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T E C H N I C A L M E M O R A N D U M

TO: Steve Teel – Washington State Department of Ecology

cc: Jerry Eide – CHS Inc.
William Joyce – Joyce Ziker Partners, PLLC
Stephanie Weir – Joyce Ziker Partners, PLLC

FROM: Tracey Mulhern, L.G., Associate Geologist

DATE: August 3, 2020

RE: **REVISED HIGH RESOLUTION SITE CHARACTERIZATION**
CENEX/GRANGE SUPPLY SITE
CHEHALIS, WASHINGTON
FARALLON PN: 301-002

Farallon Consulting, L.L.C. (Farallon) has prepared this Technical Memorandum on behalf of CHS Inc. (CHS) (formerly Cenex Harvest States Cooperatives) to describe the additional site characterization work planned for the Cenex/Grange Supply facility at 153 Northwest State Avenue (formerly 201 State Street) in Chehalis, Washington. A Site Vicinity Map depicting the geographical location of the Cenex/Grange Supply facility is provided on Figures 1.

As defined under the Washington State Model Toxics Control Act Cleanup Regulation (MTCA) and Section 020(4) of Chapter 70.105D of the Revised Code of Washington (RCW 70.105.020[4]), a "site" includes all areas where hazardous substances associated with historical use of a property have come to be located. Based on the extent of contamination defined in previous investigations, the site as it relates to the 153 Northwest State Avenue property consists of Lewis County Tax Parcel Nos. 003711000000 (northern CHS parcel) and 003717001000 (southern CHS parcel); the eastern portion of Lewis County Tax Parcel No. 004870001000; a portion of Tacoma Rail railroad tracks owned by the City of Tacoma (Parcel No. 004870003000); and a portion of the City of Chehalis Northwest Center Street right-of-way (collectively referred to herein as the Site) (Figure 2).

BACKGROUND

The Site is under Agreed Order No. DE00 TCPSR-713 entered into by the Washington State Department of Ecology (Ecology) and Cenex Harvest States Cooperatives on November 11, 2000 for a cleanup action (Agreed Order). At the request of Ecology, a new Agreed Order[1] is planned for the Site to address contamination remaining in soil and groundwater. Subsurface investigations were conducted at the Site between 2010 and 2016 to characterize the nature and extent of constituents of concern (COCs) in soil and groundwater at the Site under the existing Agreed Order. Results from the subsurface investigations indicated that the nature and extent of COCs in soil and groundwater had been adequately characterized. However, COC concentrations in groundwater in the area of monitoring well MW-28 have continued to greatly exceed Site-specific and current MTCA Method A cleanup levels. Before exploring and/or implementing alternative pilot-scale cleanup technologies for the Site, additional characterization of the area adjacent to and south of monitoring well MW-28, in the area of the operating fuel dispensers and piping, is planned. The additional characterization will aid in evaluating whether the continued high concentrations of COCs detected in groundwater samples collected from monitoring well MW-28 are from residual contamination or from an ongoing source (i.e., current leaks from the operating fuel dispensers and piping). Future cleanup efforts likely would be unsuccessful if an ongoing source of contamination is present at the Site.

High resolution site characterization (HRSC) methods using membrane interface hydraulic profiling (MiHPT) and ultraviolet optical screening tool (UVOST) technologies are planned at the Site to characterize the nature and extent of COCs in the area of monitoring well MW-28.

HRSC SUBSURFACE INVESTIGATION

The following sections provide a description of the HRSC subsurface investigation purpose and scope of work.

PURPOSE

The purpose of the HRSC subsurface investigation is to collect sufficient information to fully characterize the nature and extent of COCs in soil in the vicinity and up-gradient of monitoring well MW-28. The data collected also will be used to evaluate whether the concentrations of COCs detected in groundwater samples collected from monitoring well MW-28 that continue to greatly exceed Site-specific and current MTCA Method A cleanup levels are from historic releases from former Tank Area A or from an ongoing leak from the active underground storage tank (UST) fuel dispensers and piping.

[1] Letter regarding Need for Additional Groundwater Monitoring Wells and New Agreed Order, Grange Supply/Cenex Supply and Marketing, Inc., 201 State Street, Chehalis, Washington dated August 18, 2009, from Mr. Steve Teel of Ecology to Mr. Jerry Eide of CHS.

SCOPE OF WORK

The following section presents the details of the proposed HRSC subsurface investigation, including a description of the underground utility location and direct-push boring and data collection methods.

Underground Utility Location

Prior to conducting the HRSC subsurface investigation, a private utility location survey will be conducted at the Site in the vicinity of the fuel dispensers and piping using flexible tracer and/or ground-penetrating radar (GPR) technologies. The UST piping at the Site reportedly is contained in a larger-diameter outer piping that drains to sumps beneath each of the fuel pumps. If feasible, the utility location subcontractor will attempt to trace the location of the fuel piping by inserting a flexible tracer locating line into the outer piping. If tracing the fuel piping using a flexible tracer is not feasible, GPR will be used.

If the flexible tracer or GPR technologies are unsuccessful at locating the subsurface fuel piping, an air-knife and vacuum truck will be used to clear the boring locations to a depth of 5 feet below ground surface in the area of the fuel lines and dispensers and other suspected utilities prior to drilling activities.

Direct Push MiHPT and UVOST Borings

MiHPT and UVOST tools will be advanced using a direct-push drill rig. A total of approximately 30 borings will be advanced to depths of approximately 25 to 30 feet below ground surface at the Site. The borings will be located approximately 20 feet apart. The MiHPT borings will be completed first, followed by the UVOST borings, which will be offset approximately 3 to 5 feet from the MiHPT borings. Approximately 15 MiHPT borings will be completed in 3 transects running north-south, with approximately 5 borings in each transect. The UVOST borings will be completed next, focusing on areas where the real-time data from the MiHPT borings indicate the potential presence of light nonaqueous-phase liquid (LNAPL). The MiHPT and UVOST tools will be advanced at a constant rate of approximately 5 feet per minute with data recorded at 0.05-foot intervals from the ground surface to the bottom of the boring. If an apparent highly contaminated zone is encountered, the operator may pause the advancement of the tools once they are below the zone as necessary to allow the instruments to equilibrate before continuing the boring. The final location of each boring may be adjusted based on underground utility location results or other obstructions identified in the field. If real-time data from either the MiHPT or UVOST borings indicate the presence of contamination in the southernmost row of boings, additional borings may be advanced further to the south near the property boundary to delineate the extent of contamination. The approximate locations of the borings are provided on Figure 2.

Non-dedicated equipment will be decontaminated between borings using an Alconox and water wash and a distilled water rinse. A background blank sample will be analyzed before beginning each boring to check for the presence of contaminants.

The MiHPT tool provides relative concentrations of volatile organic compounds and soil permeability measurements. MiHPT borings will be advanced first in the area of known contamination, near monitoring well MW-28, and sequentially moved toward the up-gradient direction of groundwater flow (to the south), or where real-time data suggests the presence of contamination. Vertical profiles at each boring location will include the following data:

- Electrical conductivity – data can be used to characterize stratigraphy and potential contaminant preferential pathways when evaluated with the results of the other parameters measured. Increased electronic conductivity data can indicate the presence of finer-grained soil.
- Photoionization detector – detects total volatile organic compounds in parts per million in unsaturated soil.
- Flame ionization detector – detects hydrocarbons (total volatile organic compounds present) in parts per million.
- Hydraulic pressure – measures the pressure as water is pumped into the formation. Increasing pressure can indicate less permeable, finer-grained soil.
- Estimated hydraulic conductivity – values are calculated using hydraulic pressure data.

The UVOST tool is designed to delineate LNAPL in the subsurface from petroleum sources using laser-induced fluorescence. UVOST borings will be advanced first in the area of known contamination and/or where the data from the MiHPT investigation suggests the presence of contamination. Vertical profiles of each boring will include laser-induced fluorescence data, electrical conductivity data, and the rate of the UVOST probe advancement. The rate of probe advancement can indicate changes in lithology. The UVOST tool works to delineate LNAPL but not dissolved-phase hydrocarbons. Trace amounts of LNAPL periodically have been detected in monitoring well MW-28. The UVOST results will aid in evaluating whether LNAPL is present at the Site and if present, the vertical and lateral extent. LNAPL trapped in discontinuous lenses at the Site may be contributing to dissolved-phase petroleum hydrocarbon concentrations detected in groundwater samples collected from monitoring well MW-28.

The completed boring locations will be marked on a scaled map of the Site and surveyed using an Eos Arrow 100 GNSS hand-held global positioning system (GPS) device. The accuracy of the Eos Arrow GPS device varies based on satellite positions, atmospheric conditions such as clouds, and proximity to buildings and mountains. The accuracy of the Eos Arrow 100 GNSS GPS will be verified in the field to be 1 foot or less whenever possible. The global positioning system data will be used for potential 2D/3D modeling of the MiHPT and UVOST data collected at the Site. Completed borings will be abandoned with bentonite and the surface completed with asphalt or concrete to match the existing pavement.

Soil Sample Collection

Soil samples also will be collected for laboratory analysis from select locations to be used as a calibration tool for evaluating the HRSC data. Separate borings will be advanced following the

MiHPT and UVOST borings to facilitate the collection of soil samples. Three boings will be advanced at the Site using a direct-push drilling rig where real-time data indicates high, medium, and low concentrations of contamination are present. Soil samples will be collected continuously from the ground surface to the total depth of the boring at a depth of approximately 25 to 30 feet below ground surface. A minimum of two soil samples from each boring will be retained for laboratory analysis. The soil samples will be collected from depths that correspond to a range of high to low concentrations of contamination indicated by the HRSC data. During the advancement of the borings, the lithology will be logged in accordance with the Unified Soil Classification System and ASTM Standard D2488-06, *Standard Practice for Description and Identification of Soils*. Evidence of potential contamination such as elevated photoionization detector readings, unusual odor, discoloration, or sheen will be noted.

Soil samples collected from the borings will be collected and handled in accordance with the procedures listed below:

- Soil samples will be collected directly from the disposable sampling sleeve using either stainless steel or plastic sampling tools. Non-dedicated sampling equipment will be decontaminated between uses, as appropriate.
- The soil samples will be transferred immediately into laboratory-supplied sample containers. Samples analyzed for volatile organic compounds will be collected and prepared in accordance with U. S. Environmental Protection Agency Method 5035A protocols. Care will be taken not to handle the seal or inside cap of the container when the sample is placed into the container. The container will be filled to eliminate headspace (when applicable) and the seal/cap will be secured.
- The sample container will be labeled with the client name, project name and number, date and time sampled, sample identification, sampler's initials, analysis, and analyte preservative(s), if any.
- The sample will be logged on a Chain of Custody form and placed into a cooler at approximately 4 degrees Celsius for transport to the laboratory under chain-of-custody protocols.
- Disposable sampling and health and safety supplies and equipment will be discarded in an appropriate waste dumpster.
- The boring location will be determined relative to a landmark using a measuring tape or other measuring device and plotted on a scaled map and surveyed using an Eos Arrow 100 GNSS hand-held GPS device.

Soil samples collected from the borings will be analyzed for total petroleum hydrocarbons as diesel-range organics and as oil-range organics by Northwest Method NWTPH-Dx; total petroleum hydrocarbons as gasoline-range organics by Northwest Method NWTPH-Gx; and benzene, toluene, ethylbenzene, and xylenes by U.S. Environmental Protection Agency Method 8021.

Waste Disposal

Wastewater and soil generated during the installation of borings will be stored temporarily in labeled 55-gallon drums on the Site pending receipt of the analytical results for waste profiling. The wastewater and soil will be removed by a subcontractor and transported for proper disposal following completion of the profiling.

REPORTING

Following completion of the field activities and review of the data, Farallon will prepare a report to summarize the HRSC described herein and present the results. The report will include the following:

- A description of the HRSC subsurface investigation activities;
- A summary of the MiHPT and UVOST boring logs and results;
- A summary of the laboratory analytical results;
- Figures depicting the boring locations and results; and
- Conclusions regarding the findings of the HRSC subsurface investigation activities.

SCHEDULE OF IMPLEMENTATION

Field work for the HRSC will be completed within approximately 1 month of the approval of this Technical Memorandum. The schedule may be adjusted based on availability of the drilling and utility location companies. The utility locate will be completed first, followed by air-knife clearing of boring locations where necessary. The HRSC direct-push drilling activities will be conducted over a 3- to 5-day period. A report summarizing the HRSC results will be completed in approximately 45 business days following receipt of final data.

Attachments: Figure 1, *Site Vicinity Map*
Figure 2, *Site Plan and Proposed Boring Locations*

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FIGURES

REVISED HIGH RESOLUTION SITE CHARACTERIZATION
Cenex/Grange Supply Site
Chehalis, Washington

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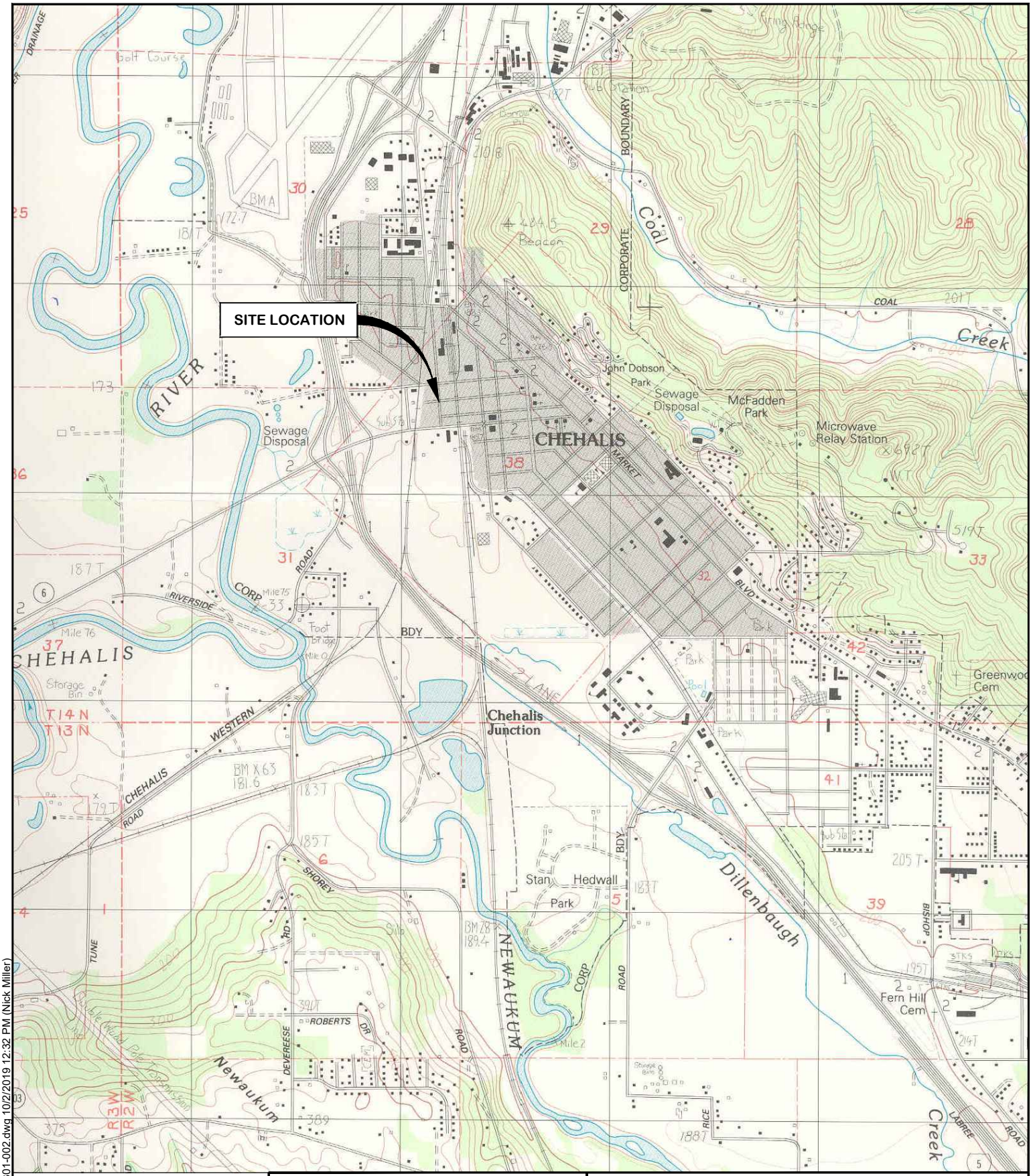

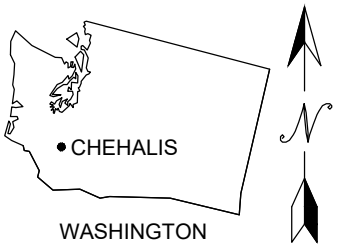

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FIGURE 1

SITE VICINITY MAP
CENEX/GRANGE SUPPLY SITE
CHEHALIS, WASHINGTON

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Drawn By: NM | Checked By: TM | Date: 10/02/2019 | Disk Reference: 301-002

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NORTHWEST PRINDLE STREET

NORTHWEST STATE AVENUE

NORTHWEST CENTER STREET

WINFIELD SOLUTIONS LLC
#003726002000

#004870003000
CITY OF TACOMA

#003709000000
RESIDENCE

#0037080020000
RESIDENCE

#003705001001
RESIDENCE

#003711000000
CHS INC.

#003705000000
PORT OF CHEHALIS

#003710000000
RESIDENCE

#003706001000
RESIDENCE

PROPANE

FORMER TANK AREA C

MW-30
MW-25
MW-21
MW-3
MW-12
MW-29
MW-8
MW-27
MW-31
MW-24
MW-22
MW-10
MW-26
MW-20
MW-9
MW-28
MW-23
MW-5
MW-103

SVE-3
SVE-2
SVE-1
MW-1
AS-3
AS-2
AS-1
SVE-5
SVE-4

FORMER TANK AREA A

OVERHEAD
FUELING
RACK

EXISTING
TANK PAD

CURRENT
USTs

FORMER TANK AREA B

FUEL CANOPY

#003717001000
CHS INC.

#004870001000
PCF ACQUISITION CO. LLC

#003721001000
PCF ACQUISITION CO. LLC

LEGEND

- CHS INC. PROPERTY BOUNDARY
- APPROXIMATE EXCAVATION AREA
- PARCEL BOUNDARY
- TRAIN TRACKS
- APPROXIMATE LOCATION OF FUEL LINES
- FUEL DISPENSER
- MW-23 MONITORING WELL
- MW-103 PCF ACQUISITION CO. LLC MONITORING WELL (NOT INCLUDED IN QUARTERLY MONITORING PROGRAM)
- AS-2 AIR SPARGE WELL
- SVE-2 SOIL VAPOR EXTRACTION WELL
- APPROXIMATE LOCATION OF PROPOSED BORINGS
- APPROXIMATE LOCATION OF PROPOSED ADDITIONAL BORINGS (AS NEEDED)

ALL LOCATIONS ARE APPROXIMATE

0 40
SCALE IN FEET

FIGURES WERE PRODUCED IN COLOR. GRAYSCALE COPIES MAY NOT REPRODUCE ALL ORIGINAL INFORMATION

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FIGURE 2

SITE PLAN AND PROPOSED BORING LOCATIONS
CENEX/GRANGE SUPPLY SITE
CEHALLIS, WASHINGTON

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