INVESTIGATION AND RESPONSE PLAN
SWMU 1 - OILY WATER SEWER
HOLLYFRONTIER PUGET SOUND REFINERY

Prepared for:

Industrial Section
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1.0 INTRODUCTION

This Investigation and Response Plan (Plan) was prepared by HollyFrontier[1] Puget Sound Refining, LLC (HFPSR) in accordance with the requirements in Agreed Order No. DE 16298 (AO). The specific requirements for this Plan are listed in Section VII.A of the AO. This Plan describes future measures to investigate the Oily Water Sewer (OWS) and respond to releases or threatened releases, if any, discovered during the investigation.

The purpose of the Agreed Order is provided on Page 3 of the AO:

"*This Order requires HollyFrontier (formerly Shell) to conduct an interim action at the Oily Water Sewer (OWS) that includes the inspection of all major trunk lines for releases or threatened releases, addressing the cause of the releases or threatened releases, and implementing interim remedial actions, if necessary, consistent with the requirements of the Model Toxics Control Act (MTCA), RCW 70.105D, and its implementing regulations at WAC 173-340, in order to ensure that there is no threat to human health due to direct contact exposure and to minimize the migration of contaminants. The interim action at the OWS also includes tracking and reporting of releases and financial assurance.*"

Per the AO Section VII.A:

"Investigation and Response Plan – Prepare a plan to investigate the OWS and develop a plan to respond to any releases or threatened releases from the OWS that are discovered during the investigation."

[1] HollyFrontier recently acquired Sinclair Oil Corporation, and the new corporate entity is named HF Sinclair. Throughout this document, references to HollyFrontier are subsumed by HF Sinclair.

2.0 SEWER INSPECTIONS

Per the AO, sewer inspection activities are required on major OWS trunk lines. The following presents HFPSR's proposed activities for conducting sewer inspections, including a summary of existing data collected to date.

2.1 EVALUATION AND USE OF EXISTING INSPECTION DATA

Prior to issuance of the AO, HFPSR implemented a sewer inspection and maintenance program with the goal of addressing sewer operational issues identified by refinery personnel. As part of this effort, sewer video inspections were completed on several major trunk lines. Those inspections and associated repairs completed will be evaluated to determine compliance with IRP requirements. Evaluation criteria include clear video evidence of the sewer pipe condition and activities completed after inspection, including sewer usage change and aboveground major load changes. After the evaluation is complete, data meeting IRP requirements will be incorporated into the release response project phase.

2.2 INSPECTION MAP AND SCHEDULE

Per the AO Section VII.A(1): *"The Investigation and Response Plan shall include: A proposed schedule and map showing the segments of the OWS that will be inspected each year."*

A map of the major OWS trunk lines is provided as Figure 1. Figure 1 also shows the proposed inspection schedule for the major trunk lines. The total length of the major trunk lines is an estimated 12,700 feet.

Unanticipated operational, safety, supply chain, or other issues may require modification of this schedule. Ecology will be notified of any schedule modifications in the annual report.

2.3 INSPECTION PROCEDURES

Per the AO Section VII.A(2): *"The Investigation and Response Plan shall include: The procedures that will be followed to inspect the internal integrity of all major trunk lines of the OWS (as depicted on the map in Exhibit A) over a 10-year cycle."*

Inspection procedures will follow standard industry protocols and good engineering practices. Specific inspection methods selected will depend on the nature of the sewer liquids (highly corrosive, toxic, and flammable), the continuous operation of the refinery and flow in the OWS, the depth to the OWS, and the risk to personnel from sewer gases. The inspection options presented in Section 2.4, including hydrostatic testing, video inspection, smoke testing, use of tracers, electro scan leak detection, a combination of these methods, or an equivalent method, are all standard industry practices for implementation.

The refinery anticipates video inspection to be the predominate inspection method. To conduct video inspections, sewers must be cleaned prior to inspection using high pressure water or other methods to flush solids from the sewer lines. The solids are typically removed using vacuum trucks. Bypassing sewer lines may be necessary to allow the video camera to fully inspect the internal integrity of the lines as the normal sewer flow is pumped around the sewer segment being inspected. Bypassing involves temporarily blocking the sewer flow using a plug or other means and pumping the oily water through temporary pipes to a downstream location.

Plant operating conditions and weather (particularly high precipitation events) may impact sewer inspection and bypass operations. Bypass operations must be carefully planned and monitored to minimize potential impacts to the inspection schedule and to ensure a safe working environment for inspection staff. If sewers are unable to be safely bypassed and video inspection is not possible, an alternate inspection methodology will be evaluated.

2.4 INSPECTION METHODS

Per the AO Section VII.A(3): *"The Investigation and Response Plan shall include: The method(s) that will be used to assess the internal integrity of the major trunk lines of the OWS. The integrity assessment must include hydrostatic testing, camera, use of tracers, a combination of these methods, or an equivalent method approved by Ecology capable of*

assessing the integrity of the system and identifying areas where releases may have occurred or are ongoing. The method(s) used to assess sewer integrity shall be appropriate for the type of pipe and shall follow standard industry protocols and good engineering practices."

The internal integrity of the OWS trunk lines shown on Figure 1 will be evaluated by inspecting the OWS using hydrostatic testing, video inspection, smoke testing, use of tracers, electro scan leak detection, a combination of these methods, or an equivalent method. The inspection data will be gathered to capture conditions within the pipe in a consistent and reliable manner. For video assessment inspections, sewer defects will be accurately coded and assigned a condition grade in accordance with the National Association of Sewer Service Companies (NASSCO) Pipeline Assessment Certification Program (PACP). As noted in Section 2.1, existing inspection data from previously completed inspections will be evaluated for usability based on that data's ability to meet or otherwise satisfy the criteria for inspection presented here.

3.0 RESPONSE TO POTENTIAL RELEASES AND SITE CHARACTERIZATION

Per the AO Section VII.A(4): *"The Investigation and Response Plan shall include: Where the integrity testing identifies potential leaks in the OWS, procedures for determining whether a release to the environment has occurred."*

If a potential release is identified during the sewer inspection, site characterization will be initiated to investigate the nature of the release as well as the horizontal and vertical extent of the release. Should multiple potential releases occur in close proximity to each other, the potential releases may be grouped together when the site characterization is conducted. A potential release is a sewer defect indicating the sewer has failed (i.e., sewers with a hole, collapsed pipe, completely separated joints, or missing pipe walls with visible soil) resulting in the potential for contaminants to be released from the OWS into soil and/or groundwater.

Site characterization activities will be conducted in accordance with WAC 173-340-350 (6) and (7) and Ecology's Guidance for Remediation of Petroleum Contaminated Sites (Publication 10-09-057) (Guidance). Site characterization will include the collection of soil samples to determine whether the soil contains constituents of concern (COCs) at concentrations exceeding the target cleanup levels specified in Section 3.4 of this Plan. Samples will be collected in close proximity (as allowed by site conditions) to the identified potential release location. Soil samples may be collected from a test pit or soil boring.

The site characterization investigation may also include other methods for determining whether a leak has occurred, including soil gas surveys, ground penetrating radar investigations, or infrared energy pattern analysis. The following provides additional details regarding soil and groundwater site investigation efforts.

3.1 SOIL INVESTIGATION

Per the AO Section VII.A(7): *"The Investigation and Response Plan shall include: Procedures for determining the nature and extent of soil contamination related to releases from the OWS in accordance with WAC 173-340-350(6) and (7) and Ecology's Guidance for*

Remediation of Petroleum Contaminated Sites, 2016, Publication No. 10-09-057 and the proposed schedule for implementing these procedures. Ecology may later approve changes to the schedule for individual releases."

Soil investigations will adequately characterize the horizontal and vertical distribution and concentrations of COCs due to releases from the OWS. Investigation procedures will ensure sampling activities are conducted safely and minimize damage to the in-situ pipe. Pipe and associated bedding disturbance increase the potential for future pipe damage and associated releases. Sewer defects, including large holes and collapsed pipes, not only impact the environment but can be a safety hazards for potential aboveground collapsed soils and structures. As such, the investigation schedule will be tailored to the defect severity and increased potential for environmental impact.

Soil sample locations will represent conditions at the identified defect location. Sampling will be conducted as near to the defect as possible, without damaging the sewer pipe and without sampling gravel bedding. If gravel bedding is encountered, soil will be sampled adjacent to the bedding. Discrete sampling will be conducted by way of hand tools, equipment excavation, or soil boring to a depth below the bottom of the pipe or structure near an identified defect. Soil samples will be field screen for evidence of petroleum using field screening methods described in Section 5.3 of the Guidance. The soil samples will be collected from the most concentrated area of the release and transferred from the sample tool and placed into the appropriate laboratory containers. The sample locations, including measured distance away from the defect, will be documented.

Sewer segments may have multiple defects occurring within close proximity. Should multiple defects occur, defects will be grouped to minimize redundant data collection. The grouping process will also consider the severity of defects and the proximity to other sampling locations. For a segment with two sampling locations in close proximity (i.e., approximately less than 30 feet apart in distance), the defect with the greatest severity will be sampled.

Site characterization will be scheduled on a prioritized basis, with less severe defects characterized after more severe defects. For more severe defects, inspection evidence may deem a potential release has occurred and repair may be warranted immediately to ensure the safety of the aboveground structures and to minimize impact to the environment. As such, a workplan will be prepared per Section 5.0 for severe

defects identified on an expedited schedule for repair. Investigation efforts will be documented in the annual report.

3.2 GROUNDWATER INVESTIGATION

Per the AO Section VII.A(8): *"The Investigation and Response Plan shall include: Methods for assessing whether or not groundwater has been impacted, including, but not limited to, the shallow uppermost aquifer. Groundwater quality shall be compared with the groundwater cleanup standards in WAC 173-340-720."*

Per AO Section VII.A(9): *"Procedures for implementation of a groundwater monitoring program when an impact to groundwater from an OWS release has been identified."*

Per AO Section VII.A(10): *"Procedures for determining the nature and extent of groundwater contamination from an OWS release in accordance with WAC 173-340-350(7) and Ecology's Guidance for Remediation of Petroleum Contaminated Sites, 2016, Publication No. 10-09-057 and the proposed schedule for implementing these procedures. Ecology may later approve changes to the schedule for individual releases."*

Should soil samples show evidence of a release extending beyond the localized area of the sewer failure, site conditions will be assessed to determine if the release impacted groundwater. The depth of the sewer pipe in relation to the understood geology/hydrogeology and the water table will be considered. For sewer segments in close proximity to groundwater with non-saturated soil, soil may be sampled for Synthetic Precipitation Leaching Procedure (SPLP) via EPA Method 1312 (or equivalent) to determine if a potential release has occurred to groundwater. Based on laboratory results from total soil analyses, SPLP analyses may be requested for specific target analytes to discern the adequacy of groundwater protection for a given area.

For sewer segments below the water table, a groundwater evaluation will be conducted when evidence of a potential release is observed. The groundwater evaluation may include installation of groundwater monitoring wells and/or the use of existing groundwater monitoring wells at the site. As noted in the Phase II RFI Work Plan for the OWS (KW Brown Environmental Services, 1992), where the sewer is located below the water table, hydraulic conditions favor the movement of groundwater into the sewer when the pipe is flowing partially full (versus contaminants flowing from the sewer into

groundwater). The sewer locally drains the shallow aquifer where failures are in the pipe. Any water entering the sewer is directed to the wastewater treatment plant. Conversely, if the sewer flows full (not normally expected), depending upon the hydraulic pressure, water could be forced out of the pipe through the failure into the surrounding bedding sand. The sewer system is generally constructed in the diamicton, which has moderately low permeability.

For soil saturated with groundwater and where site conditions allow, a reconnaissance temporary groundwater well may be installed in lieu of soil sampling. Soil disturbance near a sewer can cause additional defects and repair in the sewer due to the pressure changes in the soils. As such, the sewer pipe relative to the groundwater table, hydraulic pressures, and any other evidence of release, including using nearby groundwater well data, will be considered prior to well installation.

3.3 SAMPLING AND ANALYSIS PLAN

For each potential release, a sampling and analysis plan (SAP) consistent with the Guidance Table 6.4 will be completed[2]. The SAP will describe the number of soil samples to be collected, the depth and lateral extent of sample locations, the methods of sample collection, the COCs and laboratory analytical methods, and QA/QC procedures. The SAP will include contaminants known or suspected of being present in the wastewater conveyed by the specific section of oily water sewer piping, including "Other Site Contaminants" such as Per and Polyfluoroalkyl Substances (PFAS) if appropriate for the particular section of piping per the requirements of the Department of Ecology.

The SAP will describe the number of groundwater monitoring wells or sampling points to be installed, their approximate location(s), the depth of the screened portions of the wells, the methods of well development, the methods of groundwater sample collection, the schedule for groundwater sample collection, the COCs and laboratory analytical methods (per Tables 7.2 and 7.3 of the Guidance), and QA/QC procedures.

The SAP will ensure efforts adequately characterize the horizontal and vertical distribution of COCs in soil and/or the uppermost aquifer. The hydrogeology of the site will be investigated to determine groundwater flow rate and direction, which will allow for

[2] The SAP does not need to be submitted to Ecology for review and approval.

the preparation of a conceptual site model to be used in determining data gaps and the feasibility of remedial actions at the site.

During the site characterization, an investigation schedule will be created or updated to reflect the estimated time frame needed to assess and determine the nature and extent of affected groundwater, if appropriate. The schedule and the status of on-going investigations will be provided in the annual reports submitted to Ecology.

3.4 SITE CHARACTERIZATION LEVELS

For the purposes of this Plan, the MTCA Method C Cleanup Levels for soil (developed in accordance with WAC 173-340-745) and the MTCA Method A Cleanup Levels for groundwater (developed in accordance with WAC 173-340-720) will be considered the site characterization levels. Soil or groundwater contaminant concentrations discovered during this investigation which exceed the cleanup levels will be reported, mitigated, and/or remediated in accordance with the Interim Action requirements of Section VII.B of the AO.

3.5 CONSTITUENTS OF CONCERN

As specified in Section V.K of the AO, constituents of concern from the OWS include gasoline and diesel range total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylene (BTEX), polycyclic aromatic hydrocarbons (PAHs), and metals. The associated methods for the analytes to be sampled are shown below:

Gasoline Range TPH	NWTPH-Gx or VPH/EPH
Diesel Range TPH	NWTPH-Dx or VPH/EPH
BTEX	EPA-8021 or EPA-8260
PAHs	EPA-8270
Metals	EPA-6020 and EPA-7471

While not anticipated, should historical documentation present evidence of a release not included in the list above (such as PFAS), the analyte will be included in sampling activities per the requirements of the Department of Ecology.

4.0 SEWER REPAIR MEASURES

Per the AO Section VII.A(5): *"The Investigation and Response Plan shall include: Implementation of measures to correct the cause of the release or threatened release."*

Sewer integrity issues potentially encountered during the sewer inspection include:

- Cracks in sewer lines
- Corrosion of sewer lines
- Displacement of bell and spigot joints (either vertical or horizontal)
- Crushed or collapsed sewer lines
- Sewer line/manhole joint leakage
- Manhole riser leaks
- Cracks or severe spalling in concrete manholes
- Build-up of sediment in sewer line causing flow restriction
- Bellies in sewer line
- Damage to underground sewer lines from nearby construction
- Infiltration of perched water into the sewer system
- Exfiltration of sewer water into trench backfill

If a potential or threatened release is identified during sewer inspection activities, the potential or threatened release will be characterized in accordance with Section 3.0 of this Plan. Should a release be confirmed per Section 3.0, HFPSR will prepare a repair plan for the release location. The repair plan will evaluate the severity of the release, the accessibility of the sewer in the release location, the potential impact to the human health or the environment, and the feasibility of the repair options coupled with required remedial action at the release location.

Repairs to be considered to address defects in sewer segments include:

- Line abandonment
- Replacement
- External encasement or patching of sewer line at the release location
- In situ repair methods including liner installation or grouting

- Joint clamp
- Repair sleeve
- Coating repair
- Cured in place pipe (CIPP)
- Liquid sealing
- Spiral wound lining
- Robotic replacement
- Pipe bursting

Repair technologies for manhole repairs may include:

- Frame and Corbel repairs
- Patch walls to repair cracks
- Shotcrete walls to repair cracks and/or structural damage
- Spray-on epoxy or other coating
- Manhole lining
- Manhole replacement

Repairs may be prioritized on portions of the oily water sewer that may pose a more immediate threat to human health or the environment due to the characteristics of the oily water sewer or due to the proximity of the sewer to potential receptors.

Inaccessible sewers may not be able to be repaired due to the presence of structures or utilities at the release location. Release mitigation measures, including ongoing monitoring, will be put in place for inaccessible sewers. The mitigation measures will include measures to assess and prevent the migration of soil and groundwater COCs above cleanup levels or risk-based levels as appropriate.

5.0 INTERIM ACTION WORKPLAN SUBMITTAL

Per the AO Section VII.A(11): *"The Investigation and Response Plan shall include: Provisions for submittal of a work plan to Ecology within 60 days of completing the site characterization and before initiating one of the presumptive interim actions referenced in Section VII.B. or within 120 days of completing the site characterization and before initiating an interim action, as provided in Section VII.B."*

And per AO Section VII.B: "Implementing Interim Actions – Should data obtained under the Investigation and Response Plan show that a release or releases of hazardous substances above applicable MTCA cleanup standards from the OWS has occurred, HollyFrontier shall implement an Interim Action to address the release or releases to the extent areas are accessible."

Following completion of the site characterization work, a workplan for initiating an interim remedial action will be submitted to Ecology within 120 days. If a presumptive interim action is selected, the workplan will be submitted to Ecology within 60 days of the completion on the site characterization work.

The interim remedial actions for accessible portions of the site will be conducted in accordance with Section VII.B of the AO. If affected media are inaccessible due to the presence of buildings, utilities, roadways, process equipment, or other structures, measures will be implemented to assess and prevent the risk of migration of soil and groundwater COCs in accordance with Section 6.0 of this Plan.

The workplan for initiation of interim remedial actions for accessible portions of the site that are not following one of the presumptive interim actions described in the AO will provide the information required by WAC 173-340-430(7) including site overview, sampling and analysis plan, evaluation of cleanup standards, description of interim action, proposed schedule for implementing the interim action, compliance monitoring, and description of the reporting and documentation required during the interim action.

The workplan for initiation of interim remedial actions for accessible portion of the site that are following one of the presumptive interim actions in the AO will provide the results of the site characterization, procedures for remediation of contaminated soil

and contaminated groundwater, the presumptive interim action that is being implemented, and the schedule for implementing the remedial action.

6.0 INACCESSIBLE AREAS

Per the AO Section VII.A(12): *"The Investigation and Response Plan shall include: Measures to assess and prevent the risk of migration of soil and groundwater contamination in inaccessible areas."*

If affected media discovered during the site characterization is inaccessible due to the depth of the sewer, presence of buildings, utilities, roadways, process equipment, or other structures, measures will be implemented to assess and prevent the risk of migration of soil and groundwater COCs above cleanup levels or risk-based levels as appropriate.

Groundwater monitoring may be conducted to verify that inaccessible COCs are not migrating and posing a threat to groundwater. Institutional or engineered controls may be implemented to reduce site risk or to prevent or limit the movement of, or the exposure to, hazardous substances. The type of controls implemented will depend on the site conditions and the location of the affected media in relation to groundwater or other receptors. Some measures which may be used to reduce the risk of the migration of soil and groundwater in inaccessible areas include:

- Capping or paving the site to reduce groundwater infiltration
- Other in situ remediation systems (vapor extraction, air sparge, injection methods, bioremediation, etc.)
- Monitored natural attenuation
- Other effective methods for reducing the quantity, migration risk, or toxicity of COCs present above cleanup levels or risk-based levels as appropriate
- Deed and use restrictions
- Required worker protection measures when conducting subsurface scope.

The proposed approach for the specifically identified inaccessible affected media, including monitoring and institutional or engineering controls, will be provided in an interim action workplan like the workplan addressed in Section 5.0.

7.0 DOCUMENTATION AND REPORTING

Per the AO Section VII (A)(6): *"The Investigation and Response Plan shall include: Procedures for reporting any releases of hazardous substances from the OWS that are discovered in accordance with WAC 173-340-300(2), including providing written notification to Ecology within 90 days of discovery, the location and circumstances of the release, and any remedial actions planned, completed, or underway, to the extent known. HollyFrontier may refer to the work plan required in Section VII.B. in the report."*

Per AO Section VII.A(13): *"The Investigation and Response Plan shall include: Procedures for documenting inspection dates, findings, the location of a release, the cause of a release or threatened release, corrective actions or interim measures taken or planned, and areas where soil or groundwater contamination is left in place."*

Per AO Section VII.C: *"Annual Progress Report – HollyFrontier shall submit an annual progress report to Ecology by April 1st of each year following implementation of the Investigation and Response Plan."*

Work completed as part of the investigation and response plan scope will be documented in the facility record. This documentation will include inspections, findings, and corrective or interim actions taken. The documentation will include dates, findings, and locations of activities conducted as part of this Plan. Video camera inspections will be documented by retaining video records and by plotting known defects along with the condition grade onto a site map. Other required inspection records will also be kept and known defects identified and/or confirmed through these other inspection methods will also be plotted on a site map. The location of inspections, confirmed releases (or threatened releases), and corrective actions will be documented in the facility Geographic Information System (GIS).

Environmental sampling data will be submitted to Ecology in both printed form and entered into the Environmental Information Management (EIM) database per Section VIII.E of the Agreed Order.

Releases from the OWS discovered and confirmed during the implementation of this Plan will be reported to Ecology within 90 days of discovery. The release report will

include the location and circumstance of the release and remedial actions planned, completed, or underway.

An annual progress report will be submitted to Ecology by April 1st for the prior year. The progress report will include the items specified in AO Section VII.C.

8.0 REFERENCES

Department of Ecology, State of Washington. *Dangerous Waste Management Permit for Corrective Action*. November 2021.

Department of Ecology, State of Washington. *Guidance for Remediation of Petroleum Contaminated Sites*, *Table 7. 2. Best Management Practices Testing Recommendations for Various Petroleum Products*. June 2016.

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Whatcom Environmental Services. *Groundwater Conceptual Site Model. Shell Puget Sound Refinery*. July 2020.

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Oily Sewer Manholes
Oily Water Sewer Major Trunk Lines

Inspection to be completed by date:

December 31, 2023
December 31, 2028
December 31, 2026
December 31, 2031

HollyFrontier PSR Base Map:
General Sewer Plan (34-ES-1)

All data are approximate and should be used for relative location reference only.

0 250 500 750 1,000 Feet

1 inch = 500 feet

HF Sinclair Puget Sound Refinery

8505 South Texas Road
Anacortes, WA 98221

Major Trunk Lines Oily Water Sewer Map

Prepared on:
06/15/22

Figure 1