.15** [e f g]	**0.20**	**0.23**	**0.070**	**0.19**	< 0.03	**0.10**	0.2134	< 0.03 [h]	< 10	< 0.03	**0.064**	**0.29**	**0.069**	**0.43**	**0.37**	< 3.2	**0.086**
SB-10:GW	6/15/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	< 0.03	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
MW-1:water	4/5/18	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.06	< 0.0453	- [i]	-	-	-	-	-	-	-	-	-
AOPC 4 - Stormwater Drain - Main Yard																				
SB-5:GW	6/13/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	< 0.03	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
AOPC 5 - Southwest Compressor																				
SB-2:GW	6/12/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	**0.052**	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
AOPC 6 - Southwest Drywell																				
SB-1:GW	6/12/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	**0.060**	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
AOPC 7 - South Compressor																				
SB-4:GW	6/13/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	< 0.03	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
AOPC 10 - Stormwater Retention Structure																				
SB-7:GW	6/14/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	< 0.03	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
AOPC 13 - Foundary Waste Material																				
SB-6:GW	6/14/17	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.02265	< 0.03	< 10	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 0.03	< 3.2	< 0.03
MTCA Method A Groundwater Cleanup Levels																				
Groundwater		0.1								160	- - [j]	- -	- -	- -	- -	- -	- -	- -	- -

a Semi-volatile organic compounds (SVOCs) were analyzed using EPA method 8270D. SVOCs not listed in the table were not detected in any samples and are listed in the laboratory report
b Analytical results reported in parts per billion (ppb)
c (cPAHs) Carcinogenic Polycyclic Aromatic Hydrocarbons
d Toxicity Equivalency Factors (TEFs) calculated under WAC 173-340-708(e) in accordance with Table 708-2 (in WAC 173-340-900). TEF is shown with less than (<) symbol when no cPAHs were detected
e Bold value indicates analyte concentration exceeded laboratory reporting limit
f Yellow shading indicates analyte concentration, one-half the laboratory reporting limit, or TEF-adjusted total cPAH concentration exceeds the MTCA Method A Cleanup Level.
g The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.
h (<) Analyte concentration not detected above the laboratory reporting limit, as listed
i (-) Not analyzed
j (- -) Not Available (Washington Department of Ecology has not established a Method A Soil Cleanup Level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T7 GW - SVOCs.xlsx]SVOCs

TABLE 8
GROUNDWATER SAMPLE ANALYTICAL DATA - METALS

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	RCRA 8 Metals [a] (ppb) [b]							
		Arsenic	Barium	Cadmium	Chromium (Total)	Lead	Mercury	Selenium	Silver
AOPC 1 - Metals Receiving Area									
SB-9:GW	6/15/17	< 1 [c]	**27.3** [d]	< 1	< 1	< 1	< 1	< 1	< 1
SB-10:GW	6/15/17	< 1	**20.0**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 4 - Stormwater Drain - Main Yard									
SB-5:GW	6/13/17	< 1	**24.8**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 5 - Southwest Compressor									
SB-2:GW	6/12/17	< 1	**30.7**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 6 - Southwest Drywell									
SB-1:GW	6/12/17	< 1	**20.3**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 7 - South Compressor									
SB-4:GW	6/13/17	< 1	**18.6**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 10 - Stormwater Retention Structure									
SB-7:GW	6/14/17	< 1	**23.1**	< 1	< 1	< 1	< 1	< 1	< 1
AOPC 13 - Foundrt Waste Material									
SB-6:GW	6/14/17	< 1	**11.9**	< 1	< 1	< 1	< 1	< 1	< 1
MTCA Method A Groundwater Cleanup Levels									
Groundwater		5	- - [e]	5	- -	15	2	- -	- -

a Resource Conservation and Recovery Act (RCRA) 8 Metals analyzed using EPA method 6020A
b Analytical results reported in parts per billion (ppb)
c (<) Analyte concentration not detected above the laboratory reporting limit, as listed
d Bold value indicates analyte concentration exceeded laboratory reporting limit. The exceeded level is also shaded
e (- -) Not Available (Washington Department of Ecology has not established a cleanup level for the respective analyte)

S:\Project Files\North Star Casteel\Tables\[T8 GW - RCRA 8 Metals.xlsx]Metals

TABLE 9
GROUNDWATER SAMPLE ANALYTICAL DATA - PCBs

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Sample ID	Sample Date	PCBs [a] (ppb) [b]								
		Aroclor 1221	Aroclor 1232	Aroclor 1016	Aroclor 1242	Aroclor 1248	Aroclor 1254	Aroclor 1260	Aroclor 1262	Total PCBs
AOPC 1 - Metals Receiving Area										
SB-9:GW	6/15/2017	< 0.1 [c]	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND [d]
SB-10:GW	6/15/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 4 - Stormwater Drain - Main Yard										
SB-5:GW	6/13/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 5 - Southwest Compressor										
SB-2:GW	6/12/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 6 - Southwest Drywell										
SB-1:GW	6/12/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 7 - South Compressor										
SB-4:GW	6/13/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 10 - Stormwater Retention Structure										
SB-7:GW	6/14/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
AOPC 13 - Foundary Waste Material										
SB-6:GW	6/14/2017	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	ND
MTCA Method A Groundwater Cleanup Levels										
Groundwater		**0.1**								

a Polychlorinated Biphenyls (PCBs) analyzed using EPA method 8082A
b Analytical results reported in parts per billion (ppb)
c (<) Analyte concentration not detected above the laboratory reporting limit, as listed
d (ND) No PCBs were detected

S:\Project Files\North Star Casteel\Tables\[T9 GW - PCBs.xlsx]2017 PCBs

TABLE 10
CONSTITUENTS OF POTENTIAL CONCERN
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Constituent	Maximum Detected Concentrations [a]		Screening Levels [b]		Exceedances [c]	
	Soil (ppm) [d]	Groundwater (ppb) [e]	Soil (ppm)	Groundwater (ppb)	Soil (ppm)	Groundwater (ppb)
Gasoline	**8.6** [f]	< 100 [g]	30	800	No	No
Diesel	**46,000**	**120**	2,000	500	Yes	No
Oil	**29,000**	< 400	2,000	500	Yes	No
Benzene	**0.00333**/< 0.03	< 0.35	0.03	5.0	No	No
Toluene	**0.0117**/< 0.05	< 1	7	1,000	No	No
Ethylbenzene	**0.00353**/< 0.05	< 1	6	700	No	No
Xylenes	**0.14**/< 0.15	< 3	9	1,000	No	No
Naphthalene	**0.082**	**0.060**	5 [h]	160 [h]	No	No
1,2,4-Trimethylbenzene	**0.210**	< 1	- [i] / 6.2	- / 1.5	No	No
1,2,3-Trimethylbenzene	**0.00231**/< 0.00630	-	-	-	-	-
1,3,5-Trimethylbenzene	**0.097**	< 1	- / 78	- / 8.7	No	No
Acetone	**0.024**/< 0.5	-	61,300	11,500	No	-
Chloroform	-	**1.4**	-	-	-	-
cis-1,2-Dichloroethene	-	< 1	-	-	-	-
trans-1,2-Dichloroethene	-	< 1	-	-	-	-
Methylene Chloride	**0.0194**/< 0.5	-	-	5.0	-	-
Tetrachloroethylene	**0.0910**	**3.2**	0.05	5	Yes	No
Trichloroethene	-	< 1	2.00	5	-	No
Trichlorofluromethane	**0.0753**/< 0.5	-	-	-	-	-
Vinyl chloride	-	< 0.2	-	0.2	-	No
cPAHs	**7.55**	**0.2134**	0.1	0.1	Yes	Yes
Acenapthylene	**0.018**/< 10	< 0.03	-	-	-	-
Benzoic Acid	-	< 10	-	-	-	-
Fluorene	**0.038**/< 10	**0.064**	-	-	-	-
Phenanthrene	**0.23**/< 10	**0.29**	-	-	-	-
Anthracene	**0.028**/< 10	**0.069**	-	-	-	-
Fluoranthene	**0.23**/< 10	**0.43**	-	-	-	-
Pyrene	**0.23**/< 10	**0.37**	-	-	-	-
Bis(2-ethylhexyl)phthalate	**0.90**/< 1,600	< 3.2	-	-	-	-
Benzo(g,h,i)perylene	**0.034**/< 10	**0.086**	-	-	-	-
2-Methylnaphlalene	**0.0254**/< 100	-	-	-	-	-
Phenol	**0.549**/< 1,000	-	-	-	-	-
Total PCBs	**5.9**	na [j]	1	0.1	Yes	na
Arsenic	**63.1**	< 1	20	5	Yes	No
Barium	**231**	**30.7**	-	-	-	-
Cadmium	**24**	< 1	2	5	Yes	No
Chromium (Total)	**2,880**	< 1	2,000	50	Yes	No
Lead	**1,350**	< 1	250	15	Yes	No
Mercury	**0.0505**/ < 1	< 1	2	2	No	No
Selenium	**3.79**	< 1	-	-	-	-
Silver	**14.7**	< 1	-	-	-	-

a Maximum detected concentrations (MDCs) selected from evaluation of all soil and groundwater data collected from the Site
b Screening levels listed are MTCA Method A Cleanup Levels for unrestricted land use, unless otherwise noted
c "Yes" indicates that the maximum detected constituent concentration was above the screening level, or if the constituent, was not detected but the maximum reporting limit was above the screening level. "No" indicates that the maximum detected constituent concentration was below the screening level (SL), or the constituent was not detected and the maximum reporting limit was below the SL
d Soil sample analytical data reported in parts per million (ppm)
e Groundwater sample analytical data reported in parts per billion (ppb)
f Bold value indicates analyte concentration exceeds the laboratory reporting limit
g Analyte concentration not detected above the laboratory reporting limit, as listed (<)
h Screening level represents the maximum total concentration of naphthalene
i (-) Not analyzed / not available; a MTCA Method A Cleanup Level has not been established for this constituent if available, an EPA Regional Screening Level is listed
j (na) Not applicable

TABLE 11
EVALUATION OF REMEDIAL OPTIONS
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Criteria	Remedial Option 1 - Targeted Soil Removal and Capping	Remedial Option 2 - Complete Soil Removal	Remedial Option 3 - Capping and Institutional Controls
Protect human health and the environment	3 - Very Good	3 - Very Good	2 - Satisfactory
Comply with cleanup standards	3 - Very Good	4 - Exceptional	1 - Substandard
Comply with applicable state and federal laws	3 - Very Good	3 - Very Good	3 - Very Good
Provide for compliance monitoring	3 - Very Good	3 - Very Good	2 - Satisfactory
Use permanent solutions to the maximum extent practicable	3 - Very Good	3 - Very Good	1 - Substandard
Provide for a reasonable restoration time frame	4 - Exceptional	2 - Satisfactory	2 - Satisfactory
Consider public concerns	3 - Very Good	2 - Satisfactory	2 - Satisfactory
Sustainability	3 - Very Good	2 - Satisfactory	4 - Exceptional
Total Points	22	20	13

Exceptional = 4 points
Very Good = 3 points
Satisfactory = 2 points
Substandard = 1 point
Unsatisfactory = 0 points

S:\Project Files\North Star Casteel\Tables\[T11 - Evaluation of Remedial Options.xlsx]T11

TABLE 12
DISPROPORTIONATE COST ANALYSIS
North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

Criteria	Remedial Option 1 - Targeted Soil Removal and Capping	Remedial Option 2 - Complete Soil Removal	Remedial Option 3 - Capping and Institutional Controls
Protectiveness	3 - Very Good	4 - Exceptional	2 - Satisfactory
Permanance	3 - Very Good	4 - Exceptional	2 - Satisfactory
Cost	3 - Very Good	2 - Satisfactory	4 - Exceptional
Effectivness over the long term	3 -Very Good	3 - Very Good	2 - Satisfactory
Management of short term risks	3 - Very Good	2 - Satisfactory	3 - Very Good
Technical and administrative implementability	3 - Very Good	2 - Satisfactory	3 - Very Good
Consideration of public concerns	3 - Very Good	2 - Satisfactory	2 - Satisfactory
Total Points	21	19	18

Exceptional = 4 points
Very Good = 3 points
Satisfactory = 2 points
Substandard = 1 point
Unsatisfactory = 0 points

S:\Project Files\North Star Casteel\Tables\[T12 - Cost Analysis.xlsx]T12

Appendix A

Previous Report Links

Phase I Environmental Site Assessment Report **(Environmental Partners Inc. (EPI)), dated October 31, 2017**
(https://drive.google.com/file/d/1u4qm0z3GHnN_kybsMVXAZYaftodNd_70/view?usp=sharing)

Phase II Environmental Site Assessment Report **(EPI) dated October 31, 2017**
(https://drive.google.com/file/d/1aDEHXOTgtk1nrkxq_rqlgDKV6-dQIVeY/view?usp=sharing)

Updated Subsurface Investigation Letter Report **(EPI), dated May 3, 2018**
(https://drive.google.com/file/d/1vsCE-sudTvg5Q80QHVmEqWQJyrr8TwqX/view?usp=sharing)

Summary of Selected Confirmational Soil Sampling, **Associated Environmental Group, LLC (AEG), dated December 5, 2018**
(https://drive.google.com/file/d/1kvZ1fSuQKJjhokW-77-dde62WgTKYhF4/view?usp=sharing)

Wasco County Landfill Disposal Receipts, November 27-28, 2018
(https://drive.google.com/file/d/1PRq_IEWDNNWM39W4drT6KbkeZ20IHFzG/view?usp=sharing)

Appendix B

CSM Investigation Documentation

- Water Resources Program Well Search Results
- Water Resources Program Well Log #237775
- Vancouver Water Stations and Wellhead Protection Areas Map
- Zoning Map
- MTCA Table 749-2 Ecological Screening Values

Water Resources Program Well Search Results

DEPARTMENT OF ECOLOGY State of Washington

Well Construction and Licensing Search Tools

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Well Construction and Licensing Search Tools

MAP SEARCH RESULTS

Back **New Search**

- **Search Criteria Used:** Left Coordinate: 1078909, Right Coordinate: 1084761, Top Coordinate: 119701, Bottom Coordinate: 114292, Well Log Type: Water Well Logs Only
- There are **1** Well Reports that match your search criteria.

Download all 1 images | Download all 1 data records | Print this page | Help

Displaying 1 - 1 of **1** well report results Sort results by Well Owner Name

1. **A. M. JANNSEN DRILLING CO.** - { View PDF }
   Public Land Survey: NW, SW, S-27, T-02-N, R-01-E, Tax Parcel Number: (blank)
   County: Clark, Well Address: 21075 S.W. TULATIN VALLEY HIGHWAY ALOHA, OREGON 97005
   Well Report ID: 237775, Well Tag ID:(blank), Notice of Intent Number: (blank)
   Well Diameter: 0 in. , Well Depth: 0 ft.
   Well Type: Water
   Well Completion Date: (blank), Well Report Received Date: (blank)

Total Result Pages: 1

Water Resources Program Well Log #237775

NW'4 SW'4 Sec. 27, T. 2N. R 1E
Clark Co.

PHONE 649-5563 DAY OR NIGHT

A. M. JANNSEN DRILLING CO.

21075 S.W. Tualatin Valley Highway
ALOHA, OREGON 97005

April 29, 1975

9 2. 2275 C

Boise Cascade Papers
P. O. Box 690
Vancouver, Washington 98660

Attention: J. K. Gould

Gentlemen:

Following are the well logs of wells drilled in Vancouver, Washington for Columbia River Paper Mills in 1947, 1948, and 1957:

3-31-47 Well drilled at Vancouver, Washington
26" Well, 150 feet deep
Static Water Level 22 feet
4600 gallons ~~per minute~~

Log:			
	0	4	Clay
	4	96	Loose Gravel
	96	100	~~Gravel & clay~~, mixed
	100	113	Loose Gravel
	113	150	Cemented Gravel

Casing: 137' 1" of 26"
18' of 20"--liner
Perforations: 10 perforations diametrically, 10" vertically between perforations - from 22 feet to 125 feet.

1-22-48 Well drilled at Vancouver, Washington
26" Well, 137 feet deep
Static Water Level 22 feet
4600 gallons per minute

Log:			
	0	50	Cemented Gravel
	50	112	Loose water bearing gravel
	112	134	Cemented gravel
	134	137	Loose gravel

Casing: 117' 7" of 26" Casing
24' of 18" perforated liner,
Perforations: 1211 perforations from 40' to 137'

5-10-57 Well drilled at Vancouver, Washington
Driller: Ace Owens
26" Well, 127-1/2 feet deep
Static Water Level 33 feet
Pump Test not made

Log: 0 50 Dry gravel and boulders
50 127½ Boulders and gravel, water bearing

Casing: 127½ ft. of 26" I.D. PE Black

Perforations: 800 perforations from 55 ft. to 125 ft.

Note: Hole has a slant to the North.

Our records do not contain all the information now required on well logs. I hope the above information will be sufficient for your requirements.

Very truly,

A. M. JANNSEN DRILLING CO.

Edward M. Jannsen

jw

PERMIT NUMBER

G2-22784P

NAME

BOISE CASCADE

ADDRESS (STREET)

907 W 7th

STATE

The applicant ... the applicant, hereby granted a permit to appropriate ... subject to existing rights and to the limitations ...

SOURCE

5 wells

TRIBUTARY OF (IF SURFACE WATERS)

MAXIMUM CUBIC ...

21,280 gpm

QUANTITY, TYPE ...

21,280 acre-feet

continuously

APPROXIMATE LOCATION ...

Well No. 7 ...

Well No. 8 ...

Well No. 10 ...

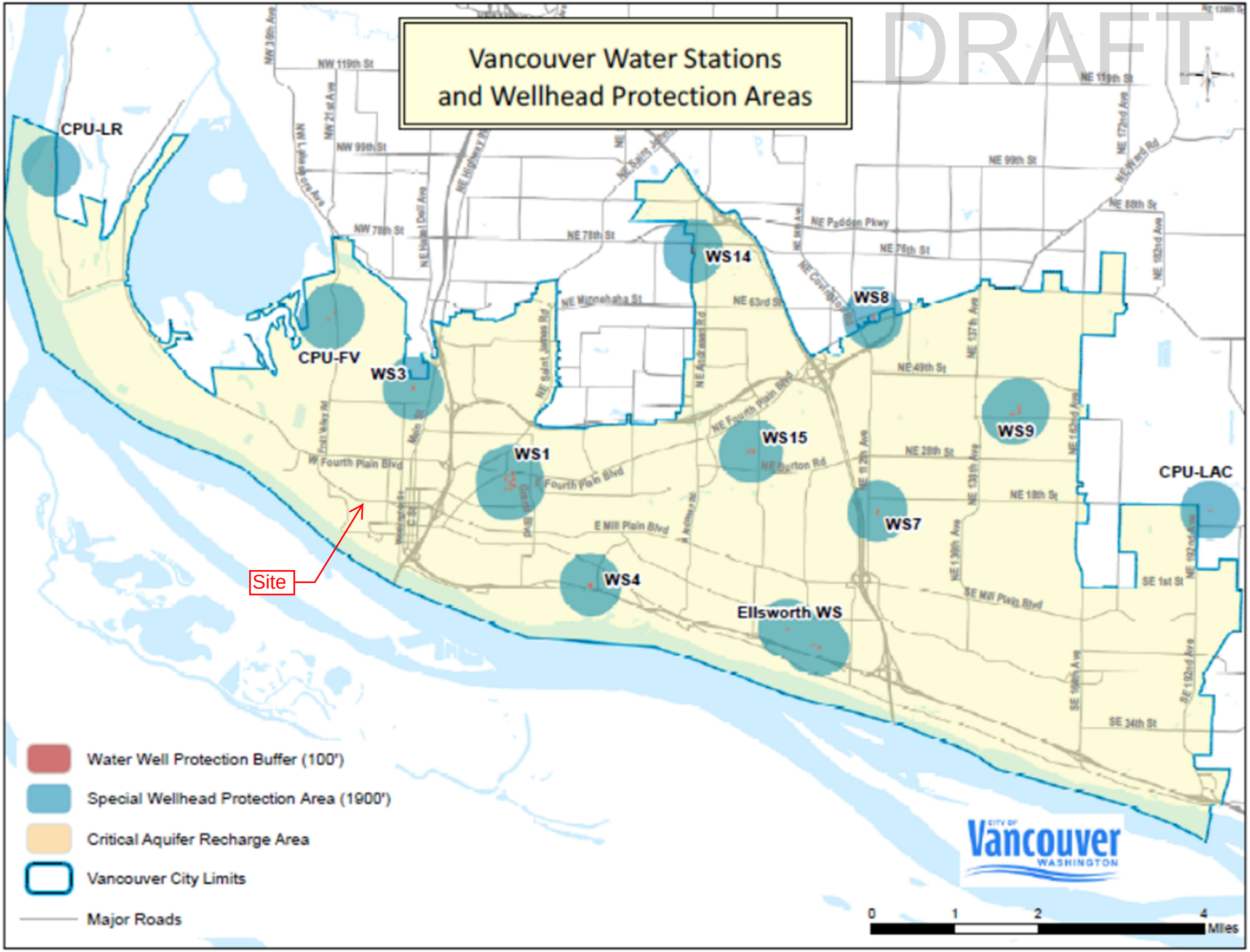
ALL from ...

LOCATED WITHIN ...

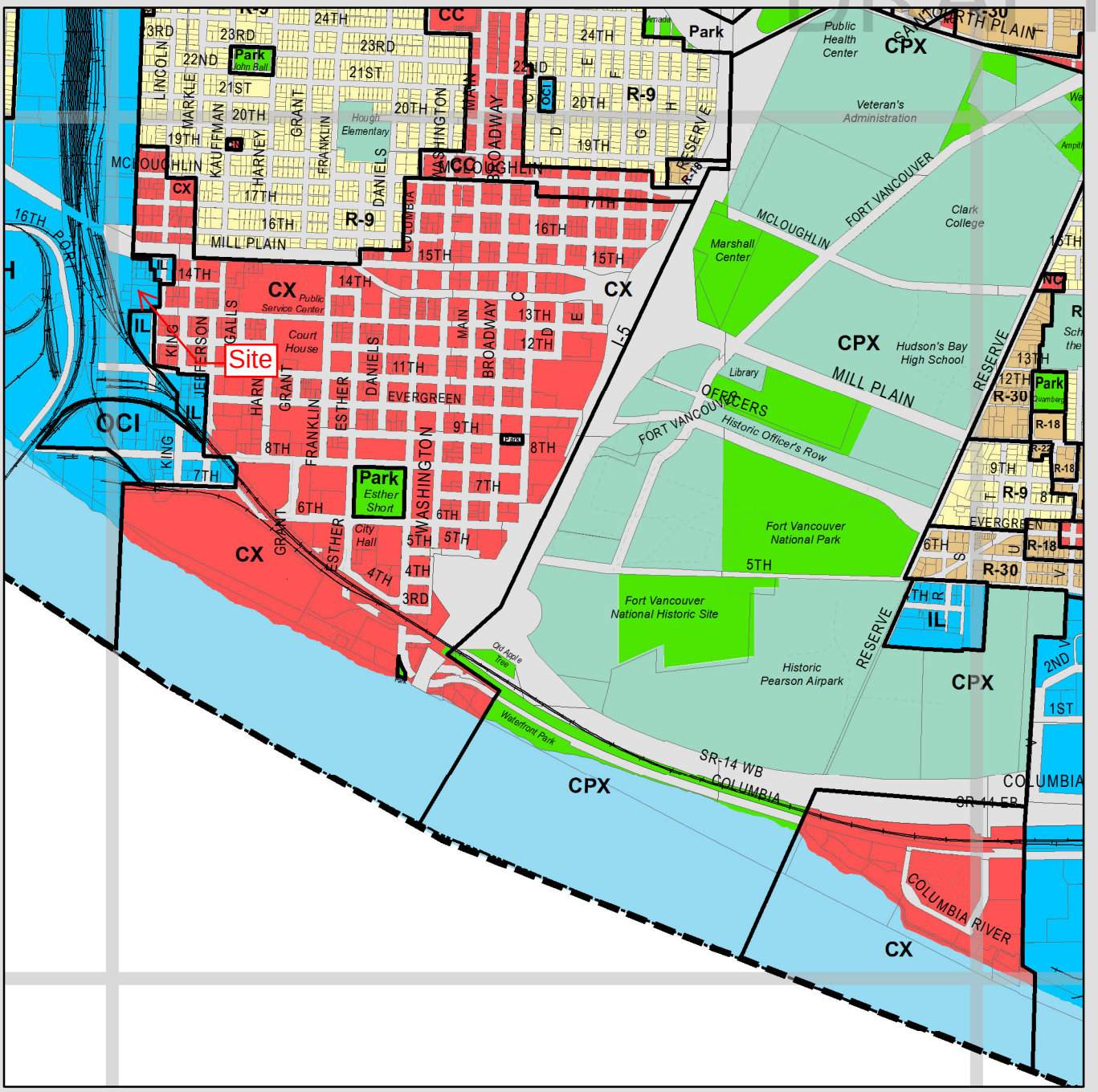
LOT	BLOCK
All in ...	...
9	55

W.R.I.A.	COUNTY
28	Clark

Vancouver Water Stations and Wellhead Protection Areas Map


Vancouver Water Stations
and Wellhead Protection Areas
DRAFT
CPU-LR
CPU-FV
WS3
WS14
WS8
WS1
WS15
WS9
WS7
CPU-LAC
WS4
Ellsworth WS
Site
NW 119th St
NW 99th St
NW 78th St
NE 78th St
NE 99th St
NE 119th St
NE Padden Pkwy
NE 76th St
NE 88th St
NE Minnehaha St
NE 63rd St
NE 49th St
NE 28th St
NE 18th St
W Fourth Plain Blvd
E Fourth Plain Blvd
NE Fourth Plain Blvd
E Mill Plain Blvd
SE Mill Plain Blvd
SE 1st St
SE 34th St
NE Burton Rd
NE Saint Johns Rd
NE Andresen Rd
NE 137th Ave
NE 162nd Ave
NE 172nd Ave
NE 182nd Ave
NE 192nd Ave
SE 192nd Ave
NE 138th Ave
NE 139th Ave
SE 164th Ave
Main St
Grand Blvd
Water Well Protection Buffer (100')
Special Wellhead Protection Area (1900')
Critical Aquifer Recharge Area
Vancouver City Limits
Major Roads
City of Vancouver Washington
0
1
2
4
Miles

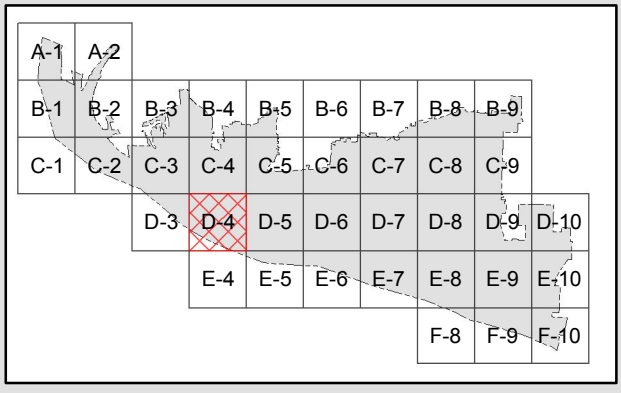
Zoning Map



Map Section: D-4

Comprehensive Plan Designations

- Urban Lower Density Residential
- Urban Higher Density Residential
- Commercial & Mixed Use
- Industrial
- Public Facility
- Open Space
- Water



0 0.25 0.5 Miles

N

Updated by Ord M-3994
Effective December 7, 2011

MTCA Table 749-2 Ecological Screening Values

Table 749-2
Priority Contaminants of Ecological Concern for Sites that Qualify for the Simplified Terrestrial Ecological Evaluation Procedure.[a]

Priority contaminant	Soil concentration (mg/kg)	
	Unrestricted land use[b]	Industrial or commercial site
METALS:[c]		
Antimony	See note d	See note d
Arsenic III	20 mg/kg	20 mg/kg
Arsenic V	95 mg/kg	260 mg/kg
Barium	1,250 mg/kg	1,320 mg/kg
Beryllium	25 mg/kg	See note d
Cadmium	25 mg/kg	36 mg/kg
Chromium (total)	42 mg/kg	135 mg/kg
Cobalt	See note d	See note d
Copper	100 mg/kg	550 mg/kg
Lead	220 mg/kg	220 mg/kg
Magnesium	See note d	See note d
Manganese	See note d	23,500 mg/kg
Mercury, inorganic	9 mg/kg	9 mg/kg
Mercury, organic	0.7 mg/kg	0.7 mg/kg
Molybdenum	See note d	71 mg/kg
Nickel	100 mg/kg	1,850 mg/kg
Selenium	0.8 mg/kg	0.8 mg/kg
Silver	See note d	See note d
Tin	275 mg/kg	See note d
Vanadium	26 mg/kg	See note d
Zinc	270 mg/kg	570 mg/kg
PESTICIDES:		
Aldicarb/aldicarb sulfone (total)	See note d	See note d
Aldrin	0.17 mg/kg	0.17 mg/kg
Benzene hexachloride (including lindane)	10 mg/kg	10 mg/kg
Carbofuran	See note d	See note d
Chlordane	1 mg/kg	7 mg/kg
Chlorpyrifos/chlorpyrifos-methyl (total)	See note d	See note d
DDT/DDD/DDE (total)	1 mg/kg	1 mg/kg
Dieldrin	0.17 mg/kg	0.17 mg/kg
Endosulfan	See note d	See note d
Endrin	0.4 mg/kg	0.4 mg/kg
Heptachlor/heptachlor epoxide (total)	0.6 mg/kg	0.6 mg/kg
Hexachlorobenzene	31 mg/kg	31 mg/kg
Parathion/methyl parathion (total)	See note d	See note d
Pentachlorophenol	11 mg/kg	11 mg/kg
Toxaphene	See note d	See note d
OTHER CHLORINATED ORGANICS:		
Chlorinated dibenzofurans (total)	3E-06 mg/kg	3E-06 mg/kg
Chlorinated dibenzo-p-dioxins (total)	5E-06 mg/kg	5E-06 mg/kg
Hexachlorophene	See note d	See note d
PCB mixtures (total)	2 mg/kg	2 mg/kg
Pentachlorobenzene	168 mg/kg	See note d
OTHER NONCHLORINATED ORGANICS:		
Acenaphthene	See note d	See note d
Benzo(a)pyrene	30 mg/kg	300 mg/kg
Bis (2-ethylhexyl) phthalate	See note d	See note d
Di-n-butyl phthalate	200 mg/kg	See note d
PETROLEUM:		
Gasoline Range Organics	200 mg/kg	12,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface.
Diesel Range Organics	460 mg/kg	15,000 mg/kg except that the concentration shall not exceed residual saturation at the soil surface.

Footnotes:

a Caution on misusing these chemical concentration numbers. These values have been developed for use at sites where a site-specific terrestrial ecological evaluation is not required. They are not intended to be protective of terrestrial ecological receptors at every site. Exceedances of the values in this table do not necessarily trigger requirements for cleanup action under this chapter. The table is not intended for purposes such as evaluating sludges or wastes.
This list does not imply that sampling must be conducted for each of these chemicals at every site. Sampling should be conducted for those chemicals that might be present based on available information, such as current and past uses of chemicals at the site.

b Applies to any site that does not meet the definition of industrial or commercial.

c For arsenic, use the valence state most likely to be appropriate for site conditions, unless laboratory information is available. Where soil conditions alternate between saturated, anaerobic and unsaturated, aerobic states, resulting in the alternating presence of arsenic III and arsenic V, the arsenic III concentrations shall apply.

d Safe concentration has not yet been established. See WAC 173-340-7492(2)(c).

Appendix C

Field Methods and Procedures

FIELD METHODS AND PROCEDURES

The following presents the general methods and procedures that are utilized to complete field activities. These activities include: advancing borings, soil excavation, groundwater level monitoring and surveying, installing temporary or monitoring wells, and collecting of soil and groundwater samples for laboratory analyses. Soil and groundwater samples are collected, preserved, and transported for analysis in general accordance with the Washington Department of Ecology (Ecology) methodology as presented under Chapter 173-340 Washington Administrative Code (WAC). If not specified by current Ecology regulations, sampling and analytical methods are implemented in general accordance with EPA protocol and/or commonly accepted industry standards for this time and place.

Utility Locating

Utilities, including overhead and underground, are identified and located prior to conducting work at the site. For overhead utilities, a safe minimum working distance is maintained with all sampling equipment dependant on the activity. For drilling or direct push equipment, a minimum 15-20 foot buffer is recommended. For other work such as excavation by backhoe, hand augering, hand probing, etc., a minimum distance is maintained such that the sampling equipment cannot come in contact with the utilities.

Underground utilities are located by contacting Utility Notification Center (UNC) for all underground sampling, excavation, and all other activities performed below the surface. The notification is performed at least 48 hours in advance of the work or as required by local laws and regulations to allow sufficient time for marking of the affected utilities. When warranted, MSBA will arrange on-site meetings with the contracted locators for the utilities to resolve any issues of proximity to the planned work.

In addition to contacting the UNC, MSBA may also perform one or more of the following activities intended to help prevent incidental contact with underground utilities during subsurface activities.

1) **Field Observation**: MSBA observes the site and surroundings for any signs of overhead and/or underground utilities.

2) **Private Utility Locate**: MSBA may contract with private utility locators if warranted to provide additional clarification of potential utilities and their locations.

3) **Hand Clearing**: MSBA may clear up to a maximum of the first five feet of subsurface soil for potential underground utilities by hand digging, hand augering, or air knifing.

Grab Soil Sampling

Grab soil samples are collected by hand or using a decontaminated shovel or hand trowel directly from surface/shallow soil or the sidewalls/base of a test pit or excavation area up to a depth of 4 feet below surface grade (bsg). At depths deeper than 4 feet bsg, soil samples are collected from an excavator bucket. The excavator bucket may be decontaminated prior to sampling. Just prior to collecting each sample, approximately 3 inches of soil is scraped away from the sampling surface. Soil samples are collected with a minimum amount of disturbance.

Soil samples are placed into laboratory provided wide-mouth glass jars, leaving as little headspace as possible. Soil samples are also collected in 40 milliliter (ml) volatile organic analysis (VOA) EPA method 5035 vials with a preservative. The jar is immediately sealed firmly with a Teflon-lined screw cap. After the samples are properly sealed, they are placed in an ice chest with ice and maintained at a temperature of 4° C (+/- 2° C) until preparation for analysis by the laboratory. Soil samples are analyzed within the laboratory designated hold times.

Disposable latex gloves are worn by the sampler and discarded after each sample. Sampling equipment is thoroughly cleaned and decontaminated between sampling events to help eliminate the potential for cross-contamination between samples. Each sample is clearly labeled with a unique name. A written record is maintained which includes, but is not limited to, the date, time, and location where the sample is collected, and any conditions which may have affected the sample integrity.

Drilling Method and Soil Sampling

Subsurface explorations are completed using drilling equipment operated by a licensed drilling subcontractor. The drilling method is selected based on the anticipated subsurface conditions. In general, push-probe or hollow-stem methods are utilized for softer silty soils and sonic or air-rotary methods are utilized for harder, rocky conditions. An MSBA representative oversees and directs the explorations and obtains all soil and groundwater samples.

Soil samples are collected by MSBA and placed into laboratory provided wide-mouth glass jars, leaving as little headspace as possible. Soil samples are also collected in 40 ml VOA EPA method 5035 vials with a preservative. The jar is immediately sealed firmly with a Teflon-lined screw cap. After the samples are properly sealed, they are placed in an ice chest with ice and maintained at a temperature of 4° C (+/- 2° C) until preparation for analysis by the laboratory. Soil samples are analyzed within the laboratory designated hold times.

Disposable latex gloves are worn by the sampler and discarded after each sample. Sampling equipment is thoroughly cleaned and decontaminated between sampling events to help eliminate the potential for cross-contamination between samples. Each sample is clearly labeled with a unique name. A written record is maintained which includes, but is not limited to, the date, time, and location where the sample is collected, and any conditions which may have affected the sample integrity. The soil type and other pertinent information is recorded on a field Subsurface Exploration Log.

Hand Auger Soil Boring and Sampling

Auger borings are advanced by hand. Samples of soil are collected directly from the barrel of the auger at the target depth or as warranted based on observed conditions. A written record is maintained which includes, but is not limited to, the date, time, and location where the sample is collected, and any unusual conditions which may affect the sample integrity.

Soil samples are collected by MSBA and placed into laboratory provided wide-mouth glass jars, leaving as little headspace as possible. Soil samples are also collected in 40 ml VOA EPA method 5035 vials with a preservative. The jar is immediately sealed firmly with a Teflon-lined screw cap. After the samples are properly sealed, they are placed in an ice chest with ice and maintained at a temperature of 4° C (+/- 2° C) until preparation for analysis by the laboratory. Soil samples are analyzed within the laboratory designated hold times.

Disposable latex gloves are worn by the sampler and discarded after each sample. Sampling equipment is thoroughly cleaned and decontaminated between sampling events to help eliminate the potential for cross-contamination between samples. Each sample is clearly labeled with a unique name. A written record is maintained which includes, but is not limited to, the date, time, and location where the sample is collected, and any conditions which may have affected the sample integrity. The soil type and other pertinent information is recorded on a field Subsurface Exploration Log.

Soil Field Screening Methods

Field screening methods consist of visual observations, water sheen screening, and/or headspace vapor screening using a MiniRAE photoionization detector (PID). Visual screening methods include observations of staining, discoloration, and other indicators of petroleum. Water sheen screening involves placing a small amount of soil into water and making observations of any sheens. Water sheen classifications are made as follows:

No Sheen: No visible sheen on the water surface.

Slight Sheen: Faint and dull sheen with no color; dissipates quickly. Naturally occurring organic matter may produce a slight sheen.

Moderate Sheen: May have some color or iridescence; spread of sheen is irregular to flowing; most of water surface covered with sheen.

Heavy Sheen: Obvious color and iridescence; spread is rapid; entire water surface may be covered with sheen.

Headspace vapor screening is conducted by creating a small hole in the soil core or placing a small portion of soil into a Zip-Loc bag and sealing it shut. The probe of the PID is inserted into the soil core. The soil sample within the bag is allowed to volatilize and the probe of the PID is inserted into the bag. The reported accuracy of a MiniRAE PID is 10% discrepancy at concentrations between 1 and 2,000 ppm and 20% discrepancy at concentrations greater than 2,000 ppm. The PID is calibrated in accordance with the manufacturer recommended procedures prior to each day of use.

Temporary Well Installation

Following completion of the soil borings, temporary wells may be installed to allow for groundwater level monitoring and sample collection. Following completion of the groundwater level monitoring and sampling, the temporary well is abandoned in accordance with the Washington Ecology Water Resources Program standards.

Well Development

Following installation, the temporary wells are developed to remove fines and to enhance the recharge and representative quality of water if sufficient water column and recharge is present. The development is performed using a bailer or pump (peristaltic or submersible). The well may be surged prior to development. Well development continues until the discharge is relatively sediment free. Well development may be discontinued if there is insufficient recharge.

Monitoring Well Elevation Survey

The top of each well casing is surveyed to within plus or minus (+/-) 0.01-foot relative to a common temporary benchmark. A temporary benchmark is designated with an assumed elevation relative to the approximate surface elevation above mean sea level (msl). The surveyed locations are marked on each casing for future reference and measuring. The purpose of the survey is to allow precise correlation of measured groundwater levels between each of the wells at the site. The survey information is recorded on a survey data sheet.

Groundwater Level Monitoring

The depth to groundwater (water level) is measured with an electronic, hand-held, water level indicator. The probe of the indicator is lowered in the well until contact with groundwater completes a circuit causing a buzzer to activate. The depth to water, measured from the surveyed point at the top of the well casing, is read directly from a graduated cord attached to the probe with marked increments of 0.01-foot. The groundwater level data is recorded on a groundwater level data sheet.

If present, free product thickness in a well is measured with an electronic, hand-held oil/water interface probe. The oil/water interface probe is lowered into the well until contact with fluids initiates a signal tone. An intermittent tone indicates water and a continuous tone indicates product. A measuring tape in increments of 0.01-foot is attached to the probe and is used to measure thickness of product in a well.

Groundwater Sampling

Prior to collecting a sample for laboratory analysis, the depth to water is measured and the wetted casing length and corresponding well volume is calculated. A minimum of three well volumes of groundwater is then purged with a bailer, submersible pump or peristaltic pump to remove potentially stagnant groundwater and allow the surrounding formation water to enter the well for sampling. During the purging process, the pH, conductivity, and turbidity may be monitored until these parameters are stabilized to confirm that representative formation water is collected for analysis. Stable parameters are generally defined by three successive readings within plus or minus 0.1 for pH, 3 percent for conductivity, and 10 percent for turbidity. Parameter stabilization is typically achieved in less than three well volumes.

After purging, a groundwater sample is collected when the water level in the well has recharged to within 85 percent of the initial static water level. If the desired amount of recharge is not achieved within a period of 60 minutes, the sample is collected and the deficient water level is recorded. If the water column does not contain sufficient volume, the sample may be collected incrementally as recharge allows. The sample is collected from the well using a bailer, submersible pump, or peristaltic pump with dedicated tubing, under low flow conditions to minimize the loss of volatile components, if present.

The groundwater is transferred into laboratory provided 40 ml glass VOA vials, one liter amber glass jars, and 250 ml polyethylene bottles. Some containers may contain a preservative. The type of container, and whether or not it is preserved, is determined by the type of laboratory analysis to be performed. Groundwater samples collected in VOAs are transferred with minimal agitation and sealed with Teflon-lined septum lids so that no head space is present. Samples collected in VOA vials are submitted for volatile organic compound (VOC) analysis. The vials may contain 2-5 drops of dilute HCL as a preservative increasing the sample hold time from 7 to 14 days. Groundwater

samples are collected in preserved or non-preserved one liter amber glass jars for analysis of non-volatile petroleum constituents. Groundwater samples are collected in non-preserved 250 ml polyethylene bottles for analysis of metals. Samples collected for analysis of dissolved metals are filtered in the field to remove 0.45 micron size particles or immediately upon receipt by the laboratory. Samples collected for analysis of total metals are not filtered. Groundwater purge and sample data is recorded on a Purge and Sample Data sheet.

After the samples are properly sealed, they are placed immediately in an ice chest with ice and maintained at a temperature of 4° C (+/- 2° C) until being prepared by the laboratory for analysis.

Chain-of-Custody and Labeling

The Chain-of-Custody (COC) is a form that documents the custody of a sample from the time of origin to the time of disposal or destruction. A COC is initiated in the field at the time the samples are collected. The sampler documents such information as the time, date, type of sample, and requested analyses. Any individual in custody of the samples, including the laboratory, is required to document the transfer of custody (beginning with the sampler) by signing the COC (including date and time of transfer).

Equipment Decontamination

Equipment used to collect soil and groundwater samples such as; bailers, water level indicators, etc., is decontaminated prior to each use. Strict decontamination procedures are utilized to help eliminate the potential for cross-contamination between samples and sample locations.

The decontamination procedure includes a thorough washing in tap water with Liquinox followed by two rinses in tap water and a third and final spray rinse using distilled water. If time permits, the sampling equipment is allowed to air dry. Disposable latex gloves are worn during sampling to help eliminate the potential for cross-contamination by the sampler. The gloves are discarded after each sample event and a new pair is utilized for each subsequent sampling event.

Investigation Derived Waste

Investigation derived waste (IDW) accumulated during the explorations typically consists of soil, groundwater, or decontamination and rinse waters. Soil and water are collected and placed into suitable containers. A label is affixed to each storage container including the date, contents, and contact information. The containers are stored onsite in a secure location pending disposal at an authorized facility. Disposable items such as sampling gloves, paper towels, and plastic sheeting are placed into plastic garbage bags and disposed in a municipal trash receptacle.

Appendix D

Site Health and Safety Plan

MARTIN S. BURCK ASSOCIATES, INC.
200 North Wasco Court, Hood River, OR 97031
Phone 541.387.4422 855.387.4422 Fax 541.387.4813
MSBA@MSBAenvironmental.com

Geologic and Environmental Consulting Services

SITE HEALTH AND SAFETY PLAN

A. GENERAL INFORMATION

Project Name:	North Star Casteel	Project Number: _____	
Location:	1200 W 13th St, Vancouver, WA		
Client	North Star Casteel		
Plan Prepared By:	Josh Owen	Date:	2/11/21
Plan Approved By:	Marty Burck	Date:	2/11/21
Project Start Date:	4/19/2021		

B. SITE DESCRIPTION

Facility History: The site is currently operated as a casteel manufacturing facility. The site has reportedly been operated as a cast steel foundry since the 1920's.

Site Description: The site consists of several buildings including a maintenance shop, welding building, office, foundry building, and a small residence.

C. PROJECT OVERVIEW

Objective: Conduct soil cleanup and investigation activities related to historic near surface

Scope of Work: Remove accessible shallow soil exceeding cleanup levels. Backfill the removal areas with clean imported soil. Collect confirmation soil samples. Cap and inspect existing concrete caps in selected areas.

D. PROJECT ORGANIZATION

Team Member	Responsibility	Training
Marty Burck	Supervisor	Registered/Licensed Geologist:, OR, WA, CA
Josh Owen	Supervisor	OSHA 40-Hour HAZWOPER and 8-hour Refresher, DEQ UST and HOT Decommissioning Supervisor, WA Site Assessor
Jonathan White	Project Manager	OSHA 40-Hour HAZWOPER and 8-hour Refresher, DEQ UST and HOT Decommissioning Supervisor, WA Site Assessor

E. CHEMICAL HAZARD ANALYSIS

Contaminant	PEL	IDLH	LEL/UEL	Flash Point	Routes of Exposure
Diesel	Not applicable	Not applicable	1.3 / 6.0 %	141 F	Inhalation, Absorption, Ingestion, Direct Contact (dermal)
Oil	Not applicable	Not applicable	NA	200 F	Inhalation, Absorption, Ingestion, Direct Contact (dermal)
Polychlorinated Biphenyls (PCBs)	0.001 ppm	5 ppm	NA	NA	Inhalation, Absorption, Ingestion, Direct Contact (dermal)
Arsenic	0.010 ppm	5 ppm	NA	NA	Inhalation, Absorption, Ingestion, Direct Contact (dermal)
Cadmium	0.005 ppm	9 ppm	NA	NA	Inhalation, Absorption, Ingestion, Direct Contact (dermal)
Chromium	1 ppm	250 ppm	NA	NA	Inhalation, Ingestion
Lead	0.05 ppm	100 ppm	NA	NA	Inhalation, Ingestion, Direct Contact (dermal)
Tetrachloroethylene (PCE)	100 ppm	150 ppm	NA	NA	Inhalation, Absorption, Ingestion, Direct Contact (dermal)

F. OTHER HAZARDS

Heat Stress:	Yes **No**	
Cold Stress:	Yes **No**	
Excessive Noise:	**Yes** No	*Wear ear plugs during operation of heavy equipment.*
Confined Space Entry:	Yes **No**	
Open Excavation:	**Yes** No	*Stay alert. Keep distance from open excavations. Do not enter excavations deeper than 4' bsg without shoring or proper shoring. Secure all open excavations prior to departure.*
Welding/Cutting:	Yes **No**	
Heavy Equipment:	**Yes** No	*Wear hard hats at all times; Make eye contact when in close proximity to heavy equipment.*
Slip, Trip, Fall Hazards:	**Yes** No	*Stay alert. Keep work area clean/unused tools properly stored.*
Overhead Utilities:	**Yes** No	*Evaluate presence/absence of overhead utilities within work area prior to using heavy equipment.*
Traffic:	Yes **No**	*Traffic control will not be used during this work. Use extreme caution around access roads.*

Underground Utilities:

Utility Location Service:	Utility Notification Center
Name of Contact:	Operator
Phone Number:	811
Precautions to be taken	A private locate will be performed to minimize risk associated with unmarked/nearby utilities

G. PERSONAL PROTECTIVE EQUIPMENT

The folowwing PPE will be utilized or available for use:

X Safety Glasses
X Hard Hat
X Steel-Toed Boots
X Ear Plugs
X Gloves
_____ Respirator
_____ Other

H. DECONTAMINATION

The decontamination procedures for personnel will include washing with soap and water. The decontamination procedure for sampling equipment will include washing in Liquinox detergent followed by rinses in tap water and a final rinse in deionized water.

I. AMBIENT AIR MONITORING

Activity	Instruments	Action Level	Frequency
Not Applicable			

J. PERSONNEL AIR MONITORING (1910.120(h))

Activity/Location	Contaminants	NIOSH/OSHA PROTOCOL
Not Applicable		

K. CONTINGENCY PLAN

Emergency Equipment on Site: (Location)

First Aid Kit:	Vehicle
Fire Extinguishers:	Vehicle
Telephone:	Vehicle (cell)
Eye Wash/Safety Shower:	Site Bathroom
Other:	

L. SIGN-OFF

All personnel have read the above plan and are familiar with its provisions. All personnel have received appropriate (OSHA) hazardous materials training to provide adequate safety to each individual commensurate with the work to be performed.

Name (Please Print)	**Signature**

M. LOCAL EMERGENCY NUMBERS:

HOSPITAL	Name:	PeaceHealth Southwest Medical Center
	Address:	400 NE Mother Joseph Pl
		Vancouver, WA 98664
	Phone:	360.514.2000
	Travel Time:	12 Minutes
	Directions:	See attached Directions and Map
	Map Attached:	Yes
PARAMEDICS	Name:	Vancouver Fire Department
	Phone:	Call 911
FIRE DEPT	Name:	Vancouver Fire Department
	Phone:	911 (emergency) or 360.487.7212
LOCAL POLICE	Name:	Vancouver Police Department
	Phone:	911 (emergency) or 360.487.7400
UTILITIES	Electric:	Clark County PUD - 360.992.3000
	Water/Sewer:	City of Vancouver - 360.487.7999
	Natural Gas:	NW Natural - 360.571.5465
	Communications:	Century Link - 800.244.1111

S:\Project Files\North Star Casteel\MSBA Reports\RIFS, Work Plan\App D SHSP\e-files\[H & S Plan.xls]Plan

Appendix E

Sampling and Analysis Plan

SAMPLING AND ANALYSIS PLAN

Field Quality Assurance

Soil Sampling

All soil samples are collected using disposable nitrile gloves, which are discarded after each sample. Sampling equipment is thoroughly cleaned between sampling events to minimize the potential of cross-contamination between samples. Samples are placed in laboratory provided containers and promptly put into a cooler with ice to maintain the temperature at approximately 4° C. Each sample container is labeled with the project name, sample identification, date, and time of collection. Samples collected during the investigation are tracked from the time of collection until received by the laboratory using a chain-of-custody. The chain-of-custody includes sample identification information, and serves as an analytical request document.

Pace Analytical (Pace) of Mount Juliet, Tennessee, performs the laboratory analysis of the soil and groundwater samples and supplies MSBA with the appropriate containers. Each sample is promptly delivered to the laboratory for analysis of constituents of interest (COIs) using appropriate methods to achieve reporting limits lower than or as low as is reasonably achievable as compared to the applicable soil and groundwater RBCs. Tables presenting the laboratory sample specifications and the laboratory detection objectives based on the minimum applicable cleanup levels for soil are included in this Attachment (Table SAP2).

A minimum of 1 equipment blank is collected during each field event at a rate of 1 per 20 samples for each matrix (i.e. soil and groundwater). Equipment blanks are submitted for laboratory analysis to evaluate potential cross-contamination of the samples. In addition, a minimum of 1 field duplicate soil sample is collected during each field event at a rate of 1 per 20 samples for each matrix. Field duplicates are submitted for laboratory analysis of COIs to evaluate precision with respect to sampling and analytical procedures. If samples are collected for the analysis of volatile organic compounds (VOCs), a minimum of 1 laboratory provided trip blank will accompany the samples at a rate of 1 per cooler. Trip blanks are submitted for analysis of VOCs to evaluate potential contamination of the samples during transport from/to the lab.

Laboratory Quality Control

The analytical laboratory maintains an internal quality assurance program consisting of a combination of the following:

Blanks - Blanks are laboratory prepared, contaminant free water samples. The blanks are carried through the analysis procedure along with the field samples to document that contaminants were not introduced to the samples during sample handling and analysis.

Surrogate Recoveries - Surrogates are organic compounds that are similar in nature to the analytes of concern, but are not normally found in nature. The surrogates are added to quality control and field samples prior to analysis. The percent recovery of the surrogate is calculated to demonstrate acceptable method performance.

LCS Recoveries - A Laboratory Control Sample (LCS) is a sample of known analytes and concentration, often a reference material containing certified amounts of target analytes or prepared by the laboratory. The percent recovery of the known concentration of analytes added to the LCS sample is calculated after chemical analyses to demonstrate acceptable method performance and to determine whether the laboratory is capable of making accurate and precise measurements at the required reporting limit.

Duplicates - Duplicates are obtained by splitting a sample into two parts which are then carried through the analyses. The analytical results are then compared by calculating the relative percent difference between the two samples.

MS/MSD Recoveries - A Matrix Spike (MS) sample is a sample that has been split into a second portion. The Matrix Spike Duplicate (MSD) is obtained by further splitting the MS sample. A known concentration of the analyte of interest is added to the MS and MSD samples. The analytical results for both samples are then compared for relative percent difference and percent recovery to demonstrate acceptable method performance.

BS and BSD Recoveries - Blank Spike (BS) and Blank Spike Duplicate (BSD) samples are obtained and analyzed in the same procedures as the MS/MSD samples. However, the laboratory blank sample is used to obtain the BS/BSD samples. The percent recovery and relative percent difference of the known concentration of analyte of interest added to the BS/BSD sample is calculated after chemical analyses to demonstrate acceptable method performance.

Review of Analytical Data

MSBA reviews the laboratory analytical reports for data quality exceptions and deviations from acceptable method performance criteria. Any exceptions and deviations, and the significance thereof, are discussed in the subsequent report.

TABLE SAP1
LABORATORY SAMPLE SPECIFICATIONS

Analyte	Analytical Method	Sample Media	Required Sample Volume	Number of Containers * Size	Container Preservative	Hold Time
Gasoline-Range Organics	NWTPH-Gx	Water	120 ml [a]	3 * 40 ml VOA [b]	HCl [c] pH<2	14 days
	NWTPH-Gx	Soil	10 gram	2 * 40 ml VOA	MeOH [d]	14 days
	EPA [e] TO-15	Soil Vapor	1 liter	1 * summa canister	None	30 days
Diesel-Range Organics	NWTPH-Dx	Water	2 liter	2 * 1 liter amber	HCl pH<2	14 days extraction 40 days analysis
	NWTPH-Dx	Soil	50 gram	1 * 8 oz [f] glass jar	Cool 4º C	14 days extraction 40 days analysis
	EPA TO-17	Soil Vapor	200 ml	1 * sorbent tube	Cool 4º C	30 days
Oil-Range Organics	NWTPH-Dx	Water	2 liter	2 * 1 liter amber	HCl pH<2	14 days extraction 40 days analysis
	NWTPH-Dx	Soil	50 gram	1 * 8 oz glass jar	Cool 4º C	14 days extraction 40 days analysis
Volatile Organic Compounds	EPA [f] 8260C	Water	120 ml	3 * 40 ml VOA	HCl pH<2	14 days
	EPA 8260C	Soil	10 gram	2 * 40 ml VOA	MeOH	14 days
	EPA TO-17	Soil Vapor	200 ml	1 * sorbent tube	Cool 4º C	30 days
	EPA TO-15	Soil Vapor	1 liter	1 * summa canister	None	30 days
Polynuclear Aromatic Hydrocarbons	EPA 8270D SIM	Water	120 ml	3 * 40 ml VOA	Cool 4º C	7 days extraction 40 days analysis
	EPA 8270D SIM	Soil	30 gram	1 * 8 oz glass jar	Cool 4º C	14 days extraction 40 days analysis
RCRA 8 Metals	EPA 6020B, 6010D, and 7470A	Water	100 ml	1 * 250 ml HDPE [g]	HNO_3 [h]	180 days
	EPA 6020B, 6010D and 7470A	Soil	0.5 gram	1 * 8 oz glass jar	Cool 4º C	180 days
PCBs	EPA 8082	Water	1 Liter	1 * 1 L glass jar	Cool 4º C	7 days extraction 40 days analysis
	EPA 8082	Soil	50 gram	1 * 4 oz glass jar	Cool 4º C	14 days extraction 40 days analysis

b Volatile organic analysis (VOA)
c Hydrochloric Acid (HCl)
d Methanol (MeOH)
e Environmental Protection Agency (EPA)
f ounce (oz)
g High density polyethylene (HDPE)
h Nitric Acid (HNO_3)

TABLE SAP2
LABORATORY DETECTION OBJECTIVES - SOIL
PHCs, VOCs, AND PAHs

Analyte	Analytical Method	CAS [a] Registry Number	Laboratory Reporting Limit [b] (ppm) [c]	Minimum Applicable MTCA Cleanup Levels [d] (ppm)
Petroleum Hydrocarbons (PHCs)				
Gasoline-Range Organics	NWTPH-Gx	NE [e]	0.8475	30/100 [f]
Diesel-Range Organics	NWTPH-Dx	NE	1.3300	2,000
Oil-Range Organics	NWTPH-Dx	NE	3.3300	2,000
Volatile Organic Compounds (VOCs)				
1,1,1,2-Tetrachloroethane	EPA 8260C	630-20-6	0.00050	NA [g]
1,1,1-Trichloroethane	EPA 8260C	71-55-6	0.00028	2
1,1,2,2-Tetrachloroethane	EPA 8260C	79-34-5	0.00039	NA
1,1,2-Trichloroethane	EPA 8260C	79-00-5	0.00088	NA
1,1,2-Trichlorotrifluoroethane	EPA 8260C	76-13-1	0.00068	NA
1,1-Dichloroethane	EPA 8260C	75-34-3	0.00058	NA
1,1-Dichloroethene	EPA 8260C	75-35-4	0.00050	NA
1,1-Dichloropropene	EPA 8260C	563-58-6	0.00070	NA
1,2,3-Trichlorobenzene	EPA 8260C	87-61-6	0.00063	NA
1,2,3-Trichloropropane	EPA 8260C	96-18-4	0.00510	NA
1,2,3-Trimethylbenzene	EPA 8260C	526-73-8	0.00115	NA
1,2,4-Trichlorobenzene	EPA 8260C	120-82-1	0.00482	NA
1,2,4-Trimethylbenzene (124-TMB)	EPA 8260C	95-63-6	0.00116	NA
1,2-Dibromo-3-Chloropropane	EPA 8260C	96-12-8	0.00510	NA
1,2-Dibromoethane (EDB)	EPA 8260C	106-93-4	0.00053	0.005
1,2-Dichlorobenzene	EPA 8260C	95-50-1	0.00145	NA
1,2-Dichloroethane (EDC)	EPA 8260C	107-06-2	0.00048	NA
1,2-Dichloropropane	EPA 8260C	78-87-5	0.00127	NA
1,3,5-Trimethylbenzene (135-TMB)	EPA 8260C	108-67-8	0.00108	NA
1,3-Dichlorobenzene	EPA 8260C	541-73-1	0.00170	NA
1,3-Dichloropropane	EPA 8260C	142-28-9	0.00175	NA
1,4-Dichlorobenzene	EPA 8260C	106-46-7	0.00197	NA
2,2-Dichloropropane	EPA 8260C	594-20-7	0.00079	NA
2-Butanone (MEK)	EPA 8260C	78-93-3	0.01250	NA
2-Chlorotoluene	EPA 8260C	95-49-8	0.00092	NA
4-Chlorotoluene	EPA 8260C	106-43-4	0.00113	NA
Acetone	EPA 8260C	67-64-1	0.01370	NA
Acrylonitrile	EPA 8260C	107-13-1	0.00190	NA
Benzene	EPA 8260C	71-43-2	0.00040	0.03
Bromobenzene	EPA 8260C	108-86-1	0.00105	NA
Bromoform	EPA 8260C	75-25-2	0.00598	NA
Bromomethane	EPA 8260C	74-83-9	0.00370	NA
Carbon Disulfide	EPA 8260C	75-15-0	0.00406	NA
Carbon Tetrachloride	EPA 8260C	56-23-5	0.00108	NA
Chlorobenzene	EPA 8260C	108-90-7	0.00057	NA
Chlorodibromomethane	EPA 8260C	124-48-1	0.00045	NA
Chloroethane	EPA 8260C	75-00-3	0.00108	NA
Chloroform	EPA 8260C	67-66-3	0.00042	NA
Chloromethane	EPA 8260C	74-87-3	0.00139	NA
Cis-1,2-Dichloroethene	EPA 8260C	156-59-2	0.00069	NA
Cis-1,3-Dichloropropene	EPA 8260C	10061-01-5	0.00068	NA
Dibromomethane	EPA 8260C	74-95-3	0.00100	NA
Dichlorobromomethane	EPA 8260C	75-27-4	0.00082	NA
Dichlorodifluoromethane	EPA 8260C	75-71-8	0.00035	NA
Hexachlorobutadiene	EPA 8260C	87-68-3	0.00053	NA
Ethylbenzene	EPA 8260C	100-41-4	0.01270	6

TABLE SAP2 (continued)

TABLE SAP2 (Continued)
LABORATORY DETECTION OBJECTIVES - SOIL
PHCs, VOCs, AND PAHs

Analyte	Analytical Method	CAS [a] Registry Number	Laboratory Reporting Limit [b] (ppm) [c]	Minimum Applicable MTCA Cleanup Levels [d] (ppm)
Isopropyl ether	EPA 8260C	108-20-3	0.00035	NA
Isopropylbenzene	EPA 8260C	98-82-8	0.00086	NA
Methyl isobutyl ketone (MIBK)	EPA 8260C	108-10-1	0.01000	NA
Methyl t-butyl ether (MTBE)	EPA 8260C	1634-04-4	0.00030	0.1
Methylene Chloride	EPA 8260C	75-09-2	0.00664	0.02
Naphthalene	EPA 8260C	91-20-3	0.00312	5
n-Butylbenzene	EPA 8260C	104-51-8	0.00384	NA
n-Propylbenzene	EPA 8260C	103-65-1	0.00118	NA
p-Isopropyltoluene	EPA 8260C	99-87-6	0.00233	NA
Sec-Butylbenzene	EPA 8260C	135-98-8	0.00253	NA
Styrene	EPA 8260C	100-42-5	0.00273	NA
Tert-Butylbenzene	EPA 8260C	98-06-6	0.00155	NA
Tetrachloroethene	EPA 8260C	127-18-4	0.00070	NA
Toluene	EPA 8260C	108-88-3	0.00125	NA
Trans-1,2-Dichloroethene	EPA 8260C	156-60-5	0.00143	NA
Trans-1,3-Dichloropropene	EPA 8260C	10061-02-6	0.00153	NA
Trichloroethene	EPA 8260C	79-01-6	0.00040	NA
Trichlorofluoromethane	EPA 8260C	75-69-4	0.00050	NA
Vinyl Chloride	EPA 8260C	75-01-4	0.00068	NA
Xylenes, total	EPA 8260C	1330-20-7	0.00478	9
Polycyclic Aromatic Hydrocarbons (PAHs)				
Acenapthene	EPA 8270D-SIM	83-32-9	0.00060	NA
Acenaphthylene	EPA 8270D-SIM	208-96-8	0.00060	NA
Anthracene	EPA 8270D-SIM	120-12-7	0.00060	NA
Benz[a]anthracene	EPA 8270D-SIM	56-55-3	0.00060	NA
Benzo[a]pyrene	EPA 8270D-SIM	50-32-8	0.00060	0.1
Benzo[b]fluoranthene	EPA 8270D-SIM	205-99-2	0.00060	NA
Benzo(g,h,i)perylene	EPA 8270D-SIM	191-24-2	0.00060	NA
Benzo[k]fluoranthene	EPA 8270D-SIM	207-08-9	0.00060	NA
Chrysene	EPA 8270D-SIM	218-01-9	0.00060	NA
Dibenz[a,h]anthracene	EPA 8270D-SIM	53-70-3	0.00060	NA
Fluoranthene	EPA 8270D-SIM	206-44-0	0.00060	NA
Fluorene	EPA 8270D-SIM	86-73-7	0.00060	NA
Indeno[1,2,3-cd]pyrene	EPA 8270D-SIM	193-39-5	0.00060	NA
Naphthalene	EPA 8270D-SIM	91-20-3	0.0020	5
Phenanthrene	EPA 8270D-SIM	85-01-8	0.00060	NA
Pyrene	EPA 8270D-SIM	129-00-0	0.00060	1,800
Polychlorinated Biphenyls (PCBs)	EPA 8082	1336-36-3	0.2	1
Metals				
Arsenic	EPA 6010D	7440-38-2	2.450	20
Cadmuim	EPA 6010D	7440-43-9	0.525	2
Chromium VI	EPA 7196A	18540-29-9	2.0	19
Chromium (total)	EPA 6010D	16065-83-1	1.25	2,000
Lead	EPA 6010D	7439-92-1	0.525	250

a Chemical Abstracts Services (CAS)
b Pace Analytical laboratory reporting limit assuming dilution is not required for analysis
c parts per million (ppm)
d Minimum applicable MTCA method A soil cleanup levels as presented in Table 740-1 of the MTCA Cleanup Regulation document
e (NE) Not established
f MTCA Method A Soil Cleanup Level is 100 ppm when benzene is not detected and ethylbenzene, toluene, and xylene are less than 1% of the mixture, and 30 ppm for all other mixtures
g (NA) Not available

DRAFT

13
12
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1

HA-8:<1
AOPC13-01
SB-6:10
AOPC13-04
AOPC13-02
SB-11:5
AOPC13-03
(<1)
cPAHs 0.1591
AOPC12-03
AOPC12-02
AOPC12-01
HA-9:<1
HA-7:1.0
HA-6:1.0
SB-7:5
AOPC11-01
HA-5:1.0
AOPC11-02
AOPC11-03
AOPC1-3
(~1)
D < 5.06
O < 12.7
As 3.4
Cd < 0.633
Cr(VI) -
Pb 5.12
PCBs nd
cPAHs 0.03179
AOPC14-1
(0)
O 155
SB-8:5
AOPC14-03
AOPC14-02
AOPC14-01
(<1)
O 7,100
HA-10:<1
AOPC1-4
(~1.5)
D 6.08
O 34.7
As 2.1
Cd 0.087
Cr(VI) -
Pb 8.14
PCBs nd
cPAHs 0.02891
HA-11:<1
HA-12:<1
AOPC1-01
(< 1)
As 63.1
Cd 23.9
Pb 1,350
HA-13:<1
AOPC3-01
SB-12:1
HA-14:<1
AOPC1-3
AOPC1-5
(~1.5)
D 26.2
O 126
As 4.21
Cd 0.447
Cr(VI) -
Pb 128
PCBs nd
cPAHs 0.05664
W 14th St.
AOPC3-02
AOPC1-05
(<1)
D 46,000
O 29,000
cPAHs 7.55
PCBs 2.8
SB-9:5
MW-1
AOPC1-2
(~1.5)
D 21.0
O 82.4
As 1.39
Cd < 0.0700
Cr(VI) 19.2
Pb 15
PCBs nd
cPAHs 0.06103
SB-13:1
AOPC1-03
(<1)
PCBs 3.2
SB-15:<1
Approximate
Location of UST
AOPC1-1
(~1.5)
D 11.6
O 63.7
As 0.641
Cd < 0.569
Cr(VI) -
Pb 5.69
PCBs nd
cPAHs 0.02862
AOPC1-04
(<1)
D 14,000
O 87,000
cPAHs 7.55
Cd 3.19
SB-10:5
AOPC1-02
SB-14:1
AOPC3-05
AOPC3-04
AOPC3-03
AOPC2-02
AOPC2-01
(<1)
As 31.8
AOPC9-01
HA-16:<1
HA-15:<1
HA-17:<1
SB-5:15
HA-21:<1
AOPC9-02
(<1)
As 26.1
Cr 2,360
SB-16:5
HA-4:0.5
(0.5)
O 3,400
cPAHs 0.5833
HA-22:<1
HA-18:<1
HA-19:<1
SB-17:5
HA-24:<1
HA-1:1.0
(1.0)
O 8,500
HA-23:<1
HA-2:1.5
AOPC5-02
(<1)
O 25,000
cPAHs 7.55
PCBs 1.8
AOPC5-1
(~3)
D 29
O 221
PCE 0.0241
PCBs 0.150
AOPC9-03
(<1)
As 22.2
Cr 2,880
HA-20:<1
HA-27:<1
(<1)
cPAHs 0.12272
AOPC5-4
(~3)
D 1,660
O 5,460
PCE 0.0292
PCBs 0.0950
HA-28:<1
HA-25:<1
HA-3:0.8
AOPC7-2
(~1.5)
O 522
SB-19:5
HA-29:<1
(<1)
cPAHs 0.1714
SB-3:5
AOPC5-04
SB-18:5
HA-26:<1
AOPC7-03
AOPC7-02
AOPC7-1
(~1.5)
O 338
AOPC5-03
(<1)
cPAHs 0.1788
PCBs 5.9
SB-2:15
AOPC5-2
(~2)
D 8.08
O 46.3
PCE 0.00993
PCBs 0.154
AOPC4-01
SB-4:15
AOPC7-01
(<1)
O 9,400
AOPC5-3
(~2)
D 22.7
O 113
PCE 0.091
PCBs 0.170
HA-31:<1
(<1)
cPAHs 0.1349
AOPC4-02
AOPC5-01
(<1)
D 2,800
O 38,000
cPAHs 7.55
PCBs 2.0
SB-1:20
PROPERTY BOUNDARY
Lincoln Ave.

Note: EPI data listed only for samples and analytes exceeding the MTCA Method A Cleanup Levels. AEG data listed for analytes detected above, or previously exceeding, the cleanup levels within the AOPC from which sample was collected. Data for remaining samples/analytes are included in the MSBA data tables and laboratory reports.

NORTH

0 20 40

Approximate Scale (feet)

LEGEND

- AEG/Magna Soil Removal Area
- Proposed Targeted Soil Removal Area
- Proposed Residual COCs Cap Area
- Additional Proposed Soil Sample Location
- **MW-1** Monitoring Well Location and ID
- **SB-2** EPI HSA Soil Boring Sample Location and ID (2017-2018)
- **HA-31** EPI Hand Auguer Soil Boring Sample Location and ID (2017-2018)
- **AOPC4-02** EPI Near Surface Soil Sample Location and ID (2017)
- **AOPC5-1** AEG/Magna Soil Sample Location and ID (2018)

AOPC5-01
(<1)
D 2,800 Soil Sample ID; Sample Depth (feet below surface grade); Diesel (NWTPH-Dx) (ppm)
O 38,000 Oil (NWTPH-Dx) (ppm)
cPAHs 7.55 TEF Adjusted Total Carcinogenic PAHs (8270) (ppm)
PCBs 2.0 Polychlorinated Biphenyls (8082A) (ppm)

PCE 0.091 Tetrachloroethylene (8260C) (ppm)
As 1.39 Arsenic (6020A) (ppm)
Cd < 0.0700 Cadmium (6020A) (ppm)
Cr(VI) 19.2 Hexavalent Chromium (3060A/7196A) (ppm)
Cr 2,880 Total Chromium (6020A) (ppm)
Pb 15 Lead (6020A) (ppm)

- **Green Outline** Sample Collected by AEG Following Excavation Cleanup
- **Brown Text** Represents Soil Removed During Excavation Cleanup
- **Red Value** Concentration Exceeds Method A Cleanup Level
- **Green Value** Concentration Exceeds Method A Cleanup Level, but is Below Method B Cleanup Level
- (<) Not Detected Above Method/Reporting Limit, as listed
- (nd) None Detected
- (-) Not Analyzed
- 14 Area of Potential Concern (AOPC) and ID

Revised: 3/10/2021 4:24 PM

MSBA
Martin S. Burck Associates, Inc.
Geologic and Environmental Consulting Services

FIGURE 5

REMEDIAL PLAN MAP

North Star Casteel Property
1200 West 13th Street
Vancouver, WA 98660

S:\Project Files\North Star Casteel\Figures\RIFS, Work Plan\F 5 Remedial Plan.vsd