Analysis of Brownfields Cleanup Alternatives
2450 Altamont Drive
Klamath Falls, OR

Prepared for:

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Analysis of Brownfields Cleanup Alternatives Report
2450 Altamont Drive, Klamath Falls, OR

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1.0 Introduction

Eastern Research Group, Inc. (ERG) was contracted by the U.S. Environmental Protection Agency (EPA) on behalf of Klamath County (the Applicant) to conduct an Analysis of Brownfields Cleanup Alternatives (ABCA) for the property located at 2450 Altamont Drive in Klamath Falls, Oregon (OR), hereinafter referred to as "the Site" or "the subject property."

In April 2024, Klamath County requested environmental site assessment (ESA) and technical assistance services from the EPA Region 10 Targeted Brownfields Assessment (TBA) Program to conduct a Phase II ESA in order to acquire information regarding the nature of contamination (if present) and risks posed by that contamination to support future cleanup of the Site, if required.

The Phase II ESA Report concluded that the soils and groundwater in the southwest corner of the Site appear to have been impacted by historic petroleum releases related to Site operations. Petroleum analytes in soil were detected at concentrations exceeding the EPA Regional Screening Levels (RSLs) for Resident Soil and Composite Worker Soil and petroleum analytes in groundwater were detected at concentrations exceeding the EPA RSL for Resident Tapwater and Oregon Department of Environmental Quality (DEQ) risk-based concentrations (RBCs) for Residential and Occupational Ingestion and Inhalation from Tapwater. Certain per- and polyfluoroalkyl substances (PFAS) were also detected in soil and groundwater in the northwest corner of the Site at detections exceeding the EPA RSLs for Resident Soil and Composite Worker Soil, and the EPA RSL for Resident Tapwater. Lead was detected in surficial soils along four of the five driplines of the Site warehouse at concentrations exceeding the DEQ RBC for Residential Soil Ingestion, Dermal Contact, and Inhalation and the EPA RSL for Resident Soil. A Hazardous Building Material Survey (HBMS) confirmed the presence of lead-based paint (LBP) in exterior and interior locations of the warehouse building and on the associated loading rack. Mercury-containing fluorescent tubes were also observed in the warehouse building during the HBMS (ERG 2025).

Screening investigation results against Oregon DEQ's RBCs is the primary method of evaluating risk, in accordance with DEQ's Risk-Based Decision Making Guidance and the Site's Conceptual Site Model. Decisions regarding protectiveness, cleanup and potential limitations on future use are based on DEQ's cleanup process for contaminants of concern (COCs) which DEQ has established screening values. If DEQ does not have established screening values for COCs, EPA SLs may be used to evaluate risk in accordance with DEQ's Human Health Risk Assessment Guidance (2010).

DEQ has initiated rulemaking to designate PFOS, PFOA, PFHxS, PFNA, HFPO-DA or GenX, and PFBS as Oregon hazardous substances. At the request of DEQ, due to a previous structure fire on the west adjoining property and reference to use of [fire-fighting] foam to extinguish the fire, ERG collected samples for PFAS analysis at the request of DEQ. PFAS results indicate there are exceedances of EPA's RSLs. After rulemaking is complete, DEQ may require cleanup to address PFAS contamination.

1.1 Purpose

This ABCA identifies the cleanup goals that must be met to ensure that present or future risk to human health or the environment is reduced to protective levels based upon present and future uses of the Site. This ABCA presents cleanup alternatives and describes the evaluation methods used to select a cleanup alternative that will address known COCs and associated risks at the Site. The cleanup alternatives are evaluated based on protection of human health and the environment, ease of implementation, cost of remediation, sustainability, ability to meet the proposed land use, and compliance with applicable standards.

1.2 Report Structure

Section 1.0 Introduction provides an overview and brief description of the purpose and scope of the ABCA.

Section 2.0 Background includes a brief Site history and a summary of prior environmental investigations at the Site.

Section 3.0 Development of Cleanup Goals includes a discussion of the current and future land use, COCs, and cleanup goals for the Site.

Section 4.0 Identification of Brownfields Cleanup Alternatives identifies and describes proposed cleanup alternatives.

Section 5.0 Evaluation of Cleanup Alternatives describes the criteria used to evaluate the proposed cleanup alternatives presented in Section 4.0.

Section 6.0 Comparison of Cleanup Alternatives compares the analysis of the proposed alternatives against the evaluation criteria and ranks them based on low to high success, producing a preferred alternative with the highest score.

Section 7.0 Limitations and Additional Assessment describes the limitations associated with planning-level estimates.

Section 8.0 References and Resources Used provides references for reports cited and used for resource information in this document.

2.0 Background

2.1 Site Location and Description

The Site is located within the city of Klamath Falls in southwest OR, is 0.48 acres, and is comprised of one parcel: tax lot 3909-003CA-00200. The subject property's general central point is located at 42.2056910 degrees North Latitude and 121.7476450 degrees West Longitude within the northwest quarter of section 3 of Township 39S, Range 09E, Willamette Principal Meridian, OR. The Site is currently owned by Klamath County as a result of a foreclosure. The Site is accessible from Crosby Avenue, which defines the property's southern border, or from Altamont Drive, which forms the property's east border. The Site is bordered on the west by an unoccupied parking lot (former lumber storage yard), and to the north by a paved walking path (former railway) separating the Site from commercial space along South 6th Street. The area in the vicinity of the subject property is mixed zoning, consisting of general commercial, low industrial, and heavy industrial uses.

2.2 Site Use History

The Site operated as a Texas Company (later known as Texaco) bulk plant between 1926 and 1999. The Site likely received gasoline and diesel fuel from the adjacent railway for local distribution. The Site formerly had five aboveground storage tanks (ASTs): two 20,000-gallon gasoline tanks, one 20,000-gallon diesel tank, one 20,000-gallon oil tank, and an approximately 12,000-gallon kerosene tank. In addition, three card-lock pump islands were located onsite, with one being used for gasoline and the other two used for diesel. The Site was damaged by a structure fire at the lumber storage yard located on the adjacent property to the west that spread to the Site's ASTs in September 1999. The Site has been inactive since 1999.

2.3 Site Reuse Plan

Klamath County intends to advertise the property for sale once cleanup goals have been achieved. Given the location of the Site in the center of Klamath Falls, the Site is anticipated to have excellent potential for further development and use after concerns about potential contamination issues have been addressed. Based on the location of the Site and its current zoning, it is likely that the property would be used for commercial purposes.

2.4 Summary of Previous Environmental Assessments

Previous environmental assessments conducted at the Site are briefly summarized below.

2.4.1 2007 & 2008 Soil & Groundwater Assessments

In 2007, a soil and groundwater assessment conducted by Environmental Management Services, Inc. (EMS) identified two general areas of soil and/or groundwater contamination on the Site. One area south of the former AST containment area had exceedances of benzene in soil above the DEQ RBC for vapor intrusion into buildings. A second area located in the southwest portion of the Site also had exceedances of benzene in soil above the DEQ RBC for vapor intrusion into buildings as well as total petroleum hydrocarbons as gasoline range organics (TPH-GRO) and benzene in groundwater at concentrations above DEQ RBCs for groundwater in excavations (EMS 2007). Methyl tert-butyl ether (MTBE) was part of this COC group during the 2007 assessment, but did not have any exceedances above any RBC for any soil or groundwater sample collected.

In 2008, a subsurface investigation conducted by Brady Environmental, Inc. (BEI) identified TPH-GRO, TPH as diesel range organics (TPH-DRO), TPH as heavy oil (TPH-HO), and the volatile organic compounds (VOCs) benzene, toluene, ethylbenzene, and total xylenes (BTEX) in soil borings located in the southern portion of the Site as well as TPH-GRO, ethylbenzene, and total xylenes at one offsite boring location. Benzene and total xylenes were also detected in on-site groundwater samples, and BTEX were detected in offsite groundwater samples. However, the report did not discuss the results of the soil and groundwater sampling in the context of DEQ RBCs. BEI delineated the general extent of the shallow (approximately 3 feet below ground surface [bgs]) petroleum contamination in the northern section of the Site near the former AST containment area, in the south and western sections of the Site near the former pump islands and extending into the sewer as a pathway and migrating westward down Crosby Avenue (BEI 2008).

2.4.2 2011 After Action Report

In 2011, Environmental Consulting & Assessment, Inc. (ECA) conducted an assessment and management of petroleum contaminated soil and groundwater during utility excavation work, done by the City of Klamath Falls. This investigation had detected TPH and VOC constituents (including MTBE) in groundwater at several borings located between the intersection of S 6th Street and Crosby Avenue (ECA 2011).

Due to the right-of-way, a preferential pathway likely exists under the roadway and the specific source of contamination in this area cannot be determined with certainty.

2.4.3 2011 Remedial Action Report

In 2011, BEI conducted remedial action at the Site including the removal of the three card lock pump islands, underground fuel lines, and the former AST containment area. Approximately 800 cubic yards of impacted soil were excavated from two areas on the Site near the former AST containment area and near the former pump islands. Remedial excavations were conducted to a depth of approximately 8 to 9 feet bgs, which is where the excavator met refusal (BEI 2011).

The 2011 BEI report indicates that soil samples were collected from the sidewalls of the excavated areas above the water table and from the bottom of the excavation below the water table. Two soil samples collected from the northern and southern extents of the initial AST excavation area had elevated TPH-GRO concentrations and one sample also had elevated concentrations of benzene and ethylbenzene. The report indicates that the excavation area was subsequently expanded and that a sample collected from the upgradient extent of the expanded AST excavation area detected TPH-GRO above the DEQ RBC for soil leaching to groundwater. Total xylenes were detected in a confirmation sample collected from the southernmost boundary of the pump island excavation area above the DEQ RBC for soil leaching to groundwater (BEI 2011).

The 2011 BEI report indicates that grab samples were collected from groundwater present in excavated areas and were analyzed for TPH-GRO and BTEX. No analytes were detected above DEQ RBCs for groundwater in excavations (BEI 2011).

Additionally, the 2011 BEI report documents that approximately 800 cubic yards of petroleum contaminated soil excavated from the Site and 300 cubic yards of petroleum contaminated soil from offsite sources were treated onsite via passive aeration techniques. The treated soil was representatively sampled for TPH-GRO and VOCs and subsequently used as fill onsite. According to the report, all samples collected from treated soil following the remedial action were below DEQ RBC levels for applicable exposure pathways. BEI recommended that no further action be taken at the Site (BEI 2011).

2.4.4 2025 Phase II ESA

ERG conducted a Phase II ESA in November 2024, with the report finalized in May 2025. During the Phase II ESA, ERG collected groundwater, soil vapor, and subsurface soil samples, as well as surface soil sampling in the accessible driplines of the existing structure to assess potential lead contamination from LBP. Additionally, a HBMS was conducted by PBS Engineering and Environmental (PBS) to quantify asbestos, lead, mercury and polychlorinated biphenyls (PCBs) in Site building materials.

The following conclusions from the Phase II ESA were identified:

- **Petroleum Impacts to Soil and Groundwater.** Soils and groundwater in the southwest corner of the Site appear to be impacted by historic petroleum releases. The benzene concentration (13.1 mg/kg) in BH-4 exceeds the DEQ RBC for Residential Soil for volatilization to outdoor air of 11 mg/kg; however, a deed restriction on use of the site for residential purposes would mitigate this risk pathway. Benzene was detected at concentrations exceeding the EPA RSL for Resident and Composite Worker Soil and ethylbenzene was detected at concentrations exceeding the EPA RSL for Resident Soil in soil samples collected at approximately 5 feet bgs from borehole location BH-4 (Figure 3).

  In addition, TPH-GRO, TPH-DRO, benzene, ethylbenzene, and naphthalene concentrations in groundwater collected from TMW-4 (the temporary monitoring well co-located with borehole BH-4) exceeded DEQ RBCs for Residential and Occupational Tapwater and/or the EPA RSL for Resident Tapwater.

  MTBE was detected in the groundwater sample from TMW-3 at a concentration above the DEQ RBC for Residential Tapwater and the EPA RSL for Resident Tapwater. No other groundwater or soil sampling location had detected COC concentrations in excess of RSLs. Due to the right-of-way, a preferential pathway may exist under the roadway and the source of MTBE contamination in this area cannot be determined.

There are no active domestic wells located within one mile downgradient of the Site.

No target petroleum constituents of concern (COCs) were detected in groundwater at concentrations exceeding DEQ RBCs for Groundwater in Excavation or in soil vapor at concentrations exceeding DEQ RBCs for Commercial Soil Vapor or EPA VISLs.

- **PFAS Impacts to Soil and Groundwater.** Soils and groundwater in the northwest corner of the Site appear to be impacted by PFAS. PFOS and PFOA were detected at concentrations exceeding the EPA RSLs for Resident Soil and/or Composite Worker Soil in soil samples collected at approximately 1.5 feet bgs from borehole locations BH-1 and BH-2 (Figure 3). In addition, PFOS, PFOA, and PFHxS concentrations in groundwater collected from TMW-1 and TMW-2 (the temporary monitoring wells co-located with boreholes BH-1 and BH-2, respectively, exceeded EPA RSLs for Resident Tapwater. It is noted that there are no current DEQ RBCs for PFAS.

  DEQ has initiated rulemaking to designate PFOS, PFOA, PFHxS, PFNA, HFPO-DA or GenX, and PFBS as Oregon hazardous substances. At the request of DEQ, due to a previous structure fire on the west adjoining property and reference to use of [fire-fighting] foam to extinguish the fire, ERG collected samples for PFAS analysis at the request of DEQ. PFAS results indicate there are exceedances of EPA's RSLs. After rulemaking is complete, DEQ may require cleanup to address PFAS contamination.

  The source of the PFAS contamination on-site is unknown. Fire suppressant foam that was likely PFAS-containing was applied in the vicinity of the former ASTs on-site during the 1999 fire, as well as on the west-adjacent property (a former lumber storage building and yard) where the fire originated. It is unknown if the Site had other sources of PFAS releases at the site from on-site fire suppression systems that were common for bulk fuel storage facilities or other on-site storage that may have contributed to the soil and groundwater concentrations detected.

  There are no active domestic wells located within one mile downgradient of the Site.

- **Lead in Surface Soil at Warehouse Driplines.** Lead was detected in surficial soils along two dripline locations around the Site warehouse at concentrations exceeding the EPA RSL for Resident Soil and along four dripline locations (representing three sides of the building) at concentrations exceeding the DEQ RBC for Residential Soil. Exterior paint samples collected from the warehouse building and associated loading rack had lead concentrations ranging from 620 mg/kg to 49,000 mg/kg. Based on the confirmed presence of LBP on the warehouse's exterior, it is likely that this is the source of elevated concentrations of lead found in surficial soils surrounding the warehouse.

- **Presence of Hazardous Building Materials.** The HBMS identified LBP in interior and exterior locations of the warehouse building and on the loading rack structure. Mercury-containing fluorescent tubes were also observed during the HBMS. These hazardous building materials may pose a risk to current and future Site users and the environment.

Based on the findings and conclusions summarized above, it is noted that deed restrictions preventing residential Site use and groundwater use at the Site would remove the risk of on-site petroleum and surface soil drip-line lead exposure concerns. Along with the Site being connected to the public water supply system, a groundwater use restriction would also remove the potential for exposure to PFAS detected in groundwater via the tapwater pathway.

ERG recommends that additional PFAS sampling at the Site and surrounding properties be conducted to determine the origin and extent of soil and groundwater PFAS contamination. ERG also recommends the development of an Analysis of Brownfields Cleanup Alternatives (ABCA) to identify and evaluate cleanup alternatives to address hazardous building materials in Site structures. Since PFAS are not currently listed by Oregon as hazardous substances, PFAS site impacts are not being recommended to be addressed in the ABCA at this time. However, Oregon is currently undertaking rulemaking that would list them as hazardous substances and DEQ recommends including cleanup options to address potential risk to PFAS contamination (e.g., soil removal and offsite disposal following a CMMP or capping with a Soil Cap Management Plan). After the conclusion of DEQ's rulemaking process, the ABCA should be revised to incorporate cleanup alternatives for PFAS contaminants.

3.0 Development of Cleanup Goals

Cleanup goals vary depending on the current and reasonably likely future land uses at the Site. The following sections describe the current and future land uses, potential scenarios or pathways by which a Site user could be exposed to COCs at the Site, applicable laws and regulations, and cleanup goals for Site COCs.

3.1 Land Use

3.1.1 Current Land Use

The subject property is currently unoccupied and inactive.

3.1.2 Anticipated Future Land Use

Cleanup target levels vary depending on the current and reasonably likely future land uses at the Site. The current property owner, Klamath County, has indicated that they are open to accepting deed restrictions such that the Site would not be allowed to have future residential use or groundwater use in order to eliminate soil and groundwater exposure pathways based on exceedances of DEQ RBCs for Residential Soil and Tapwater and EPA RSLs.

Based on the mixed zoning designation of the subject property and general commercial uses in the vicinity of the Site, the proposed future use of the Site includes removal of some or all the Site structures and redevelopment of the land for commercial or industrial use.

3.1.3 Climate Considerations

EPA's Climate Change Adaptation Plan describes priority actions for EPA to integrate into its programs, policies, rules, and operations (EPA 2021a). The Adaptation Plan outlined the following potential impacts of changing weather conditions on contaminated sites:

- Wildfire, more intense flooding and coastal storms, and sea level rise, can release pollution from contaminated sites and/or industrial facilities.
- Increased temperatures and changes in runoff can adversely affect cleanups.
- Unexpected, climate-driven conditions can compromise the effectiveness of cleanup remedies selected without those impacts in mind.
- Climate impacts can increase the amount of debris sent to landfills and can also encroach on the landfills.

EPA Region 10's Climate Change Adaptation Implementation Plan (EPA 2022) further identifies vulnerabilities specific to the general geographic region where the Site is located, including:

1. Increased Precipitation Frequency and Intensity
2. Changes in Precipitation State, Snowpack, and Snowmelt
3. Flooding and Fluctuating Groundwater Elevation Levels Due to Precipitation Changes
4. Increased Drought
5. Increased Number and Severity of Wildfires
6. Sea-Level Rise
7. Permafrost Thaw
8. Increase in Average Annual Air Temperature

The Site is susceptible to several of the vulnerabilities identified above.

Information obtained from the U.S. Climate Mapping for Resilience & Adaptation (CMRA) tool (NOAA, 2025a) identifies potential impacts of changing weather conditions within Klamath County, where the Site is located, by comparing a historic period of 1976-2005 with modeled climate projections from mid-century (2035-2064) and late century (2070-2099). Notable projected climate hazards include extreme heat, defined as the number of days within a year exceeding 90 degrees F to greater than 105 degrees F. Climate projections predict the number of days exceeding 90 degrees F to grow from a range of 6-9 days in the historic period to a range of 35-74 days, depending on the modeled emissions scenario. The model indicates that Klamath County typically had zero days per year where the maximum temperature exceeded 105 degrees F in the historic period, however, that may increase to 0-6 days per year by the mid- to late-century. According to the National Oceanic and Atmospheric Administration (NOAA, 2025b), increasing days of extreme weather (i.e., extreme heat), as well as an overall shift towards a warmer climate can affect the resilience of existing infrastructure. Examples include requiring more indoor cooling, which further stresses energy grids.

Climate projections reflected in the CMRA tool indicate that Klamath County may receive approximately the same amount of annual precipitation in the mid- and late century periods as compared to the modeled historic time period (projections show a slight increase). However, the increase in air temperature may affect the precipitation state, in particular, the snowpack. During the historic period, Klamath County had an average of 18-21 days per year where the maximum temperature was less than 32°F, which influences whether precipitation falls as rain or snow, as well as the maintenance of the snowpack. Modeled results indicate that the number of days with a maximum temperature below 32°F may decrease to 5-14 days per year on average by mid-century and to 1-10 days per year on average by late century, depending on the climate emissions scenario. The EPA states that "the number of days below freezing during a year determines which plants can thrive, what food sources are available for animals, and when and how animals migrate or hibernate. Freezing temperatures also help reduce populations of certain insects and other pests" (EPA 2024c).

The Federal Emergency Management Agency's (FEMA's) National Risk Index identifies Census tract 41035971500, which encompasses portions of the city of Klamath Falls, as having a *Very High* risk index overall when compared to the rest of the U.S. FEMA's Risk Index scores consider expected annual loss due to natural hazards, social vulnerability, and community resilience (FEMA 2025).

Based on the Site location and its proposed reuse, climate impacts are likely to affect the Site. The cleanup alternatives discussed in this report are accompanied by unquantifiable amounts of risk to their long-term performance due to uncertainties that may be introduced by a changing climate; however, to allow for relative comparison, the alternatives are discussed qualitatively. The alternatives include considerations of strategies for environmental adaptation and resilience, when practical, such as the topics outlined in EPA's Climate Smart Brownfields Manual (EPA 2021b).

3.2 Exposure Scenarios and Pathways

When a human or ecological receptor comes into contact with a contaminant in the environment (soil, air, and/or water) through ingestion, inhalation, or dermal exposure, this is considered a complete exposure pathway. A complete exposure pathway consists of four necessary elements: 1) a source and mechanism of chemical release to the environment, 2) an environmental transport medium for a released chemical, 3) a point of potential contact with the impacted medium (referred to as the exposure point), and 4) an exposure route (e.g., groundwater ingestion, vapor intrusion) at the exposure point.

Depending on the exposure scenario, Site users may come into contact with petroleum or PFAS in soil and groundwater, lead in dripline soils and lead and mercury found in hazardous building materials.

The exposure pathways of concern are:

- Incidental inhalation of, and dermal contact with petroleum constituents including benzene and ethylbenzene found in subsurface soils
  - As mentioned in Section 2.4.4, benzene and ethylbenzene in subsurface soils exceed the EPA RSLs for Resident Soil and benzene exceeded the DEQ RBC for Residential Soil for volatilization to outdoor air. Considering the proposed deed restrictions preventing future residential use of the Site, incidental inhalation of and dermal contact with subsurface soils by residential users is would not be a possible exposure pathway.
  - Although benzene also exceeded the EPA RSL for Composite Worker Soil, none of these petroleum constituents were detected at concentrations exceeding the applicable DEQ RBCs for Occupational Soil, Construction Worker, or Excavation Worker pathways. Therefore, clean-up measures are not required for occupational, construction and excavation uses of the site.
- Incidental dermal contact with PFAS constituents including Perfluorooctane sulfonic acid (PFOS) and perfluorooctanoic acid (PFOA), found in subsurface soils
  - The PFAS constituents identified in subsurface soils were detected at concentrations that exceed the EPA RSLs for Resident Soil and/or Composite Worker Soil. There are no current DEQ RBCs for PFAS.
- Ingestion and incidental inhalation of, and dermal contact with petroleum and PFAS constituents including TPH-GRO, TPH-DRO, benzene, ethylbenzene, naphthalene, MTBE, PFOS, PFOA, and PFHxS found in groundwater,
  - The petroleum constituents identified in groundwater exceeded DEQ RBCs for Residential or Occupational Tapwater, and/or EPA RSLs for Resident Tapwater. Groundwater is not currently used for drinking water and deed restrictions are proposed to prevent future groundwater use at the Site; therefore, the groundwater exposure pathway (e.g., the route by which a person can be exposed to a contaminant in the groundwater, usually through ingestion) is considered incomplete.
- PFAS was detected at concentrations exceeding the EPA RSL for Resident Tapwater. There are no current RBCs for PFAS, however, deed restrictions to prevent future groundwater use at the Site would mean the PFAS exposure pathway would be incomplete. Incidental ingestion and inhalation of, and dermal contact with lead found in dripline soils, and
  - The concentrations of lead detected in surface soils exceed the DEQ RBC and the EPA RSL for Residential Soil. Considering proposed deed restrictions preventing future

residential use of the Site, incidental ingestion and inhalation of, and dermal contact with lead in dripline soils is considered incomplete.

- Incidental ingestion and inhalation of, and dermal contact with lead or mercury in hazardous building materials within the Site buildings.

Based on the proposed future commercial use of the Site and restriction of future use of groundwater, as well as the concentrations of petroleum, PFAS and lead COCs detected in soil and/or groundwater, there are no exposure pathways of concern related to these constituents in these medias in a future residential scenario. PFAS contamination in soil was detected above EPA's RSL for Composite Worker. Since PFAS are not currently listed by Oregon as hazardous substances, they have not been evaluated as part of the ABCA. However, Oregon is currently undertaking rulemaking that would list them as hazardous substances and DEQ recommends including cleanup options to address potential risk to PFAS contamination (e.g., soil removal and offsite disposal following a CMMP or capping with a Soil Cap Management Plan). After conclusion of DEQ's rulemaking process, the ABCA should be revised to incorporate cleanup alternatives for PFAS contaminants.

Based on current and future Site uses, including the proposed deed restrictions on future residential site use and groundwater use discussed in Section 2.4.4, the following exposure scenarios have been identified[1]:

- Future Adult Occupational Worker Scenario
- Future Adult Construction and Excavation Worker Scenario

3.3 Site Hazards and Contaminants of Concern

The HBMS completed as part of the 2025 Phase II ESA (ERG 2025) confirmed LBP on internal and external surfaces within the Site warehouse and loading rack and mercury-containing fluorescent tubes within the Site warehouse.

3.3.1 Lead

Lead is toxic, particularly to children, causing developmental issues and other health problems. It poses risks during removal, especially in dust form. Exposure to lead can occur from breathing workplace air or dust, eating contaminated foods, or drinking contaminated water. Children can be exposed from eating LBP chips or playing in contaminated soil. Lead can damage the nervous system, kidneys, and reproductive system (ATSDR 2007).

Lead Paint

A total of 11 representative paint-chip samples from the interior and exterior of the warehouse and loading rack structure were collected during the 2025 HBMS conducted by PBS. For reference, 500 parts per million (ppm) is considered lead-containing paint (LCP) while 5,000 ppm is considered LBP.

[1] Current and future adult and child site visitor and trespasser exposure scenarios are not included, as DEQ does not consider this a reasonable receptor pathway based on propsed site use.

All 11 samples were found to contain lead with concentrations ranging from 62 ppm to 82,000 ppm. LCP was identified in painted surfaces on door frames, interior and exterior walls, floors, and window trim. LBP was confirmed on exterior walls, support beams, window frames, and door frames on the warehouse and on the associated loading rack structure (ERG 2025).

Removal and demolition of painted surfaces must be performed in accordance with Occupational Safety and Health Administration (OSHA) 29 Code of Federal Regulations (CFR) Part 1926.62 and EPA Title X Standards and Regulations. All work must be performed by a certified lead abatement professional.

3.3.2 Mercury Containing Light Bulbs

The 2025 HBMS identified fluorescent tubes are present throughout the Site structure. All eight observed fluorescent light tubes are presumed to contain mercury. PBS also inspected and/or disassembled representative fluorescent light fixture ballasts throughout the Site warehouse building. The ballasts that were observed and disassembled were not suspect for PCBs (ERG 2025).

3.4 Applicable Laws and Regulations

Laws and regulations that are applicable to this cleanup are summarized in the following sections. All cleanup activities, including the removal, disposal, or handling of Site COCs will be conducted in accordance with these and other applicable laws and regulations.

3.4.1 Lead in Paint

EPA (40 CFR Part 745) defines LBP as paint containing greater than 1 mg lead/square centimeter (cm2) or more than 0.5% lead (5,000 mg/kg) and establishes work practices and certifications required for renovations impacting residences and child occupied facilities constructed before 1978.

OSHA's Safety and Health Regulations for Construction, Occupational Health and Environmental Controls, Lead (29 CFR Part 1926.62) applies to new construction, alteration, repair, or renovation of structures that contain lead. The regulation specifies permissible exposure limits (PELs) for construction personnel and establishes training, housekeeping, monitoring, medical surveillance, and personal/respiratory protection requirements.

Oregon uses OSHA's Lead in Construction Standard (OSHA 3142-12R), which outlines worker protection requirements for construction workers exposed to lead. The standard includes requirements for addressing exposure assessment, methods of compliance, respiratory protection, protective clothing and equipment, hygiene facilities and practices, medical surveillance, medical removal protection, employee information and training, signs, recordkeeping and observation of monitoring.

The Oregon Health Authority (OHA) requires that lead-based paint activities (paint inspection, project design and abatement/lead-paint hazard removal) protect the public from hazards of improperly conducted lead-based paint activities through the Lead-Based Paint Program (LBPP). The LBPP requires individuals and firms conducting lead-based paint removal activities to be properly trained by an accredited training provider, certified by OHA and have an Oregon Construction and Contractor's Board (CCB) license.

RCRA (40 CFR Part 261.24 Subpart C) establishes the toxicity characteristic for lead-containing waste determined by TCLP EPA Method 1311 at 5 milligrams per liter (mg/L).

3.5 Cleanup Goal

The cleanup goal is to reduce or eliminate exposures to physical, environmental, and health hazards at the Site for future commercial workers, construction workers or visitors. These goals will be achieved by mitigating and/or removing and disposing of LBP and other hazardous building materials.

4.0 Identification of Brownfields Cleanup Alternatives

This section presents a range of reasonable and proven response actions and cleanup alternatives, based on COC concentrations discussed in Section 3.0, Site characteristics, current and future Site use, potential exposure pathways and associated risks, and overall cleanup goals.

These cleanup alternatives are designed to address the following areas requiring cleanup (as identified during the Phase II ESA [ERG 2025]):

- Known and presumed hazardous building materials in the Site warehouse and loading rack structure

Three potential cleanup alternatives are identified below and described in further detail in the following Sections.

- Alternative 1 – Demolition of Site Structures and Proper Management and Disposal of Hazardous Building Materials
- Alternative 2 – Stabilization of Lead-Based Paint and Off-Site Disposal of Mercury-containing Building Materials
- Alternative 3 - No Action

4.1 Alternative 1 - Demolition of Site Structures and Proper Management and Disposal of Hazardous Building Materials

This alternative includes the following activities:

- Demolish all Site structures and dispose of building materials, adhering to lead-safe management practices per local, state, and federal regulations;[2] and
- Remove and properly dispose of mercury-containing building materials per applicable local, state, and federal regulations.

This alternative requires that mercury-containing light tubes be removed for disposal at an approved facility prior to demolition.

This alternative requires an OHA-certified and CBB-licensed contractor, to conduct the demolition activities to minimize impacts from LBP.

4.2 Alternative 2 - Stabilization of Lead-Based Paint and Off-Site Disposal of Mercury-containing Building Materials

This alternative includes the following activities:

- Removal and offsite disposal of all mercury- containing building materials from the Site warehouse per applicable local, state, and federal regulations; and

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[2] A demolition alternative is analyzed for information purposes, given that future project funding is unknown. Demolition may not be an eligible activity for EPA Brownfields funding resources, depending on Site conditions.

- Stabilization of LBP, adhering to lead-safe management practices per local, state and federal regulations.

Under this alternative, the Site structures will be retained for demolition or renovation by a future property owner.

This alternative requires that an OHA-certified and CBB-licensed contractor stabilize all LBP within Site structures.

This alternative includes removal of mercury-containing light tubes for disposal at an approved facility.

4.3 Alternative 3 - No Action

The No Action Alternative assumes no cleanup will be undertaken at the Site and the Site buildings must be considered contaminated structures with access restricted to only individuals with appropriate training.

4.4 Alternatives Considered but Not Carried Forward for Detailed Analysis

During the ABCA development, ERG considered addressing soil and groundwater petroleum and PFAS contamination. Clean-up alternatives related to soil and groundwater could include removal and disposal of contaminated soil and treatment of groundwater (such as in-situ injections and additional post-clean-up monitoring events). Additional considerations related to PFAS treatment and disposal would also need to be addressed. Ultimately, it was determined that alternatives related to soil and groundwater clean-up were needed due to the presumed future site use and proposed deed restrictions, and the lack of published DEQ RBCs related to PFAS at the time of this report.

5.0 Evaluation of Cleanup Alternatives

5.1 Description of Evaluation Criteria

The cleanup alternatives identified for the Site are evaluated in this section based on the following performance criteria:

1. Overall protection of human health and the environment.
2. Ease of implementation.
3. Cost.
4. Sustainability, long-term effectiveness, and resilience of the remedial options to address potential adverse impacts caused by extreme weather events.
5. Ability to meet proposed land use.

The following sections describing these performance criteria serve as a basis for conducting a comparative analysis of the proposed remedial alternatives.

5.1.1 Overall Protection of Human Health and the Environment

This criterion is used to evaluate whether human health and the environment are adequately protected. Human health protection includes reducing risk to acceptable levels, either by reducing contamination concentrations or eliminating potential routes for exposure. Environmental protection includes minimizing or avoiding negative impacts to natural, cultural, and historical resources.

5.1.2 Ease of Implementation

Ease to implement refers to the technical and administrative feasibility of carrying out an alternative and the availability of the required services and materials. The following factors are considered for each alternative:

- The likelihood of technical difficulties in constructing the alternative and delays due to technical problems.
- The potential for regulatory constraints to develop (e.g., as a result of uncovering buried cultural resources or encountering endangered species).
- The availability of necessary equipment, specialists, and provisions, as necessary.

5.1.3 Cost

This criterion considers the cost of implementing an alternative, including capital costs, Operations and Maintenance (O&M) costs, opportunity costs, and monitoring costs.

5.1.4 Sustainability, Long-term Effectiveness, and Resiliency

Sustainability and long-term effectiveness include an assessment for the potential need to replace the alternative's technical components in the long term. This criterion also considers the alternative's resiliency in light of reasonably foreseeable extreme weather trends at the Site. These changing climate conditions include projected increases in extreme heat, changes in future precipitation state (e.g., precipitation falling as rain vs. snow), wildfire, and/or extreme weather events, etc.

5.1.5 Ability to Meet Proposed Land Use

This criterion addresses the cleanup alternative's ability to meet the use and design requirements of the Site anticipated future use.

5.2 Detailed Analysis of Alternatives

Alternatives 1 and 2 have the potential to provide for overall protection of human health and the environment and are designed in compliance with applicable laws and regulations. Because a No Action Alternative (Alternative 3) does not meet the goal for protection of human health and the environment, this alternative is not included in the detailed analysis of cleanup alternatives.

5.2.1 Detailed Analysis of Alternative 1 – Demolition of Site Structures and Proper Management and Disposal of Hazardous Building Materials

Alternative 1 includes the removal and offsite disposal of mercury-containing building materials from the Site warehouse prior to demolition and demolition and disposal of all Site structures with a lead-safe certified contractor per applicable local, state, and federal regulations to manage LBP in building materials.

Overall Protection of Human Health and the Environment

The overall protection of human health and the environment in the long-term would be met due to the removal of all LBP and mercury- containing building materials from the Site structures (in accordance with applicable regulations).

Although disturbance of hazardous building materials may increase the potential for short-term exposure to lead and mercury during removal if proper regulatory procedures are not followed, the removal of hazardous building materials will effectively reduce the risk of future long-term exposures to Site COCs and remove the source of contamination to surface soil around Site structures. Transportation of hazardous building materials for offsite disposal may pose a potential, but negligible, short-term risk to human health and the environment.

Utilizing a certified and licensed contractor will ensure that proper work practices are followed, and all demolition activities are conducted in compliance with applicable regulations, thereby helping to ensure that risks to human health and the environment related to LBP are minimized.

Ease of Implementation

The implementation of Alternative 1 requires an OHA-certified and CBB-licensed contractor and accessible disposal facilities. Although Klamath Falls is in a rural location, there are likely several licensed contractors qualified to perform the lead-safe building demolition in the greater region. The Klamath County Landfill in Klamath Falls, OR is likely the nearest location that will accept building materials, assuming that the building materials will be determined to be non-hazardous.

It is likely that a single contractor can be used that has the proper LBP certifications and licensures to manage the LBP and the overall demolition of Site structures, to offer additional ease of implementation.

Cost

The cost estimate for Alternative 1 is provided in Appendix A, Table A-1. The overall cost for this Alternative is estimated to be $39,500. Alternative 1 is moderately expensive because this Alternative proposes the removal and disposal of all Site building materials as a means to address hazardous building materials. This Alternative results in a larger volume of waste and higher associated removal, transportation, and disposal costs. However, full removal and demolition eliminates future costs associated with renovating and maintaining the Site buildings.

Costs provided in Appendix A, Table A-1 are based on the following assumptions:

- Mercury- containing materials will be removed prior to demolition. Assumes that Klamath County can manage the tubes through their own recycling program or at a low cost with a local vendor.
- After removal of mercury, the warehouse, loading dock, and concrete foundation will be demolished and the building debris will be disposed of at the Klamath County landfill. Materials containing LBP will be handled in accordance with applicable laws and regulations during demolition. This disposal cost assumes transport of building debris to the landfill located in Klamath Falls, OR.
- All costs are planning level. The cost estimates are associated with rough order of magnitude estimates provided by regional vendors and are presented with a 30% escalation factor.

Multiple abatement and demolition bids could be solicited to ensure competitive pricing, limited by the availability of contractors in region.

Sustainability, Long-term Effectiveness, and Resiliency

Alternative 1 will provide a high level of long-term effectiveness because all hazardous building materials will be removed and disposed of offsite. Utilizing an accredited contractor will verify the proper removal of all hazardous building materials. Demolition of all Site structures eliminates the need for long-term management, monitoring, or maintenance of LBP or other hazardous building materials.

This Alternative provides a high level of resiliency because, following cleanup, there would be no buildings with hazardous materials remaining onsite that could be vulnerable to impacts from changing climate conditions (e.g., extreme weather events, etc.).

Considering full demolition of Site structures, Alternative 1 generates more non-hazardous debris to be transported and disposed of in landfills than Alternative 2. Generally, the emissions and energy use for Alternative 1 are relatively high in comparison to other alternatives, due to increased use of heavy equipment on-site to demolish Site structures and the higher volume of waste to be managed due to demolition.

Ability to Meet Proposed Land Use

Alternative 1 would meet the desired future land use of preparation to be sold as vacant land, which could be then developed for commercial use. The removal of Site structures makes the property more desirable for resale and development.

5.2.2 Detailed Analysis of Alternative 2 – Stabilization of Lead-Based Paint and Off-Site Disposal of Mercury-containing Building Materials

Alternative 2 includes the removal and offsite disposal of mercury- -containing building materials per applicable local, state, and federal regulations. Additionally, LBP on Site structures will be stabilized.

Overall Protection of Human Health and the Environment

The overall protection of human health and the environment in the long-term would be met with Alternative 2 due to the removal of mercury- containing building materials from the Site structures (in accordance with applicable regulations) as well as stabilization of any LBP on the interior and exterior of structures. As with Alternative 1, although the disturbance and transportation of hazardous building materials may increase the potential for short-term risks to human health and the environment, utilizing properly accredited contractors can help ensure that proper work practices are followed to minimize these risks.

Stabilization of LBP provides effective mitigation of the risks of exposure to lead, as it reduces the likelihood of flaking or damaged lead paint.

Ease of Implementation

As with Alternative 1, the implementation of Alternative 2 is feasible, as there are likely licensed contractors qualified to perform the hazardous materials removal and LBP stabilization activities in the region.

Stabilization of LBP is more difficult than demolition with safe work practices, due to the need for more precise and careful abatement if a structure will be reused.

Unlike Alternative 1, Alternative 2 may require additional assessment and maintenance in the future, if LBP becomes exposed or is damaged, although the effort associated with this on-going maintenance is anticipated to be minimal. Additional assessment may require visual observation of the condition of the LBP on a routine basis and future maintenance could involve touch-ups of non-LBP coatings.

Cost

The cost estimate for Alternative 2 is provided in Appendix A, Table A-1. The overall cost for this Alternative is estimated to be $36,250. Overall, Alternative 2 is less expensive than Alternative 1, as the level of effort required to stabilize the LBP is not as significant when compared to Alternative 1. Additionally, Alternative 1 includes the costs associated with demolition of all Site structures.

Costs provided in Appendix A, Table A-1 are based on the following assumptions:

- Stabilization of LBP in place on all Site structures, performed by a licensed and certified contractor within 100 miles of Klamath Falls.
- Removal and management of mercury-containing fluorescent tubes at a certified recycler or hazardous waste landfill. Assumes that Klamath County can manage the tubes through their own recycling program or at a low cost with a local vendor.
- Future costs associated with potential assessment and maintenance of LBP are not included.
- All costs are planning level. Certain cost estimates are associated with rough order of magnitude estimates provided by regional vendors and are presented with a 30% escalation factor.

As with Alternative 1, multiple abatement bids could be solicited to ensure competitive pricing.

Sustainability, Long-term Effectiveness, and Resiliency

Alternative 2 will provide an acceptable level of long-term effectiveness because the mercury-containing fluorescent tubes will be removed from the Site and the stabilization of LBP represents a relatively effective solution in the long term, although the hazardous material will remain on-site.

This Alternative provides a moderate level of resiliency because, following stabilization, as long as the structure is maintained, LBP in the Site structures is not likely to be vulnerable to impacts from changing climate conditions (e.g., extreme weather events, etc.).

Generally, the emissions and energy use estimated for Alternative 2 are relatively low in comparison to Alternative 1, due to less use of heavy equipment on-site and the lower volume of waste to be managed.

Ability to Meet Proposed Land Use

Alternative 2 would meet the desired future land use of redevelopment for commercial use, although the Site structures will likely need to be demolished by a future property owner as part of the redevelopment.

6.0 Comparison of Cleanup Alternatives

This section presents a comparison of the proposed cleanup alternatives based on the performance criteria described in Section 5.1. The ability of each alternative to meet the performance criteria is measured on a 3-point scale and summarized in Table 1, with 1 = Low Success/High Cost,
2 = Moderate Success/Moderate Cost, and 3 = High Success/Low Cost.

6.1 Overall Protection of Human health and the Environment

Both Alternatives 1 and 2 provide a high level of protection to human health and the environment over a long period of time because they either completely remove hazardous building materials or stabilize them to prevent exposure to Site users. The No Action Alternative is not protective of human health and the environment.

6.2 Ease of Implementation

Alternative 2 provides a high ease of implementation, as the stabilization of LBP at the Site could be completed in a day with a one or two-person crew. Alternative 1 involves the demolition of the building, which will require more labor, equipment and effort.

The ease of implementation is considered to be moderate for Alternative 1 and low for Alternative 2. The No Action Alternative does not require any work to be completed and therefore the ease of implementation is considered high.

6.3 Cost of Remediation

The cost for each cleanup alternative is presented in Appendix A, along with the assumptions associated with the cost estimates. These costs are planning level estimates intended only for the relative comparison of the alternatives and should not be used as budget- or design-level estimates.

Overall, the costs for both Alternative 1 and Alternative 2 are considered moderate. While Alternative 1 is slightly more expensive than Alternative 2 due to additional costs to demolish the structures, it results in vacant land ready for redevelopment.

6.4 Sustainability, Long-term Effectiveness, and Resiliency

Alternatives 1 has a high level of sustainability, long-term effectiveness, and resiliency because all hazardous building materials will be removed for offsite disposal in a regulated facility. Alternative 2 has a moderate level of sustainability and long-term effectiveness, as the LBP will still remain on the Site and although the risk of future exposure would be low, if the structure is not properly maintained, LBP could become damaged and pose a risk in the future. Additionally, although Alternative 2 would result in lower emissions and generation of waste in the short term, the Site structures will likely need to be demolished during redevelopment, and therefore the emissions and waste generation will not truly be lower. Further, Alternative 2 will ultimately result in additional trips to the Site for redevelopment that could be accomplished more efficiently with Alternative 1.

The No Action Alternative is considered to be the least effective alternative in the long term, is the least resilient to extreme weather trends of all the Alternatives, and little to no energy consumption or emissions.

6.5 Ability to Meet Proposed Land Use

The proposed future use of the Site includes commercial redevelopment by a future property owner. Both Alternatives 1 and 2 have the ability to meet this future land use. Under both alternatives, hazardous building materials will be addressed to promote redevelopment. However, Alternative 1 results in vacant land ready for redevelopment, while Alternative 2 results in existing Site structures in need of future demolition prior to reuse.

The No Action Alternative does support the future land use because the known hazardous building materials are a deterrent for future use of the Site structures.

6.6 Summary

In summary, both Alternatives 1 and 2 would adequately protect human health and the environment. The main differentiators between Alternative 1 and Alternative 2 are ease of implementation, long-term effectiveness, overall cost and ability to meet the proposed land use; however, Alternative 2 does not include the costs for demolition of the Site structures, which will likely need to take place prior to redevelopment.

Based on the comparative analysis discussed in the previous sections and the total performance scores shown in Table 1 below, Alternative 1, including complete demolition of structures onsite to prepare the Site for sale as vacant land, is the preferred alternative.

Table 1. Comparative Analysis of Cleanup Alternatives

Cleanup Alternative	Overall Protection of Human Health and the Environment	Ease of Implementation	Cost-Effective Approach towards Remediation	Sustainability -O&M and Long-term Effectiveness	Ability to Meet Proposed Land Use	Total Score
Alternative 1 – Demolition of Site Structures and Proper Management and Disposal of Hazardous Building Materials	3	2	3	3	3	14
Alternative 2 - Stabilization of Lead-Based Paint and Off-Site Disposal of Mercury-containing Building Materials	2	3	3	2	1	11
Alternative 3 - No Action	0	3	3	0	0	6

Notes: (0=does not achieve the criteria, 1=Low Success, 2=Medium Success, 3=High Success)
(For Cost: 1=High Cost, 2=Medium Cost, 3=Low Cost)

7.0 Limitations and Additional Assessment Needs

This ABCA provides cleanup alternatives but is not intended to be used as a cleanup workplan. The cost estimates presented are planning level estimates presented solely for comparison purposes and should not be used as budget- or design-level estimates. The cleanup costs presented in this ABCA are estimates based on available information; actual Site conditions may vary. Following the completion of a cleanup workplan for the Site, the alternatives and cost estimates presented in this ABCA should be reevaluated and adjusted as appropriate.

8.0 References and Resources Used

29 CFR 1926.62, Title 29, Code of Federal Regulations, Part 1926, “Lead.”.

40 CFR 261.24, Title 40, Code of Federal Regulations, Part 261.24 Subpart C, “Toxicity Characteristic”.

Brady Environmental, Inc. (BEI). 2008. Subsurface Investigation, Former Janz Bulk Plant, 2450 Altamont Drive, Klamath Falls, Oregon. August 29.

BEI, 2011. Remedial Action Report, Former Altamont Bulk Plant, 2450 Altamont Drive, Klamath Falls, Oregon, ECSI No. 2931. December.

National Oceanic and Atmospheric Administration (NOAA), 2025a, Climate Mapping for Resilience and Adaptation (CMRA). Results for "2450 Altamont Drive, Klamath Falls, OR". https://resilience.climate.gov/

NOAA, 2025b. February 5, 2025. *Climate Change Impacts*. https://www.noaa.gov/education/resource-collections/climate/climate-change-impacts

Oregon Department of Environmental Quality (DEQ), 2003. Risk-Based Decision Making for the Remediation of Contaminated Sites. September. Last revised: October 2017.

DEQ, 2018. Fact Sheet: Background Levels of Metals in Soils for Cleanups. January.

DEQ, 2023. Risk-Based Concentrations for Individual Chemicals. Revision: May 2018 amended June 2023.

Environmental Consulting & Assessment, Inc. (ECA), 2011. After Action Report for: Utility Excavation Project, Corner of Altamont Drive and Crosby Avenue, Klamath Falls, Oregon 97603. February.

Environmental Management Services, Inc. (EMS), 2007. Soil and Groundwater Assessment Report, Former Altamont Bulk Plant, 2450 Altamont Drive, Klamath Falls, Oregon, ECSI No. 2931.

U.S. Environmental Protection Agency (EPA). 2012. National Water Program 2012 Strategy: Response to Climate Change. December.

EPA, 2019. EPA Spreadsheets for Environmental Footprint Analysis (SEFA). Office of Superfund Remediation and Technology Innovation. https://cluin.org/greenremediation/SEFA/

EPA, 2020. EPA Principles for Greener Cleanups. https://www.epa.gov/greenercleanups/epa-principles-greener-cleanups

EPA 2021a. EPA Climate Change Adaptation Plan. 231-R-210-01. October.

EPA 2021b. Climate Smart Brownfields Manual. EPA 560-F-21-002. Available online at https://www.epa.gov/land-revitalization/climate-smart-brownfields-manual.

EPA, 2022. EPA Region 10 Climate Change Adaptation Implementation Plan. 910B22001. October. Available online at https://www.epa.gov/system/files/documents/2022-10/bh508-R10%20Climate%20Change%20Adaptation%20Implementation%20Plan.pdf.

EPA, 2024a. Regional Screening Level Resident Soil Table, November. Available online at: https://semspub.epa.gov/work/HQ/405273.pdf.

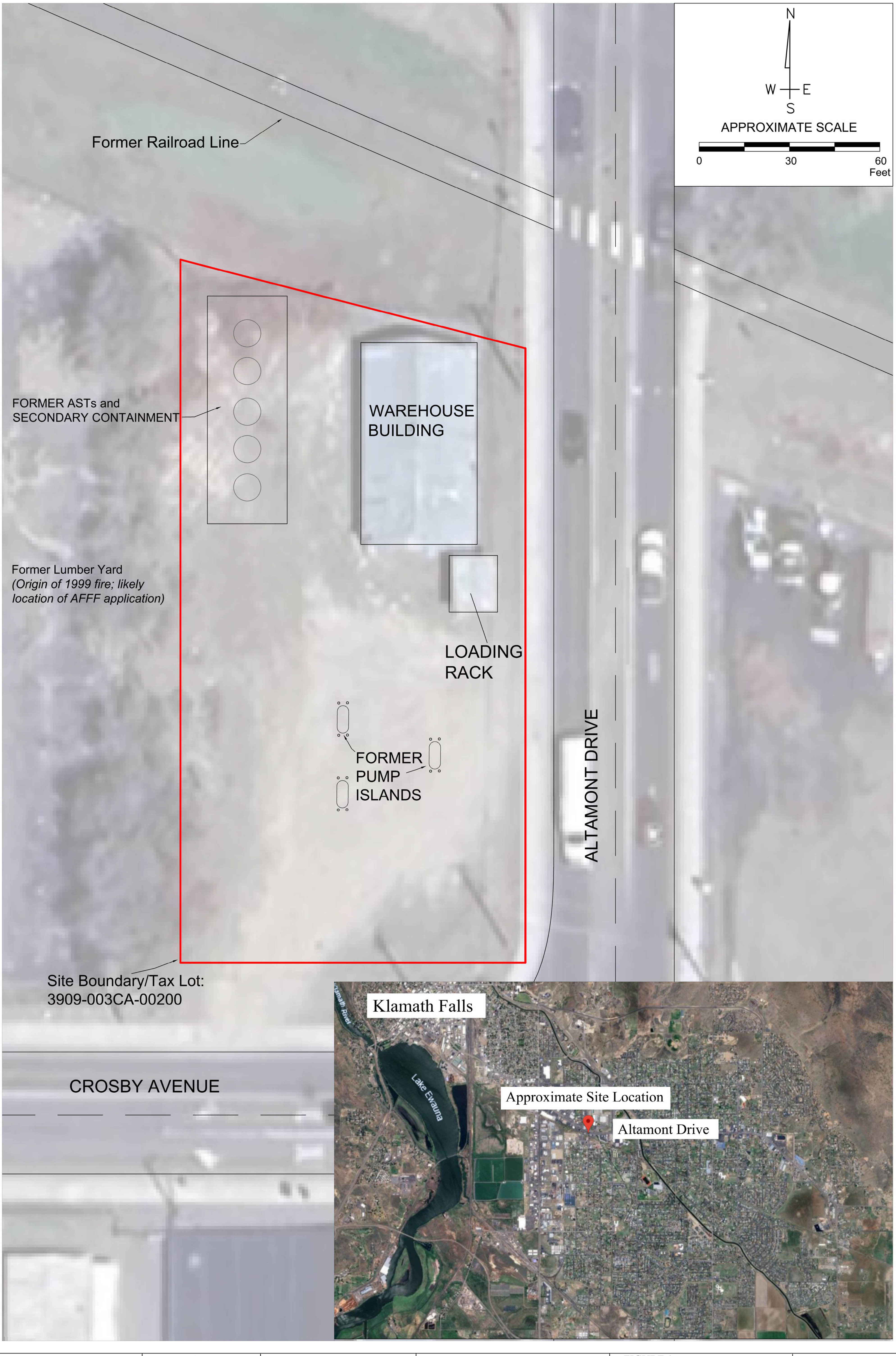
EPA, 2024b. Regional Screening Level Composite Worker Soil Table, November. Available online at: https://semspub.epa.gov/work/HQ/405277.pdf.

EPA, 2024c. Climate Change Indicators: Freeze-Thaw Conditions. Available online at https://www.epa.gov/climate-indicators/climate-change-indicators-freeze-thaw-conditions.

ERG, 2025. Phase II Environmental Site Assessment Report, 2450 Altamont Drive, Klamath, OR. Prepared for the Environmental Protection Agency, Region 10. Final, March XX.

Federal Emergency Management Agency (FEMA), 2025. National Risk Index. Available online at: https://hazards.fema.gov/nri/map

U.S. Department of Housing and Urban Development (HUD), 2012. Guidelines for the Evaluation and Control of Lead-Based Paint Hazards in Housing. Office of Healthy Homes and Lead Hazard Control. Second Edition. July.



Alta Science & Engineering, Inc.	PRINT DATE: February 4, 2025	PROJECTION: UTM NAD 83, Zone 11N	PROJECT NAME: Phase II ESA 2450 Altamont Drive Klamath Falls, OR	FIGURE 1 Site Location Map	This map was produced using information obtained from several different sources that have not been independently verified. These sources have also not provided information on the precision and accuracy of the data. Information on this map is not a substitute for survey data.
	PROJECT NUMBER: 22136	PROJECT MANAGER: S. Weppner			
		CARTOGRAPHER: B. Brantley			

Appendix A Cost Estimate

Cost Estimates for Hazardous Building Material Cleanup Alternatives						
	Alternative 1 – Demolition of Site Structures and Proper Management and Disposal of Hazardous Building Materials		*Alternative 2 – Stabilization of Lead Based Paint and Off-Site Disposal of Mercury-containing Building Materials*		*Alternative 3 – No action*	
Cost Factor	**Assumptions**	**Cost**	**Assumptions**	**Cost**	**Assumptions**	**Cost**
Stabilization	No stabilization of LBP costs are associated with this alternative.	**--**	Stabilization of Lead Based Paint (LBP). No demolition costs included.	**$35,750** [1]	No costs are associated with the no action alternative.	--
Demolition	Demolition of warehouse, loading dock structure, and concrete foundation, including disposal of materials.	**$39,000** [1]	No demolition costs are associated with this alternative.	**--**		
Mercury Tube Disposal	Removal and disposal of mercury-containing tubes prior to building demolition. Assumes that the County can manage disposal at a low cost.	**$500**	Removal and disposal of mercury-containing tubes. Assumes that the County can manage disposal at a low cost.	**$500**		
Total Cost		**$39,500**		**$36,250**	**--**	

[1]Planning level cost estimates are associated w/ regional vendors and are subject to change based on year, plus a 30% escalation.