WORK PLAN

ONSITE GROUNDWATER MONITOR WELL INSTALLATIONS AND SAMPLING

Former Round The Clock Deli
722 South Lincoln Street, Port Angeles, WA

WA DOE Facility ID: 63427274
VCP Project No. SW0962

Prepared for:

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1 PROJECT DESCRIPTION

1.1 Location

The Site is located at 722 South Lincoln Street, Port Angeles, Washington. It was previously known as Around The Clock Deli property on which underground petroleum storage tanks (USTs) have been removed. The Site is listed by the Washington Department of Ecology as Facility 63427274, a Hazardous Waste Generator and a LUST facility. The property is under a Voluntary Cleanup Program (ID SW0962) to perform independent remedial activities related to known petroleum hydrocarbon contamination.

1.2 Purpose and Objectives

The purpose of this work is to install groundwater monitor wells within the Site for long-term monitoring. The Site is adjacent to an area in which previous groundwater investigations have concluded that petroleum contaminated groundwater plumes are co-mingled from near the intersection of 8th Street and South Lincoln Avenue, and northerly along South Lincoln Street. Groundwater samples from the proposed monitor wells would provide data that will allow differentiation of the Site plume from the migrating co-mingled plume within South Lincoln Street (Hwy 101).

Some of the degraded gasoline within a portion of the South Lincoln co-mingled plume was probably manufactured prior to 1996 when the organic manganese additive MMT was generally phased out (Friedman and Bruya 2012). Previous comparisons have indicated that the gasoline onsite and offsite are from different sources. Further analyses of onsite product and comparison to previous co-mingled plume groundwater analyses will be conducted to determine if the co-mingled plume is migrating onto the Site.

Specific objectives of this investigation include:

- Install five groundwater monitor wells.
- Sample soil for petroleum hydrocarbons and lead.
- After development and time for equilibrium of existing product, collect groundwater samples quarterly from the monitor wells and analyze for total petroleum hydrocarbons.
- Analyze product sample for MMT analysis from onsite wells and compare with previous offsite product results.
- Prepare summary report evaluating potential for onsite migration of co-mingled groundwater plume.

1.3 Schedule

The groundwater investigation will begin when this work plan has been approved by the State of Washington Department of Ecology (“DOE”) and a drilling subcontractor has been secured. The field investigation is expected to take approximately two days for drilling, well development, and initial sampling. A report on the field investigation and data results would be completed within an estimated timeframe of four weeks following completion of the monitor well installations.

2 BACKGROUND

Previous investigations have resulted in the following conclusions.

- The Site has been a petroleum service station since about 1924, with at least 3 building and UST configurations.
- Soil and groundwater contamination at the Site is primarily due to petroleum hydrocarbon constituents.
- In 2008, 28 groundwater monitoring wells were installed to determine the extent of contaminant plumes.
- A co-mingled plume of gasoline contaminated groundwater extends from approximately the northern boundary of the ARCO property on SE 8th Street, northeasterly at least 400 feet under South Lincoln Street and is approximately 300 feet wide (northwest to southeast).
- The potential sources of contaminated soil within the Site are likely associated with leaks from USTs, dispensers and pipelines.
- Gasoline contaminated groundwater is migrating north-northeasterly, in a distribution pattern enhanced by higher permeability features, such as, a now filled-in stream channel ("gulch") and backfilled utility trenches.
- Offsite sources contributing to the contaminated groundwater plume may be service station facilities located across South Lincoln Street and farther upgradient.

3 FIELD INVESTIGATION

3.1 Monitor Well Locations

The groundwater monitor wells will be located as follows and are shown in Figure 1.

Monitor well GES-1 and GES-2 within the Site adjacent to East 8th Street in an upgradient location.

Monitor wells GES-3 and GES-4 within the Site along South Lincoln Street in a side-gradient direction.

Monitor well GES-5 within the Site along the north boundary in a downgradient direction.

3.2 Well Installation and Development

Well installations will be conducted in accordance with Chapter 173-160 WAC. The screen and blank well casings will be constructed of two (2)-inch diameter Schedule 40, polyvinyl chloride ("PVC") flush coupled, threaded pipe. The screens may be slotted with nominal machine cuts of 0.010-inch width. The filter packs may consist of nominal clean graded Colorado silica #10-20 sand. Upon drilling to a total depth estimated at 20 to 23 feet, the well casing, consisting of a threaded end cap on a 10-foot section of screen in turn threaded fit into blank casing, will be assembled and lowered to total depth. The filter pack

will be placed by measuring with a weighted tape measure into the annular space to approximately one-foot above the well screen. An aquifer seal of bentonite pellets will be placed from above the filter pack to 0.5-feet depth. A surface seal of Portland Type II cement will be placed from about 0.5-feet to the surface. A lockable, water tight well cover will be installed on the well casing and a vault traffic box will be cemented around the well at the surface. Safety bollards will be installed around each well location. The final well construction will be depicted on an as-built well sketch.

At least 24 hours will be allowed between installation and development so the well installation components can properly set. The wells will then be developed and subsequently sampled within 30 days. An elevation survey for each monitoring well location will be completed to estimate groundwater flow direction and gradient.

3.3 Chemicals of Potential Concern and Analytical Methods

Gasoline related constituents are the chemicals detected during the previous remedial activities and are the COPCs. The following chemical analyses will be performed on the groundwater and soil samples and reported at method detection limit goals at or below Method A unrestricted land use cleanup levels.

ANALYSIS	METHOD
Gasoline range organics and benzene, toluene, ethylbenzene, xylenes	NWTPH-Gx/BTEX
Lead	Total lead (EPA 6010B)
Hydrocarbon fuel scan (organic manganese additive) if sufficient product	PIANO and organometallic

Data quality objectives for the proposed groundwater investigation are to generate data of known and documented quality that can be used to determine whether COPCs are present in groundwater above detection levels and at levels that pose an unacceptable risk. Data will be compared to MTCA Method A unrestricted land use.

3.4 Groundwater Sampling

Each monitor well will first be checked for product with a clean steel tape with hydrocarbon sensitive paste. If sufficient free product is determined for sample collection, the free product will be removed with a peristaltic pump with new tubing and placed in appropriate laboratory furnished containers.

If insufficient free product is available, or no free product is observed, groundwater sampling will be conducted using low-flow purging sampling techniques. During sampling, new tubing will be lowered down the well casing. The tubing will be positioned at the approximate middle of the well screen. The wells will be purged until groundwater quality parameters are stable.

During purging, water quality parameters including temperature, pH, and conductivity will be monitored. Turbidity will be monitored and recorded but will not be

used as an indication of stabilization. After stabilization is reached, a groundwater sample will be collected. Groundwater samples will be prepared according to protocol established by the analytical laboratory.

3.5 Soil Sampling

Subsurface soil samples will be collected at 5-foot intervals or sampling when potential contamination is visible. Soil samples for hydrocarbon analyses will be collected in accordance with laboratory required procedures. Sample volumes for the remaining analyses will be placed in lab furnished, pre-cleaned, sample containers. The samples will be placed in iced coolers with a laboratory furnished blank sample container for quality control to await shipment.

3.6 Data Evaluation

Analytical data resulting from sample analyses will be summarized and tabulated. Detected concentrations will be compared to the requirements of MTCA to determine whether chemicals of potential concern are present in soil or groundwater at concentrations that exceed cleanup levels.

3.7 Field Procedures and Quality Assurance

Samples of groundwater will be obtained according to standard field methods and will be prepared in accordance with protocol established by the analytical laboratory for containers, preserving, storage and transport to the laboratory. A chain of custody will be prepared for all samples.

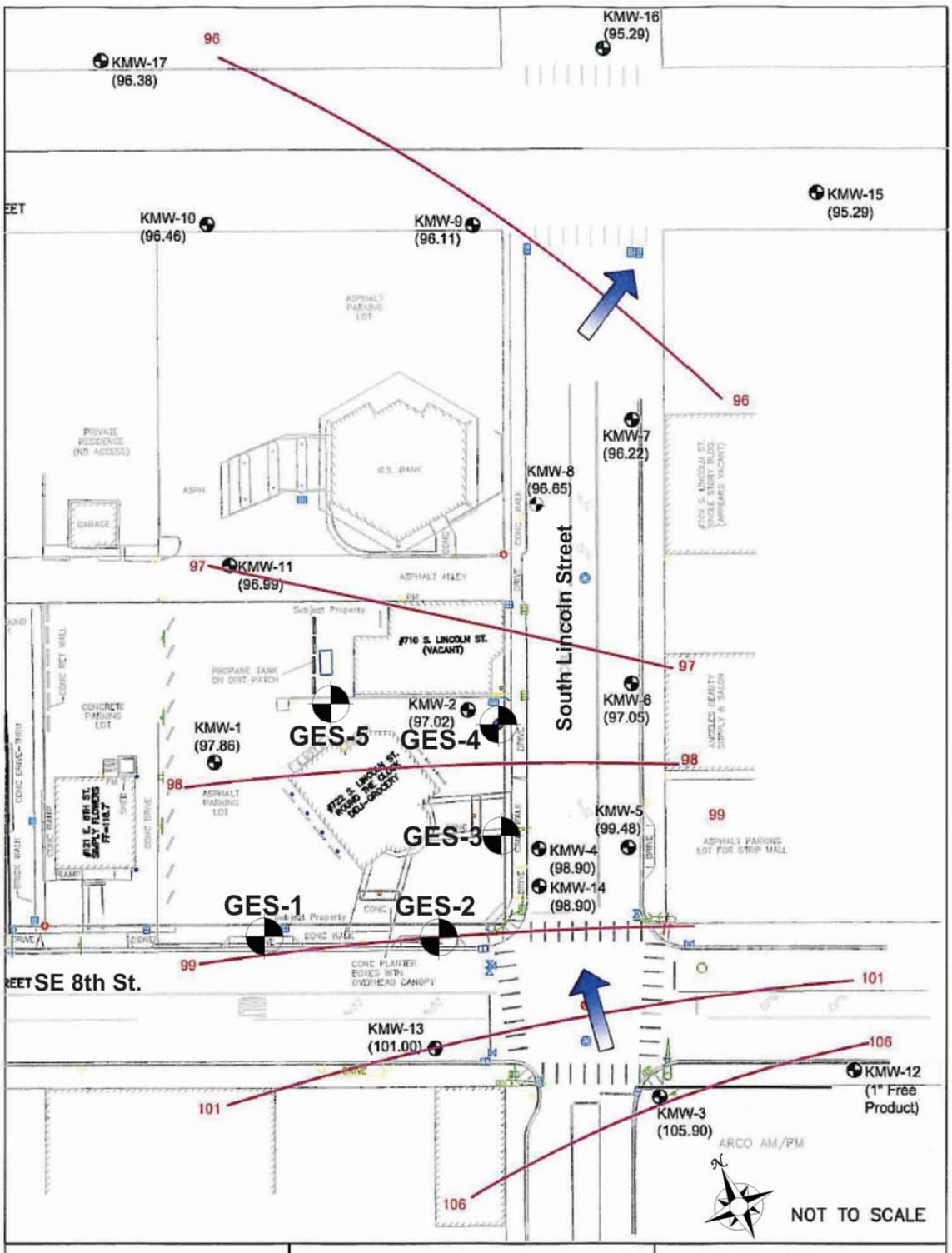
Appropriate decontamination procedures will be followed to prevent cross contamination of the drilling equipment between drill holes, and of groundwater samples between sample depths and between drill hole locations. Any investigation derived waste soil and groundwater and disposable sample collection materials will be collected, drummed, marked and left on-Site for disposal by the property owner.

During drilling, a continuous geologic log will be prepared describing the subsurface materials encountered, depth to groundwater, presence of saturated zones, and any other pertinent geologic or environmental observations.

4 REPORT

A report will be prepared on the field investigation including geologic logs and laboratory analyses. A separate report on the evaluation and possible encroachment of the co-mingled plumes will be prepared if sufficient free product is collected and analyzed.

Richard C. Kent, L.G.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KMW-17
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96
KMW-15
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(96.11)
KMW-7
(96.22)
KMW-8
(96.65)
South Lincoln Street
97
KMW-11
(96.99)
#710 S. LINCOLN ST.
(VACANT)
KMW-6
(97.05)
KMW-2
(97.02)
KMW-1
(97.86)
GES-5
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98
KMW-5
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99
GES-3
KMW-4
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(98.90)
GES-1
GES-2
SE 8th St.
KMW-13
(101.00)
101
106
KMW-12
(1" Free
Product)
KMW-3
(105.90)
ARCO AM/PM
NOT TO SCALE
Proposed location
Approximate gradient
FIGURE 1 - PROPOSED
GROUNDWATER MONITOR WELLS
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