



## TECHNICAL MEMORANDUM

To: Washington State Department of Ecology  
From: Craig Hultgren, LHG  
Date: August 10, 2020  
Subject: Addendum to the 2019 O&M Monitoring Report – Modifications to Site Monitoring

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### INTRODUCTION

This technical memorandum has been prepared to outline proposed modifications to operations and maintenance (O&M) monitoring and future groundwater monitoring at the Coleman Oil facility in Wenatchee, Washington (Figure 1). Planned upgrades to the Site's groundwater treatment system have been completed. The new system recirculates treated water into sumps located in the uplands area of the Site instead of discharging it into the City of Wenatchee's sanitary sewer system. Same as the previous system, petroleum contaminated water is collected from 9 pumping wells (MW09R, MW10R, BH01R, MW17, MW24, MW28, MW29, MW30, and MW32) and treated using granular activated carbon (GAC). The treated water is temporarily placed into the storage tanks located in Tank Farm A. The treated water is enriched with oxygen using hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) and then discharged into one or more of the sumps that have been placed in the uplands area during remedial excavations in 2017 and 2019. This creates a closed loop system designed to enhance the biologic degradation of residual hydrocarbons at the Site. The new treatment system has been automated and will require less manpower to operate and maintain.

HydroCon plans to modify some of the Site monitoring based on the capabilities of the new remediation system as well as a response to improved Site conditions due to remedial interim actions taken at the Site. These modifications will be implemented after the construction of the recirculation system. A discussion of these modifications is provided below.

### O&M MONITORING

#### Product Recovery

O&M monitoring has been conducted at the Site since the initial emergency response actions took place after the release of R99 biodiesel occurred in March 2017. Initially a groundwater extraction and treatment system were constructed following the installation of six recovery sumps within the remedial excavation performed in 2017. Water and product extracted from the sumps was routed to an oil/water separator (OWS) to remove product and then treated with GAC prior to discharge into the City of Wenatchee's sanitary sewer system. Additionally, product recovery from wells MW-6, MW-8, MW-9, MW-10, MW-11, BH-1 and BH-2 was done primarily through passive means utilizing hydrophobic socks placed at the groundwater interface in the wells.



In May 2018 HydroCon constructed a new groundwater extraction and treatment system. Active pumping began at wells MW-9, MW-10 and BH-1. The OWS servicing the sumps was taken out of service in late May 2018 and separate OWSs were installed for water being pumped from MW-9, MW-10 and BH-1.

On July 10, 2018, top loading pumps were installed in these wells and BH-1 to recover product and maintain water levels at summer time levels. In August 2018 monitoring wells MW-9 and MW-10 were deepened and enlarged to 4-inch diameter wells and renamed MW09R and MW10R, respectively. In October 2018, the remedial system was expanded to include monitoring wells MW24, MW28, MW29, and MW30. On January 10, 2019 monitoring well BH-1 was deepened, enlarged to 4-inch diameter, and renamed BH01R. On January 11, 2019 wells BH01R, MW17, and MW32 were added to the remediation system. This expansion constitutes the current configuration of the treatment system at Tank Farm A.

A significant decreasing trend in product recovery has been observed at the Site.

- 2017 349.78 gallons
- 2018 99.56 gallons
- 2019 5.13 gallons
- 2020 (through May 21) 0.62 gallons
- The last time product was recovered in the Columbia River was August 29, 2018.

Based on these numbers, it is apparent that the majority of recoverable product has been removed from the Site to the maximum extent practical. Since the amount of product recovery has been reduced to such a small volume and the recirculation system will be automated, HydroCon will discontinue measuring product recovery. It should be noted that the new treatment system will have the same capacity to recover product as it has in the past.

### Surface Water Level and Sheen Monitoring on the Columbia River

River levels are measured relative to a mark on a staff gauge set in the river in the area of observed sheen. The elevation of the mark was surveyed relative to the staff gauge. The staff gauge location is shown on Figure 2 and marked at an elevation of 619.36 feet above mean sea level (amsl). The staff gauge was installed to provide a local reference point for river level elevations. Therefore, a water level reading of -7 inches below the top of the gauge (618.6 feet amsl) would be slightly above SL02. Any water level equal to or higher than -7 inches below the top of the gauge would indicate the river level is equal to or higher than one or more of the seeps.

A correlation of the water level of the Columbia River to sheen occurrence has been observed at the Site. When the water level in the River reaches an elevation equal to or greater than the elevation of one or more of the seeps a sheen has often (but not always) been observed. The elevation of the seeps in the river are as follows:

- SL01 = 618.70 feet amsl



- SL02 = 618.57 feet amsl
- SL03 = 619.11 feet amsl
- SL04 = 618.84 feet amsl

HydroCon prepared a field form (River Level and Sheen Assessment Form) to document the River level; the River elevation to compare with seep elevations; water levels in the Site monitoring wells to compare with pump settings; and sheen observations. This field form (Attachment A) will be used for all future monitoring.

As stated above, the recirculation system will be automated which will result in a diminished onsite presence of manpower to obtain water level readings in the Columbia River as well as the Site monitoring wells. A camera has been installed to observe the river levels and the presence/absence of hydrocarbon sheen. HydroCon will add markings to the staff gauge in the top portion which is at equal or higher elevations than the seeps. These markings are intended to be seen by the camera so the observer will be able to tell if the river level is equal to or higher than the seeps. This will alert the observer to pay special attention to the river for the presence of a sheen.

Future water level monitoring in the pumping wells will continue on a daily basis after the recirculation system is installed. The perched aquifer will respond (rise) in response to the application of the treated water. It is likely that some residual contamination will be driven into solution by this process. The benefit of this reaction is that it will make the contamination more readily available for biologic degradation as well as capture in the extraction wells. The concern for mobilizing contamination is that it could find its way into the River. In order to prepare for this potential scenario HydroCon recommends that the booms stay in the River for at least the first year of operating the recirculation system. Even though there has not been any product recovered in the River in almost 2 years it provides a safeguard that will protect the River, if necessary.

It is anticipated that routine water level monitoring in the pumping wells will be performed on a reduced frequency (weekly to monthly basis) once the effects of water recirculation are understood. HydroCon recommends adjusting the frequency of water level monitoring and River level monitoring on a seasonal basis afterwards. An increased frequency in water level monitoring in the wells and River is recommended during the Spring melt when the River levels are at the highest (typically late April to July).

### Maintain and Operate the Recirculation System

Even though the recirculation will be automated, routine inspection and maintenance of equipment, fittings, and replenishment of hydrogen peroxide stock will be necessary. A camera will be placed in Tank Farm A to observe the storage tanks, carbon units, and oil/water separators. Routine inspections will be conducted by Coleman Oil personnel to ensure the system is operational and working within optimal performance criteria.



Routine maintenance of the extraction pumps in the wells including removal of scaling and accumulated biologic material will be done every 6 months using a pressure washer. The hydrogen peroxide metering pump diaphragm will be inspected and replaced, as necessary. The piping will be inspected for cracks, leaks, and freezing conditions. The carbon in GAC vessels will be changed out as needed. The oil/water separators will be cleaned once a year by pressure washing. The sumps will be inspected quarterly and cleaned using a pressure water, as necessary. Coleman Oil personnel will document all maintenance activity in a log book.

## FUTURE GROUNDWATER MONITORING

A total of 38 wells are currently located at the Site. A discussion of the use of these wells is provided below.

### Water Level Monitoring

Water level monitoring is performed prior to performing groundwater monitoring events. The remediation system is turned off a minimum of 2 days prior to collecting static water level measurements. Groundwater elevations are calculated from this data set and groundwater elevation contour plots are created to illustrate the direction of groundwater flow. HydroCon recommends that all of the wells at the Site continues to be used for water level monitoring.

Water and product level monitoring is also performed on a routine basis at the pumping wells to assess the presence of free product and if the pumps are working properly. Water levels collected during these events are compared to the pump settings which have been set at specific depths to control water levels (hydraulic capture). If the depth of water in a well is higher than the pump setting it indicates that the pump is not working property and requires maintenance. This information is recorded on the River Level and Sheen Assessment Form (Attachment A).

### Groundwater Monitoring

Twenty-nine wells have been included in recent groundwater monitoring at the Site. As previously documented, nine wells are not monitored due to improper well construction (MW-1 through MW-5), redundant location (MW-7), located outside the defined Site boundary (MW-22), or have insufficient water to sample (MW15 and MW18).

The frequency of groundwater monitoring at the Site has been on a quarterly to biannual basis since April 2017. Once the recirculation system is in operation it is anticipated that the increased oxygen content in the perched aquifer being monitored will simulate biodegradation of the remaining petroleum hydrocarbons. This process will likely take several years before the concentration of all contaminants of concern (COCs) remain below their respective MTCA Method A cleanup levels at all wells being monitored. Taking this into consideration, HydroCon proposes to perform recirculation system performance groundwater monitoring at selected wells on a semiannual basis until all COCs are below



their respective CULs at all wells. This sampling will be adjusted each year so that different seasons are monitored (e.g., Spring and Fall one year followed by Summer and Winter the next, etc.). Once all COCs have been reduced below their respective CULs at all wells being monitored HydroCon will transition to compliance groundwater monitoring. This monitoring will be performed on a quarterly basis until 4 consecutive quarters of all wells being sampled remain below the CULs is achieved.

During the quarterly compliance groundwater monitoring, one sampling event will include comprehensive sampling. This event will include collecting groundwater samples at all the site monitoring wells to verify that site conditions have not changed.

One final recommendation is modification of the number of wells to monitor at the Site. Monitoring wells were placed throughout the Site as part of the remedial investigation. These wells served as groundwater monitoring points to assess the lateral extent of contamination as well as groundwater extraction points to remediate areas that were known to contain free product and high concentrations of dissolved phase hydrocarbons. The effects of the groundwater treatment system, remedial excavations, and time have reduced the contamination footprint. Based on our current understanding of groundwater contamination, HydroCon proposes to utilize the following monitoring wells for future groundwater compliance monitoring points shown on Figure 3:

#### 9 Pumping wells

- MW09R
- MW10R
- BH01R
- MW17
- MW24
- MW28
- MW29
- MW30
- MW32

#### 8 Monitoring wells

- MW-6
- MW-8
- MW-11
- MW13R
- MW14
- MW20
- MW21
- BH-2

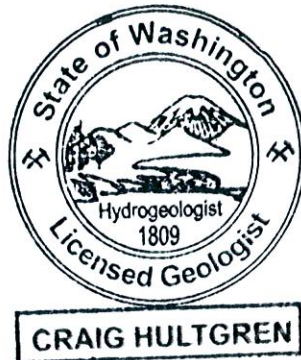
Analytical protocols will remain the same as the previous sampling events including 3 blind duplicates and a trip blank for quality control and the following laboratory analyses:

- GRPH using Method NWTPH-Gx.
- DRPH and ORPH using Method NWTPH-Dx.
- BTEX using EPA Method 8260C.

HydroCon will measure the following groundwater parameters during purging and sampling and record them on Groundwater Sample Collection Forms:

- Temperature
- Specific conductivity
- pH
- Dissolved oxygen
- Oxidation reduction potential
- Turbidity

Sincerely,



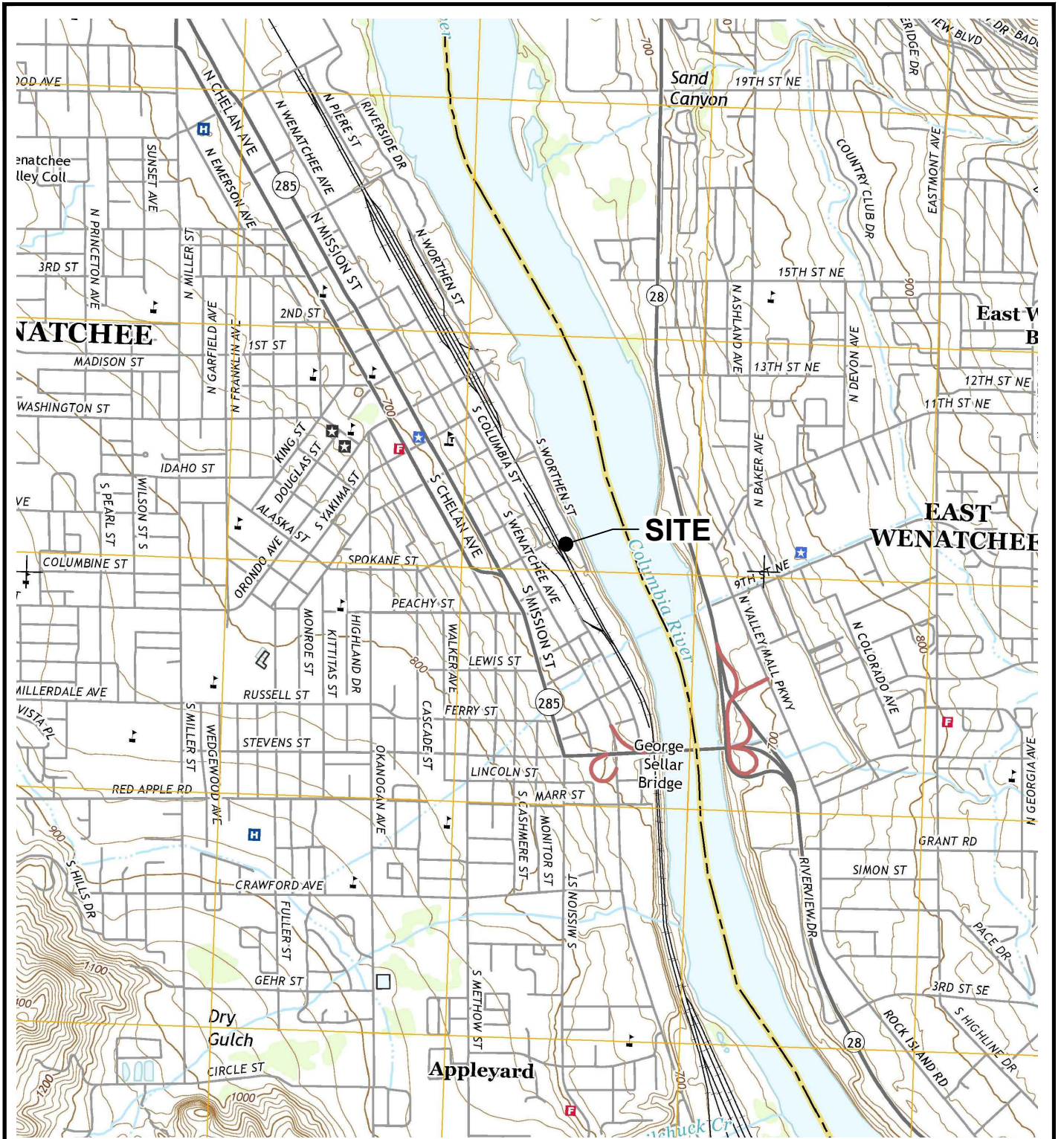
**Figures**

- Figure 1 - Site Location Map
- Figure 2 - Site Features
- Figure 3 - Proposed Compliance Point Monitoring Wells

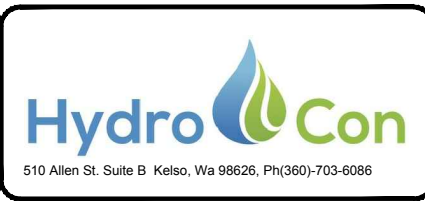
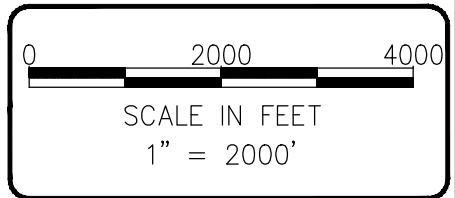
**Attachments**

- Attachment A – River Level and Sheen Assessment Form

## FIGURES



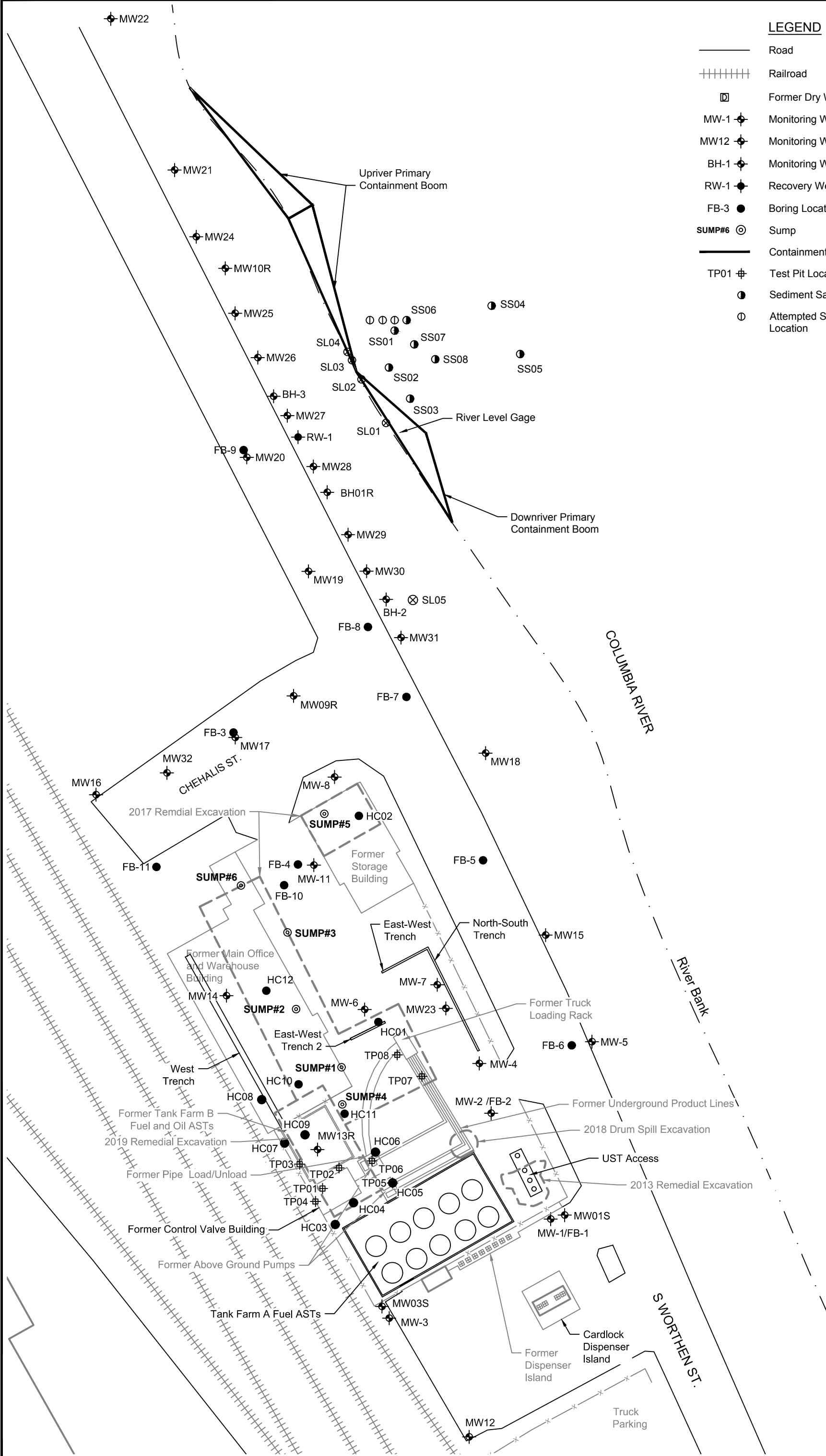
**NOTE(S):**  
 USGS, WENATCHEE QUADRANGLE  
 WASHINGTON  
 7.5 MINUTE SERIES (TOPOGRAPHIC)



DATE: 10-18-18  
 DWN: JJT  
 CHK: RH  
 APPROVED: RH  
 PRJ. MGR: CH  
 PROJECT NO:  
 2017-074

**FIGURE 1**  
 SITE LOCATION MAP  
 COLEMAN OIL COMPANY  
 3 CHEHALIS ST.  
 WENATCHEE, WA.



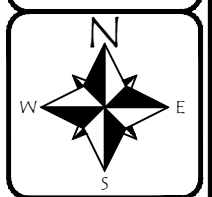
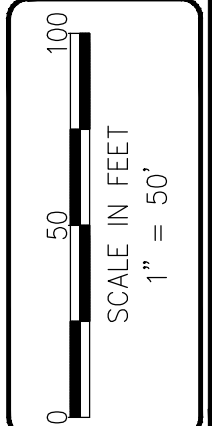


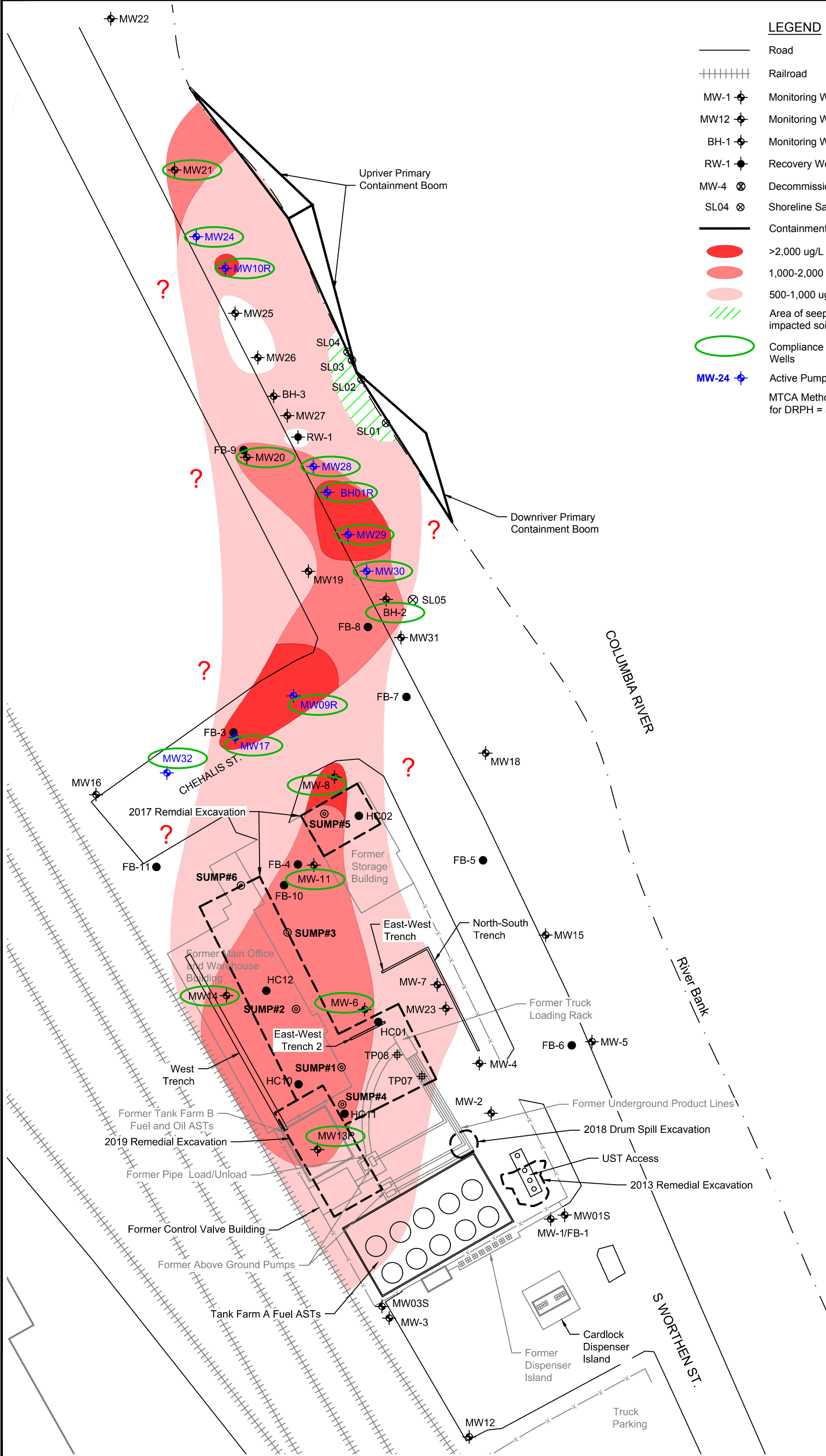
**LEGEND**

- Road
- +++++ Railroad
- Former Dry Well
- MW-1 Monitoring Well (FARALLON)
- MW12 Monitoring Well (HydroCon)
- BH-1 Monitoring Well (EPI, 2017)
- RW-1 Recovery Well (FARALLON)
- Boring Locations
- SUMP#6 Sump
- Containment Booms
- TP01 Test Pit Locations
- Sediment Sample Locations
- Attempted Sediment Sample Location

FIGURE 2  
 SITE FEATURES  
 COLEMAN OIL COMPANY  
 3 CHEHALIS ST.  
 WENATCHEE, WA.

DATE: 1-10-20  
 DWN: JJT  
 CHK: CH  
 APPROVED: CH  
 PRJ MGR: CH  
 PROJECT NO:  
 2017-074

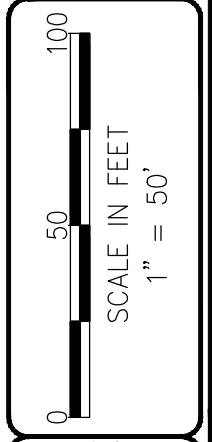




- LEGEND**
- Road
  - +++++ Railroad
  - MW-1 Monitoring Well (FARALLON)
  - MW12 Monitoring Well (HydroCon)
  - BH-1 Monitoring Well (EPI, 2017)
  - RW-1 Recovery Well (FARALLON)
  - MW-4 Decommissioned Wells
  - SL04 Shoreline Sample Locations
  - Containment Booms
  - Red Oval >2,000 ug/L
  - Light Red Oval 1,000-2,000 ug/L
  - Very Light Red Oval 500-1,000 ug/L
  - Green Hatched Area Area of seeps in contact with impacted soil
  - Green Oval Compliance Point Monitoring Wells
  - MW-24 Active Pumping Monitoring Well
  - MTCA Method A Cleanup Level for DRPH = 500 ug/L

FIGURE 3  
 PROPOSED COMPLIANCE POINT  
 MONITORING WELLS  
 COLEMAN OIL COMPANY  
 3 CHEHALIS ST.  
 WENATCHEE, WA.

DATE: 5-26-20  
 DWN: JJT  
 CHK: CH  
 APPROVED: CH  
 PRJ MGR: CH  
 PROJECT NO:  
 2017-074



**ATTACHMENT A**

**RIVER LEVEL AND SHEEN ASSESSMENT FORM**



# River Level and Sheen Assessment

360.703.6079 / Fax 360.703.6086	Coleman Oil Company - R99 Biodiesel Investigation	Date:
314 West 15th St., Suite 300, Vancouver, WA		<b>EXAMPLE</b>
Prepared By:	Agreed Order Number DE 15389	Page:
<b>Engineer</b>		1 of 1

## DESCRIPTION OF SHEEN

**NO SHEEN**

Location:

Magnitude:

Description:

### Groundwater/Product Extraction System

On or OFF? **System is On**

Last time it was turned off? **Quarterly GW Sampling Event at end of March 2020**

### Drawdown Level Set at Pumping Wells

MW10R: 27'	MW09R: 28'	BH01R: 34'
MW24: 27'	MW17: 25'	MW29: 33'
MW28: 33'	MW32: 28'	MW30: 33'

### Actual Depth to Water at Pumping Wells

MW10R: 27.44	MW09R: 28.20	BH01R: 39.62	water level is higher than pump setting
MW24: 26.89	MW17: 25.65	MW29: 33.20	
MW28: 32.89	MW32: 28.34	MW30: 32.78	

Note:

### Elevation of Columbia River and Seeps

River Gauge Elevation:	619.36	<b>Seeps</b>
River Level:	-11"	<b>SL01: 618.70</b>
Note: A negative number indicates the water level is ABOVE the top of the River gauge.		<b>SL02: 618.57</b>
Columbia River Elevation:	<b>620.27</b>	<b>SL03: 619.11</b>
		<b>SL04: 618.84</b>

**Assessment:** **The elevation of the river is higher than the 4 seeps.**