



## **PERIODIC REVIEW**

**Continental Airlines Hydrant Fuel System  
SeaTac International Airport  
Facility Site ID#: 77676343**

**SeaTac International Airport  
Concourse C and North Satellite  
SeaTac, Washington**

**Northwest Region Office**

**TOXICS CLEANUP PROGRAM**

**March 2019**

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## 1.0 INTRODUCTION

This document is a review by the Washington State Department of Ecology (Ecology) of post-cleanup Site conditions and monitoring data to ensure that human health and the environment are being protected at the Continental Airlines Hydrant Fuel System (Site). Cleanup at this Site was implemented under the Model Toxics Control Act (MTCA) regulations, Chapter 173-340 Washington Administrative Code (WAC).

Cleanup activities at this Site were completed under the Voluntary Cleanup Program. The cleanup actions resulted in concentrations of petroleum hydrocarbons remaining at the Site which exceed MTCA cleanup levels. The MTCA cleanup levels for soil are established under WAC 173-340-740. The MTCA cleanup levels for groundwater are established under WAC 173-340-720. WAC 173-340-420 (2) requires that Ecology conduct a periodic review of a Site every five years under the following conditions:

- (a) Whenever the department conducts a cleanup action;
- (b) Whenever the department approves a cleanup action under an order, agreed order or consent decree;
- (c) Or, as resources permit, whenever the department issues a no further action opinion;
- (d) And one of the following conditions exists:
  - 1. Where an institutional control and/or financial assurance is required as part of the cleanup action;
  - 2. Where the cleanup level is based on a practical quantitation limit; or
  - 3. Where, in the department's judgment, modifications to the default equations or assumptions using site-specific information would significantly increase the concentration of hazardous substances remaining at the Site after cleanup or the uncertainty in the ecological evaluation or the reliability of the cleanup action is such that additional review is necessary to assure long-term protection of human health and the environment.

When evaluating whether human health and the environment are being protected, the factors the department shall consider include [WAC 173-340-420(4)]:

- (a) The effectiveness of ongoing or completed cleanup actions, including the effectiveness of engineered controls and institutional controls in limiting exposure to hazardous substances remaining at the Site;
- (b) New scientific information for individual hazardous substances or mixtures present at the Site;
- (c) New applicable state and federal laws for hazardous substances present at the Site;
- (d) Current and projected Site and resource uses;
- (e) The availability and practicability of more permanent remedies; and
- (f) The availability of improved analytical techniques to evaluate compliance with cleanup levels.

The Department shall publish a notice of all periodic reviews in the Site Register and provide an opportunity for public comment.

## **2.0 SUMMARY OF SITE CONDITIONS**

### **2.1 Site Description and History**

The Continental jet fuel hydrant distribution system at SeaTac International Airport was installed in the early 1970s and was operated by Crawford Aviation, under contract to Continental, until the fall of 1991. The inactive distribution system runs from the former underground storage tank (UST) farm on Air Cargo Road, around the North Satellite, and along the west and north sides of Concourse C. The jet fuel hydrant distribution system consists of approximately 4,110 feet of underground piping, and supplied Jet A fuel to 16 hydrant dispensing valves located along the route. This system has been closed and capped. The Port of Seattle (the Port) installed a new system (approximately parallel to the closed system), which it leases to various airlines. United Airlines acquired Continental Airlines in approximately 2010.

The geology beneath the inactive fuel hydrant system consists of glacial deposits. Typically, the uppermost unit consists of approximately 15 feet of dense, gravely sand and silt to sandy gravel (glacial till). The thickness of this unit decreased to approximately 10 feet near borings 100 and 101 (south end of hydrant distribution system). Beneath this uppermost unit is a fine to coarse grained sand (outwash sand). Occasional lenses of gravel and silty sand were present in some borings. Groundwater was not observed in any of the borings.

### **2.2 Site Investigations**

ENSR Consulting and Engineering (ENSR) conducted a Site assessment in April 1994 to determine if any releases had occurred from the jet fuel hydrant distribution system. Sixty-one soil borings were advanced to 10 to 15 feet below ground surface (bgs) at 100-foot intervals along the pipeline and adjacent to high point vents, low point drains, hydrant valve pits, and hydrant line junctions. Most of the soil samples containing elevated total petroleum hydrocarbon (TPH) concentrations were collected between 5 and 10 feet bgs in borings drilled adjacent to valve pits, high point drains, and low point drains. TPH concentrations ranging from 210 to 6,100 parts per million (ppm) were found in soil samples collected from borings drilled near 10 of the 16 hydrant valve pits. TPH concentrations of 11,000 and 18,000 ppm were found near two low point drains.

The results of ENSR's investigation show that petroleum-impacted soil appears to be isolated, and associated with the hydrant valve pit areas, two low point drains (sample locations B34 and B21), and one high point vent (sample location B15) located along the main pipeline. The ENSR field activities did not determine the vertical extent of TPH in soil along the fuel hydrant distribution system.

Foster Wheeler Environmental conducted field activities from April 22 through May 5, 1999 associated with the subsurface investigation at SeaTac International Airport. Field activities included:

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- Locating utilities using magnetometer and GPR equipment;
  - Drilling 13 soil borings using hollow-stem auger drilling equipment;
  - Performing sampling and field monitoring during drilling activities;
  - Preparing and submitting samples for chemical analysis; and,
  - Conducting waste characterization sampling of soil and water generated during drilling activities.

Two soil samples from each boring were submitted for chemical analysis. At boring B89 only one sample was submitted for analysis due to insufficient sample recovery at the other sampling depths in the boring. The sample yielding the highest field kit screening and/or the photoionization detector (PID) result, and the sample collected at the base of each boring were submitted for chemical analysis. The samples were analyzed for diesel-range TPH (Jet A) using the Washington Total Petroleum Hydrocarbons - diesel range (NWTPH-D) analytical method using a Jet A standard. Three soil samples showing the highest PID and/or field kit reading from borings B90, B92, and B101 were also selected for TPH fractionation analysis using Ecology's analytical methods recommended under the Interim TPH Policy (Ecology 1997; Ecology 1998). The samples were analyzed for volatile petroleum hydrocarbons (VPH); extractable petroleum hydrocarbons (EPH); carcinogenic polynuclear aromatic compounds (cPAHs); benzene, toluene, ethylbenzene, and xylene (BTEX); methyl tert-butyl ether (MTBE); and naphthalene. Chemical analyses were performed by CCI Analytical Laboratories, Inc. (CCI) of Everett, Washington.

Based on the field screening and soil sample analytical results, TPH was detected in soil samples from 10 of the 13 soil borings. Borings B89, B91, and B92 did not show concentrations of TPH above the laboratory's method reporting limit. TPH was detected above the MTCA Method A Cleanup Level in the following samples:

- Four samples from the 20-foot depth (B90, B94 and B99),
- Four samples from the 15-foot depth (B95, B97, B100, and B101),
- Two samples from the 10-foot depth (B93 and B98),
- One sample from the 5-foot depth (B95).

When present, TPH soil concentrations generally were found between 10 feet and 20 feet bgs. In most cases, the TPH was present within the dense, glacial till and the upper 5 to 10 feet of the outwash sand. In B90 and B96 the TPH concentration extended to a depth of 25 feet bgs, based on field screening results. At B94, TPH concentrations were detected (830 milligrams per kilogram [mg/kg]) at a depth of 20 feet bgs, but were not detected at a depth of 25 feet. Soil samples CON-B90-20, CON-B95-15, and CON-B96-20 were also analyzed for TPH fractionation. The TPH fractionation data were collected to evaluate the potential health risks posed by the residual TPH in the soil. BTEX, MTBE, and cPAHs were not detected above the method reporting limit in these samples except for relatively low levels of total xylenes (3 ppm) in sample CON-B90-20.

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## 2.3 Cleanup Actions

An Interim TPH Policy evaluation was conducted (see next Section) and included the assessment of two exposure pathways consistent with the policy: direct contact with impacted soil and leaching from soil to groundwater. Carcinogenic compounds were not detected in the soil samples and consequently, no carcinogenic risks were calculated. Non-carcinogenic risks were evaluated for three samples submitted for VPH/EPH analyses. The calculated hazard indexes (HIs) for industrial land-use for samples CON-B90-20, CON-B95-15, and CON-B96-20 are 0.04, 0.01, and 0.03, respectively. According to Interim TPH Policy guidance, since these HIs are all below 1.0, the risk associated with direct contact with impacted soils in the vicinity of Continental's abandoned fuel hydrant distribution system is not considered significant.

The theoretical groundwater concentrations calculated based on Ecology's soil-to- groundwater modeling for samples CON-B90-20, CON-B95-15, and CON-B96-20 are 0.4 milligrams per liter (mg/L), 0.6 mg/L, and 0.4 mg/L, respectively. These values are lower than the Method A cleanup level of 1.0 mg/L, which is based on the protection of a drinking water source. Therefore, soil concentrations are considered to be protective of groundwater since they are below 1.0 mg/L.

The Interim TPH Policy guidance was also used to calculate a Method C cleanup level for TPH for soils in the vicinity of Continental's fuel hydrant distribution system. A Method C soil cleanup level of 153,477 mg/kg was calculated for TPH based on direct contact with impacted soils, using the fractional distribution determined from the VPH/EPH analyses. However, since free product is required to be removed to the extent practical and in a manner which minimizes the spread of hazardous substances according to MTCA, residual saturation (free product) must also be considered in addition to the calculated Method C level (Interim TPH Policy recommends the use of literature values). The literature search conducted by Foster Wheeler found estimated residual saturation concentrations ranging from 13,333 to 22,857 mg/kg for the soil and product types encountered at the Site. All TPH results for soils sampled during Site characterization activities and previous work conducted by ENSR are below the more limiting residual saturation concentrations, with the exception of one sample collected in 1994.

The consultant summarized that the Interim TPH Policy Evaluation indicates that petroleum impacted soil located in the vicinity of Continental's fuel hydrant distribution system does not pose a risk to human health under an industrial land use scenario. Soil impacts in the vicinity of the fuel distribution system are present to a depth of approximately 20 feet bgs and have not migrated to the upper aquifer, which is located at approximately 90 feet bgs. This can likely be attributed to the shallow soil (glacial till) which impedes petroleum hydrocarbon migration due to low permeability.

If the fuel hydrant distribution system is removed in the future, exposure of workers to soil through direct contact could occur during excavation or construction activities. Although direct contact with the impacted soil is not considered a significant risk based on the Interim TPH Policy Evaluation presented herein, the excavation or construction activities should be planned

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so to minimize exposure to workers and to address the appropriate handling, characterization, and disposal/treatment of petroleum-impacted soil that may be encountered.

Ecology agreed with the remedy and issued a No Further Action (NFA) determination on October 10, 2003 after appropriate institutional controls were implemented. An “effective alternative system” for the institutional controls was implemented by the Port of Seattle (as opposed to a Restrictive Covenant) since the property is owned by a government entity that does not routinely file with the county recording office [WAC 173-340-440 (8) (b)]. This is discussed in more detail in Sections 2.5 and 3.1.

## **2.4 Cleanup Levels**

Foster Wheeler evaluated petroleum impacts in soils in the vicinity of Continental’s fuel hydrant distribution system according to the technical approach and analytical procedures described in Ecology’s “Interim Interpretive and Policy Statement, Cleanup of TPH” (Interim TPH Policy) dated January 1997. The Interim TPH Policy was later codified and made permanent in the regulations. Risks were evaluated for two exposure pathways, direct contact to impacted soils under an industrial land use scenario (industrial workers) and leaching from soil-to-groundwater. A cleanup level was calculated for soils based on these two exposure pathways. As described in the Interim TPH Policy, calculated soil cleanup levels are limited by residual saturation (defined as petroleum concentration in soil where product will begin to flow downward under the force of gravity). Therefore, estimates of residual saturation were obtained through a literature search (recommended in the Interim TPH Policy) for products similar to Jet-A, and for the soil type in the vicinity of Continental’s fuel hydrant distribution system.

The Interim TPH Policy was developed to be consistent with the current MTCA rule and provides the methodology to calculate Method B and C soil and groundwater cleanup levels for TPH using surrogates to represent specific fractions of petroleum compounds. The policy allows for a detailed evaluation of complex petroleum mixtures that takes into account changes that occur as a result of weathering and degradation. The policy requires use of new analytical methods VPH and EPH that quantify hydrocarbon fractions in two groups: aliphatics and aromatics. Carcinogenic compounds were not detected in soil samples and consequently, carcinogenic risks were not evaluated.

The conceptual Site model (CSM) for Continental’s fuel distribution system area is similar to CSMs that have been developed for other properties located at the airport. The airport is zoned for industrial activity (airport industrial, according to City of SeaTac records), has controlled access, and is paved with concrete approximately 16 inches thick. There are no water supply wells in the vicinity of the Site which are screened in the upper aquifer located at approximately 90 feet bgs (Emcon 1999).

The source of petroleum contamination in soils in the vicinity of Continental’s fuel hydrant distribution system is likely to be from spills and leaks associated with the hydrant pits and low point drains, according to the environmental consultant. This system was disconnected from the tank farm in the fall of 1991. Site characterization activities conducted by Continental in the

vicinity of their fuel hydrant distribution system indicate that petroleum hydrocarbon concentrations detected in soil in these areas (vicinity of Concourse C and the North Concourse) have not reached groundwater. Petroleum hydrocarbon concentrations in soil have not migrated beyond a depth of approximately 20 feet bgs and the upper aquifer is located at a depth of approximately 90 feet bgs. Furthermore, the consultant concluded that due to the thickness of the concrete at the surface, surface water infiltration is likely to be minimal and has not, nor is it likely to, aide in transport of petroleum hydrocarbons to groundwater. Therefore, an evaluation by the consultant of potential exposure pathways indicates that the most likely complete exposure pathway is for industrial workers that may come in direct contact with impacted soils in the vicinity of Continental's fuel hydrant distribution system during future excavation activities. In general, exposure via inhalation is not considered to be significant since the source is aged (weathered and degraded) and is known to be Jet A fuel which is not very volatile.

Samples were analyzed using the VPH/EPH analyses required by the Interim TPH Policy. The VPH analysis is used to quantify lighter hydrocarbon fractions and the EPH analysis is used to quantify heavier hydrocarbon fractions. Both the VPH and EPH analysis divide the petroleum hydrocarbons into two major fractions based on their carbon structures, aliphatic compounds, and aromatic compounds. The results are reported in specified groups of equivalent carbon (EC) chain lengths (e.g., EC8-10).

Three soil samples (CON-B90-20, CON-B95-15, and CON-B96-20) were submitted for VPH/EPH analyses. Sample CON-B96-20 was selected because the highest TPH concentration (7,900 ppm) was detected in this sample. Sample CON-B90-20 was selected for comparison with sample CON-B96-20 since the TPH concentration detected in this sample (6,200) is very similar to CON-B96-20. Sample CON-B95-15 was also selected for analysis since this sample has an intermediate TPH concentration (880 ppm). Fractionation results were used to evaluate risk consistent with the Interim TPH Policy and to calculate a TPH cleanup level for soils at the Site.

The airport is zoned for industrial activity and potential receptors that may come into contact with impacted soils in the vicinity of the fuel distribution system are industrial workers. Therefore, a MTCA Method C industrial evaluation was conducted. Non-carcinogenic risks were calculated for a Method C industrial scenario using the methodology provided in the Interim TPH Policy. Non-carcinogenic risks are quantified in terms of the hazard quotient (HQ), which is a ratio of the actual dose of a chemical to a reference dose considered to be protective of human health. HQs are added for all chemicals in a single sample to calculate the hazard index (HI). HIs in excess of 1.0 are considered to be an unacceptable risk. The equations and assumptions for calculating HQs are described in the Interim TPH Policy. The calculated HIs for industrial land-use for samples CON-B90-20, CON-B95-15, and CON-B96-20 are 0.04, 0.01, and 0.03, respectively. Since these HIs are all below 1.0, the consultant concluded the risks associated with direct contact with impacted soils in the vicinity of Continental's fuel hydrant distribution system are not considered significant.

The Interim TPH Policy was used to calculate projected/theoretical groundwater concentrations, which may result from leaching or migration of the petroleum present in impacted soils in the vicinity of Continental's fuel hydrant distribution system. These calculations were performed



using a soil/pore water equilibrium partitioning model (Raoult's Law) for the vadose zone and a simple mass balance mixing model for the saturated zone, as described in the Interim TPH Policy. The calculations were performed for each hydrocarbon fraction using the surrogate fate and transport values published in the Interim TPH Policy; Ecology's default dilution factor of 20 for the mixing model; and Ecology's spreadsheet for Interim TPH calculations available on its website. The theoretical groundwater concentrations calculated based on Ecology's soil-to-groundwater modeling for samples CON-B90-20, CON-B95-15, and CON-B96-20 are 0.4 mg/L, 0.6 mg/L, and 0.4 mg/L respectively. These values are lower than the Method A cleanup level 1.0 mg/L, which is based on the protection of an aquifer for drinking water purposes. Therefore, the soil concentrations in the vicinity of the fuel hydrant distribution system are considered to be protective of groundwater since the calculated impact to groundwater is less than 1.0 mg/L. In addition, the groundwater is not used for drinking water purposes.

MTCA requires that the owner or operator shall remove free product to the maximum extent practicable and in a manner that minimizes the spread of hazardous substances. Consistent with MTCA, Interim TPH Policy defines residual saturation concentration as the upper limit to any pore water partitioning model. If petroleum is present in soils above the residual saturation concentration, product will begin to flow downward under the force of gravity (free product). The residual saturation concentration is dependent on properties of the product and soils at the Site. As recommended in the Interim TPH Policy, a literature review was conducted to obtain estimates of residual saturation for soils in the vicinity of Continental's fuel hydrant distribution system.

Soils in the vicinity of the fuel distribution system are heterogeneous and typically comprised of a layer of till (approximately 10 to 15 feet thick) above a layer of mostly fine to medium sand containing varying percentages of coarse sand and silt. Jet A fuel is in the middle distillates range similar to diesel and kerosene, and is estimated to have a density of approximately 0.8 grams per cubic centimeter ( $\text{g/cm}^3$ ). A literature value for residual saturation of 17,000 mg/kg was obtained for fine sand/silt and a liquid hydrocarbon density of  $0.8 \text{ g/cm}^3$  (API 1989). Literature values for middle distillates with hydrocarbon densities of  $0.8 \text{ g/cm}^3$  have also been estimated by Cohen and Mercer and are very similar to this value. Cohen and Mercer estimate residual saturation concentrations of 13,333 mg/kg for fine to medium sand and 22,857 mg/kg for silt to fine sand (1993).

All TPH concentrations detected in soils during Site characterization activities in the vicinity of the fuel distribution system are below these literature values with the exception of one sample collected in March 1994, in which TPH was detected at a concentration of 18,000 mg/kg. With the exception of this sample, TPH concentrations detected during the March 1994 event ranged from non-detect to 11,000 mg/kg. TPH concentrations detected in soil samples collected during the Site characterization activities in May 1999, range from non-detect to 7,900 mg/kg. More than likely, some weathering and degradation of the petroleum have occurred. Visual evidence of free product in soil was not reported in the samples collected in 1994 or 1999, including the samples with the highest concentrations of TPH. Furthermore, data collected during the Site characterization events in the vicinity of the fuel distribution system show that hydrocarbon soil impacts are present to a depth of approximately 20 feet bgs and have not migrated to the upper

aquifer which is located at approximately 90 feet bgs. This can likely be attributed to the shallow soil (glacial fill) which impedes petroleum hydrocarbon migration due to low permeability.

A Method C soil cleanup level was calculated for TPH based on direct contact with soil under an industrial land use scenario (industrial workers) and impact to groundwater using the fractional distribution determined from the VPH/EPH analyses. Using Interim TPH Policy guidance, Method C TPH cleanup level calculations were conducted for each of the three soil samples submitted for VPH/EPH analyses (sum of the aliphatics and aromatics) that results in an HI of 0.99 (assuming the same proportion of aliphatics, aromatics, and BTEX as the submitted sample). Of the three samples analyzed, the Method C soil cleanup level based on the fractional distribution of Sample CON-B95-15 was the lowest and was calculated to be 153,477 mg/kg. This calculated cleanup level, based on direct contact of an industrial worker with impacted soil, is also protective of groundwater since the projected groundwater concentration for this sample is less than 1.0 mg/L. However, this calculated cleanup level is greater than the literature cited residual saturation values of 13,333 to 22,857 mg/kg referenced previously. Therefore, for the area near Continental's fuel hydrant distribution system, the appropriate soil cleanup level will, in turn, be based on residual saturation since these concentrations are below the calculated cleanup level. TPH concentrations detected in soil near the fuel hydrant distribution system are all below the more limiting residual saturation values with the exception of one soil sample collected in 1994.

## 2.5 Institutional Controls

Based on the Site use, surface cover, and cleanup levels, it was determined that the Site was eligible for a NFA determination if institutional controls and an effective alternative system was implemented for the property. Institutional controls were implemented for the Site by the Port of Seattle in 2003, which imposed the following limitations:

1. Site access is restricted with fencing and property signage.
2. Construction activity conducted by the Port, Port tenants, and all contractors, or other work that might involve exposure to residual contamination, must be performed in compliance with airport procedures. Compliance with these procedures is required of the Port and all tenants and contractors. The procedures require that Port environmental staff review and approve any such work before it is performed. In addition, most construction or other work mentioned above at SeaTac International Airport (STIA) requires issuance of a Building/Grading Permit from the Port of Seattle Airport Building Department and/or a Certificate of Port Standards Compliance (COPS) issued by the Port Project Management Group. These approvals are not issued until the Environmental Programs have reviewed and approved the project. See STIA Project Design Manual (1/01), and STIA Tenant Design and Construction Process Manual (10/02).

The Airport Building Department and COPS processes provide an effective alternative system to meet the requirements of a restrictive covenant. Compliance by the Port, Port tenants, and their contractors with the procedures discussed above results in environmental staff review of

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proposed projects to verify that such projects do not interfere with a cleanup action (e.g., verify that cap integrity is maintained) or result in a release of hazardous substance.

Should the Port transfer its ownership in any portion of SeaTac International Airport that is associated with this Site, the Port will refer to and comply with the MTCA requirements for institutional controls, including deed restrictions, that are in effect at the time of that transfer.

The full institutional control statement is available as Appendix 6.4.

## **2.6 2012 Fuel Hydrant System Closure**

During Ecology's 2011 Site visit, the inactive fuel hydrant system was discovered to not have been closed properly (which can allow surface water infiltration and can present a potential pathway for future fuel spills to enter the openings and further contaminate the area). Ecology recommended the system be properly closed and sealed to prevent liquids from infiltrating through the system to the soil.

SLR International Corp performed the work to close the inactive fuel hydrant system between November 14 and 16, 2011. No remaining fuel was identified in the inactive fuel hydrant system, as it had already been removed years prior. To close the fuel hydrant system, the valve was removed and the fuel line was capped at each hydrant valve pit. Then, the valve pits and the pits that housed the remaining high point vents and low point drains were filled with concrete. Metal utility lids cover the closed pits.

## **2.7 2014 – 2015 Construction Project**

The Port provided documentation of a construction project performed in 2014 and 2015. The purpose of the project was to install new ADA-compliant walkways, ramps, elevators, and utilities to upgrade passenger conveyance routes to and from smaller airplanes at Gates C2, C10/12, and C14. Fuel pipeline removal and contaminated soil removal and disposal occurred during the course of the construction project. No groundwater was encountered.

Approximately 18 feet of abandoned 12-inch fuel line and 10 feet of abandoned 6-inch fuel line was removed at Gate C2 during the construction project. Limited areas of petroleum contaminated soil was encountered at Gates C2 and C14. Petroleum contaminated soil, including approximately 400 tons from Gate C2 and 90 tons from Gate C14, that had to be removed to complete the construction project was taken to Allied Waste for disposal. Petroleum contaminated soil (that did not need to be removed to complete the project) was left in place below the removed fuel lines at Gate C2. Clean structural fill was used to backfill the excavations.

## **3.0 PERIODIC REVIEW**

### **3.1 Effectiveness of completed cleanup actions**

The effective alternative system for the Site, implemented by the Port of Seattle, is in place. This alternative system prohibits activities that will result in the release of contaminants at the Site, and prohibits any use of the property that is inconsistent with the alternative system. This alternative system serves to ensure the long term integrity of the remedy.

Based upon the Site visit conducted on March 21, 2019, the thick concrete surface at the Site continues to eliminate exposure to contaminated soils by ingestion and direct contact. The surface appears in satisfactory condition, and no repair, maintenance, or contingency actions appear to be required at this time. The Site is still operating as an airport. A photo log is available as Appendix 6.5.

Mr. Don Robbins (Senior Environmental Program Manager at the Port's Aviation Environmental Program) described the Port's construction planning and permitting procedures. The Port's environmental team works with the construction team to determine whether a proposed project will encounter contamination. To assist in this task, a database and mapping tool (called POSAV Compliance and Project Status Database) was created in 2013 that includes all cleanup sites and known areas of contamination at the airport. The mapping tool shows where the contamination is located, and site summaries describe the background, current status, nature of contamination, monitoring, etc. of each cleanup site.

Construction crews have 40-hour HAZWOPER training. A geologist or engineer is on-site during construction projects to screen for contamination. If contamination is encountered, the Port's environmental team is notified. If the encountered contaminated soil is saturated with free product, the Port's policy is to remove as much as possible while it is exposed. Otherwise, only the contaminated soil that must be removed to accomplish the construction project is excavated. All excavated contaminated soil is removed from the property for proper disposal. Another Port policy is to remove inactive fuel lines when they are encountered during construction projects. No groundwater or perched groundwater has been encountered during any projects at the Site.

The Port's operations team is responsible for maintaining the surface cap. They perform weekly inspections to look for concrete damage. Most of the airport consists of square concrete panels that are 18 inches thick. If the concrete is damaged, the entire panel is replaced with a new one and the seams are sealed. The concrete panels are stamped with the date of installation.

Soils with TPH concentrations higher than MTCA cleanup levels are still present at the Site. However, the remedy prevents human exposure to this contamination by ingestion and direct contact with soils. The effective alternative system for the property will ensure that the remaining contamination is contained and controlled.

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### 3.2 New scientific information for individual hazardous substances or mixtures present at the Site

There is no new scientific information for the contaminants related to the Site.

### 3.3 New applicable state and federal laws for hazardous substances present at the Site

The cleanup at the Site was governed by Chapter 173-340 WAC. WAC 173-340-702(12) (c) [2001 ed.] provides that,

“A release cleaned up under the cleanup levels determined in (a) or (b) of this subsection shall not be subject to further cleanup action due solely to subsequent amendments to the provision in this chapter on cleanup levels, unless the department determines, on a case-by-case basis, that the previous cleanup action is no longer sufficiently protective of human health and the environment.”

Although cleanup levels changed for petroleum hydrocarbon compounds as a result of modifications to MTCA in 2001, these changes do not appear to affect this cleanup. The cleanup action is still protective of human health and the environment. A table comparing MTCA cleanup levels from 1991 to 2001 is available below.

Analyte	1991 MTCA Method A Soil Cleanup Level (ppm)	2001 MTCA Method A Soil Cleanup Level (ppm)	1991 MTCA Method A Groundwater Cleanup level (ppb)	2001 MTCA Method A Groundwater Cleanup Level (ppb)
Cadmium	2	2	5	5
Lead	250	250	5	15
TPH	None Listed	None Listed	1000	None Listed
TPH-Gas	100	100/30	None Listed	1000/800
TPH-Diesel	200	2000	None Listed	500
TPH-Oil	200	2000	None Listed	500

### 3.4 Current and projected Site and resource use

The Site is currently used for commercial and industrial purposes. There have been no changes in current or projected future Site or resource uses.

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### 3.5 Availability and practicability of more permanent remedies

The remedy implemented included containment of hazardous substances, and it continues to be protective of human health. While more permanent remedies may be available, they are still not practicable at this Site.

### 3.6 Availability of improved analytical techniques to evaluate compliance with cleanup levels

The analytical methods used at the time of the remedial action were capable of detection below selected Site cleanup levels. The presence of improved analytical techniques would not affect decisions or recommendations made for the Site.

## 4.0 CONCLUSIONS

The following conclusions have been made as a result of this periodic review:

- 1) The remedial actions completed at the Site appear to be protective of human health and the environment.
- 2) Soil cleanup levels have not been met at the Site; however, the cleanup action for the property is determined to comply with cleanup standards under WAC 173-340-740(6) (f), since the long-term integrity of the containment system is ensured and the requirements for containment technologies have been met.
- 3) The effective alternative system (in place of a Restrictive Covenant) for the property is in place and has been effective in protecting public health and the environment from exposure to hazardous substances and protecting the integrity of the cleanup action. However, the effective alternative system documents provided by the Port of Seattle are missing some elements required under WAC 173-340-440. The Port of Seattle must add the following to their effective alternative system documentation for the Site:
  - a) **Interference with Remedial Action:** The property owner shall not engage in any activity on the property that may impact or interfere with the remedial action and any operation, maintenance, inspection, or monitoring of that remedial action without prior written approval from Ecology.
  - b) **Protection of Human Health and the Environment:** The property owner shall not engage in any activity on the property that may threaten the continued protection of human health or the environment without prior written approval from Ecology. This includes, but is not limited to, any activity that results in the release of residual contamination that was contained as a part of the remedial action or that exacerbates or creates a new exposure to residual contamination remaining on the property (such as construction activities or other earthwork).

- c) **Conveyance of Any Interest:** The property owner must provide written notice to Ecology when conveying any interest, including but not limited to title, easement, leases, or other interests. A notice of the institutional controls and effective alternative system must be included in the conveying document.
- d) **Access:** The property owner grants Ecology and its authorized representatives, upon reasonable notice, the right to enter the property at reasonable times to evaluate the effectiveness of the institutional controls and associated remedial actions, including the right to take samples, inspect any remedial actions conducted on the property, and to inspect related records.
- e) **POSAV Compliance and Project Status Database:** Update your database to clarify that your No Further Action (NFA) status with Ecology is contingent upon institutional controls that limit or prohibit activities that interfere with the integrity of the cleanup action or that may result in exposure to hazardous substances at the Site.

No additional cleanup actions are required by the property owner at this time. It is the property owner's responsibility to continue to inspect the Site to assure that the integrity of the remedy is maintained.

#### 4.1 Next Review

The next review for the Site will be scheduled five years from the date of this periodic review. In the event that additional cleanup actions or institutional controls are required, the next periodic review will be scheduled five years from the completion of those activities.

## 5.0 REFERENCES

ENSR, Site Assessment for Jet Fuel Hydrant System at SeaTac International Airport, July 1994;

Foster Wheeler Environmental Corporation, Fuel Hydrant System Investigation Report, SeaTac International Airport, September 8, 1999;

Lovely Consulting, Inc., Seattle Tacoma International Airport Construction Projects, Environmental Agent Work Plan, April 2002;

Perkins Coie, Request for No Further Action Letter, March 4, 2003;

Port of Seattle, Effective Alternative System for Institutional Controls, 2003;

SLR International Corp, Closure of Continental Fuel Hydrant System, January 17, 2012.

Port of Seattle, Concourse C Vertical Circulation Documentation, May 16, 2014 to July 31, 2015.

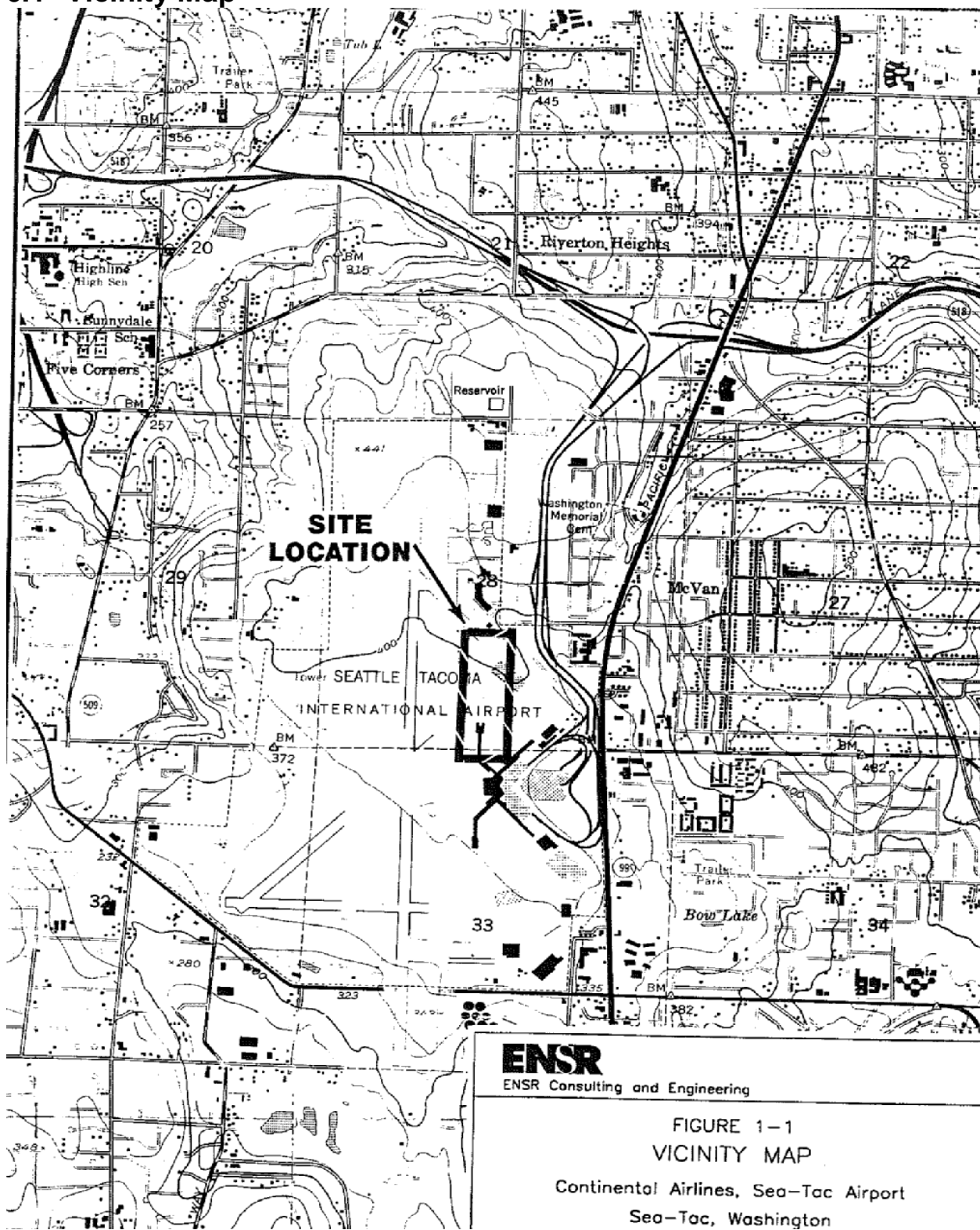
Ecology, 2019 Site Visit.



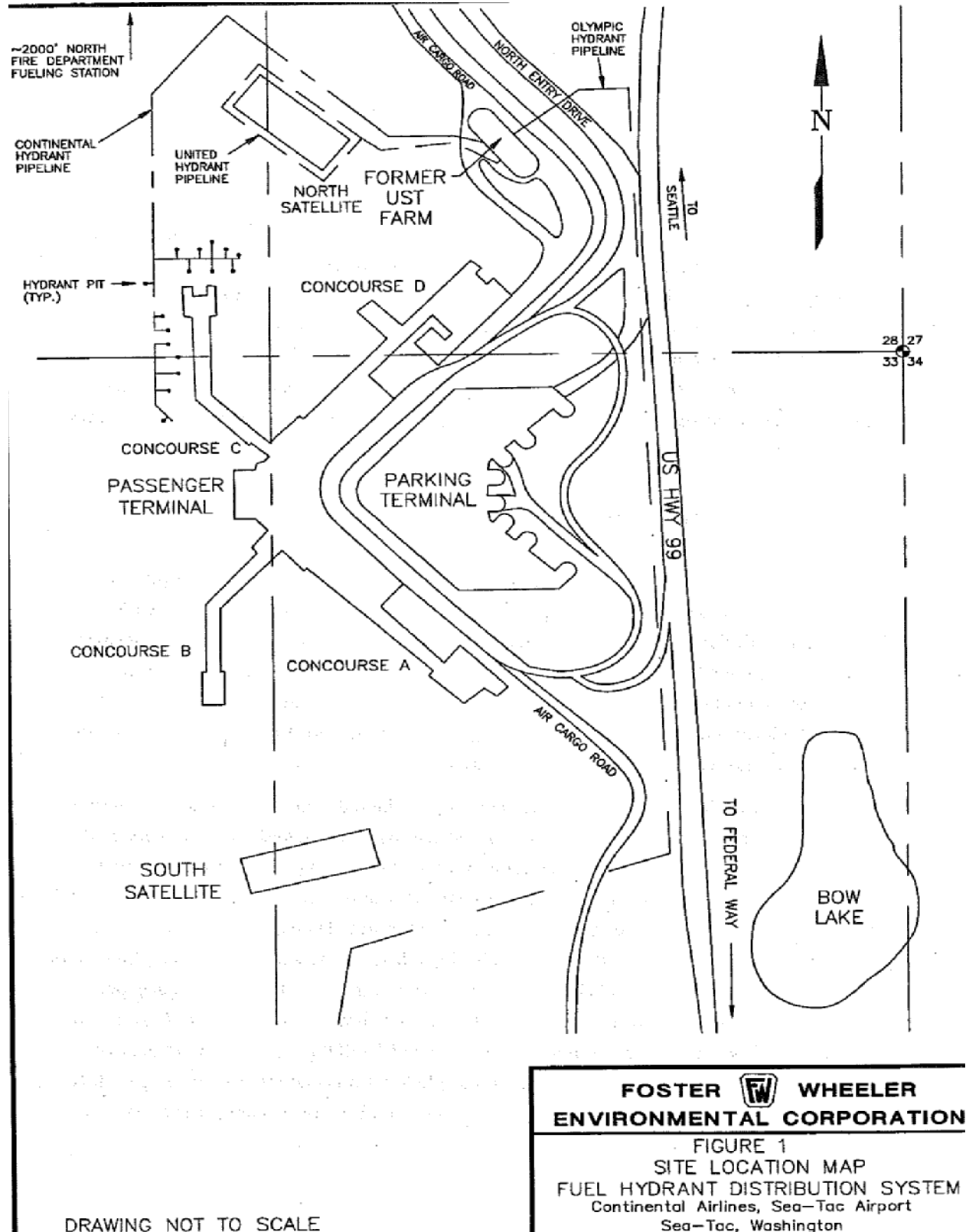
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## **6.0 APPENDICES**

## 6.1 Vicinity Map



## 6.2 Site Plan



[illegible]

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## 6.4 Effective Alternative System for Institutional Controls

### **PORT OF SEATTLE SEA-TAC INTERNATIONAL AIRPORT AIRPORT OPERATIONAL AREA INSTITUTIONAL CONTROLS**

The following information is provided consistent with WAC 173-340-440(8)(b).

The Port of Seattle is the local government entity that owns and operates Sea-Tac International Airport (STIA). The Port does not routinely file with the county recording officer records related to the Port's interests at Sea-Tac International Airport.

STIA is an industrial property and will remain an industrial property for the foreseeable future. Port properties are zoned Aviation Operations or Aviation Commercial by the City of SeaTac. (See City of SeaTac zoning map and classification description, attached.) The subject environmental management site is located within the Aviation Operations zone.

Institutional controls implemented at Sea-Tac International Airport properties and facilities, both within and outside the Aircraft Operations Area, include the following:

- 1) Site access is restricted with fencing and property signage.
- 2) Construction activity conducted by the Port, Port tenants, and all contractors, or other work that might involve exposure to residual contamination, must be performed in compliance with airport procedures. Compliance with these procedures is required of the Port and all tenants and contractors. The procedures require that Port environmental staff review and approve any such work before it is performed. In addition, most construction or other work mentioned above at STIA requires issuance of a Building/Grading Permit from the Port of Seattle Airport Building Department and/or a Certificate of Port Standards Compliance (COPS) issued by the Port Project Management Group. These approvals are not issued until the Environmental Programs have reviewed and approved the project. See *STIA Project Design Manual* (1/01), and *STIA Tenant Design and Construction Process Manual* (10/02).

The Airport Building Department and COPS processes provide an effective alternative system to meet the requirements of a restrictive covenant. Compliance by the Port, Port tenants, and their contractors with the procedures discussed above results in environmental staff review of proposed projects to verify that such projects do not interfere with a cleanup action (e.g., verify that cap integrity is maintained) or result in a release of hazardous substance.

Should the Port transfer its ownership in any portion of Sea-Tac International Airport that is associated with this Site, the Port will refer to and comply with the MTCA requirements for institutional controls, including deed restrictions, that are in effect at the time of that transfer.

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## 6.5 Photo log

**Photo 1: Concrete pavement cap at SeaTac Airport's Concourse C.**



**Photo 2: New walkway for passenger conveyance to small planes (constructed 2015).**





**Photo 3: Closed hydrant fuel line access pit (filled with concrete with metal lid on top).**



**Photo 4: Closed hydrant fuel line access pit (filled with concrete with metal lid on top).**

