Kennedy Jenks

32001 32nd Avenue South, Suite 100
Federal Way, Washington 98001
253-835-6400

Compliance Monitoring Plan

Circle K 1461
Seattle, Washington 98112

22 November 2022

Prepared for

DEPARTMENT OF ECOLOGY
State of Washington

3190 160th Avenue SE
Bellevue, Washington 98008-5452

KJ Project No. 2196008*00

Compliance Monitoring Plan
Signature Page

Site: Circle K 1461

Facility Site Identification Number (FSID):

Cleanup Site Identification Number (CSID): #5089

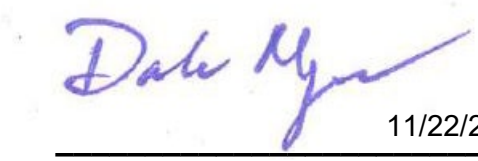
Address: 2350 24th Avenue East, Seattle, Washington

Document Name: Circle K 1461 – Compliance Monitoring Plan (CMP)

Document Date: November 2022

Signature below indicates review and approval of the Compliance Monitoring Plan and agreement that the anticipated sampling and analytical methods are sufficient to meet the quality objectives of the Circle K Environmental Remediation System Monitoring Program.

Washington State Department of Ecology:



11/22/2022

Dale Myers Date
Ecology Site Manager
Phone: (425) 649-4426
e-mail: damy461@ecy.wa.gov

Kennedy/Jenks Consultants, Inc. Project Manager:

11/22/2022

Ryan Hultgren Date
Title: Project Manager
Phone: (253) 835-6432
e-mail: RyanHultgren@KennedyJenks.com

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List of Acronyms

bgs	below ground surface
BTEX	benzene, toluene, ethylbenzene, and xylene
CAP	cleanup action plan
CD	Consent Decree No. 82-2-08095-8, April 1992
CLARC	Cleanup Levels and Risk Calculation
CMP	Compliance Monitoring Plan
COC	contaminants of concern
CUL	cleanup level
Ecology	Washington State Department of Ecology
EDR	Engineering Design Report
EPA	U.S. Environmental Protection Agency
GRO	Gasoline Range Organics
HASP	Health and Safety Plan
IDW	investigation-derived waste
Kennedy Jenks	Kennedy/Jenks Consultants, Inc.
LEL	lower explosive limit
LNAPL	light non-aqueous phase liquid
MPE	multi-phase extraction
MTCA	Model Toxics Control Act
MW	monitoring well
O&M	operations and maintenance
PID	photoionization detector
ppbv	part per billion by volume
QAPP	Quality Assurance Project Plan
RI/FS	Remedial Investigation and Feasibility Study
RW	remediation well
SAP	Sampling and Analysis Plan
SSD	sub-slab depressurization
SW	slanted remediation well
UST	underground storage tank
VI	vapor intrusion
VOC	volatile organic compound
WAC	Washington Administrative Code

Section 1: Introduction

This Compliance Monitoring Plan (CMP) describes specific activities and requirements for compliance monitoring associated with the cleanup action planned for the Circle K 1461 Station #1461 located at 2350 24th Avenue East in Seattle, Washington in King County (Site) (see Figure 1). The Site is currently operating as a convenience store and dry cleaner.

This document is intended to be used in conjunction with other Site-specific project documents, including the following:

- Remedial Investigation and Feasibility Study (RI/FS) Report, Former Circle K Site [Kennedy/Jenks Consultants, Inc. (Kennedy Jenks) 2017]
- Engineering Design Report (EDR), Former Circle K Site 1461, Seattle, Washington (Kennedy Jenks 2021a)
- Health and Safety Plan (HASP) (Kennedy Jenks 2021b)
- Project Manual for the Circle K 1461 Environmental Remediation System Installation Seattle, Washington (Project Manual) (Kennedy Jenks 2022a)
- Operations and Maintenance Manual (O&M Manual) [Kennedy Jenks 2022b (Draft)]
- Sampling and Analysis Plan / Quality Assurance Project Plan (SAP/QAPP) [Kennedy Jenks 2022c (Draft)]

The draft O&M Manual and draft SAP/QAPP (prepared in 2022) will be finalized in conjunction with implementation of the cleanup action. This CMP has been prepared to fulfill requirements of the Model Toxics Control Act (MTCA) regulations published in Washington Administrative Code (WAC) WAC 173-340-410 and WAC 173-340-400(a)(xiv). This Site is listed on the Washington State Department of Ecology (Ecology) Site Information System and Hazardous Sites List as Circle K 1461, under cleanup site ID 5086 and facility/site ID 2322.

1.1 Project Description and Cleanup Action Overview

A remedial action is planned to address petroleum hydrocarbon-impacted soil and groundwater at the Site. Hydrocarbons detected in soil and groundwater have been attributed to a leaking underground storage tank (UST) that was discovered in August 1989. A Multi-Phase Extraction (MPE) system will be installed and operated to reduce concentrations of Gasoline Range Organics (GRO) and benzene, toluene, ethylbenzene, and xylene (BTEX) in the soil and groundwater below the Site. Groundwater, soil, and vapor samples will be collected periodically to monitor treatment progress.

In April 1992, Ecology entered into Consent Decree No. 82-2-08095-8 (CD) with Mr. Kuk Jin Choung and Ms. Kathy-Kyung D. Choung, owners of the property, to conduct a RI/FS and develop a cleanup action plan (CAP) for the Site. After completion of the RI/FS and CAP, the CD requires performance of the cleanup action to protect human health and the environment in accordance with Model Toxics Control Act (MTCA) regulations. The RI/FS and

CAP were finalized in December 2017. Implementation of the CAP is continuing under the CD with Ecology oversight, under Ecology contract number C2100069.

The Site history and planned cleanup action are described in detail in the RI/FS, CAP, and EDR. The findings presented in the RI/FS Report (Kennedy Jenks 2017) included the most current data set for the Site. A general summary overview is provided below in Section 1.2.

1.2 Previous Remedial and Investigation Activities

In 1989, a leak was discovered in one of the four onsite gasoline USTs. It was estimated that approximately 4,000 to 6,000 gallons of gasoline were released to the subsurface. Following the discovery of the release, all six onsite USTs and the pump island were removed. In addition, approximately 900 cubic yards (cy) of petroleum hydrocarbon-containing soil (PCS) were excavated and removed from the Site. The property was redeveloped in 1990 and 1991 and currently includes a single one-story building operated as a retail dry cleaning store (Jay's Cleaners) and a convenience store (Mont's Market).

Additional remedial and investigation activities were conducted between 1989 and 2006 including installation of and sampling groundwater monitoring wells, light non-aqueous phase liquid (LNAPL) recovery, groundwater extraction and treatment, soil vapor extraction (SVE), and enhanced fluid recovery (EFR). A Draft RI/FS was completed for the Site in 2009 by Ecology (Ecology 2009). Additional RI field activities were completed by Kennedy Jenks in 2016 and 2017 to address data gaps remaining after the Draft RI/FS. The locations of monitoring and remediation wells installed through the 2016/2017 investigation plus proposed remediation wells for the MPE system are presented in Figure 2. Additional details regarding the pre-2016 RI remedial systems and subsequent investigations are summarized in the RI/FS (Kennedy Jenks 2017) and the EDR (Kennedy Jenks 2021a).

1.2.1 Contaminants of Concern

The RI/FS identified GRO and BTEX constituents related to former fueling activities at the Site as the primary contaminants of concern (COCs). GRO and BTEX constituents are present in soil and groundwater at concentrations above MTCA Method A cleanup levels (CULs). Toluene, ethylbenzene, and xylenes are also COCs and are present at concentrations above MTCA Method A CULs in Site media where GRO and/or benzene are also reported. Reported concentrations of GRO and benzene are used to describe the extent of impacted media in the following sections.

1.2.2 Impacted Soil

Based on analytical results and field observations, the vertical extent of GRO concentrations exceeding the soil MTCA Method A CUL appears to be generally limited to the zone from 8 to greater than 20 feet bgs. The horizontal extent of GRO-impacted soil (approximately 5,300 square feet) is generally located beneath the onsite parking lot and may extend beneath the onsite building and into the roadways to the north and west of the property as shown in Figure 3. The lateral and vertical extents of benzene, toluene, ethylbenzene, and xylenes concentrations that exceed the soil CUL appear to coincide with the distribution of GRO; therefore, targeting the zone in which GRO concentrations exceed soil CULs for remediation will also address cleanup of the aromatic gasoline constituents.

1.2.3 Impacted Groundwater

There are currently 19 groundwater monitoring wells and nine multi-purpose wells on Site. Monitoring wells MW-1 through MW-16 were installed in 1989. Monitoring wells MW-17, MW-18, and MW-19 and nine multi-purpose wells (MW-20, MW-21, and RW-1 through RW-7) were installed on Site as part of the RI activities in 2016 and 2017. Table 1 lists existing monitoring and remediation wells and six proposed new remediation wells, along with the installation date and screen interval. Six of the wells (MW-1, MW-2, MW-3, MW-5, MW-12, and MW-13) have been abandoned and are not shown in Table 1. Locations of existing wells are shown on Figure 2. Existing wells will be utilized as part of the monitoring program and as part of the remedial system design. The planned remedial action will include the installation of three new multi-purpose remediation wells (RW-8, RW-9, and RW-10) and three new slanted remediation wells (SW-1, SW-2, and SW-3).

Petroleum hydrocarbons in groundwater at the Site are limited to dissolved-phase impacts; LNAPL was last measured in Site monitoring wells (MW-4, MW-8, MW-9, and MW-13) in October 2006 [EA Engineering, Science, and Technology, Inc. (EA) 2006] and was not observed in monitoring wells during RI groundwater monitoring events in 2016 and 2017 (Kennedy Jenks 2017). The extent of dissolved-phase petroleum hydrocarbons (approximately 10,900 square feet) and related compounds is bounded on the north side of East McGraw Street, and generally extends beneath the onsite parking lot as shown in Figure 3. Dissolved-phase impacts may also extend beneath the onsite building and to the west beneath 24th Avenue East, though groundwater impacts are bounded along the western side of the street.

1.2.4 Vapor Intrusion Assessment

Kennedy Jenks conducted an initial (Tier 1) assessment of the potential for vapor intrusion (VI) into the main Site structure and adjacent residences following the methods described in the EPA's *Technical Guide for Addressing Petroleum Vapor Intrusion at Leaking Underground Storage Tank Sites* (EPA 2015). The results of the Tier 1 assessment are presented in the RI/FS (Kennedy Jenks 2017) and are summarized as follows:

- The occupied on-property commercial structure is within the lateral VI inclusion zone based on the maximum benzene, toluene, and xylene concentrations detected in groundwater near the building.

- Although groundwater at the Site is typically encountered approximately 10 feet bgs adjacent to the building, exceeding EPA's vertical groundwater separation distance criterion of 6 feet for bio-attenuation of petroleum hydrocarbons, the presence of underground utilities could provide a preferential pathway(s) for soil vapors to enter the onsite building. Consequently, the VI pathway into the onsite structure is considered potentially complete pending further characterization of preferential vapor pathways.

- The potential for VI into nearby residential structures appears to be very low based upon the proximity of the soil and groundwater contamination to such structures; however, in the absence of additional sampling at the residential properties to confirm subsurface conditions, the VI pathway for off-property residential areas must be regarded as potentially complete.

1.3 Purpose of the CMP

The purpose of this CMP is to satisfy the requirements of WAC 173-340-410 and WAC 173-340-400(a)(xiv) and those established under the 1992 CD.

The CMP provides a description of the compliance monitoring requirements for the cleanup action, including protection monitoring, performance monitoring, and confirmational monitoring as described in WAC 173-340-410:

- Protection Monitoring. Protection monitoring is performed during the cleanup action to confirm that human health and the environment are adequately protected during the construction and operation and maintenance period of the cleanup action as described in the health and safety plan.

- Performance Monitoring. Performance monitoring is performed during the cleanup action and includes sampling and analysis of environmental media to ensure that cleanup standards have been attained during the cleanup action, and, as appropriate, demonstrating attainment of other performance standards including construction quality control and permit compliance.

- Confirmational Monitoring. Confirmational monitoring is performed following the cleanup action to confirm the long-term effectiveness of the cleanup action once cleanup standards, and if appropriate, remediation levels or other performance standards, have been attained.

The CMP is presented in Section 3 and includes a summary of the required compliance monitoring sampling during and after the cleanup action.

Section 2: Organization and Responsibilities

As previously discussed, the cleanup action at the Site is being performed under the 1992 CD and managed by Ecology. The primary parties responsible for implementation of the cleanup action and compliance monitoring include the following:

Ecology:	Project Coordinator Dale Myers Northwest Regional Office, Bellevue, Washington
Consultant:	Kennedy/Jenks Consultants, Inc. Ryan Hultgren Federal Way, Washington
Construction Contractor:	To be determined.
Operations and Maintenance (O&M) Contractor:	To be determined.

2.1 Compliance Monitoring Responsibilities

The general areas of responsibility for the primary parties involved with implementation of the cleanup action, with respect to compliance monitoring, are summarized below:

- **Ecology.** The cleanup action is being managed by Ecology under the 1992 CD. Ecology is also the primary regulatory agency providing oversight of the project. Ecology will provide review and approval of planned sampling frequency and analytical tests, and review of analytical results (during the cleanup action) for the onsite vapor and water treatment systems, soil and groundwater samples, and imported fill materials.

- **Consultant.** The consultant will perform oversight of construction activities and sampling performed by the Construction Contractor. The consultant will also work with the O&M Contractor to ensure that the needed data are collected during remediation system operation and will provide engineering services as needed to troubleshoot system issues.

- **Construction Contractor.** The Construction Contractor is responsible for performing construction-related activities at the Site as described in the EDR and Project Manual. Monitoring and sampling related activities performed by the contractor are anticipated to include:

    - Installation of four new Vapor Pin® sample devices in the property building, three new sub-slab depressurization (SSD) horizontal wells below grade in gravel located on the north and west sides of the building, and six new remediation wells.

- Soil screening and chemical sampling of soil from the soil borings for new remediation wells, excavated soil from piping trenches and drilling cuttings for waste disposal characterization, and imported fill materials.

- Collection of water samples from new remediation wells development water and decontamination water from equipment cleaning for water waste disposal characterization.

- Collection of vapor samples from SSD wells and Vapor Pin® sampling devices for field analysis. Samples may also be collected for laboratory analysis.

- **O&M Contractor.** The O&M Contractor is responsible for performing operation, maintenance and monitoring of the remediation system as described in the EDR and Operations and Maintenance Manual (O&M Manual). The O&M Contractor is anticipated to conduct the following compliance monitoring sampling activities during remediation system operation and following shutdown:

  - Collection of effluent water samples from the onsite water treatment system for laboratory analysis.

  - Collection of influent and effluent vapor samples from the onsite vapor treatment system and from individual extraction wells for field and laboratory analysis.

  - Collection of vapor samples from SSD wells and Vapor Pin® sampling devices.

  - Collection of groundwater samples from monitoring wells for performance monitoring (at startup, quarterly for two years, semiannually for remaining years of system operation) and confirmation monitoring (quarterly until results from four consecutive quarters are below Site cleanup levels).

  - Collection of confirmation soil samples to demonstrate Site cleanup levels have been achieved in soil.

  - Collection of soil and/or water samples for waste disposal characterization.

Note: This document only describes responsibilities related to sampling and analysis of soil, vapor, and water samples. Other project responsibilities for each party are discussed in greater detail in other project documents (EDR, Project Manual, O&M Manual, SAP/QAPP, etc.).

2.2 Project Schedule

A general remedial action schedule, as required in WAC 173-340-400(4)(a)(vi), is outlined below.

The design plans and construction specifications are expected to be completed in third or fourth quarter 2022. A contractor is expected to be selected by fourth quarter 2022. The installation of the system is expected to be completed in 13 to 15 weeks as outlined below. Operation of the system is expected to occur over a 3- to 10-year period.

Estimated Project Schedule

- Stage 1. Mobilization and Well Installation – 2 weeks
- Stage 2. Vapor Monitoring Equipment Installation – 1 week
- Stage 3. Excavation and Trenching, Soil Screening and Sampling – 3 weeks
- Stage 4. Treatment System Installation – 3 to 4 weeks
- Stage 5. Installation of Electrical Components – 1 Week
- Stage 6. Site Restoration – 1 week
- Stage 7. Demobilization and Final Completion – 2 to 3 weeks
- Stage 8. Operation and Compliance Monitoring – 3 to 12 years

As indicated above, each stage will be completed consecutively. The actual time required to complete the remedial action may vary depending on Site conditions, weather conditions, and the rate of decrease in the constituents in the groundwater and vapor on Site.

Groundwater and vapor monitoring will be conducted during system operation (Stage 8). Confirmation monitoring will be conducted once the remediation system is no longer actively operating and will include soil sampling to confirm soil meets Site CULs, and groundwater monitoring until four consecutive quarters of groundwater sampling results meet Site CULs. The specific wells, laboratory analytes, and sampling frequency may be modified for groundwater monitoring events as determined by Ecology.

Section 3: Compliance Monitoring

This section describes the compliance monitoring activities that will be performed at the Site as part of the remedial action. Compliance monitoring activities identified in this section will fulfill requirements for ongoing monitoring of this remedial action in accordance with MTCA (WAC 173-340-410).

Existing Site monitoring wells not included as part of the remedial action will remain onsite for possible future use during confirmation monitoring. The locations of these monitoring wells are shown on Figure 2.

3.1 Protection Monitoring

Health and safety measures are required for those individuals working at and visiting the Site. Remediation contractors working at the Site will prepare a Site-specific HASP (under separate cover) for their employees, which will describe health and safety measures, including any protection monitoring necessary during construction (Construction Contractor) and O&M (O&M Contractor) activities. In addition, the consultant will prepare a separate HASP for compliance monitoring tasks to be performed by its personnel during the remediation system construction and operation phases, and the subsequent confirmation monitoring phase.

The remediation contractors will have primary responsibility for implementation of the HASP during the construction and maintenance phases of the cleanup action, including protection monitoring for their personnel, including subcontractors, visitors, and the general public (the onsite businesses will remain open during the remedial action). Protection monitoring by the contractors will also include measures, as necessary, for protection of surrounding communities and the environment during construction and will be specified in their Site HASP.

During construction and operation and maintenance activities, contractors will confirm that human health and the environment are protected in accordance with their Site HASP and federal and local regulations. Within the contractors' Site HASPs, details will be included on procedures for vapor and air space monitoring for protection of Site workers.

Specific protection monitoring on the property will include vapor monitoring to assess the possibility of a vapor intrusion pathway into the property building. Protection vapor monitoring will be conducted via the sampling of three SSD wells on the north and west sides of the building and sampling of four Vapor Pin® sampling devices installed within the building. Vapor monitoring will also continue through site restoration activities (performance monitoring).

Approximate locations of the SSD wells are shown on Sheet C-01 of the Project Manual. The SSD wells will be monitored for total volatile organic compounds (VOCs) using a photoionization detector (PID) capable of measurements at low-detection ranges, with a resolution of 1 part per billion by volume (ppbv) or less; also known as a ppb PID. Monitoring will also be performed using a multi-gas meter (four-gas meter) to measure percent lower explosive limit (% LEL), oxygen, carbon dioxide, and total VOCs. SSD wells be monitored using a ppb PID and four-gas meter biannually, as well as between different states of remedial system operation: before

startup (baseline sampling), before changing to Granular Activated Carbon (GAC) operations, before changing to surfactant injection, and before changing to enhanced biodegradation.

Approximate locations of the vapor pins are shown in Figure 3 (as well as Sheet C-01). Vapor pins will be monitored quarterly using a ppb PID and four-gas meter, as noted in the O&M Manual.

3.2 Performance Monitoring

Performance monitoring is required in conjunction with the remedial action, to confirm that the remedial action has attained Site CULs and met remedial action objectives (RAOs). The scope of activities includes:

- Collection of soil samples for characterization (from soil borings during installation of six remediation wells) and for construction quality control (i.e., testing of imported fill materials).
- Collection of soil and water samples for waste disposal profile development (i.e., stockpiled soil, well development water, groundwater sampling purge water, vapor treatment system condensate).
- Collection of groundwater samples from a selection of monitoring wells during remedial system operation to evaluate cleanup progress, optimize treatment corridors, and attainment of cleanup levels.
- Collection of water samples from the water treatment system (effluent) to monitor compliance with permit discharge criteria and when to progress through the three phases of the remedial system operation.
- Collection of vapor samples from the SSD wells on the north and west sides of the property building and Vapor Pin® sampling devices installed in the building to assess vapor intrusion.
- Collection of vapor samples from the vapor treatment system (influent and effluent) and individual extraction remediation wells to demonstrate compliance with substantial emissions requirements.

Performance monitoring tasks associated with the cleanup action are summarized below for soil, groundwater, and vapor matrices.

3.2.1 Soil Monitoring

Performance soil monitoring to be conducted by the Construction Contractor during construction activities will include soil screening and soil sampling including the following:

- Field screening each soil boring, and collection and laboratory analysis of up to two soil samples from each of the soil borings for proposed, new vertical remediation wells (RW-8, RW-9, and RW-10) and slanted remediation wells (SW-1, SW-2, and SW-3) (Figure 1). Soil samples will be submitted for laboratory chemical analysis of GRO by

Northwest Total Petroleum Hydrocarbons in Gasoline Range (NWTPH-Gx) and BTEX by EPA Method 8260B to 1) further delineate the nature and extent of impacts to soil and groundwater and 2) for investigation derived waste (IDW) disposal characterization purposes.

- Field screening and collection and laboratory analysis of soil samples from soil stockpiles generated during system installation for waste characterization, if required (i.e., if waste cannot be profiled using existing RI data). Required chemical analyses for soil samples will be determined based on generator knowledge and the requirements of the waste disposal facility.

- Collection and laboratory analysis of representative samples of imported fill materials for chemical analysis. [Note: This is the Construction Contractor's responsibility; however, this sampling may also be performed by the Consultant for verification purposes.] Required chemical analyses for soil samples will be determined by Ecology and the Consultant.

3.2.2 Groundwater Monitoring

Performance groundwater monitoring to be conducted by the Construction Contractor during construction activities will include collection and laboratory analysis of water samples from remediation well development water and cleaning water for waste disposal characterization.

Performance groundwater monitoring to be conducted by the O&M Contractor during remediation system operation will include:

- Collection of water samples from the influent and effluent of the liquid treatment system, in accordance with recommendations from the City of Seattle and King County. [Note: This sampling is the Contractor's responsibility; however, to ensure accuracy of the results, the Consultant will also perform periodic independent monitoring.]

- Collection of groundwater samples from monitoring wells during system operation. During initial operation and transitions between treatment methods, monitoring may be conducted more often at selected wells.

3.2.3 Vapor Monitoring

Performance Vapor Monitoring to be conducted by the O&M Contractor during remediation system operation will include:

- Performance of the vapor treatment system will be confirmed via sampling and analysis of the influent and effluent vapors, in accordance with recommendations from the Puget Sound Clean Air Agency (PSCAA). The influent and effluent vapors will be sampled monthly for the first two quarters of system operation and quarterly thereafter for field and laboratory analyses of VOCs. Additional details on vapor performance monitoring are included in the O&M Manual and SAP/QAPP.

- Vapor monitoring to assess the possibility of a vapor intrusion pathway into the property building will be conducted during remediation system operation. Vapor monitoring will be

conducted via collection of vapor samples from Vapor Pin® sample devices installed in the building (Figure 3) and the SSD wells located on the north and west sides of the building (Sheet C-01 in the Project Manual). Field testing of vapor samples collected from the site will be conducted using a ppb PID for total VOCs and a 4-gas meter to measure % LEL, oxygen, carbon dioxide, and VOCs. Vapor samples may also be collected for laboratory analysis of VOCs based on field measurement results.

3.3 Confirmation Monitoring

Confirmation monitoring will be conducted to assess the long-term effectiveness of the remedial action once cleanup standards have been attained and/or once the remediation system is no longer actively operating. Confirmation monitoring at the Site will include:

- Soil sampling to confirm soil meets Site cleanup levels, and
- Four consecutive quarters of groundwater monitoring to show that groundwater concentrations meet Site cleanup levels.

Additional details on the sampling locations, sampling methods, analyses to be performed and sampling frequency for soil and groundwater confirmation monitoring activities at the Site are included in the SAP/QAPP (under separate cover). The location(s) and depth(s) for collection of confirmation soil samples will be determined in accordance with applicable Ecology guidance and will be approved by Ecology prior to collecting samples.

Confirmation groundwater monitoring events will be performed following completion of the remediation system operation. Groundwater samples will be collected from monitoring wells located on and off the properly to demonstrate attainment of Site cleanup levels. These wells are identified as “Compliance Wells” in Table 1. Groundwater monitoring will be ceased in wells after laboratory data from four consecutive quarters of monitoring indicate GRO and BTEX concentrations in groundwater samples are below the Site cleanup levels. Those wells will then be removed from the groundwater monitoring program, but not decommissioned.

The specific wells, laboratory analytes, and sampling frequency may be modified for subsequent monitoring events as determined by Ecology.

3.4 Cleanup Requirements

3.4.1 Remedial Action Objectives

The objective of the cleanup action is to reduce potential risks to human health and the environment. Because the Site is zoned as “Neighborhood-Commercial,” the proposed soil cleanup standards must be protective of unrestricted land use. Specific risk-based remedial action objectives include:

- Reduce the potential for human contact with soil and groundwater containing COCs at concentrations exceeding the selected CULs.
- Protect groundwater quality by addressing dissolved phase petroleum hydrocarbons exceeding the selected CULs.

- Reduce the potential for human exposure to vapors (primarily vapor intrusion into buildings) associated with soil and groundwater containing COCs at concentrations exceeding the selected CULs.

3.4.2 Cleanup and Screening Levels

The cleanup standards for soil and groundwater, as selected in the RI/FS and presented in the CAP, are noted below per WAC 173-340-400(4)(a)(i).

- **Soil:** MTCA Method A soil CULs for unrestricted land use based on WAC 173-340-740 and/or obtained from Ecology's Cleanup Levels and Risk Calculation (CLARC) database. For those compounds where MTCA Method A levels may not be available, soil CULs will be based on MTCA Method B values and/or leaching to groundwater values.

- **Groundwater:** MTCA Method A groundwater CULs for fuel components (GRO and BTEX constituents) based on WAC 173-340-740 and/or obtained from Ecology's CLARC database. For those compounds where MTCA Method A levels may not be available, groundwater CULs will be based on MTCA Method B values.

- **Vapor Intrusion:** Screening levels for soil gas will be based on MTCA Method B groundwater screening levels for the vapor intrusion pathway obtained from Ecology's CLARC database. If sub-slab soil gas samples are collected, they will be compared to Method B sub-slab soil gas screening levels obtained from Ecology's CLARC database.

CULs for unrestricted land uses are proposed as part of the cleanup standards for this Site. These standards are protective of human exposure via direct contact pathway and are protective of groundwater and surface water. The CULs are summarized in Table 2.

Groundwater CULs selected for the Site are based on MTCA Method A CULs for fuel components (GRO and BTEX). MTCA Method A groundwater CULs for GRO and BTEX were selected for fuel components because they are the most applicable and protective standards for gasoline-range hydrocarbon compounds (including BTEX).

3.4.3 Points of Compliance

The points of compliance, based on the potential chemical exposure routes, are those points where cleanup levels established for the Site shall be achieved.

The points of compliance for Site media were established as follows:

- **Soil:** Based on WAC 173-340-740, the point of compliance for soil is as follows:
  - Throughout the Site for protection of groundwater.
  - From the ground surface to the depth of shallow groundwater for possible VI.
  - From the ground surface to a depth of 15 feet below grade for protection of humans based on direct contact.

- **Groundwater:** In accordance with WAC 173-340-720(8), throughout the Site from the uppermost saturated zone to the lowest depth potentially affected by Site contaminants.
- **Air:** In accordance with WAC 174-340-750(6), in ambient air throughout the Site.

Section 4: Reporting

At the completion of construction, an As Built Report will be prepared in accordance with WAC 173-340-400(6)(b)(ii). The Engineer responsible for the oversight of construction will prepare as built drawings incorporating drawing markups provided by the Construction Contractor and a report documenting construction. The report will also contain an opinion from the Engineer, based on testing results and inspections, as to whether the cleanup action has been constructed in substantial compliance with the plans and specifications and related documents.

The responsibilities, content, and frequency for data reporting and remedial progress reporting to Ecology during operation and maintenance of the MPE system and compliance monitoring will be as provided in Section 8.4 of the SAP/QAPP.

Deliverables will be provided to Ecology electronically in MS Word, Excel, and/or Adobe PDF formats for all documents, as appropriate.

References

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Tables

Kennedy Jenks

Table 1: Summary of Groundwater Monitoring and Remediation Wells

FORMER CIRCLE K SITE 1461
Seattle, Washington

Monitoring Well ID	Date Installed	Well Status	Well Use	Well Diameter (inches)	Screened Interval (feet bgs)	Easting (US Survey Feet)	Northing (US Survey Feet)
MW-2	09/11/1989	Existing	Monitoring Well	2	5.5-20.9	1278287.96	236985.88
MW-6	10/02/1989	Existing	Monitoring Well	2	5-20.4	1278462.46	236998.42
MW-7	10/02/1989	Existing	Monitoring Well	2	5-20.2	1278497.04	236983.26
MW-8	10/03/1989	Existing	Compliance Well	2	5-20.3	1278438.10	237006.82
MW-9	10/03/1989	Existing	Compliance Well	2	5-21.2	1278408.96	237007.40
MW-10	10/03/1989	Existing	Compliance Well	2	5-20.4	1278488.93	236997.48
MW-11	10/04/1989	Existing	Monitoring Well	2	5-20.0	1278384.53	237065.31
MW-13	12/20/1989	Existing	Compliance Well	2	4-19.0	1278402.55	236971.66
MW-14	12/20/1989	Existing	Compliance Well	2	4-19.3	1278458.03	237022.92
MW-15	12/21/1989	Existing	Compliance Well	2	4-18.7	1278421.35	237026.01
MW-16	12/21/1989	Existing	Compliance Well	2	4-19.2	1278390.29	237013.58
MW-17	08/01/2016	Existing	Compliance Well	2	4-19	1278436.82	236871.78
MW-18	08/01/2016	Existing	Compliance Well	2	5-15	1278391.36	236873.73
MW-19	09/23/2016	Existing	Compliance Well	2	5-20	1278433.66	236911.07
MW-20	09/23/2016	Existing	Compliance Well	4	5-20	1278392.00	236918.95
MW-21	09/23/2016	Existing	Compliance Well	4	5-20	1278392.68	236948.84
RW-1	02/07/2017	Existing	Compliance Well	4	5.5-20.5	1278390.95	236890.20
MW-4	09/12/1989	Existing	Remediation Well	2	4-18.8	1278447.91	236985.00
RW-2	02/09/2017	Existing	Remediation Well	4	5-20	1278404.38	236970.10
RW-3	02/09/2017	Existing	Remediation Well	4	5-20	1278409.31	236960.04
RW-4	02/08/2017	Existing	Remediation Well	4	5-20	1278418.32	236947.51
RW-5	02/08/2017	Existing	Remediation Well	4	5-20	1278407.00	236932.47
RW-6	02/10/2017	Existing	Remediation Well	4	5-20	1278425.63	236982.51
RW-7	02/07/2017	Existing	Remediation Well	4	5.0-20.0	1278432.90	236913.61
RW-8	TBD	Proposed	Remediation Well	4	5-20	1278394.71	236950.38
RW-9	TBD	Proposed	Remediation Well	4	5-20	1278406.10	236909.25
RW-10	TBD	Proposed	Remediation Well	4	23-28	1278422.51	236924.38
SW-1	TBD	Proposed	Slant Remediation Well	4	5-18	1278385.16	236943.24
SW-2	TBD	Proposed	Slant Remediation Well	4	5-18	1278397.11	236929.86
SW-3	TBD	Proposed	Slant Remediation Well	4	5-18	1278385.16	236919.10

Notes:

Monitoring Well	Existing monitoring well for groundwater level measurements only
Compliance Well	Existing monitoring well for groundwater compliance monitoring
Remediation Well	Existing injection/extraction remediation well
Remediation Well	Proposed new remediation well; easting and northing data are approximate
Slant Remediation Well	Proposed new slanted remediation well; easting and northing data are approximate

bgs = below ground surface
TBD = to be determined
Easting and Northing data provided in horizontal datum NAD 83, Washington North State Plane Coordinates in U.S. Survey feet.

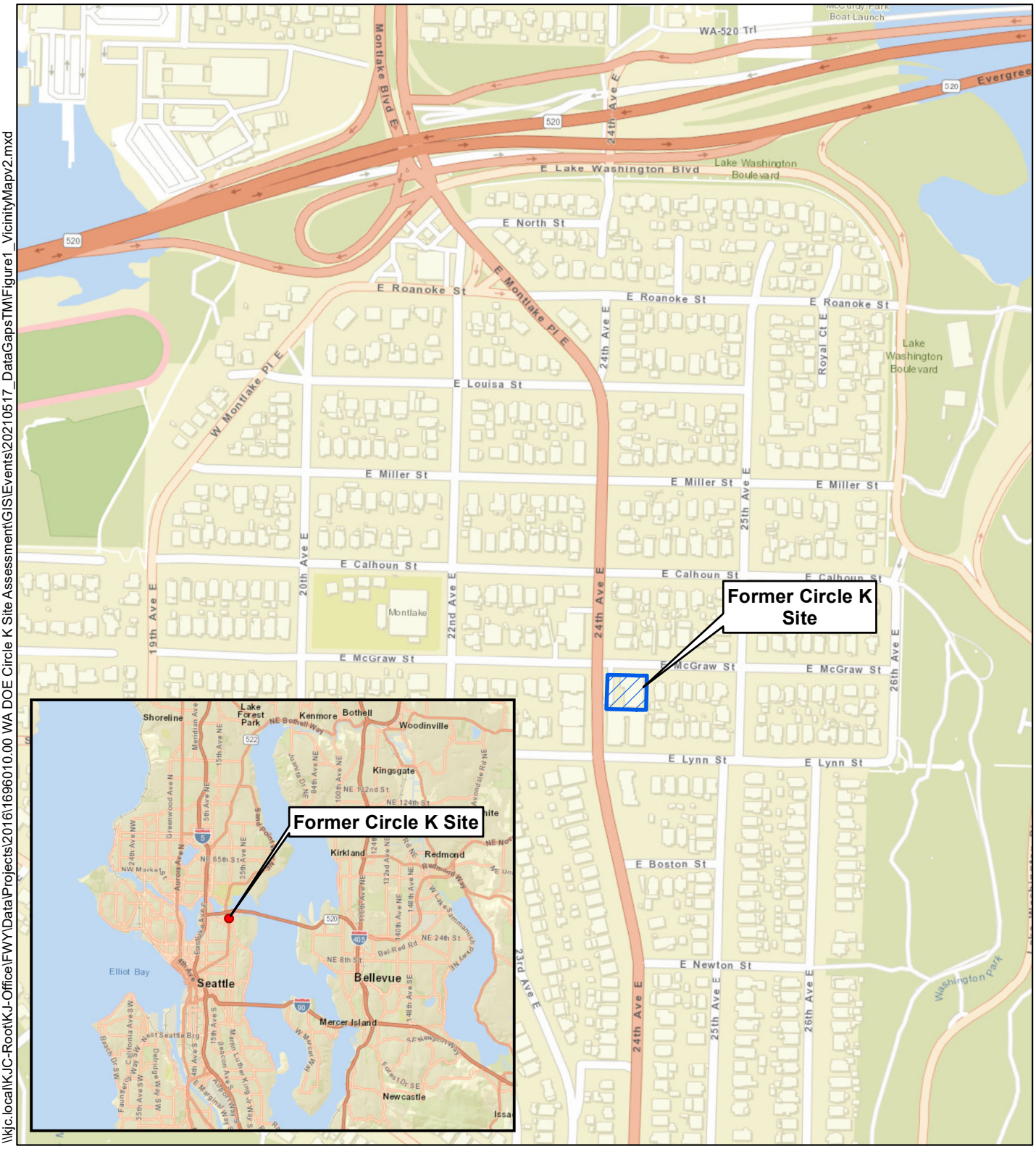
Table 2: Summary of Site Cleanup Levels and Screening Levels

FORMER CIRCLE K SITE 1461
Seattle, Washington

Media / COCs	Value and Units	Cleanup Level / Screening Level Source
Soil		
Gasoline-Range Organics (GRO)	100 mg/kg (w/o benzene)	MTCA Method A Soil Cleanup Levels (CULs) for Unrestricted Land Use - Washington State Administrative Code (WAC) 173-340-740, Table 740-1.
	30 mg/kg (with benzene)	
Benzene	0.03 mg/kg	
Toluene	7 mg/kg	
Ethylbenzene	6 mg/kg	
Xylenes	9 mg/kg	
Groundwater		
Gasoline-Range Organics (GRO)	1,000 µg/L (w/o benzene)	MTCA Method A Groundwater CULs - WAC 173-340-720, Table 720-1.
	800 µg/L (with benzene)	
Benzene	5 µg/L	
Toluene	1,000 µg/L	
Ethylbenzene	700 µg/L	
Xylenes	1,000 µg/L	
Soil Gas / Vapor		
Gasoline-Range Organics (GRO)	1,500 µg/m^3 (425 ppbv)	MTCA Method B Noncancer Sub-Slab Soil Gas Screening Level - Cleanup Levels and Risk Calculation (CLARC) Vapor Intrusion Method B Table - July 2022
Benzene	460 µg/m^3 (140 ppbv)	
Toluene	76,000 µg/m^3 (20,160 ppbv)	
Ethylbenzene	15,000 µg/m^3 (3,450 ppbv)	
Xylenes	1,500 µg/m^3 (345 ppbv)	

Notes:
COCs = contaminants of concern
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
µg/m^3 = micrograms per cubic meter
ppbv = parts per billion by volume

Figures



\\kjc.local\KJC-Root\KJ-Office\FWY\Data\Projects\2016\1696010.00 WA DOE Circle K Site Assessment\GIS\Events\20210517_DataGapsTM\Figure1_VicinityMapv2.mxd

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors,

Legend

Site Location

N

0 200 400

Scale: Feet

Note:
1. All locations are approximate.

Kennedy Jenks

Former Circle K Site
Seattle, Washington

Site Location and Vicinity Map

KJ 2196008*00

Figure 1

Path: H:\GIS_CloudProjects\WA DOE\Circle K\SAP\Figure2_SiteMap.mxd

Legend

- Existing Well
- Existing Well to be Used for Extraction/Injection
- New Extraction/Injection Well
- New Slant Well
- New Vapor Monitoring Pin
- Parcel Boundary

Notes:
1. All locations are approximate.

N

0 15 30

Scale: Feet

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Former Circle K Site
Seattle, Washington

Well Locations Map

KJ 2196008*00

Figure 2

Path: H:\GIS_CloudProjects\WA.DOE\Circle K\SAP\Figure3_ExtentofImpact.mxd ©2022 Kennedy/Jenks Consultants

Legend

- Existing Well
- Existing Well to be Used for Extraction/Injection
- New Extraction/Injection Well
- New Slant Well
- New Vapor Monitoring Pin
- Parcel Boundary
- Approximate Extent of Gasoline-Range Organics and/or Benzene in Groundwater above MTCA Method A Cleanup Levels
- Approximate Extent of Gasoline-Range Organics and/or Benzene in Soil above MTCA Method A Cleanup Levels

Notes:
1. All locations are approximate.
2. GRO = gasoline range organics
3. CUL = clean up levels

N

0 15 30

Scale: Feet

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Former Circle K Site
Seattle, Washington

Approximate Extents of GRO and Benzene Impacts to Soil and Groundwater

KJ 2196008*00

Figure 3