



Chromium Assessment Report

**Northwest Pipeline LLC
Mount Vernon Compressor Station
15498 Lange Road
Mount Vernon, Washington 99273**

Latitude 48.423 N – Longitude 122.216 W

Voluntary Cleanup Program # NW2008

Facility Site ID # 2684

Cleanup Site ID # 4766

Prepared For:

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TABLE OF CONTENTS

1.0 INTRODUCTION	1
2.0 BACKGROUND	1
2.1 Facility Description	2
2.2 Remedial Investigation and Ecology Communications	2
2.3 Interim Remedial Actions and Problem Formulation.....	2
3.0 INITIAL INVESTIGATION.....	4
3.1 Initial Objectives	4
3.2 Methodology	4
3.3 Findings	6
3.4 Initial Data Review	7
3.5 Initial Background Study.....	8
3.5.1 Methodology	8
3.5.2 Initial Background Findings	9
Planned Next Steps.....	9
4.0 TERRESTRIAL ECOLOGICAL EVALUATION.....	10
5.0 ANALYTICAL CONSIDERATIONS	11
6.0 RE-ASSESSMENT	12
6.1 Methodology	12
6.2 Findings	13
7.0 BACKGROUND STUDY	13
7.1 Statistical Methods	13
7.2 Findings	14
7.3 Establishing Background Concentration	14
7.4 Site Data Evaluation Compared to Background	15
8.0 FINDINGS	16
9.0 LIMITATIONS.....	17

TABLES

Table 1	Summary of Chromium Data using EPA Method 6010
Table 2	Summary of Hexavalent Chromium Results
Table 3	Summary of Initial Background Soil Analytical Results
Table 4	TEE Sampling Analytical Data Comparison and Discrepancies
Table 5	Summary of Re-Assessment Chromium Analytical Results for Soil (in mg/kg)
Table 6	Summary of Re-Assessed Chromium Data for Area Background Study

FIGURES

Figure 1	General Vicinity Map
Figure 2	Site Representation
Figure 3	Soil Sample Locations Analyzed by EPA Method 6010
Figure 4	Locations of Initial Background Samples
Figure 5	Soil Sample Locations Analyzed by EPA Method 6020
Figure 6	Background Sample Locations analyzed by ICP-MS Analytical Methods
Figure 7	Soil Sample Locations Analyzed by EPA Method 6020, with Chromium Concentrations that Exceed Background Levels

ATTACHMENTS

Attachment A	Ecology Opinion Letter dated November 5 2013
Attachment B	Ecology Opinion Letter dated August 30, 2011
Attachment C	Ecology Opinion Letter dated September 29, 2014
Attachment D	Copies of Laboratory Analytical Reports
Attachment E	MTCA Stat Report for Background Data
Attachment F	MTCA Stat Report for Site Data

ABBREVIATIONS AND ACRONYMS

Abbreviation/ Acronym	Definition
AST	Aboveground storage tank
COC	Contaminant of concern
CUL	Cleanup level
DPT	Direct-push technology
Ecology	Washington State Department of Ecology
EIC	Ecological Indicator Soil Concentrations
EPA	U.S. Environmental Protection Agency
EPI	Environmental Partners, Inc.
ESC	Environmental Science Corporation
FBI	Friedman & Bruya, Inc.
ICP	Inductively coupled plasma
ICP-MS	Inductively coupled plasma-mass spectrometry
IRA	Interim remedial action
MTCA	Model Toxics Control Act
NWP	Northwest Pipeline LLC
REL	Remediation level
RI-CAP	Remedial Investigation and Cleanup Action Plan
TEE	Terrestrial Ecological Evaluation
UCL90	90 percent upper confidence limit
UCL95	95 percent upper confidence limit
WAC	Washington Administrative Code

1.0 INTRODUCTION

On behalf of Northwest Pipeline LLC (NWP), Environmental Partners, Inc. (EPI) is pleased to present this *Chromium Assessment Report* for the Mt. Vernon Compressor Station (Mt. Vernon C/S) located at 15498 Lange Road, Mount Vernon, Washington (subject property). The location of the subject property is presented on Figure 1. NWP is the sole owner of the subject property.

The work at the subject property has been performed in continued fulfillment of: (1) the assessment and remediation initiated by NWP during the 2005/2006 Capacity Replacement Project (CRP) and (2) statements made in NWP's "commitment letter" dated January 19, 2006, which indicated the company's commitment to assessing and, as necessary, remediating its remaining facilities in Washington following the CRP. This Chromium Assessment Report, and the work documented herein, are intended to meet the remediation and reporting requirements of the Model Toxics Control Act (RCW 70.105D) and its implementing regulations (Washington Administrative Code [WAC] 173-340; collectively "MTCA").

The subject property is enrolled in the Washington State Department of Ecology (Ecology) Voluntary Cleanup Program (VCP) as VCP Project No. NW2008 and Ms. Diane Escobedo is the acting Ecology Project Manager. The Ecology Facility/Site ID number is 2684.

EPI previously completed an *Interim Remedial Action Report* (IRA Report) for the subject property dated January 5, 2017 to document the removal of all contaminants of concern (COCs) in soil, with the exception of chromium. During implementation of the remedial actions, chromium impacts appeared to be more widespread than initially determined during the remedial investigation. The apparent widespread nature of chromium in soil was inconsistent with the prior knowledge of the subject property and the uses and potential sources of release of chromium. There was not a clear explanation for the distribution of chromium in soil. The available data suggested the possibility of analytical or laboratory bias in the data or some unknown release mechanism not associated with operations at the Mt. Vernon C/S. Additional assessment and investigation were required to further evaluate these possibilities and to assess whether chromium is an appropriate COC for the subject property.

Since completion of the IRA, extensive assessment work has been conducted at the subject property. This report details those efforts, the investigative findings, and clearly supports a conclusion that the majority of the chromium concentrations observed at the subject property were the result of inadvertent analytical interference resulting in a substantial upward bias in reported chromium concentrations.

2.0 BACKGROUND

This section summarizes the pertinent background information for actions previously taken at the subject property.

2.1 Facility Description

The subject property consists of a compressor station facility within a fenced and locked enclosure. The area inside the fence is approximately 9.9 acres. The facility is located northwest of Lange Road in Skagit County and can be accessed from Plant Road off of Lange Road at approximately 48° 25' 21" North latitude, 122° 12' 57" West longitude.

The compressor station facility Standard Industrial Classification (SIC) number is 4922 and the North American Industry Classification System (NAICS) number is 486210.

A detailed description of the structures and appurtenances present at the subject property is included in the *Site Condition Summary and Sampling Plan*, dated December 2005, and previously submitted to Ecology. A representation of current features at the subject property is presented on Figure 2. In general, the fenced enclosure includes three compressor complexes identified in this report as Compressor Complexes A, B, and C. There are six large buildings plus numerous support structures, and aboveground storage tanks (ASTs). Piping at the facility and 30-inch and 26-inch gas transmission mainlines traverse the eastern edge of the enclosure. Suction and discharge piping tee off of the main lines along the eastern fence and traverse east-west into the compressor complexes at the facility.

2.2 Remedial Investigation and Ecology Communications

Prior to IRA implementation, NWP prepared a *Remedial Investigation and Cleanup Action Plan* (RI-CAP), dated November 14, 2012, presenting the current subject property conditions, remedial objectives, COCs, associated remediation levels (RELs), and cleanup levels (CULs), and technical basis for conducting a remedial action. This document was submitted to Ecology through the VCP for review and approval prior to implementation.

Ecology approved the selected remedial action presented in the RI-CAP via an opinion letter dated November 5, 2013. A copy of that letter is presented in Attachment A.

2.3 Interim Remedial Actions and Problem Formulation

Interim remedial actions were conducted at the subject property in September through November 2014. The results of the IRA activities are documented in the IRA Report dated January 5, 2017. The RI-CAP served as the basis for the remedial actions conducted. The reader is referred to the RI-CAP document for all site characterization details and the development of the RELs and CULs used for the remedial actions and the IRA Report for the details of the implemented cleanup.

As documented in the IRA Report, prior to conducting the remedial actions, it was necessary to conduct terrestrial ecological evaluation (TEE) hot spot removals to show compliance at the subject property with applicable TEE regulations documented in WAC 173-340-7490. The contaminants of ecological concern (COECs) for the TEE were total chromium and mercury. There were 14 TEE hot spot removal areas identified at the Mt. Vernon C/S. Twelve of the planned 14 hot spot excavations were to address chromium in soil. The remaining two TEE hot spot removal areas were for mercury.

The approach for TEE hot spot removals was presented in the *Terrestrial Ecological Evaluation Program for Northwest Pipeline GP I-5 Corridor Compressor Station Facilities* dated August 16, 2011 (TEE Program Document), which was approved by Ecology via a letter dated August 30, 2011. A copy of that letter is presented in Attachment B. The methodology for the hot spot removal was documented in the RI-CAP.

The objective of hot spot removal was to comply with TEE CULs documented in NWPL GP's *Terrestrial Ecological Evaluation Summary Report, Northwest Pipeline GP I-5 Corridor Compressor Station Facilities*, dated February 19, 2013, which was formally approved by Ecology via memorandum dated September 29, 2014. A copy of that approval is presented in Attachment C.

The TEE CULs were:

- Chromium – 42 milligrams/kilogram (mg/kg); and
- Mercury – 0.1 mg/kg.

During the IRA, TEE hot spot removals were attempted in 9 of the 14 hot spot locations. The two hot spot removal areas excavated for mercury impacts were determined to be in compliance with the TEE CUL of 0.1 mg/kg at the completion of excavation.

The remaining seven TEE hot spot areas were excavated for chromium impacts. Only one of the seven of these areas excavated for chromium achieved the cleanup level of 42 mg/kg at the terminal limits of the excavation area. The terminal limits of the remaining six TEE hot spot removal areas continued to contain chromium at concentrations exceeding the TEE CUL of 42 mg/kg.

An initial evaluation of these data did not indicate a clear pattern of distribution or decreasing trends as the excavation progressed outward. These data suggested the possibility that either chromium impacts were more widespread than originally anticipated or that there were other factors at play in the observed concentrations.

The appearance of widespread chromium in soil at the Mt. Vernon C/S facility was incongruent with facility knowledge due to the following:

- There was no known source of significant chromium at the Mt. Vernon C/S facility.
- There was not a known mechanism to distribute chromium in the locations observed.
- A total of 15 compressor station facilities have been assessed as part of the NWP assessment and remediation program initiated across Washington State. The Mt. Vernon C/S facility was the only compressor station to exhibit the chromium impacts at the magnitude and distribution observed.

In addition to these issues, the published TEE CUL for chromium of 42 mg/kg is highly conservative and is based upon the observed natural background concentration for Washington State. Absent a known or suspected source of chromium at the Mt. Vernon C/S, no pattern of chromium release at other

compressor station facilities (which all contain similar processes), and observed concentrations above an established background concentration, it was determined that further evaluation of the source of the observed concentrations was warranted.

Based on these considerations further assessment was initiated to:

- Perform a more thorough investigation of the chromium impacts, including assessing both surface and subsurface soil conditions;
- Assess natural background concentrations of chromium soil concentrations in the area surrounding the subject property;
- Assess a site-specific TEE cleanup level for chromium instead of using the book value published in MTCA Table 749-3; and
- Evaluate chromium analytical methods.

This Chromium Assessment Report documents this further investigation of chromium impacts to soil at the Mt. Vernon C/S and presents conclusions regarding the origin of the previous elevated chromium impacts observed at the subject property.

3.0 INITIAL INVESTIGATION

Based on the findings during the IRA, an investigation was initiated to further assess the chromium impacts at the Mt. Vernon C/S.

3.1 Initial Objectives

The initial objectives of the further investigation were to perform a site-wide assessment of chromium impacts at the subject property in order to determine a potential source area(s) and extent of chromium impacts. Specific objectives included:

- Collect surface soil samples and subsurface samples from depths ranging from 12 to 30 inches using a site-wide evenly distributed grid network.;
- Perform chromium analysis on samples in select locations at depths ranging from 60 to 120 inches below grade to determine a potential depth of impact; and
- Data analysis to determine potential next steps for addressing chromium.

3.2 Methodology

Soil sampling was conducted at the Mt. Vernon C/S in four successively iterative phases:

- June 2015;
- September 2015;
- December 2015; and
- October 2016.

During the June 2015 sampling the facility was initially screened on a 75-foot site-wide off-set sampling grid in an attempt to identify chromium hot spots and potentially identify a source. As data were received and evaluated, follow-up sampling in September 2015, December 2015 and October 2016 was performed to successively fill apparent data gaps and to vertically and laterally delineate the extent of chromium impacts. The sample locations are depicted on Figure 3.

Locations were sampled by a combination of hand sampling and using a direct-push technology (DPT) drill rig to sample at deeper depths. All sampling equipment was decontaminated using a triple-rinse Alconox solution prior to advancing sampling equipment and hand tools necessary for sampling.

A total of 1,221 soil samples (including duplicates) were retained for laboratory analysis. Sample names are designated with the coordinates of their corresponding grid node followed by a colon with the sample depth indicated in inches. For example, sample DI57:18 was collected at the northing grid node DI and easting grid node 57 at a depth of 18 inches below grade.

Duplicate samples were collected from 14 locations. Duplicate samples are designated with a “.5” following the depth in the sample name. Therefore, a duplicate sample collected from the example sample above would be named DI57:18.5. All duplicate samples collected at the site were taken from surface sample locations (see below for surface sampling definition).

In addition, a total of 25 samples were collected at the limits of the initial IRA hot spot excavations, resulting in a total of 1,246 samples representative of undisturbed on-site conditions.

Soil sampling was conducted within four vertical “horizons” defined as follows:

1. **Surface Samples** – Surface samples ranged in depth from immediately below the gravel surface (i.e., designated as depth “0”) to 3 inches below grade. A surface sample was submitted for analysis from each sample location. A total of 487 samples (including duplicates) were submitted from this horizon.
2. **Subsurface Horizon 1** – Subsurface Horizon 1 samples ranged in depth from 6 inches to 18 inches below grade. Soil samples from this horizon were submitted for analysis from each sample location. A total of 495 samples were submitted from this horizon, which includes 24 samples that were collected from this horizon during the hot spot remediation.
3. **Subsurface Horizon 2** – Subsurface Horizon 2 samples ranged in depth from 24 to 30 inches below grade. Samples from this horizon were selectively submitted for analysis to vertically delineate impacts identified at the second sampling horizon. A total of 256 samples were submitted from this horizon, which includes one sample that was collected from this horizon during the hot spot remediation.

4. **Subsurface Horizon 3** – Subsurface Horizon 3 samples were from 60 inches below grade or deeper. Samples from this horizon were submitted from a total of eight total locations to assess for deeper impacts.

All sample locations are depicted on Figure 3.

All samples were collected into new laboratory-supplied sampling jars. All samples from the initial investigation were submitted to ESC Lab Sciences (ESC) of Mt. Juliet, Tennessee, for chromium analysis using U.S. Environmental Protection Agency (EPA) Method 6010C.

In addition, a total of 31 soil samples displaying the highest concentration of total chromium were submitted for analysis of hexavalent chromium using EPA Method 3060A/7196A.

3.3 Findings

The analytical results for the Initial Investigation are presented in Table 1. Sample locations are depicted on Figure 3. Copies of the original laboratory reports are included in Attachment D.

As previously mentioned, all initial samples were analyzed using EPA Method 6010C. Total chromium was detected at concentrations ranging from 5.1 mg/kg to 783 mg/kg using this analytical method.

Since TEE CULs are the driver for the investigation, all samples were screened against the MTCA Table 749-3 Ecological Indicator Concentration (EIC) of 42 mg/kg for chromium. Total chromium concentrations exceeded the EIC value of 42 mg/kg in 1,173 of the 1,246 samples. The number of exceedances in each sampling horizon breaks down as follows:

- Surface Samples – 444 of 487 samples
- Subsurface Horizon 1 (12 to 18 inches) – 472 of 495 samples
- Subsurface Horizon 2 (24 to 30 inches) – 250 of 256 samples
- Subsurface Horizon 3 (60 inches or below) – 7 of 8 samples

A summary of the hexavalent chromium data is included in Table 2. Hexavalent chromium was detected in 6 of the 31 samples submitted for analysis. The concentrations ranged from 2.8 mg/kg to 4.7 mg/kg. There is no established EIC for hexavalent chromium. Therefore, hexavalent chromium concentrations were compared to the MTCA Method A Soil Cleanup Level for Unrestricted Land Uses of 19 mg/kg. None of the detected concentrations of hexavalent chromium exceeded the 19 mg/kg value and therefore, moving forward, hexavalent chromium is not considered a COC for the Mt. Vernon C/S facility.

3.4 Initial Data Review

Based on a review of the data, the distribution of total chromium using EPA Method 6010C in the four data horizons did not display any discernable pattern that could be associated with a point source(s) for release of chromium at a property. For a typical metals release scenario, concentrations would be highest at the surface and attenuate with depth and would also demonstrate a decrease in concentrations vertically and laterally from the source. This distribution pattern for metals has been consistently observed during the extensive investigation and remediation activities performed at the other 15 NWP compressor station facilities. That is not the pattern of distribution observed for chromium at the Mt. Vernon C/S.

In many cases for the initial EPA Method 6010C dataset at the Mt. Vernon C/S facility, concentrations at Subsurface Horizon 1 were higher than the Surface Samples and rarely were deeper samples from Subsurface Horizon 2 or 3 coincident with high concentrations in the shallower horizon. There was no discernable or consistent pattern that was suggestive of a surface release and concentration attenuation with depth. Additionally, the lateral distribution of chromium in soil was not associated with current or known historic uses or areas of operation. That is, the reported chromium concentrations did not coincide with actual subject property activities but, rather, were located somewhat randomly across the property.

At this time in the investigation, EPI conducted an exhaustive search for a potential chromium source(s) at the Mt. Vernon C/S. The search included interviews with long-time employees, review of chemical data from on-site processes, review of historic on-property chemical use, review of local geologic conditions, and review of nearby potential source areas. Despite the exhaustive search, no known significant source of chromium was identified at or near the Mt. Vernon C/S facility.

The appearance of widespread chromium continued to incongruous with the operations at the Mt. Vernon C/S facility due to the following:

- The distribution of chromium did not have a discernable pattern that would represent a single release;
- Despite an exhaustive search including interviews with long-time employees, review of chemical data from on-site processes, review of local geologic conditions, and review of nearby potential source areas, no known significant source of chromium was identified at or near the Mt. Vernon C/S facility;
- There was not a known mechanism to distribute chromium in the locations observed; and
- A total of 15 compressor station facilities have been assessed as part of the NWP assessment and remediation program initiated across Washington State. The Mt. Vernon C/S facility was the only compressor station to exhibit the chromium impacts at the magnitude and distribution observed.

3.5 Initial Background Study

At this point in the assessment of the subject property, EPI and NWP began to suspect that the observed chromium impacts may not be associated with the compressor stations operations.

In order to assess whether a release of chromium had occurred at the subject property, a background study was performed in compliance with WAC 173-340-709 Methods for Defining Background Concentrations.

3.5.1 Methodology

Two types of background concentrations may be determined: "natural background" and "area background" concentrations, as defined in WAC 173-340-200. These types of background concentrations are defined as follows:

- "Natural background" is defined as the concentration of hazardous substance consistently present in the environment that has not been influenced by localized human activities (i.e., naturally occurring metals and radionuclides in rock and soil due to geological processes, or persistent organic compounds or radionuclides in surficial soils and/or sediment due to global distribution or fallout from bomb testing and nuclear accidents).
- "Area background" is defined as the concentrations of hazardous substances that are consistently present in the environment in the vicinity of a site that are the result of human activities unrelated to releases from that site. The size of the affected area for a particular contaminant is smaller than for natural background.

For this study, it was determined that a natural background study was appropriate. The area surrounding the subject property is not influenced by human activities and provided a good basis for naturally occurring metals in soil due to natural processes.

In accordance with WAC 173-340-709(4), a minimum of 10 samples is required to determine natural background concentration. Samples must be collected from areas that have the same basic characteristics as the medium of concern (e.g., similar geology and soil characteristics).

Samples must also be collected in areas that have not been influenced by releases from a site, and, in the case of natural background concentrations, have not been influenced by releases from other localized human activities.

As part of the initial background study for the vicinity of the Mt. Vernon C/S facility, a total of 20 samples were collected and analyzed for chromium. At each sample location, the ground surface was scraped by hand using decontaminated tools to reveal soil immediately beneath the grass or natural duff surfaces. Soil samples were collected from the first available soil at each location, at depths generally 3 to 6 inches below grade.

The background sampling phase was broken into two mobilizations. Fifteen of the 20 samples were collected in October 2016. These samples were submitted to ESC Lab Sciences of Mt. Juliet, Tennessee, for chromium analysis using EPA Method 6010C. It was later determined that a wider area of study was warranted for the background study and an additional 5 samples were collected. Due to the desire for “rush” data, these remaining five samples were submitted to Friedman & Bruya Analytical Laboratories, Inc. (FBI) of Seattle, Washington, using EPA Method 200.8. The sample locations are depicted on Figure 4.

3.5.2 Initial Background Findings

The analytical results for the initial background are summarized in Table 3. Copies of the original laboratory reports are included in Attachment D.

Total chromium concentrations ranged from 16.7 mg/kg to 352 mg/kg in the 20 samples collected from the background locations. Four of the background sample locations contained concentrations exceeding 180 mg/kg. Based on sampling conducted throughout Washington and conversations with toxicologists from Ecology, in the absence of a chromite-bearing source material (which is not typical in the area of the Mt. Vernon C/S facility), it was highly unlikely that concentrations exceeding 180 to 200 mg/kg would be considered true background.

These findings caused further suspicion for the dataset. Given the background sampling locations and their distance from the subject property, and knowledge of the subject property operations, it was deemed highly unlikely that the Mt. Vernon C/S facility could have affected such a large area. Moreover, there was no reason to believe that the natural background in the area of the subject property should be 4 to 5 times the state-wide background. Additionally, there was no indication of a historical area wide source that could have produced and elevated area background.

Planned Next Steps

Despite the lack of apparent source and the unlikelihood of an on-property release, the data collected through the background study continued to suggest that remediation may be necessary. Therefore, a plan for implementation of additional assessment was formed to address the apparent chromium impacts.

In order to better define the cleanup levels to be used at the subject property a site-specific TEE was planned to establish a more accurate TEE CUL based on property-specific conditions and considerations, rather than the generic EIC value contained in MTCA.

The plan to address the subject property at that time was as follows:

- Perform a site-specific TEE for the Mt. Vernon C/S facility. This effort would include performance of bioassay testing on site-specific flora to determine an appropriate TEE CUL.
- After establishing TEE CULs, the areas of impact would be defined in accordance with the site-specific TEE CUL.

- Perform required remediation and/or Net Environmental Benefit Analysis (NEBA) as allowed under MTCA.

4.0 TERRESTRIAL ECOLOGICAL EVALUATION

NWP initiated a TEE to establish site-specific cleanup levels for the Mt. Vernon C/S facility. It was during this phase of work that an analytical problem was identified for the existing EPA Method 6010C chromium dataset. The discovery of the problem is described below.

In cooperation with Ecology, NWP has performed numerous TEEs for both its meter and compressor station facilities throughout Washington State. These site-specific TEE studies utilize bioassay and bioaccumulation factor testing to establish site-specific concentrations protective of potential on-site terrestrial receptors. The first step of this process is to establish a starting concentration for the bioassay testing.

In order to establish a starting concentration, a TEE soil sample is collected into a 5-gallon bucket. From the bucket, five discreet representative samples are collected. Each sample is analyzed for the target analyte being considered in the TEE. The concentrations of the five samples submitted from the TEE bucket are then averaged to establish the starting concentration.

To select an appropriate TEE sample location, the initial EPA Method 6010C dataset was reviewed. Based on this review the following locations (and original chromium concentrations) were selected:

- AI-85:0 – 598 mg/kg;
- CK-88:3 – 726 mg/kg;
- CK-88:18 – 563 mg/kg; and
- CO-88:18 – 422 mg/kg.

These four locations were good candidates for the TEE sampling as they represented some of the highest total chromium concentrations observed at the Mt. Vernon C/S facility. Therefore, a TEE bucket sample was collected from each of these locations. From each bucket, a total of five soil samples was collected and submitted to FBI for total chromium analysis using EPA Method 6020A.

After receipt of the analytical data for each of the TEE bucket samples, it was discovered that the concentrations reported by FBI using EPA Method 6020A were 5 to 10 times lower than the original assessment samples that were analyzed by ESC using EPA Method 6010C. Whereas EPA Method 6010C is an Inductively Coupled Plasma (ICP) method, EPA Method 6020A is a ICP-Mass Spectrometry (ICP-MS) method. The use of mass spectrometry as a component of EPA Method 6020A is considered the newer and more accurate method, was considered the more appropriate method for this evaluation. The use of mass spectrometry methods also generally allows the analytical laboratory to have a higher degree of confidence in the result and to more easily adjust for matrix interferences from other naturally-occurring metals or elements.

The widely dissimilar analytical result caused renewed suspicion of the original EPA Method 6010C dataset. Therefore, as a point of comparison, each sample analyzed by FBI was shipped to ESC as a blind duplicate (i.e., neither ESC nor FBI were made aware of the re-analysis) and re-submitted for chromium analysis using EPA Method 6010C. This would provide a direct comparison of the sampling results using both the EPA Method 6010C and 6020A analytical methods.

The analytical results for the blind data comparison are included in Table 4. Copies of the original laboratory data reports are included in Attachment D.

The results of the blind duplicate analysis using EPA Method 6010C were consistently significantly higher than the samples analyzed by EPA Method 6020A. Out of the 20 blind samples submitted, no samples analyzed by EPA Method 6010C were less than the EPA Method 6020A results, as would be expected based on normal and random analytical variability. Rather, concentrations from the EPA Method 6010C dataset was 1.3 times to 7.8 times higher than the data generated using the using EPA Method 6020A. This finding is a clear indication of a clear and significant upward bias in the EPA Method 6010C results relative to the EPA Method 6020A results.

This finding precipitated deeper discussions with the analytical laboratory to understand why the difference in data.

5.0 ANALYTICAL CONSIDERATIONS

When more than one analytical method is available, MTCA allows for departmental selection of analytical methods to establish the highest quality and most accurate data available for determination of actual site conditions. This is allowed under WAC 173-340-830(2)(h) that states:

“The department may require an analysis to be conducted by more than one method in order to provide higher data quality.”

As noted above, EPA Method 6010C is an Inductively Coupled Plasma (ICP) method, while EPA Method 6020A is an ICP-Mass Spectrometry (ICP-MS) method.

ICP is a method that measures wavelengths of light that are the result of heating the sample using a plasma torch. In discussions with Mr. Eric Young of FBI, false positive bias for metals using ICP-only methods (such as EPA Method 6010C) are well documented. Such false positive bias can be caused by several potential conditions including elemental spectral wavelength overlap, wing overlap, and emission scatter. These interferences can be subtle and often undetectable or not apparent to the analyst since the interfering compounds are typically naturally occurring and a normal component of the soil or rock matrix being analyzed.

ICP-MS methods (such as EPA Method 200.8 and EPA Method 6020A) employ mass spectroscopy techniques that greatly limit the overreporting of concentrations in standard metals analysis by utilizing separation in a capillary column prior to analysis. This achieves a higher level of accuracy as it only analyzes the metals within a specific atomic weight rather than by light wavelengths alone.

To confirm this, FBI contacted personnel from the manufacturer of the analytical equipment (PerkinElmer) were contacted to provide a Tier IV data validation package for the original EPA Method 6010C dataset provided by ESC. Based on comments from PerkinElmer, it is their professional opinion that another element (i.e., other than chromium) within the soil matrix is causing an artificially high response in chromium spectrums within the original EPA Method 6010C dataset, which was communicated verbally to FBI and documented in email. It must be noted that spectral interference for metals analysis is compound specific and does not affect all analytes. The balance of the EPA Method 6010C dataset was deemed to be valid. Without further instrument testing and extensive analysis for general soil chemistry and inorganic metallic complexes (i.e., oxides, hydroxides, sulfide) or other minerals it was not possible to determine the exact compounds within the soil matrix that resulted in the instrument interference.

This over-reporting by EPA Method 6010C is obvious within the TEE dataset in that 100 percent of the sample results from the EPA Method 6010C dataset were elevated relative to the EPA Method 6020A dataset, with a relative percent difference of 78. This is an indication both that an interference exists and that the interference results in an average 4.5X upward bias. If there were no interference or bias, the average of the two datasets would be similar and differences would be randomly distributed.

In combination with the fact that there is no known source of chromium impacts at the Mt. Vernon C/S facility, and chromium has not been a widespread COC for any other compressor station facility throughout Washington State, it was determined that prior extensive (i.e., 1,246 samples) dataset consisting solely of EPA Method 6010C resulted in an incorrect assessment of chromium at the subject property.

Therefore, a re-assessment of chromium in soil at the subject property was performed, as described below in Section 6.0.

6.0 RE-ASSESSMENT

EPI conducted a re-assessment to verify the appropriate method for analyzing chromium in soil at the Mt. Vernon C/S facility.

6.1 Methodology

In order to perform the re-assessment, the original EPA Method 6010C dataset was reviewed to determine appropriate sample locations. The sample locations were selected based on concentration and distribution across the facility. The objective of sampling criteria was to re-sample representative locations with high concentrations exceeding 200 mg/kg and to supplement those locations with the highest concentrations in other areas to provide an even horizontal and vertical assessment of the entire EPA Method 6010C sampling area.

The locations selected for re-assessment are summarized in Table 5 and are depicted on Figure 5.

Re-assessment occurred in October 2017. Locations were sampled using hand tools. All sampling equipment was decontaminated using a triple-rinse Alconox solution prior to advancing sampling equipment and hand tools.

A total of 91 soil samples were collected and submitted for analysis during the re-assessment efforts. Samples were collected from identical locations to that of the initial assessment and were named accordingly.

All samples were collected into new laboratory-supplied sampling jars. All samples from the re-assessment investigation were submitted to FBI of Seattle, Washington, for chromium analysis using EPA Method 6020A.

6.2 Findings

The analytical results for the re-assessment are presented in Table 5. Sample locations are depicted on Figure 5. Copies of the original laboratory reports are included in Attachment D.

Total chromium was detected at concentrations ranging from 15.6 mg/kg to 179 mg/kg using the EPA Method 6020A analytical method. The re-assessment data demonstrate that EPA Method 6010C sample results were again consistently significantly higher than the samples analyzed by EPA Method 6020A. Out of the 91 samples submitted during the re-assessment effort, no samples analyzed by EPA Method 6010C had concentrations less than the EPA Method 6020 results. Concentrations in the EPA Method 6010C dataset were 1.4 times to 13.5 times higher than the data generated using the EPA 6020C method.

This is a further empirical demonstration that the EPA Method 6010C method over-reports the concentration of chromium in soil due an undetermined, but pervasive, site-specific interference. In no case has a concentration of chromium in a duplicate sample, either by direct split or re-sampling effort, exceeded the EPA Method 6010C data using EPA Method 6020A. This trend was observed to be consistent for 111 samples submitted for analysis (20 samples collected during the TEE sampling effort and 91 samples during the re-assessment).

Therefore, EPA Method 6020A has been verified as the most appropriate method for assessing chromium concentrations at the Mt. Vernon C/S facility.

7.0 BACKGROUND STUDY

Since the initial background study described in Section 3.5 was performed using EPA Method 6010C, re-assessment of the background data was also conducted using the methods described in Section 5.3.1.

A total of 15 samples were re-collected and analyzed for chromium using EPA Method 6020A. Five of the prior 20 background samples had already been analyzed by an ICP-MS analytical method (i.e., EPA Method 200.8) and were therefore deemed usable. The background data collected at the site using EPA Method 6020A are summarized on Table 6. The sample locations are depicted on Figure 6.

7.1 Statistical Methods

Statistical methods and detailed guidance on how to derive background values are presented in Section 4 of Ecology's *Statistical Guidance for Ecology Site Managers* (August 1992, Publication No. 92-54). MTCAS_{stat} can also be used to derive background values.

- Background sampling data shall be assumed to be lognormally distributed unless another distribution is demonstrated to be more appropriate.
- For lognormally distributed datasets, background shall be defined as the true upper 90th percentile or 4 times the true 50th percentile, whichever is lower.
- For normally distributed datasets, background shall be defined as the true upper 80th percentile or 4 times the true 50th percentile, whichever is lower.
- Measurements below the method detection limit shall be assigned a value equal to one-half of the method detection limit.
- Measurements above the method detection limit, but below the practical quantitation limit shall be assigned a value equal to the method detection limit.

The following sections present the findings of the background study and the comparison of the data to the representative dataset collected during the re-assessment sampling effort using 6020 data.

7.2 Findings

A total of 20 background samples were collected and analyzed for chromium using ICP-MS analytical methods (i.e., EPA Method 6020A or EPA Method 200.8). The locations of the samples are depicted on Figure 6. The analytical results are summarized in Table 6. Copies of the original laboratory reports are included in Attachment D.

Total chromium was detected in the background sampling dataset at concentrations ranging from 16.7 mg/kg to 165 mg/kg using ICP-MS analytical methods. Consistent with prior results, all of the resampled background samples analyzed by EPA Method 6020A contained chromium concentrations significantly less than the original samples analyzed by EPA Method 6010C.

7.3 Establishing Background Concentration

The background sampling dataset was assessed in compliance with the methods described above as allowed by Section 173-340-709(3) of the MTCA regulation using the guidance presented by Ecology in the *Statistical Guidance for Ecology Project Managers* (Ecology Publication #92-54). The MTCAS_{Stat} Background Module tool provided by Ecology was also used as part of this analysis.

The dataset of the performance sampling results was analyzed using MTCAS_{Stat} to provide the true mean and to determine the distribution of the data. The calculated true mean of the data is 48.77 mg/kg. MTCAS_{Stat} indicated that the data are lognormally distributed. The lognormal distribution of the dataset is consistent with expectation for natural systems datasets and confirms that the dataset is valid and does not contain sample location bias or unknown concentration influences. The MTCAS_{Stat} report is presented as Attachment E.

The 90 percent upper confidence limit (UCL90) of the dataset is considered to be the natural background concentration. As allowed in *Statistical Guidance for Ecology Project Managers* for a lognormally distributed data, the dataset was then analyzed using a T-statistic for calculation of the UCL90. Using this method, the UCL90 around the true mean, and therefore the natural background concentration for chromium, is 103.4 mg/kg.

Therefore, using the procedures documented in MTCA and in the *Statistical Guidance for Ecology Project Managers*, the background concentration for chromium in soil applicable to the Mt. Vernon C/S facility is 103.4 mg/kg.

The established background concentration of 103.4 mg/kg is consistent with the reported natural background concentration for chromium that is documented in Ecology's *Natural Background Soil Metals Concentrations in Washington State* (Ecology Publication #94-115). According to this document, chromium concentrations collected in "Group W" (which included Whatcom, Skagit, Grays Harbor, Lewis, and Pacific Counties) contained a UCL90 chromium concentration of 78.46 mg/kg with a maximum concentration detected of 163 mg/kg. These data are summarized on Figure 15 on page 7-10 of Publication #94-115). The data show a local upward bias relative to the statewide concentration of 42 mg/kg and the TEE CUL of 42 mg/kg in the area of the subject property.

7.4 Site Data Evaluation Compared to Background

The following 7 of the 91 re-assessment samples exceeded the established background concentration of 103.4 mg/kg:

- 0P87:18
- V92:0
- V93:0
- V94:0
- W94:0
- AF25:30
- CK88:18

The data are summarized in Table 5. The distribution of these samples is shown on Figure 7.

As allowed under MTCA, the re-assessment dataset was analyzed for compliance with the established background concentration.

The 91 re-assessment samples are considered representative of on-property conditions and were analyzed as the final dataset. Total chromium concentrations ranged from 15.6 mg/kg to 179 mg/kg in the re-assessment dataset. These data were evaluated for compliance with the established background concentration as allowed by Section 173-340-740(7) of the MTCA regulation using the guidance presented by Ecology in the *Statistical Guidance for Ecology Project Managers* (Ecology Publication #92-54). The MTCASat Site Module tool provided by Ecology was also used as part of this analysis.

The dataset of the re-assessment sampling results was analyzed using *MTCASat* to provide the true mean and to determine the distribution of the data. The calculated true mean of the data is 57.7 mg/kg. *MTCASat* indicated that the data were not to be treated as either normally or lognormally distributed. The *MTCASat* report is presented in Attachment F.

As allowed in *Statistical Guidance for Ecology Project Managers*, the dataset was analyzed using a Z-statistic for calculation of the 95 percent upper confidence limit (UCL95) for data that are neither normally nor lognormally distributed. Using this method, the UCL95 around the true mean is 62.3 mg/kg. As a method of comparison, the dataset was analyzed using the Lands Method for lognormally distributed data and the T-statistic for normally distributed data. Using these methods, the UCL95 around the true mean is 61.7 mg/kg and 62.4, respectively. Each of these methods results in a UCL95 that is less than the 103.4 mg/kg background concentration for chromium in soil.

The performance sampling dataset for the limits of the remedial excavation therefore comply with the background concentration for chromium in soil since:

1. No more than 10 percent of the sample results exceed the 103.4 mg/kg background concentration for chromium (i.e., 7 of 91 or 7.7 percent).
2. No single sample is more than twice the cleanup level (i.e., maximum concentration is 179 mg/kg).
3. The UCL95 around the true mean is less than the cleanup level (i.e., the maximum UCL95 using any of the statistical methods/distribution is 62.4 mg/kg).

Based upon these re-assessment sampling data, the Mt. Vernon C/S facility is currently in compliance with the established background concentration for chromium of 103.4 mg/kg. Therefore, no further assessment or remedial action is required or necessary at this facility.

8.0 FINDINGS

The following conclusions are supported by the actions and findings of the chromium assessment performed at the subject property:

- Thorough assessment activities conducted at the Mt. Vernon C/S facility establish that EPA Method 6020A is the most appropriate for assessing total chromium concentrations. Using this analytical method, the subject property has been appropriately screened for chromium concentrations in soil.
- Based on a MTCA-compliant statistical analysis, the natural background concentration for chromium in soil in the vicinity of the subject property is 103.4 mg/kg.
- Based on extensive soil data collected and analyzed using appropriate analytical methods, chromium in soil is in compliance with the established natural background concentration established for the vicinity of the subject property. The concentrations of chromium in soil

do not exceed the natural background concentration established for the area of the subject property.

- No additional assessment or remediation is necessary or warranted to address chromium impacts to soil at the Mt. Vernon C/S facility.

9.0 LIMITATIONS

To the extent that preparation of this *Chromium Assessment Report* has required the application of best professional judgment and the application of scientific principles, certain results of this work have been based on subjective interpretation. EPI makes no warranties express or implied, including and without limitation, warranties as to merchantability or fitness for a particular purpose. The information provided in this *Chromium Assessment Report* is not to be construed as legal advice.

This report was prepared solely for NWP and the contents herein may not be used or relied upon by any other person without the express written consent and authorization of EPI.

Tables

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
HS1-1	12	9/25/2014	28		--
HS1-2	6	9/25/2014	21		--
HS1-3	6	9/25/2014	8.2		--
HS1-4	6	9/25/2014	36		--
HS1-5	6	9/25/2014	32		--
HS2-2	12	9/25/2014	44		--
	12+12	9/30/2014	60		--
HS2-3	12	9/25/2014	53		--
HS2-4	12	9/25/2014	27		--
HS2-5	12	9/25/2014	28		--
HS3-1	12	9/25/2014	35		--
HS3-2	6	9/25/2014	51		--
HS3-3	6	9/25/2014	12		--
HS3-4	6	9/25/2014	62		--
HS3-5	6	9/25/2014	49		--
HS5-1	24	9/25/2014	72		--
HS5-2	12+12	9/30/2014	70		--
HS5-3	12+12	9/30/2014	77		--
HS7-2	12	9/30/2014	72		--
HS7-3	12	9/30/2014	76		--
HS13-1	12	9/25/2014	38		--
HS13-3	6	9/25/2014	20		--
HS13-4	6	9/25/2014	31		--
HS13-5	6	9/25/2014	66		--
	6+12	9/30/2015	26		--
1	0	12/2/2015	93.4		--
	18	12/2/2015	71.2		--
2	0	12/2/2015	60.5		--
	18	12/2/2015	80.5		--
3	0	12/2/2015	49.7		--
	18	12/2/2015	62.9		--
4	0	12/2/2015	58.1		--
	18	12/2/2015	63.1		--
5	0	12/2/2015	72.6		--
	18	12/2/2015	67.3		--
6	0	12/2/2015	105		--
	18	12/2/2015	112		--
7	0	12/2/2015	126		--
	18	12/2/2015	197		--
8	0	12/2/2015	85.2		--
	18	12/2/2015	70.2		--
000P-75	0	10/19/2016	84.5		--
	18	10/19/2016	76.4		--
	30	10/19/2016	66.1		--
000P-95	0	10/19/2016	54.9		--
	18	10/19/2016	57.3		--
	30	10/19/2016	92.4		--
000T-58	0	10/19/2016	103		--
	18	10/19/2016	94.6		--
	30	10/19/2016	91.3		--
000V135	0	10/19/2016	85.3		--
	18	10/19/2016	106		--
000W10	0	10/19/2016	59.0		--
	18	10/19/2016	61.9		--
	30	10/19/2016	82.4		--
00A115	0	10/19/2016	25.4		--
	18	10/19/2016	88.7		--
	30	10/19/2016	79.6		--
00B-87	0	10/19/2016	86.7		--
	18	10/19/2016	60.4		--
	30	10/19/2016	37.0		--
00C-70	0	10/19/2016	67.2		--
	18	10/19/2016	72.1		--
	30	10/19/2016	109		--
00F-75	0	10/19/2016	52.8		--
	18	10/19/2016	147		<2.59
	30	10/19/2016	88.7		--
00F-94	0	10/19/2016	90.0		--
	18	10/19/2016	90.7		--
	30	10/19/2016	84.5		--

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Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
00G130	0	10/19/2016	73.3		--
	18	10/19/2016	91.2		--
	30	10/19/2016	75.6		--
00I145	0	10/19/2016	65.7		--
	18	10/19/2016	122		--
	30	10/19/2016	88.1		--
00J15	0	10/19/2016	41.8		--
	18	10/19/2016	64.3		--
	30	10/19/2016	78.4		--
00J95	0	10/19/2016	50.9		--
	18	10/19/2016	73.9		--
	30	10/19/2016	89.9		--
00K116	0	10/19/2016	62.5		--
	12	10/19/2016	59.5		--
00L52	0	10/19/2016	62.7		--
	18	10/19/2016	66.4		--
	30	10/19/2016	76.6		--
00L72	0	10/19/2016	49.4		--
	18	10/19/2016	71.3		--
	30	10/19/2016	73.1		--
00M-70	0	12/2/2015	64.4		--
	18	12/2/2015	76.5		--
	30	12/2/2015	91.4		--
00M-80	0	12/2/2015	77.2		--
	18	12/2/2015	113		--
00M-89	0	10/19/2016	95.2		--
	18	10/19/2016	81.8		--
	30	10/19/2016	79.5		--
00N-55	0	10/19/2016	60.5		--
	18	10/19/2016	53.4		--
00N118	0	10/19/2016	56.2		--
	18	10/19/2016	82.7		--
	30	10/19/2016	89.2		--
00P-99	0	10/19/2016	74.0		--
	18	10/19/2016	90.1		--
	30	10/19/2016	80.8		--
00P125	0	10/19/2016	57.4		--
	18	10/19/2016	86.5		--
	30	10/19/2016	102		--
00Q109	0	10/19/2016	54.8		--
	12	10/19/2016	61.6		--
00Q131	0	10/19/2016	33.9		--
	18	10/19/2016	51.0		--
	30	10/19/2016	70.6		--
00R-61	0	10/19/2016	63.8		--
	18	10/19/2016	61.8		--
	30	10/19/2016	89.4		--
00R120	0	12/2/2015	102		--
	18	12/2/2015	91.0		--
	30	12/2/2015	69.0		--
00S-96	0	10/20/2016	77.8		--
	18	10/20/2016	84.3		--
	30	10/20/2016	81.8		--
00T-43	0	10/20/2016	76.4		--
	18	10/20/2016	154		--
	30	10/20/2016	134		--
00T91	0	10/20/2016	5.04		--
	18	10/20/2016	47.0		--
	30	10/20/2016	64.9		--
00V28	0	10/20/2016	76.6		--
	18	10/20/2016	77.4		--
	30	10/20/2016	67.9		--
00V105	0	10/20/2016	63.7		--
	18	10/20/2016	67.5		--
	30	10/20/2016	82.4		--
00V116	0	12/2/2015	70.9		--
	18	12/2/2015	74.9		--
00W16	0	10/20/2016	61.1		--
	18	10/20/2016	66.9		--
	30	10/20/2016	75.1		--

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Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
00W38	0	10/20/2016	77.1		--
	18	10/20/2016	72.5		--
	30	10/20/2016	73.8		--
00W-70	0	12/2/2015	77.5		--
	18	12/2/2015	104		--
	30	12/2/2015	92.4		--
00W-80	0	12/2/2015	95.1		--
	18	12/2/2015	100		--
	30	12/2/2015	83.0		--
00W-90	0	12/2/2015	84.6		--
	18	12/2/2015	108		--
	30	12/2/2015	81.2		--
00W97	0	10/20/2016	13.1		--
	18	10/20/2016	84.5		--
	30	10/20/2016	90.3		--
00W148	0	10/20/2016	18.3		--
	18	10/20/2016	107		--
	30	10/20/2016	63.7		--
00X111	0	12/2/2015	113		--
	18	12/2/2015	153		--
	30	12/2/2015	84.0		--
00Y4	0	10/20/2016	72.9		--
	18	10/20/2016	74.9		--
	30	10/20/2016	80.9		--
00Z106	0	12/2/2015	93.0		--
	18	12/2/2015	99.8		--
	30	12/2/2015	85.6		--
00Z125	0	10/20/2016	47.9		--
	18	10/20/2016	68.4		--
0A23	0	10/20/2016	75.2		--
	18	10/20/2016	75.4		--
	30	10/20/2016	84.1		--
0A45	0	10/20/2016	69.0		--
	18	10/20/2016	76.8		--
	30	10/20/2016	74.9		--
0A55	0	10/20/2016	43.6		--
	18	10/20/2016	75.1		--
	30	10/20/2016	115		--
0A78	0	10/20/2016	55.8		--
	18	10/20/2016	83.4		--
	30	10/20/2016	96.3		--
0A133	0	10/20/2016	79.1		--
	18	10/20/2016	88.3		--
	30	10/20/2016	82.1		--
0B67	0	10/20/2016	81.7		--
	18	10/20/2016	151		--
0B96	0	12/5/2015	72.9		--
	18	12/2/2015	83.2		--
	30	12/2/2015	79.3		--
0B100	3	9/22/2015	72.2		--
	18	9/22/2015	62.6		--
0B117	0	12/2/2015	84.2		--
	18	12/2/2015	86.5		--
	30	12/2/2015	86.3		--
0C34	0	10/20/2016	64.8		--
	18	10/20/2016	79.5		--
	30	10/20/2016	85.6		--
0C85	0	10/20/2016	44.3		--
	18	10/20/2016	57.8		--
0C-99	0	10/20/2016	83.2		--
	18	10/20/2016	112		--
	30	10/20/2016	114		--
0D92	0	12/2/2015	53.1		--
	18	12/2/2015	82.9		--
	30	12/2/2015	89.3		--
0D119	0	12/2/2015	75.1		--
	18	12/2/2015	69.1		--
0E42	0	10/20/2016	73.5		--
	18	10/20/2016	61.8		--
	30	10/20/2016	66.8		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
0F11	0	10/20/2016	88.4		--
	18	10/20/2016	84.3		--
	30	10/20/2016	97.2		--
0F50	0	10/20/2016	68.9		--
	18	10/20/2016	85.2		--
	30	10/20/2016	111		--
0F59	0	10/20/2016	70.5		--
	18	10/20/2016	90.2		--
	30	10/20/2016	88.1		--
0F74	0	10/20/2016	69.3		--
	18	10/20/2016	95.4		--
	30	10/20/2016	146		<2.58
0F88	0	12/2/2015	45.1		--
	18	12/2/2015	52.1		--
0F121	0	12/2/2015	78.3		--
	18	12/2/2015	104		--
0F128	0	10/20/2016	82.3		--
	18	10/20/2016	92.3		--
	30	10/20/2016	109		--
0G16	0	12/2/2015	80.8		--
	18	12/2/2015	82.9		--
	30	12/2/2015	71.3		--
0G20	0	12/2/2015	77.5		--
	18	12/2/2015	86.2		--
	30	12/2/2015	70.5		--
0G24	0	12/2/2015	70.2		--
	18	12/2/2015	79.9		--
	30	12/2/2015	67.7		--
0G35	0	12/2/2015	85.6		--
	18	12/2/2015	66.2		--
0G-60	0	12/2/2015	106	J5	--
	18	12/2/2015	105		--
	30	12/2/2015	191		<2
0G-70	0	12/2/2015	115		--
	18	12/2/2015	165		--
	18	10/20/2016	78.8		--
	30	12/2/2015	194		<2
0G-80	0	12/2/2015	139		--
	18	12/2/2015	82.9		--
	30	12/2/2015	111		--
0G-90	0	12/2/2015	90.3		--
	18	12/2/2015	101		--
	30	12/2/2015	96.8		--
0H-45	0	10/18/2016	68.4		--
	18	10/18/2016	87.2		--
	30	10/18/2016	76.1		--
0H83	0	12/2/2015	84.9		--
	18	12/2/2015	196		--
	18	10/20/2016	72.8		--
	30	12/2/2015	110		--
0H115	3	9/22/2015	79.2		--
	18	9/22/2015	105		--
	30	9/22/2015	126		--
0J-52	0	10/18/2016	72.0		--
	18	10/18/2016	78.1		--
	30	10/18/2016	71.7		--
0J69	0	12/2/2015	66.0		--
	3	9/22/2015	70.2		--
	18	9/22/2015	75.4		--
	18	12/2/2015	69.5		--
0J90	3	9/23/2015	37.8		--
	18	9/23/2015	117		--
	30	9/23/2015	68.8		--
0J96	3	9/25/2015	86.7		--
	12	9/25/2015	80.9		--
	24	9/24/2015	69.4		--
0J102	3	9/25/2015	98.3		--
	18	9/25/2015	114		--
	30	9/24/2015	60.4		--
0J108	3	9/25/2015	73.6		--
	12	9/25/2015	74.3		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
OJ117	0	12/2/2015	79.6		--
	18	12/2/2015	106		--
	30	12/2/2015	121		--
OK36	0	12/2/2015	85.8		--
	18	12/2/2015	80.1		--
	30	12/2/2015	80.7		--
OK40	0	12/2/2015	76.1		--
	18	12/2/2015	83.7		--
	30	12/2/2015	73.3		--
OK44	0	12/2/2015	74.8		--
	18	12/2/2015	86.7		--
	30	12/2/2015	89.6		--
OK48	0	12/2/2015	81.3		--
	18	12/2/2015	66.8		--
OK52	0	12/2/2015	85.3		--
	18	12/2/2015	60.0		--
OK56	0	12/2/2015	76.1		--
	18	12/2/2015	67.1		--
OK60	0	12/2/2015	80.2		--
	18	12/2/2015	75.6		--
OK64	0	12/2/2015	68.0		--
	18	12/2/2015	62.6		--
OL120	0	12/2/2015	93.6		--
	18	12/2/2015	187		--
	30	12/2/2015	82.7		--
OM51	3	9/23/2015	80.6		--
	18	9/22/2015	79.2		--
	30	9/23/2015	78.4		--
OM111	3	9/25/2015	70.7		--
	12	9/25/2015	112		--
	24	9/24/2015	76.9		--
OM122	3	9/22/2015	95.3		--
	18	9/22/2015	77.8		--
OM128	0	10/18/2016	69.1		--
	18	10/18/2016	117		--
	30	10/18/2016	99.5		--
OM134	0	10/18/2016	70.4		--
	18	10/18/2016	103		--
	30	10/18/2016	105		--
ON-08	0	12/2/2015	75.3		--
	18	12/2/2015	77.3		--
ON86	0	12/2/2015	96.2		--
	18	12/2/2015	92.8		--
	30	12/2/2015	73.0		--
ON90	0	12/2/2015	86.3		--
	18	12/2/2015	96.9		--
	30	12/2/2015	104		--
OO145	0	10/18/2016	49.3		--
	18	10/18/2016	107		--
	30	10/18/2016	91.1		--
OP17	3	9/23/2015	67		--
	18	9/23/2015	102		--
	30	9/23/2015	66.1		--
OP27	3	9/23/2015	57.7		--
	18	9/23/2015	110		--
	30	9/23/2015	64.3		--
OP37	3	9/23/2015	45.0		--
	18	9/23/2015	116		--
	30	9/23/2015	62.5		--
OP47	3	9/23/2015	39.7		--
	18	9/23/2015	88.9		--
	30	9/23/2015	65.5		--
OP57	3	9/23/2015	76.3		--
	18	9/23/2015	94.5		--
	30	9/23/2015	74.2		--
OP67	3	9/25/2015	74.8		--
	18	9/25/2015	70.4		--
OP77	3	9/23/2015	77.5		--
	3.5	9/23/2015	115		--
	18	9/23/2015	60.6		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
0P87	3	9/23/2015	84.2		--
	18	9/23/2015	323		4.49
	30	9/23/2015	209		--
0P97	3	9/25/2015	114		--
	12	9/25/2015	77.1		--
0P107	3	9/25/2015	74.7		--
	12	9/25/2015	96.0		--
	24	9/24/2015	110		--
	60	12/2/2015	64.6		--
	90	12/2/2015	72.7		--
	120	12/2/2015	73.3		--
0P114	3	9/25/2015	105		--
	12	9/25/2015	79.9		--
	24	9/24/2015	74.1		--
0P121	0	12/2/2015	78.4		--
	18	12/2/2015	89.1		--
0Q00	0	12/2/2015	86.8		--
	18	12/2/2015	69.4		--
0Q-70	0	12/2/2015	80.2		--
	18	12/2/2015	69.1		--
0Q-80	0	12/2/2015	145		--
	18	12/2/2015	75.5		--
0Q83	0	12/2/2015	256		--
	0	10/20/2016	48.8		--
	18	12/2/2015	122		--
	30	12/2/2015	55.5		--
0Q-90	0	12/2/2015	75.4		--
	18	12/2/2015	94.3		--
	30	12/2/2015	78.3		--
0Q90	0	12/2/2015	109		--
	18	12/2/2015	62.4		--
0S-47	0	10/18/2016	69.4		--
	18	10/18/2016	82.2		--
	30	10/18/2016	103		--
0S-58	0	10/18/2016	71.4		--
	18	10/18/2016	69.8		--
	30	10/18/2016	81.9		--
0S84	0	12/2/2015	454		--
	18	12/2/2015	104		--
	30	12/2/2015	223		3.92
0S87	0	12/2/2015	136		--
	18	12/2/2015	231		--
	30	12/2/2015	222		2.8
0V05	3	9/22/2015	83.3		--
	18	9/22/2015	83.8		--
	30	9/23/2015	69.5		--
0W-33	0	10/18/2016	110		--
	18	10/18/2016	122		--
	30	10/18/2016	134		--
0X-54	0	10/18/2016	5.10		--
	18	10/18/2016	84.0		--
	30	10/18/2016	157		--
0X116	3	9/25/2015	82.0		--
	18	9/25/2015	82.3		--
0X119	0	12/2/2015	67.1		--
	18	12/2/2015	67.6		--
0Y111	3	9/25/2015	68.3		--
	12	9/25/2015	80.5		--
	18	9/24/2015	68.9		--
0Y116	30	9/23/2015	68.5		--
0Z07	3	9/25/2015	82.6		--
	18	9/25/2015	94.0		--
	30	9/23/2015	102		--
	60	12/2/2015	74.5		--
0Z27	3	9/25/2015	47.9		--
	18	9/25/2015	69.8		--
0Z37	3	9/24/2015	33.1		--
	18	9/24/2015	89.4		--
0Z47	18	9/23/2015	65.9		--
0Z57	3	9/24/2015	56.0		--
	18	9/24/2015	119		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
OZ67	3	9/24/2015	34.5		--
	12	9/24/2015	112		--
OZ77	3	9/24/2015	87.7		--
	18	9/23/2015	42.8		--
OZ87	3	9/23/2015	37.0		--
	18	9/23/2015	56.3		--
OZ97	3	9/25/2015	103		--
	12	9/25/2015	95.9		--
	24	9/24/2015	84.5		--
OZ107	3	9/25/2015	83.0		--
	12	9/25/2015	70.8		--
	24	9/25/2015	93.4		--
OZ121	0	10/18/2016	71.9		--
	18	10/18/2016	105		--
	30	10/18/2016	81.5		--
A00	0	12/2/2015	83.1		--
	18	12/2/2015	77.0		--
A-70	0	12/2/2015	116		--
	18	12/2/2015	75.1		--
A-80	0	12/2/2015	94.3		--
	18	12/2/2015	81.0		--
A-90	0	12/2/2015	73.4		--
	18	12/2/2015	119		--
E-63	0	10/19/2016	60.9		--
	18	10/19/2016	66.6		--
	30	10/19/2016	75.4		--
E112	3	9/22/2015	54.9		--
	18	9/22/2015	55.9		--
G-57	0	10/19/2016	50.9		--
	18	10/19/2016	66.0		--
	30	10/19/2016	78.1		--
G119	0	10/19/2016	93.2		--
	18	10/19/2016	103		--
	30	10/19/2016	88.3		--
G134	0	10/19/2016	101		--
	12	10/19/2016	107		--
J-41	0	10/19/2016	89.4		--
	18	10/19/2016	122		--
	30	10/19/2016	323		--
J-70	0	12/2/2015	70.6		--
	18	12/2/2015	91.4		--
	30	12/2/2015	76.7		--
J-80	0	12/2/2015	77.2		--
	18	12/2/2015	264		--
	18	10/20/2016	89.1		--
	30	12/2/2015	161		<2
J-90	0	12/2/2015	74	O1	--
	18	12/2/2015	72		--
J-98	0	12/2/2015	52.2		--
	18	12/2/2015	76.5		--
J07	3	9/22/2015	12.3		--
	18	9/23/2015	40.6		--
J107	3	9/23/2015	61.2		--
	3.5	9/23/2015	46.7		--
	18	9/23/2015	74.8		--
J113	0	12/2/2015	49.0		--
	18	12/2/2015	106		--
J17	3	9/23/2015	39.8		--
	18	9/23/2015	62.9		--
J27	3	9/24/2015	31.5		--
	18	9/24/2015	45.3		--
J47	3	9/24/2015	22.4		--
	18	9/24/2015	69.1		--
J57	3	9/24/2015	57.4		--
	12	9/24/2015	52.0		--
J67	3	9/24/2015	45.4		--
	18	9/24/2015	53.7		--
J77	3	9/23/2015	41.8		--
	18	9/23/2015	62.8		--
J87	3	9/23/2015	14.8		--
	18	9/23/2015	69.4		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
J97	3	9/25/2015	78.8		--
	12	9/25/2015	70.9		--
K109	3	9/23/2015	63.2		--
	18	9/22/2015	65.3		--
N-67	0	10/19/2016	62.8		--
	18	10/19/2016	66.7		--
O120	0	10/19/2016	113		--
	18	10/19/2016	78.1		--
	30	10/19/2016	70.0		--
Q106	3	9/22/2015	69.9		--
	18	9/22/2015	99.4		--
	30	9/22/2015	96.0		--
S-61	0	10/19/2016	34.3		--
	18	10/19/2016	29.5		--
	30	10/19/2016	49.8		--
S94	0	6/3/15	330		--
	18	6/3/15	89		--
	24	6/3/15	79		--
S95	0	6/3/15	90		--
	18	6/3/15	77		--
	24	6/3/15	59		--
S96	0	6/3/15	130		--
	18	6/3/15	98		--
	24	6/3/15	82		--
S108	0	12/2/2015	73.9		--
	18	12/2/2015	80.9		--
T07	3	9/24/2015	53.1		--
	18	9/24/2015	44.5		--
T27	3	9/24/2015	39.8		--
	12	9/24/2015	80.6		--
	24	9/24/2015	156		--
T37	3	9/23/2015	63.0		--
	18	9/23/2015	62.6		--
T47	3	9/23/2015	33.1		--
	3.5	9/24/2015	51.5		--
	18	9/24/2015	91.1		--
	30	9/24/2015	189		--
	60	12/2/2015	140		--
T57	3	9/24/2015	27.0		--
	12	9/24/2015	76.9		--
T67	3	9/23/2015	75.4		--
	18	9/23/2015	105		--
	30	9/23/2015	74.0		--
T77	3	9/23/2015	112		--
	18	9/23/2015	99.7		--
	30	9/23/2015	113		--
T-80	0	12/2/2015	78.2		--
	18	12/2/2015	78.6		--
T87	3	9/23/2015	54.7		--
	18	9/23/2015	83.8		--
	30	9/23/2015	115		--
T-90	0	12/2/2015	55.2		--
	18	12/2/2015	76.7		--
T93	0	6/3/15	340		--
	18	6/3/15	99		--
	24	6/3/15	82		--
T94	0	6/3/15	170		--
	0.5	6/3/15	160		--
	18	6/3/15	71		--
	24	6/3/15	56		--
T95	0	6/3/15	130		--
	18	6/3/15	46		--
	24	6/3/15	46		--
T96	0	6/3/15	78		--
	18	6/3/15	76		--
	24	6/3/15	63		--
T-97	3	9/23/2015	48.5		--
	18	9/23/2015	63.6		--
U92	0	6/3/15	300		--
	18	6/3/15	70		--
	24	6/3/15	70		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
U93	0	6/3/15	120		--
	18	6/3/15	52		--
	24	6/3/15	44		--
U95	0	6/3/15	180		--
	18	6/3/15	39		--
U96	0	6/3/15	72		--
	18	6/3/15	64		--
U111	0	10/19/2016	81.9		--
	18	10/19/2016	81.9		--
	30	10/19/2016	117		--
V92	0	6/3/15	320		--
	18	6/3/15	74		--
V93	0	6/3/15	260		--
	18	6/3/15	50		--
V94	0	6/3/15	220		--
	0.5	6/3/15	240		--
	18	6/3/15	67		--
	24	6/3/15	42		--
V95	0	6/3/15	76		--
	18	6/3/15	75		--
	24	6/3/15	38		--
W-91	3	9/22/2015	78.5		--
	18	9/22/2015	116		--
	24	9/22/2015	68.5		--
W92	0	6/3/15	200		--
	18	6/3/15	64		--
W93	0	6/3/15	260		--
	18	6/3/15	69		--
	24	6/3/15	82		--
W94	0	6/3/15	260		--
	18	6/3/15	96		--
	24	6/3/15	91		--
W103	3	9/22/2015	97.5		--
	18	9/22/2015	106		--
	30	9/22/2015	51.2		--
X-50	0	10/19/2016	50.5		--
	18	10/19/2016	46.1		--
	30	10/19/2016	39.5		--
X-74	0	10/19/2016	147	O1	--
	18	10/19/2016	209		4.70
	30	10/19/2016	214		<2.17
Z-80	0	12/2/2015	23.2		--
	18	12/2/2015	68.1		--
Z-95	0	12/2/2015	71.0		--
	18	12/2/2015	77.7		--
Z87	3	9/22/2015	102		--
	12	9/22/2015	48.4		--
Z114	0	10/19/2016	51.5		--
	18	10/19/2016	67.4		--
	24	10/19/2016	68.1		--
AA-70	0	10/18/2016	106		--
	18	10/18/2016	102		--
AA104	0	12/2/2015	74.9		--
	18	12/2/2015	98.3		--
AB38	3	9/23/2015	152	J3 J5	--
	24	9/23/2015	122		--
AC28	3	9/23/2015	82.6		--
	3.5	9/23/2015	69.2		--
	18	9/23/2015	256		--
	30	9/23/2015	39.3		--
AC-81	0	10/18/2016	66.5		--
	18	10/18/2016	63.5		--
	30	10/18/2016	99		--
AC100	3	9/22/2015	87.1		--
	18	9/22/2015	108		--
	30	9/22/2015	103		--
AC124	0	10/18/2016	61		--
	18	10/18/2016	67.4		--
AD07	3	9/24/2015	67.1		--
	12	9/24/2015	78.5		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
AD17	3	9/24/2015	46.7		--
	12	9/23/2015	82.7		--
	24	9/24/2015	50.6		--
AD45	3	9/24/2015	91.2		--
	12	9/24/2015	74.3		--
AD57	3	9/24/2015	80.5		--
	12	9/24/2015	63.0		--
AD67	3	9/24/2015	122		--
	18	9/24/2015	114		--
AD77	3	9/24/2015	85.2		--
	18	9/24/2015	96.4		--
	30	9/24/2015	231		--
	60	12/2/2015	65.9		--
AD87	3	9/23/2015	94.8		--
	18	9/23/2015	111		--
	30	9/23/2015	62.4		--
AD97	3	9/25/2015	75.6		--
	18	9/25/2015	75.1		--
AD105	0	10/18/2016	78.8		--
	18	10/18/2016	97.9		--
	30	10/18/2016	103		--
AE-85	3	9/25/2015	72.1		--
	18	9/25/2015	90.9		--
	30	9/24/2015	71.4		--
AE-95	0	12/2/2015	84.4		--
	18	12/2/2015	85.4		--
	30	12/2/2015	85.4		--
AF25	0	12/2/2015	112		--
	18	12/2/2015	267		--
	18	10/20/2016	101		--
	30	12/2/2015	268		<2
AF28	0	12/2/2015	68.2		--
	18	12/2/2015	88		--
	30	12/2/2015	77.5		--
AH-62	0	10/18/2016	103		--
	18	10/18/2016	129		--
	30	10/18/2016	387		--
AI-85	0	12/2/2015	598		--
	0	10/20/2016	96.7		--
	18	12/2/2015	97.6		--
	30	12/2/2015	100		--
AI-91	0	12/2/2015	65.7		--
	18	12/2/2015	90.6		--
	30	12/2/2015	83.0		--
AI97	3	9/25/2015	71.4		--
	18	9/25/2015	112		--
	30	9/24/2015	83.7		--
AI107	0	10/18/2016	71.2		--
	18	10/18/2016	114		--
	30	10/18/2016	75.3		--
AK-78	0	10/18/2016	63.3		--
	18	10/18/2016	102		--
	30	10/18/2016	93.1		--
AL06	3	9/25/2015	85.4		--
	18	9/25/2015	75.9		--
AL-72	0	10/18/2016	43.7		--
	18	10/18/2016	78.7		--
AM98	0	12/2/2015	75.6		--
	18	12/2/2015	78.6		--
AN04	0	12/2/2015	100		--
	18	12/2/2015	90.2		--
	30	12/2/2015	131		--
AN07	3	9/25/2015	66.6		--
	12	9/25/2015	86.6		--
	24	9/24/2015	96.3		--
AN17	3	9/25/2015	74.4		--
	18	9/25/2015	71.4		--
AN27	3	9/25/2015	61.8		--
	18	9/25/2015	73.1		--
AN37	3	9/25/2015	74.3		--
	18	9/25/2015	73.0		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
AN47	3	9/25/2015	39.0		--
	18	9/25/2015	69.1		--
AN58	3	9/25/2015	130		--
	18	9/25/2015	83.9		--
AN70	3	9/25/2015	82.2		--
	18	9/25/2015	99.5		--
	30	9/24/2015	67.3		--
AN78	3	9/25/2015	72.0		--
	18	9/25/2015	69.0		--
AN87	3	9/25/2015	90.0		--
	18	9/25/2015	69.5		--
AO94	3	9/25/2015	64.0		--
	18	9/25/2015	90.7		--
	30	9/24/2015	73.3		--
AP99	0	10/18/2016	89.4		--
	18	10/18/2016	101		--
	30	10/18/2016	129		3.64
AQ-79	0	10/18/2016	81.1		--
	18	10/18/2016	98.0		--
	30	10/18/2016	80.0		--
AQ-86	0	10/18/2016	114		--
	18	10/18/2016	334		4.64
	30	10/18/2016	77.8		--
AR03	3	9/25/2015	82.9		--
	12	9/25/2015	68.4		--
AS117	0	10/18/2016	47.7		--
	18	10/18/2016	76.3		--
	30	10/18/2016	81.1		--
AU28	0	12/2/2015	95.2		--
	18	12/2/2015	195		--
	18	10/20/2016	312		<2.25
AU31	0	12/2/2015	154		--
	0	10/20/2016	78.5		--
	18	12/2/2015	94.6		--
AU-65	0	10/18/2016	82.4		--
	18	10/18/2016	97.3		--
	30	10/18/2016	128		--
AU90	3	9/25/2015	91.5		--
	18	9/25/2015	89.4		--
	30	9/24/2015	70.6		--
AU94/AY92	0	12/2/2015	75.8		--
	18	12/2/2015	84.3		--
AU104	0	10/18/2016	77.1		--
	18	10/18/2016	116		--
	30	10/18/2016	80.5		--
AV02	0	6/4/15	48		--
	18	6/4/15	43		--
AV03	0	6/4/15	68		--
	0.5	6/4/15	68		--
	18	6/4/15	72		--
AV-74	0	10/18/2016	88.9		--
	18	10/18/2016	113		--
	30	10/18/2016	102		--
AW01	0	6/4/15	52		--
	18	6/4/15	58		--
AW02	0	6/4/15	68		--
	18	6/4/15	81		--
	24	6/4/15	56		--
AW08	3	9/25/2015	127		--
	12	9/25/2015	82.3		--
	24	9/24/2015	78.6		--
AW18	3	9/25/2015	111		--
	18	9/25/2015	85.6		--
	30	9/24/2015	75.3		--
AX00	3	9/25/2015	99.8		--
	18	9/25/2015	63.9		--
AX01	0	6/4/15	58		--
	18	6/4/15	43		--
	24	6/4/15	55		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
AX02	0	6/4/15	98		--
	18	6/4/15	140		--
	24	6/4/15	51		--
AX03	0	6/4/15	100		--
	0.5	6/4/15	84		--
	18	6/4/15	59		--
	24	6/4/15	59		--
AX09	3	9/25/2015	92.9		--
	18	9/25/2015	94.3		--
	30	9/24/2015	85.1		--
AX15	3	9/25/2015	73.2		--
	18	9/25/2015	95.9		--
	30	9/24/2015	175		--
AX26	0	12/2/2015	120		--
	18	12/2/2015	98.1		--
AX28	3	9/25/2015	199		--
	12	9/25/2015	228		--
AX31	0	12/2/2015	106		--
	18	12/2/2015	130		--
AX37	3	9/25/2015	85.4		--
	18	9/25/2015	70.4		--
AX47	3	9/25/2015	74.4		--
	3.5	9/25/2015	77.7		--
	18	9/25/2015	146		--
AX57	3	9/25/2015	102		--
	12	9/25/2015	92.4		--
	24	9/24/2015	88.4		--
AX67	3	9/25/2015	80.6		--
	18	9/25/2015	70.3		--
AX77	3	9/25/2015	91.9		--
	18	9/25/2015	72.0		--
AX87	3	9/25/2015	93.3		--
	3.5	9/25/2015	110		--
	18	9/25/2015	101		--
	30	9/24/2015	68.3		--
AY01	0	6/4/15	78		--
	18	6/4/15	100		--
	24	6/4/15	82		--
AY02	0	6/4/15	69		--
	18	6/4/15	59		--
	24	6/4/15	39		--
AY03	0	6/4/15	65		--
	18	6/4/15	67		--
AZ26	0	12/2/2015	85.4		--
	18	12/2/2015	163		--
	18	10/20/2016	99.6		--
AZ29	0	12/2/2015	118	J3 J5	--
	18	12/2/2015	110		--
AZ-76	0	10/18/2016	74.3		--
	18	10/18/2016	77.0		--
	30	10/18/2016	88.0		--
BA03	3	9/25/2015	106		--
	18	9/25/2015	98.0		--
	30	9/24/2015	101		--
BA07	0	12/2/2015	65.3		--
	18	12/2/2015	90.9		--
	3	12/2/2015	97.1		--
BA11	0	12/2/2015	127		--
	18	12/2/2015	92.7		--
	60	12/2/2015	35.7		--
BA15	3	9/25/2015	84.5		--
	18	9/25/2015	80.3		--
	30	9/24/2015	85.3		--
BA88	3	9/25/2015	29.8		--
	18	9/25/2015	43.6		--
BC03	0	12/2/2015	87.9		--
	18	12/2/2015	80.9		--
BC-84	0	10/18/2016	64.0		--
	18	10/18/2016	71.3	O1	--
	30	10/18/2016	75.4		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
BC93	0	10/18/2016	95.5		--
	18	10/18/2016	104		--
	30	10/18/2016	77.6		--
BD-77	0	10/18/2016	71.1		--
	18	10/18/2016	78.3		--
	30	10/18/2016	71.1		--
BE03	0	12/2/2015	134		--
	18	12/2/2015	84.0		--
BE11	0	12/2/2015	99.4		--
	18	12/2/2015	95.0		--
	30	12/2/2015	115		--
BF94	0	10/18/2016	87.4		--
	18	10/18/2016	155		--
	30	10/18/2016	120		--
BG12	3	9/25/2015	47.7		--
	18	9/25/2015	37.2		--
BG85	3	9/25/2015	38.3		--
	18	9/25/2015	48.9		--
BH17	3	9/25/2015	33.6		--
	18	9/25/2015	36.6		--
BH27	3	9/25/2015	42.4		--
	18	9/25/2015	52.9		--
BH37	3	9/25/2015	36.8		--
	3.5	9/25/2015	31.3		--
	18	9/25/2015	40.8		--
BH47	3	9/25/2015	45.1		--
	12	9/25/2015	57.7		--
BH57	3	9/25/2015	44.9		--
	18	9/25/2015	49.5		--
BH67	3	9/25/2015	28.0		--
	18	9/25/2015	51.4		--
BH77	3	9/25/2015	45.3		--
	18	9/25/2015	62.2		--
BI-90	0	10/18/2016	99.9		--
	18	10/18/2016	93.9		--
	30	10/18/2016	96.7		--
BK-68	0	10/18/2016	85.0		--
	18	10/18/2016	76.6		--
	30	10/18/2016	75.2		--
BM12	3	9/25/2015	49.5		--
	18	9/25/2015	64.3		--
BM15	3	9/25/2015	33.4		--
	18	9/25/2015	46.0		--
BM18	3	9/25/2015	52.2		--
	18	9/25/2015	37.1		--
BM20	24	6/3/15	46		--
BM81	3	9/25/2015	36.8		--
	18	9/25/2015	53.5		--
BM102	0	10/18/2016	102		--
	18	10/18/2016	113		--
	30	10/18/2016	107		--
BN19	0	6/3/15	41		--
	18	6/3/15	42		--
	24	6/3/15	58		--
BN20	0	6/3/15	42		--
	18	6/3/15	54		--
BO18	0	6/3/15	240		--
	18	6/3/15	250		--
	24	6/3/15	53		--
BO19	0	6/3/15	18		--
	18	6/3/15	18		--
	24	6/3/15	100		--
BP12	0	12/2/2015	88.2		--
	18	12/2/2015	103		--
	30	12/2/2015	92.3		--
BP15	3	9/25/2015	47.2		--
	18	9/25/2015	42.7		--
BP18	0	6/3/15	130		--
	18	6/3/15	100		--
	24	6/3/15	86		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
BP19	0	6/3/15	47		--
	18	6/3/15	96		--
	24	6/3/15	110		--
BQ18	18	6/3/15	94		--
	24	6/3/15	100		--
BQ19	0	6/3/15	32		--
	18	6/3/15	90		--
	24	6/3/15	78		--
BR27	3	9/25/2015	47.4		--
	12	9/25/2015	50.0		--
BR37	3	9/25/2015	61.9		--
	18	9/25/2015	55.9		--
BR47	3	9/25/2015	45.9		--
	18	9/25/2015	63.8		--
BR57	3	9/25/2015	33.6		--
	18	9/25/2015	54.3		--
BR77	3	9/25/2015	77.9		--
	18	9/25/2015	90.0		--
	30	9/24/2015	56.8		--
BR85	0	10/18/2016	85.2		--
	18	10/18/2016	106		--
	30	10/18/2016	96.6		--
BR88	0	10/18/2016	96.9	O1	--
	18	10/18/2016	97.8		--
	30	10/18/2016	76.6		--
BS15	3	9/25/2015	72.0		--
	3.5	9/25/2015	81.0		--
	18	9/25/2015	91.6		--
	30	9/24/2015	70.9		--
BS78	3	9/25/2015	68.9		--
	18	9/25/2015	50.1		--
BT12	0	12/2/2015	42.2		--
	18	12/2/2015	113		--
	30	12/2/2015	93.5		--
BU81	0	12/2/2015	96.5		--
	18	12/2/2015	100		--
BX-85	0	10/18/2016	104		--
	18	10/18/2016	121		--
	30	10/18/2016	64.3		--
BY15	3	9/25/2015	79.6		--
	18	9/25/2015	74.5		--
BY75	3	9/25/2015	152		--
	18	9/25/2015	130		--
	30	9/24/2015	79.6		--
BY-75	0	10/18/2016	83.6		--
	18	10/18/2016	66.7		--
	30	10/18/2016	109		--
BY79	0	12/2/2015	113		--
	18	12/2/2015	138		--
CB12	0	12/2/2015	101		--
CB17	3	9/25/2015	63.3		--
	18	9/25/2015	79.8		--
CB27	3	9/25/2015	81.0		--
	18	9/25/2015	87.4		--
	30	9/24/2015	73.2		--
CB37	3	9/25/2015	108		--
	18	9/25/2015	71.4		--
CB47	3	9/25/2015	93.9		--
	18	9/25/2015	110		--
	30	9/24/2015	106		--
CB57	3	9/25/2015	101		--
	18	9/25/2015	101		--
CC00	0	12/2/2015	69.2		--
	18	12/2/2015	82.4		--
CC04	0	12/2/2015	116		--
	18	12/2/2015	85.6		--
CC08	0	12/2/2015	96.0		--
	18	12/2/2015	99.5		--
CC77	0	12/2/2015	124		--
	18	12/2/2015	162		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
CC-96	0	12/2/2015	103		--
	18	12/2/2015	99.9		--
	30	12/2/2015	90.8		--
CD-87	0	10/18/2016	110		--
	18	10/18/2016	104		--
CE12	3	9/25/2015	91.4		--
	18	9/25/2015	98.6		--
	30	9/24/2015	80.1		--
CE72	3	9/25/2015	139		--
	18	9/25/2015	109		--
	30	9/24/2015	109		--
CE80	0	10/18/2016	133		--
	18	10/18/2016	124		--
	30	10/18/2016	127		--
CE84	18	10/18/2016	144		--
	30	10/18/2016	170		--
CE-92	0	12/2/2015	146		--
	12	12/2/2015	241		--
	12	10/20/2016	127		--
CE94	0	10/18/2016	78.8		--
	18	10/18/2016	98.0		--
	30	10/18/2016	88.2		--
CG06	3	9/25/2015	54.0		--
	18	9/25/2015	97.1		--
	30	9/24/2015	68.3		--
CG75	0	12/2/2015	136		--
	18	12/2/2015	126		--
CG-89	0	12/2/2015	243		--
	0	10/20/2016	262		<3.36
CH00	3	9/25/2015	82.9		--
	18	9/25/2015	97.5		--
	30	9/24/2015	94.6		--
CH-72	0	10/18/2016	115		--
	18	10/18/2016	242		--
	30	10/18/2016	342		--
CH-78	0	10/18/2016	103		--
	18	10/18/2016	73.7		--
	30	10/18/2016	91.2		--
CH-94	3	9/25/2015	233		--
	18	9/25/2015	391		<2.17
CJ-82	0	10/18/2016	114		--
	18	10/18/2016	118		--
CK70	3	9/25/2015	137		--
	18	9/25/2015	163		--
	30	9/24/2015	141		--
CK73	0	12/2/2015	124		--
	18	12/2/2015	92.2		--
CK-88	3	9/25/2015	726		<2.21
	18	9/25/2015	563		--
CL07	3	9/25/2015	38.8		--
	12	9/25/2015	73.7		--
CL17	3	9/25/2015	90.3		--
	12	9/25/2015	67.4		--
	18	9/25/2015	65.4		--
CL27	3	9/25/2015	50.5		--
	12	9/25/2015	88.8		--
	24	9/24/2015	77.9		--
CL37	3	9/25/2015	70.3		--
	18	9/25/2015	89.4		--
	30	9/24/2015	126		--
CL47	3	9/25/2015	83.5		--
	3.5	9/25/2015	82.9		--
	18	9/25/2015	105		--
	30	9/24/2015	151		--
	60	12/2/2015	84.1		--
CL57	3	9/25/2015	156		--
	18	9/25/2015	103		--
	30	9/24/2015	109		--
CL67	3	9/25/2015	134		--
	18	9/25/2015	136		--
	30	9/24/2015	204		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
CL-84	0	12/2/2015	147	J6	--
	12	12/2/2015	143		--
CL-97	3	9/25/2015	86.3		--
	18	9/25/2015	100		--
	30	9/24/2015	162		--
CM82	0	10/18/2016	111		--
	18	10/18/2016	112		--
	30	10/18/2016	118		--
CM-95	0	12/2/2015	47.2		--
	18	12/2/2015	133		--
	30	12/2/2015	65.5		--
CN-59	0	10/18/2016	76.7		--
	18	10/18/2016	79.8		--
	30	10/18/2016	85.5		--
CN-97	0	12/2/2015	67.5		--
	18	12/2/2015	78.3		--
CO-67	0	10/18/2016	117		--
	18	10/18/2016	139		--
CO71	0	12/2/2015	130		--
	18	12/2/2015	109		--
CO-73	0	10/18/2016	143		--
	18	10/18/2016	196		--
CO-78	0	10/18/2016	147		<2.99
	18	10/18/2016	201		<2.63
	30	10/18/2016	104		--
CO-88	0	12/2/2015	30.0		--
	18	12/2/2015	422		--
	18	10/20/2016	329		<2.29
	30	12/2/2015	66.8		--
CO-91	0	12/2/2015	27.9		--
	18	12/2/2015	262		--
	18	10/20/2016	118		--
	30	12/2/2015	72.5		--
CP-80	0	12/2/2015	205		--
	0	10/20/2016	239		<2.51
	12	12/2/2015	345		--
	12	10/20/2016	274		<2.70
CQ-82	3	9/25/2015	204		--
	18	9/25/2015	194		--
CQ-86	0	12/2/2015	43.8		--
	18	12/2/2015	79.7		--
	30	12/2/2015	119		--
CQ-89	0	12/2/2015	100		--
	18	12/2/2015	243		--
	18	10/20/2016	103		--
	30	12/2/2015	192		<2
CQ-92	0	12/2/2015	144		--
	18	12/2/2015	758		--
	18	10/20/2016	743		<2.22
	30	12/2/2015	138		--
CS69	0	12/2/2015	110		--
	18	12/2/2015	181		--
	18	10/20/2016	97.1		--
CS-88	0	10/18/2016	105		--
	18	10/18/2016	94.2		--
	30	10/18/2016	103		--
CT-78	0	12/2/2015	133		--
	12	12/2/2015	184		--
	12	10/20/2016	214		<2.65
CT-83	0	12/2/2015	34.9		--
	18	12/2/2015	92.4		--
	30	12/2/2015	142		--
CT-87	0	12/2/2015	44.2		--
	18	12/2/2015	87.3		--
	30	12/2/2015	63.6		--
CU-65	0	10/18/2016	111		--
	18	10/18/2016	134		--
	30	10/18/2016	147		--
CU-71	0	10/19/2016	216		--
	18	10/19/2016	240		--
	30	10/19/2016	273		--

Table 1
Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
CU72	0	10/19/2016	123		--
	18	10/19/2016	159		<2.82
	30	10/19/2016	195		<2.68
CU-75	0	10/19/2016	254		<2.72
	18	10/19/2016	783		<2.46
	30	10/19/2016	268		<2.23
CV07	3	9/25/2015	25.1		--
	18	9/25/2015	74.6		--
CV17	3	9/25/2015	106		--
	12	9/25/2015	123		--
	24	9/24/2015	141		--
CV27	3	9/25/2015	101		--
	18	9/25/2015	71.6		--
CV37	3	9/25/2015	64.3		--
	18	9/25/2015	70.3		--
CV47	3	9/25/2015	95.5		--
	18	9/25/2015	121		--
	30	9/24/2015	73.2		--
CV57	3	9/25/2015	79.2		--
	18	9/25/2015	112		--
	30	9/24/2015	106		--
CV-87	3	9/25/2015	86.5		--
	18	9/25/2015	204		--
CV-97	3	9/25/2015	133		--
	18	9/25/2015	220		--
	30	9/24/2015	120		--
CW63	3	9/25/2015	69.1		--
	18	9/25/2015	92.1		--
	30	9/24/2015	106		--
CW67	0	12/2/2015	217		--
	0	10/20/2016	129		--
	18	12/2/2015	76.1		--
CX-76	0	12/2/2015	44.7		--
	12	12/2/2015	56.0		--
CX-80	3	9/25/2015	80.4		--
	12	9/25/2015	104		--
CY75	0	10/19/2016	128		--
	18	10/19/2016	124		--
	30	10/19/2016	101		--
CZ03	3	9/25/2015	133		--
	18	9/25/2015	148		--
	30	9/24/2015	79.8		--
CZ09	3	9/25/2015	46.2		--
	18	9/25/2015	63.3		--
CZ21	3	9/25/2015	43.9		--
	3.5	9/25/2015	43.6		--
	18	9/25/2015	63.2		--
CZ27	3	9/25/2015	51.8		--
	24	9/25/2015	46.7		--
CZ57	3	9/25/2015	76.2		--
	18	9/25/2015	68.3		--
CZ-82	3	9/25/2015	184		--
	18	9/25/2015	243		--
CZ-91	3	9/25/2015	279		--
	12	9/25/2015	272		--
	24	9/24/2015	205		--
CZ-97	3	9/25/2015	267		--
	18	9/25/2015	217		--
DA03	3	9/25/2015	32.0		--
	12	9/25/2015	51.9		--
DA59	0	12/2/2015	53.0		--
	18	12/2/2015	94.8		--
DA63	0	12/2/2015	43.6		--
	18	12/2/2015	38.4		--
DB-77	0	12/2/2015	49.8		--
	12	12/2/2015	73.2		--
DB-81	0	12/2/2015	61.7		--
DC08	0	6/3/15	160		--
DC09	0	6/3/15	84.3		--
DC11	0	6/3/15	69.7		--

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Summary of Chromium Data using EPA Method 6010C
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a		Chromium Hexavalent ^b
DC12	3	9/25/2015	91.5		--
	18	9/25/2015	89.6		--
	30	9/24/2015	106		--
DC15	3	9/25/2015	96.5		--
	18	9/25/2015	70.2		--
DC18	3	9/25/2015	81.2		--
	18	9/25/2015	78.4		--
DC32	3	9/25/2015	54.7		--
	18	9/25/2015	56.4		--
DD08	0	6/3/2015	110		--
DD09	0	6/3/15	86.5		--
DD10	0	6/3/15	86.3		--
DD21	0	12/2/2015	50.7		--
	12	12/2/2015	71.5		--
DD25	3	9/25/2015	77.5		--
	12	9/25/2015	89.4		--
	18	9/24/2015	135		--
DD37	3	9/25/2015	74.5		--
	12	9/25/2015	57.4		--
DE11	0	12/2/2015	62.7		--
	12	12/2/2015	54.2		--
DE14	0	12/2/2015	58.9		--
	12	12/2/2015	67.9		--
DE43	3	9/25/2015	59.6		--
	18	9/25/2015	60.8		--
DE-59	0	10/19/2016	134		--
	18	10/19/2016	126		--
	30	10/19/2016	180		--
DE61	0	10/19/2016	95.9		--
	18	10/19/2016	144		<2.30
	30	10/19/2016	89.1		--
DE66	0	10/19/2016	84.0		--
	18	10/19/2016	174		--
	30	10/19/2016	172		--
DG48	3	9/25/2015	63.5		--
	18	9/25/2015	74.7		--
DH21	0	12/2/2015	70.4		--
DH25	0	12/2/2015	61.2		--
	12	12/2/2015	77.1		--
DH-65	0	10/19/2016	176		--
DI57	0	10/19/2016	118		--
	18	10/19/2016	238		--
	30	10/19/2016	264		--
DI72	0	10/19/2016	73.3		--
	18	10/19/2016	197		--
	0	10/19/2016	62.0		--
NX120	3	9/22/2015	93.9		--
	12	9/22/2015	70.7		--
OZ47	3	9/23/2015	51.3		--
OZ67	24	9/24/2015	67.3		--
Cleanup Level			42 ^c		19 ^d

Notes:

- All results presented in milligrams/kilogram (mg/kg).
- Bold**

Bold results indicate that the compound was detected.
- Shaded results indicate that the compound was detected at a concentration greater than the cleanup level.
- a

Analyzed by EPA Method 6010C.
- b

Analyzed by EPA Method 3060A/7196A.
- c

Based on Terrestrial Ecological Evaluation Ecological Indicator Concentrations (EIC) in MTCA Table 749-3.
- d

Based on protection of human health.
- Not analyzed.

Qualifiers:

- J3

The associated batch QC was outside the established quality control range for precision.
- J5

The sample matrix interfered with the ability to make any accurate determination; spike value is high.
- J6

The sample matrix interfered with the ability to make any accurate determination; spike value is low.
- O1

The analyte failed the method required serial dilution test and/or subsequent post-spike criteria. These failures indicate matrix interference.

Table 2
Summary of Hexavalent Chromium Results
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Sample Date	Chromium ^a	Chromium Hexavalent ^b
00F-75	18	10/19/2016	147	<2.59
0F74	30	10/20/2016	146	<2.58
0G-60	30	12/2/2015	191	<2
0G-70	30	12/2/2015	194	<2
0P87	18	9/23/2015	323	4.49
0S84	30	12/2/2015	223	3.92
0S87	30	12/2/2015	222	2.8
J-80	30	12/2/2015	161	<2
X-74	18	10/19/2016	209	4.70
	30	10/19/2016	214	<2.17
AF25	30	12/2/2015	268	<2
AP99	30	10/18/2016	129	3.64
AQ-86	18	10/18/2016	334	4.64
AU28	18	10/20/2016	312	<2.25
CG-89	0	10/20/2016	262	<3.36
CH-94	18	9/25/2015	391	<2.17
CK-88	3	9/25/2015	726	<2.21
CO-78	0	10/18/2016	147	<2.99
	18	10/18/2016	201	<2.63
CO-88	18	10/20/2016	329	<2.29
CP-80	0	10/20/2016	239	<2.51
	12	10/20/2016	274	<2.70
CQ-89	30	12/2/2015	192	<2
CQ-92	18	10/20/2016	743	<2.22
CT-78	12	10/20/2016	214	<2.65
CU72	18	10/19/2016	159	<2.82
	30	10/19/2016	195	<2.68
CU-75	0	10/19/2016	254	<2.72
	18	10/19/2016	783	<2.46
	30	10/19/2016	268	<2.23
DE61	18	10/19/2016	144	<2.30
Cleanup Level			42 ^c	19 ^d

Notes:

All results presented in milligrams/kilogram (mg/kg).

Bold



Bold results indicate that the compound was detected.

Shaded results indicate that the compound was detected at a concentration greater than the cleanup level.

a Analyzed by EPA Method 6010C.

b Analyzed by EPA Method 3060A/7196A.

c Based on TEE for protection of plants.

d Based on protection of human health.

Table 3
Summary of Initial Background Soil Analytical Results
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Date	Chromium^a
Back-1	10/20/2016	84.9
Back-2	10/20/2016	51.4
Back-3	10/20/2016	26.8
Back-4	10/20/2016	58.4
Back-5	10/20/2016	46.0
Back-6	10/20/2016	54.3
Back-7	10/20/2016	40.9
Back-8	10/20/2016	96.4
Back-9	10/20/2016	44.8
Back-10	10/20/2016	111
Back-11	10/20/2016	352
Back-12	10/20/2016	77.1
Back-13	10/20/2016	182
Back-14	10/20/2016	216
Back-15	10/20/2016	285
Back-16	12/14/2016	156
Back-17	12/14/2016	107
Back-18	12/14/2016	165
Back-19	12/14/2016	16.7
Back-20	12/14/2016	19.6

Notes:

All results presented in milligrams/kilogram (mg/kg).

Bold Bold results indicate that the compound was detected.

a October samples were analyzed by EPA Method 6010C.
December samples were analyzed by EPA Method 200.8.

Table 4
TEE Sampling Analytical Data Comparison and Discrepancies
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample ID		Freidman & Bruya, Inc. ^a	ESC Lab Sciences ^b	Times Higher	Average
A1-85:0	A	38.4	111	2.9	3.2
	B	36.9	79.3	2.1	
	C	49.1	195	4.0	
	D	34.9	177	5.1	
	E	56.1	99	1.8	
CK-88:3	A	116	384	3.3	5.3
	B	83.6	445	5.3	
	C	87.3	680	7.8	
	D	90.1	464	5.1	
	E	106	513	4.8	
CK-88:18	A	91.8	347	3.8	5.1
	B	80.3	557	6.9	
	C	92	389	4.2	
	D	96.4	409	4.2	
	E	60.3	385	6.4	
CO-88:18	A	22.2	38.3	1.7	2.1
	B	16.6	38	2.3	
	C	20.5	26.9	1.3	
	D	15.5	44	2.8	
	E	17.6	43.3	2.5	

Notes:

Chromium results presented in milligrams/kilogram (mg/kg).

a Analyzed by EPA Method SW6020.

b Analyzed by EPA Method SW6010C (ICP).

Table 5 Summary of Re-Assessment Chromium Analytical Results for Soil (in mg/kg) Chromium Assessment Report Mount Vernon Compressor Station 15498 Lange Road, Mount Vernon, Washington				
Sample Location	Sample Depth (inches)	Original Chromium ^a ESC (6010)	October/November 2017 Chromium ^b FBI (6020)	Times Higher (6010/6020)
00B-87	0	86.7	41.1	2.1
00M-70	30	91.4	41.5	2.2
00M-80	18	113	57.0	2.0
00N118	18	82.7	60.4	1.4
00N118	30	89.2	45.3	2.0
0A55	30	115	50.9	2.3
0G-80	0	139	46.5	3.0
0K48	0	81.3	39.1	2.1
0P87	3	84.2	42.5	2.0
0P87	18	323	132	2.4
0Q-80	0	145	60.4	2.4
0Q83	0	256	19.5	13.1
J-41	0	89.4	44.9	2.0
J-41	18	122	49.6	2.5
J-41	30	323	84.9	3.8
J-80	18	264	38.9	6.8
S94	0	330	34.5	9.6
T93	0	340	33.8	10.1
U92	0	300	34.7	8.6
V92	0	320	132	2.4
V93	0	260	105	2.5
V94	0	220	179	1.2
W93	0	260	81.9	3.2
W94	0	260	177	1.5
AA-70	0	106	54.4	1.9
AB38	3	152	15.6	9.7
AC28	18	256	59.3	4.3
AD77	3	85.2	19.7	4.3
AD77	18	96.4	46.0	2.1
AD77	30	231	42.1	5.5
AF25	0	112	48.4	2.3
AF25	18	267	61.8	4.3
AF25	30	268	120	2.2
AH-62	0	103	33.5	3.1
AH-62	18	129	43.0	3.0
AH-62	30	387	50.9	7.6
AI-85	0	96.7	33.3	2.9
AQ-86	0	114	51.6	2.2
AQ-86	18	334	56.4	5.9
AU28	0	95.2	46.8	2.0
AU28	18	312	48.3	6.5
AU31	0	154	49.5	3.1
AX28	3	199	67.7	2.9
AX28	12	228	49.7	4.6
BA07	18	90.9	58.3	1.6
BA07	30	97.1	45.9	2.1
BE03	0	134	63.1	2.1
BM102	0	102	50.3	2.0
BO18	0	240	48.3	5.0
BO18	18	250	64.5	3.9
BP18	0	130	40.5	3.2
BY75	3	152	65.0	2.3
CB37	3	108	46.5	2.3
CD-87	0	110	56.8	1.9
CE80	0	133	72.6	1.8
CE80	18	124	53.6	2.3
CE-92	0	146	54.8	2.7
CE-92	12	241	50.4	4.8
CG-89	0	243	52.7	4.6
CH-94	3	233	53.8	4.3
CH-94	18	391	71.7	5.5
CK70	3	137	43.8	3.1
CK-88	0	422	101	4.2
CK-88	18	329	117	2.8
CL47	3.5	82.9	32.5	2.6
CL47	18	105	37.6	2.8
CL47	30	151	52.9	2.9
CL-84	0	147	43.1	3.4
CO-78	0	147	48.1	3.1

Table 5
Summary of Re-Assessment Chromium Analytical Results for Soil (in mg/kg)
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Original Chromium ^a ESC (6010)	October/November 2017 Chromium ^b FBI (6020)	Times Higher (6010/6020)
CP-80	0	239	57.4	4.2
CP-80	12	345	64.5	5.3
CQ-82	3	204	57.2	3.6
CQ-89	0	100	30.6	3.3
CQ-92	0	144	52.3	2.8
CQ-92	18	758	56.3	13.5
CT-78	0	133	51.6	2.6
CU-75	0	254	69.1	3.7
CU-75	18	783	60.5	12.9
CU-75	30	268	67.6	4.0
CV17	3	106	50.8	2.1
CW67	0	217	57.1	3.8
CZ03	3	133	30.9	4.3
CZ-82	3	184	30.7	6.0
CZ-82	18	243	38.8	6.3
CZ-91	3	279	62.2	4.5
CZ-91	12	272	42.2	6.4
CZ-97	3	267	42.1	6.3
DD08	0	110	44.3	2.5
DI57	0	118	66.6	1.8
DI57	18	238	88.3	2.7
DI57	30	264	53.1	5.0

Notes:
All results presented in milligrams/kilogram (mg/kg).
Bold Bold results indicate that the compound was detected.
a Analyzed by EPA Method 6010C.
b Analyzed by EPA Method 6020A, unless otherwise indicated.

Table 6
Summary of Re-Assessed Chromium Data for Area Background Study
Chromium Assessment Report
Mount Vernon Compressor Station
15498 Lange Road, Mount Vernon, Washington

Sample Location	Sample Depth (inches)	Original Chromium ^a ESC (6010)	October/November 2017 Chromium ^b FBI (6020)	Times Higher (6010/6020)
Back-1	0	84.9	21.2	4.0
Back-2	0	51.4	30.8	1.7
Back-3	0	26.8	26.1	1.0
Back-4	0	58.4	36.7	1.6
Back-5	0	46	28.8	1.6
Back-6	0	54.3	34.1	1.6
Back-7	0	40.9	41.1	1.0
Back-8	0	96.4	16.1	6.0
Back-9	0	44.8	16.8	2.7
Back-10	0	111	17.8	6.2
Back-11	0	352	68.3	5.2
Back-12	0	77.1	11.3	6.8
Back-13	0	182	88.9	2.0
Back-14	0	216	47.8	4.5
Back-15	0	285	25.3	11.3
Back-16	0	--	156^c	NA
Back-17	0	--	107^c	NA
Back-18	0	--	165^c	NA
Back-19	0	--	16.7^c	NA
Back-20	0	--	19.6^c	NA

Notes:

All results presented in milligrams/kilogram (mg/kg).

Bold Bold results indicate that the compound was detected.

a Analyzed by EPA Method 6010C.

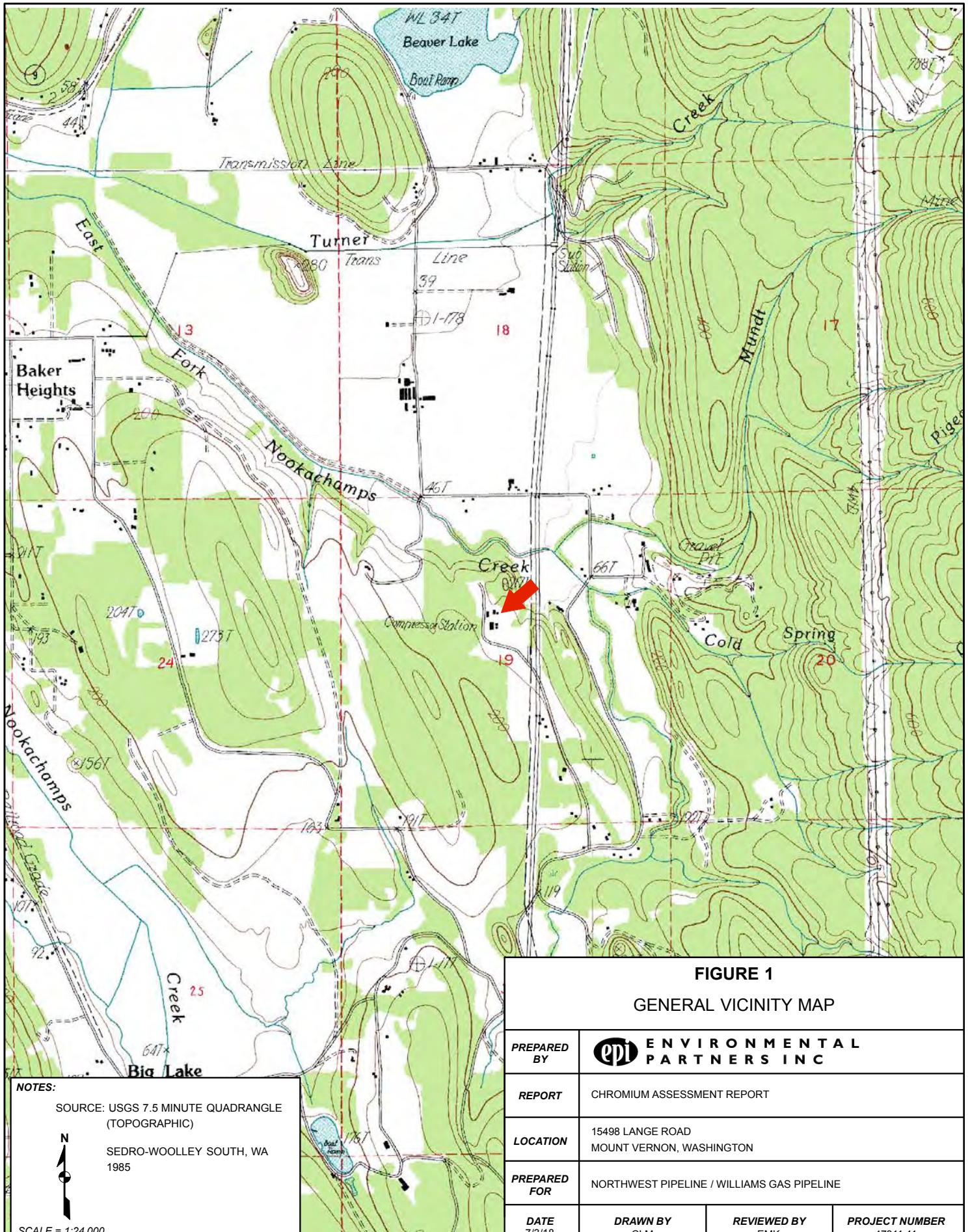
b Analyzed by EPA Method 6020A, unless otherwise indicated.

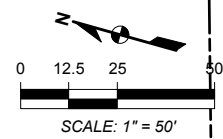
c Analyzed by EPA Method 200.8.

NA Not applicable.

-- Not analyzed.

Figures





NOTES:

- APPROXIMATE PROPERTY BOUNDARY (SKAGIT COUNTY GIS)
- - - - - FENCELINE
- P30336 SKAGIT COUNTY PARCEL NUMBER

P30335

P30336

P30328

P30340

P30349

P30343

P30342

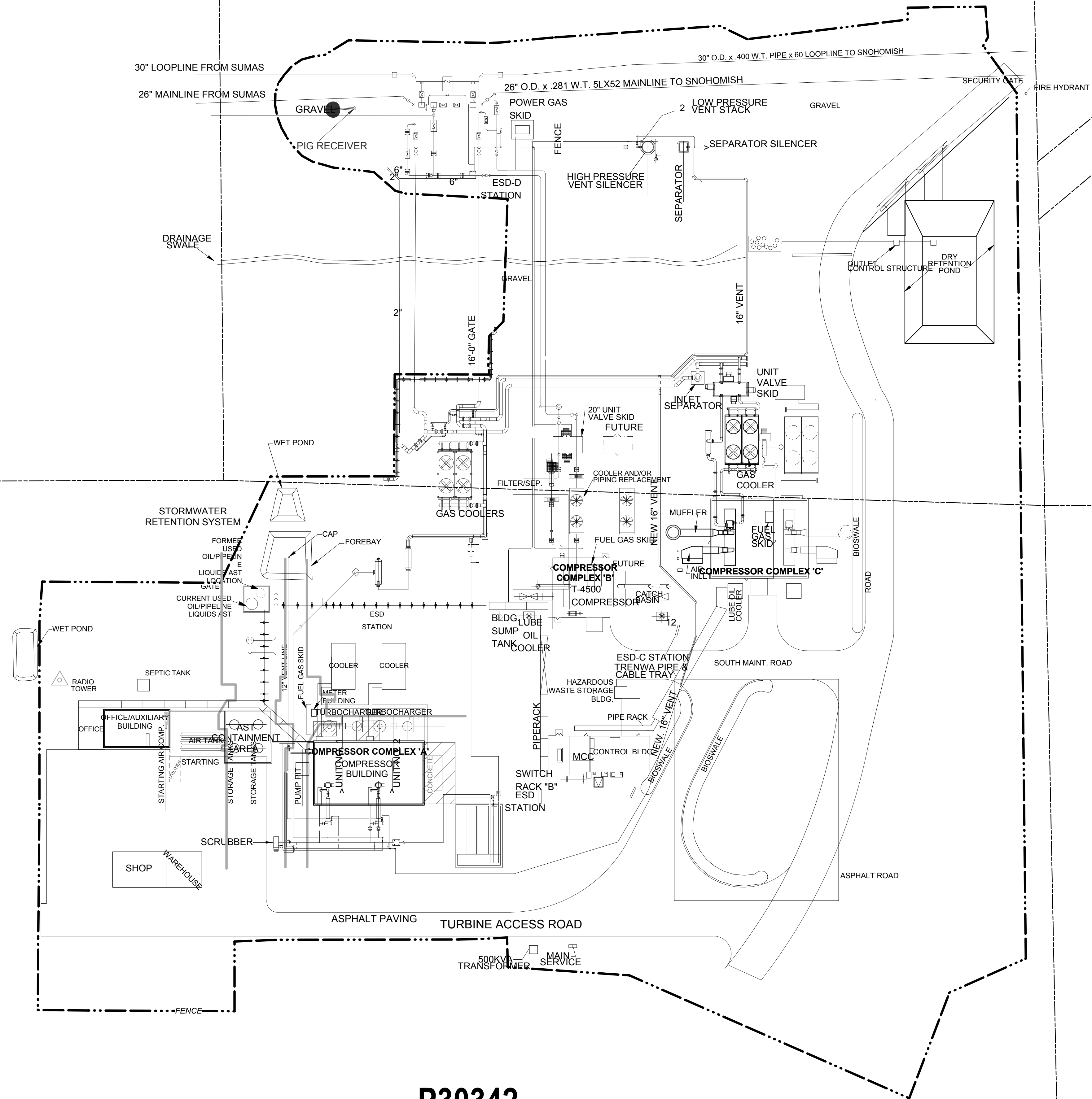
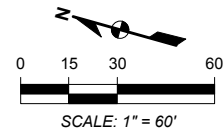


FIGURE 2				
SITE REPRESENTATION				
PREPARED BY	ENVIRONMENTAL PARTNERS INC.			
REPORT	CHROMIUM ASSESSMENT REPORT			
LOCATION	15488 LANGE ROAD MOUNT VERNON, WASHINGTON			
PREPARED FOR	NORTHWEST PIPELINE, LLC			
DATE 10/18	DRAWN BY VPB	REVIEWED BY EMK	PROJECT NUMBER 47311.11	



NOTES:

- CHROMIUM SAMPLE LOCATION (2014 AND 2015)
- CHROMIUM SAMPLE LOCATION (2016)
- APPROXIMATE PROPERTY BOUNDARY (SKAGIT COUNTY GIS)
- FENCELINE
- P30336 SKAGIT COUNTY PARCEL NUMBER

P30335

P30336

P30349

P30343

P30342

P30340

P30328

P30340

FIGURE 3				
SOIL SAMPLE LOCATIONS ANALYZED BY EPA METHOD 6010				
PREPARED BY	ENVIRONMENTAL PARTNERS INC.			
REPORT	CHROMIUM ASSESSMENT REPORT			
LOCATION	15488 LANGE ROAD MOUNT VERNON, WASHINGTON			
PREPARED FOR	NORTHWEST PIPELINE, LLC			
DATE 7/3/16	DRAWN BY VPB	REVIEWED BY EMK	PROJECT NUMBER 47311.11	

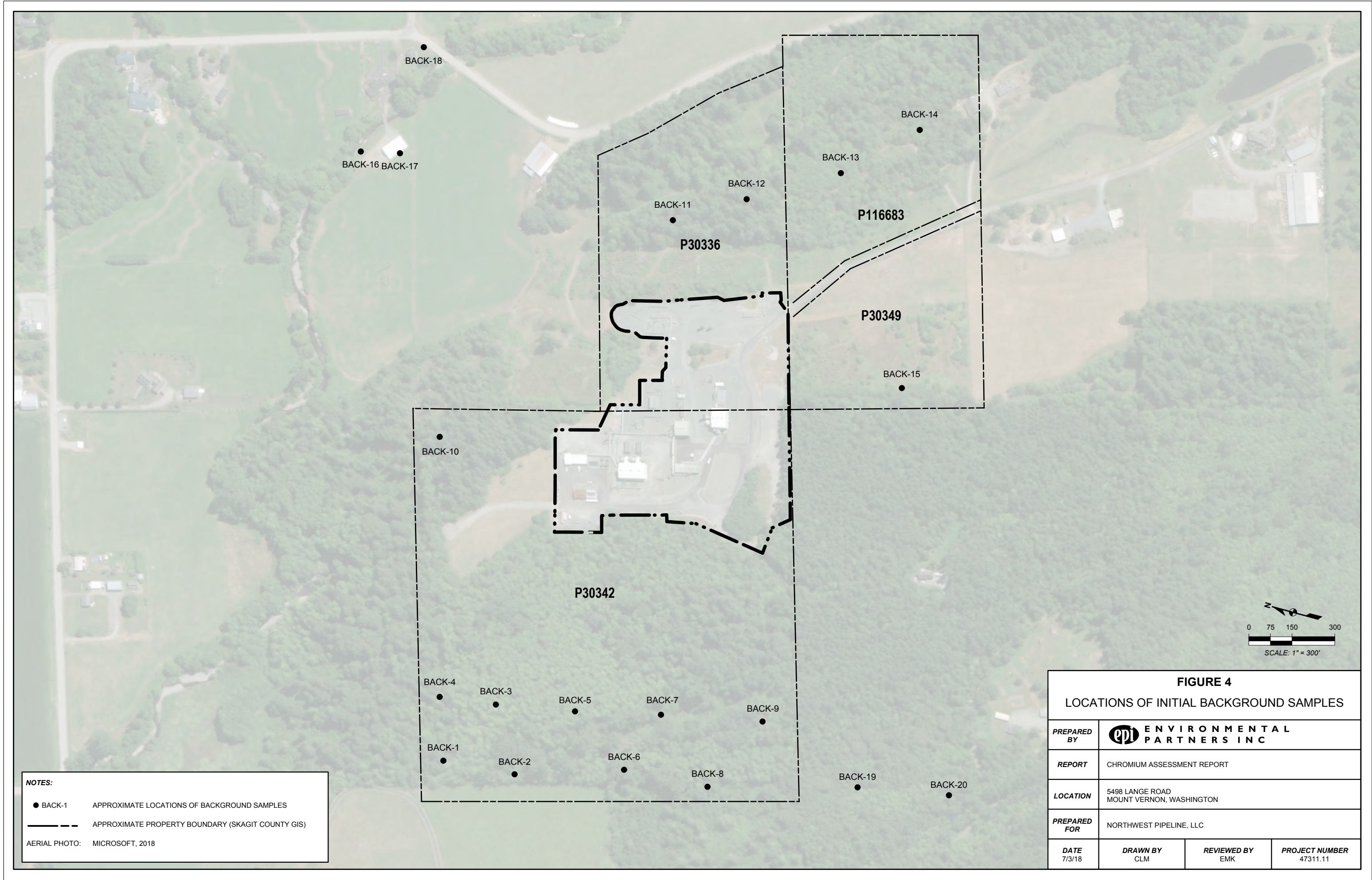
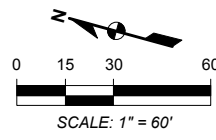


FIGURE 4			
LOCATIONS OF INITIAL BACKGROUND SAMPLES			
PREPARED BY	epi ENVIRONMENTAL PARTNERS INC		
REPORT	CHROMIUM ASSESSMENT REPORT		
LOCATION	5498 LANGE ROAD MOUNT VERNON, WASHINGTON		
PREPARED FOR	NORTHWEST PIPELINE, LLC		
DATE 7/3/18	DRAWN BY CLM	REVIEWED BY EMK	PROJECT NUMBER 47311.11



NOTES:

- CHROMIUM SAMPLE LOCATION (2017)
- APPROXIMATE PROPERTY BOUNDARY (SKAGIT COUNTY GIS)
- FENCELINE
- P30336 SKAGIT COUNTY PARCEL NUMBER

P30335

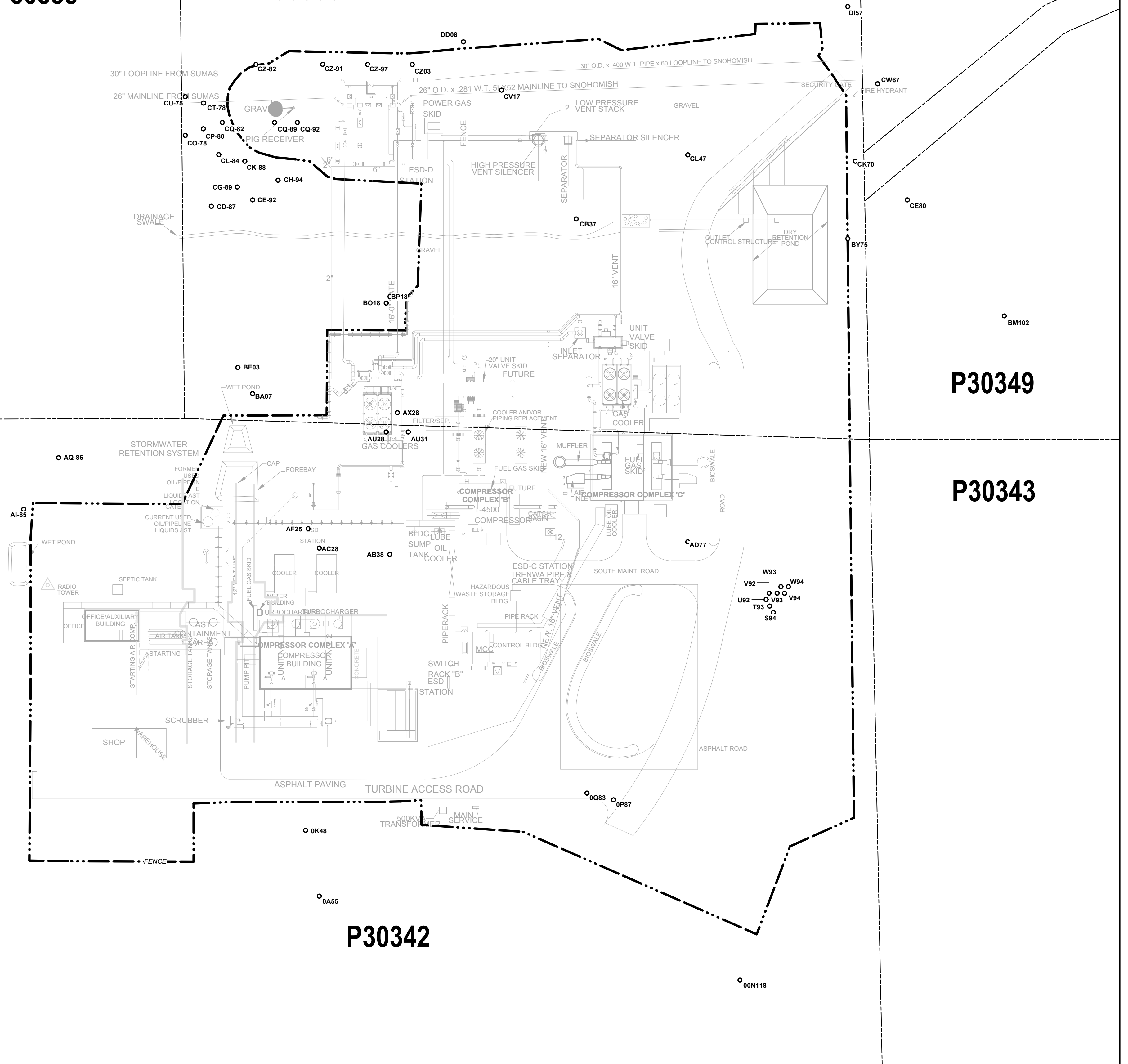
P30336

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P30340



BM102

○ J-41

○ J-80

○ 0Q-80

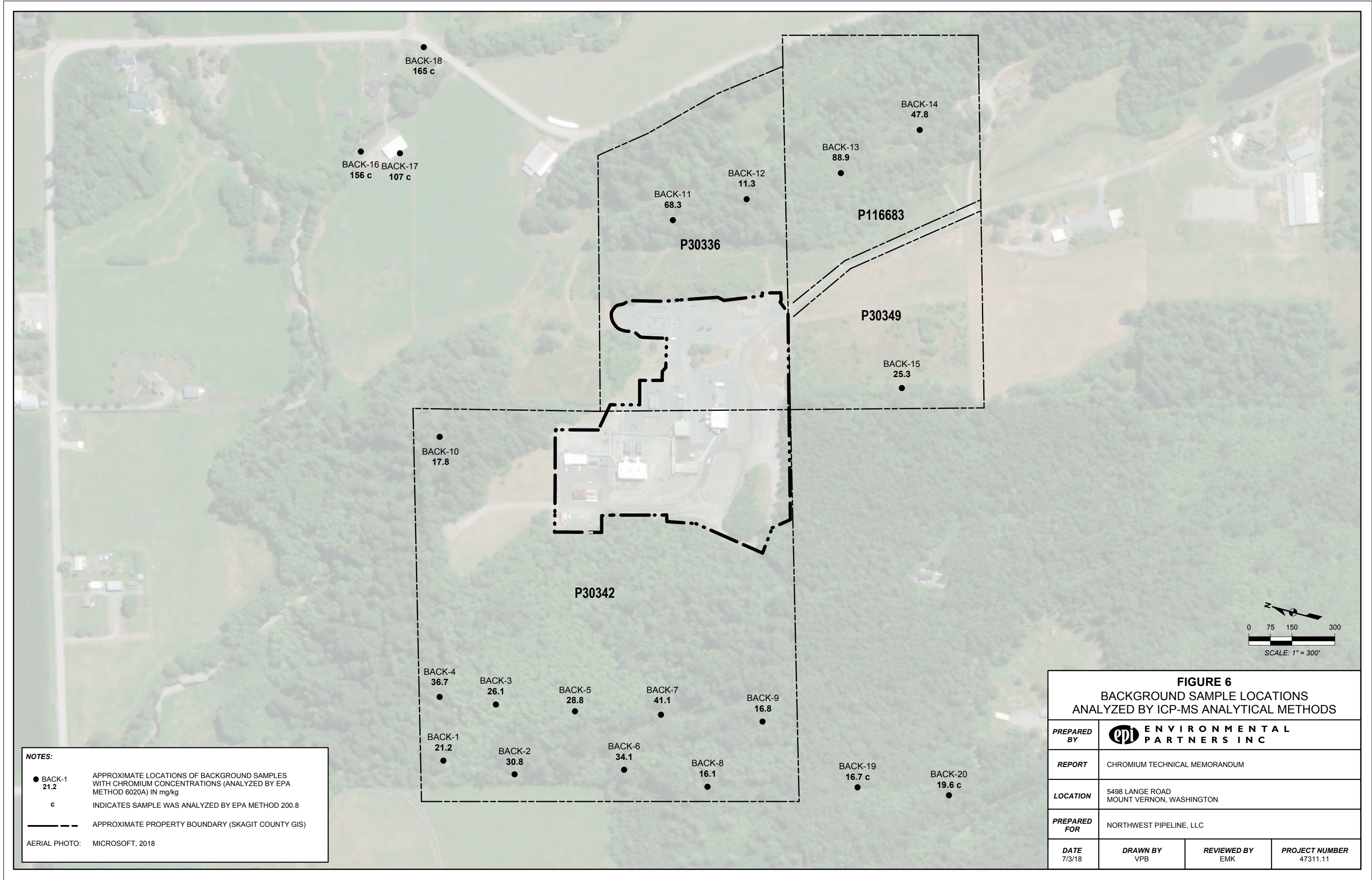
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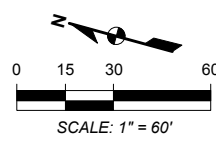
○ 00M-70

○ 00M-80

○ 00B-87

FIGURE 5			
SOIL SAMPLING LOCATIONS ANALYZED BY EPA METHOD 8020			
PREPARED BY	ENVIRONMENTAL PARTNERS INC.		
REPORT	CHROMIUM ASSESSMENT REPORT		
LOCATION	15488 LANGE ROAD MOUNT VERNON, WASHINGTON		
PREPARED FOR	NORTHWEST PIPELINE, LLC		
DATE 10/18	DRAWN BY VPS	REVIEWED BY EMK	PROJECT NUMBER 47311.11





- NOTES:
- CHROMIUM SAMPLE LOCATION (2017)
 - INDICATES SAMPLE WITH CHROMIUM LEVELS >BACKGROUND (103.4 mg/kg)
 - APPROXIMATE PROPERTY BOUNDARY (SKAGIT COUNTY GIS)
 - - - - - FENCELINE
 - P30336 SKAGIT COUNTY PARCEL NUMBER

P30335

P30336

P30349

P30343

P30342

P30340

P30328

P30340

FIGURE 7			
SOIL SAMPLING LOCATIONS, ANALYZED BY EPA METHOD 6020, WITH CHROMIUM CONCENTRATIONS THAT EXCEED BACKGROUND LEVELS			
PREPARED BY	ENVIRONMENTAL PARTNERS INC.		
REPORT	CHROMIUM TECHNICAL MEMORANDUM		
LOCATION	15488 LANGE ROAD MOUNT VERNON, WASHINGTON		
PREPARED FOR	NORTHWEST PIPELINE, LLC		
DATE 10/18	DRAWN BY VPB	REVIEWED BY EMK	PROJECT NUMBER 47311.11

Attachment A
Ecology Opinion Letter dated November 5, 2013



STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Northwest Regional Office • 3190 160th Ave SE • Bellevue, WA 98008-5452 • 425-649-7000
711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

November 5, 2013

Mr. Eric Koltes
Environmental Partners Inc.
295 NE Gilman Boulevard
Issaquah, WA 98027

Re: Opinion Pursuant to WAC 173-340-515(5) on Remedial Investigation and Feasibility Study for the Following Hazardous Waste Site:

- **Name:** Northwest Pipeline GP Mt Vernon C/S
- **Address:** 15498 Lange Rd, Mount Vernon WA
- **Facility/Site No.:** 2684
- **VCP No.:** NW2008
- **Cleanup Site ID No.:** 4766

Dear Mr. Koltes:

Thank you for submitting documents regarding your Remedial Investigation and Feasibility Study for the Northwest Pipeline GP Mt Vernon C/S (Site) for review by the Washington State Department of Ecology (Ecology) under the Voluntary Cleanup Program (VCP). Ecology appreciates your initiative in pursuing this administrative option for cleaning up hazardous waste sites under the Model Toxics Control Act (MTCA), Chapter 70.105D RCW.

This letter constitutes an advisory opinion regarding a review of submitted documents/reports pursuant to requirements of MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site:

- Arsenic, cadmium, lead, and polychlorobiphenols (PCBs) in soil.
- Arsenic in groundwater.

Ecology is providing this advisory opinion under the specific authority of RCW 70.105D.030(1)(i) and WAC 173-340-515(5).

This opinion does not resolve a person's liability to the state under MTCA or protect a person from contribution claims by third parties for matters addressed by the opinion. The state does



Mr. Eric Koltes
November 5, 2013
Page 2

not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). The opinion is advisory only and not binding on Ecology.

Ecology's Toxics Cleanup Program has reviewed the following information regarding your proposed remedial actions:

1. Remedial Investigation and Cleanup Action Plan Northwest Pipeline Mount Vernon Compressor Station, dated November 14, 2012, prepared by Environmental Partners Inc.
2. Terrestrial Ecological Evaluation Program Northwest Pipeline GP I-5 Corridor Compressor Station Facilities, dated August 16, 2011, prepared by Environmental Partners Inc.
3. Deferred AOPC Sampling Plan Mount Vernon Compressor Station, dated July 2008, prepared by Environmental Partners Inc.
4. Site Condition Summary and Sampling Plan Mount Vernon Compressor Station, dated December 2005, prepared by Environmental Partners Inc.

The documents listed above are kept in the Central Files of the Northwest Regional Office of Ecology (NWRO) for review by appointment only. You can make an appointment by calling the NWRO resource contact at (425) 649-7235 or by sending an email to nwro_public_request@ecy.wa.gov.

The Site is defined by the extent of contamination caused by the following releases:

- Arsenic, cadmium, lead, and PCBs in soil.
- Arsenic in groundwater.

Based on a review of supporting documentation listed above, pursuant to **requirements contained in MTCA and its implementing regulations, Chapter 70.105D RCW and Chapter 173-340 WAC, for characterizing and addressing the following release(s) at the Site, Ecology has determined:**

- Ecology concurs that the Remedial Investigation is complete with the nature and extent of all contaminants of concern clearly identified at this Site.
- Ecology concurs with the selection of cleanup standards for the chemicals of concern at this Site.
- Ecology notes your selected alternative in the Feasibility Study is Alternative 2: Targeted Excavation with Institutional Controls and Monitored Natural Attenuation of Groundwater impacts.

- Ecology approves of your selected remedial action, which is described below, as likely to meet the substantive requirements of MTCA for this Site.

Alternative 2 – Targeted Excavation with Institutional Controls and MNA of Ground Water Impacts

This alternative involves the excavation and off-site disposal of all impacted soils that exceed the site-specific cleanup levels (CUL) *and RELs.* It is currently estimated that a total of approximately 715 cubic yards of in-place soil exceed the site-specific CULs.

Remediation will consist of removal, off-site disposal, and replacement of approximately 785 cubic yards of soil, which is the volume of impacted soil plus a 10 percent contingency for additional volume based on performance sampling results.

Once remedial activities are completed a Work Plan for Monitored Natural Attenuation (MNA) will be submitted to Ecology for approval and implementation.

The general scope of Alternative 2 is:

- Preparing a Sampling and Analysis Plan and Health and Safety Plan;
- Obtaining appropriate construction permits;
- Excavation and disposal of 785 cubic yards of soil;
- Soil sampling and analysis to document soil conditions for disposal;
- Confirmation soil sampling and analysis of the sides and bottom of the excavation;
- Site restoration consisting of importing, placing and compacting clean backfill and restoring the gravel surface;
- Documentation of all remedial activities;
- Address ground water impacts through MNA;
- Implementation of institutional controls for the impacted soil above Site CULs remaining on Site.

This opinion does not represent a determination by Ecology that a proposed remedial action will be sufficient to characterize and address the specified contamination at the Site or that no further remedial action will be required at the Site upon completion of the proposed remedial action. To obtain either of these opinions, you must submit appropriate documentation to Ecology and request such an opinion under the VCP. **This letter also does not provide an opinion regarding the sufficiency of any other remedial action proposed for or conducted at the Site.**

Mr. Eric Koltes
November 5, 2013
Page 4

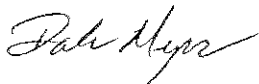
Please note that this opinion is based solely on the information contained in the documents listed above. Therefore, if any of the information contained in those documents is materially false or misleading, then this opinion will automatically be rendered null and void.

The state, Ecology, and its officers and employees make no guarantees or assurances by providing this opinion, and no cause of action against the state, Ecology, its officers or employees may arise from any act or omission in providing this opinion.

Again, Ecology appreciates your initiative in conducting independent remedial action and requesting technical consultation under the VCP. As the cleanup of the Site progresses, you may request additional consultative services under the VCP, including assistance in identifying applicable regulatory requirements and opinions regarding whether remedial actions proposed for or conducted at the Site meet those requirements.

If you have any questions about this opinion or the termination of the Agreement, please contact me by phone at (425) 649-4446 or e-mail at damy461@ecy.wa.gov.

Sincerely,



Dale Myers
Site Manager
Toxics Cleanup Program

cc: Mr. Aaron Galer, Northwest Pipeline GP / Williams Gas Pipeline
Mr. Alan Hopkins, Portnoy Environmental
Sonia Fernandez, VCP Coordinator, Ecology

Attachment B
Ecology Opinion Letter dated August 30, 2011



473xx

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

PO Box 47775 • Olympia, Washington 98504-7775 • (360) 407-6300

August 30, 2011



Mr. Aaron Galer
Environmental Scientist III
Williams - Northwest Pipeline
295 Chipeta Way # 1
Salt Lake City, UT 84108-1285

Re: Transmittal of Ecology Comments on the Revised *Terrestrial Ecological Evaluation Program, Northwest Pipeline GP I-5 Corridor Compressor Station Facilities*, Prepared by Williams Gas Pipeline, Environmental Partners, Inc., and Portnoy Environmental, dated August 16, 2011.

Dear Mr. Galer:

Thank you for revising the above-referenced Compressor Station (C/S) Terrestrial Ecological Evaluation (TEE) Program document in response to our previous comment letter. We approve this document provided that the following comment is incorporated:

- Table 1, Sumner C/S, Arsenic: Under the "Receptor Eliminated" column for vascular plants, the code "M" is shown. However, a "U" code appears to be more correct. Please check this entry and change if appropriate.

If you have any questions, please contact me at (360) 407-6247 or via e-mail at stee461@ecy.wa.gov.

Sincerely,

SS Teel

Steve Teel, LHG
Site Manager/Hydrogeologist
Toxics Cleanup Program
Southwest Regional Office

ST/ksc:TEE C S Approval 08302011

By certified mail: (7010 1670 0002 4158 8882)

cc: Eric Koltes, Environmental Partners, Inc.
Mr. Alan Hopkins, P.G., Portnoy Environmental
Dale Myers – Ecology-NWRO
Scott Rose – Ecology



Attachment C
Ecology Opinion Letter dated September 29, 2014

Memo

Department of Ecology
Central Regional Office

September 29, 2014

To: Environmental Partners, Inc.
Northwest Pipe Line
From: Norm Peck 

Re: Revised Terrestrial Ecological Evaluation Summary Report, Northwest Pipeline GP Eastern Washington Compressor Station Facilities, Northwest Pipeline GP, Environmental Partners, Inc. and Portnoy Environmental, September 3, 2014

The Department of Ecology (Ecology) received copies of the above report for review on or about September 9, 2014. The report was reviewed by Norm Peck (CRO), Steve Teel (SWRO) and Arthur Buchan (HQ) in consideration of comments and questions provided to Environmental Partners, Inc. and Northwest Pipeline. Ecology has determined that this report is responsive to and addresses the comments and questions posed by Ecology, and accepts the report and its findings.

Though not a condition of approval of the report, Ecology would like to reiterate that from our perspective dibenzodioxins, dibenzofurans and dioxin-like PCB congeners are potential contaminants of environmental concern at the Plymouth Compressor Station Site. Ecology Comment 10 addressed this concern, and Ecology expects to see the explanation committed to in the response to Ecology Comment 10, i.e. "An explanation will be provided in the forthcoming Remedial Investigation and Cleanup Action Plan for the Plymouth Compressor Station." While these contaminants may not have been previously identified as 'of concern', the presence of relatively high concentrations of PCBs, and the applications of PCB-containing oils at the facility raise significant concerns for related contaminants often found where high-temperature applications of PCB-containing lubricants, coolant oils, sealers, etc. have occurred.

Please provide Ecology with an electronic copy of the document as finalized for inclusion in the electronic record. Given the size of the document, if any further changes to the document of a minor editorial nature occur, it would be acceptable to Ecology to receive an addendum noting the changes rather than requiring reprinting of the entire document.

If you have any questions, please feel free to contact me at (509) 454-7837 or by email at nope461@ecy.wa.gov.

cc Arthur Buchan (TCP, HQ)
Steve Teel (TCP, SWRO)
Files