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REMEDIAL SITE INVESTIGATION & CHARACTERIZATION REPORT

Sportland Mini-Mart
4400 Bullfrog Road
Cle Elum, Washington

Project Number: 12698

October 15, 2012

Prepared for:

Sportland Project, LLC
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Report Title: Remedial Site Investigation and Characterization Report

Project Number: 12698

Date: August 24, 2012

Site: 4400 Bullfrog Road, Cle Elum, Washington

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1.0 INTRODUCTION

Fulcrum Environmental Consulting, Inc. (Fulcrum) was retained by Sportland Project, LLC to conduct a subsurface investigation of the Sportland Mini Mart and Fueling Station facility. The facility is located at 4400 Bullfrog Road in Cle Elum, Washington. See Appendix A, Figure 1 for the site location. Fulcrum understands that previous investigations and limited remedial activities have been completed at the site following discovery of product release in 1998 from a former onsite fuel dispenser system.

The in-progress investigation activities have been designed to provide current site characterization data associated with residual impact to site soils and groundwater, collected in conformance with Washington State Department of Ecology (Ecology) criteria, to satisfy environmental regulatory requirements and to facilitate subsequent remedial design and site closure.

Site services were provided by Jeremy Lynn, Licensed Hydrogeologist; and Kendra Williams, Geologist-in-Training; both with Fulcrum.

2.0 SITE DESCRIPTION AND BACKGROUND

The site is identified by the Kittitas County Assessor's Office as the following tax parcels:

- 673034
- 953132

The Sportland Mini Mart and Fueling Station facility is located southeast of the intersection of Bullfrog Road and Washington State Route 903, northwest of the city of Cle Elum, Washington. The site is currently operated as retail fueling station and off-road vehicle dealership and repair facility. The facility is bordered to the north by Washington State Route 903, and to the west by Bullfrog Road. Mixed residential and commercial land use is present north and east of the facility. See Appendix A, Figure 2 for general site features.

Onsite structures include the mini-mart building located in the north-central portion of the facility with the current fueling islands located south and adjacent to the mini-mart building. The onsite dealership building is located east of the mini-mart building and within the northeast portion of the facility. The associated dealership repair shop and storage areas are located immediately south of the dealership building.

Fulcrum understands that in September 1998, the underground storage tanks and associated system components were replaced as a portion of gasoline retail fueling system upgrades. During system removal, a leak was observed beneath the former eastern fuel dispenser and gasoline impacted soils were identified. Prior to investigation activities presented herein, sampling and site characterization has been primarily completed by GN Northern, Inc, in 1998 to 1999.

Additional detail associated with previously completed investigation activities is presented in the site-specific Sampling and Analysis Plan (SAP)/Quality Assurance Project Plan (QAPP). See

Appendix B for the site-specific SAP/QAPP. Additional detail associated with the site location and potential worker safety hazards is presented in the site-specific Health and Safety Plan (HSP). See Appendix C for the HSP.

3.0 SCOPE OF SERVICES

Fulcrum was retained by Sportland Project, LLC to complete a site subsurface investigation. The primary goal of this project is to provide characterization for the presence and extents of impact associated with petroleum hydrocarbon and gasoline additives, collectively product, to site soils and groundwater; and to determine the absence or presence of free product in soils or product on the surface of site groundwater. Contaminants of concern include gasoline range organics, diesel range organics, select volatile organic compounds, and lead. Collected data is intended to establish the extents of contaminant impact to the site and to facilitate future assessment of remedial strategies and associated remediation costs. Tasks associated with this phase of investigation include the following:

- Prepare a site-specific SAP/QAPP and HSP associated with investigation activities
- Complete a subsurface soil sampling event to characterize the current site conditions associated with the former product release.
- Complete project reporting inclusive of data evaluation and interpretation of extents of residual soil impact.
- Complete initial, and as necessary, subsequent quarterly groundwater monitoring events for contaminants identified in site soils and previously completed investigation activities.
- Prepare in-progress reporting and a final site characterization report for the project. The final site characterization report is designed to include:
  - Maps of the study area showing sample collection locations, water levels in monitoring wells, groundwater flow direction, and contaminant concentrations and distribution.
  - Discussion of soil and water quality results.
  - Comparison of results to the cleanup standards for the contaminants of concern, to use in evaluating the potential remedial options.
  - Significant or potentially significant findings.

All proposed investigation activities are designed to meet the criteria set forth in the Washington Administrative Code (WAC) 173-340 for independent remedial investigation to facilitate remedial action planning, design, and implementation. All investigation activities have been completed under a site-specific SAP/QAPP and HSP.

The intent of this Remedial Investigation and Site Characterization Report is to present the findings of the soil sampling event and initial monitoring well sampling event.

To facilitate site investigation activities, Sportland Project, LLC. contracted the following companies:

- Cruse & Associates, Inc. of Ellensburg, Washington was retained to complete land survey services.

- Utilities Plus, LLC of Yakima, Washington was retained to complete private, third-party utility locate services.
- Environmental West Exploration, Inc. of Spokane, Washington was retained to complete environmental drilling and monitoring well installation.
- Fremont Analytical, Inc. of Seattle, Washington was retained to complete laboratory analysis.

4.0 GEOLOGIC SETTING

Migration of contaminants within the subsurface is primarily a function of the chemical and physical interaction between constituents and subsurface conditions such as soil type, geologic features, and groundwater gradient and flow direction. Additionally, subsurface geologic conditions play a large role in the appropriateness and potential success of a given remedial alternative.

4.1 Regional Geologic Setting

Regional geologic setting is most efficiently reviewed in United States Geological Survey *Hydrogeologic Framework of Sedimentary Deposits in Six Structural Basins, Yakima River Basin, Washington* (USGS, 2006). As described, the Yakima Basin is located within the Yakima Folds Geomorphic Province (YFGP), the youngest of three geologic formations comprising the Columbia River Plateau. The YFGP is located on the western margin of the Columbia River Plateau and is comprised of both consolidated and unconsolidated materials. The central, eastern, and southwestern portions of the YFGP are comprised of Miocene Age basalts with intercalated sedimentary deposits. The lowlands within the YFGP consist of erosional sedimentary deposits including: alluvium, lacustrine, glacial, and glacial-fluvial materials with localized areas of wind-blown loess. Anticlinal ridge and synclinal valley structures dominate the topography of the YFGP.

The Yakima River Basin (YRB) located within the boundaries of the YFGP, extends from the northeastern slopes of the Cascade Mountain Range in Kittitas County to the confluence of the Yakima and Columbia Rivers in Klickitat County. The YRB additionally incorporates portions of Benton County and the majority of Yakima County. The YRB comprises an area of approximately 6,200-square miles and a total of six structural aquifer basins (USGS, 2006). The network of Yakima Basin aquifers is supplied by the headwaters of the eastern slopes of Cascade Mountain Range. The Yakima River, eight tributary rivers, and numerous streams are supplied by annual snow-melt runoff from the Cascade Mountains.

The six identified aquifer basins include the Roslyn, Kittitas, Selah, Yakima, Toppenish, and Benton Basins. The site is located within the southern portion of the Roslyn Basin.

The Roslyn Basin encompasses an area of about 80-squre miles southeast of the Kachess and Cle Elum Lakes. Two northwest trending faults cut through the south-central part of the basin and several synclines and anticlines are present in the northeast part of the basin. The basin fill deposit stratigraphy is divided into three hydrogeologic subunits. The upper unit, limited to the Yakima

River floodplain, consists of the alluvial, lacustrine, and glacial deposits and ranges in thickness from 0 to 360-feet. The second unit consists predominantly of fine-grained, lacustrine deposits of clay and silt and ranges in thickness from 0 to 530-feet. The third unit, limited to the deeper parts of the alluvial valley, consists of coarser deposits, mostly sand and gravels and ranges in thickness from 0 to 240 feet. The total basin thickness ranges from 0 to 700 feet.

4.2 Local Geologic Setting

The site is located at an approximate elevation above sea level of 2,120-feet with a topographic elevation change of less than 10-feet across the site, and sloping downward from north to south (USGS, 2011).

Site soils are identified by the United States Department of Agriculture (USDA) National Resource Conservation Service (NRCS) Web Soil Survey as being predominately composed of Roslyn Ashy Sandy Loam (USDA, 2012).

4.2.1 Roslyn Ashy Sandy Loam

Roslyn Ashy Sandy Loam is described as being composed of moderately decomposed plant material from the surface to a depth of 1-inch below ground surface (bgs). Soils at depths of 1 to 15-inches bgs are described as ashy sandy loam. Soils at depths of 15 to 37-inches are described as loam with underlying gravelly loam to a depth of 60-inches bgs. Roslyn Ashy Sandy Loam is additionally described as being well drained with a moderately high to high capacity to transmit water and a depth to groundwater of more than 80-inches below ground surface (bgs).

4.2.2 Soils Identified During Onsite Activities

Onsite investigation activities generally identified surface soils consisting of sandy gravel from the surface to depths of approximately 5 to 10-feet bgs. Underlying soils were composed of clayey sandy gravel to sandy gravel extending to the maximum depths of borings of approximately 17.5 to 22.5-feet bgs. Groundwater was evident within gravelly soil horizons at depths of approximately 15 to 20-feet bgs with high water marks extending to depths of approximately 12.5-feet. Depths to surface water vary with topographical elevations changes across the site.

4.2.4 Hydrology and Hydrogeologic Site Conditions

Site-specific hydrology and hydrogeologic influences include the presence Crystal Creek, located approximately ¼-mile northeast of the site, and the Yakima River. Crystal creek flows southwesterly and joins the Yakima River about 2-miles southeast of the site. The Yakima River flows east and is found approximately 1.5-miles south of the site.

Groundwater flow at the site appears to be complex and may vary seasonally. Based on previously collected site data by GN Northern, Inc. and limited site characterization data collected to date, groundwater, at times, may flow northeast toward Crystal Creek or southeast toward the confluence of Crystal Creek and the Yakima River.

5.0 APPLICABLE REGULATORY GUIDANCE

Environmental regulatory authority for the site location is governed under Ecology for site contamination concerns.

5.1 MTCA Regulations

In March 1989, the Model Toxics Control Act (MTCA) was enacted in Washington State (Ecology, 2007a). The MTCA regulations set standards to ensure quality of cleanup and protection of human health and the environment. A major portion of the MTCA regulation, completed in 1991, was the development of numerical cleanup standards and requirements for cleanup actions. Three options were established under MTCA for site-specific cleanup levels: Method A, B, and C. Method A defines cleanup levels for 25 of the most common hazardous substances found at sites. Method B levels are set using a site risk assessment, which enables consideration of site-specific characteristics. Method C is similar to Method B, however the individual substance's cancer risk portion of the assessment is set at 1 in 100,000 rather than 1 in 1,000,000. Method C cleanup levels are applicable at industrial sites. Method B standard values are found in Ecology's Cleanup Levels and Risk Calculations database (Ecology, 2012).

Rule amendments to MTCA, which became effective August 15, 2001, changed the cleanup levels of petroleum hydrocarbon contamination. Whereas diesel and heavy oil concentrations were increased, the MTCA Method A cleanup levels for gasoline and gasoline components (Benzene, Toluene, Ethylbenzene, and Xylene) were lowered significantly. Changes to MTCA since 2001 have been primarily administrative in nature, although review and adjustment of specific contaminants is ongoing.

5.2 Cleanup Standards Selected

Ecology's MTCA Method A cleanup tables were developed to provide conservative cleanup levels for sites undergoing routine cleanup actions or those sites with relatively few hazardous substances. Method A cleanup levels are specifically designated as appropriate for residential facilities and are appropriate for a conservative approach at school and public sites.

However, based on site-specific conditions, such as the number of different contaminants, petroleum composition, and site-specific geologic conditions, MTCA Method B levels usually provide results in higher cleanup levels for soil and often provide lower and more conservative cleanup level for groundwater when compared with MTCA Method A levels. As such, where appropriate, Fulcrum has evaluated site conditions against both Method A and Method B cleanup levels. Where Method A cleanup levels have not been established, Fulcrum has defaulted to using Method B cleanup levels.

Application of the MTCA Method A or Method B cleanup levels during this portion of the project does not exclude the potential for reevaluation of site contaminants by other methods or other applicable standards at any time.

5.3 Remedial Action Planning Requirements

While Fulcrum's investigation activities included collection and evaluation of site soils and groundwater with applicable regulatory cleanup levels, the intent of the investigation is primarily to evaluate extents of impact to facilitate site characterization and remediation. As such, Fulcrum's investigation activities were completed with the intent of satisfying investigation and site data requirements for evaluation of remedial options as established in WAC 173-340-360 and WAC 173-340-440 for site remediation planning.

In general, remedial methods must include meeting the following requirements:

- Establishment of appropriate site engineering controls and monitoring of contamination as appropriate to significantly reduce potential for human contact and to provide data associated with potential contaminant migration to ensure protection of groundwater resources, WAC-173-340-440.
- Complete, if appropriate, a Terrestrial Ecological Evaluation (TEE) of site conditions to determine the effects of remedial methods on potential sensitive ecological receptors, WAC 173-340-7490 through 7494.

The remedial method must satisfy the following minimum requirement for selection of a cleanup action under WAC 173-340-360(2)(a):

- Protect Human Health and the Environment – through direct contact pathways and protection of soil, groundwater, atmospheric resources, and evaluation of site-specific contaminants' impacts on ecological receptors as evaluated under the Terrestrial Ecological Evaluation (TEE) process.
- Comply with Cleanup Standards – use interim control requirements established under WAC 173-340-440.
- Comply with Applicable State and Federal Laws
- Provide Compliance Monitoring

The selected remedy also must meet other requirements for selection under WAC 173-340-360(2)(b), which include the following:

- Use Permanent Solutions to the Maximum Extent Practicable
- Providing for a Reasonable Restoration Time Frame
- Consideration of Public Concerns

Fulcrum's investigation activities were designed to satisfy the data requirements in order to facilitate future evaluation of site conditions and remedial options to meet the above identified requirements.

6.0 ONSITE INVESTIGATION ACTIVITIES

Fulcrum completed site investigation activities under site-specific SAP/QAPP and HSP. The investigation was designed to include a multi-phased approach comprised of an initial soil

characterization and sampling event, followed by quarterly monitoring of previously installed groundwater monitoring wells. Based on results of the soil investigation and sampling of previously installed groundwater monitoring wells, additional monitoring wells are intended to be installed as necessary to meet project objectives.

6.1 Soil Investigation

From August 20 through 22, 2012, Fulcrum completed site soil investigation activities. See Appendix C.2 for site observation reports and Appendix C.3 for site photographs associated with the soil investigation. See Appendix B for the SAP/QAPP governing the soil investigation.

Fulcrum's approach consisted of completing boreholes to delineate extents of soil impact and to evaluate the presence of free product on site groundwater. The purpose of the soil investigation was two-fold; first, confirm worst case environmental contamination and second, determine approximate extents of contaminant impact. From these borehole locations, samples were collected for analysis for diesel and heavy oil range organics, gasoline range organics, gasoline additives, and lead. All samples for volatile organic compound analysis were collected as prescribed in Ecology's relevant technical memorandum (Ecology, 2004.)

Fulcrum completed eleven boreholes within the property boundaries. Air rotary drilling methods were used to excavate the boreholes. Boreholes were completed to a depth generally 2.5 to 5.0 feet below encountered groundwater elevation. Boreholes were located to delineate extents of soil impact and to evaluate the presence of free product on site groundwater and were adjusted as necessary in the field to meet the project objectives. Completed borehole locations included the following:

- Two boreholes northwest of the area of release (01, 11)
- Four boreholes located south and west of the current fueling tanks and pumping islands (02,03,04,05)
- Two boreholes between the current pumping islands and former fueling islands (06,07)
- One borehole southeast of the known area of impact (08)
- Two boreholes northeast of the known area of impact and near the property boundaries (09, 10)

See Appendix A, Figure 2 for borehole locations. See Appendix C for borehole logs and observations.

Soil samples were generally collected at 5-foot intervals from each borehole except where split-spoon core sampler refusal was encountered due to soil conditions. Soil samples at select locations were collected at 2.5-foot intervals due to refusal at 5-foot depth intervals or encountered groundwater elevation.

Fulcrum collected 46 soil samples during the investigation of which 32 were analyzed by Fremont Analytical, Inc. (Fremont). All other samples were collected, shipped to Fremont, and placed on hold pending results of the initial analysis.

Soils were field evaluated for volatile organic compounds (VOC) using a Rae Systems Photo Ionization Detector (PID) meter with VOC sensor. As presented in the SAP/QAPP, all collected soil samples for field evaluation were placed into resealable polyethylene bags and warmed. Concentrations of VOC identified in the soil samples collected ranged from 0 to 1,099 parts per million.

Moderate gasoline odor and sheen were identified within boreholes 06, 07, and 09. Gasoline odor within borehole 09 was limited to elevations between 15 and 20-feet bgs and greatest at approximately 17.5-feet bgs during drill bit advancement. Sample collection was attempted at 15, 17.5, and 20 bgs. Samples were successfully collected at 15 and 20-feet bgs; however, due to poor recovery no samples were collected at 17.5-feet bgs. All other elevations identified with gasoline odor within all other boreholes were successfully sampled during the investigation.

While sheen was observed on select core samples, Fulcrum did not identify free product utilizing a Solinst Petroleum Interface Probe within the completed boreholes prior to closure.

6.3 Deviations from SAP/QAPP

During the project, Fulcrum's onsite staff completed field modifications to the Sampling and Analysis Plan (SAP), including number and location of borehole to improve investigation performance.

Fulcrum's investigation strategy consisted of borehole excavations in locations surrounding current and former fueling islands and underground storage tanks as well as adjacent to property boundaries. The initial intent was to complete up to ten boreholes. Based on the presence of both underground and overhead utilities, the two boreholes proposed at the south corner of the mini-mart building and immediately south of Highway 903, were altered to include one borehole east of the mini-mart building. Based on encountered suspect contamination within boreholes 06 and 07, two additional boreholes were completed and included: one borehole south of the dealership building, and one borehole west of the current fueling island. Under the expanded and modified borehole plan, Fulcrum excavated eleven boreholes.

6.4 Initial Groundwater Monitoring Event

On October 1, 2012, Fulcrum completed onsite activities associated with initial groundwater monitoring via previously installed monitoring wells. The following conditions were noted at each monitoring well:

- Monitoring Well 01: Silted to 16-feet bgs, the estimated elevation of groundwater. No measurable water identified.
- Monitoring Well 02: Damaged pressure cap.
- Monitoring Well 03: Damaged well casing below pressure cap.
- Monitoring Well 04: Damaged well casing; however, sealed by present polyvinyl chloride (PVC) cap. Less than 6-inches of water column present in well.
- Monitoring Well 05: Heavy iron precipitation present in well casing. Physical barrier encountered preventing installation of dedicated tubing below groundwater elevation.

Due to the encountered conditions, Fulcrum has determined that repair to existing wells and installation of appropriate and usable wells is necessary to meet project objectives. A monitoring well installation plan is presented under separate cover.

At each well in which water was present, Fulcrum utilized a Solinst Petroleum Interface Probe to evaluate the potential for free product. No free product was identified within any of the existing monitoring wells. An intermittent, reading of free product was encountered in Monitoring Well 02; however, the reading was not repeatable through numerous measurements.

7.0 LABORATORY ANALYSIS

Selected laboratory analysis, as well as collection and handling protocol for samples collected from each area of investigation is established in the SAP/QAPP. See Appendix B for the project SAP/QAPP.

Following collection, all samples were shipped via commercial carrier to Fremont for analysis. All samples were reported to be received in intact condition and within appropriate preservation temperatures and chemical preservations where specified by analytical methodologies. See laboratory reports for sample receipt checklists for the soil investigation in Appendix D.

7.1 Laboratory Results

A summation of laboratory results for each sample is presented in Appendix D. Discussion of laboratory results is presented in Section 8.0.

7.2 Laboratory QA/QC Review – Soil Investigation

Fulcrum collected 46 soil samples during the investigation, of which 32 were analyzed. All samples were delivered to the laboratory within the prescribed holding time and preserved on ice. No delivery errors or damage to collected samples were reported during shipment or upon receipt at the laboratory. No samples were reported by the laboratory to have insufficient sample volume to complete the requested analysis and all analyses were performed consistent with the laboratory quality assurance program.

Few data qualifiers were reported in the laboratory results. Data qualifiers were limited primarily to repeatability comparisons associated with matrix spike samples. Data qualifiers are reviewed in the order of work completed.

Fremont Work Order 1208159 – Temperature within the rigid insulated shipping container, commonly referred to as a cooler, measured by Fremont ranged from 4.1 degrees Celsius (˚C) to 4.8˚C and custody seals were reported to be intact.

Of the 32 soil samples analyzed, four samples had laboratory notes associated with the analysis or sample handling. These samples are listed along with a description of the notes associated with them.

- Sample 082012.02.20 noted that a spike recovery was outside of accepted recovery limits. The method is in control as indicated by the Method Blank (MB) and Laboratory Control.

- Sample 082112.06.15 noted that a spike recovery was outside of accepted recovery limits. A review of the sample note by the laboratory attributed the recovery limit error to TPH interference. The method is in control as indicated by the Method Blank (MB) and Laboratory Control. In addition, dilution of the sample was required.

- Sample 082112.07.15 noted that dilution of the sample was required.

- Sample 082112.07.20 noted that dilution of the sample was required.

Review of these notes indicates that laboratory quality assurance and quality control is satisfactory and identified laboratory QA/QC should not affect project data.

8.0 DISCUSSION OF INVESTIGATION RESULTS

Based on field observations, and where recoverable sample was collected, Fulcrum selected the following sample intervals for analysis:

- Intervals above and below encountered groundwater elevation within all boreholes and representing the elevations with the greatest potential for impact, 15 to 20-foot elevations
- Six samples collected at 10-feet bgs, including boreholes 03, 04, 06, 07, 08, and 09
- Two samples collected at 5-feet bgs, including boreholes 06 and 07
- Three field duplicate, or approximately 10-percent of number of samples analyzed

The following constituents were identified within sampled soils above Method A cleanup levels:

- Gasoline Range Organics C6-C12 ranging from non-detect concentrations to 357 milligrams per kilogram (mg/Kg)
- Gasoline Additives or components:
  - Benzene ranging from non-detect to 0.640 mg/Kg
  - Toluene ranging from non-detect to 30.8 mg/Kg
  - Ethylbenzene ranging from non-detect to 10.7 mg/Kg
  - m, and p-Xylenes ranging from non-detect to 46.8 mg/Kg
  - o-Xylene ranging from non-detect to 16.2 mg/Kg

All constituents identified above MTCA Method A cleanup levels were limited to samples 82112.06.15, 82112.07.15, and 82112.07.20 collected from boreholes 06 and 07. Additionally, constituents above MTCA Method A cleanup levels were limited to elevations ranging from 15 to 20-feet bgs.

Detectable concentrations of gasoline additives are predominantly comprised of ethylbenzene and xylenes within analyzed samples, suggesting significant degradation of petroleum hydrocarbons across the site. Detection of benzene was limited to sample 082112-07.20.

Detectable concentrations of lead were below MTCA Method A cleanup levels and consistent with naturally occurring background concentrations for central Washington (Ecology, 1994) for all samples analyzed. Laboratory analysis did not identify concentrations of Ethanol, Methyl tert-Butyl Ether (MTBE), 1,2-Dichloroethane (EDC), or 1,2-Dibromoethane (EDB) at or above method reporting limits.

8.1.1 Additional Selected Laboratory Analysis

Samples 82112.06.15, 82112.07.15, and 82112.07.20 were selected for the following additional analysis representing the samples with constituent concentrations above MTCA Method A cleanup levels:

- Northwest Extractable Petroleum Hydrocarbons (NWEPH) for extractable petroleum hydrocarbons
- Northwest Volatile Petroleum Hydrocarbons (NWVPH) for volatile petroleum hydrocarbons
- Environmental Protection Agency Method 8260 for n-Hexane and Naphthalene

Additional laboratory results identified concentrations of naphthalene ranging from 0.392 to 7.38 mg/Kg. Results confirmed naphthalene above MTCA Method A cleanup level of 5 mg/Kg in samples 082112-07.15 and 07.20.

Laboratory results identified n-hexane ranging from concentrations of 2.71 to 12.80 mg/Kg and below the MTCA Method B cleanup level of 4,800 mg/Kg.

8.1.2 Method B Cleanup Level Evaluation

Fulcrum completed evaluation of VPH and EPH results utilizing the Ecology published MTCATPH11.1 program to calculate a site-specific Method B cleanup value (Ecology, 2007b). See Appendix E for individual Method B cleanup level calculations.

Results identified a Method B cleanup level of 2,566 mg/Kg for total petroleum hydrocarbons for protection of human health through direct contact and utilizing data from sample 082112-06.15 as a conservative approach.

The calculated Method B cleanup level is above the documented concentrations of petroleum range hydrocarbons samples 082112-06.15, 07.15 and 07.20. Use of Method B cleanup levels may provide a critical decision pathway for remedial strategy and quantity of soils requiring remediation. However, as soil analysis have documented the presence of few contaminants, Method A cleanup levels can be utilized at the site.

9.0 DATA GAPS IN THE INVESTIGATION

To date, the following data gaps have been identified associated with the investigation:

No sample recovery or analysis for soils at the elevation of 17.5-feet bgs within borehole 09. The elevation represents the single location which has not been sampled and identified with petroleum odor in the field. Based on review of soils associated with boreholes 06 and 07, concentrations of petroleum above site-specific cleanup levels are not expected to be present within borehole 09. However, the general location is anticipated to be sampled and analyzed during monitoring well installation activities.

A source associated with the presence of kerosene range hydrocarbons within site soils has not been identified. While kerosene range hydrocarbon concentrations are well below MTCA Method A and B cleanup levels, suggests the presence of an offsite source or former onsite source of petroleum. Additional historic research for the facility parcels and offsite parcels should be completed to facilitate identification of additional suspect sources of environmental impact.

To date, groundwater sampling under the site-specific SAP/QAPP has not been completed due to encountered conditions of previously installed onsite monitoring wells. Repair and installation of additional monitoring wells is scheduled to be completed to facilitate groundwater sampling and characterization activities.

10.0 CONCEPTUAL SITE MODEL

A conceptual site model will be prepared following receipt of results for groundwater sample collection and analysis.

11.0 TERRESTRIAL ECOLOGICAL EVALUATION

A Terrestrial Ecological Evolution will be prepared following receipt of results for groundwater sample collection and analysis.

12.0 CONCLUSIONS

The site-specific project objectives for the in-progress investigation include the following as presented in Section 3.0:

- Determine the extents of residual petroleum contamination in site soils
- Evaluate groundwater for the presence of free product
- Determine the extents of residual contamination in site groundwater

The investigation was designed to address the three objectives and provide sufficient site data to facilitate remedial alternatives review, selection, and design.

To date, investigation activities have addressed two of the three project objectives including determining the extents of residual impact to site soils and determining the absence or presence of free product on site groundwater.

12.1 Extents of Residual Petroleum Contaminated Soils

Remedial site activities completed in 1998 included excavation and offsite disposal of approximately 412 cubic yards of petroleum impacted soils from beneath the former fueling island and current UST location.

Results of the soil investigation activities identified residual concentrations of gasoline range hydrocarbons above MTCA Method A cleanup levels at depths ranging from 15 to 20-feet bgs within borehole locations 06 and 07. The borehole locations 06 and 07 are located adjacent to the former fueling island and established source of petroleum release.

Soils collected from borehole locations 01 through 05 and 08 through 11, identified concentrations of petroleum range hydrocarbons either to be not present at method detection limits or where detected, well below MTCA cleanup levels. Based on field observations, Fulcrum recommends collection of soils from 17.5-feet bgs within borehole location 09 during monitoring well installation activities.
Evaluation of constituent concentrations against calculated site-specific MTCA Method B cleanup values suggests that residual constituent concentrations are below the Method B cleanup level for protection of human health through direct contact pathways.

However, due to the site-specific calculated Method B pathway for protection of groundwater, groundwater monitoring is required to meet MTCA regulatory criteria.

12.2 Absence or Presence of Free Product on Site Groundwater

Results of the soil sampling event and the limited initial groundwater sampling event did not identify the presence of free product on site groundwater. However, additional evaluation is appropriate to confirm this conclusion.

12.3 Extents of Residual Petroleum Contaminated Groundwater

To date, groundwater sampling has not been completed under the site-specific SAP/QAPP. As such, Fulcrum recommends, and has scheduled, installation of additional groundwater monitoring wells to establish the extents of residual contaminated groundwater. Additionally, repair of select previously installed monitoring wells is necessary to meet project requirements.

13.0 LIMITATIONS

Fulcrum Environmental Consulting, Inc. has performed professional services in accordance with generally accepted professional consulting principles and practices. No other warranty, expressed or implied, is made. The conclusions and recommendations are based upon our field observations, field screening, and independent laboratory analysis. The scope of services for this project is limited to the investigation of the identified localized release area.

Oversight services included observation of excavated areas, site investigation, and sample collection. Excavation activities were not included within Fulcrum's scope of services. Fulcrum makes no warranties expressed or implied as to the accuracy or completeness of other's work included or referenced herein, nor the use of segregated portions of this report. This document does not imply that the property is free of other environmental concerns. This report is solely for the use and information of our client. Any reliance on this report by a third party is at that party's sole risk.

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14.0 REFERENCES

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