GeoEngineers

Memorandum

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To:	Norman Hepner, PE
From:	Jonathan Rudders and Bruce Williams JER 5/14/13 BAW 5/14/13
Date:	January 31, 2012
File:	0504-078-00
Subject:	Moxee City Shop and STP, File Review Summary

INTRODUCTION

The purpose of this memorandum is to summarize results of our file review associated with the Moxee City Shop and Sewage Treatment Plant (herein designated site) located at 7520 Postma Road in Moxee, Washington. The site occupies about 2.8 acres and is located approximately as shown in the attached Vicinity Map, Figure 1. The site, currently being used as a shop servicing City of Moxee equipment, formerly contained an operational sewage treatment plant. Site assessment activities were performed during 1996 associated with underground storage tank (UST) removal activities. The site is included within the Washington State Department of Ecology's (Ecology's) Clean Sites Initiative program. Ecology's objective for the site is to perform sufficient assessment and remedial activities to achieve a No Further Action (NFA) designation.

In addition to a file review summary, this memorandum contains the following information:

- Identified gaps in the existing data set.
- Potential site contaminants.
- Applicable pathways of concern.
- Components of a recommended soil and groundwater assessment program.
- Anticipated cleanup/screening levels.

FILE REVIEW SUMMARY

Document List

GeoEngineers reviewed the following documents during our file review:

- Work Plan by Ecology, (December 2011).
- Work Assignment/Amendment by Ecology (January 5, 2012).
- Report by Sage Earth Sciences, Inc. (Sage) summarizing results of 1996 UST removal activities performed at the site, (June 1996).
- Report by Maxim Technologies, Inc. (Maxim) summarizing results of a 1996 environmental investigation performed at the site, (December 1996).

Site Background

Our understanding of previous site assessment and remedial activities was primarily obtained through review of the 1996 Sage and Maxim reports. Two, 1,000-gallon capacity, gasoline USTs were removed from the site during May 1996. These USTs were installed during approximately 1977 and used to fuel City vehicles. The USTs were located about 40 feet south of the former STP Control Office, approximately as shown in 1996 UST Excavation and Test Pit Locations, Figure 2. Approximately 50 yards of petroleum-impacted soil encountered during excavation activities was excavated, treated on-site via bio-remediation and subsequently used to backfill the excavation. During UST removal activities, corrosion, pitting, and small holes were observed on the tanks. Groundwater was encountered between 4 and 5 feet below ground surface (bgs) in the UST excavation.

No confirmation soil samples collected from the UST excavation contained concentrations of petroleum hydrocarbons in excess of Model Toxics Control Act (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.

Additional soil assessment activities were conducted during August 1996 by Maxim. These activities consisted of an expansion (to the west) of the UST excavation to confirm that the original excavation had sufficiently removed petroleum-impacted soil in that direction. Maxim concluded that all petroleum-impacted soil associated with the UST excavation had been successfully removed and treated. However, no discussion of assessment associated with dispensers or underground piping is presented in either the Sage or Maxim reports.

Maxim also excavated four test pits to depths of about 8 feet bgs for the purpose of groundwater sample collection. Approximate test pit locations are presented in Figure 2. Encountered soil generally consisted of a surficial silty clay layer that extended about 6 feet bgs and was underlain by sand and gravel. Groundwater was encountered at depths between about 6 and 8 feet bgs. Maxim indicated that groundwater flow direction at the site likely is to the west/southwest, though 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, benzene, ethylbenzene, and xylenes 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. Maxim recommended the installation of a groundwater monitoring well network at the site, although we understand this was not completed.

DATA GAPS

Based on our file review and understanding of site environmental activities performed to data, we conclude there is a reasonable likelihood that insufficient assessment activities have been performed at the site. Data gaps include the following:

- Potential presence of residual petroleum source, associated with 1) dispensers/underground piping and/or 2) insufficient soil treatment or removal.

- Groundwater elevation and flow distribution across the site, including any seasonal variation in groundwater flow associated with fluctuations in recharge or irrigation operations.
- Presence and extent of existing groundwater contamination at and potentially downgradient of the source area(s).

POTENTIAL CONTAMINANTS OF CONCERN AND EXPOSURE PATHWAYS

The suspected contamination sources at the site consist of petroleum associated with former UST's, dispensers, and underground piping. The contaminants of potential concern (COPCs) include GRPH, volatile organic compounds (VOCs), naphthalenes, and lead in both soil and groundwater. The samples collected during 1996 were analyzed solely for GRPH, BTEX, and lead, therefore it is unknown whether or at what levels the other COPCs historically have been present at the site.

The site is paved near the former UST locations. As such, direct contact exposure to exposed soil is unlikely. Depth to groundwater at the site is relatively shallow (about 4 to 8 feet below ground surface [bgs]). Therefore, groundwater contamination could occur through direct contact with contaminated soil and/or leaching/vertical transport to the saturated zone.

A complete exposure pathway consists of: 1) an identified contaminant source; 2) a transport pathway to locations (exposure points) where potential receptors might come in contact with COPCs; and 3) an exposure route (e.g., soil ingestion) through which potential receptors might be exposed to COPCs. Exposure pathways deemed to be incomplete have been omitted from the below discussion.

Potential exposure pathways of concern and receptors at the site include the following:

- Ecological
  - Direct contact with contaminated groundwater – small mammals, birds, soil biota, and plants.
  - Ingestion of contaminated groundwater – small mammals and birds.
  - Ingestion of plants or fauna that have ingested or absorbed contaminants from the site – predatory small mammals and birds.
- Human
  - Dermal contact with contaminated soil during soil borings and monitoring well installation – onsite workers.
  - Dermal contact with contaminated groundwater removed from onsite wells or encountered during boring – onsite workers.
  - Dermal contact with and inhalation of contaminated windblown dust during excavation work – onsite workers, adjacent offsite workers, adjacent residents, patrons of adjacent businesses.
  - Ingestion of groundwater in downgradient water supply wells.
  - Inhalation of vapor intruding into adjacent buildings.

RECOMMENDED SOIL AND GROUNDWATER ASSESSMENT COMPONENTS

Recommended investigative steps designed to confirm if soil and/or groundwater contamination at the site requires further assessment and/or remedial action are as follows:

General

- Prepare a Sampling and Analysis Plan (SAP), Health and Safety Plan (HASP) and Quality Assurance Project Plan (QAPP).
- Notify the Call-Before-You-Dig utility notification service before beginning drilling activities.
- Subcontract a private utility locator to clear explorations located on private property before drilling. Contain soil cuttings and groundwater from assessment and/or well construction activities. Material should be drummed separately, labeled, and stored on-site pending results of analytical testing.
- Subcontract a licensed contractor to remove and dispose of drill cuttings from source assessment and/or well construction activities at a suitable disposal facility.

Source Assessment

- Drill about 10 soil borings using direct-push drilling methods at the site. Soil boring locations should be based on previous UST removal and assessment activities conducted by Sage and Maxim and designed to evaluate whether residual source contamination exists within and/or downgradient of the UST removal area and any previous underground piping/dispensers. Soil samples should be collected in 4-foot acrylic sleeves continuously during drilling. Select sub-samples should be field-screened using visual observations, water sheen tests, and headspace vapor measurements with a photoionization detector (PID) to assess possible presence of petroleum-related contaminants. At least one sample from each 4-foot sleeve should be collected for potential chemical analysis.
- Construct two monitoring wells near the soil borings exhibiting the greatest indications of petroleum contamination based on field-screening measurements. The monitoring wells should be installed using direct-push drilling techniques and consist of ¾-inch-diameter, Schedule 40 polyvinyl chloride (PVC) casing with a pre-pack well screen surrounded by an appropriate sand filter pack and bentonite slurry seal. The top of the well screens should be located approximately 3 feet below ground surface. The expected total depths of the monitoring wells are 12 feet, or about 5 feet below the expected depth to groundwater.

  The wells should be completed with a flush-mount surface monument. A lockable cap should be installed in the top of the PVC well casing. A concrete surface seal should be placed around the monuments at the ground surface to divert surface water away from the well location. The wells should be developed using surging and bailing techniques.
- Submit about 10 soil samples to a qualified analytical laboratory for chemical analysis. The sample collected from the vadose zone from each boring exhibiting the greatest indications of petroleum contamination based on field-screening measurements, should be submitted for chemical analysis. Remaining samples should be held at the laboratory for potential analysis. Soil samples should be analyzed for GRPH, BTEX, 1,2-dibromoethane (EDB), 1,2-dichloroethane (EDC), methyl tertiary-butyl ether (MTBE) n-hexane, naphthalenes, and lead. Two soil samples should be analyzed for

fractionalized petroleum hydrocarbons (aliphatics and aromatics). Samples should be analyzed on standard turn-around-time.

- Collect groundwater samples from the two installed monitoring wells and submit to a qualified local analytical laboratory for analysis of GRPH, BTEX, EDB, EDC, MTBE, n-hexane, naphthalenes, and lead. One duplicate sample should be collected.

Results Evaluation

- Enter data results information into Ecology's Environmental Information Management (EIM) database.
- Compare laboratory analytical results associated with source assessment activities with applicable project cleanup criteria.
- Develop conclusions regarding source assessment results and associated recommendations regarding additional site assessment and remedial activities.

CLEANUP AND SCREENING LEVELS

Anticipated cleanup and/or screening levels for the site and associated COPCs are presented in Table 1. The enumerated levels are based on the following:

- Soil – MTCA Method A cleanup levels for unrestricted land uses.
- Groundwater – MTCA Method A Cleanup Levels for groundwater.
- Terrestrial Ecological – Unrestricted land use cleanup levels for sites that qualify for the Simplified Terrestrial Ecological Evaluation Procedure (Table 749-2 of MTCA).

TABLE 1. CLEANUP/SCREENING LEVELS FOR COPCS

Contaminant	Soil [1] (mg/kg)	Groundwater [1] (µg/l)	Simplified Terrestrial Ecological Evaluation Procedure Soil Concentration [2] (mg/kg)
GRPH (with benzene)	30	800	200
GRPH (without benzene)	100	1,000	200
Benzene	0.03	5	NE
Toluene	7	1,000	NE
Ethylbenzene	6	700	NE
Xylenes	9	1,000 [3]	NE
EDB	0.005	0.01	NE
EDC	NE	5	NE
MTBE	0.1	20	NE
Naphthalenes	5	160	NE
Lead	250	15	220

Notes:

[1] Cleanup levels from MTCA Method A.

[2] Unrestricted land use cleanup levels for sites that qualify for the Simplified Terrestrial Ecological Evaluation Procedure (Table 749-2 of MTCA).

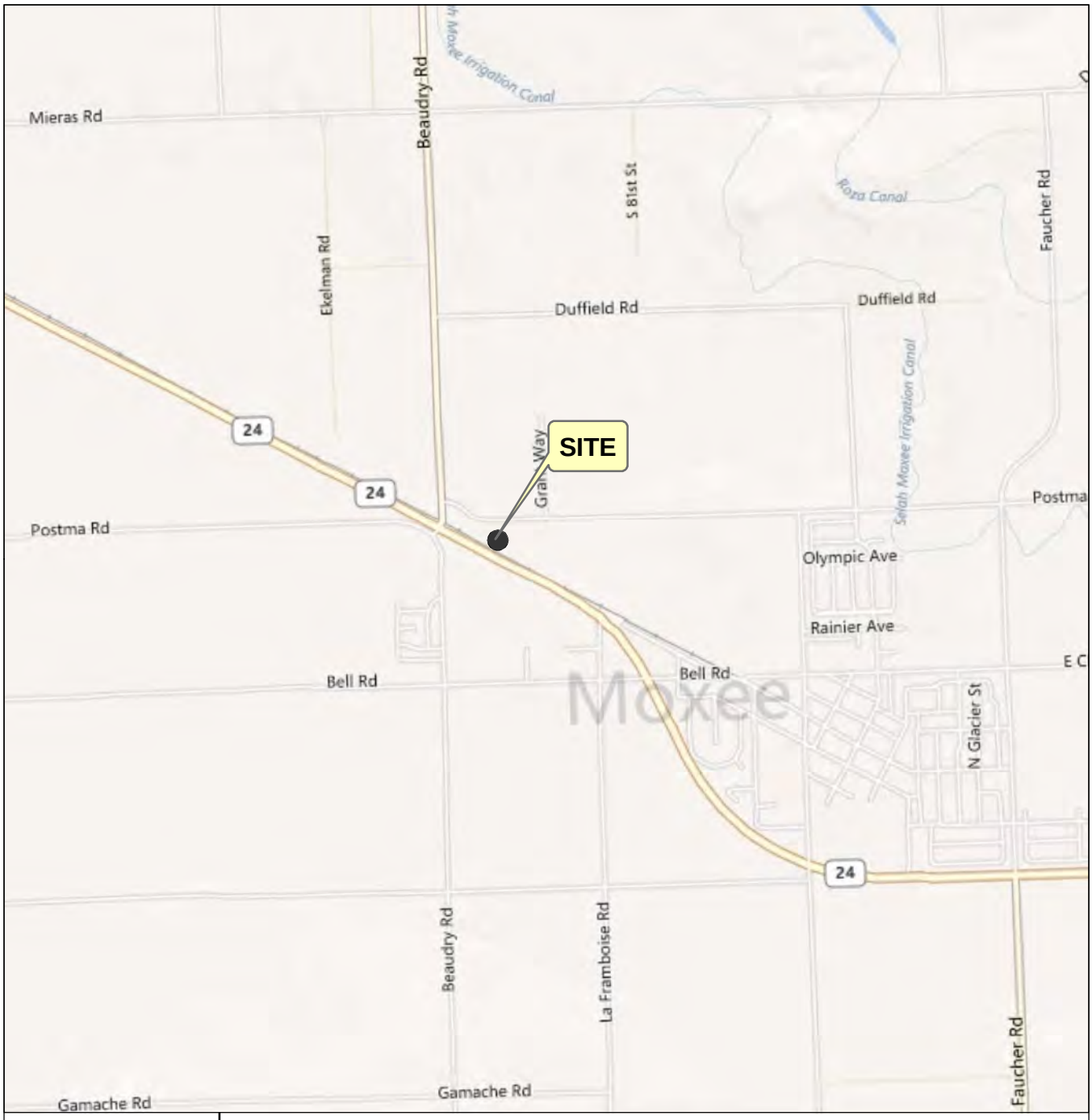
[3] Screening level is for m-xylene or o-xylene.

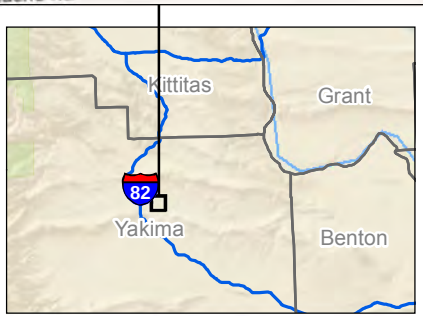
mg/kg = milligrams per kilogram; µg/l = micrograms per liter; NE = Not established;

Attachments:

Figure 1. Vicinity Map

Figure 2. 1996 UST Excavation and Test Pit Locations





N
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2,000 0 2,000
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: ESRI Data & Maps, Street Maps 2008.
Bing Maps Road from ESRI Data Online.
Projection: NAD 1983, UTM Zone 10 North.

Vicinity Map

Moxee City Shop & STP
Moxee, Washington

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Figure 1

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Approximate Location of 1996
Test Pits/Groundwater Samples

Groundwater Concentrations Exceeded MTCA Method A Cleanup Levels

Groundwater Concentrations Did Not Exceed MTCA Method A Cleanup Levels

Approximate Location of 1996 UST Excavation

N
W E
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60 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.
Data Sources: Bing Maps Aerial from ESRI Data Online.
Projection: NAD 1983, UTM Zone 10 North.

1996 UST Excavation and Test Pit Locations

Moxee City Shop & STP
Moxee, Washington

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Figure 2

Office: SPOK Path: W:\Spokane\Projects\0\0504078\GIS\00\0504078_F2_UST_TestPits.mxd Map Revised: 5/17/2012 CRC