Cleanup Action Plan
Coleman Oil Yakima Bulk Plant

Site Name:	Coleman Oil Yakima Bulk Plant
Site Address:	1 East I Street, Yakima 98901
Agreed Order:	DE 23182
ERTS ID Nos.:	663825, 670092
Ecology Site Cleanup ID:	13200
Facility/Site ID:	4233

Prepared for:
Washington Department of Ecology
Under Agreed Order DE 15639
Washington Department of Ecology Toxics Cleanup Program
Central Region Office
Union Gap, WA

PBS Project No. 41392.000

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ACRONYMS AND ABBREVIATIONS

ARAR	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
Bgs	below ground surface
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes
CAP	Cleanup Action Plan
COC	Contaminant/Chemical of Concern
CMP	Compliance Monitoring Plan
CPOC	Conditional Points of Compliance
CSID	Cleanup Site Identification number
CSM	Conceptual Site Model
CUL	Cleanup Levels
DCA	Disproportionate Cost Analysis
DCAP	draft Cleanup Action Plan
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
FS	Feasibility Study
FSID	Facility Site identification number
MPE	Multiphase Extraction
MTCA	Model Toxics Control Act
NAPL	Non-aqueous phase liquid
PAHs	Polycyclic Aromatic Hydrocarbons
PCS	Petroleum contaminated soil
COPC	Contaminants of Potential Concern
PLP	Potential Liable Parties
POC	Point of Compliance
PRB	Permeable Reactive Barrier
RI	Remedial Investigation
RCW	Revised Code of Washington
SEB	Surfactant Enhanced Bioremediation
TPH	Total Petroleum Hydrocarbons
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
VOCs	Volatile Organic Compounds
WAC	Washington State Administrative Code

EXECUTIVE SUMMARY

This document presents the Cleanup Action Plan (CAP) for the Coleman Oil Yakima Bulk Facility Site in Yakima, Washington. This CAP was prepared by Coleman Oil in collaboration with the Washington State Department of Ecology (Ecology). This CAP has been prepared to meet the requirements of the Model Toxics Control Cleanup Act (MTCA) administered by Ecology under Chapter 173-340 of the Washington Administrative Code (WAC). This CAP describes Ecology's proposed cleanup action for this site and sets forth the requirements that the cleanup must meet.

Background

The Property has operated as a bulk petroleum storage and distribution facility for over 60 years. The Site is impacted by two discrete and apparent releases of diesel and gasoline fuels to the subsurface which were identified in March and December of 2016, respectively. There is evidence of more weathered petroleum in both the gasoline and diesel ranges that indicated prior undefined releases at the Site. The locations of both 2016 releases are well understood and are depicted on Figure 2. The exact volumes of the respective releases are currently unknown.

Nonaqueous phase liquid (NAPL), also referred to as floating product, remains present at the Site following release discovery and performance of interim actions. Analysis and visual assessment of NAPL samples by the laboratory indicate that the NAPL plume contains three distinguishable compositions.

- A mixture of fresh and weathered gasoline and diesel fuels
- A mixture of fresh and weathered diesel fuel only
- Weathered diesel fuel only

Cleanup Action Overview

The selected cleanup action will employ surfactant enhanced bioremediation (SEB) using a designed injection/recovery treatment system. Surfactant technology has the unique ability to selectively desorb contaminants and make NAPL miscible in the aqueous phase for enhanced mass removal. The surfactants will also desorb contamination from the soil surfaces, or from NAPL layers making them more available for in-situ or ex-situ remediation. The liberated contaminated water is then more biologically available for microbial (bacteria) and associated enzymatic degradation. The NAPL and contaminated water is collected through recovery wells, pumped into a treatment system, and then reinjected into the impacted areas to create a recirculation treatment zone.

Bioventing as a remedy component may be used in conjunction on a contingent basis with the selected SEB alternative to address vadose zone contamination.

1 INTRODUCTION

1.1 Purpose

This Cleanup Action Plan (CAP) was prepared for the Department of Ecology and on behalf of the Coleman Oil Company for the Coleman Oil Yakima Bulk Fuel Plant Site (Site) located at 1 East I Street in Yakima, Washington. The CAP was prepared in accordance with the Washington State Model Toxics Control Act (MTCA) Chapter 173-340-380 under Washington Administrative Code (WAC). The general location of the Site is depicted on Figure 1 – Site Vicinity.

A CAP is required as part of the site cleanup process under MTCA. The purpose of the CAP is to identify the proposed cleanup action for the Site and to provide an explanatory document for public review. More specifically, this CAP:

- Describes the Site,
- Summarizes current site conditions,
- Summarizes the cleanup action alternatives considered in the remedy selection process,
- Describes the selected cleanup action for the Site and the rational for selecting this alternative,
- Identifies site-specific cleanup levels and points of compliance for each hazardous substance and medium of concern for the proposed cleanup action.

Ecology has made a preliminary determination that a cleanup conducted in conformance with this CAP will comply with the requirements for selection of a remedy under WAC 173-340-360.

1.2 Previous Studies

Concentrations of petroleum in shallow soil were confirmed to be present at the Property in 2015 prior to the 2016 diesel and gasoline releases (PBS, 2015). Groundwater samples were not collected in the 2015 Site investigation, and as such, it is unknown if contaminants confirmed to be present in soil in 2015 had reached the groundwater table prior to discovery of the 2016 diesel and gasoline releases.

The diesel release was discovered in March of 2016. The release was reported to the Department of Ecology (Ecology) within 24 hours on March 21, 2016, and was assigned the Environmental Report Tracking System (ERTS) number 663825. Following initial response and remedial excavation, monitoring wells were installed to assess impacts to groundwater. The locations of both 2016 releases are well understood and are depicted on Figure 2. Petroleum contaminated soil (PCS) removal conducted on March 23 and 30, 2016 included the excavation and off-site disposal of approximately 212 tons of material. Interim action also included dual phase vacuum extraction of diesel fuel and water from RW1 over eight removal events for a total removal of 50 gallons of diesel product. Analysis of samples collected from the wells in May of 2016 confirmed the presence of Total Petroleum Hydrocarbons (TPHs) and BTEX constituents in groundwater in exceedance of their respective cleanup levels (CULs). Additionally, gauging of newly installed onsite wells confirmed the presence of non-aqueous phase liquids (NAPL) approximately 4.5 feet thick in wells RW1 and MW3. (*"Site Characterization and Interim Actions" (PBS 2016).*

The gasoline release was discovered in December of 2016. Following discovery of the gasoline release, additional monitoring wells (MW4 through MW6) were installed to further assess and bound the extents of COCs in groundwater. Analysis of groundwater samples collected from MW1 through MW6 on December 13, 2016, confirmed the presence of TPHs and BTEX constituents already known to be present in groundwater at the Site. In addition to already known contaminants of concern (COCs) at the Site, naphthalene was detected in exceedance of the CUL in well MW6.

Site characterization and interim action activities were completed at the Site from 2016 to 2023 as detailed in the *"Remedial Investigation and Interim Action Report, Coleman Oil Yakima Bulk Fuel" PBS, dated October 11, 2023,* and included the following:

- Advancement of 26 soil borings with soil samples analyzed at various depths.
- Installation of 16 groundwater monitoring wells to permit groundwater sample and analysis.
- Installation of one recovery well (RW-1)
- Shallow soil sampling to identify sources of contamination.
- (1) Heating oil underground storage tank (UST) decommissioning by removal and associated UST site assessment
- Excavation and offsite disposal of petroleum contaminated soil
- Ongoing multiphase extraction (MPE) of non-aqueous phase liquid (NAPL) and contaminated water from the recovery well, RW-1.
- Quarterly groundwater monitoring
- Vapor intrusion evaluation of adjacent structures.

The Remedial Investigation (RI) report concluded that the Site is impacted by two discrete and apparent releases of diesel and gasoline fuels to the subsurface which were identified in March and December of 2016, respectively. The location and extent of the soil impacts are shown on Figure 4. There is evidence of more weathered petroleum in both the gasoline and diesel ranges that indicated prior undefined releases at the Site. The locations of both 2016 releases are well understood. The exact volumes of the respective releases are currently unknown. The nature and extent of contamination in soil are well characterized. Petroleum contaminated soil with COCs in exceedance of cleanup levels (CULs) remain at the Site in defined areas. The potential for petroleum vapor intrusion was evaluated and found to not be present in the existing on-site structures.

Groundwater flow direction is consistently to the southeast with an average gradient of approximately 0.015 feet/foot as shown on Figure 3. The extent of groundwater contamination has been defined in the upgradient, downgradient and lateral direction, except for directly to the west, where impacted MW5 is the furthest explored before the site extends onto the BNSF property in that direction. Nonaqueous phase liquid (NAPL) is present at several locations on the Site including wells: RW-1, MW-3, MW-4, MW-5, MW-8, MW-11, and MW-12. See Figures 5 - 7 for distribution of NAPL. Concentrations of dissolved petroleum COCs in groundwater exceed the CULs throughout most of the Site.

It is suspected that a preexisting TPH as diesel plume in groundwater originating from near the northern property boundary and former ASTs was present at the Site prior to the discovery of the 2016 diesel and gasoline releases.

The Feasibility Study (FS) for the Coleman Yakima Bulk Fuel Plant Site was prepared in accordance with WAC 173-340-350(8) and presented in general accordance with the FS Checklist Guidance (Publication No. 16-09-007). The FS evaluated various remedial alternatives for the Site using disproportionate cost analysis (DCA). The remedial alternatives and selected alternative were evaluated in the *"Feasibility Study, Coleman Oil Yakima Bulk Fuel," PBS, dated October 6, 2023,* and are further described in Section 3 of this DCAP.

1.3 Regulatory Framework

Coleman Oil entered an Agreed Order (No. DE 15639) with other potentially liable parties (PLPs) and Ecology. The effective date of the Agreed Order is March 29, 2018. The PLPs are currently:

- Coleman Oil Company, LLC (Coleman Oil)
- BNSF Railway Company (BNSF)
- Carol Jean Wondrack
- Wondrack Distributing, Inc.
- Chevron Environmental Management Company (Chevron)

The Agreed Order requires the PLPs to complete a Remedial Investigation (RI), Feasibility Study (FS), and to prepare a DCAP for the site. Currently, no additional local, state, or federal regulatory agencies are involved in the cleanup process at the Site.

Final versions of the RI and FS were submitted to Ecology as described in this document. The RI and FS for the Site were approved as final in Ecology's opinion letter issued to the Coleman Oil Company on January 8, 2024.

2 SITE DESCRIPTION

2.1 Site History

The approximate 1.0-acre property comprises one parcel (181313-14070) in Yakima, Washington at the northeast corner of the intersection of East I Street and the BNSF Railroad (see Vicinity Map - Figure 1). The site is currently developed as a bulk fuel storage and distribution facility.

The property is currently developed as a petroleum storage, distribution and active fueling facility. Site features include four active ASTs, associated fuel transfer components, a secondary containment structure, an out-of-use fueling canopy and several structures used as office space and equipment storage. There are currently no proposed plans for change of land use or redevelopment for the site. See Site Plan - Figure 2 for layout of the property.

Tax parcel #181313-14070 was acquired by Standard Oil Company in 1908. It was owned by the Standard Oil Company and thereafter its successor in interest, Chevron U.S.A., until 1986 when it was acquired by Joseph E. Wondrack and Carol J. Wondrack. It has been owned by Carol Jean Wondrack since February 2010. It is understood that Coleman Oil is in a purchase agreement for the

parcel with Carol Jean Wondrack. The west adjacent parcel formerly known as 181313-99997 is owned by BNSF Railroad as successor in interest to the Northern Pacific Railway Company, which acquired its interest in the parcel from the United States of America, pursuant to Section 2 of the Northern Pacific Land Grant Act of 1864.

It is noted that the western portion of the facility was formerly mapped on the Yakima County Assessor's website as being part of west adjacent tax parcel 181313-99997. Previous PBS reports reference both parcels as comprising the site. It is understood that a transaction and re-parceling took place and the property is now a single parcel, owned by Carol Jean Wondrack on the County Assessors webpage on the date of this report. The entirety of the property currently owned by Ms. Wondrack is mapped as tax parcel 181313-14070. After the re-parceling, the BNSF parcel was renumbered to 181313-12030.

Wondrack Distributing, Inc. operated the bulk fuel distributing facility located at the property from 1976 to August 1, 2015. Since August 1, 2015, the bulk fuel distributing facility has been operated by the Coleman Oil Company.

During late 2017 to early 2018, Coleman Oil made several modifications to the fuel transfer and storage infrastructure. Six aboveground storage tanks (ASTs) were removed from the north central and northeastern portions of the property, and a new secondary containment and fueling area was constructed in their place. Four active ASTs remain in the northwestern portion of the property.

Underground product piping is not utilized in the current system. Fuel in the ASTs is bottom loaded and unloaded at the south and eastern sides of the ASTs within the secondary containment system. The fueling canopy in the southcentral portion of the site is no longer in use. One heating oil underground storage tank (UST) was discovered and removed from the site during excavation of a subsurface diesel fuel line in 2017.

2.2 Human Health and Environmental Concerns

Typical concerns for the petroleum contamination in soil and groundwater identified at the Site include direct contact with the soil, migration of contaminants to groundwater resources such as supply or irrigation wells, seeping of contamination into surface water bodies, and vapor intrusion into nearby occupied structures. Evaluation for potential exposure to these contaminants includes determining if there are complete pathways to these contaminants through site investigation data and understanding of the site use and conditions.

Direct contact with contaminated soil and/or groundwater by site workers conducting excavation earthworks or cleanup activities was identified as a complete exposure pathway by the conceptual site model (CSM) presented in the RI. The drinking water pathway is a potential future source of drinking water and is a complete exposure pathway. Ingestion of contaminated groundwater above MTCA Method A cleanup levels is considered a potential complete exposure pathway for the Site. Based on WAC 173-340-720(2), groundwater is considered potable regardless of whether it is currently being used at or near the facility. Please refer to Conceptual Site Model, Figure 8 for visual depiction of contaminated media and exposure pathways.

2.3 Cleanup Standards

2.3.1 *Contaminants of Concern*

The Site is impacted by two discrete and apparent releases of diesel and gasoline fuels to the subsurface which were identified in March and December of 2016, respectively. There is evidence of more weathered petroleum in both the gasoline and diesel ranges that indicated prior undefined releases at the Site. The following contaminants of concern (COCs) were identified in soil and groundwater at the Site.

Soil

- TPH in the gasoline range
- TPH in the diesel range
- TPH in the heavy oil range
- Cadmium
- Lead
- Naphthalene

Groundwater

- TPH as gasoline range organics
- TPH as diesel range organics
- BTEX
- Naphthalene

2.3.2 *Cleanup Levels*

In accordance with MTCA, cleanup levels were developed to include identified potential exposure pathways for human and environmental receptors based on the current and future planned land use. The property is currently zoned for industrial use, and future zoning is not anticipated to change. The current and near-term use of the property is a commercial bulk storage and fueling station, although future uses are unknown and, as such, the adopted cleanup criteria are protective for unrestricted land use.

The proposed cleanup criteria for soil at the Site will be the MTCA Method A Soil Cleanup Levels for Unrestricted Land Uses (MTCA Method A) as defined in WAC 173-340-720, 173-340-740, and 173 340-747.

The proposed cleanup criteria for groundwater at the Site will be the MTCA Method A Groundwater Cleanup Levels (MTCA Method A) as defined in WAC 173-340-720,173-340-740, and 173-340-747.

Cleanup standards are presented by media (i.e., soil or groundwater) for each COC in Table 4.

3 CLEANUP ACTION ALTERNATIVES AND ANALYSIS

3.1 Cleanup Action Alternatives

This section describes the cleanup alternatives that were developed and evaluated in the Feasibility Study. For a more detailed discussion of the cleanup alternatives and selection process refer to the Feasibility Study. The Feasibility Study presented four cleanup alternatives to remediate Site soil and groundwater.

Alternative 1 – Multiphase Extraction Enhanced Monitored Natural Attenuation

Alternative 1 included periodic performance of multiphase extraction (MPE) events and groundwater monitoring. MPE events performed monthly would be utilized to remove contaminant

mass via non-aqueous phase liquid (NAPL) and contaminated groundwater from the subsurface as well as control the migration of contaminants from the Site. Groundwater monitoring would be used to track the attenuation of NAPL and contaminant concentrations in groundwater due to MPE and natural degradation of dissolved phase-contaminants.

Alternative 2: Surfactant Enhanced Bioremediation

Alternative 2 would employ Surfactant Enhanced Bioremediation (SEB) using an injection/recovery treatment system. Surfactant technology has the unique ability to selectively desorb contaminants and make NAPL miscible in the aqueous phase for enhanced mass removal. The surfactants will also desorb contamination from the soil surfaces, or from NAPL layers making them more available for in-situ or ex-situ remediation. The liberated contaminated water is then more biologically available for microbial (bacteria) and associated enzymatic degradation. Once desorbed by the surfactants, the NAPL will be recovered though a set of extraction wells to remove liquids (water and NAPL). This liquid will be processed through an above ground separator to capture the free phase petroleum, then surfactant and biologic solutions will be added, and the water is reintroduced through injection wells to create a closed loop system to effectively treat the area. Recovered free phase petroleum would be removed from the Site for disposal. The injection wells will be placed at intervals to saturate areas of contaminated soil as well as the vadose zone areas above the water table zone.

Pilot testing will be conducted with limited remedial injections and passive flow meters to determine the effect on contaminant mass reduction as groundwater flows downgradient from the source area.

Alternative 3 – Surfactant Enhanced Dual Phase Extraction

Alternative 3 included implementation of Surfactant Enhanced Dual Phase Extraction (SEDPE) using an injection/extraction system (liquid + vapor), ex situ treatment of groundwater, and reinjection of treated water enhanced with surfactant. The injection of a surfactant into the vadose and groundwater zone will liberate NAPL and dissolved petroleum in the groundwater. Groundwater extraction wells will be strategically placed to capture the groundwater and pump into an oil/water separator, treated using aeration and then recirculated with surfactants into the injection wells. The recovery wells are designed to enhance soil vapor extraction (SVE) from the vadose zone. The petroleum vapors will be conveyed from the recovery wells using high vacuum regenerative blowers to an exhaust system equipped with an activated carbon filter system.

Alternative 3 was very similar to Alternative 2. The primary difference between Alternatives 2 and 3 is that Alternative 3 proposed the use of dual phase extraction to treat and remove contaminant mass within the vadose zone while Alternative 2 has a greater focus on treatment and removal of contaminants in the 'smear zone' using bioremediation.

Alternative 4 – Targeted Soil Excavation with Passive Reactive Barrier

Alternative 4 included demolition of property structures, soil removal to 20-feet below ground surface (bgs) within areas of remaining soil contamination, installation of a passive reactive barrier downgradient of the Site across I Street, and performance of MPE events downgradient of the Site. Excavated soil would be removed from the Site for offsite disposal. A 4-inch diameter recovery well

would be installed downgradient from the Site in the vicinity of MW-12. MPE events would be conducted quarterly using a vacuum truck and the newly installed recovery well for up to five years, or until MPE events were determined to have no significant reduction in the presence of NAPL at the Site for four consecutive quarters.

In addition, a passive reactive barrier (PRB) would be installed to deal with dissolved contaminants in the groundwater down gradient of the Property along and south of I-Street. The PRB would be installed using a remedial injection solution composed of granular activated carbon, a microbial solution of bacteria concentrates, as well as amendments added to serve as an ongoing food and respiratory source for continued biological degradation of contaminants. The objective of injections within this area is to create a reactive curtain of remedial solution through which groundwater leaving the source area and moving downgradient will flow.

Contingent Remedial Technology:
Bioventing/biosparging was not evaluated as a stand-alone cleanup remedy, although there is value in adding bioventing as a contingent remedy component forming part of a combined remedy to address shallow soil impacts in the areas around S39, S26/S27/S28, and MW-1/VB1/BH13/RW-1 where diesel contamination exists as shallow as 1 to 3 feet deep or gasoline and diesel extends as deep as 18 feet, below the surface covering at the facility. This shallow contamination exists in the vadose zone that the surfactant enhanced bioremediation is unlikely to fully address. Bioventing can be added as a contingent component to the selected remedy based on the requirements under WAC 173-340-360, especially as it relates to permanence, protectiveness, and completing the cleanup action in a reasonable restoration timeframe.

3.2 Initial Screening of Alternatives

In accordance with WAC 173-340-360(2), there are minimum requirements that must be met for a selected cleanup action. These minimum requirements are defined in terms of Threshold Requirements and Other Requirements. Threshold Requirements which must be met by the selected cleanup action include the following:

- Protect Human Health and the environment,
- Comply with cleanup standards,
- Comply with applicable state and federal laws; and
- Provide for compliance monitoring.

When appropriate, MTCA allows for an initial screening of remedial technologies such that the number of alternatives carried forward to the evaluation is reduced. MTCA stipulates that the following remedial action alternatives or components may be eliminated from further consideration in the Feasibility Study:

- Alternatives or components that clearly do not meet the minimum requirements established for cleanup actions under WAC 173-340-360, including those alternatives for which costs are clearly disproportionate.
- Alternatives or components which are not technically possible.

For the initial screening process, Table 3 summarizes the potential remedial technologies and components. Retained components were assembled into remedial alternatives for further evaluation against MTCA criteria for cleanup actions. The following four remedial alternatives were developed using the technologies retained in the initial screening:

- Alternative 1 – Multiphase Extraction Enhanced Monitored Natural Attenuation (MPE MNA)
- Alternative 2 – Surfactant Enhanced Bioremediation (SEB)
- Alternative 3 – Surfactant Enhanced Dual Phase Extraction (SEDPE)
- Alternative 4 – Targeted Soil Excavation with Passive Reactive Barrier (PRB) and MPE

3.3 Detailed Evaluation of Alternatives

To further evaluate the selected alternatives to support the remedy selection, Ecology evaluated four alternatives for the remediation of contaminated soil and groundwater at the Coleman Oil Site. The evaluation compared the adequacy of each alternative relative to MTCA criteria (WAC 173-340-360), as well as a ranking of criteria by disproportionate cost analysis (DCA), in accordance with WAC 173-340-350.

When selecting a cleanup action, MTCA requires that Ecology give preference to actions that use permanent solutions to the maximum extent practicable. To select the most practicable permanent solution from among those cleanup action alternatives that are protective of human health and the environment, Ecology conducts a disproportionate cost analysis (DCA). The DCA allows for a comparison of the costs and benefits of the alternatives and evaluation of alternatives according to criteria identified in Section 360(f) of MTCA [WAC 173-340-360(f)]. These criteria include:

- Protectiveness
- Permanence
- Cost
- Effectiveness over the long term
- Management of short-term risks
- Technical and administrative implementability
- Consideration of public concerns

A detailed DCA evaluation is included as Table 3. As described in MTCA, the comparison of benefits and costs may be quantitative, but will often be qualitative and require the use of best professional judgment. It's important to recognize that Ecology has the discretion to favor or disfavor qualitative benefits and use that information in selecting a cleanup action. [WAC 173-340-360(3)(e)(ii)(C)].

Consistent with MTCA evaluation criteria (WAC 173-340-360, starting with the alternatives that meet the threshold requirements, Alternatives 1 through 4, the overall weighted benefit score and cost of Alternatives 1 through 3 are compared to the scores and costs for the most permanent alternative, Alternative 4. Alternative 4 includes the most aggressive means of source reduction by excavating NAPL and contaminated soil and represents the most permanent remedial alternative evaluated in this FS. As such, Alternative 4 represents the benchmark against which the incremental costs and benefits of the other alternatives were evaluated.

An evaluation of remedial alternatives is presented in Table 1. All four alternatives evaluated in the FS met the threshold and other requirements of MTCA and were further evaluated by conducting a DCA. Table 2 compares costs between various alternatives. Table 3 presents the DCA performed for the four alternatives using alternative 4 as the baseline, or most permanent remedy.

- The Alternative 1 remedy was not expected to result in a reasonable restoration timeframe as it would not efficiently treat or remove contaminants. The restoration timeframe for this remedy was estimated to be at least 30 years. Alternative 1 was not selected as the proposed cleanup action for the Site.
- Alternative 4 received an overall weighted benefit score less than that of Alternatives 2 and 3 but greater than that of Alternative 1. Alternative 4 had the highest estimated cost for implementation of the four alternatives evaluated. The cost of Alternative 4 was determined to be disproportionate to its incremental benefits. Based on these findings, Alternative 4 was not selected as the proposed cleanup action for the Site.
- Evaluation of the alternatives determined Alternative 2 to be a more effective alternative with a lower cost than Alternative 3. As such, Alternative 3 was not selected as the proposed cleanup action.
- Alternative 2 meets the threshold and other MTCA requirements and was selected as the preferred remedy based on the DCA. Alternative 2 was determined to be the most permanent remedy and had an overall weighted benefit score of 6.4 points in the DCA.

4 DESCRIPTION OF SELECTED REMEDY

4.1 Site Description

This CAP applies to the portions of the Site where soil and groundwater concentrations exceed applicable cleanup levels. The Site boundary is depicted on Figures 4 through 6 as the extent of groundwater with concentrations of gasoline and/or diesel exceeding the MTCA Method A CUL.

The contamination identified on the Coleman property has migrated in the groundwater media south toward I Street and beyond the property boundary, and to the west toward the BNSF railway corridor. The contamination present under and south of I Street is primarily dissolved petroleum compounds in the groundwater. There is also a plume of NAPL consisting of diesel fuel present on the western boundary of the Site that extends south of I Street toward monitoring well MW 12. The western extent of the petroleum in groundwater at the Site extends toward the BNSF railway line located approximately 20-feet west of the Coleman Oil property line.

4.2 Description of the Cleanup Action

Based on a detailed review of remedial alternatives, including the DCA, Ecology selected Alternative 2 (Surfactant Enhanced Bioremediation). The selected cleanup action complies with MTCA requirements and addresses concerns of Coleman Oil Company and the public and maximize the benefit/cost ratio.

Alternative 2 employs surfactant enhanced bioremediation using an injection and recovery treatment system. Surfactant technology has the unique ability to selectively desorb contaminants and make NAPL miscible in the aqueous phase for enhanced mass removal. The surfactants will also

desorb contamination from the soil surfaces, or from NAPL layers making them more available for in-situ or ex-situ remediation. The liberated contaminated water is then more biologically available for microbial (bacteria) and associated enzymatic degradation.

Once desorbed by the surfactants, the NAPL will be recovered though a set of extraction wells to remove liquids (water and NAPL). This liquid will be processed through an aboveground oil/water separator to capture the free-phase petroleum, then surfactant and biologic solutions will be added, and the enhanced water is reintroduced through injection wells to create a closed loop system to effectively treat the area. Recovered free-phase petroleum would be removed from the Site for disposal. The injection wells will be placed at intervals to saturate areas of contaminated soil as well as the vadose zone areas above the groundwater table.

Alternative 2 injects water enhanced with surfactants and microbial amendments into the vadose zone to treat contaminated soil above the water table and within the smear zone. These contaminants would be treated in-situ by microbial amendments and ex-situ in the above ground system following removal from the subsurface by extraction wells. In addition to the on-property SEB treatment system, Alternative 2 includes installation of an additional recovery well(s) downgradient of the property near MW-12. MPE events would be performed on the well(s) on a quarterly basis for 5 years. Elements of the proposed cleanup action are shown on Figure 7. Groundwater monitoring will be conducted on a semiannual basis until groundwater cleanup levels are achieved. Once the groundwater at the standard points of compliance meets the cleanup level, final groundwater compliance monitoring will be performed on a quarterly basis for the equivalent of one year.

Alternative 2 can include an evaluation of bioventing as a contingent technology during pilot testing activities. This contingent technology can supplement the selected SEB remedy, to further reduce COCs in the soil media.

Bioventing may be effective to address shallow soil impacts in the areas around S39, S26/S27/S28, and MW-1/VB1/BH13/RW-1 where diesel contamination exists as shallow as 1 to 3 feet deep or gasoline and diesel extends as deep as 18 feet, below the surface covering at the facility. This shallow contamination exists in the vadose zone that the surfactant enhanced bioremediation is unlikely to fully address. The bioventing component would be combined with the preferred remedy based on the requirements under WAC 173-340-360.

A pilot study would be performed to determine spacing and placement of injection and recovery wells to ensure an appropriate zone of influence for the wells. The study would include measurement of physical and chemical parameters of NAPL as well as injected surfactant/enzyme at specified wells in proximity to selected injection and extractions wells. Additionally, an improved understanding of localized groundwater flow conditions within the site would aid in system design. This could be achieved via the use of tracer dye studies, passive flow meters, or other means implemented during the pilot test.

Performance monitoring will be performed with the frequency and specific well locations to be defined in the Engineering Design Report (EDR). The preliminary groundwater performance monitoring frequency will be semi-annual and use selected key monitoring wells during the performance monitoring period.

Performance monitoring for NAPL in groundwater includes a proposed remediation level for NAPL thickness of 0.05 feet, indicating recovery of NAPL to a practicable limit that is not consistently recoverable, and the remaining NAPL impacts are immobile. NAPL transmissivity testing will be completed during the pilot test period to confirm the remediation performance NAPL level metrics. Per WAC 173-340-355, a remediation level defines the concentration of a hazardous substance in an environmental medium at which a particular cleanup action component will be used. If the proposed cleanup action does not result in a reduction of NAPL thickness to below the remediation level within the restoration timeframe, additional cleanup actions will be performed to further reduce NAPL thickness.

Additional cleanup actions may consist of further performance of the actions included in the selected alternative if these actions are shown to result in sufficient reduction of NAPL thickness but are unable to achieve remediation levels within the restoration timeframe. Additional cleanup actions may also include other methods if the proposed cleanup action is determined to be a suboptimal technique for reducing NAPL thickness during implementation of the cleanup action.

4.3 Cleanup Standards and Points of Compliance

4.3.1 *Soil Cleanup Standards and Points of Compliance*

The cleanup criteria for soil at the Site are the MTCA Method A Soil Cleanup Levels for Unrestricted Land Uses (MTCA Method A) as defined in WAC 173-340-740 and 173-340-747. Soil CULs are provided in Table 4.

Standard points of compliance for soil are established to evaluate the cleanup action. The standard point of compliance for soil is defined as throughout the Site from ground surface to 15 feet bgs.

4.3.2 *Groundwater Cleanup Standards and Points of Compliance*

Groundwater cleanup levels are established based on estimates of the highest beneficial use and the reasonable maximum exposure expected to occur under both current and potential future site use conditions. Ecology has determined that at most sites use of groundwater as a source of drinking water is the beneficial use requiring the highest quality of groundwater and that exposure to hazardous substances through ingestion of drinking water and other domestic uses represents the reasonable maximum exposure.

At this site, MTCA Method A groundwater cleanup levels (CULs) were determined to be applicable to Coleman Oil site cleanup actions. The cleanup criteria for groundwater at the Site are the MTCA Method A Groundwater CULs (MTCA Method A) as defined in WAC 173-340-720,173-340-740, and 173-340-747. Groundwater CULs are provided in Table 4.

Groundwater standard points of compliance are for protection of drinking water and would extend vertically from the uppermost level of the saturated zone to the lowest depth potentially impacted by the releases. Standard points of compliance for groundwater are established under this CAP.

4.3.3 *Applicable, Relevant and Appropriate Requirements (ARAR)*

A detailed list of applicable, relevant, and appropriate requirements (ARARs) applicable to the selected cleanup actions is included as Table 5. The list of ARARs is from Section 2 of the 2023 Feasibility Study.

4.4 Restoration Timeframe

The proposed cleanup action can be completed within a reasonable time frame. The proposed cleanup action will be implemented upon Ecology approval of the Engineering Design Report. The selected alternative offers an effective remedy that meets the criteria for selection of a cleanup action under MTCA.

The proposed cleanup action will greatly reduce the risk posed by COCs to human health and the environment by:

- Groundwater extraction
- Ex situ groundwater treatment
- In situ groundwater treatment via injection of treated groundwater augmented with surfactants and biological amendments

It is expected that the Alternative 2 SEB recirculating system NAPL recovery and supplemental biological treatment may take 5 years of operation to reach the CULs. Achievement of CULs would be evaluated and confirmed by groundwater monitoring performed throughout and following remediation.

Compliance groundwater monitoring will be required during and following completion of the cleanup action. When groundwater monitoring results indicate that cleanup objectives have been met, a Groundwater Completion Report will be prepared and submitted to Ecology for their review and approval. After the cleanup standards have been met, the monitoring wells will be removed and closed in accordance with the Minimum Standards for Construction and Maintenance of Wells, WAC 173-160- 151 and Water Well Construction, Chapter 18.104.040 of the Revised Code of Washington.

4.5 Compliance Monitoring

A Compliance Monitoring Plan (CMP) will be developed for the cleanup action that meets the requirements of WAC 173-340-410. Compliance monitoring for the cleanup actions includes protection monitoring (during construction), performance monitoring (collection of soil and groundwater samples) following implementation of the cleanup action, and confirmation monitoring (long-term groundwater monitoring until cleanup levels are achieved). The details of the monitoring will be specified in the forthcoming EDR.

Compliance monitoring of soil will be performed via drilling investigation following implementation of the cleanup remedy. As described in Section 4.3.2, Method A CULs are established for soil. Compliance monitoring of soil will be further detailed in the EDR.

Groundwater confirmation monitoring will be conducted as specified in the Compliance Monitoring Plan (CMP). It is anticipated that groundwater compliance monitoring will include groundwater sampling and analysis of TPH as diesel and gasoline, naphthalene, and BTEX The compliance monitoring will be based on the monitoring well network at the wells to be selected in the CMP.

4.6 Schedule for Implementation

The cleanup action will be implemented following the approval of the DCAP. The preliminary sequence and implementation schedule for the cleanup action is as follows:

Item	Task	Preliminary Schedule
1	Perform Pilot Testing on Site	3rd Quarter 2024
2	Engineering Design Report (EDR)	4th Quarter 2024
3	Ecology Review and Approval of the EDR	4th Qtr 2024 or 1st Qtr 2025
4	Contract and schedule contractors and equipment	1st half 2025
5	SEB recirculation system implementation a. Install specified wells, pumps, and system components. b. Bioventing will be implemented on a contingent basis.	*start date: 2025* Concurrent with implementation of SEB recirculation system
6	Operate treatment system(s) conduct performance monitoring.	5-year period
7	Compliance Monitoring	2030-2031
8	Periodic Review	5 years after first operation of the SEB recirculation system
9	Request Ecology Review and Closure	2032
10	Remove Systems and Restore Site	2033

4.7 Institutional/Engineering Controls

The cleanup action includes engineering and institutional controls to protect human health and the environment from residual contamination in soil and groundwater in accordance with WAC 173-340- 440.

During implementation of the cleanup action, interim engineering controls including construction fencing/securing the work area would be used to minimize exposure to contaminated soil. Following construction, engineering controls will include replacement of asphalt pavement over excavation or trench areas, removal of the treatment system components, and the decommissioning of monitoring or recovery wells in accordance with WAC 173-160-460.

Land Use Restrictions (LURs) or Engineering Controls (ECs) such as an environmental covenant recorded for the source property may be implemented with any of the above alternatives as appropriate. LURs or ECs would be implemented if CULs are unable to be reached in a reasonable timeframe using proper implementation of the selected alternative, including potential optimization of the treatment system if initial milestones are not met. Milestones and metrics for system performance and triggers for system optimization will be specified later in system design and operations and maintenance (O&M) documents. LURs or ECs would address residual contaminants which are likely to be part of the proposed remedy alternative.

Institutional controls will likely be required in the form of a restrictive environmental covenant on the property to protect human health and the environment from exposure to soil remaining on site exceeding MTCA Method A cleanup levels. The restrictive covenant would, at a minimum, require notifications for conducting intrusive activities at the Site within the zone of residual soil contamination. The use of Site groundwater as a drinking water source would also be prohibited.

The restrictive covenant would be recorded prior to completion of the cleanup actions. An Institutional Controls (IC) Plan will be developed prior to completion of the cleanup action. The IC Plan would prescribe periodic inspections of the Site, including the integrity of asphalt pavement. The IC Plan would be reviewed and updated every 5 years as part of the periodic review process. Appendix C to the Cleanup Action Plan Agreed Order includes a template for an environmental covenant.

4.8 Likely Vulnerable Populations and Overburdened Communities

An assessment was performed to determine whether the population threatened by the Site includes a vulnerable population or overburdened community. This review process is described in the Toxics Cleanup Program's Implementation Memorandum No. 25. This memorandum calls for a review of the census tract that encompasses the Site.

Information relevant to the assessment is accessible at the Washington State Department of Health's Environmental Health Disparities web portal and at the EPA's EJScreen web portal. Based on a review of this information, a potentially exposed population exists in Census Tract No. 53077000200 that may be subject to environmental impacts, as defined in RCW 70A.02.005 (aka the HEAL Act). The term, potentially exposed population, refers to vulnerable populations and overburdened communities.

4.9 Public Participation

As provided under WAC 173-340-600, members of the public will be invited to review and comment on the draft CAP before it is finalized during a formal public comment period. Comments received during this period will be entered into the site's formal record, considered by cleanup staff, and responded to in a responsiveness summary before the draft CAP is final.

Notice for this comment period will include mailings to nearby businesses and residents, email

notification distributed to an email listserv, posting in Ecology's Site Register, website updates, and newspaper legal ad. Contingent on public interest, Ecology will hold a public meeting where detailed information about the site and DCAP will be available.

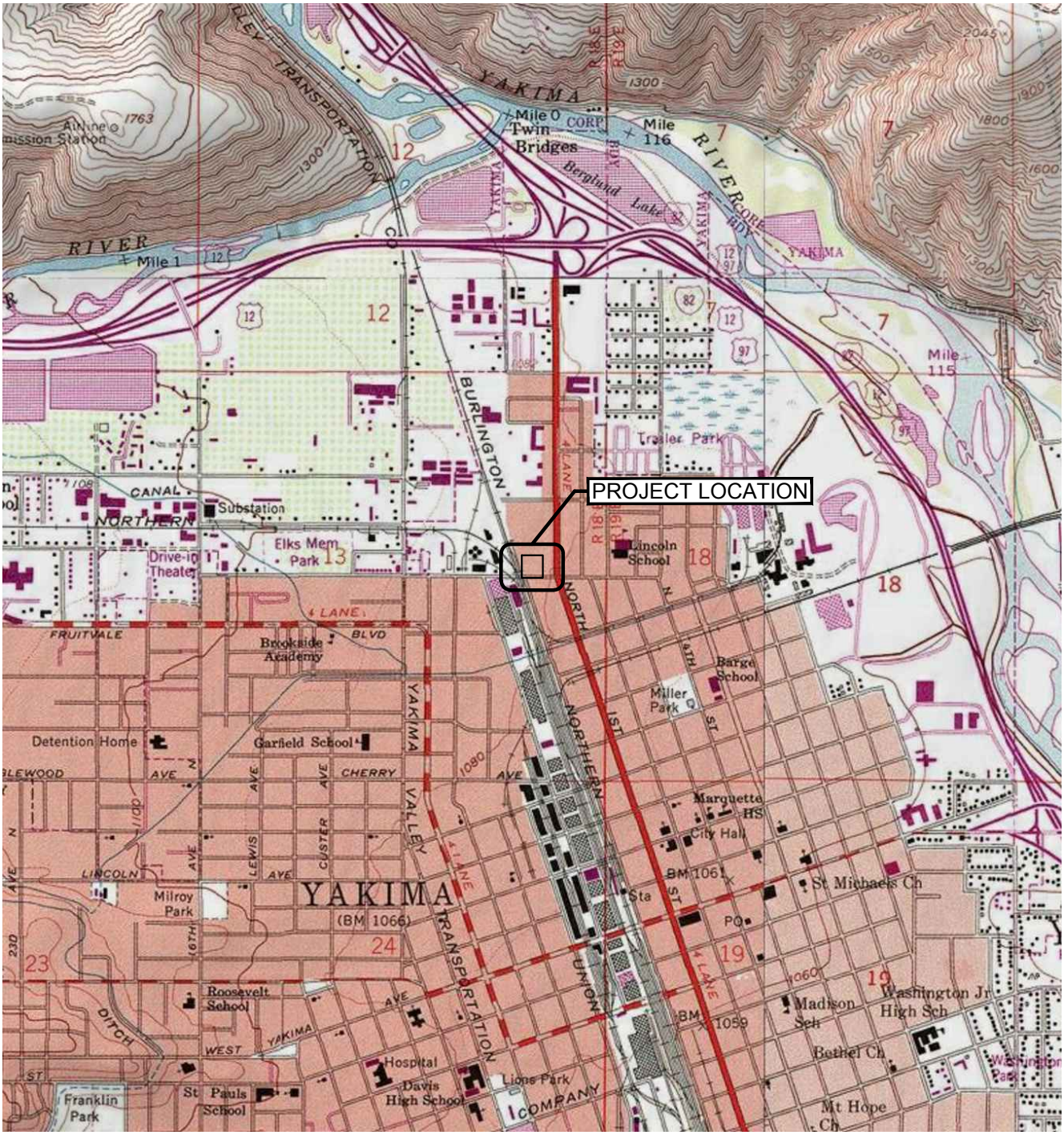
Public comment will also be provided for other components of the final CAP as described in WAC 173-340-600(15).

5 REFERENCES

(PBS, 2023a) Feasibility Study, Coleman Oil Yakima Bulk Fuel, prepared by PBS, dated October 6, 2023.

(PBS, 2023b) Remedial Investigation and Interim Action Report – Coleman Oil Yakima Bulk Fuel, prepared by PBS, October 11, 2023.

Figures



SOURCE: USGS YAKIMA WEST, WA QUADRANGLE 1985

WASHINGTON

Scale 1" = 2,000'

0' 1,000' 2,000' 4,000'

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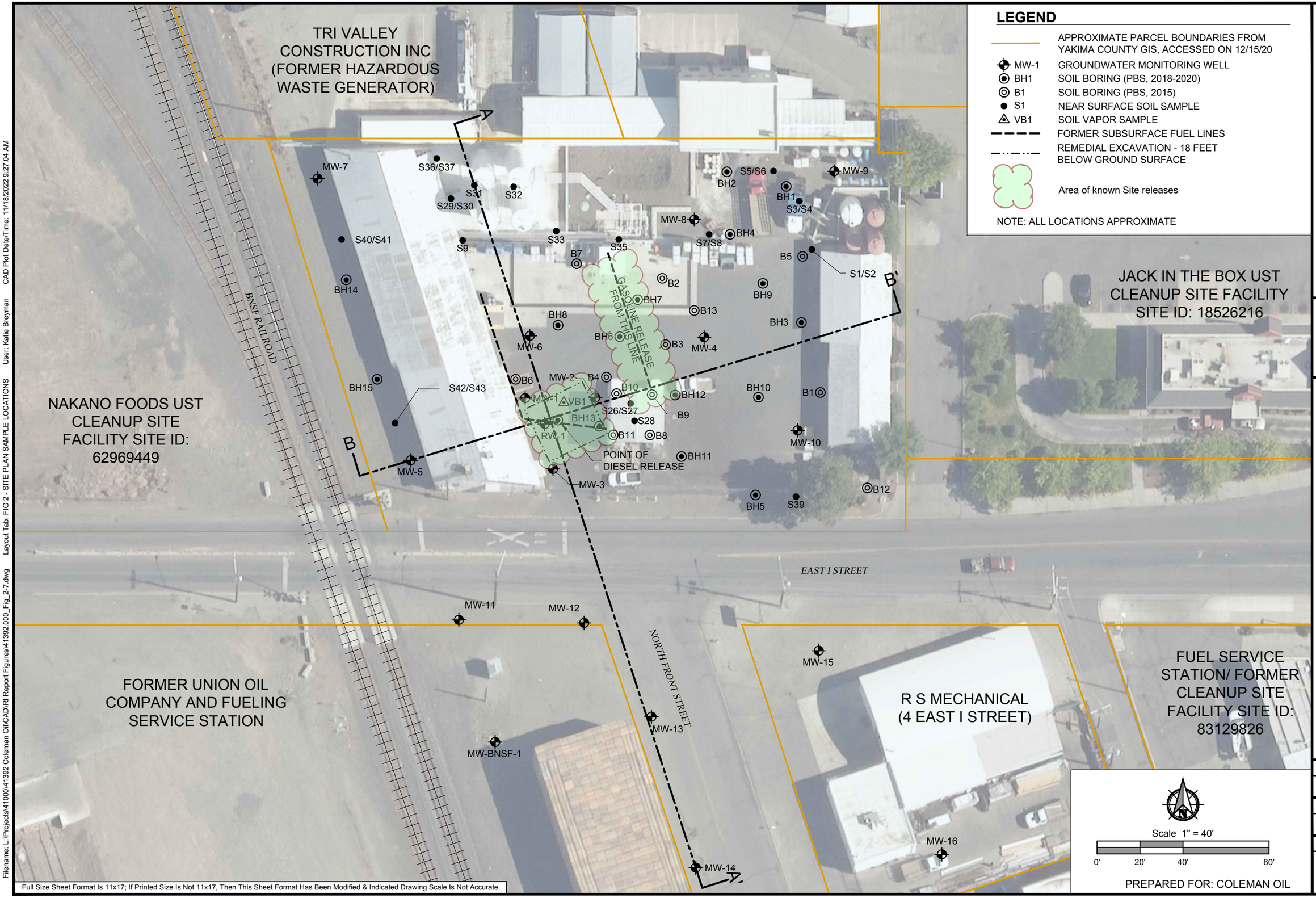
VICINITY MAP

1 EAST I STREET
YAKIMA, WASHINGTON

MAR 2024
41392.000

FIGURE
1



LEGEND

- APPROXIMATE PARCEL BOUNDARIES FROM YAKIMA COUNTY GIS, ACCESSED ON 12/15/20
- MW-1 GROUNDWATER MONITORING WELL
- BH1 SOIL BORING (PBS, 2018-2020)
- B1 SOIL BORING (PBS, 2015)
- S1 NEAR SURFACE SOIL SAMPLE
- VB1 SOIL VAPOR SAMPLE
- FORMER SUBSURFACE FUEL LINES
- REMEDIAL EXCAVATION - 18 FEET BELOW GROUND SURFACE
- Area of known Site releases

NOTE: ALL LOCATIONS APPROXIMATE

Scale 1" = 40'

0' 20' 40' 80'

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SITE PLAN: SAMPLE LOCATIONS
COLEMAN OIL
1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
2

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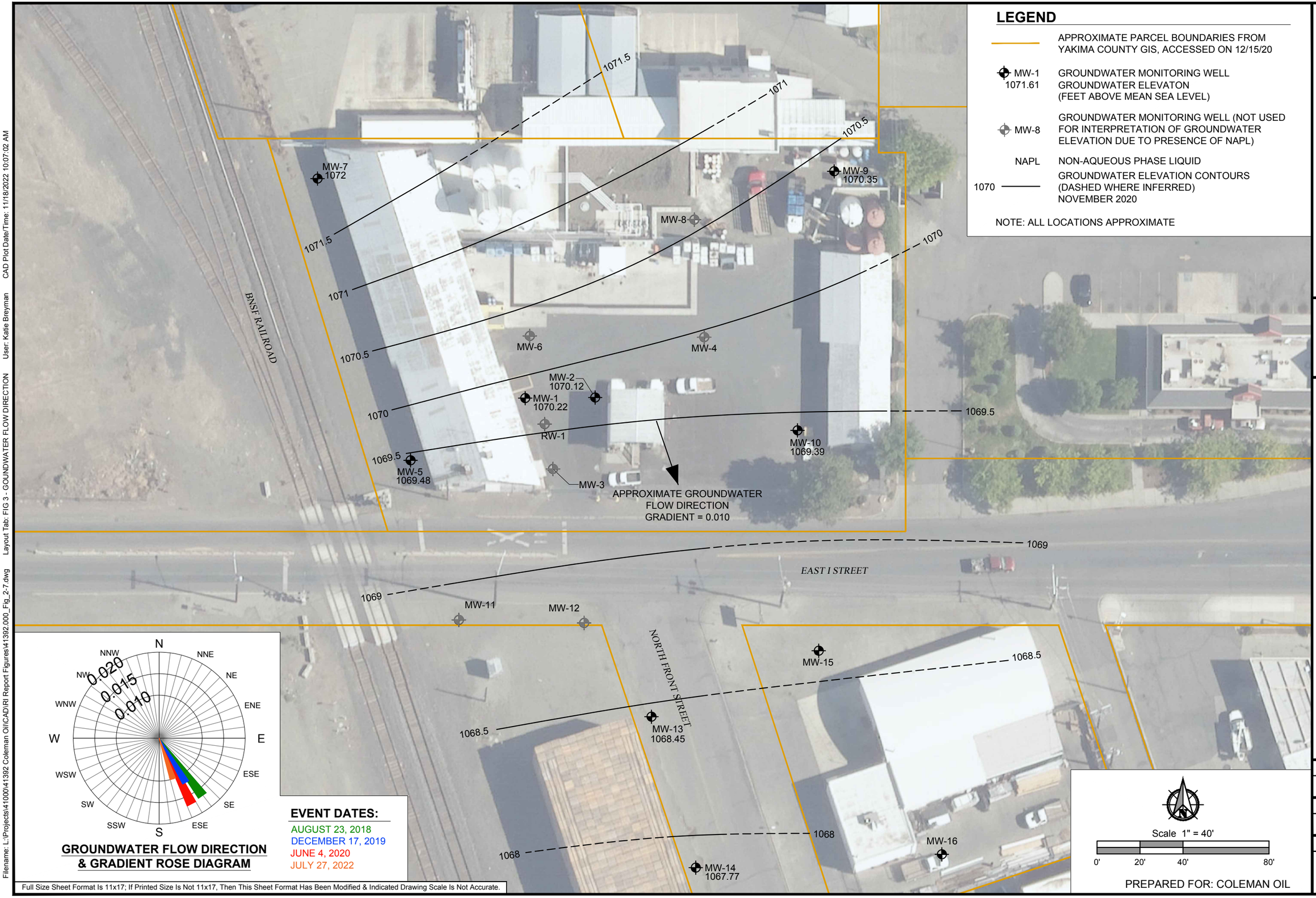
Filename: L:\Projects\41000\41392 Coleman Oil\CAD\RI Report Figures\41392.000_Fig_2-7.dwg Layout Tab: FIG 2 - SITE PLAN SAMPLE LOCATIONS User: Katie Breyman CAD Plot Date/Time: 11/18/2022 9:27:04 AM



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SITE PLAN - GROUNDWATER ELEVATION CONTOUR MAP

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
3

Filename: L:\Projects\41000\41392 Coleman Oil\CAD\RI Report Figures\41392.000_Fig_2-7.dwg Layout Tab: FIG 3 - GOUNDWATER FLOW DIRECTION User: Katie Breyman CAD Plot Date/Time: 11/18/2022 10:07:02 AM

LEGEND

- APPROXIMATE PARCEL BOUNDARIES FROM YAKIMA COUNTY GIS, ACCESSED ON 12/15/20
- MW-1 — GROUNDWATER MONITORING WELL
- BH1 — SOIL BORING (PBS, 2018-2020)
- B1 — SOIL BORING (PBS, 2015)
- S1 — NEAR SURFACE SOIL SAMPLE
- VB1 — SOIL VAPOR SAMPLE
- FORMER SUBSURFACE FUEL LINES
- REMEDIAL EXCAVATION - 10 FEET BELOW GROUND SURFACE
- EXTENT OF SOIL CONTAMINATION >MTCA CULS
- MTCA CUL — MODEL TOXICS CONTROL ACT METHOD A GROUNDWATER CLEANUP LEVEL FOR SOIL:
  - LEAD: 250 mg/kg
  - CADMIUM: 2 mg/kg
  - DIESEL: 2,000 mg/kg
  - HEAVY OIL: 2,000 mg/kg
  - GASOLINE: 30 mg/kg
- (mg/kg) — MILLIGRAMS PER KILOGRAM

NOTE: DEPICTED SOIL CONTAMINATION BASED ON 2015 & 2016 INVESTIGATION. CONTAMINANTS HAVE NOT BEEN DETECTED IN EXCEEDANCE OF MTCA CULS IN SITE SOIL SAMPLES FROM 2018-2020

MW-7 S36/S37 S31 S32 S29/S30 S40/S41 S9 S33 S35 B7 BH14 BH2 S5/S6 MW-9 BH1 S3/S4 MW-8 BH4 S7/S8 B5 S1/S2 B2 BH9 BH7 B13 BH8 BH3 BH6 B3 MW-6 MW-4 B6 MW-2 B4 B10 BH15 S42/S43 MW-1 VB1 BH12 BH10 B1 S26/S27 S28 B9 BH13 RW-1 B11 B8 MW-10 MW-5 BH11 MW-3 BH5 S39 B12 MW-11 MW-12 MW-15 MW-13 MW-16 MW-14

BNSF RAILROAD

GASOLINE RELEASE FROM THIS LINE

DIESEL & HEAVY OIL (3-FT DEPTH)

DIESEL (1-FT DEPTH)

POINT OF DIESEL RELEASE

DIESEL & GASOLINE (18-FT DEPTH)

EAST I STREET

NORTH FRONT STREET

Scale 1" = 40'

0' 20' 40' 80'

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EXTENT OF DIESEL AND HEAVY OIL IN SOIL

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
4

Filename: L:\Projects\41000\41392 Coleman Oil\CAD\RI Report Figures\41392.000_Fig_2-7.dwg Layout Tab: FIG 4- CONTAMINATION IN SOIL User: Katie Breyman CAD Plot Date/Time: 11/18/2022 10:07:52 AM

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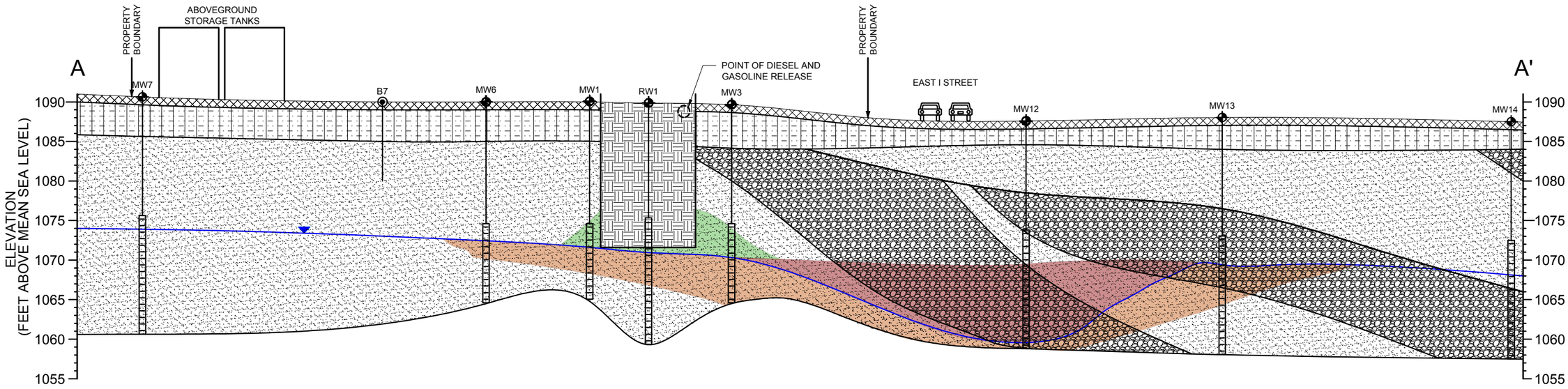

1

CROSS-SECTION A-A'

0' 20' 40' 80'

2X VERTICAL EXAGGERATION

LEGEND

BH-1	DIRECT PUSH/SONIC SOIL BORING		ASPHALT/ ARTIFICIAL FILL
MW1/RW1	MONITORING WELL		SILTY SAND WITH GRAVEL (SM)
	WELL SCREEN		WELL GRADED SAND WITH GRAVEL AND SILT (SW)
			WELL GRADED GRAVEL WITH SAND (GW)
	GROUNDWATER (NOV 2020)		AREA OF SOIL EXCAVATION AND CLEAN BACKFILL
	FORMER SUBSURFACE FUEL LINE		NAPL (NOV 2020)
NAPL	NON-AQUEOUS PHASE LIQUID		GROUNDWATER WITH CONCENTRATION OF GASOLINE AND/OR DIESEL >MTCA CUL
MTCA CUL	MODEL TOXINS CONTROL ACT METHOD A CLEANUP LEVEL		SOIL CONTAMINANT CONCENTRATIONS >MTCA CUL

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CONCEPTUAL SITE MODEL - CROSS-SECTIONS

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
5

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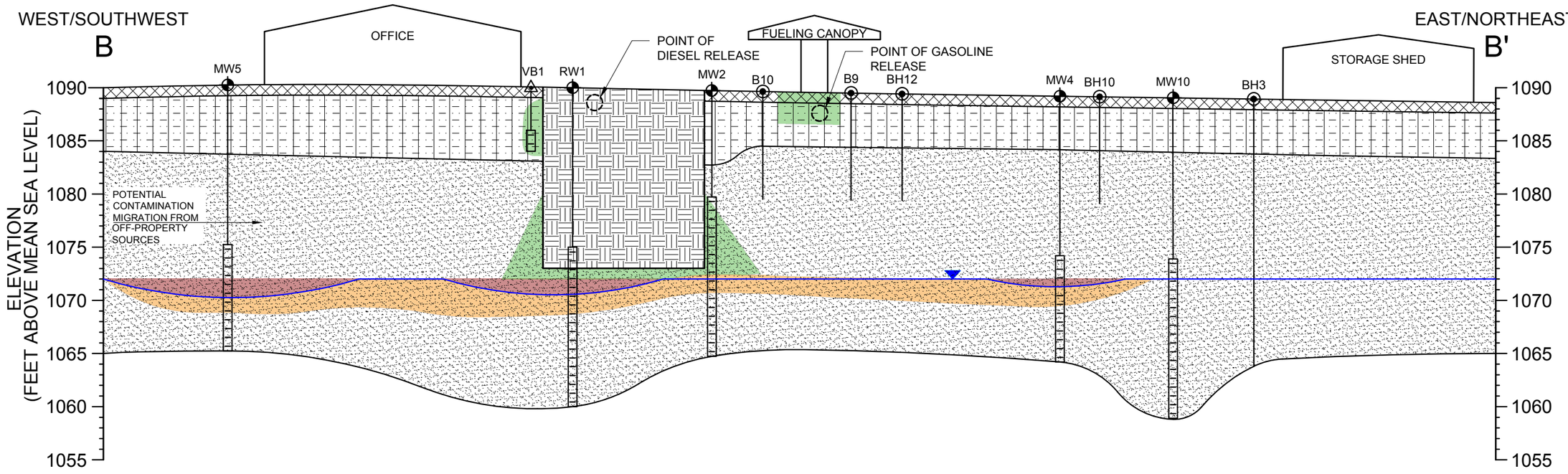

1

CROSS-SECTION B-B'

0' 20' 40' 80'

2X VERTICAL EXAGGERATION

LEGEND

BH-1	DIRECT PUSH/SONIC SOIL BORING		ASPHALT/ ARTIFICIAL FILL
MW1/RW1	MONITORING WELL		SILTY SAND WITH GRAVEL (SM)
	WELL SCREEN		WELL SORTED SAND WITH GRAVEL AND SILT (SW)
VB1	SOIL VAPOR WELL		AREA OF SOIL EXCAVATION AND CLEAN BACKFILL
	WELL SCREEN		NAPL (NOV 2020)
	GROUNDWATER (NOV 2020)		GROUNDWATER WITH CONCENTRATION OF GASOLINE AND/OR DIESEL >MTCS CUL
	FORMER SUBSURFACE FUEL LINE		SOIL CONTAMINANT CONCENTRATIONS >MTCA CUL
NAPL	NON-AQUEOUS PHASE LIQUID		
MTCA CUL	MODEL TOXINS CONTROL ACT METHOD A CLEANUP LEVEL		

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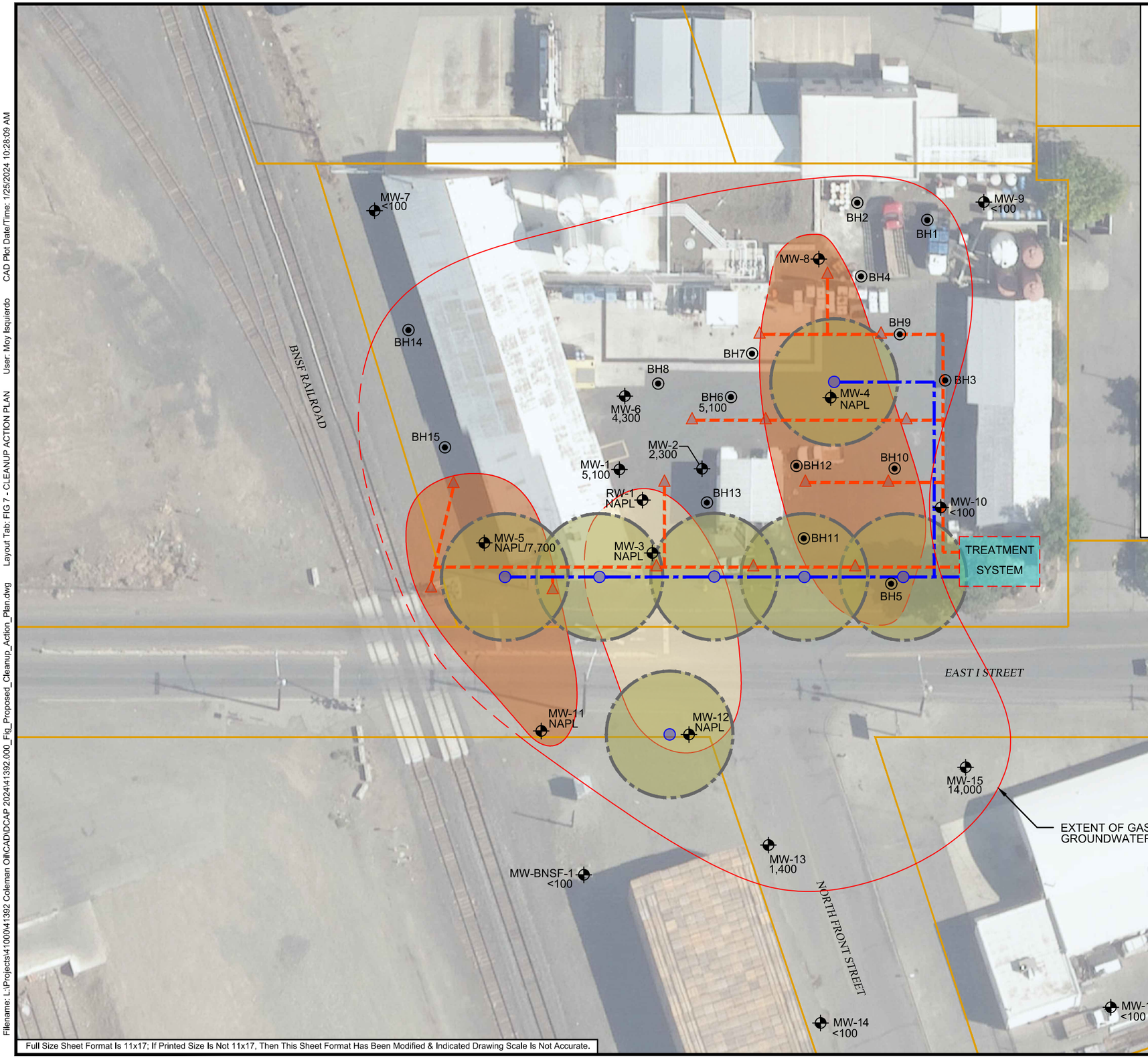
CONCEPTUAL SITE MODEL - CROSS-SECTIONS

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
6

Filename: L:\Projects\41000\41392 Coleman Oil\CAD\RI Report Figures\41392.000_Fig_2-7.dwg Layout Tab: FIG 10 - B-B' CROSS SECTION User: Katie Breyman CAD Plot Date/Time: 11/18/2022 10:30:46 AM



LEGEND

- APPROXIMATE PARCEL BOUNDARIES FROM YAKIMA COUNTY GIS, ACCESSED ON 12/15/20
- MW-1 — GROUNDWATER MONITORING WELL
- BH1 — SOIL BORING
- 2,100 — CONCENTRATION OF GASOLINE IN GROUNDWATER (µg/L) (JUL 2022)
- NAPL — WELL CONTAINS MEASURABLE NON-AQUEOUS PHASE LIQUIDS (NAPL). GROUNDWATER SAMPLE NOT COLLECTED.
- AREAS CONTAINING NAPL IN THE FORM OF WEATHERED FUEL
- AREA CONTAINING NAPL IN THE FORM OF MIXED FRESH & WEATHERED FUEL
- MTCA CUL — MODEL TOXICS CONTROL ACT METHOD A GROUNDWATER CLEANUP LEVEL FOR GASOLINE (800 µg/L)
- (µg/L) — MICROGRAMS PER LITER

NOTE: ALL LOCATIONS APPROXIMATE

FEASIBILITY STUDY ALTERNATIVE 2: SURFACTANT ENHANCED BIOMEDIATION (SEB)

- INJECTION WELL
- INJECTION WELL LINE
- EXTRACTION WELL
- EXTRACTION WELL LINE
- ZONE OF RECOVERY - 25' RADIUS

Scale 1" = 40'

0' 20' 40' 80'

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PROPOSED CLEANUP ACTION PLAN
COLEMAN OIL
1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
FIGURE
7

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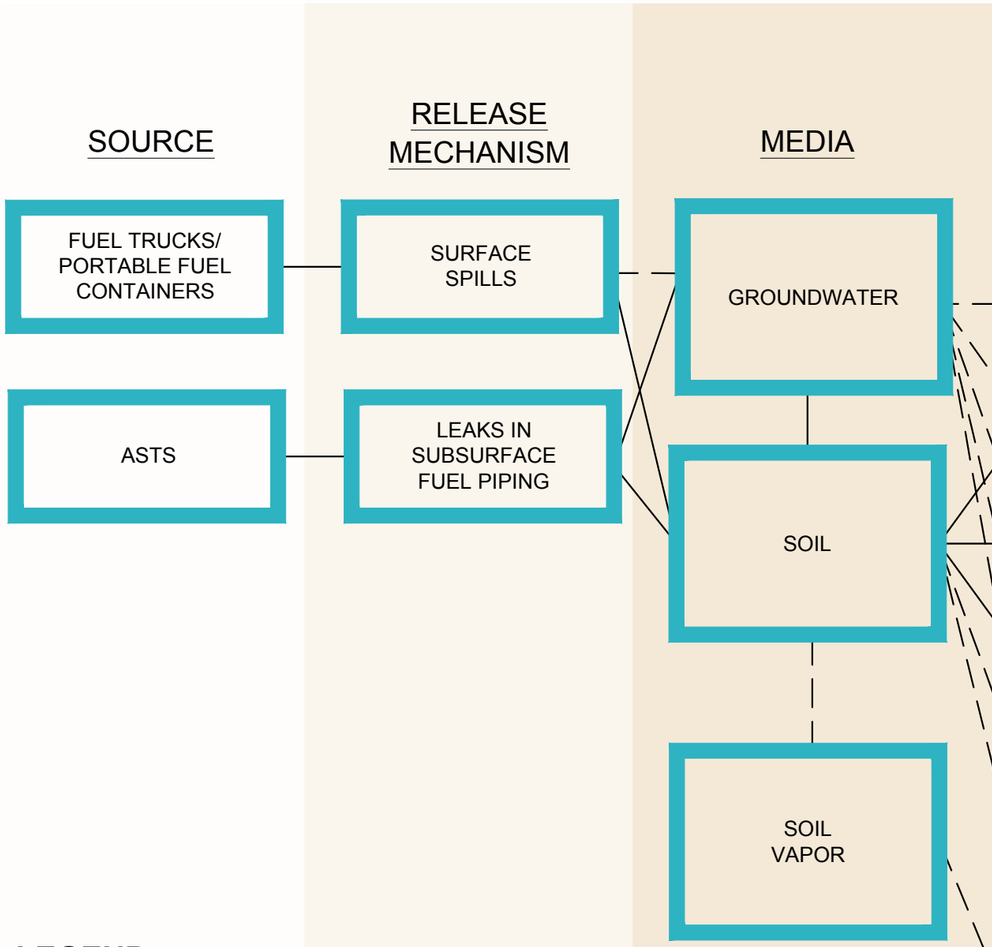
Filename: L:\Projects\41000\41392 Coleman Oil\CAD\DCAP 2024\41392.000_Fig_Proposed_Cleanup_Action_Plan.dwg Layout Tab: FIG 7 - CLEANUP ACTION PLAN User: Moy Isquierdo CAD Plot Date/Time: 1/25/2024 10:28:09 AM



HUMAN RECEPTOR		ENVIRONMENTAL EXPOSURE ROUTE		
RESIDENTS	SITE WORKERS	TERRESTRIAL	AQUATIC	
IP	CP	IP	IP	INGESTION
IP	CP	IP	IP	INHALATION
IP	CP	IP	IP	DERMAL CONTACT
IP	CP	IP	IP	INGESTION
IP	CP	IP	IP	INHALATION
IP	CP	IP	IP	DERMAL CONTACT
IP	CP	IP	IP	INGESTION
IP	CP	IP	IP	INHALATION
IP	CP	IP	IP	DERMAL CONTACT
IP	IP	IP	IP	INGESTION
IP	IP	IP	IP	INHALATION
IP	IP	IP	IP	DERMAL CONTACT
IP	IP	IP	IP	INGESTION
IP	IP	IP	IP	INHALATION
IP	IP	IP	IP	DERMAL CONTACT

LEGEND

— — — INCOMPLETE PATHWAY (IP)

———— COMPLETE PATHWAY (CP)

GENERAL NOTES

1. GROUNDWATER HAS BEEN MEASURED IN ON-SITE MONITORING WELLS RANGING IN DEPTH FROM 16 FEET TO 25 FEET BGS.
2. THE ENTIRE PROPERTY IS CURRENTLY COVERED WITH ASPHALT OR CONCRETE, PREVENTING EXPOSURE TO PLANTS AND/OR WILDLIFE.
3. SUB-SLAB SOIL VAPOR SAMPLES COLLECTED AT THE PROPERTY INDICATE VAPOR INTRUSION IS NOT A COMPLETE PATHWAY.

Filename: L:\Projects\41000\41392 Coleman Oil\CAD\RI Report Figures\41392.000_Fig_2-7.dwg Layout Tab: FIG 11 - CSM FLOW CHART User: Katie Breyman CAD Plot Date/Time: 11/18/2022 11:10:19 AM

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CONCEPTUAL SITE MODEL - FLOW CHART

COLEMAN OIL

1 EAST I STREET, YAKIMA, WASHINGTON

PROJECT
41392.000
DATE
MAR 2024
SHEET ID
8

Tables

Table 1. Evaluation of Remedial Alternatives
Coleman Oil, Yakima, Washington

MTCA Evaluation Criteria	Alternative 1: MPE Enhanced MNA	Alternative 2: Surfactant Enhanced Bioremediation	Alternative 3: Surfactant Enhanced Dual Phase Extraction	Alternative 4: Targeted Soil Excavation with PRB and MPE
Threshold Requirements				
Protect human health and the environment	This remedy is protective of human health and the environment because it provides capture of nonaqueous phase liquid (NAPL) and contaminated groundwater via multiphase extraction (MPE) to prevent plume migration and ongoing groundwater (GW) monitoring to ensure plume reduction or stability.	This remedy is protective of human health and the environment because it provides recovery of NAPL, treatment of GW and includes GW monitoring to ensure plume reduction or stability.	This remedy is protective of human health and the environment because it provides recovery of NAPL, treatment of GW and includes GW monitoring to ensure plume reduction or stability.	This remedy is protective of human health and the environment because it would remove the source of contamination that has impacted GW, eventually reducing GW concentrations, along with MPE, installation of a passive reactive barrier (PRB) to prevent downgradient plume migration, and GW monitoring.
Comply with cleanup standards	Alternative 1 is expected to eventually result in compliance with GW cleanup standards at standard or conditional points of compliance.	Alternative 2 would comply with GW cleanup standards at standard points of compliance.	Alternative 3 would comply with GW cleanup standards at standard points of compliance.	Alternative 4 would comply with GW cleanup standards at standard or conditional points of compliance.
Comply with applicable state and federal laws	Alternative 1 will comply with applicable state and federal laws by eventually reducing GW concentrations to below cleanup standards.	Alternative 2 will comply with applicable state and federal laws by reducing GW concentrations to below cleanup standards.	Alternative 3 will comply with applicable state and federal laws by reducing GW concentrations to below cleanup standards.	Alternative 4 will comply with applicable state and federal laws by eventually reducing GW concentrations to below cleanup standards.
Provide for compliance monitoring	This option includes compliance monitoring.	This option includes compliance monitoring.	This option includes compliance monitoring.	This option includes compliance monitoring.
Does remedy meet all Threshold Requirements?	*Yes*	*Yes*	*Yes*	*Yes*

Table 1. Evaluation of Remedial Alternatives
Coleman Oil, Yakima, Washington

Other Requirements				
Permanent to the Maximum Extent Practicable	This alternative serves as a permanent remedy removing some NAPL and conducting GW monitoring to confirm that contaminants may be reduced by natural attenuation.	This alternative serves as a permanent remedy by enhancing NAPL recovery and allowing in situ bioremediation to treat GW contamination to concentrations that pose no threat to human health or the environment.	This alternative serves as a permanent remedy by enhancing NAPL recovery, and physically removing and treating GW contamination to concentrations that pose no threat to human health or the environment.	This alternative serves as a permanent remedy by removing the residual source of contamination to groundwater and PRB to treat and prevent downgradient plume migration.
Provide for reasonable restoration timeframe	This remedy does not provide a reasonable restoration time as it would not efficiently remove or treat contamination. The timeframe for this alternative is at least 30 years.	This remedy would provide a restoration time of approximately 5 years with physical and biological treatment of GW.	This remedy would provide a restoration time of approximately 5 years with physical treatment of GW and soil vapor.	This remedy would provide a reasonable restoration time, estimated at 10 years. Although this alternative would remove residual contamination in soil, which is expected to reduce GW concentrations, the remaining restoration timeframe is uncertain, therefore, 10 years is assumed, as that timeframe may be needed for GW monitoring.
Consider public concerns	The public may be concerned that active reduction of contamination in soil and groundwater are not being conducted.	No public concerns are identified with this alternative presuming GW monitoring confirms no downgradient migration of plume.	No public concerns are identified with this alternative presuming GW monitoring confirms no downgradient migration of plume.	The public may be concerned with impacts to adjacent public right of way (ROW) needed to facilitate soil excavation. Additionally, public concerns may exist regarding the environmental/greenhouse gas impacts of hauling contaminated media for offsite disposal rather than the in situ destruction of contamination.

Notes:
GW - groundwater

Table 1. Evaluation of Remedial Alternatives
Coleman Oil, Yakima, Washington

MNA – Monitored Natural Attenuation
MPE – Multiphase extraction
MTCA – Model Toxics Control Act
NAPL – Nonaqueous phase liquid
ROW – right of way
PRB – Passive reactive barrier

Table 2 - Comparison of Remedial Action Alternative Costs
Coleman Oil, Yakima, Washington

Task	Alternatives			
	1	2	3	4
	MPE Enhanced MNA	Surfactant Enhanced Bioremediation	Surfactant Enhanced Dual Phase Extraction	Targeted Soil Excavation with PRB and MPE
Capital Cost Totals				
Capital Direct Costs	$104,000	$735,400	$783,000	$6,399,000
Contractor Contingency Assumed	30%	35%	35%	30%
Capital Indirect Costs	$152,800	$425,353	$444,000	$1,300,000
Total Capital Costs	**$257,000**	**$1,161,000**	**$1,227,000**	**$7,699,000**
O&M Cost Totals				
Total O&M Costs	$2,760,000	$1,076,000	$1,261,000	$420,000
Total Capital and O&M Costs	$3,017,000	$2,237,000	$2,488,000	$8,119,000
Years of O&M	30	5	5	10
Annualized O&M Costs	$92,000	$215,200	$252,200	$42,000
PW O&M Costs	$2,311,000	$1,034,000	$1,212,000	$390,000
Project Totals				
Total Capital and PW O&M Costs	**$2,600,000**	**$2,200,000**	**$2,400,000**	**$8,100,000**
Total Project Cost	**$2.6 M**	**$2.2 M**	**$2.4 M**	**$8.1 M**

Notes:
M - million
MNA - monitored natural attenuation
MPE - multiphase extraction
O&M - operation and maintenance
PRB - Passive Reactive Barrier
PW - Present Worth assumes a 2.0% interest rate for 30 years, 1.3% for 5 years and 1.5% for 10 years per OMB Circular A-94, revised 3/2023

Table 3. Disproportionate Cost Analysis Relative Benefits Ranking Evaluation
Coleman Oil, Yakima, Washington

Evaluation Criteria (Weighting Factor %)	Alternative 1: Multiphase Extraction Enhanced Monitored Natural Attenuation	Alternative 2: Surfactant Enhanced Bioremediation	Alternative 3: Surfactant Enhanced Dual Phase Extraction	Alternative 4: Targeted Soil Excavation with PRB and MPE
	Relative Benefits Ranking for DCA			
Overall Protectiveness 30%	**Fair** This remedy is protective of human health and the environment because reduces contamination by removal of NAPL and provides soil confirmation sampling and ongoing groundwater monitoring during remediation to ensure that the contaminant plume remains stable or is reduced and exposure pathways remain incomplete.	**Excellent** This remedy is protective of human health and the environment because it removes NAPL and reduces contamination in place and provides soil confirmation sampling and ongoing groundwater monitoring during remediation to ensure that the contaminant plume remains stable or is reduced and exposure pathways remain incomplete.	**Excellent** This remedy is protective of human health and the environment because it reduces contamination in place and provides soil confirmation sampling and ongoing groundwater monitoring during remediation to ensure that the contaminant plume remains stable or is reduced and exposure pathways remain incomplete.	**Excellent** This remedy is protective of human health and the environment because it provides removal of the source to groundwater contamination and includes soil confirmation sampling and ongoing groundwater monitoring to ensure the contaminant plume is stable and exposure pathways remain incomplete.
Benefit Score[a]: Raw/(Weighted)	**3/(0.9)**	**7/(2.1)**	**7/(2.1)**	**8/(2.4)**
Permanence 20%	**Fair** Permanent remedy by removing some NAPL and conducting monitoring to confirm that contaminants will be further reduced by natural attenuation. Contaminants will be reduced by MPE although concentrations above cleanup standards may remain.	**Excellent** Permanent remedy by enhancing NAPL recovery and allowing in situ bioremediation to treat GW contamination to concentrations that pose no threat to human health or the environment.	**Excellent** Permanent remedy by enhancing NAPL recovery and physically removing and treating GW contamination to concentrations that pose no threat to human health or the environment.	**Excellent** Permanent remedy by removing the source of contamination to GW and PRB to treat and prevent downgradient plume migration. Contaminants will be further reduced by natural attenuation to concentrations that pose no threat to human health or the environment.
Benefit Score[a]: Raw/(Weighted)	**3/(0.6)**	**8/(1.6)**	**8/(1.6)**	**8/(1.6)**

Table 3. Disproportionate Cost Analysis Relative Benefits Ranking Evaluation
Coleman Oil, Yakima, Washington

Evaluation Criteria (Weighting Factor %)	Alternative 1: Multiphase Extraction Enhanced Monitored Natural Attenuation	Alternative 2: Surfactant Enhanced Bioremediation	Alternative 3: Surfactant Enhanced Dual Phase Extraction	Alternative 4: Targeted Soil Excavation with PRB and MPE
	Relative Benefits Ranking for DCA			
Long-Term Effectiveness 20% Benefit Score[a]: Raw/(Weighted)	**Fair** If MPE is unable to reduce contaminant concentrations to below cleanup standards, long term effectiveness of this remedy would be reduced. **4/(0.8)**	**Excellent** Permanent destruction of contaminants and reduction of concentrations to below cleanup levels will remain very effective in the long term. **8/(1.6)**	**Excellent** Permanent destruction of contaminants and reduction of concentrations to below cleanup levels will remain very effective in the long term. **8/(1.6)**	**Excellent** Removal of source of contamination by excavation and monitoring to ensure groundwater concentrations attenuate to below cleanup levels will remain very effective in the long term. **8/(1.6)**
Management of Short-Term Risks 10% Benefit Score[a]: Raw/(Weighted)	**Excellent** While this remedy may eventually achieve cleanup standards for groundwater, the time frame for contaminant reduction is long, and thus risks of contamination remain in the short-term. However, there is minimal short-term risk for workers during implementation. **7/(0.7)**	**Good** Moderate risk of contact with contaminated soil and groundwater during drilling, installation of injection and extraction wells, and during treatment system operation. **6/(0.6)**	**Good** Moderate risk of contact with contaminated soil and groundwater during drilling, installation of injection and extraction wells, and during treatment system operation. **5/(0.5)**	**Poor** Moderate to high risk of contact with contaminated soil and groundwater during excavation and offsite disposal, but this risk can be managed with proper controls. Following excavation of source, short term risk is greatly reduced. **2/(0.2)**

Table 3. Disproportionate Cost Analysis Relative Benefits Ranking Evaluation
Coleman Oil, Yakima, Washington

Evaluation Criteria (Weighting Factor %)	Alternative 1: Multiphase Extraction Enhanced Monitored Natural Attenuation	Alternative 2: Surfactant Enhanced Bioremediation	Alternative 3: Surfactant Enhanced Dual Phase Extraction	Alternative 4: Targeted Soil Excavation with PRB and MPE
	Relative Benefits Ranking for DCA			
Implementability 10% Benefit Score[a]: Raw/(Weighted)	**Superior** This remedy can be implemented with mobile equipment that visits the Site periodically on an as needed basis. The scope of this remedy is easily expanded or reduced to meet Site needs based on monitoring. **10/(1.0)**	**Good** • Technical implementation moderately complex with significant impacts to current on-site operations. • Administrative implementation challenges include installation of system, particularly injection/extraction wells and horizontal piping, during continued operation of the Site as a bulk fueling facility. **5/(0.5)**	**Good** • Technical implementation moderately complex with significant impacts to current on-site operations. • Administrative implementation challenges include installation of system, particularly injection/extraction wells and horizontal piping, during continued operation of the Site as a bulk fueling facility. **5/(0.5)**	**Poor** • Technical implementation is not complex but very impactful to Site; excavation to depths of 20 feet bgs involves logistical challenges in an area with adjacent structures. • Building demolition and reconstruction is required, presenting a significant impact to Site relative to other alternatives. **2/(0.2)**
Consideration of Public Concerns 10%	This criterion will be evaluated after the public comment period	This criterion will be evaluated after the public comment period	This criterion will be evaluated after the public comment period	This criterion will be evaluated after the public comment period

Table 3. Disproportionate Cost Analysis Relative Benefits Ranking Evaluation
Coleman Oil, Yakima, Washington

Evaluation Criteria	Alternative 1: Multiphase Extraction Enhanced Monitored Natural Attenuation	Alternative 2: Surfactant Enhanced Bioremediation	Alternative 3: Surfactant Enhanced Dual Phase Extraction	Alternative 4: Targeted Soil Excavation with PRB and MPE
	DCA Summary			
Estimated Cost[b]	**$2.6M**	**$2.3M**	**$2.5M**	**$8.1M**
Overall Weighted Benefit Score	**4 Fair**	**6.4 Good**	**6.3 Good**	**6 Good**
Overall Alternative Benefit Ranking	4	1 (Most Beneficial)	2	3
Relative Cost/Benefit Ratio	650K	359K	397K	1,350K
Remedy Permanent to the Maximum Extent Practicable?	No	Yes	No	No
Is the Alternative's Cost Disproportionate to its Incremental Benefits?	Yes	No	Yes	Yes

[a] – Ratings used: Poor (1-2), Fair (3-4), Good (5-6), Excellent (7-8), Superior (9-10).
[b] – Estimated Cost = Total Project Present Worth Cost (see Table 5 Comparison of Remedial Action Alternative Costs and Appendix A Remedial Action Alternative Cost Estimates).

Notes:
DCA – disproportionate cost analysis
GW - groundwater
MNA – monitored natural attenuation
MPE – Multiphase extraction
NAPL – non-aqueous phase liquid
O&M – operation and maintenance
PRB – passive reactive barrier

Table 4. Cleanup Levels and Remediation Levels
Coleman Oil Yakima

Chemicals of Concern	Groundwater Cleanup Levels (MTCA Method A[a]) (µg/L)	Soil Cleanup Levels (MTCA Method A [b]) (mg/kg)	Remediation Levels (feet)
TPH-D	500	2,000	N/A
TPH-G	800	30	
Benzene	5	0.03	
Toluene	1,000	7	
Ethylbenzene	700	6	
Total Xylenes	1,000	9	
Naphthalene	160	5	
Cadmium	5	2	
Lead	15	250	
NAPL	N/A	N/A	0.05

Notes:

[a] Groundwater cleanup levels based on MTCA Method A Groundwater cleanup levels
[b] Soil cleanup levels based on MTCA Method A Soil cleanup levels for unrestricted land use

MTCA – Model Toxics Control Act
mg/kg – milligrams per kilogram
N/A – not applicable. The CAP does not establish remediation levels for COCs or cleanup standards for NAPL.
NAPL – nonaqueous phase liquid
TPH – Total Petroleum Hydrocarbons
TPH-D – Diesel range TPH
TPH-G – Gasoline range TPH
µg/L – micrograms per liter

Table 5. Applicable or Relevant and Appropriate Requirements
Coleman Oil, Yakima, Washington

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/Relevant and Appropriate
Chemical-Specific			
Federal National Primary Drinking Water Regulations	40 CFR 141 and 142	Establishes health-based standards, maximum contaminant levels (MCL) and maximum contaminant level goals (MCLG), for public water systems.	Relevant and Appropriate
Federal Regional Screening Levels for soil and water	Source: epa.gov/risk/regional-screening-levels-rsls	Provides risk-based concentrations that are intended to assist risk assessor and others in initial screening-level evaluations of environmental regulations	Applicable
Washington State Model Toxics Control Act (MTCA) Cleanup Levels (CULs) for Groundwater	WAC 173-340	Requires groundwater cleanup levels be based on the estimates of the highest beneficial use and the reasonable maximum potential exposure under current and future site uses	Applicable
MTCA - Selection of Cleanup Actions	WAC 173-340-360(2)(f)	Limits on use of remediation levels	Relevant and Appropriate
Washington State Water Quality Standards for Groundwater	WAC 173-200	Establishes maximum contaminant concentrations for the protection of beneficial uses of groundwater	Potentially Relevant and Appropriate
Washington Dangerous Waste Regulations	WAC 173-303	This regulation implements chapter 70.105 RCW, the Hazardous Waste Management Act as amended, and implements, in part, chapters 70.95E, 70.105D, and 15.54 RCW, and Subtitle C of Public Law 94-580, the Resource Conservation and Recovery Act of 1976, which the legislature has empowered the department to implement.	Potentially Relevant and Appropriate
Action-Specific			
MTCA - Selection of Cleanup Actions	WAC 173-340-360(2)(a)&(b)	Establishes the minimum requirements and procedures for selecting cleanup actions; defines threshold requirements and other requirements	Applicable
MTCA - Selection of Cleanup Actions	WAC 173-340-360(2)(c)	Establishes the minimum requirements for groundwater cleanup actions	Applicable
MTCA - Selection of Cleanup Actions	WAC 173-340-360(2)(e)	Requirements for institutional controls	Applicable
Washington MTCA - Limits on dilution and dispersion	WAC 173-340-360(2)(g)	Addresses reliance on dilution and dispersion overactive remedial measures	Applicable

Table 5. Applicable or Relevant and Appropriate Requirements
Coleman Oil, Yakima, Washington

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/Relevant and Appropriate
Washington State Regulation and Licensing for Well Contractors and Operators	RCW 18.104 WAC 173-162	Establishes procedures for examination, licensing, and regulation of well contractors and operators	Relevant and Appropriate
Washington State Standards for Construction and Maintenance of Water Wells	RCW 18.104 WAC 173-160	Establishes minimum standards for construction of water and monitoring wells and for the decommissioning of wells.	Relevant and Appropriate
Washington Underground Injection Control Program	WAC 173-218	Requirements for underground injection control applicable to cleanup alternatives that include injection of materials into subsurface groundwater and soil.	Relevant and Appropriate
Washington Solid Waste Management Handling Standards and Regulations	RCW 70.95WAC 173-350	Solid waste requirements are potentially applicable to the offsite disposal of solid nonhazardous wastes that may be generated as part of well installation or excavation.	Relevant and Appropriate
Location-Specific			
Endangered Species Act	16 USC 1531-1543; 50 CFR 402; 50 CFR 17	Requirements to protect fish, wildlife and plants that are threatened or endangered with extinction. This act requires consultation with resource agencies for projects that may affect threatened or endangered species.	Potentially Relevant and Appropriate
Fish and Wildlife Conservation Act	16 USC 2901; 50 CFR 83	Requirements for federal agencies to use their authority to conserve and promote conservation of non-game fish and wildlife, and evaluated in conjunction with the Endangered Species Act consultation.	Potentially Relevant and Appropriate
Archaeological and Historic Preservation Act	16 USC 469	Establishes procedures for the preservation of historical and archeological data that might be destroyed through alteration of terrain because of a federally licensed activity or program.	Potentially Relevant and Appropriate
Archaeological Resources Protection Act	16 USC 470aa; 43 CFR 7	Specifies the steps that must be taken to protect archaeological resources and sites that are on public and Native American lands and to preserve data uncovered.	Potentially Relevant and Appropriate
City of Yakima Grading Permit	2018 IBC, Appendix J	Grading permits required for clearing/grading land-disturbing activities. https://www.yakimawa.gov/services/codes/files/Grading-Permit-Application_05-2023.pdf	Relevant and Appropriate

Table 5. Applicable or Relevant and Appropriate Requirements
Coleman Oil, Yakima, Washington

Standard, Requirement, Criteria, or Limitation	Citation	Description	Applicable/Relevant and Appropriate
City of Yakima Stormwater and Erosion Control	YMC 7.83.130	Requirements for stormwater management and erosion control for clearing/grading of 1 acre or more.	Potentially Relevant and Appropriate
Yakima Regional Clean Air Agency (YRCAA)	Regulation 1 of the YRCAA	Local requirements implementing the Washington Clean Air Act to control air pollution through procedures, standards, permits, and programs.	Relevant and Appropriate
Stormwater Permit Program	RCW 90.48.260; 40 CFR 122.26; WAC 173-226	Requirements of the Federal Clean Water Act for coverage under the general stormwater permit for stormwater discharges associated with construction activities disturbing over 1 acre.	Relevant and Appropriate
State Waste Discharge Permit Program	WAC 173-216	Requirements for discharge of treated water directly to the ground.	Potentially Relevant and Appropriate
State Environmental Policy Act	RCW 43.21C; WAC 197-11; WAC 173-802	State law intended to ensure state and local government officials consider environmental values when making decisions or taking an official action such as approving the Cleanup Action Plan.	Relevant and Appropriate

Notes:
CFR – code of federal regulations
CULs – cleanup levels
IBC – International Building Code
MCL – maximum contaminant level
MCLG – maximum contaminant level goals
MTCA – Model Toxics Control Act
RCW – Revised Code of Washington
WAC – Washington Administrative Code
USC – United States Code
YMC – Yakima Municipal Code
YRCAA - Yakima Regional Clean Air Agency