Moxee POTW Interim Action Plan

7520 Postma Road
Moxee, Washington

Prepared by
Washington State Department of Ecology
October 20, 2014

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ACRONYMS AND ABBREVIATIONS

AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene and total xylenes
COC	contaminant of concern
CSID	Cleanup Site Identification
CUL	cleanup level
Ecology	Washington State Department of Ecology
EPA	US Environmental Protection Agency
ft	feet or foot
FS	Feasibility Study
FSID	Facility Site Identification
GRPH	gasoline-range petroleum hydrocarbons
HASP	Health and Safety Plan
IA	Interim Action
IAP	Interim Action Plan
lbs	pounds
MCL	Maximum Contaminant Level
mg/L	milligrams per liter
mg/kg	milligrams per kilogram
MTCA	Model Toxics Control Act
PID	photoionization detector
POC	point of compliance
POTW	publically owned treatment works
RI	Remedial Investigation
µg/L	micrograms per liter
µg/kg	micrograms per kilogram
QAPP	Quality Assurance Project Plan
RCW	Revised Code of Washington
SAP	Sampling and Analysis Plan
SEPA	State Environmental Policy Act
Simplot	Simplot Soil Builders Moxee City cleanup site
Site	Moxee POTW cleanup site
SMCL	Secondary Maximum Contaminant Level
STP	sewage treatment plant
TEE	terrestrial ecological evaluation
TPH	total petroleum hydrocarbons
UIC	underground injection control
UST	underground storage tank
VI	vapor intrusion
VOC	volatile organic compound
WAC	Washington Administrative Code

Moxee POTW Interim Action Plan

1.0 INTRODUCTION

This document provides a draft Interim Action Plan (IAP) for petroleum hydrocarbon remediation in soil and/or groundwater. The Washington State Department of Ecology (Ecology) is conducting an interim action (IA) for a petroleum release that occurred at the Moxee Publicly Owned Treatment Works (POTW) (Site) located at 7520 Postma Road in Moxee, Washington.

1.1 Purpose

The IA is intended to reduce contamination in soil and groundwater at the Site impacted with gasoline-range petroleum hydrocarbons (GRPH) to concentrations below toxicity-based cleanup levels in affected media throughout the Site (soil and groundwater). The selected IA for the Site as described in this IAP includes *in situ* soil and groundwater treatment through chemical oxidation and enhanced bioremediation, followed by compliance monitoring. This IA is intended to be a final cleanup action for the Moxee POTW petroleum release. A separate nitrate- and sulfate-related groundwater contamination plume, likely originating from the neighboring, upgradient Simplot Soilbuilders Moxee City (Simplot) site (FSID# 84612438, CSID# 12402), will not be addressed during this IA.

1.2 Public Participation and Final Interim Action Plan

Ecology is providing public notice and opportunity for comment on this IAP, as required in Washington Administrative Code (WAC) 173-340-600(16). After review and consideration of comments received, Ecology will determine the need for changes to this plan and prepare a responsiveness summary.

1.3 Interim Action Plan Content Requirements

This IAP was prepared by Ecology's Toxics Cleanup Program and developed in accordance with Ecology's Model Toxics Control Act Cleanup Regulation (MTCA), WAC 173-340-430 to present the selected IA for the Moxee POTW Site to be conducted by Ecology. The proposed IA was selected in accordance with the MTCA criteria in WAC 173-340-200 (Routine Cleanup Actions) and WAC 173-340-360 (Selection of Cleanup Actions).

The general requirements for cleanup interim action plan contents are specified in WAC 173-340-430 and include the following elements.

- A description of the planned interim action
- How IA meets the MTCA criteria in WAC 173-340-430(1 through 3)
- Information from the remedial investigation and feasibility study (RI/FS) including
    - Existing Site conditions
    - Summary of available data
    - Alternative interim actions considered
    - Rationale for selecting the proposed alternative

A separate work plan will prepared to include more specific information such as: design and construction requirements, a compliance monitoring plan, a Health and Safety Plan (HASP), a Sampling and Analysis Plan (SAP) and a Quality Assurance Project Plan (QAPP).

1.4 Interim Action Plan Organization

A description of subsequent sections of this IAP and the topics discussed are as follows:

- Section 2.0 – Site Background, History, Environmental Conditions, and Exposure Pathways
- Section 3.0 – Remedial Action Objectives, Cleanup Standards, Applicable or Relevant and Appropriate Requirements
- Section 4.0 – Alternatives Development and Evaluation
- Section 5.0 – Selected Interim Action
- Section 6.0 – Interim Action Implementation Schedule
- Section 7.0 – Contingency Plan
- Section 8.0 – References.

2.0 SITE BACKGROUND, HISTORY, ENVIRONMENTAL CONDITIONS, AND EXPOSURE PATHWAYS

Background project information and a summary of previous environmental investigation activities and interim cleanup actions are described in the following subsections.

2.1 Site Location, Description, & Identifiers

- Site Address: 7520 Postma Road in Moxee, Yakima County, Washington (Vicinity Map, Figure 1).
- Location: Section 02, of Township 12, Range 19, of the Willamette Meridian
- Yakima County Assessor's Parcel Number (APN): 19120212007
- The assigned Ecology identification numbers for the Site are:
    - Facility Site Identification (FSID) - 42788675
    - Cleanup Site Identification (CSID) – 6057
- Alternative Site Names: Moxee (Former) Sewage Treatment Plant (STP), Moxee City Shop

The Moxee POTW property is 2.81 acres in size and is zoned as public land. This property is bounded on the north by Postma Rd, on the west and south by State Highway 24 and a railroad line, and on the east by the Simplot Grower Solutions facility, a manufacturing property. A mix of manufacturing, commercial, residential and vacant properties are also located across the right-of-ways to the west, south and north (Vicinity Map and Site Plan, Figures 1 and 2).

The Site is defined as the area located in the City of Moxee where petroleum-related contaminants released at the Moxee POTW property have migrated. For purposes of this IAP, the Site includes areas that may be affected by contaminants originating from the former Moxee POTW.

2.2 Historical Operations and Nature of Contamination

The Moxee POTW Property, currently being used as a public works shop servicing City of Moxee equipment, formerly operated as a POTW for municipal sewage treatment from 1976 to July 2008. Several buildings and structures associated with the POTW remain in the western portion of the property. In addition, sludge drying beds were formerly located within the footprint of the current building in the northeast property corner. The currently active portion of the property, which contains two buildings and an asphalt parking area associated with public works shop maintenance operations, is situated within the eastern portion of the property. The

southeastern building has been used as a public works shop since it was built. During POTW operation, a treatment plant lab also operated on the south end and the maintenance shop in the remainder of the building. Two, 1,000-gallon capacity, gasoline underground storage tanks (USTs) were located on Site about 10 feet south of the public works shop. These USTs were installed in 1977 and used to fuel City vehicles from 1977 to 1992. A Site assessment was performed in 1996 associated with UST removal activities. At that time, petroleum hydrocarbon contamination was identified and a release from the UST system was confirmed. Petroleum impacted soils associated with the UST were treated during the UST removal activities.

A separate nitrate- and sulfate-related groundwater contamination plume located to the northeast of the Site, likely originating from the neighboring Simplot site, will be addressed separately from this IA.

Figure 2 depicts the current Site layout and adjacent properties.

2.3 Geology and Hydrogeology

Soil encountered generally consisted of a top layer of asphalt underlain by less than a foot of imported fine to coarse gravel. Native soil conditions observed below the imported surficial material generally are fine-grained. Two primary units were observed: (1) a brown silty sand unit; and (2) a brown silt unit with occasional minor sand and gravel.

Site groundwater elevations fluctuate seasonally as a result of localized groundwater recharge created from infiltration of precipitation and snowmelt within associated upland areas to the north, east and south of the Site and, potentially, the stage of surface water within the Yakima River and irrigation canals. The highest groundwater levels were noted during the late spring monitoring events. The shallow groundwater table at the Site is typically present at approximately 3 to 8 feet below ground surface (bgs) under unconfined conditions. Groundwater flow direction is generally toward the southwest. Groundwater horizontal gradients at the Site range from 0.002 to 0.03 feet per foot (15 to 150 feet per mile). Vertical gradients and groundwater velocities have not been assessed.

2.4 Previous Environmental Investigations and Interim Cleanup Actions

Two, 1,000-gallon capacity, gasoline USTs were removed from the Site in 1996. Associated with tank removal activities, Sage Earth Sciences, Inc. (Sage, 1996) and Maxim Technologies, Inc. (Maxim, 1996) performed and documented Site assessment activities. During UST removal activities, corrosion, pitting and small holes were observed on the tanks. Approximately 50 cubic yards of petroleum-contaminated soil encountered during excavation activities were excavated, treated on-Site via bio-remediation and subsequently used to backfill the excavation. Groundwater was encountered between 4 and 5 feet in depth in the UST excavation.

Confirmation soil samples collected from the UST excavation did not contain concentrations of petroleum hydrocarbons in excess of MTCA Method A cleanup levels. However, a groundwater sample collected from the excavation contained concentrations of the following analytes that were several orders of magnitude greater than MTCA Method A groundwater cleanup levels: gasoline-range petroleum hydrocarbons (GRPH); benzene, toluene, ethylbenzene and total xylenes (BTEX); and lead. Lead was only detected in the open UST pit excavation water. Additional sampling surrounding the UST excavation indicated that lead was not a Site contaminant of concern (Maxim, 1996). Additional soil assessment and cleanup activities were conducted in August 1996 by Maxim. These activities included expanding the UST excavation (to the west) to confirm the original soil excavation activities had sufficiently removed petroleum-contaminated soil. Maxim concluded that all petroleum-contaminated soil associated with the USTs had been successfully removed and treated.

Maxim also excavated four test pits to depths of about 8 feet to collect groundwater samples. Encountered soil reportedly consisted of a surficial silty clay layer that extended to a depth of about 6 feet and was underlain by sand and gravel. Groundwater was encountered at depths between about 6 and 8 feet. Maxim indicated that groundwater flow direction at the Site likely was to the west/southwest, although Site-specific groundwater elevation data were not collected. Groundwater samples were collected from each test pit and submitted to an analytical laboratory for GRPH and BTEX analyses. Results indicated GRPH and BTEX were detected in the groundwater sample collected from test pit 3 (located about 10 feet southwest of the UST excavation) at concentrations greater than MTCA Method A cleanup criteria.

GeoEngineers conducted soil and groundwater assessment activities for Ecology at the Site during March 2012 (GeoEngineers, 2012B), October 2012 (GeoEngineers, 2013A) and November and December 2013 (GeoEngineers, 2014A and 2014B). This work further delineated petroleum, nitrate, and sulfate contamination in soil and groundwater. As part of these investigations, natural attenuation parameters, including nitrate and sulfate, were evaluated to preliminarily assess the potential for bioremediation. Nitrate and sulfate concentrations were found to exceed groundwater screening levels along the eastern, upgradient property boundary. Subsequently, property owners of the neighboring property to the east provided access to advance a limited number of borings to further evaluate nitrate and sulfate impacts on the Simplot property. This assessment concluded that the source area for these anions could occur within the neighboring Simplot property. The boundaries of the potential source area within the Simplot property have not been defined.

2.5 Summary of Groundwater Monitoring Results

The Site's monitoring well network currently consists of six on-property wells. These wells are shallow wells installed at screen depths of approximately 3 to 12 ½ feet bgs to monitor conditions in the shallow aquifer. Maximum concentrations of groundwater contaminants exceeding soil or groundwater screening levels from recent (2012 through 2014) monitoring events are listed below. See Tables 1 to 4, and Figures 2 and 4 for a summary of groundwater data.

Maximum Contaminant Concentrations in Shallow Groundwater		
	Maximum Contaminant Concentrations	Screening Levels
GRPH	2,500 µg/L (MW-1)	1,000/800 µg/L (A)
Nitrate-Nitrogen	176 mg/L (MW-2)*	10 mg/L (MCL)
Sulfate	290 mg/L (MW-2)*	250 mg/L (SMCL)

Notes:

*= not part of the Moxee POTW petroleum release
A = MTCA Method A. For GRPH the screening level is 1,000 ug/L, if benzene is not detected; otherwise the screening level is 800 µg/L. Benzene has not been detected in groundwater at this Site.
MCL = Maximum Contaminant Level established by Title 40, Volume 19 of the Code of Federal Regulations
SMCL = Secondary Maximum Contaminant Level recommended by the Environmental Protection Agency

Site contaminants of concern (COCs) in groundwater related to the Moxee POTW petroleum release include: GRPH.

Nitrates as nitrogen and sulfate also exceed their MCL (nitrate) and SMCL (sulfate) screening levels. However, these are not considered Moxee POTW Site COCs because they are not associated with the petroleum release from the Moxee POTW facility.

2.6 Summary of Soil Investigation Results

The 2012 and 2013 subsurface investigations also assessed remnant soil contaminant concentrations. Soil samples were collected from 23 explorations (17 soil borings and six monitoring wells). The maximum contaminant concentrations exceeding soil screening levels are listed below. Soil contamination was observed at depths ranging between 5 to 16 ft bgs. See Figures 2 and 3, and Table 5 for sample locations and a summary of soil data.

Maximum Contaminant Concentrations in Soil		
	Maximum Contaminant Concentrations	Screening Levels
GRPH	73.5 mg/kg (MW-2, 6 ft bgs)	30/100 (A)
Nitrate	110 mg/kg (B-1, 2.5-3 ft bgs)	128,000 (B)
Sulfate	440 mg/kg (B-2, 2.5-3 ft bgs)	RND

Notes:

A = MTCA Method A. For GRPH the screening level is 30 mg/kg, if benzene is not detected; otherwise the screening level is 100 mg/kg. Benzene was not detected in soil samples at this Site during the 2012 to 2014 investigations.

B = Standard formula value for MTCA Method B, Non-Carcinogen, in Soil, as calculated by Ecology's Cleanup Levels and Risk Calculations (CLARC) database. The nitrate regulatory level is specific to ingestion. Additional evaluation would be required to determine a soil cleanup level protective of groundwater and other pathways.

RND = Researched-No-Data under MTCA Method A, B and C.

Site COCs in soil related to the Moxee POTW petroleum release include: GRPH.

Nitrate and sulfate concentrations were elevated in soil, but did not exceed preliminary screening levels. Further investigation and evaluation of cleanup levels is recommended for the Simplot site. However, these are not considered Site COCs because they are not associated with the petroleum release from the Moxee POTW facility.

2.7 Summary of Soil Vapor Intrusion Evaluation

Based on a review of contaminant concentrations and Site conditions, there is low potential for vapor intrusion (VI) at the Moxee POTW Site. Shallow groundwater gasoline range petroleum hydrocarbons (GRPH) concentrations exceed the Draft Ecology vapor intrusion Tier 1 groundwater screening levels (Ecology, 2009). This risk is considered low because the groundwater contamination is limited to one monitoring well (MW-1) downgradient of the former tank basin, to the south of the City Shop building. In addition low levels of shallow soil GRPH contamination were detected to the east of the City Shop building. Although this potential VI risk exists, the pending interim action is designed to reduce petroleum concentrations and therefore eliminate the risk of vapor intrusion.

2.8 Terrestrial Ecological Evaluation

The Site meets the Terrestrial Ecological Evaluation Exclusion Criteria based on WAC 173-340-7491. Therefore, no further evaluation of this exposure pathway is required.

2.9 Extent of Contamination and Areas of Concern

Site COCs include contaminants related to the Moxee POTW petroleum release. Based on assessment results, the following areas of concern were identified:

- Area 1 - an area of petroleum-based soil and groundwater contamination immediately downgradient of the 1996 UST excavation
- Area 2 - an area east of the City shop building (former POTW control office) with:
    - elevated anion (nitrate and sulfate) concentrations in soil (less than MTCA Method B screening level) and groundwater (above MCL screening level)
    - relatively low-level GRPH (less than the MTCA Method A cleanup level) concentrations in soil in the area generally between MW-2 and MW-6. GRPH has not been detected at concentrations exceeding MTCA cleanup levels from groundwater samples collected from monitoring wells MW-2 and MW-6.

Site features, sample locations and monitoring wells are depicted on Figures 2 and 5.

GRPH also has been detected in groundwater samples obtained from monitoring well MW-1 and boring DP-6, located downgradient of the former UST, at concentrations greater than MTCA Method A cleanup level. Petroleum-related contaminants of concern have not been detected at concentrations greater than MTCA Method A groundwater cleanup levels from downgradient monitoring wells MW-3, MW-4 and MW-5 and upgradient monitoring wells MW-2 and MW-6. The impacted shallow unconfined aquifer is present at depths ranging from about 3 to 8 feet below grade, as measured in wells since November 2012. Soil samples with low level GRPH concentrations less than MTCA Method A cleanup level were obtained from borings DP-4 (4-4.5 ft bgs) and monitoring well MW-2 (6 ft bgs).

Other contaminants found on Site above screening levels include nitrate and sulfate. These are not considered Site COCs because they are not related to the petroleum release. Nitrate and/or sulfate have been found in groundwater at concentrations exceeding the MCL and SMCL, respectively, in monitoring wells MW-2 and MW-6 and borings B-1, B-2, B-3, DP-6, DP-9, DP-10, DP-11, DP-and 13. Groundwater concentrations from borings are considered less quantitative (more qualitative) than monitoring well results, but are an indication of the presence of these contaminants. Nitrate and sulfate soil concentrations are elevated in the area east of the City Shop building, but do not exceed soil screening levels.

2.10 Exposure Pathway Evaluation

Petroleum-contaminated soil is capped by the asphalt parking area. As a result, human and ecological direct contact with contaminants of concern is unlikely unless construction activities were to occur.

Petroleum-contaminated groundwater appears isolated to the area around MW-1 and has not been detected in downgradient monitoring wells MW-3, MW-4 and MW-5. No production wells are present on the Site; human or ecological ingestion or direct contact with contaminated groundwater is unlikely.

The vapor pathway was evaluated and, although there is low potential for soil vapors currently, the selected remedy will address this pathway.

The terrestrial pathway was evaluated and qualified for an exclusion.

3.0 REMEDIAL ACTION OBJECTIVES, CLEANUP STANDARDS, AND APPLICABLE OR RELEVANT APPROPRIATE REQUIREMENTS

This section outlines remedial action objectives (RAOs) and cleanup standards for the Site. Cleanup standards, as defined in WAC 173-340-700, for the Site include establishing cleanup levels and points of compliance at which the cleanup levels will be attained for the Site. The cleanup standards have been established for the Site in accordance with MTCA (WAC 173-340-700 through 173-340-760) and are presented in the following sections.

3.1 Remedial Action Objectives

Risks to human health and the environment via the exposure pathway are listed above. The interim action will address the following RAOs:

- Prevent direct contact with contaminated soil by treating or removing petroleum-impacted soils to concentrations below the MTCA Method A unrestricted land use cleanup levels.
- Protect groundwater by treating or removing impacted soil and groundwater to reduce contaminant concentrations below the MTCA Method A cleanup levels.
- Prevent potential air impacts by treating or removing impacted soils and groundwater to prevent migration of vapors to nearby buildings.

3.2 Cleanup Levels

For the Moxee POTW Site, Ecology established the cleanup levels (CULs) for the contaminants of concern in soil and groundwater at the Site primarily based on MTCA Method A criteria.

Cleanup Levels				
	Soil		Groundwater	
GRPH	100 mg/kg	A, 1	1,000 µg/L	A, 2

A = based on MTCA Method A
1= Based on the non-detection of benzene in soil. See WAC 173-340-900, Table 740-1, footnote s.
2= Based on the non-detection of benzene in groundwater. See WAC 173-340-900, Table 720-1, footnote x.

Results indicate that nitrate and sulfate are likely originating from the adjacent Simplot facility. These parameters will continue to be tracked, monitored, and evaluated as part of groundwater compliance monitoring and to evaluate petroleum bioremediation performance. They will be addressed as a separate cleanup site (Simplot).

3.3 Points of Compliance

This IAP has established points of compliance for soil and groundwater at the Site. The point of compliance is the point (horizontal or vertical) where the established cleanup levels must be achieved. The standard soil and groundwater points of compliance will be observed for the remediation alternative selected.

The soil point of compliance is all soils throughout the Site (WAC 173-340-740(6)). This cleanup point of compliance is based on the protection of groundwater.

The groundwater point of compliance is the standard point of compliance per WAC 173-340-720 (8)(a) & (b), which is established throughout the Site from the "... uppermost level of the saturated zone extending vertically to the lowest most depth which could potentially be affected by the Site." The cleanup levels will be attained in all groundwater from the point of compliance to the outer boundary of the Site plume.

3.4 Applicable or Relevant and Appropriate Requirements (ARARs)

The selected cleanup action will comply with federal, state, and local ARARs. Applicable requirements are federal and state laws or regulations that legally apply to a hazardous substance, cleanup action, location, or other circumstance at the property. Relevant and appropriate requirements are those federal and state regulations that do not legally apply but address situations sufficiently similar that they may warrant application to the cleanup action. The following ARARs have been identified for the property:

- Model Toxics Control Act (MTCA 70.105D RCW, Chapter 173-340 WAC). MTCA contains detailed regulations guiding cleanup of contaminated sites and reporting requirements.
- State Environmental Policy Act (SEPA – 43.21 RCW, Chapter 197-11 WAC). An environmental checklist and opportunity to consider public concerns are necessary for an interim action, pursuant to MTCA.
- Minimum Standards for Construction and Maintenance of Wells (Chapter 173-160 WAC). This regulation contains requirements for abandonment and construction of resource protection wells.
- Underground Injection Control Program (Chapter 173-218). These are regulations guiding environmentally protective implementation of amendment injections into the subsurface.

4.0 ALTERNATIVES DEVELOPMENT AND EVALUATION

This section presents a summary of the remedial action alternatives that were evaluated and MTCA criteria for selection of a cleanup action.

4.1 Alternatives Considered

The following remedial alternatives were considered in the initial stages:

- Alternative 1 — Dig and Haul;
- Alternative 2 — In situ treatment with a chemical oxidant and bioremediation;
- Alternative 3 — Monitored Natural Attenuation; and
- Alternative 4 — No Action

4.2 Criteria for Evaluation of Alternatives

The selected remedial alternative is required to meet the following cleanup action selection criteria specified in MTCA regulations (WAC 173-340-360 and WAC 173-340-740). An alternative must meet all of the threshold criteria to be eligible for selection as a Site remedy. If the alternative was considered to comply, the subsequent evaluation of the alternative was based on the remaining evaluation factors. The alternative that most closely satisfied all of these criteria was selected as interim action for the Site.

- Minimum Requirements for Cleanup Actions (WAC 173-340-360(2))
    - Threshold Requirements:
        - Protect human health and the environment
        - Comply with cleanup standards
        - Comply with applicable state and federal laws
        - Provide for compliance monitoring
    - Other Requirements:
        - Use a permanent solution to the maximum extent practicable. If a disproportional cost analysis is used, then evaluate:
            - Protectiveness
            - Permanence

        - Cost
        - Effectiveness over the long term
        - Management of short-term risks
        - Technical and administrative implementability
        - Consideration of public concerns
      - Provide for a reasonable restoration time frame
      - Consider public concerns
    - Groundwater Cleanup Actions:
      - Use a permanent groundwater cleanup action to achieve the cleanup levels for groundwater established in WAC 173-340-720 at the standard points of compliance
    - Use institutional controls when required by WAC 173-340-440
- Unrestricted Land Use Soil Cleanup Standards (WAC 173-340-740):
    - Use permanent soil cleanup action to achieve cleanup levels for soil at the standard points of compliance

5.0 SELECTED INTERIM ACTION

This section presents a description of the selected interim action; rationale for selection and how the selected interim action satisfies MTCA criteria; and criteria for completion of cleanup. After an initial screening Alternative 2, enhanced bioremediation with chemical oxidation, was selected as a routine cleanup action under WAC 173-340-200. GeoEngineers prepared a Moxee City Shop Site Remedial Approach memo for the Moxee POTW Site (GeoEngineers, 2014C), in place of a Feasibility Study. As a routine cleanup action this memorandum satisfied the requirement to evaluate and select a cleanup action, without having to prepare a comprehensive or focused feasibility study document.

5.1 Interim Action Description

The selected interim action, Alternative 2, includes a combined approach using in situ chemical oxidation and enhanced bioremediation applied through lance injections, and followed by compliance monitoring. These components are described below. The purpose of the proposed actions at the Site is to remediate soil and groundwater petroleum contamination at the Site. Soil and groundwater will be restored to toxicity-based cleanup levels protective of human health and the environment.

5.1.1 Lance Injections

The lance injection points will be used to dose the vadose zone, smear zone (groundwater fluctuation zone), and groundwater with oxidants, surfactants, nutrients and microbes to reduce GRPH contamination to concentrations less than MTCA Method A cleanup levels. Target depths for injections are between 3 and 10 ft bgs. In Area 1, approximately 15 lance injection points (1-inch-diameter) will be advanced at approximately 6- to 10-foot spacing within about a 500 square foot (sq ft) area upgradient of MW-1. In Area 2, about 8 to 10 shallow injection points will be advanced between MW-2 and MW-6 (approximately 250 sq ft area) to address GRPH concentrations in shallow soil.

The chemical oxidant and enhanced bioremediation injections will be completed over a 2-day period. After the oxidant injection (described below), each injection point will be capped/plugged overnight and reused the following day to inject the bioremediation amendments. The injection points will be backfilled with bentonite and patched with asphalt after concluding the bioremediation amendment dosage.

The lance injection work will be completed by Ecology's Prime Contractor (GeoEngineers, Inc.) and their subcontractor (Bioremediation Specialists, LLC).

5.1.2 Chemical Oxidation

Initially, a chemical oxidant (NovIOX™) will be injected into the area of concern at a rate based on recent assessment results. The chemical oxidant injection is intended to reduce vadose zone, smear zone, and groundwater contaminant concentrations by oxidizing contaminants into volatile fatty acids for consumption by microbes and improving permeability of the soil matrix. The chemical oxidation step reduces the contaminant load in the vadose zone and helps set the stage for enhanced bioremediation to occur more successfully in the smear zone and groundwater. The oxidant injection is planned to require one day in the field.

5.1.3 Enhanced Bioremediation

Following the initial chemical oxidation injection, a suite of enhanced bioremediation products will be injected into the area of concern using the same injection points. The purpose of this application is to stimulate growth of naturally occurring and added bacteria that are capable of breaking down petroleum contamination into non-toxic compounds. Bioremediation product applications will include injection of oxygen releasing compounds (AnoxEA-aq™), microbes (AM3™), and a surfactant (ReleaSE™). The approximate contaminant mass will be calculated based on the recent soil and groundwater assessment results. Based on oxidant depletion and groundwater-soil matrix re-equilibration rates, the product is expected to remain effective for about 180 to 365 days. Following this, natural attenuation processes are expected to continue. The bioremediation product injection is estimated to require one day.

5.1.4 Compliance Monitoring

Compliance monitoring is a component of the selected interim action and is planned to be implemented in accordance with WAC 173-340-410. Compliance monitoring for the petroleum release will include protection, performance, and confirmational monitoring as described below.

Protection Monitoring. Protection monitoring will be performed to confirm that human health and the environment are adequately protected during the construction phase of the interim action. Protection monitoring will consist of VOC measurements using a photoionization detector (PID) at least hourly during construction. A HASP developed for the remediation will be prepared during the remedial design phase to address protection monitoring requirements.

Performance and Confirmation Monitoring. Performance and confirmation monitoring will be conducted to assess the short- and long-term effectiveness of the interim action. Performance and confirmation monitoring will consist of quarterly groundwater monitoring at the six existing monitoring wells. Groundwater samples will be analyzed for the contaminants of concern and natural attenuation parameters, including total organic carbon. The performance monitoring component of the groundwater sampling will continue until groundwater GRPH concentrations, particularly in monitoring well MW-1, are detected at concentrations less than MTCA Method A cleanup levels. Post-treatment confirmation monitoring will be implemented for a minimum period of one year following the treatment performance monitoring period to ensure treatment goals are achieved. Four consecutive quarters of contaminant concentrations less than the MTCA Method A cleanup level will be considered sufficient for Site closure.

Additionally, about 3 to 5 direct-push soil borings will be advanced in the area between monitoring wells MW-2 and MW-6 to collect soil confirmation samples. The shallow soil remediation will be considered successful if contaminant concentrations are less than MTCA Method A cleanup levels.

Results indicate that nitrate and sulfate groundwater impacts are likely originating from the adjacent Simplot facility. These parameters will continue to be tracked, monitored, and evaluated as part of groundwater compliance monitoring and to evaluate petroleum bioremediation performance. However, they will be addressed as a separate cleanup site (Simplot).

5.2 Satisfaction of MTCA Criteria and Rationale for Selection

The selected interim action satisfies the MTCA criteria in WAC 173-340-360 for the selection of cleanup actions. A discussion of how the selected interim action meets the specific MTCA minimum requirements is provided below.

5.2.1 Threshold Requirements

Ecology has determined that the selected interim action meets the threshold requirements of WAC 173-340-360(2)(a). Specifically, the selected interim action will:

- Protect human health and the environment;
- Comply with cleanup standards;
- Comply with applicable state and federal laws; and
- Provide for compliance monitoring.

5.2.2 Other Requirements - Permanent Solutions

The selected interim action also meets the regulatory requirements for a "permanent solution to the maximum extent practicable" per WAC 173 340-360 (2)(b)(i). Specifically, the proposed interim action includes permanent destruction of the source through in situ treatment. This will reduce petroleum contamination concentrations in soil and groundwater below toxicity-based cleanup levels throughout the Site and eliminate the greater overall threat to human health and the environment by treatment of impacted soil and groundwater. Break down products from this interim action are non-toxic.

5.2.3 Other Requirements - Restoration Time Frame

As required by WAC 173-340-360(2)(b)(ii), a cleanup action shall provide for a reasonable restoration time frame by considering the following factors specified in WAC 173-340-360(4)(b):

- Potential risks posed by the Site to human health and the environment
- Practicability of achieving a shorter restoration time frame
- Current uses of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Potential future uses of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site
- Availability of alternative water supplies
- Likely effectiveness and reliability of institutional controls
- Ability to control and monitor migration of contamination
- Toxicity of the hazardous substances
- Natural processes which reduce concentrations of the hazardous substances

The proposed interim action takes into consideration the factors listed above. The restoration time frame is estimated to be 1 to 2 years. This is similar to (or less than) the time frame of other alternatives considered.

The expected performance of this alternative in attaining Site CULs within a reasonable time frame is high, based on experiences at other sites with similar geology and contaminant concentrations. Although in situ bioremediation is a proven technology, its overall performance with respect to the degree of cleanup and remediation time frame will be a function of the Site geology and the ability to distribute amendment throughout the treatment zone, and the presence of residual or unknown sources of contaminants.

5.2.4 Other Requirements - Consideration of Public Concerns

This IAP and related documents will be made available for public review and comment per WAC 173-340-360(2)(b)(iii). An evaluation of comments received will be conducted and a responsiveness summary will be prepared to determine the need for changes to this plan based on new information received.

5.2.5 Groundwater Cleanup Actions

This IAP satisfies the WAC 173-340-360(2)(c) requirement that a permanent cleanup action be used to achieve groundwater cleanup levels at the standard point of compliance where practicable. The IAP goal is to achieve unrestricted (MTCA Method A) groundwater cleanup levels for petroleum throughout the entire Site.

5.2.6 Institutional Controls

The use of institutional controls [WAC 173-340-360(2)(e)] will not be necessary for this cleanup because the goal is to achieve cleanup levels in all media throughout the entire Site.

5.2.7 Unrestricted Land Use Soil Cleanup Standards

As outlined in WAC 73-340-740(2&6), the interim action will permanently achieve unrestricted land use (MTCA Method A) petroleum cleanup levels in soils throughout the entire Site.

5.3 Other Rationale

In addition, Ecology determined that the chemical oxidation and enhanced bioremediation alternative:

- would be equally effective as the other alternatives within a reasonable restoration timeframe;
- had a greater potential to permanently treat residual impacts (ex. undetected stringers or smear zone contamination);
- would be less disruptive to City of Moxee operations on the property; and
- had the potential to be less costly than other alternatives considered.

5.4 Completion of Interim Action

As previously described chemical oxidation and enhanced bioremediation injections are estimated to occur over a 2 day period. Confirmation monitoring will then be performed for about 1 year following implementation to verify that CULs have been attained in both soil and groundwater. It is assumed that treatment goals will be met and maintained within 1 year of treatment. Site closure is expected to occur within 1.5-2 years and include final reporting and well decommissioning.

This interim action will be deemed complete when all components of the remedy have been implemented and compliance with the soil and groundwater CULs have been achieved. Demonstration of attainment and maintenance of selected CULs at the points of compliance will include a minimum of 1 year of confirmation groundwater samples and a single soil sampling event.

Following completion of the interim action, Ecology shall provide public notice and an opportunity for public comment prior to removing the Site from the Hazardous Sites List in accordance with WAC 173-340-330 (7), unless Ecology becomes aware of circumstances at the Site that present a previously unknown threat to human health and the environment.

6.0 INTERIM ACTION IMPLEMENTATION SCHEDULE

This interim action will be implemented in accordance with WAC 173-340-400. After the public comment period and issuance Ecology will determine if any changes need to be made to the IAP. The estimated schedule for the interim action design, implementation, and monitoring is summarized below:

- SEPA Public Comment Period and Responsiveness Summary – Fall 2014
- Work Plan, Compliance Monitoring Plan, SAP, QAPP, HASP, underground injection control (UIC) notification– Fall 2014
- Treatment Implementation – Fall/Winter 2014
- Technical Memorandum Documenting Treatment Implementation and Schedule – Winter 2014
- Performance and Confirmation Monitoring (Groundwater & Soil) – Winter 2014 through Winter 2015
- Interim Action Report (or 1 yr status report) – Following 4 quarters of confirmation monitoring – Winter 2015/Spring 2016

7.0 CONTINGENCY PLAN

This section describes a contingency plan in the unexpected event that remedial action objectives are not met. Potential reasons why RAOs may not been met at other sites with similar contamination have been related to rebound, stringers, smear zone, or other residual impacts. Contingency actions for this Site could include an additional round of treatment and/or an extension of the compliance monitoring period to include additional quarters. In either case it is imperative to understand whether results indicate attenuation is continuing to occur. Monitoring should be designed to distinguish between natural attenuation and left-over bioremediation product activity. At a minimum, an annual evaluation should be conducted to determine or adjust the best path forward towards cleanup.

8.0 REFERENCES

- Ecology. 2011. Guidance for Remediation of Petroleum Contaminated Sites. Ecology Publication No. 10-09-057. September 2011.
- Ecology. 2009. DRAFT Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action. Ecology Publication No. 09-09-047. October 2009.
- GeoEngineers, Inc. 2014A. "Data Gap Investigation Report, Moxee City Shop and Former STP, Moxee, Washington." April 3, 2014.
- GeoEngineers, Inc. 2014B. "Quarterly Groundwater Monitoring First Quarter 2014, City Shop and Sewage Treatment Plant, Moxee, Washington." June 12, 2014.
- GeoEngineers, Inc. 2014C. "Moxee City Shop Site Remedial Approach Memorandum" June 19, 2014.
- GeoEngineers, Inc. 2013A. "Soil and Groundwater Assessment, City Shop and Sewage Treatment Plan, Moxee, Washington." May 14, 2013.

- GeoEngineers, Inc. 2013B. "Work Plan, Data Gap Investigation, Moxee City Shop and Former STP, Moxee, Washington." November 6, 2013.
- GeoEngineers, Inc. 2012A. "Memorandum, Moxee City Shop and STP, File Review Summary." January 31, 2012.
- GeoEngineers, Inc. 2012B. "Source Assessment, Moxee City Shop and STP, Moxee, Washington." May 21, 2012.
- Maxim Technologies, Inc. 1996. "Limited Remedial Action Report for Moxee Sewer Treatment Plant Facility, 7520 Postma Road, Moxee, Washington". December 1996.
- Sage Earth Sciences, Inc. 1996. "Closure Site Assessment Report, For Removal of 2 UST's at the Moxee Wastewater Treatment Facility, Moxee, WA." June 1996.
- Washington Administrative Code, Chapter 173-340, Model Toxics Control Act, Updated November 12, 2007.

Table 1

Summary of Groundwater Level Measurements

Moxee City Shop and Former STP

Moxee, Washington

Well Number	Top of Casing Elevation [1] (feet)	Screen Elevation [1] (feet)	Date Measured	Monitoring Well Headspace [2] (ppm)	Depth to Groundwater [3] (feet)	Groundwater Elevation [1] (feet)	Change in Groundwater Elevation [4] (feet)
MW-1	1,024.95	1,011.3 to 1,023.3	11/01/12	0.0	7.35	1,017.60	NA
			02/13/13	0.0	7.55	1,017.40	-0.20
			05/27/13	0.0	2.83	1,022.12	4.72
			08/21/13	NM	5.31	1,019.64	-2.48
			12/30/13	3.9	4.70	1,020.25	0.61
			02/26/14	0.0	4.18	1,020.77	0.52
			05/21/14	0.0	4.85	1,020.10	-0.67
			08/12/14	0.6	6.66	1,018.29	-1.81
MW-2	1,025.49	1,013.9 to 1,021.9	11/01/12	0.0	7.65	1,017.84	NA
			02/13/13	0.0	7.96	1,017.53	-0.31
			05/27/13	0.0	3.00	1,022.49	4.96
			08/21/13	NM	5.72	1,019.77	-2.72
			12/30/13	0.0	5.75	1,019.74	-0.03
			02/26/14	NM	4.58	1,020.91	1.17
			05/21/14	0.0	5.20	1,020.29	-0.62
			08/12/14	0.1	7.06	1,018.43	-1.86
MW-3	1,025.24	1,013.6 to 1,021.6	11/01/12	0.0	7.81	1,017.43	NA
			02/13/13	0.0	8.06	1,017.18	-0.25
			05/27/13	0.0	3.22	1,022.02	4.84
			08/21/13	NM	5.78	1,019.46	-2.56
			12/30/13	0.0	5.89	1,019.35	-0.11
			02/26/14	0.0	4.70	1,020.54	1.19
			05/21/14	0.1	5.35	1,019.89	-0.65
			08/12/14	4.9	7.16	1,018.08	-1.81

Well Number	Top of Casing Elevation [1] (feet)	Screen Elevation [1] (feet)	Date Measured	Monitoring Well Headspace [2] (ppm)	Depth to Groundwater [3] (feet)	Groundwater Elevation [1] (feet)	Change in Groundwater Elevation [4] (feet)
MW-4	1,025.56	1,013.9 to 1,021.9	11/01/12	0.0	7.95	1,017.61	NA
			02/13/13	0.0	8.14	1,017.42	-0.19
			05/27/13	0.0	3.29	1,022.27	4.85
			08/21/13	NM	5.93	1,019.63	-2.64
			12/30/13	0.0	6.06	1,019.50	-0.13
			02/26/14	0.0	4.74	1,020.82	1.32
			05/21/14	0.0	5.45	1,020.11	-0.71
			08/12/14	0.4	7.41	1,018.15	-1.96
MW-5	1,025.31	1,010.1 to 1,022.6	12/30/13	1.0	5.89	1,019.67	–
			02/26/14	0.0	4.66	1,020.90	1.23
			05/21/14	0.0	5.27	1,020.29	-0.61
			08/12/14	1.0	7.19	1,018.37	-1.92
MW-6	1,025.37	1,010.4 to 1,022.9	12/30/13	1.1	5.64	1,019.92	–
			02/26/14	0.3	4.53	1,021.03	1.11
			05/21/14	0.2	5.09	1,020.47	-0.56
			08/12/14	0.3	6.84	1,018.72	-1.75

Notes:

[1]Elevations are referenced to the North American Vertical Datum of 1988 (NAVD88).

[2]Well headspace measurements were obtained using a photoionization detector immediately upon removal of the well's compression cap.

[3]Depth to water measurements obtained from top of well casing. Wells are contained in flush-mounted protective steel monuments installed at or near existing grade.

[4]Change in groundwater elevation is relative to the previous measurement at the respective well location.

ppm = parts per million; NA = Not Applicable; NM = Not Measured

Table 2

Summary of Chemical Analytical Results - Groundwater[1]

Moxee City Shop and Former STP

Moxee, Washington

	Regulatory Level[2]	Monitoring Well, Screen Depths and Date Sampled																
		MW-1										MW-2						
		Screen: 1.8 to 11.8 feet bgs										Screen: 4.0 to 12.0 feet bgs						
		03/01/12	11/01/12	02/13/13	05/27/13	08/21/13	12/30/13	02/26/14	05/21/14	08/12/14	Dup-1-081214	11/01/12	02/13/13	05/27/13	08/21/13	12/30/13	02/26/14	05/21/14
Method EPA 8260C (µg/L)																		
Gasoline-range petroleum hydrocarbons	1,000/800[3]	**1,550**	**2,500**	571	**1,440**	**1,660**	**1,690**	**2,080**	**2,330**	**1,810**	**1,870**	<90.0	<90.0	<90.0	<90.0	<90.0	<90.0	<100
Benzene	5	0.210	0.300	0.210	<0.200	<0.200	0.290	<0.200	0.270	0.390	0.420	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Toluene	1,000	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	80.9	101	46.3	29.7	26.0	34.4	34.9	30.6	110	103	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
m,p-Xylene	1,000[4]	NT	15.5	61.0	1.67	<0.500	<0.500	1.63	<0.500	10.8	10.6	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
o-Xylene	1,000[4]	NT	2.44	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	6.62	6.69	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes (total)	1,000[4]	11.1	18.0	61.3	2.00	<1.50	<1.50	2.02	<1.50	17.5	17.3	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Hexane	480[5]	1.30	3.46	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Method EPA 8270 (µg/L)																		
Naphthalene	160[6]	9.32	4.47	2.06	1.83	0.294	1.28	2.97 J	1.11	3.92	4.54	<0.191	<0.0953	<0.0951	<0.0961	<0.0951	<0.0972	<0.0953
2-Methylnaphthalene	160[6]	0.495	0.944	<0.0946	0.110	<0.267	<0.0984	<0.0989	<0.0963	0.546	0.649	<0.191	<0.0953	<0.0951	<0.0961	<0.0951	<0.0972	<0.0953
1-Methylnapthalene	160[6]	4.74	7.77	2.95	4.57	0.855	5.37	9.92 J	4.82	7.58	7.63	<0.191	<0.0953	<0.0951	<0.0961	<0.0951	<0.0972	<0.0953
Method EPA 200.7 - Dissolved Metals by EPA 200 Series Methods (mg/L)																		
Manganese	2.2[5]	NT	0.943	0.582	0.683	0.608	0.863	0.639	0.572	NT	NT	0.678	0.256	0.293	0.442	0.306	0.0847	0.0358
Method RSK-175 - Dissolved Gases (GC) (mg/L)																		
Methane	NE	NT	0.0108	<0.00500	<0.00500	0.0577	0.00695	0.0172	<0.00500	NT	NT	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500	<0.00500
Method EPA 300.0 - Anions by EPA Method 300.0 (mg/L)																		
Nitrate-Nitrogen	10[7]	NT	<0.200	0.250	<0.200	0.200	<0.200	<0.200	<0.200	<0.200	<0.200	**176**	**123**	**119**	**143**	**125**	**102**	**66.6**
Sulfate	250[8]	NT	18.3	24.1	28.0	19.1	14.4	17.3	20.6	4.42	4.44	**290**	236	226	236	219	193	158
Method SM 2320B - Conventional Chemistry Parameters by APHA/EPA Methods (mg/L)																		
Total Alkalinity	NE	NT	480	485	570	500	445	500	560	430	435	230	255	255	235	270	250	300

08/12/14
<100
<0.200
<0.500
<0.500
<0.500
<0.500
<1.50
<1.00
<0.191
<0.191
<0.191
NT
NT
125
216
265

	Regulatory Level[2]	Monitoring Well, Screen Depths and Date Sampled															
		MW-3								MW-4							
		Screen: 4.0 to 12.0 feet bgs								Screen: 4.0 to 12.0 feet bgs							
		11/01/12	02/13/13	05/27/13	08/21/13	12/30/13	02/26/14	05/21/14	08/12/14	11/01/12	02/13/13	05/27/13	08/21/13	12/30/13	02/26/14	05/21/14	08/12/14
Method EPA 8260C (µg/L)																	
Gasoline-range petroleum hydrocarbons	1,000/800[3]	<90.0	<90.0	<90.0	<90.0	<90.0	<90.0	<100	<100	<90.0	<90.0	<90.0	<90.0	<90.0	<90.0	<100	<100
Benzene	5	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Toluene	1,000	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
m,p-Xylene	1,000[4]	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
o-Xylene	1,000[4]	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes (total)	1,000[4]	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Hexane	480[5]	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Method EPA 8270 (µg/L)																	
Naphthalene	160[6]	<0.190	<0.0945	<0.0954	<0.0957	<0.0988	<0.0963	<0.0950	<0.190	<0.190	<0.0952	<0.0953	<0.0954	<0.0985	<0.0967	<0.0970	<0.190
2-Methylnaphthalene	160[6]	<0.190	<0.0945	<0.0954	<0.0957	<0.0988	<0.0963	<0.0950	<0.190	<0.190	<0.0952	<0.0953	<0.0954	<0.0985	<0.0967	<0.0970	<0.190
1-Methylnapthalene	160[6]	<0.190	<0.0945	<0.0954	<0.0957	<0.0988	<0.0963	<0.0950	<0.190	<0.190	<0.0952	<0.0953	<0.0954	<0.0985	<0.0967	<0.0970	<0.190
Method EPA 200.7 - Dissolved Metals by EPA 200 Series Methods (mg/L)																	
Manganese	2.2[5]	0.178	0.0213	0.0331	0.0358	0.0224	0.0153	0.0225	NT	0.208	<0.0100	0.0201	<0.0100	<0.0100	<0.0100	<0.0100	NT
Method RSK-175 - Dissolved Gases (GC) (mg/L)																	
Methane	NE	<0.00500	0.00508	<0.00500	0.0909	<0.00500	<0.00500	<0.00500	NT	<0.00500	<0.00500	<0.00500	0.00579	<0.00500	<0.00500	<0.00500	NT
Method EPA 300.0 - Anions by EPA Method 300.0 (mg/L)																	
Nitrate-Nitrogen	10[7]	1.12	0.730	1.090	0.500	0.240	0.360	0.240	<0.200	0.420	2.81	3.14	1.41	0.950	3.16	3.44	1.88
Sulfate	250[8]	34.2	31.3	34.8	31.3	23.2	21.9	24.8	32.4	31.7	43.0	37.9	34.2	30.7	35.5	36.3	31.5
Method SM 2320B - Conventional Chemistry Parameters by APHA/EPA Methods (mg/L)																	
Total Alkalinity	NE	335	325	375	405	280	300	355	485	245	435	405	345	320	465	455	270

	Regulatory Level[2]	Monitoring Well, Screen Depths and Date Sampled							
		MW-5				MW-6			
		Screen: 3.0 to 12.5 feet bgs				Screen: 3.0 to 12.5 feet bgs			
		12/30/13	02/26/14	05/21/14	08/12/14	12/30/13	02/26/14	05/21/14	8/12/2014
Method EPA 8260C (µg/L)									
Gasoline-range petroleum hydrocarbons	1,000/800[3]	<90.0	<90.0	<100	<100	<90.0	<90.0	<100	<100
Benzene	5	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200	<0.200
Toluene	1,000	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Ethylbenzene	700	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
m,p-Xylene	1,000[4]	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
o-Xylene	1,000[4]	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500	<0.500
Xylenes (total)	1,000[4]	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50	<1.50
Hexane	480[5]	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
Method EPA 8270 (µg/L)									
Naphthalene	160[6]	<0.102	<0.0958	<0.0980	<0.190	<0.0982	<0.0963	<0.0945	<0.191
2-Methylnaphthalene	160[6]	<0.102	<0.0958	<0.0980	<0.190	<0.0982	<0.0963	<0.0945	<0.191
1-Methylnapthalene	160[6]	<0.102	<0.0958	<0.0980	<0.190	<0.0982	<0.0963	<0.0945	<0.191
Method EPA 200.7 - Dissolved Metals by EPA 200 Series Methods (mg/L)									
Manganese	2.2[5]	0.120	0.0887	0.0905	NT	0.414	0.226	0.221	NT
Method RSK-175 - Dissolved Gases (GC) (mg/L)									
Methane	NE	<0.00500	<0.00500	<0.00500	NT	<0.00500	<0.00500	<0.00500	NT
Method EPA 300.0 - Anions by EPA Method 300.0 (mg/L)									
Nitrate-Nitrogen	10[7]	<0.200	0.810	0.780	<0.200	**158**	**99**	**105**	**156**
Sulfate	250[8]	23.0	29.3	28.6	27.5	249	217	227	**260**
Method SM 2320B - Conventional Chemistry Parameters by APHA/EPA Methods (mg/L)									
Total Alkalinity	NE	135	155	145	160	195	305	285	210

Notes:

[1]Chemical analyses conducted by TestAmerica Laboratories, Inc. of Spokane, Washington.

[2]Regulatory Level refers to Washington State Model Toxics Control Act (MTCA) Method A cleanup level unless otherwise footnoted.

[3]MTCA Method A cleanup level for gasoline-range petroleum hydrocarbons is 1,000 µg/l, if benzene is not detected; otherwise the cleanup level is 800 µg/l.

[4]Cleanup level for total xylenes.

[5]Standard formula value for MTCA Method B in groundwater as calculated by Ecology's Cleanup Levels and Risk Calculations (CLARC) database.

[6]Cleanup level refers to sum of naphthalenes.

[7]Maximum contaminant level established by Title 40, Volume 19 of the Code of Federal Regulations.

[8]Secondary Maximum Contaminant Level recommended by the Environmental Protection Agency.

Additional chemical analytical data available in "Limited Remedial Action Report for Moxee Sewer Treatment Plant Facility" (Maxim Technologies, Inc 1996) and "Closure Site Assessment Report for Removal of 2 UST's at the Moxee Wastewater Treatment Facility, Moxee, WA" (Sage Earth Sciences, Inc. 1996).

Bold indicates analyte concentration exceeds referenced Regulatory Level.

J = Result is considered approximate based on quality assurance/quality control review of the associated laboratory report.

NE = not established; µg/L = micrograms per liter; mg/L = milligrams per liter; NT = not tested; bgs = below ground surface

Table 3

Summary of Chemical Analytical Results - Groundwater Samples from Soil Borings [1]

Moxee City Shop and Former STP

Moxee, Washington

Boring	Regulatory	DP-6	DP-8	DP-9	DP-10	DP-11	DP-12	DP-13	B-1	B-2	B-3
Date Sampled	Levels [2]	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	12/12/13	12/12/13	12/12/13
Sample Depth (feet bgs)		4 to 8 [3]	4 to 8 [3]	4 to 8 [3]	4 to 8 [3]	4 to 8 [3]	4 to 8 [3]	4 to 8 [3]	15	15	15
Method EPA 8260C - NWTPH-Gx and Volatile Organic Compounds (µg/L)											
Gasoline-range hydrocarbons	1,000/800 [4]	1,340	<90.0	NT	NT	NT	NT [10]	NT	NT	NT	NT
Benzene	5	0.530	<0.200	NT	NT	NT	NT [10]	NT	NT	NT	NT
Toluene	1,000	<0.500	<0.500	NT	NT	NT	NT [10]	NT	NT	NT	NT
Ethylbenzene	700	<0.500	<0.500	NT	NT	NT	NT [10]	NT	NT	NT	NT
m,p-Xylene	1,000 [5]	33.4	<0.500	NT	NT	NT	NT [10]	NT	NT	NT	NT
o-Xylene	1,000 [5]	29.8	<0.500	NT	NT	NT	NT [10]	NT	NT	NT	NT
Xylenes (total)	1,000 [5]	63.2	<1.50	NT	NT	NT	NT [10]	NT	NT	NT	NT
Hexane	480 [6]	<1.00	<1.00	NT	NT	NT	NT [10]	NT	NT	NT	NT
Method EPA 8270D - Polycyclic Aromatic Compounds (PAH) by GC/MS with Selected Ion Monitoring (µg/L)											
Naphthalene	160 [7]	1.25	<0.107	NT	NT	NT	<0.0980	NT	NT	NT	NT
2-Methylnaphthalene	160 [7]	0.155	<0.107	NT	NT	NT	<0.0980	NT	NT	NT	NT
1-Methylnaphthalene	160 [7]	1.28	<0.107	NT	NT	NT	<0.0980	NT	NT	NT	NT
Method EPA 300 - Polynuclear Aromatic Compounds (PAH) by GC/MS with Selected Ion Monitoring (mg/L)											
Nitrate	10 [8]	<0.200	2.94	99.7	263	38.5	NT	158	199	94.0	0.710
Sulfate	250 [9]	105	96.2	251	361	192	NT	329	735	1670	1520

Notes:

[1] Chemical analyses conducted by TestAmerica of Spokane, Washington.

[2] Regulatory level refers to Washington State Model Toxics Control Act (MTCA) Method A cleanup level unless otherwise footnoted.

[3] To collect groundwater samples from direct-push borings, a 4-foot-long screen was placed from about 4 to 8 feet bgs. If insufficient volume was achieved at that depth, the screen was lowered to about 8 to 12 feet bgs.

[4] Gasoline-range petroleum hydrocarbon cleanup levels in groundwater are 1,000 µg/L when benzene is detected and 800 µg/L when benzene is not detected.

[5] Cleanup level for total xylenes.

[6] Standard formula value for MTCA Method B, Non-Carcinogen, in Groundwater, as calculated by Ecology's Cleanup Levels and Risk Calculations (CLARC) database.

[7] Cleanup level refers to sum of naphthalenes.

[8] Maximum contaminant level established by Title 40, Volume 19 of the Code of Federal Regulations.

[9] Secondary maximum contaminant level recommeded by the Environmental Protection Agency.

[10] The sample containers for Method EPA 8260C and associated with the groundwater sample collected from boring DP-12 broke in shipment to the analytical laboratory.

Additional chemical analytical data available in "Limited Remedial Action Report for Moxee Sewer Treatment Plant Facility" (Maxim Technologies, Inc 1996) and "Closure Site Assessment Report for Removal of 2 UST's at the Moxee Wastewater Treatment Facility, Moxee, WA" (Sage Earth Sciences, Inc. 1996).

Bold indicates analyte concentration exceeds referenced Regulatory Level.

mg/L=milligrams per liter; µg/L = micrograms per liter; NT = not tested; bgs = below ground surface

Table 4

Summary of Field-Measured Natural Attenuation Parameters[1]

Moxee City Shop and Former STP

Moxee, Washington

Well Number	Date Collected	pH	Temperature (°C)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP - Field[2] (mV)	ORP - Normalized[3] (mV)	Soluble Ferrous Iron (mg/L)
MW-1	11/01/12	7.69	19.15	0.833	0.65	-36	164	NT
	02/13/13	7.62	9.50	0.683	1.78	-41	167	<0.2
	05/27/13	8.11	15.45	0.805	1.60	-55	148	<0.2
	08/21/13	7.81	23.47	0.955	1.43	206	402	<0.2
	12/30/13	7.73	13.60	0.639	0.30	-148	57	0.5
	02/26/14	7.98	11.46	0.908	0.24	-145.7	54.3	<0.2
	05/21/14	7.98	17.55	1.030	0.25	-67.6	132.4	<0.2
	08/12/14	7.58	26.62	0.798	0.42	-127	67	<0.2
MW-2	11/01/12	7.66	18.77	2.079	1.99	313	513	NT
	02/13/13	8.07	12.74	1.314	0.11	-49	157	<0.2
	05/27/13	8.04	14.46	1.296	0.13	183	387	<0.2
	08/21/13	7.84	18.71	1.521	0.07	406	607	<0.2
	12/30/13	7.94	13.86	1.234	0.09	-58	147	<0.2
	02/26/14	7.89	12.08	1.648	0.75	62.7	262.7	<0.2
	05/21/14	7.93	15.86	1.620	0.45	174.7	374.7	<0.2
	08/12/14	7.75	20.16	1.507	0.14	-109	90	<0.2
MW-3	11/01/12	8.73	17.82	0.617	3.29	289	490	NT
	02/13/13	7.27	11.53	0.511	0.27	-34	173	<0.2
	05/27/13	9.02	14.46	0.581	0.24	288	492	<0.2
	08/21/13	8.65	19.56	0.674	0.03	311	511	<0.2
	12/30/13	9.05	14.32	0.458	0.06	-124	80	<0.2
	02/26/14	9.16	11.24	0.569	0.62	-92.1	107.9	<0.2
	05/21/14	8.98	15.31	0.532	0.04	300	500	<0.2
	08/12/14	8.47	18.79	0.801	0.19	-262	-62	<0.2
MW-4	11/01/12	8.77	17.47	0.463	4.70	297	499	NT
	02/13/13	7.56	11.27	0.704	0.45	-41	166	<0.2
	05/27/13	8.58	14.41	0.663	0.41	233	437	<0.2
	08/21/13	8.29	19.69	0.610	1.02	364	564	<0.2

Well Number	Date Collected	pH	Temperature (°C)	Specific Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	ORP - Field[2] (mV)	ORP - Normalized[3] (mV)	Soluble Ferrous Iron (mg/L)
	12/30/13	8.45	12.68	0.531	0.19	-82	124	<0.2
MW-4 cont.	02/26/14	8.30	10.60	0.870	1.25	65.3	265.3	<0.2
	05/21/14	8.21	17.40	0.972	0.50	144.4	344.4	<0.2
	08/12/14	8.52	23.79	0.569	1.32	-194	2	<0.2
MW-5	12/30/13	8.45	13.74	0.251	1.47	-68	137	<0.2
	02/26/14	8.27	10.93	0.376	1.11	10.3	210.3	<0.2
	05/21/14	8.34	18.80	0.322	0.14	335	535	<0.2
	08/12/14	8.63	18.85	0.297	0.15	-266	-66	<0.2
MW-6	12/30/13	7.78	13.88	1.387	2.36	-25	180	<0.2
	02/26/14	8.04	11.53	1.592	0.40	75.8	275.8	<0.2
	05/21/14	7.98	16.18	1.766	0.20	210.1	410.1	<0.2
	08/12/14	7.80	19.30	1.749	0.31	-150	50	<0.2

Notes:

[1]Reported water quality parameters reflect stabilized conditions at the conclusion of well purging during low-flow sampling.

[2]Field ORP values are relative to the reference electrode associated with the multi-parameter meter.

[3]Normalized ORP values have been normalized, using algorithms provided by the instrument manufacturer, to the standard hydrogen electrode (SHE).

ORP = Oxidation reduction potential; °C = degrees Celsius; mS/cm = millisiemens per centimeter; mg/L = milligrams per liter; mV = millivolts; NT = not tested

Table 5

Summary of Chemical Analytical Results - Soil [1,2]

Moxee City Shop and Former STP
Moxee, Washington

Boring	Regulatory	DP-2[4]	DP-3[4]	DP-4[4]	DP-5[4]	DP-6[4]	DP-6	DP-7	DP-8	DP-9	DP-10	DP-11	DP-12	DP-13	DP-14
Sample Depth (feet)	Levels [3]	4.5-5	4-4.5	4-4.5	4-5	4.5-5	1.5-2.5	1-1.8	1-1.8	1-2	1.3-2	2-2.5	1-2	1-2	1-2
Date Sampled		03/01/12	03/01/12	03/01/12	03/01/12	03/01/12	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13	11/14/13
Method EPA 8260C - NWTPH-Gx and Volatile Organic Compounds (mg/kg)															
Gasoline-range hydrocarbons	30/100 [5]	<7.62	<7.94	37.9	<7.48	<7.74	<6.72	<6.25	<6.94	NT	NT	NT	<5.01	NT	<6.54
MTBE	0.10	<0.0457	<0.0476	<0.0425	<0.0449	<0.0464	NT	NT	NT	NT	NT	NT	NT	NT	NT
Benzene	0.03	<0.0229	<0.0238	<0.0213	<0.0224	<0.0232	<0.00672	<0.00625	<0.00694	NT	NT	NT	<0.00501	NT	<0.00654
Ethylbenzene	6	<0.152	<0.159	<0.142	<0.150	<0.155	<0.134	<0.125	<0.139	NT	NT	NT	<0.100	NT	<0.131
Toluene	7	<0.152	<0.159	<0.142	<0.150	<0.155	<0.134	<0.125	<0.139	NT	NT	NT	<0.100	NT	<0.131
o-Xylene	9 [6]	<0.305	<0.317	<0.284	<0.299	<0.309	<0.269	<0.250	<0.278	NT	NT	NT	<0.200	NT	<0.261
m,p-Xylene	9 [6]	<0.609	<0.635	<0.567	<0.598	<0.619	<0.537	<0.500	<0.555	NT	NT	NT	<0.400	NT	<0.523
Xylenes (total)	9 [6]	<2.29	<2.38	<2.13	<2.24	<2.32	<2.02	<1.87	<2.08	NT	NT	NT	<1.50	NT	<1.96
Hexane	4,800 [7]	<0.152	<0.159	<0.142	<0.150	<0.155	<0.134	<0.125	<0.139	NT	NT	NT	<0.100	NT	<0.131
1,2-Dichloroethane (EDC)	11 [8]	<0.152	<0.159	<0.142	<0.150	<0.155	NT	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 8011 (µg/kg)															
1,2-Dibromoethane (EDB)	5	<1.27	<1.31	<12.0	<1.19	<1.28	NT	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 8270D - Polynuclear Aromatic Compounds (PAH) by GC/MS with Selected Ion Monitoring[9] (mg/kg)															
Naphthalene	5 [10]	<0.305	<0.305	<0.284	<0.309	<0.309	<0.0121	<0.0119	<0.0125	NT	NT	NT	<0.0106	NT	<0.0124
2-Methylnaphthalene	5 [10]	<0.0130	<0.0129	0.0289	<0.0127	<0.0126	<0.0121	<0.0119	<0.0125	NT	NT	NT	<0.0106	NT	<0.0124
1-Methylnaphthalene	5 [10]	<0.0130	<0.0129	0.0185	<0.0127	<0.0126	<0.0121	<0.0119	<0.0125	NT	NT	NT	<0.0106	NT	<0.0124
Method EPA 6010C (mg/kg)															
Lead	250	5.30	6.18	5.53	4.95	7.24	NT	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 300 - Anions (mg/kg)															
Nitrate	130,000 [7]	NT	NT	NT	NT	NT	NT	NT	NT	12	47	<1.6	NT	14	NT
Sulfate	RND	NT	NT	NT	NT	NT	NT	NT	NT	12	49	15	NT	21	NT

Boring	Regulatory Levels [3]	MW-2[4]	MW-3[4]	MW-4[4]	MW-5	MW-6	B-1	B-2	B-3
Sample Depth (feet)		6	6	2.5	5-5.5	5-5.5	2-2.5	2.5-3	5.5-6.5
Date Sampled		10/31/12	10/31/12	10/31/12	12/12/13	12/13/13	12/12/13	12/12/13	12/12/13
Method EPA 8260C - NWTPH-Gx and Volatile Organic Compounds (mg/kg)									
Gasoline-range hydrocarbons	30/100 [5]	73.5	<7.75	<8.18	<7.46	13.5	NT	NT	NT
MTBE	0.10	NT	NT	NT	NT	NT	NT	NT	NT
Benzene	0.03	<0.00732	<0.00775	<0.00818	<0.00746	<0.00663	NT	NT	NT
Ethylbenzene	6	<0.146	<0.155	<0.164	<0.149	<0.133	NT	NT	NT
Toluene	7	<0.146	<0.155	<0.164	<0.149	<0.133	NT	NT	NT
o-Xylene	9 [6]	<0.293	<0.310	<0.327	<0.298	<0.265	NT	NT	NT
m,p-Xylene	9 [6]	<0.586	<0.620	<0.654	<0.596	<0.530	NT	NT	NT
Xylenes (total)	9 [6]	<2.20	<2.33	<2.45	<2.24	<1.99	NT	NT	NT
Hexane	4,800 [7]	<0.146	<0.155	<0.164	<0.149	<0.133	NT	NT	NT
1,2-Dichloroethane (EDC)	11[8]	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 8011 (µg/kg)									
1,2-Dibromoethane (EDB)	5	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 8270D - Polynuclear Aromatic Compounds (PAH) by GC/MS with Selected Ion Monitoring[9] (mg/kg)									
Naphthalene	5[10]	<0.0126	<0.0129	<0.0132	<0.0161	<0.0128	NT	NT	NT
2-Methylnaphthalene	5 [10]	<0.0126	<0.0129	<0.0132	<0.0161	<0.0128	NT	NT	NT
1-Methylnaphthalene	5 [10]	<0.0126	<0.0129	<0.0132	<0.0161	<0.0128	NT	NT	NT
Method EPA 6010C (mg/kg)									
Lead	250	NT	NT	NT	NT	NT	NT	NT	NT
Method EPA 300 - Anions (mg/kg)									
Nitrate	130,000 [7]	NT	NT	NT	NT	<2.4	110	47	<2.3
Sulfate	RND	NT	NT	NT	NT	48	200	440	360

Notes:

[1] Chemical analyses conducted by TestAmerica of Spokane, Washington.

[2] All analyte concentrations presented in milligrams per kilogram (mg/kg), unless otherwise noted.

[3] Regulatory level refers to Washington State Model Toxics Control Act (MTCA) Method A cleanup level unless otherwise footnoted.

[4] Data are adapted from previous project report. Data from borings DP-2 through DP-6 were initially reported by GeoEngineers (2012B) and data from borings MW-2 to MW-4 were initially reported by GeoEngineers (2013A).

[5] Gasoline-range petroleum hydrocarbon cleanup levels in soil are 30 mg/kg when benzene is detected and 100 mg/kg when benzene is not detected.

[6] Cleanup level for total xylenes.

[7] Standard formula value for MTCA Method B, Non-Carcinogen, in Soil, as calculated by Ecology's Cleanup Levels and Risk Calculations (CLARC) database. The nitrate regulatory level is specific to ingestion. Additional evaluation would be required to determine a soil cleanup level protective of groundwater and other pathways.

[8] Standard formula value for MTCA Method B, Carcinogen, In Soil, as calculated by Ecology's CLARC database.

[9] Napthalene data for DP-2 through DP-6 were analyzed by Method EPA 8260C.

[10] Cleanup level refers to sum of naphthalenes.

Additional chemical analytical data available in "Limited Remedial Action Report for Moxee Sewer Treatment Plant Facility" (Maxim Technologies, Inc 1996) and "Closure Site Assessment Report for Removal of 2 UST's at the Moxee Wastewater Treatment Facility, Moxee, WA" (Sage Earth Sciences, Inc. 1996).

mg/kg = milligrams per kilogram; µg/kg = micrograms per kilogram; EPA = Washington State Environmental Protection Agency; NT = not tested; MTBE = methyl teriary butly ether

RND = Researched-No Data under MTCA Method A and not researched under MTCA Methods B and C.

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Sources: ESRI Data & Maps, Street Maps 2008.
Bing Maps Road from ESRI Data Online.
Projection: NAD 1983, Washington State Plane South, feet.

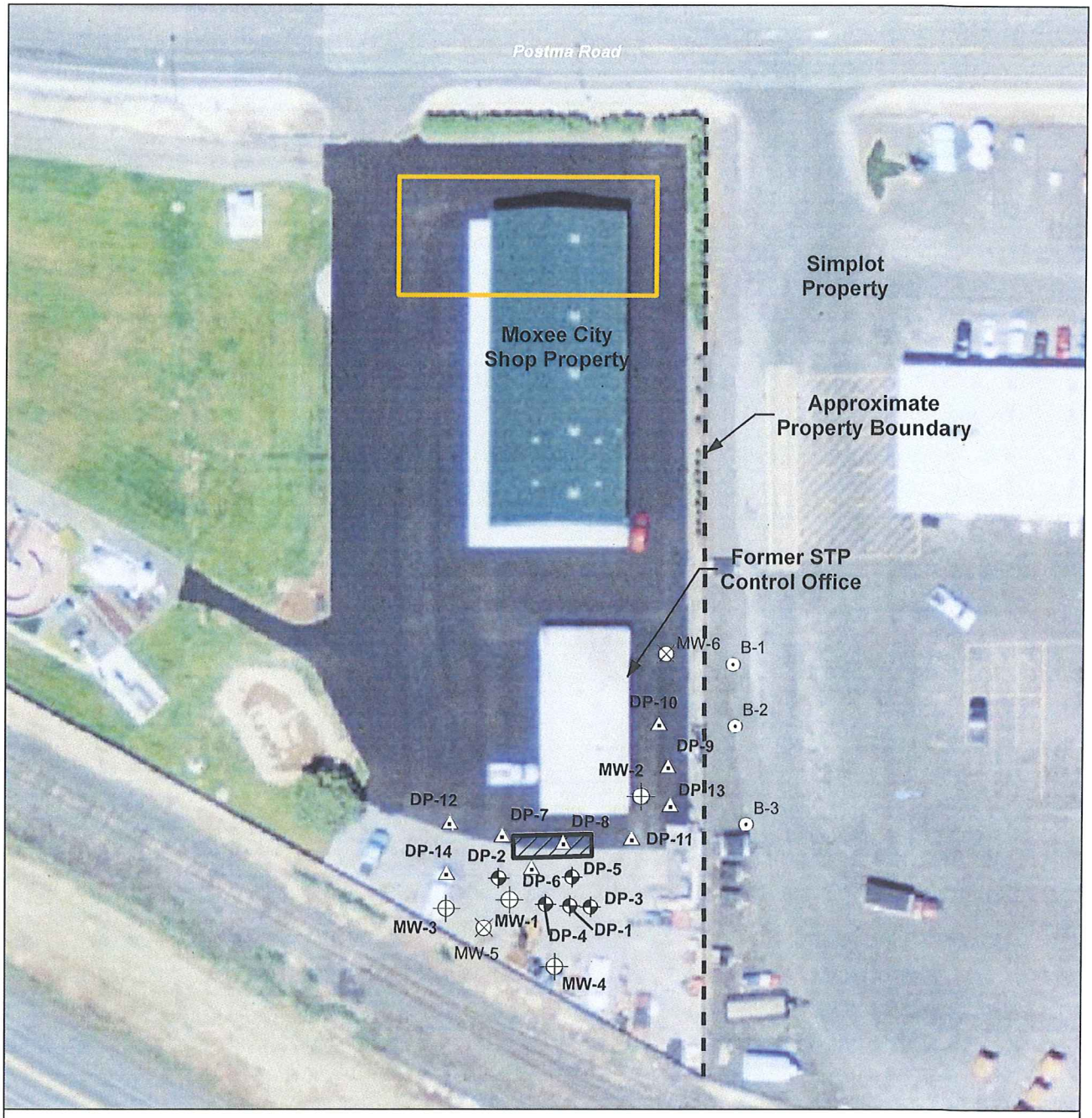
Vicinity Map

Moxee City Shop and Former STP
Moxee, Washington

GeoEngineers

Figure 1

Office: SPOK Path: W:\Spokane\Projects\00\50407800\GIS\00\50407800_F1_VicinityMap.mxd Map Revised: 02/12/2014 CRC



Approximate Direct-Push Boring Location (November 2013)

Approximate Hollow-Stem Auger Boring Location (December 2013)

Approximate Direct-Push Boring Location (March 2012)

Approximate New Monitoring Well Location (December 2013)

Approximate Existing Monitoring Well Location (March and October 2012)

Approximate Property Boundary

Approximate Location of 1996 UST Excavation

Historical Sludge Drying Cells Approximate Location

N W E S

0 60 Feet

Notes:
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Data Sources: Aerial from ESRI Data Online.
Projection: NAD 1983, Washington State Plane South, feet.

Site Plan

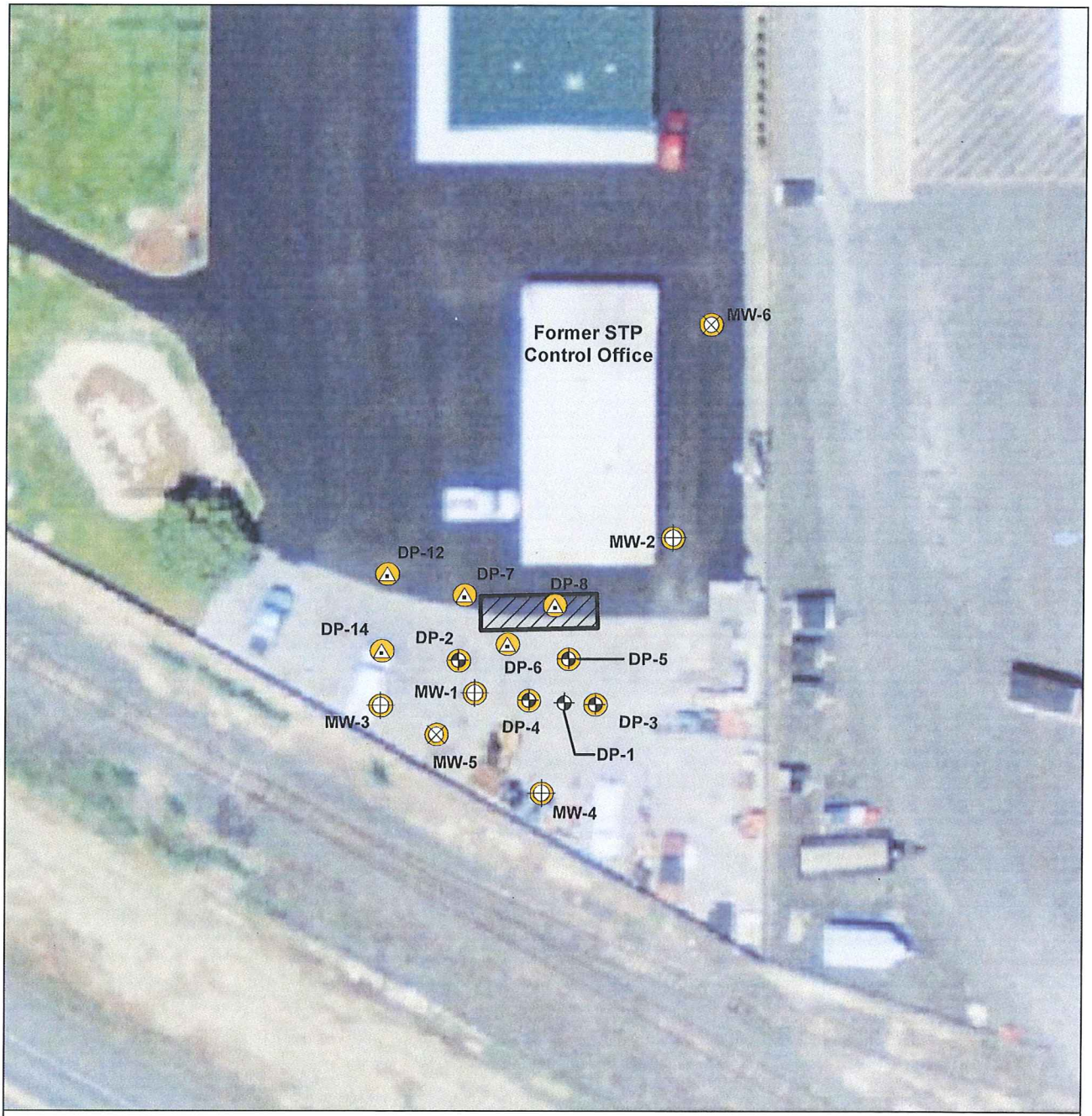
Moxee City Shop and Former STP
Moxee, Washington

GeoEngineers

Figure 2

Map Revised: 03 October 2014 ccabrera

Office: SPOK Path: P:\0\0504078\GIS\01\0504078 01_F2_SitePlan_IAP.mxd



Approximate Direct-Push Boring Location (November 2013)

Approximate Direct Push Boring Location (March 2012)

Approximate New Monitoring Well Location (December 2013)

Approximate Existing Monitoring Well Location (March and October 2012)

Petroleum-Based Compounds Either Not Detected or Detected at Concentrations Less Than Cleanup Levels in Soil Samples

Approximate Location of 1996 UST Excavation

N
W E
S

0 40
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3.All soil sample petroleum-based contaminant concentrations were less than applicable Model Toxics Control Act Method A or B cleanup levels, or were not detected.
4. Locations where soil samples were not collected for petroleum-based analytes are omitted from this figure.
Data Sources: Aerial from ESRI Data Online.
Projection: NAD 1983, Washington State Plane South, feet.

Soil Chemical Analytical Results

Moxee City Shop and Former STP
Moxee, Washington

GeoEngineers

Figure 3

Office: SPO Path: P:\0\0504078\GIS\01\0504078 01_F3_Soils_PH_Dec2013_IAP.mxd Map Revised: 03 October 2014 ccabrera

DP-6 1,340 — Approximate Direct-Push Boring Location and Groundwater GRPH Concentration (µg/l) during November 2013

MW-1 1,690 — Approximate Monitoring Well Location and Groundwater GRPH Concentration (µg/l) during December 2013

Interpreted Limits of Petroleum-Based Groundwater Contamination in Excess of Cleanup Levels

Petroleum-Based Compounds Either Not Detected or Detected at Concentrations Less Than Cleanup Levels in Project Groundwater Sample(s)

Petroleum-Based Compounds Detected at Concentrations Greater Than Cleanup Levels in Project Groundwater Sample(s)

Approximate Location of 1996 UST Excavation

N W E S

0 60

Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
3. Groundwater sample contaminant concentrations are referenced to Model Toxics Control Act Method A or B cleanup levels, depending on analyte.
4. Soil borings where groundwater samples were not collected for petroleum-based analysis are omitted from this figure.
5. µg/l = micrograms per liter; GRPH = gasoline-range petroleum hydrocarbons

Data Sources: Aerial from ESRI Data Online.
Projection: NAD 1983, Washington State Plane South, feet.

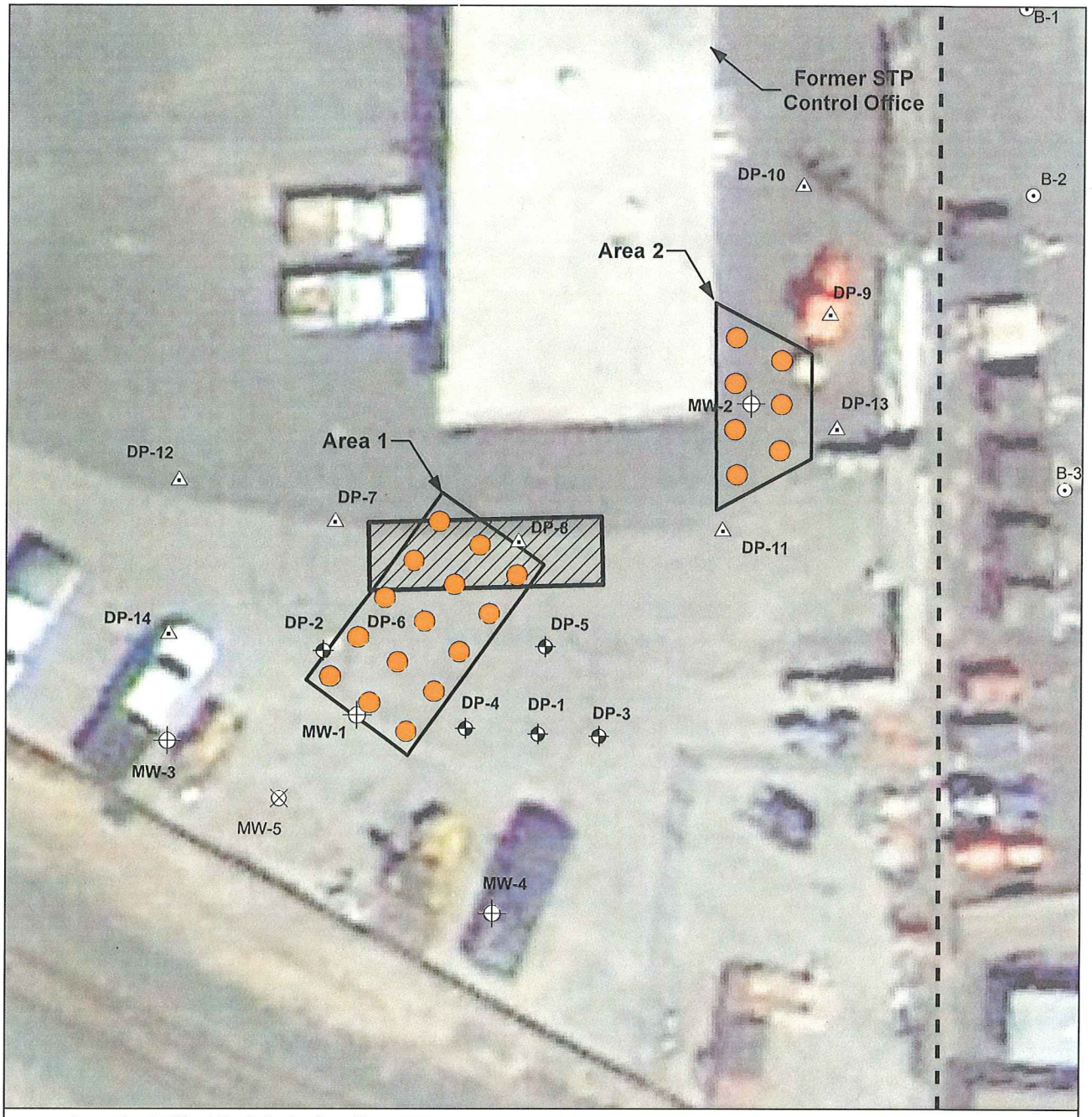
Groundwater Analytical Results

Moxee City Shop and Former STP
Moxee, Washington

GeoEngineers

Figure 4

Office: SPO Path: P:\0105040781GIS\01105040781_F4_GW_PH_Dec2013_JAP.mxd Map Revised: 03 October 2014 ccabrera



Approximate Direct-Push Boring Location (November 2013)

Approximate Hollow-Stem Auger Boring Location (December 2013)

Approximate Direct-Push Boring Location (March 2012)

Approximate Monitoring Well Location (December 2013)

Approximate Monitoring Well Location (March and October 2012)

Approximate Property Boundary

Approximate Location of 1996 UST Excavation

Proposed Lance Injection Point Location

N
W
E
S
0
20
Feet

Notes:
1. The locations of all features shown are approximate.
2. This drawing is for information purposes. It is intended to assist in showing features discussed in an attached document. GeoEngineers, Inc. cannot guarantee the accuracy and content of electronic files. The master file is stored by GeoEngineers, Inc. and will serve as the official record of this communication.
Data Sources: 2013 Aerial from Google Earth Pro.
Projection: NAD 1983, Washington State Plane South, feet.

Proposed Injection Locations – Selected Interim Action

Moxee City Shop and Former STP
Moxee, Washington

GeoEngineers

Figure 5

Office: SPOK Path: P:\01\05040781GIS\01\05040781_F5_Remediation Plan_IAP.mxd Map Revised: 03 October 2014 ccabrera