LANDAU ASSOCIATES

BOILER HOUSE CONSTRUCTION ENVIRONMENTAL SUPPORT WORK PLAN

North Boeing Field
Seattle, Washington

August 18, 2025

Prepared for

The Boeing Company
Seattle, Washington

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NBF Boiler House Construction Environmental Support Work Plan Seattle, Washington

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LIST OF ABBREVIATIONS AND ACRONYMS

AOC ..... area of concern
bgs ..... below ground surface
Boeing ..... The Boeing Company
COC ..... contaminant of concern
DI ..... de-ionized
DO ..... dissolved oxygen
DP ..... direct push
DPD ..... Department of Planning and Development
DRO ..... diesel-range organics
Ecology ..... Washington State Department of Ecology
EPA ..... US Environmental Protection Agency
ft ..... feet, foot
GRO ..... gasoline-range organics
HASP ..... health and safety plan
HEPA ..... high efficiency particulate air
ID ..... identification
IDW ..... investigation-derived waste
L ..... liter
Landau ..... Landau Associates, Inc.
LEL ..... lower exposure limit
NBF ..... North Boeing Field
NTU ..... nephelometric turbidity unit
NWTPH-Dx ..... Northwest diesel-range total petroleum hydrocarbon extended
NWTPH-Gx ..... Northwest gasoline-range total petroleum hydrocarbon extended
O_2 ..... oxygen
ORO ..... oil-range organics
ORP ..... oxidation reduction potential
PAH ..... polycyclic aromatic hydrocarbon
PCB ..... polychlorinated biphenyl
PID ..... photoionization detector
PPE ..... personal protective equipment
PVC ..... polyvinyl chloride
QC ..... quality control
RI ..... remedial investigation
Site ..... North Boeing Field
SOP ..... standard operating procedure
SVOC ..... semivolatile organic compound
TPH ..... total petroleum hydrocarbon

USCS ..... Unified Soil Classification System
VOA ..... volatile organic analysis
VOC ..... volatile organic compound

1.0 INTRODUCTION

Landau Associates, Inc. (Landau) has prepared this document on behalf of The Boeing Company (Boeing) to present a work plan to perform site characterization in support of the North Boeing Field (NBF) Boiler House construction located in Seattle, Washington (Figure 1). The objective of the investigation is to characterize soil and groundwater conditions at and near the portion of NBF (Site) where the Boiler House Project is proposed (Figure 2).

The intent of this Boeing Facilities Project is to construct a new boiler house to provide steam to NBF and the Boeing Plant 2 facilities that will replace the existing boiler plant. The Project will require soil excavation and dewatering for installing the new boiler house foundation, rerouting storm drains, and installing aggregate piers.

NBF is under an Agreed Order (No. DE 5685) with the Washington State Department of Ecology (Ecology), and completion of a remedial investigation (RI)/feasibility study in accordance with the Agreed Order is currently in progress. As part of the RI, areas of concern (AOCs) have been identified; the new boiler house is located within AOC-10, the sitewide AOC as defined in the draft NBF RI report.[1] A composite soil sample was collected by Boeing in December 2024 from soil collected in multiple potholes to a maximum depth of approximately 8 feet (ft) below ground surface (bgs) from the anticipated excavation area and analyzed for polychlorinated biphenyls (PCBs), copper, nickel, and zinc. PCBs were not detected, and detections of copper, nickel, and zinc were below RI screening levels. Soil and groundwater sampling under the RI has not previously included sampling directly in the footprint of the planned boiler house.

In accordance with the Agreed Order, Ecology requested collection of soil and groundwater samples in advance of construction activities to support characterization of the area and determine if the Project will be conducted as an independent action or interim action. Ecology also recommended the preparation of a work plan for review and approval in advance of the subsurface assessment (work plan).

1.1 Site Description and Previous Site Investigations

NBF is located in an industrial area approximately 4 miles south of downtown Seattle, east/northeast of the Lower Duwamish Superfund Site. The NBF facility comprises approximately 130 acres of developed land located between East Marginal Way South to the west and King County International Airport to the east and extending from Ellis Avenue South on the north to the Federal Aviation Administration tower on the south. The NBF RI site extends from Boeing Building 3-812 and the south end of Concourse B north to the NBF property boundary, and the Project is located on the western portion of the Site adjacent to Building 3-370 (Figure 2).

[1] Landau. 2023. Draft Remedial Investigation Report, North Boeing Field/Georgetown Steam Plant, Seattle, Washington. September 29.

The depth to the water table at the Site varies seasonally, ranging from 2.21 to 11.95 ft below the top-of-pipe elevation for all wells monitored. Groundwater flow directions observed during the RI indicate a flow direction across the Site that is generally toward the southwest, toward the Lower Duwamish Waterway and Slip 4. Monitoring Wells NGW613, NGW621, and NGW624 are located in the vicinity of the Project; the depths to the water table in these wells range from 7.06 to 10.84 ft below the top-of-pipe elevation.

Environmental investigations at the Site to date have been conducted to characterize and evaluate various media, including soil and groundwater. Investigations and interim actions are summarized in a draft RI report (Landau 2023). Based on the results of these previous investigations and interim actions, the following paragraphs summarize the presence of contamination that is known or suspected to remain within AOC-10 at the Site.

Contaminants that remain in NBF soil within AOC-10 and were identified as contaminants of concern (COCs) per the draft RI include the following (Landau 2023):

- PCBs
- Inorganics (antimony, arsenic, barium, cadmium, cobalt, copper, lead, mercury, selenium, thallium, vanadium, and zinc)
- Semivolatile organic compounds (SVOCs), including polycyclic aromatic hydrocarbons (PAHs) and benzoic acid, benzyl alcohol, bis(2-Ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate and dimethyl phthalate, hexachlorobutadiene, 4-methylphenol, pentachlorophenol, and phenol
- Volatile organic compounds (VOCs), including acetone; benzene; bromoform; carbon tetrachloride; chloroform; dibromochloromethane; bromodichloromethane; 1,1-dichloroethane; 1,2-dichloroethane; cis-DCE; 1,2-dichloropropane; ethylbenzene; 2-butanone/MEK; 4-methyl-2-pentanone; methylene chloride; PCE; toluene; 1,1,1-trichloroethane; 1,1,2-trichloroethane; TCE; and total xylenes
- Total petroleum hydrocarbons (TPHs) including gasoline-range hydrocarbons, diesel-range hydrocarbons, and oil-range hydrocarbons.

Contaminants that remain in NBF groundwater within AOC-10 and were identified as COCs per the draft RI include (Landau 2023):

- PCBs
- Inorganics (arsenic, cadmium, copper, iron, lead, manganese, and mercury
- SVOCs, including PAHs (specifically benzo[a]anthracene and benzo[a]pyrene) and bis(2-ethylhexyl) phthalate
- TPHs.

As further detailed below, soil and groundwater samples proposed in this work plan will be analyzed for the COCs that have been identified in AOC-10 (Sections 2.3.3 and 2.4.3 respectively).

2.0 INVESTIGATION ACTIVITIES

The following sections describe the field activities that will be performed to complete the investigation. To further characterize soil and groundwater contamination in the vicinity of the Project, additional soil and groundwater investigation activities will be conducted. The investigation will consist of collecting and analyzing soil samples from five locations within the footprint of the boiler house excavation and three borings within the footprint of the reroute of stormwater lines as shown on Figure 3. A grab groundwater sample will be collected from one boring within the planned footprint of the boiler house excavation.

2.1 Site Reconnaissance and Utility Locate

A Site reconnaissance will be completed prior to investigation activities. The Site reconnaissance will involve one or more Site visits that include evaluating potential access issues by noting Site features and/or facility infrastructure and materials that overlie or impede drilling access to proposed investigation locations.

Utility locates will be conducted no more than 2 weeks before any drilling or coring program begins. A One-Call Utility Locate form will be filled out for each location (Appendix A), and the One-Call Utility Locate Service will be contacted.[2] For locations within the facility or for other access-restricted areas, a meeting time will be requested. The onsite Boeing representative will need to be present to escort the public utility locator onsite, if public utilities are identified onsite that need marking. All utilities listed by the One-Call service will be contacted if specific markings are not visible within the requested locate radius around each boring. A private underground utility locate will also be conducted. Available facility utility maps will be reviewed to identify the potential presence of utilities or other subsurface infrastructure in the vicinity of the proposed exploration locations. Investigation locations may be moved based on the results of the Site reconnaissance, public and private locates, and/or review of facility maps to avoid subsurface utilities or other facility infrastructure or materials that are not readily moveable. The Boeing Onsite Activities Representative will review the boring locations relative to the utility clearance information and sign a Boeing Pre-Dig Utility Clearance Checklist prior to drilling.

2.2 Subsurface Exploration

This section describes the techniques used for subsurface exploration, including drilling activities. Drilling activities include advancing soil borings and collecting soil samples for field-screening, lithologic logging, grab groundwater sample collection, and soil and groundwater laboratory chemical analysis. This section also describes borehole decommissioning activities.

All subsurface explorations involving drilling will be completed by a driller licensed in the State of Washington and will be monitored by an environmental professional. Air-knifing will be completed by trained personnel to a depth of up to 8 ft bgs at each location to confirm the absence of utilities.

[2] Contact information for the One-Call Utility Locate Service is provided on the website www.callbeforeyoudig.org/washington/ or by calling 1.800.424.5555.

2.2.1 Direct-Push Drilling

Soil borings will be advanced using direct-push (DP) drilling techniques to a depth of 10 or 15 ft bgs. The completion depths of soil borings may vary as influenced by drilling conditions encountered and the depths of the water-bearing units.

DP drilling is accomplished using a truck-mounted, track-mounted, or hand-portable DP rig. Depending on the manufacturer, make, and model, DP drill tooling is advanced by static push, pneumatic impact, vibratory methods, or a combination thereof. In its standard configuration, DP drilling collects a continuous soil core in a 2.25-inch-diameter core barrel with a removable, dedicated polyethylene liner. Once the desired depth is reached, the core is extracted from the ground and the liner and soil core are removed from the core barrel. Soil screening, logging, and sampling procedures are described in Section 2.3.

2.2.2 Borehole Decommissioning

Following soil sample collection, all borings will be decommissioned according to Washington State *Minimum Standards for Construction and Maintenance of Wells* (Washington Administrative Code 173-160-460). Per the code, each soil boring will be decommissioned by sealing the boring from the bottom up to the ground surface using bentonite chips or pellets, bentonite slurry, neat cement grout, or neat cement. Grout and slurry used for sealing the boring below the water table will be placed from the bottom up using methods that avoid segregation or dilution of the sealing material. Application methods include dump bailers and a tremie tube. Above the water table, grout and slurry can be hand poured into the boring as the casing is being raised. Bentonite chips and/or pellets should be poured into the borehole very slowly and monitored by a weighted sounding tape to minimize bridging.

The ground surface will be restored to match existing conditions after soil borings that are not completed as monitoring wells are decommissioned. Asphalt and cement will be patched to cover the bentonite (or other material) seal. Vegetation will be replanted, if necessary, and groundcover will be restored by raking or other physical means. For landscaped areas, efforts will be made to disrupt existing conditions as little as possible during drilling to minimize restoration work.

2.2.3 Drilling Documentation

Qualified environmental field personnel will maintain detailed records of drilling activities. These records will consist of soil boring logs, information recorded in field notebooks, and driller's daily field reports. Field forms, including examples of the field logs and development sheets, are included in Appendix A. Specific procedures for performing and documenting soil logging and soil screening activities are described in Section 2.3. below.

The driller will prepare and maintain a daily field drilling report. The drilling report will specify the number of hours worked, material used, unusual problems, and other special comments and observations. The driller will provide a copy of the log for approval to the onsite environmental field personnel at the end of each day.

2.3 Soil Sampling

This section presents procedures for soil logging, field-screening, and sampling during investigation activities. This section also presents procedures for other soil sampling that may be required. Soil sampling will be conducted by field personnel trained in soil sampling techniques.

2.3.1 Soil Logging

Soil samples will be collected during subsurface exploration to classify soil lithology in accordance with the Unified Soil Classification System (USCS). Soil sample collection methods will depend on the type of exploration. Lithology will be recorded on a Log of Exploration (Appendix A) form along with evidence of contamination based on field-screening (Section 2.3.2) and other pertinent information.

Log entries will include the following:

- Boring location.
- Dates and times of drilling.
- Drilling equipment (e.g., type of rig, size of bits, drill rod designations, and sampler types).
- Boring dimensions.
- Sample depths.
- Depth to groundwater.
- Stratigraphy—soil will be described according to the USCS. Descriptors will include soil composition, density, color, approximate percentages of grain sizes present, and a qualitative estimate of moisture content.
- Additional sample features such as odor, the presence of VOCs (based on screening with a photoionization detector [PID]), non-native debris, and the presence of non-aqueous-phase liquids, if present.

2.3.2 Field-Screening

Soil will be field-screened for evidence of chemical impact to environmental media. Field-screening techniques may include visually inspecting the soil for staining, sheen, discoloration, odor, and other evidence of impact. If appropriate, sheen-testing may be performed by agitating a small volume of soil in a bowl or pan with clean water to see if a sheen is generated. VOC monitoring for soil will be conducted using headspace analysis. Headspace analysis is performed by collecting a small amount of soil in a Ziploc® bag, sealing the bag, breaking up the soil, and letting it sit for 2 to 5 minutes. The tubing from a PID is then inserted into the Ziploc bag, the bag is resealed around the tube, and the highest reading for each compound measured by the PID is recorded in the comments section of the soil boring logs.

As described in the Health and Safety Plan (HASP; Appendix B), the onsite environmental field personnel will also use the PID to monitor the field staff breathing zone for volatile organic gases. If action levels exceed the levels listed in the HASP, drilling will be discontinued. Drilling will proceed only when volatile organic gas concentrations have returned to an acceptable level.

2.3.3 Soil Sample Collection and Analyses

Each boring will be drilled using a DP rig to a total depth of 10 or 15 ft bgs or refusal, whichever is encountered first, depending on the boring location. Borings located within the Boiler House footprint and the boring located to the north will extend to a maximum of 15 ft bgs, and the two borings located along the proposed stormwater route adjacent to the Boiler House will extend to a maximum of 10 ft bgs. Soil samples will be collected at the anticipated final depth of excavation: within the Boiler House footprint at 12 ft bgs, within the boring located to the north at 13 ft bgs, and within the two stormwater borings at 9 ft bgs. If impacted soil is observed as indicated by field-screening (Section 2.3.2), an additional soil sample will be collected from the most impacted zone.

All soil samples will be analyzed for full-list VOCs by US Environmental Protection Agency (EPA) Method 8260D, full-list SVOCs by Method 8270E, PAHs by Method 8270E SIM, toxicity characteristic leaching procedure RCRA 8 metals by EPA 6020B, total metals (antimony, arsenic, barium, cadmium, cobalt, copper, lead, mercury, nickel, selenium, thallium, vanadium, and zinc) by EPA 6020B, PCBs by EPA 8082A, and gasoline-range organics (GRO) and diesel-range and oil-range organics (DRO and ORO, respectively) by Northwest TPH extended (NWTPH-Gx and NWTPH-Dx, respectively). Additional analytical soil samples will not be required to characterize investigation-derived waste (IDW).

Soil samples for volatile constituents will be collected using EPA Method 5035A procedures. The procedures involve using a small coring device or open-ended syringe to collect an undisturbed soil sample of a specified weight, which is then placed in a pre-preserved volatile organic analysis (VOA) vial. This method minimizes loss of VOCs to volatilization during the sampling process. The contracted analytical laboratory will provide specific sampling equipment and instructions on how to collect the samples (e.g., sample quantity for each VOA vial). EPA Method 5035A will not be used to collect samples of disturbed soil (such as drill cuttings) for waste disposal characterization, because the method is intended to be used for relatively undisturbed soil.

Soil samples for non-volatile constituents including, but not limited to, PCBs, metals, and diesel-range petroleum hydrocarbons will be collected in laboratory-provided jars of an appropriate size for the number of analyses being conducted. Care will be taken to collect an appropriately representative sample. Larger samples may be mixed in stainless-steel bowls to homogenize the sample before collecting into sample jars. Sampling spoons and bowls will be cleaned between samples using an Alconox® wash, tap water rinse, and final de-ionized (DI) water rinse. Soil analyses will depend on the location and nature of the release.

All samples will be stored in coolers with ice and transported using proper chain-of-custody procedures to Boeing's contracted analytical laboratory. Additional information regarding proper procedures is included in Section 2.5.5 of this report.

2.4 Groundwater Grab Sampling

During drilling, borehole groundwater grab samples will be collected from a temporary well installed during drilling. When a borehole sample is to be collected, water may not be used during drilling to control heave.

2.4.1 Temporary Well Installation

Temporary wells will be installed during drilling and will consist of a 5-ft-long polyvinyl chloride (PVC) screen (0.010-inch-wide slots) and PVC casing. The driller will advance the exploration to the desired depth, install the temporary well, place a sand pack (if needed) to a height of 2 ft above the screen, and then pull the casing 5 ft up to expose the screen to the surrounding formation. A new well screen will be used for each temporary well. One temporary well is anticipated at one location within the boiler house footprint; additional temporary wells may be installed if groundwater recharge is too slow to collect a sample at the originally selected location.

2.4.2 Borehole and Temporary Well Sampling Procedures

Temporary wells will be purged using low-flow purging as described below until the water runs clear, at least 10 well casing volumes have been removed, or the boring/temporary well is pumped dry, whichever is sooner. “Clear,” for the purposes of well development, means that the turbidity of the purge water is equal to or less than 10 nephelometric turbidity units (NTU). If the well dewaters (i.e., runs dry) during the initial purging effort, one or more well casing volumes will be removed after the well has fully recharged, if practicable. Note that borehole samples generally have very high turbidity, which does not substantially improve with additional purging; therefore, the turbidity goal of less than 10 NTU may not be achievable. After purging, the well will then be sampled using low-flow sampling methods.

2.4.2.1 Low-Flow Sampling

Low-flow sampling minimizes disturbance to the aquifer during groundwater sample collection. The low pumping rate induces laminar flow in the immediate vicinity of the sampling pump intake, thus drawing groundwater horizontally from the aquifer and into the sampling device.

Purging and sampling will be performed using a peristaltic pump with dedicated polyethylene or Teflon™ tubing. The end of the sample tubing will be positioned approximately 1 ft below the surface of the water table. Care will be taken to gently insert the tubing to minimize disturbance of any sediment that may have settled in the temporary well. Purging will proceed as follows:

- The well will be purged at a rate of less than 0.5 liters (L) per minute and with drawdown of less than 4 inches (0.3 ft) during purging. The flow rate will be measured by filling a 1-L container and measuring the rate of filling using a stopwatch. Some wells may need to be pumped at slower rates to avoid drawdown of the water column within the well. Purging will continue until temperature, conductivity, pH, dissolved oxygen (DO), and oxidation reduction potential (ORP) have stabilized, as described below.

- Field parameters (pH, temperature, conductivity, DO, ORP, and turbidity) will be continuously monitored during purging using a flow cell. Purging of the well will be considered complete when all field parameters become stable for three successive readings. The three successive readings should be within +/- 3 percent for temperature, +/- 3 percent for conductivity, +/- 10 percent for DO, +/- 10 millivolts for ORP, and +/- 10 percent NTU for turbidity for values greater than 5 NTU (if three turbidity values are less than 5 NTU, these values will be considered stabilized).
- If one or more of the readings have not stabilized within 30 minutes, samples will be collected, and the unstable readings will be noted on the sampling form.
- Purge water will be contained in 5-gallon buckets dedicated to the Site and transported back to the drum storage area at NBF.

2.4.3 Grab Groundwater Sample Collection and Analyses

Samples will be collected through low-flow purging techniques, as described in Section 2.4.2. The pump will not be turned off for an extended period of time, nor will the pumping rate be changed between the purging and sampling process. Samples that do not require filtering will be collected into the laboratory-provided sample container directly from the end of the sample tubing. Sample bottles for volatiles analyses will be filled with no headspace while avoiding overfilling that would dilute the preservative.

All grab groundwater samples will be analyzed for PCBs by EPA 8082A, dissolved and total metals (arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, selenium, silver, and zinc), polycyclic aromatic hydrocarbons by 8270E SIM, bis(2-ethlhexyl) phthalate by EPA Method 8270E, GRO by NWTPH-Gx, and DRO and ORO by NWTPH-Dx. Additional analytical groundwater samples will not be required to characterize IDW.

All samples will be stored in coolers with ice and transported using proper chain-of-custody procedures to the laboratory. Additional information regarding proper chain-of-custody procedures is included in Section 2.5.5 of this report.

2.5 Sample Handling and Documentation

This section describes sample handling and documentation procedures. The procedures described are designed to provide a thorough record of events surrounding the collection of each sample and ensure that data collected in the field are usable.

2.5.1 Sample Labeling

Gummed paper labels, which adhere strongly to glass or plastic, will be used. Labels will be prepared with waterproof indelible ink and will include the following information:

- Project number
- Sample identification (ID) number
- Date and time of sampling

- Name(s) of sampling personnel
- Analysis and type of preservatives added.

To ensure a consistent sample tracking mechanism, each sample collected will be given a unique sample ID number using a consecutive numbering system or an alphanumeric system. The consecutive numbering system consists of four primary types: groundwater monitoring wells, stormwater/surface water samples, borings, and test pits. The sample ID numbers derived from the consecutive numbering system will share the following general structure. In general, the sample ID number will include a site code (NBF) a location type (GW for groundwater monitoring well, SB for soil boring), a consecutive number, and a date or a depth (borings).

The following sections below describe the creation of the sample ID number, which will be used for samples collected throughout the Project.

2.5.2 Soil Samples

This section describes the sample ID number designations used for soil samples collected from a soil boring. The sample matrix will not be included in the sample ID number but will be recorded in the field logbook. The sample ID will be designated as follows:

- Site code for NBF
- Project code: Boiler House Construction (BH)
- Location type: Boring (SB)
- The boring number will be a one-digit consecutive number
- Sample collection depth in ft bgs.

Thus, a soil sample collected from the NBF Site at Boring No. 1 at a depth interval of 11 to 12 ft bgs would be assigned the following sample ID number:

NBF-BH-SB-1:11-12

NBF	BH	SB	1	11 – 12
NBF Site	Boiler House	Location type (boring)	Boring number	Depth interval (ft bgs)

2.5.3 Grab Groundwater Samples

This section describes the sample ID number designations used for grab groundwater samples collected from a temporary well. Grab groundwater samples will have the bottom depth of the screen added between the temporary well number and the date. For example, NBF-BH-TW-1:10-20250815 is a grab groundwater sample collected from the temporary well at Boring No. 1. The sample ID indicates the bottom of the screen was at 10 ft bgs and the sample was collected on August 15, 2025.

2.5.4 Sample Handling and Storage

This section describes the handling and storage requirements of sample containers.

2.5.4.1 Sample Containers

Water and soil samples (primary as well as quality assurance/quality control [QC]) will be collected in glass or plastic containers supplied by the contracted analytical laboratories. The containers will have screw-type lids to ensure the bottles are adequately sealed. Teflon inserts located inside the lids of the containers will prevent sample reaction with the lid and improve the quality of the seal. The sample containers will be pre-cleaned and certified under chain-of-custody procedures. Commercially available, pre-cleaned containers are acceptable. The contracted laboratories' sample container shipment documentation will record batch numbers for the containers. With this documentation, containers can be traced, and wash analyses can be reviewed, if necessary.

2.5.5 Chain-of-Custody Procedures

Verifiable sample custody is an integral part of all field and laboratory operations associated with Site monitoring. The primary purpose of the chain-of-custody procedures is to document the possession of the samples from collection through storage and analysis to reporting. Chain-of-custody forms will become the permanent record of sample handling and shipment. The field investigation manager or their designee will be responsible to the project manager for monitoring compliance with chain-of-custody procedures.

Field sampling personnel are responsible for the care and security of samples from the time the samples are collected until they have been turned over to the shipping agent or laboratories. A sample is considered to be in one's custody if it is in plain view at all times, in the physical possession of the sampler, or stored in a locked place where tampering is prevented.

Empty coolers containing ice will be available at the study area for use each day in the field. Samples collected during the day will be stored in shipping coolers beginning at the time of collection. The coolers will be locked inside the field vehicle when sampling personnel are not present.

A chain-of-custody form will be filled out for each cooler that is shipped. Only samples in that cooler will be listed on the chain-of-custody form. An example of the chain-of-custody records that will be used is provided in Appendix A. Each chain-of-custody form will contain the following information:

- Site name and contract number.
- Company name.
- Project number.
- Sample ID numbers.
- Date and time of sampling.
- Type of sample and number of sample containers associated with each sampling point.
- List of analyses requested.
- Metals analyses separated into dissolved or total categories, as applicable, under analyses requested columns; the list of metals for analysis will be specified in the comments section of the form.

- Number of containers for each sample.
- Name and signature of sampling personnel.
- Comments regarding matrix spike/matrix spike duplicate samples, or any other information that is necessary for the lab.
- Spaces for transfer of custody acknowledgment.

When the chain-of-custody form is complete, field team members will crosscheck the form for possible errors. Any corrections made to each record will be marked with a single strike mark that is dated and initialed. The person who initials corrections will be the same person who relinquishes custody of the samples.

2.5.5.1 Transfer to Project Laboratories

Samples will be delivered to the laboratory, shipped to the contracted laboratory by overnight delivery service, or picked up by a courier for overnight delivery. If samples are to be shipped, the contracted laboratory will provide return shipping labels as well as packing supplies, bubble wrap, secondary containment bags, absorbent pads, etc., to secure samples during transit. The chain-of-custody form that has accompanied a cooler from the time of sample collection will be signed, dated, placed in a Ziploc bag, and taped to the inside lid of the cooler. If samples are shipped, a custody seal will be signed by the person relinquishing the samples and placed across the cooler lid to ensure that the cooler is not opened during shipment. The contracted laboratory, upon receipt of the cooler, will verify that the custody seal is intact and will sign the chain-of-custody form to accept custody of the samples.

A temperature blank (provided by the laboratory) may also be included in each cooler depending on the individual laboratory procedures.

2.6 Equipment Decontamination

The decontamination procedures described below are to be used by field personnel to clean drilling, sampling, and related field equipment. Deviation from these procedures must be documented in field records.

2.6.1 Water-Level Indicator

The tape and probe head of the water-level indicator will be rinsed with Alconox soap, tap water, and DI water between each well measurement.

2.6.2 Sampling Equipment

Non-dedicated sampling equipment will be decontaminated between sample locations. Sampling equipment includes all devices used to collect or contain a sample prior to placement into a laboratory-provided sample container or used downhole in a well or boring (e.g., water-level indicator and depth-sounding tape). Before initial use, sampling equipment that may contribute to the contamination of a sample must be thoroughly decontaminated unless specific documentation exists to

show that the sampling equipment has already been decontaminated. Pre-cleaned equipment and sample jars in factory-sealed containers do not require decontamination.

Decontamination will be performed according to the following procedure:

- Scrub equipment thoroughly with phosphate-free detergent (Alconox) and potable water using a brush to remove any particulate matter or surface film.
- Rinse with potable water.
- Do a final rinse with DI water.
- Keep decontaminated equipment in a clean location to prevent recontamination.

2.6.3 Heavy Equipment

Heavy equipment (i.e., drilling equipment that is used downhole or that contacts material and equipment going downhole) will be cleaned by a hot water, high-pressure wash before each use and at completion of the Project. Potable tap water will be used as the cleaning agent.

Prior to drilling at each location and to demobilization off site, all drilling equipment exposed to soil and groundwater will be cleaned with a high-pressure wash or steam cleaner. Water used for cleaning will be obtained from a potable source and transported to the drilling site or from an approved facility source. Contaminating substances will not be introduced into the borings or wells during any part of the drilling, well installation, or well development process. Containers used to transport drilling water must not have been used for any other purpose. Decontamination water will be contained, characterized, and disposed of in accordance with the procedures presented in Section 2.7. Containers of decontamination water will be labeled and stored separately from other containers.

2.7 Investigation-Derived Waste Handling and Disposition

IDW generated during Site activities covered by this work plan will be stored, handled, and disposed of according to guidelines described in this section. According to the EPA guidelines, the most important elements of managing IDW include the following:

- Leaving the Site in no worse condition than existed before the investigation
- Removing wastes that present an immediate threat to human health or the environment
- Complying with applicable or relevant and appropriate federal and state regulations to the extent practicable
- Planning and coordinating IDW management
- Minimizing the quantity of generated wastes.

The methods for handling and disposing of IDW were developed under the assumption that it is unlikely that any of the IDW generated during this project will require special handling or disposal. IDW is handled by Boeing Site Services in accordance with appropriate waste-handling protocols depending on the characteristics and source of the waste. Onsite staging and temporary storage of IDW containers will be determined during pre-field planning activities with Boeing. The following sections discuss the different types of IDW that will be generated during this investigation.

2.7.1 Drill Cuttings

Drill cuttings resulting from soil boring activities will be placed in 55-gallon drums and stored pending laboratory analysis of soil samples. Disposal will be in accordance with appropriate regulations and Boeing disposal practices.

2.7.2 Decontamination Solutions

Decontamination solutions will consist of a 1 percent solution of non-phosphatic laboratory detergent (Alconox or equivalent) and distilled water. Alconox is nontoxic, non-hazardous, and biodegradable. Decontamination solutions will be stored along with other decontamination water in 55-gallon drums or other transportable liquid containers, pending laboratory analysis of groundwater samples.

2.7.3 Development and Purge Water

During development of the monitoring wells, field personnel will observe the water for visual and olfactory evidence of contamination. Water generated during development of the wells will be contained in 55-gallon drums or other transportable liquid containers. The drums will be labeled and stored on site in a specified containment area. The water will be stored until laboratory analysis of groundwater samples is complete and IDW disposal options are evaluated. Disposal will be in accordance with appropriate regulations and Boeing disposal practices.

2.7.4 Personal Protective Equipment

Level D personal protective equipment (PPE) will be used while performing sampling tasks for this project unless additional PPE is required by the applicable HASP. The only PPE that will need disposal will be nitrile gloves. The nitrile gloves will be bagged and disposed of with other inert solid wastes. When working in PCB-contaminated soil, protective booties (or rubber boots to be decontaminated) and Tyvek® suits may be needed to protect clothing from becoming contaminated.

2.7.5 Solid Wastes

Non-hazardous solid wastes such as used paper towels, used gloves, and used sampling hoses will be placed in plastic refuse sacks and discarded into a receptacle identified by the onsite environmental field personnel.

2.7.6 Drum Handling

All drums with soil or water will be placed in the pre-determined drum storage area at the end of each day. All drums will have green non-hazardous labels provided by the onsite Boeing field representative. Drums will be stored according to the following procedures:

- The bolt must be over the label and facing down.
- The bolt and label must be facing the side of the pallet the forks slide into so that when a forklift operator picks up the pallet, they can see the labels easily.
- The drums must be wiped clean of soil clumps, and the labels must be easy to read.

- No more than four drums will be placed on a pallet.
- Only drums of like material will be placed on the same pallet.
- Only like materials will be stored in each drum.

2.8 Health and Safety

Sampling activities for the investigation are covered under the HASP in Appendix B. Physical copies of task-specific HASPs will be kept on site at all times during field activities. Daily tailgate safety meetings will take place before work begins each day; Landau will lead the meetings, and all subcontractors, Boeing representatives, and visitors will be required to attend.

3.0 QUALITY CONTROL

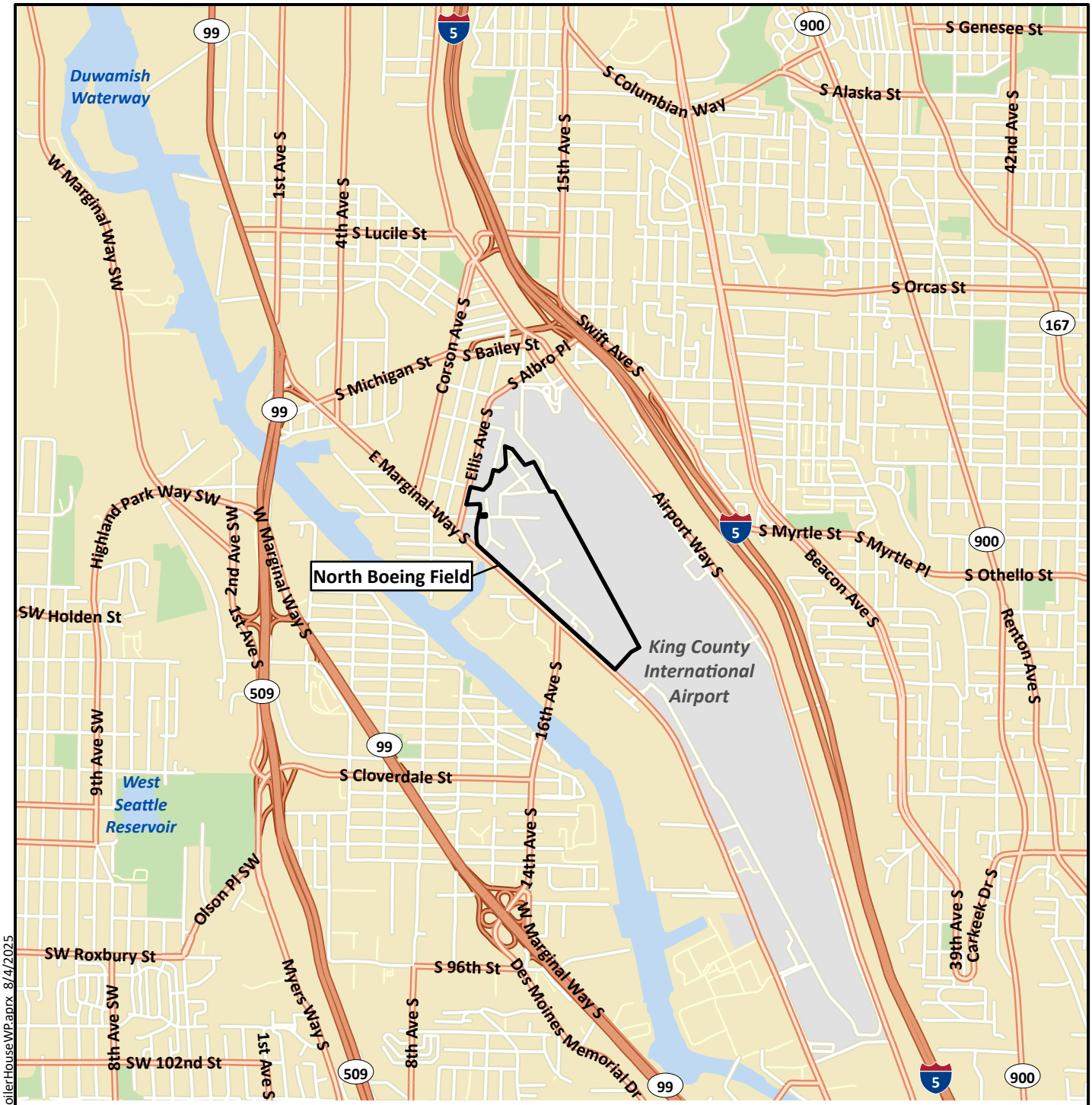
The QC procedures for measuring field parameters such as pH, redox potential, conductance, DO, turbidity, and temperature in groundwater samples will include calibrating the instruments and checking the reproducibility of the measurements by taking multiple readings on a single sample or reference standard.

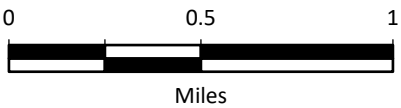
The contracted chemical laboratories will implement required standard operating procedures (SOPs) for sample preparation, cleanup, and analysis. These SOPs will be based on the most current version of EPA Method SW-846. Documentation of these SOPs will be kept on file at the contracted laboratory.

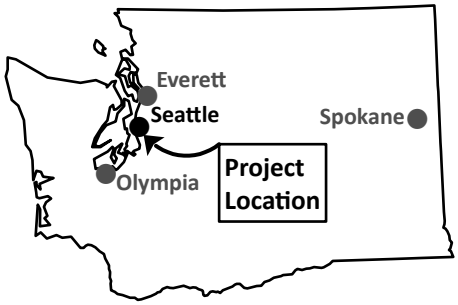
Documentation of appropriate method performance for the Project target compounds will be available from the selected laboratory and will include the criteria for acceptance, rejection, or qualification of data. The laboratory is also required to periodically update method performance data such as control limits and method detection limits.

4.0 USE OF THIS WORK PLAN

This work plan has been prepared for the exclusive use of Boeing for specific application to the NBF Boiler House Construction Environmental Support Project. No other party is entitled to rely on the information, conclusions, and/or recommendations included in this document without the express written consent of Landau. Further, the reuse of information, conclusions, and/or recommendations provided herein for extensions of the Project or for any other project, without review and authorization by Landau, shall be at the user's sole risk. Landau warrants that within the limitations of scope, schedule, and budget, our services have been provided in a manner consistent with that level of care and skill ordinarily exercised by members of the profession currently practicing in the same locality under similar conditions as this project. Landau makes no other warranty, either express or implied.







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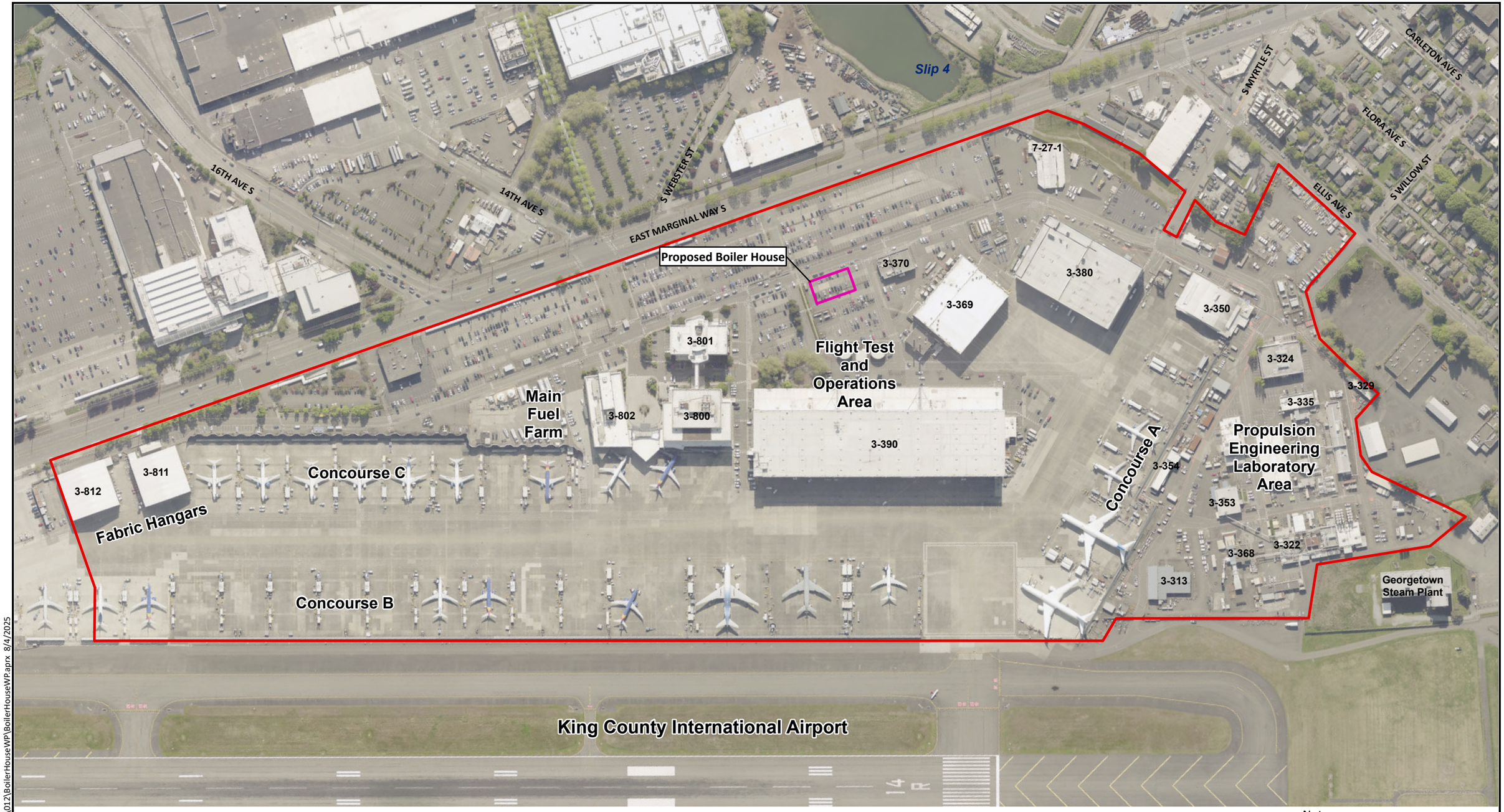
NBF Boiler House Construction Environmental Support Seattle, Washington	**Vicinity Map**	Figure 1



Legend

- Proposed Boiler House Footprint
- North Boeing Field RI Site Boundary

0 300 600

Scale in Feet

Data Source: King County GIS.

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

NBF Boiler House Construction Environmental Support Seattle, Washington	**Overview of NBF Site**	Figure 2

LANDAU ASSOCIATES

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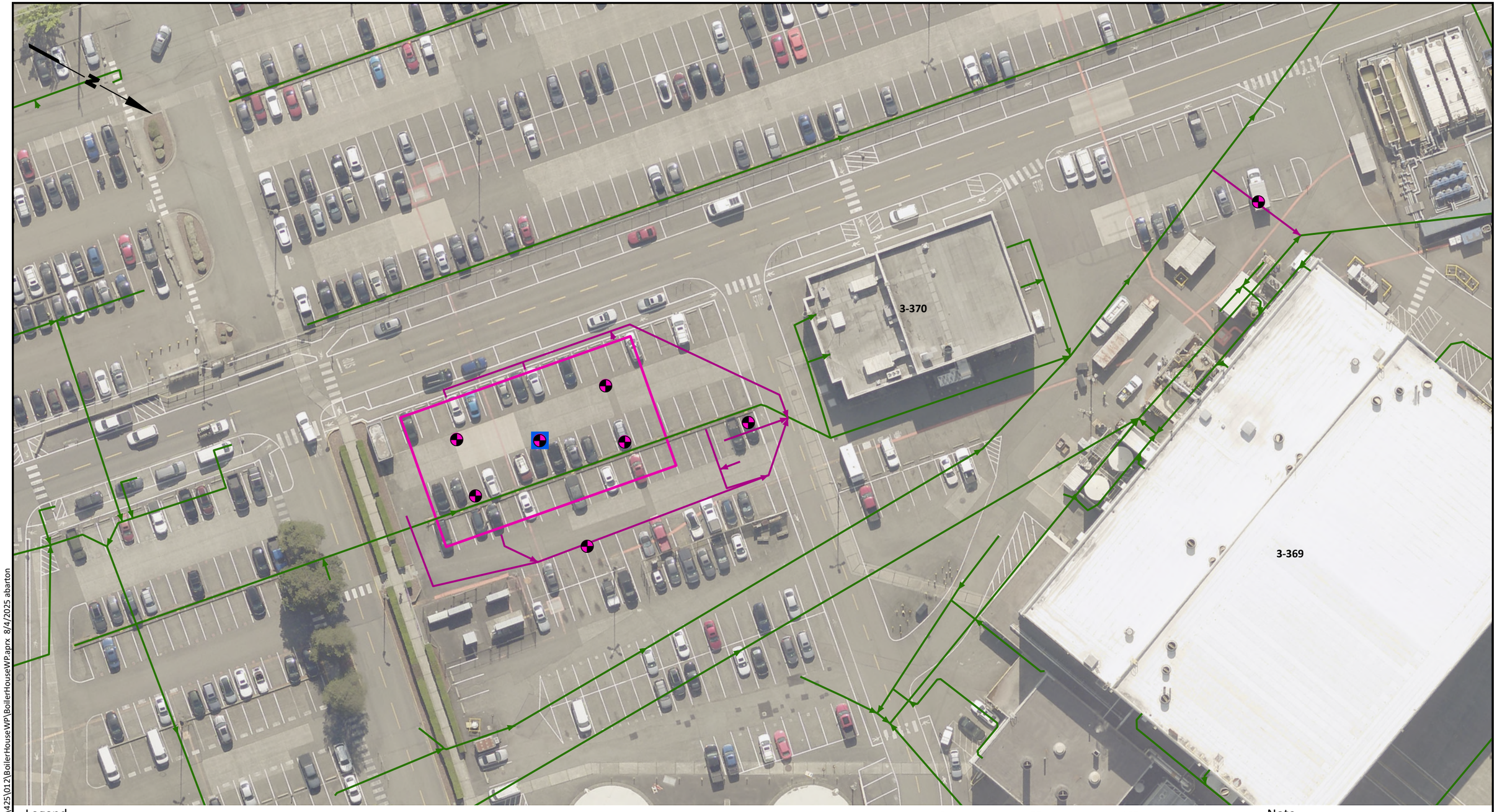

Legend

- Proposed Soil Sample Location
- Proposed Grab Groundwater Sample Location
- Proposed Boiler House Footprint
- Proposed New Stormwater Line
- Existing Stormwater Line

0 50 100

Scale in Feet

Data Source: King County GIS.

Note

1. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

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NBF Boiler House Construction Environmental Support Seattle, Washington	**Proposed Investigation Locations**	Figure 3

APPENDIX A

Field Sampling Forms

Boeing Pre-Dig/Excavation Check List

To be completed by Project Focal/Onsite Activity Representative prior to excavation on site.

CAUTION: Prior to any digging or excavation activity please check with your Environmental Representative.

1. Organization/Service Provider has been notified of work location: **Yes / No / NA**

2. Onsite review and job walk has been completed by a Boeing Representative, construction representative, or Service Provider representative before construction starts: **Yes / No / NA**

3. Digging/Excavation boundaries are outlined in white paint: **Yes / No / NA**

4. Have locations of underground utilities been established? **Yes / No / NA**

Date Required? _____

List method of line locates: _____

_____

Locator Representative Name:_____ Phone Number: _____

a. Electric (RED) **Yes / NA** Require Shutdown: **Yes / NA**

b. Gas (YELLOW) **Yes / NA** Require Shutdown: **Yes / NA**

c. Water (BLUE) **Yes / NA** Require Shutdown: **Yes / NA**

d. Sewers (GREEN) **Yes / NA** Require Shutdown: **Yes / NA**

e. Communications (ORANGE) **Yes / NA** Require Shutdown: **Yes / NA**

f. Reclaimed Water (PURPLE) **Yes / NA** Require Shutdown: **Yes / NA**

g. Other ( ) **Yes / NA** Require Shutdown: **Yes / NA**

5. Pertinent shut-off valves and switches are located for area of work. If any are closed, Lock/Tag/Try requirements apply. **Yes / No / NA**

6. All Workers assigned to project have been instructed on: **Yes / No / NA**
   a. Location
   b. Type
   c. Hand/Dig Probe (minimum 24" of utility markings)

7. Workers have been instructed how to contact Emergency Services and Company Representative in an emergency: **Yes / No / NA**

8. Estimated time for digging excavation to be open: _____ days

9. Surface Encumbrances (e.g., walkways, storage tanks, roads, fences): Describe: **Yes / No / NA**

10. Digging/Excavation will require walkway for crossing and/or traffic control: **Yes / No / NA**

11. Comments:

_____

_____

_____

_____

_____

12. Reviewed:

Signature Project Focal: _____ Date & Time: _____

Signature Organization/Onsite Activity Representative: _____

Date & Time: _____

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Exploration No. _____
Date _____ Hour _____

Log of Exploration

Project Name _____ Project No. _____

Client/owner _____ Exploration Operator _____

Exploration Method _____

_____

Logged by _____ Exploration Completed _____

Ground Surface Conditions _____

Weather Conditions _____

Location Sketch (show dimensions to mapped features)

North Arrow

(East) (North)

Coordinates: "x" _____ "y" _____ Method _____

Elevations _____ Datum _____

Sample Depth (top) (ft.) / Sample Length (ft.)	Recovery Length (ft.)	Retained Depth (top) (ft.) / Retained Length (ft.)	Sample Number	Sampler/Hammer Codes	Blow Counts	Other Test Data) _____	USCS Symbol / Unit Contact	Depth Scale (ft)	Sample Description Color, secondary soil type, PRIMARY SOIL TYPE with modifiers and minor components (density/consistency, moisture)(geologic unit)	Comments on Heave, Water Conditions, & Drilling Action
								0		
								1		
								2		
								3		
								4		
								5		
								6		
								7		
								8		
								9		
								0		
								1		
								2		
								3		
								4		
								5		
								6		
								7		
								8		
								9		
								0		

Sampler and Hammer Information

a = 3.25-in. O.D. – D&M	1 = 300-lb./30-in. Drop
b = 2.0-in. O.D. – SPT	2 = 140-lb./30-in. Drop
c = Shelby Tube	3 = Pushed
d = Grab Sample	4 = Vibrocore
g = 2.5-in. O.D.– WSDOT	5 = _____
h = 3.0-in. O.D. – M.Calif.	
i = _____	

Water Level Information

Date		
Time		
Depth to Water		
Hole Depth		
Casing Depth		

Total Depth _____ Finish Date _____ Hour _____ Continued

Subcontractors Daily Activity Record

Project Name _____ Project No. _____

Location _____ Date _____

_____ Landau Rep. _____

Client _____ Weather _____

CONTRACTOR INFORMATION

Contractor _____ Project/Health & Safety Briefing Conducted: ☐ Yes ☐ No

☐ Drilling ☐ Grading

☐ Excavation ☐ Other _____

Contractor Rep. _____

TIME LOG (Documented by Landau Associates Representative at end of each working shift)

Activity	Total Hours	A.M. 12	1	2	3	4	5	A.M. 6	7	8	9	10	11	P.M. 12	1	2	3	4	5	P.M. 6	7	8	9	10	11
Mobe/Moves																									
Drilling/Excavation																									
Installation																									
Decontamination																									
Standby																									
Downtime																									

Remarks: Explain all downtime. Explain all standby time and who authorized it, unusual difficulties, etc.

EXPENDABLES: ITEMIZE QUANTITY, SIZE, ETC.

Item	Quantity	Type	I.D.	O.D.	Length	Billing

Subsurface Data	Depth	Samples

PERSONNEL / EQUIPMENT

Position	Name	Hours	Support Equipment	Status (A.D.S.F.)	Hours Oper.	Down	Standby

A – Available; D – Down; S – Standby; F – Field

Drum/Tank Inventory

Project Name _____ Project Number _____

Location _____ Date _____

Client _____ Landau Representative _____

Drum/Tank Number	Date Generated	Contents	Estimated Quantity	Suspected Contaminants	Generation Source	Disposal Method / Date Disposed	Sketch of Site and Drum/Tank Location

LANDAU ASSOCIATES

Field Report

Project No.: _____ Report No.: _____

Client: _____ Date: _____

Project Name: _____ DPD Permit No.: _____

Location: _____

Weather Conditions: _____

Prepared By: _____

Visitors: _____

Unsatisfactory Conditions & Recommended Correction: _____

Attachments: _____

Signed: _____

LANDAU ASSOCIATES

Chain of Custody

Project Name: ____________ Project Contact(s): Data@landauinc.com Project Location/Event: ____________

Project #: ____________ Project Contact(s): ____________ Requested TAT: ☐ Standard ☐ Rush

Sampled By: ____________

Stored on Ice: ☐ Yes ☐ No

Shipment Method: ____________

Special Handling Requirements: ____________

REQUESTED ANALYSIS

Sample ID	Date	Time	Matrix	# of Cont.																		MS/MSD	HOLD	Comments/Instructions:
		Preserved Y/N:																						
																								☐ Dissolved metals field filtered (0.45micron)
																								Other:

Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature	Signature	Signature
Printed Name	Printed Name	Printed Name	Printed Name
Company	Company	Company	Company
Date & Time	Date & Time	Date & Time	Date & Time

LANDAU ASSOCIATES

PHOTOGRAPH LOG

Project Name: _____ Project Number: _____
Location: _____ Date: _____
Client _____ Landau Representative: _____

Roll No./Phone No.	Comments

LANDAU ASSOCIATES

PHOTOGRAPH LOG

Project Name: _____ Project Number: _____
Location: _____ Date: _____
Client _____ Landau Representative: _____

Utility Locate Checklist

Project Name _____ Project No. _____

Location _____ Date _____

Client _____ Landau Rep. _____

Exploration Number (White)	TV & Telep. (Orange)	Lighting & Elect. (Red)	Fuel & Gas (Yellow)	Water (Blue)	Drains & Sewer (Green)	Access / Restriction	O.K. To Drill/Exc.	Remarks

APPENDIX B

Health and Safety Plan

SITE-SPECIFIC HEALTH AND SAFETY PLAN

Project Number:	North Boeing Field 0025082.425	**Reviewed by:**	Christine Kimmel
Prepared by:	Sarah Newport, GIT	**Date:**	August 4, 2025
Date:	July 31, 2025		

Work Location Description

Project Name:	North Boeing Field Boiler House Construction Environmental Support
Location:	North Boeing Field, Seattle, WA 98108
Anticipated Activities	Soil boring advancement (push probe), soil and groundwater sampling from temporary well screen. Explorations to be air-knifed up to 8 ft below grade.
Size:	Approximately 0.7 acres (Project area)
Surrounding Population:	Industrial
Buildings/Homes/Industry:	Current Boeing storage, parking, and operations
Site Topography:	Flat
Anticipated Weather:	Typical northwest weather: dry and sunny (60 – 90 degrees) in summer months, potentially rainy and cool (40 – 65 degrees) in winter months.
Unusual Features:	None known
Site History:	Environmental investigations conducted at the Site have been conducted to characterize and evaluate the chemical quality and physical condition of various media, including soil and groundwater. The primary contaminants in areas where remaining soil contamination overlaps with the Project excavation areas and this investigation are as follows: • Total petroleum hydrocarbons (TPH) in the gasoline range (TPH-G), TPH in the diesel range (TPH-D), and TPH in the oil range (TPH-O) • Polychlorinated biphenyls (PCBs) • Volatile Organic Compounds (VOCs) including acetone; benzene, toluene, ethylbenzene, and xylenes (BTEX); bromoform; carbon tetrachloride; chloroform;

dibromochloromethane; bromodichloromethane; 1,1-dichloroethane; 1,2-dichloroethane; cis-DCE; 1,2-dichloropropane; 2-butanone/MEK; 4-methyl-2-pentanone; methylene chloride; tetrachlorethene (PCE); toluene; 1,1,1-trichloroethane; 1,1,2-trichloroethane; and trichloroethene (TCE);

- Semivolativle Organic Compounds (SVOCs) including PAHs and benzoic acid, benzyl alcohol, bis(2-Ethylhexyl) phthalate, butyl benzyl phthalate, di-n-butyl phthalate and dimethyl phthalate, hexachlorobutadiene, 4-methylphenol, pentachlorophenol, and phenol
- Inorganics (antimony, arsenic, barium, cadmium, cobalt, copper, lead, mercury, selenium, thallium, vanadium, and zinc).

PCBs, inorganics (arsenic, cadmium, copper, iron, lead, manganese, and mercury), SVOCs including PAHs (specifically benzo[a]anthracene and benzo[a]pyrene), bis(2-ethylhexyl) phthalate, and TPH are the primary contaminants in areas where remaining groundwater contamination overlaps with the Project excavation areas and this investigation.

The objective of the investigation is to characterize soil and groundwater conditions at the project site to support characterization of the area and evaluation should the project be considered an independent action or interim action.

Hazard Description

Background Review: ☒ Complete ☐ Partial

If partial, why? Click here to enter text.

Hazard Level: ☐ B ☐ C ☒ D ☐ Unknown

Justification: Click here to enter text.

Types of Hazards: **(Attach additional sheets as necessary)**

A. ☒ Chemical ☐ Biological ☒ Ingestion ☐ O_2 Def. ☒ Skin Contact
☒ Inhalation ☒ Explosive

Describe: Contact with contaminated soil or groundwater.

B. ☒ Physical ☒ Cold Stress ☒ Noise ☒ Heat Stress ☐ Other

Describe: Physical hazards associated with drilling and soil and grab groundwater sampling. Weather-related illness potential will be dependent on the weather.

C. ☐ Radiation

Describe: Click here to enter text.

Nature of Hazards:

☒ Air	Describe:	Potential for inhalation of vapors from impacted soil; potential explosive conditions if accumulated vapors are encountered in the subsurface.
☒ Soil	Describe:	Potential for contact with or ingestion of contaminated soil during drilling and soil sampling.
☐ Surface Water	Describe:	Click here to enter text.
☒ Groundwater	Describe:	Potential for contact with or ingestion of contaminated groundwater.
☐ Other	Describe:	Click here to enter text.

Chemical Contaminants of Concern ☐ N/A

Contaminant	PEL (ppm)	IDLH (ppm)	Source/Quantity Characteristics	Route of Exposure	Symptoms of Acute Exposure	Instruments Used to Monitor Contaminant
Metals (protective to Arsenic)	0.002 mg/m^3	5.0 mg/m^3	Soil: maximum concentration of 19.6 mg/kg Groundwater: maximum concentration of 100 µg/L	Inhalation, ingestion, skin and/or eye contact	Ulceration of nasal septum, dermatitis, gastrointestinal disturbances, peripheral neuropathy, respiratory irritation, hyperpigmentation of skin [arsenic, cadmium, and lead are potential occupational carcinogens]	Dust Control
Petroleum distillate protective to GRO	100	400	Soil: maximum concentration of TPH-G of 8,500 mg/kg Groundwater: maximum concentration of TPH-G of 4,600 µg/L	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Central nervous system depression, confusion, unconsciousness, coma; irritation of skin, eyes, and mucous membranes; defatting of skin; dermatitis; liver and kidney damage.	PID
Bis(2-Ethylhexyl) phthalate	5	10	Soil: maximum concentration of 7.2 mg/kg Groundwater: maximum concentration of 6.2 µg/L	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane. In Animals: liver damage; teratogenic effects; [potential occupational carcinogen]	PID
4-methylphenol	2.3	250	Soil: maximum concentration of 0.68 mg/kg	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation of the eyes, skin, mucous membrane; central nervous system effects: confusion, depression, resp failure; dyspnea (breathing	PID

					difficulty), irregular rapid respiration, weak pulse; eye, skin burns; dermatitis; lung, liver, kidney, pancreas damage	
SVOCs (protective to Pentachlorophenol)	0.5 mg/m^3	2.5 mg/m^3	Soil: maximum concentration of 0.075 mg/kg	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation of eyes, nose, throat; sneezing, cough; lassitude (weakness, exhaustion), anorexia, weight loss; sweating; headache, dizziness; nausea, vomiting; dyspnea (breathing difficulty), chest pain; high fever; dermatitis	Dust Control
PCBs	0.001 mg/m^3	5 mg/m^3	Soil: maximum concentration of 2.7 mg/kg Groundwater: maximum concentration of 0.002 µg/L	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]	Dust Control
BTEX (protective to Benzene)	0.1	500	Soil: maximum concentration of 0.116 mg/kg (benzene)	Inhalation, skin absorption, ingestion, skin and/or eye contact.	Prolonged skin contact with benzene or excessive inhalation of its vapor may cause headache, weakness, loss of appetite, and lassitude (known occupational carcinogen)	PID
VOCs (protective to Trichlorethene)	100 (TWA)	1,000	soil: maximum concentration of 5.4 mg/kg	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias,	PID

					paresthesia; liver injury; [potential occupational carcinogen]	
PAHs (protective to Benzo[a]pyrene)	0.1 mg/m^3	80 mg/m^3	Soil: maximum total PAH concentration of 2.98 mg/kg Groundwater: maximum total PAH concentration of 0.008 µg/L	Inhalation, skin/eye adsorption, ingestion	Dermatitis, bronchitis (potential occupational carcinogen)	Dust control

Abbreviations and Acronyms

GRO = gasoline-range organics
IDLH = immediately dangerous to life and health
µg/L = micrograms per liter
mg/m^3 = milligrams per cubic meter
mg/kg = milligrams per kilogram
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PEL = permissible exposure limits
PID = photoionization detector
ppm = parts per million
THP-G = gasoline-range total petroleum hydrocarbons
TWA = time-weighted average

Click here to enter text.

Physical Hazards of Concern ☐ N/A

Hazard	Description	Location	Procedures Used to Monitor Hazard
Drill Rig, Forklift, and Support Vehicles	Moving parts of drill rig, forklift, and the support vehicles can be locations of falling and flying objects and pinch/crush points	Drilling locations	Alert observation of surroundings; minimize time spent near drill rig and get drillers attention before approaching drill rig, forklift, or any vehicle; no loose clothing; know the emergency shutoff system; verify equipment has working backup alarms. Establish isolation work zone with cone and tape with only HAZWOPER-trained personnel in area.

Weather Stress	Exposure to hot or cold temperatures, wind, and/or rain	All areas of the site	Have drinking water accessible, wear appropriate clothing (light for heat, warm for cold), wear sunscreen protection, avoid caffeine, work in the shade when possible, and take short breaks in the shade as needed.
Slips, Trips, and Falls	Uneven terrain and drilling equipment	All areas of the site	Visual observations of terrain and hazards. Keep work area clear of debris and footwear in good condition.
Overhead and Underground Utilities	Damage to utilities through drilling and excavations	Around work area	Review client-provided utility maps, and a public and private utility-locating service will be utilized. Contractor to air-knife to 8 ft below grade at each boring location. No raised drill rig towers within 20 ft of overhead power lines.
Travel to and from Site	Operating motor vehicle in traffic on highways and rural roads.	Route to and from site from Landau Associates office	Operate motor vehicle while well rested and physically able to drive safely. Conduct pre-trip vehicle inspection; all vehicles to be maintained and in good working order. Obey all traffic laws, including no cell phone use while driving. Secure all cargo properly to avoid shifting. Allow sufficient time for travel to site at safe speeds. Engage emergency brake when parking vehicles. Establish a planned route prior to departure. Be observant of unsafe road conditions and erratic/dangerous drivers.
Noise	Loud noises associated with drilling activities	Drilling locations	Appropriate hearing protection (i.e., earmuffs or ear plugs with a noise reduction rating of at least 20 dBA) will be used if individuals work near high noise-generating equipment (>85 dBA).
Vehicles Used at Site	Parking lot and roadway with traffic present during drilling events	All areas of the site	Establish work area using cones and/or delineation tape. Wear proper PPE. Remain alert of surroundings; use brightly colored safety vest. Stand clear of equipment and avoid pinch points. Make eye contact with operator prior to advancing. Stay alert for vehicles throughout the site.
Potential Exposure to Contamination	Petroleum hydrocarbons, metals, PAHs, PCBs, VOCs, and SVOCs	Drilling and sampling locations	Wear selected PPE for task. Exchange disposable PPE between soil sampling intervals. Minimize contact with soil and groundwater. Contain investigation-derived waste, soil, and groundwater in a work isolation area, and do not transfer to work vehicles or other areas of the site.
Explosion	Spark from non-grounded equipment conducting work in the subsurface	Near drilling locations	If vapors accumulate in subsurface, the potential exists for a spark from non-grounded equipment to cause an explosion. The drill rig will be properly grounded. Use intrinsically safe equipment when working in areas of free product (no cell phones).

Abbreviations and Acronyms

dBA = A-weighed decibel
ft = foot/feet
PAH = polycyclic aromatic hydrocarbon
PCB = polychlorinated biphenyl
PPE = personal protective equipment
SVOC = semivolatile organic compound
VOC = volatile organic compound

Notes: Click here to enter text.

Work Location Instrument Readings ☐ N/A

Location: ______________________________

Percent O_2:	____________	Percent LEL:	____________
Radioactivity:	____________	PID:	____________
FID:	____________	Other:	____________
Other:	____________	Other:	____________
Other:	____________	Other:	____________

Location: ______________________________

Percent O_2:	____________	Percent LEL:	____________
Radioactivity:	____________	PID:	____________
FID:	____________	Other:	____________
Other:	____________	Other:	____________
Other:	____________	Other:	____________

Location: ______________________________

Percent O_2:	____________	Percent LEL:	____________
Radioactivity:	____________	PID:	____________
FID:	____________	Other:	____________
Other:	____________	Other:	____________
Other:	____________	Other:	____________

Location: ______________________________

Percent O_2:	____________	Percent LEL:	____________
Radioactivity:	____________	PID:	____________
FID:	____________	Other:	____________
Other:	____________	Other:	____________
Other:	____________	Other:	____________

Location: ______________________________

Percent O_2:	____________	Percent LEL:	____________
Radioactivity:	____________	PID:	____________
FID:	____________	Other:	____________
Other:	____________	Other:	____________
Other:	____________	Other:	____________

Hazards Expected in Preparation for Work Assignment ☐ N/A

Describe: Click here to enter text.

Personal Protective Equipment

Level of Protection:

☐ A ☐ B ☐ C ☒ D

Location/Activity: All

☐ A ☐ B ☒ C ☐ D

Location/Activity: Ambient air target levels, see Attachment A

Protective Equipment:

Respirator: ☐ N/A

- ☐ SCBA, Airline
- ☐ Full-Face Respirator
- ☒ Half-Face Respirator (Cart. Organic vapor/HEPA) (Only if upgrade to Level C)
- ☐ Escape mask
- ☐ Other: Click here to enter text.
- ☐ Other: Click here to enter text.

Clothing: ☐ N/A

- ☐ High Visible Safety Vest
- ☐ Chemically-Resistant Splash Suit
- ☐ Apron; Type:
- ☐ Tyvek Coverall (Upgrade to Level C)
- ☒ Saranex Coverall
- ☐ Coverall; Type:
- ☒ Other: Dedicated field clothing, highly visible safety vest

Head & Eye: ☐ N/A

- ☒ Hard Hat
- ☐ Goggles
- ☐ Face Shield
- ☒ Safety Eyeglasses
- ☐ Other: Click here to enter text.

Hand Protection: ☐ N/A

- ☒ Undergloves; Type: Nitrile
- ☐ Gloves; Type:
- ☐ Overgloves; Type:
- ☐ Other: Click here to enter text.

Foot Protection: ☐ N/A

- ☐ Leather Boots with Steel Toe
- ☐ Neoprene Boots with Steel Toe/Shank
- ☒ Disposable Overboots
- ☒ Other: Chemical-Resistant Steel-Toe

Monitoring Equipment: ☐ **N/A**

- ☒ CGI
- ☐ O_2 Meter
- ☐ Rad Survey
- ☐ Detector Tubes; Type:
- ☒ PID
- ☐ FID
- ☐ Other: Click here to enter text.

Decontamination

Personal Decon: ☒ Required ☐ Not Required

If required, describe: Decontaminate exposed skin using hot water and soap before each break in the work shift and before eating or drinking. Replace disposable PPE (nitrile gloves) and discard as solid waste between sampling intervals. Avoid hand-to-mouth contact.

Equipment Decon: ☒ Required ☐ Not Required

If required, describe: Decontamination of non-dedicated soil and groundwater sampling equipment with Alconox/tap water solution followed by tap water rinse and de-ionized water rinse. Field staff will be prepared to set up a wash sink on site.

Down-the-hole drilling equipment to be decontaminated using a high-pressure, hot-water steam cleaner.

All generated decontamination water will be contained and stored on site in 55-gallon drums.

Activities Covered Under This Plan

Task No.	Description	Preliminary Schedule
1	Soil boring and soil and grab groundwater sampling	August 27-28, 2025

Subcontractor's Health and Safety Program Evaluation ☐ N/A

Subcontractor: Cascade Drilling

Address: 19404 Woodinville-Snohomish RD NE
Woodinville, WA

Evaluation Criteria:

Item	Adequate	Inadequate	Comments
Medical Surveillance Program	☐	☐	Click here to enter text.
Personal Protective Equipment Availability	☐	☐	Click here to enter text.
Onsite Monitoring Equipment Availability	☐	☐	Click here to enter text.
Safe Working Procedures Specification	☐	☐	Click here to enter text.
Training Protocols	☐	☐	Click here to enter text.
Ancillary Support Procedures (if any)	☐	☐	Click here to enter text.
Emergency Procedures	☐	☐	Click here to enter text.
Evacuation Procedures Contingency Plan	☐	☐	Click here to enter text.
Decontamination Procedures Equipment	☐	☐	Click here to enter text.
Decontamination Procedures Personnel	☐	☐	Click here to enter text.

Results of Evaluation: ☒ **Adequate** ☐ **Inadequate**

Additional Comments: Based on review of Contractor site-specific Health and Safety documents and Master Agreement

Evaluation Conducted By: Christine Kimmel Date: August 4, 2025

Personnel and Roles

Name	Work Location Title/Task	Medical Current	Respirator Fit Test Current	Hazwoper Training Current
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Click here to enter text.	Click here to enter text.	☐	☐	☐
Click here to enter text.	Click here to enter text.	☐	☐	☐
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Emergency Facilities and Numbers

Hospital: First Hill Medical Swedish Hospital 1124 Columbia St, Seattle, WA 98104

Telephone: 206-386-6000

Address: Click here to enter text.
Click here to enter text.

Directions:
1. Attachment B
2. Click here to enter text.
3. Click here to enter text.
4. Click here to enter text.
5. Click here to enter text.
6. Click here to enter text.
7. Click here to enter text.
8. Click here to enter text.

Emergency Transportation Systems (Fire, Police, Ambulance): 911 (off site) or 844-898-6644 (inside Boeing secure site)
Emergency Routes: Map (Attachment B)

Emergency Contacts:

Name	Primary Contact	Secondary Contact
Elyssa Dixon, PE	425-802-3112	425-967-2004
Chris Kimmel, LHG	425-329-0254	206-786-3801

In the event of an emergency, do the following:

1. Call for help as soon as possible. Call 911. Give the following information:
   - WHERE the emergency is – use cross streets or landmarks
   - PHONE NUMBER you are calling from
   - WHAT HAPPENED – type of injury
   - WHAT is being done for the victim(s)
   - YOU HANG UP LAST – let the person you called hang up first.
2. If the victim can be moved, paramedics will transport to the hospital. If the injury or exposure is not life-threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.

Health and Safety Plan
Approval/Sign Off Form

I have read, understood, and agreed with the information set forth in this Health and Safety Plan (and attachments) and discussed in the Personnel Health and Safety briefing.

Name	Signature	Date
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Click here to enter text.		Click here to enter text.
Site Safety Coordinator	Signature	Date
Christine Kimmel, LHG	Christine Kimmel	8/4/25
Landau H&S Manager	Signature	Date
Elyssa Dixon, PE	Elyssa Dixon	8/5/25
Landau Project Manager	Signature	Date

Personnel Health and Safety Briefing Conducted by:

Name	Signature	Date
Click here to enter text.		Click here to enter text.

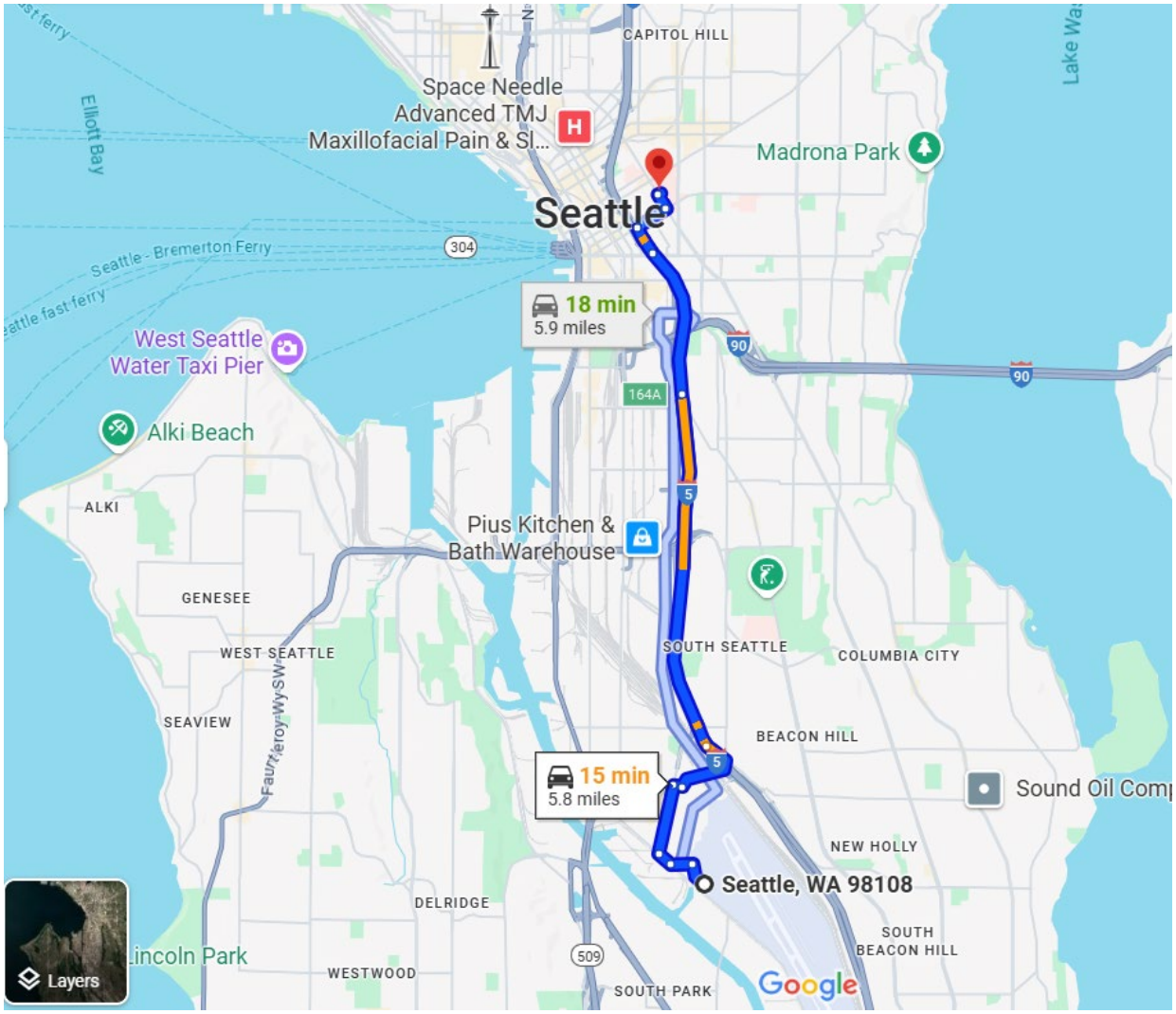
Attachment A
Action Levels for Respiratory Protection

Monitoring Parameter	Reading	Level of Protection
Organic Vapors	PID reading >15 ppm at point of operations for more than 1 minute	Establish 25-ft-diameter exclusion zone around work area. Monitor worker's breathing zone.
	PID reading >15 ppm in worker's breathing zone for more than 1 minute	Evacuate area or upgrade to Level C half-face respirator with organic vapor/HEPA cartridge. Establish contamination reduction.
	PID reading >75 ppm in worker's breathing zone for more than 1 minute	Evacuate area and move upwind to allow vapors to dissipate. May resume work in Level C PPE after vapors dissipate.
	PID reading >100 ppm in worker's breathing zone for more than 1 minute OR >300 ppm instantaneous	Evacuate area and move upwind. Notify onsite contact and Landau Associates health and safety manager.
Particulate Matter	Visible dust	Apply moisture. If dust persists, then upgrade to respirator and eliminate dust at edge of isolation area.
Explosion	LEL >10% Or <19.5% Oxygen>23%	Stop work. Verify proper grounding of equipment prior to contacting health and safety manager.

Abbreviations and Acronyms

ft = foot/feet
HEPA = high efficiency particulate air
PID = photoionization detector
PPE = personal protective equipment
ppm = parts per million

Attachment B
Emergency Route – Map to the Hospital



Georgetown
Seattle, WA 98108

- Get on I-5 N from Corson Ave S
  5 min (1.6 mi)
- Take exit 164A from I-5 N
  6 min (3.8 mi)
- Continue on James St. Drive to Columbia St
  3 min (0.4 mi)

1124 Columbia St
Seattle, WA 98104