The Boeing Company
P.O. Box 3707
Seattle, WA 98127-2207

November 20, 2020
DAT-2020-040

Mr. Kenneth Thiessen
Oregon Department of Environmental Quality
Northwest Region Portland Office
700 NE Multnomah Street, Suite 600
Portland, OR 97232

Subject: Boeing Portland Facility
Building 85-001 Former Vapor Degreaser Source Area
Shallow Subsurface Investigation Work Plan

Dear Mr. Thiessen:

Enclosed please find the following work plan to conduct an investigation for monitoring of shallow subsurface vapor concentration distribution within the delineated vapor plume associated with the former vapor degreasers within the 85-001 building at The Boeing Company's Portland facility:

- Work Plan: Shallow Subsurface Investigation, Building 85-001 Former Vapor Degrease Source Area, Boeing Portland, Gresham, Oregon, dated November 20, 2020.

Two hard copies will be produced and mailed to your attention.

Please contact me if you have any questions.

Sincerely,

Debbie Taege
Project Manager
Boeing EHS Remediation
deborah.a.taege@boeing.com
Mobile (818) 720-5575

Technical Memorandum

TO: Debbie Taege, The Boeing Company

FROM: Evelyn Ives, PE and Erin Waibel, RG

DATE: November 20, 2020

RE: **Work Plan: Shallow Subsurface Investigation**
Building 85-001 Former Vapor Degreaser Source Area
Boeing Portland
Gresham, Oregon
Project No. 0025116.120.210

This work plan presents procedures for Landau Associates, Inc. (LAI) to conduct an investigation for monitoring of shallow subsurface vapor concentration distribution within the delineated vapor plume associated with the former vapor degreasers within the 85-001 building at The Boeing Company's (Boeing) Portland facility (Figure 1). The purpose of this investigation is to evaluate volatile organic compound (VOC)-impacted subsurface soil (primarily impacted with trichloroethene [TCE]) near and downgradient of the former vapor degreasers (source of contamination) to aid in optimization of the soil vapor extraction (SVE) system which was installed more than eight years ago in September 2012. In the 2019 Annual Progress report (LAI 2020), it was recommended that an additional investigation of shallow soil vapor be conducted to better delineate the distribution of TCE and identify the cause(s) of rebounding vapor concentrations in the sub-slab interval observed during the temporary shutdown of the SVE system in 2018. This investigation and monitoring activities will be conducted under the Oregon Department of Environmental Quality (ODEQ) Order on Consent (Order) DEQ No. LWSR-NWR-04-12.

Background Summary

Historical releases of TCE from the two former vapor degreasers inside Building 85-001 were the primary source of TCE contamination in the Troutdale Gravel Aquifer (TGA). Prior to 2009, the area of the former vapor degreasers was inaccessible for soil and groundwater investigations due to limited access for drilling inside the active manufacturing building and difficult geologic conditions (dense to very dense soil with cobbles and boulders). With advancement in limited access rotosonic drilling techniques, three investigations have been conducted within the former vapor degreaser source area (FVDSA) between 2009 and 2011 (LAI 2010, 2011a, 2012a). Between late-2009 and mid-2011, several rounds of temporary sub-slab vapor sampling were conducted totaling 56 sub-slab locations. By early January 2012, seven multiple-purpose wells (BOP-78[i], BOP-79[i], and BOP-84[i] through BOP-88[i]) were installed within the FVDSA with a well screen section in the vadose and a screen section below the water table, and wells VOW-16 through VOW-18 were installed and are screened within the vadose zone to monitor at-depth vapor concentrations. The multi-purpose wells are currently utilized for SVE operation (system installation in September 2012), groundwater quality monitoring, and *in situ* bioremediation injections. In April 2013, nine permanent sub-slab vapor points (VP-1 through

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VP-9) were installed in the FVDSA based on previous temporary sub-slab investigation locations and TCE concentrations. The permanent sub-slab vapor points were installed to monitor impacted subsurface conditions near the surface and to evaluate the SVE system.

The SVE system operated on a full-time basis from September 2012 through 2014, when the system switched to pulsed operation. The most significant SVE system shutdown since installation occurred from October 31, 2017 through August 20, 2018 to facilitate a facility construction project. Vapor samples collected on August 10, 2018 indicated rebound in soil vapor above the TCE screening level (2,900 micrograms per cubic meter [$\mu g/m^3$]; protective of occupational receptor in buildings with vapor intrusion) occurred in three sub-slab sampling points (Figure 2) and at one at-depth interval location (Figure 3). Sub-slab samples are collected immediately below the building's concrete slab, which is approximately 6–9 inches thick. At-depth samples are collected from the multiple-purpose and vapor observation wells (VOW-16 through VOW-18) which are screened from about 5 feet (ft) below ground surface (bgs) to 45 ft bgs. Sub-slab and at-depth TCE rebound concentrations over time are shown on Figures 4 and 5.

As shown on Figure 4, rebound concentrations during the most recent system-wide shutdown at VP-2, VP-5, and VP-1 were similar to baseline concentrations observed before SVE was implemented. The maximum rebound concentrations observed in sub-slab samples (510,000 $\mu g/m^3$ at VP-2 and 260,000 $\mu g/m^3$ at VP-5) are an order of magnitude larger than the maximum rebound concentrations in at-depth sampling points (16,000 $\mu g/m^3$ at VOW-17 and 2,900 $\mu g/m^3$ at BOP-84[i]). At-depth sampling points are collected from well screens installed from about 5 ft to 45 ft bgs. Rebound concentrations at sub-slab sampling points are significantly higher than at-depth sampling locations and may indicate that residual contaminant mass is located within the shallow subsurface. Furthermore, it appears the current configuration of the SVE system has not accomplished treatment in some areas of the FVDSA, given rebounding concentrations to levels observed before SVE treatment was implemented.

Soil samples were not collected/analyzed for VOCs during the previous investigations within the FVDSA as sampling criteria was not met (i.e., elevated field screening photoionization detector [PID] readings greater than 50 parts per million) for sample collection per the ODEQ-approved work plan (LAI 2011b). Additionally, in 2018, Boeing facilities reconfigured the equipment layout and operations on the FVDSA; therefore, previously inaccessible areas in the FVDSA are now accessible. The current accessibility allows for samples to be collected closer to the former vapor degreaser footprint.

Objective

The goal of this investigation is to gather data needed to evaluate potential SVE treatment optimization by using: 1) rebound testing to delineate where residual contamination remains in shallow soils and 2) soil testing to assess whether contaminant mass is present in soil less than 5 ft bgs in areas previously inaccessible because of Boeing operations. Rebound testing will be conducted by measuring the increase in contaminant concentrations over time after the SVE system is shut down and until equilibrium is observed. Equilibrium concentrations are indicative of the remaining contaminant mass at each sampling point.

Soil testing will be conducted in areas where sub-slab vapor sampling data indicates rebound concentrations are well above the vapor screening level (near VP-1, VP-2, and VP-5). Data will be used to evaluate whether residual contaminant mass is bound to soil within 5 ft bgs or if permeable soils are transporting residual mass to sub-slab locations from deeper intervals. This information will be used to assess shallow-subsurface treatment options.

Pre-Field Activities

The following outlines tasks that must be completed prior to the start of invasive field tasks (i.e., coring and sampling). These include preparing a health and safety plan (HASP) and conducting a utility locate in the area of investigation.

Health and Safety Plan

The site-specific HASP for implementation of field activities described in this work plan is provided in Attachment 1. LAI employees will follow the procedures described in this HASP. LAI's subcontractors will prepare their own health and safety plan or choose to adopt the HASP prepared by LAI.

Utility Clearance

Prior to initiation of any invasive subsurface activity, the locations of each proposed boring (vapor pin and soil location) will be checked in the field to locate aboveground utilities or physical limitations that would prevent drilling at the proposed location. LAI will coordinate with Boeing Facility personnel to check the proposed boring locations for potential obstructions using available facility drawings.

A public utility locate service will be contacted to locate public underground utilities at the site and a private utility locate service will be contacted to locate underground utilities near the proposed vapor pin and soil boring locations. Sampling locations will be relocated, as needed, to avoid utilities and meet the objectives of the investigation.

Sub-slab Vapor Point Installation Procedure

Ten sub-slab vapor points (VP-10 through VP-19) will be installed by using a Cox Colvin sub-slab sampling device with the same procedures as the previously installed vapor pins (LAI 2013). Proposed and existing vapor pin locations are shown on Figure 6. A ⅝-inch diameter hole will be drilled into the concrete floor using a roto hammer and a stainless-steel vapor pin will be installed. A shop vacuum with a high-efficiency particulate air (HEPA) filter will be used to prevent dust accumulation within the hole and migration into the breathing zone. The annulus space around the vapor pin will be sealed with a Teflon sleeve creating an air-tight seal. A protective plastic cap will be placed on the top of the vapor point to eliminate vapors from being released. A 2-inch diameter stainless-steel flush-mount protective cover will be fastened to the floor to match the existing concrete slab grade.

A leak test will be conducted at the vapor point upon completion of the installation. The leak test will be conducted by placing a sealed shroud around the sampling device. Helium will be pumped into the shroud prior to the sample collection. A portable helium detector will collect measurements from the shroud and the sub-slab via the vapor point sampling tube. If no helium is detected in the subsurface, then the test results indicate an adequate seal is present and the vapor point is available for future sampling activities. If a vapor point fails the leak test, the point will be reinstalled and tested to verify the presence of an adequate seal. Additionally, at the time of installation, a baseline PID reading will be recorded.

Shallow Soil Sampling

Five shallow soil borings will be advanced by hand to a maximum depth of 5 ft bgs (Figure 6). Plastic sheeting will be taped down around each boring before advancement to contain soil removed from the boring. A subcontractor will perform the concrete coring through the facility floor and, if necessary, can assist LAI with boring down to the maximum depth.

An environmental professional from LAI will supervise all coring, conduct all sampling activities, prepare a descriptive log of each soil boring, and screen samples for indications of potential contamination, as described below. All samples collected will be visually described in the field in general accordance with ASTM International D2488-17, Standard Practice for Description and Identification of Soils (Visual-Manual Procedure).

Environmental field-screening will consist of visual and olfactory observations (sheen, staining, and odor) as well as PID headspace analysis and will be recorded on the exploration log. Headspace analysis will be conducted by placing a representative portion of the soil in a sealable plastic bag, allowing the soil to off-gas inside the sealed bag for 5 minutes, then inserting the PID tip into the bag to measure total VOCs.

For each boring, up to three soil samples will be collected. The following general sampling protocol will be applied:

- If PID readings reach 20 parts per million (ppm) or other observations indicate the potential presence of contamination, one sample will be collected from the area of highest apparent contamination, and, if possible, one soil sample will be collected from 1 ft above and 1 ft below the apparent contamination zone.

- If field screening does not indicate the presence of contamination, one sample will be collected from the top (0–1 ft bgs), middle (2–3 ft bgs), and bottom (4–5 ft bgs) of the boring (and select soils with the highest silt content, if possible).
- The sample intervals will be approximately 1 ft in length, or long enough to collect sufficient volume of soil to fill the required sample containers.

Soil samples will be collected in laboratory-supplied jars and submitted to Eurofins Lancaster Laboratories (LLI) located in Lancaster, Pennsylvania for VOC analysis (US Environmental Protection Agency [EPA] Method 8260), in accordance with the site-specific Sampling and Analysis Plan (SAP; LAI 2012b).

Upon sampling completion, the borings will be backfilled with the soil removed from that boring unless field screening indicates the potential presence of contamination (e.g., discolored soil, sheen, or PID detections above ambient readings). If necessary, the backfill material will come from the clean soil stockpile located in the southwest corner of the site. Surface restoration at each boring location will be completed to match the existing concrete slab.

Soil Vapor Extraction System Rebound Testing

The following procedures will be conducted as part of the SVE system rebound testing at sub-slab vapor pin and soil gas monitoring well locations. There are three soil gas monitoring wells in the FVDSA (VOW-16, VOW-17, and VOW-18) that will be monitored at the same time as sub-slab concentrations to provide a comparison to concentration trends observed at shallow vapor pins.

System Shutdown Schedule

The SVE system is currently operational but will be shut down temporarily during vapor pin installation and soil sample collection to prevent potential SVE interference during vapor pin leak testing and screening soils with a PID. After field work is complete, the system will be turned back on until the routine semiannual vapor sampling in February 2021, during which the SVE system needs to be operational for SVE system operations, maintenance, and management (OMM) sampling. After the OMM samples are collected, the SVE system will be shutdown.

The SVE system will be shut down for a 24-hour period, during which semiannual vapor sampling will occur as is typically performed at all at-depth locations (multi-purpose wells and vapor observation wells) and sub-slab sampling locations (VP-1 through VP-19). Sampling procedures are detailed below. After sampling, the SVE system will remain shut down (typically the system is restarted immediately after sampling) until equilibrium is reached and rebound samples have been collected. Additional sampling at all sub-slab locations (VP-1 through VP-19) and three vapor monitoring wells (VOW-16, VOW-17, and VOW-18) will be sampled on a weekly basis for approximately 4 weeks. The shutdown duration may be extended if data trends indicate that equilibrium soil vapor concentrations have not been reached. After the SVE system rebound testing is complete, the SVE system will return to routine operation.

Sub-slab Vapor Sampling Procedures

Sub-slab vapor sampling will be conducted and analyzed in the same manner as the routine semiannual vapor sampling is conducted on-site in accordance with the SAP (LAI 2012b) as described below.

Sub-slab vapor samples will be collected in 1-liter Summa canisters and sent to Air Toxics laboratory of Folsom, California to be analyzed for VOCs by method TO-15. Sub-slab vapor samples will be collected as described in the previously ODEQ-approved work plan for the previous investigations and the ODEQ Guidance for assessing and Remediating Vapor Intrusion in Buildings (ODEQ 2010). A hand pump will be connected to sample point Teflon tubing and a minimum of 2 volumes (i.e., the volume of the tubing and core) will be purged prior to sampling. The valve on the sample tubing will be opened to perform the purge and then closed. Each Summa canister will be connected to the tubing with a Swagelok fitting and the valve on the sample tubing and the needle valve on the Summa canister will be opened to collect the sample.

After the needle valve has been open for approximately 5–6 minutes (a flow rate of 167 milliliters per minute [mL/min] will not be exceeded) and adequate volume of vapor has been collected, the needle valve will be closed, and the Summa canister will be detached. The initial and final canister vacuum will be recorded on the chain-of-custody that is sent to the laboratory with the canisters. For the sample to be valid, the initial canister vacuum must be greater than 25 inches of mercury (inHg; typically, the laboratory ships the canisters with approximately 29.9 inHg), and the final canister vacuum will be between 2 and 6 inHg. The tubing will be removed, and the vapor point valve will be closed prior to replacing the protective cap.

Samples will be submitted for laboratory analysis of a short list of VOCs. Vapor samples will be submitted to Eurofins Air Toxics for laboratory analysis for VOCs by EPA Method TO-15 for the TGA remedy VOC compounds of interest only: TCE; cis-1,2-dichloroethene (cDCE); vinyl chloride (VC); trichloroethane (TCA); tetrachloroethene (PCE); and 1,1-dichloroethene (1,1-DCE). Reporting limits for these compounds by Method TO-15, for samples collected in 1-liter canisters, range from 2.9 to 7 $\mu g/m^3$. These reporting limits are low compared to the risk-based concentrations (RBCs) and are therefore adequate for this investigation.

Investigation-Derived Waste

It is assumed very little investigation-derived waste (IDW) will be generated during this investigation. Decontamination of all sampling equipment will be conducted on the Decontamination Pad located in the Boeing Remediation Yard. Decontamination water generated during sampling activities will be treated through the onsite groundwater extraction system. All non-disposable personal protective equipment and sampling equipment will be washed with an Alconox soap and tap water mixture and rinsed with distilled water.

Soil cuttings removed from the borings will be used as backfill within the same boring unless field screening indicates the potential presence of contamination. Soil cuttings that indicate the potential presence of contamination will be containerized and transported to the Remediation Yard for Boeing's disposal pending analytical results. Concrete cores will be disposed of in accordance with Boeing's Solid Waste Segregation Direction. All drums will be properly labeled at the end of each day.

Data Evaluation and Reporting

Data evaluation and reporting of sampling activities and findings will be included in the annual progress report for the TGA remedy. Data will be evaluated to assess where significant rebound is observed in the sub-slab interval and whether those areas correlate with TCE in shallow soil. The evaluation will inform potential expansion or re-configuration of the SVE system. Results and recommendations will be provided to ODEQ for consideration.

Schedule

It is anticipated that the permanent vapor pin installation and soil sampling activities described in this work plan will be conducted during the Boeing holiday shutdown in the late-December 2020/early-January 2021 time frame. Because of challenging coring conditions in the FVDSA, LAI estimates vapor pin installation and soil sampling will take approximately 4–5 days to complete. Rebound testing will be conducted in first quarter 2021 in conjunction with the routine semiannual vapor sampling event in February 2021.

Limitations

This Technical Memorandum has been prepared for the exclusive use of Boeing for specific application to the shallow subsurface investigation at the Building 85-001 Former Vapor Degreaser Source Area of the Boeing Portland facility. No other party is entitled to rely on the information, conclusions, and recommendations included in this document without the express written consent of LAI. Further, the reuse of information, conclusions, and recommendations provided herein for extensions of the project or for any other project, without review and authorization by LAI, shall be at the user's sole risk. LAIs 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. We make no other warranty, either express or implied.

LANDAU ASSOCIATES, INC.

Erin Waibel, RG
Sr. Project Geologist

Evelyn Ives, PE
Senior Engineer

EMW/EHI/ljl
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Attachments

Figure 1: Boeing Portland Site Map
Figure 2: Sub-slab TCE Vapor 2018 Rebound vs. Baseline
Figure 3: Monitoring Well TCE Vapor 2018 Rebound vs. Baseline
Figure 4: Sub-slab TCE Vapor Concentrations
Figure 5: Monitoring Well TCE Vapor Concentrations
Figure 6: Proposed Sub-slab Vapor Pin and Soil Boring Locations
Attachment 1: Boeing Portland Health and Safety Plan

References

LAI. 2010. Environmental Subsurface Investigation, Building 85-001 Former Degreaser Area, Boeing Portland Facility, Portland, Oregon. Landau Associates, Inc. July 22.

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Brett Borgeson, Landau Associates, Inc., to Robert Williams, Oregon State Department of Environmental Quality. March 19.

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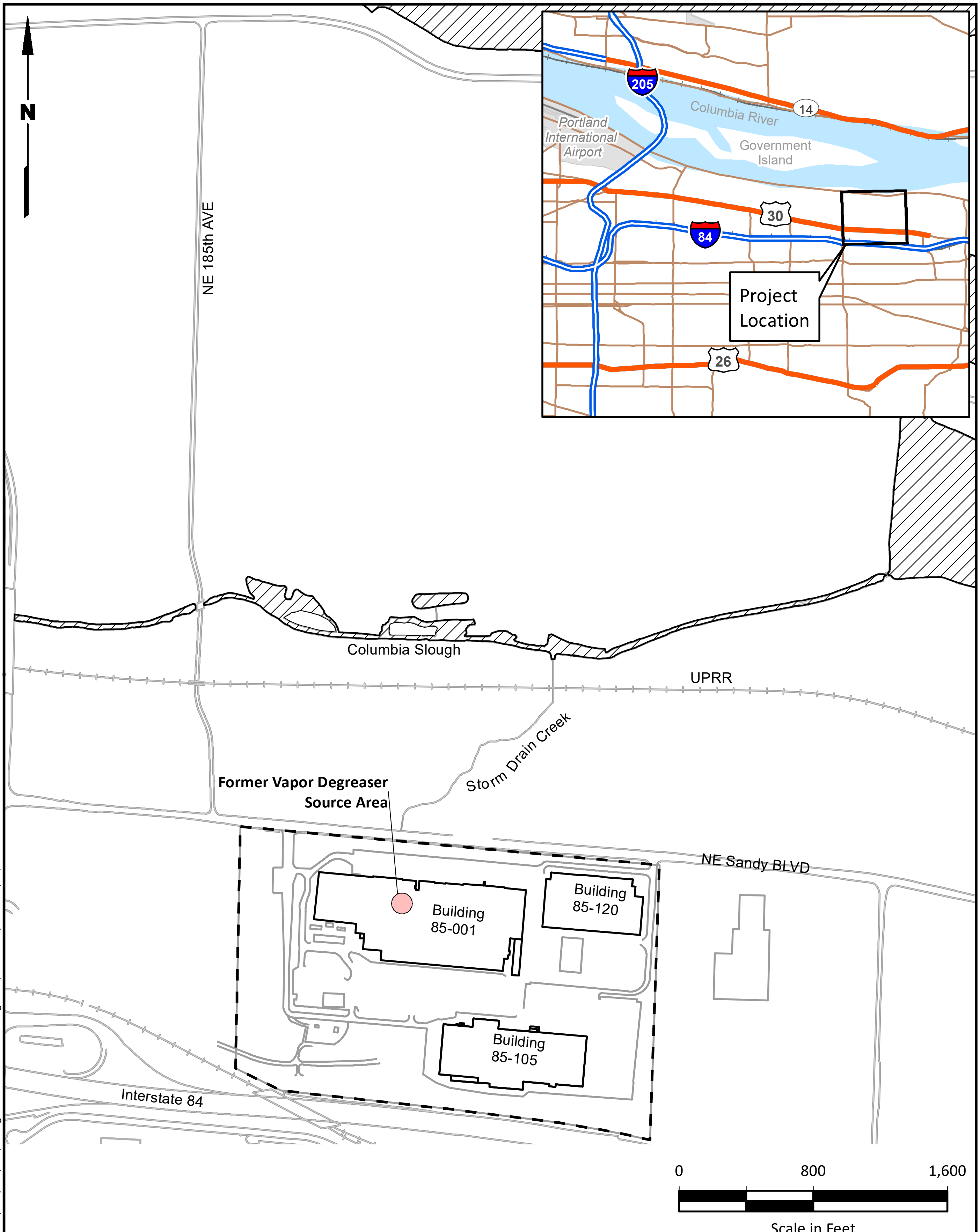

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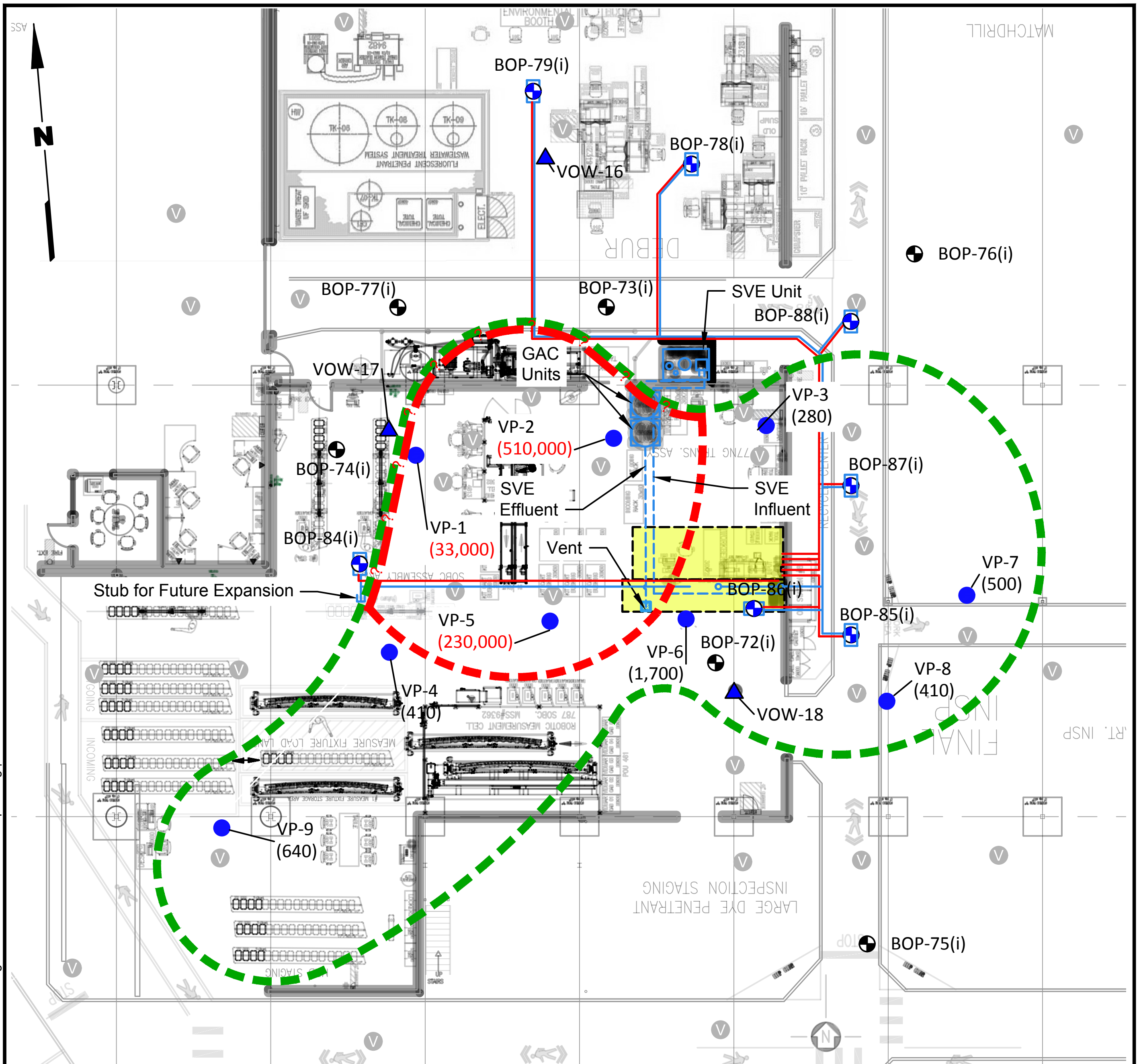
Boeing Portland Gresham, Oregon	**Boeing Portland Site Map**	Figure 1



Legend

- Sub-Slab Vapor Pin Location
- Multiple-Purpose SVE and Monitoring Well Location
- Monitoring Well Location
- Baseline Investigation Sub-Slab Grab Sample Location
- Vapor Observation Well Location
- VP-1 (33,000) — Vapor Pin Designation August 2018 TCE Concentration (µg/m^3)
- Approximate Location of Former Degreasers
- Below-ground Donor Injection Piping
- Below-ground SVE Piping
- Above-ground SVE Piping
- Baseline (2009-2011) TCE Concentrations Above Screening Level
- 2018 Rebound TCE Concentrations Above Screening Level

0 20 40

Scale in Feet

Notes

1. Values shown in RED are above screening level (2,900 µg/m^3).
2. The soil vapor extraction (SVE) system was shut down on October 31, 2017 to facilitate a facility construction project in the area. The SVE system had been non-operational for 283 days prior sampling on August 10, 2018. The SVE system resumed operation on August 20, 2018.
3. Black and white reproduction of this color original may reduce its effectiveness and lead to incorrect interpretation.

Source: The Boeing Company

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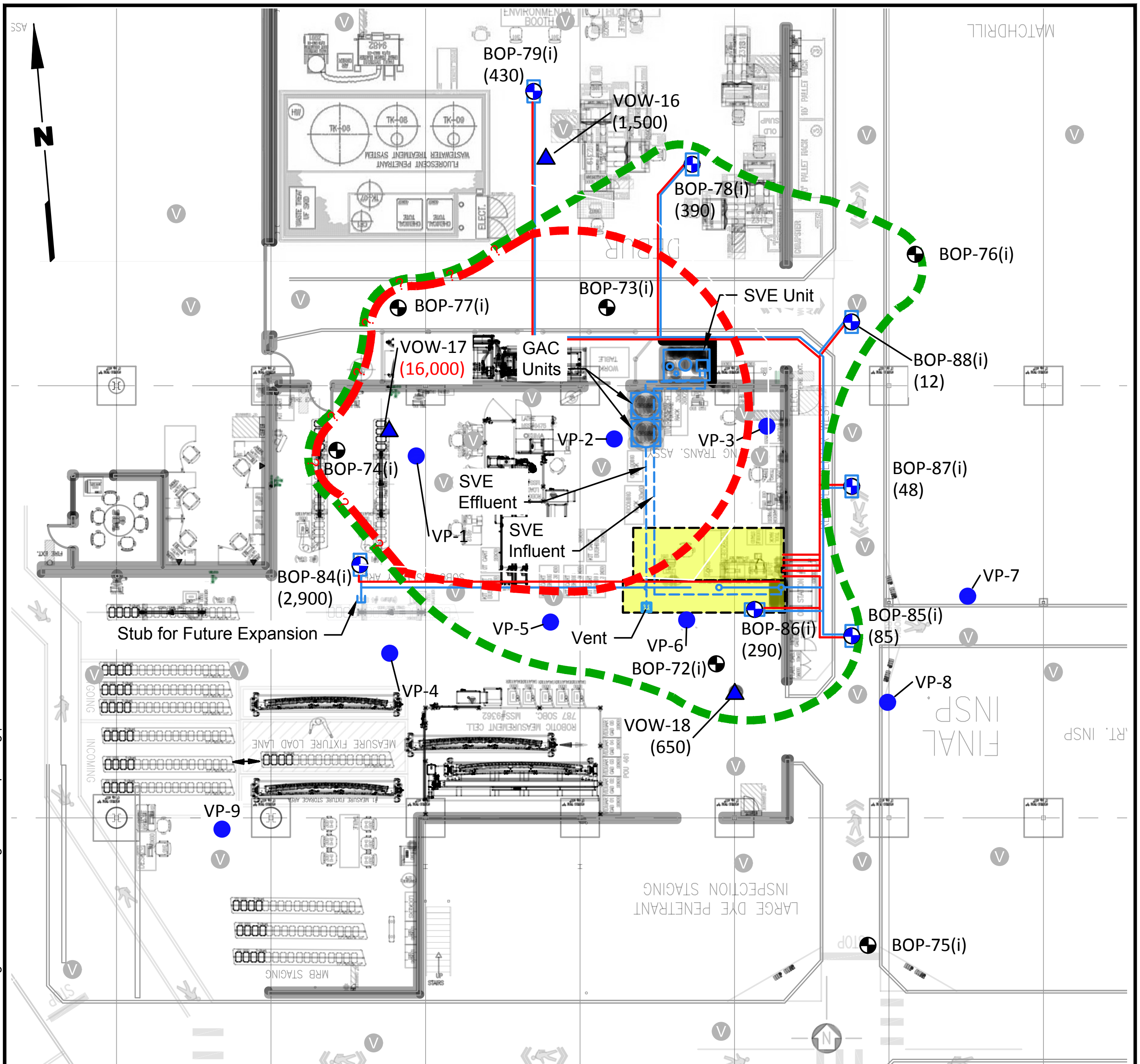
Gresham, Oregon

Sub-slab TCE Vapor 2018 Rebound vs Baseline

Figure 2



Legend

- Sub-Slab Vapor Pin Location
- Multiple-Purpose SVE and Monitoring Well Location
- Monitoring Well Location
- Baseline Investigation Sub-Slab Grab Sample Location
- Vapor Observation Well Location
- VOW-17 (16,000) — Vapor Pin Designation August 2018 TCE Concentration (µg/m³)
- Approximate Location of Former Degreasers
- Below-ground Donor Injection Piping
- Below-ground SVE Piping
- Above-ground SVE Piping
- Baseline (2009-2012) TCE Concentrations Above Screening Level
- 2018 Rebound TCE Concentrations Above Screening Level

0 20 40

Scale in Feet

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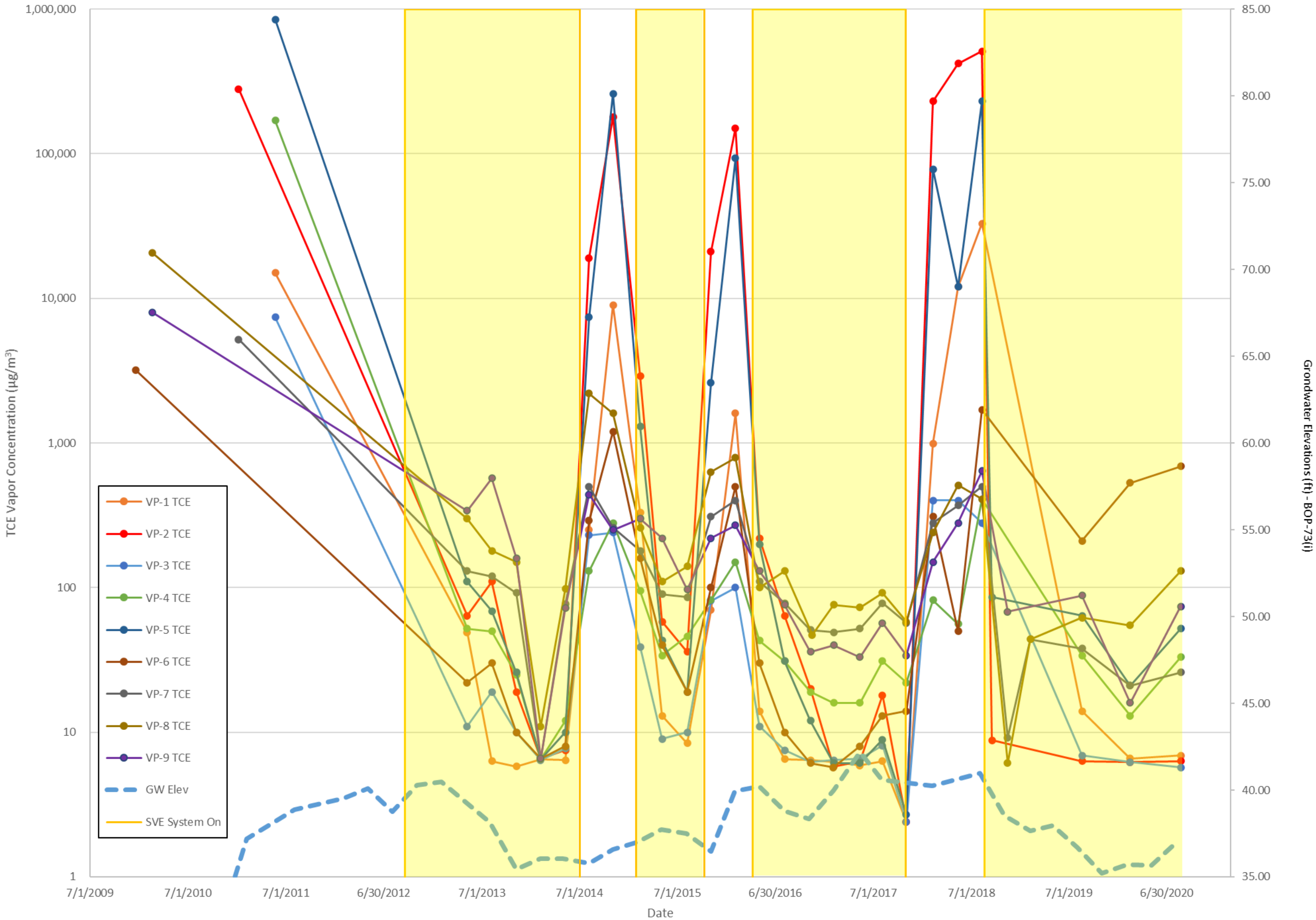
Monitoring Well TCE Vapor 2018 Rebound vs Baseline

Figure
3



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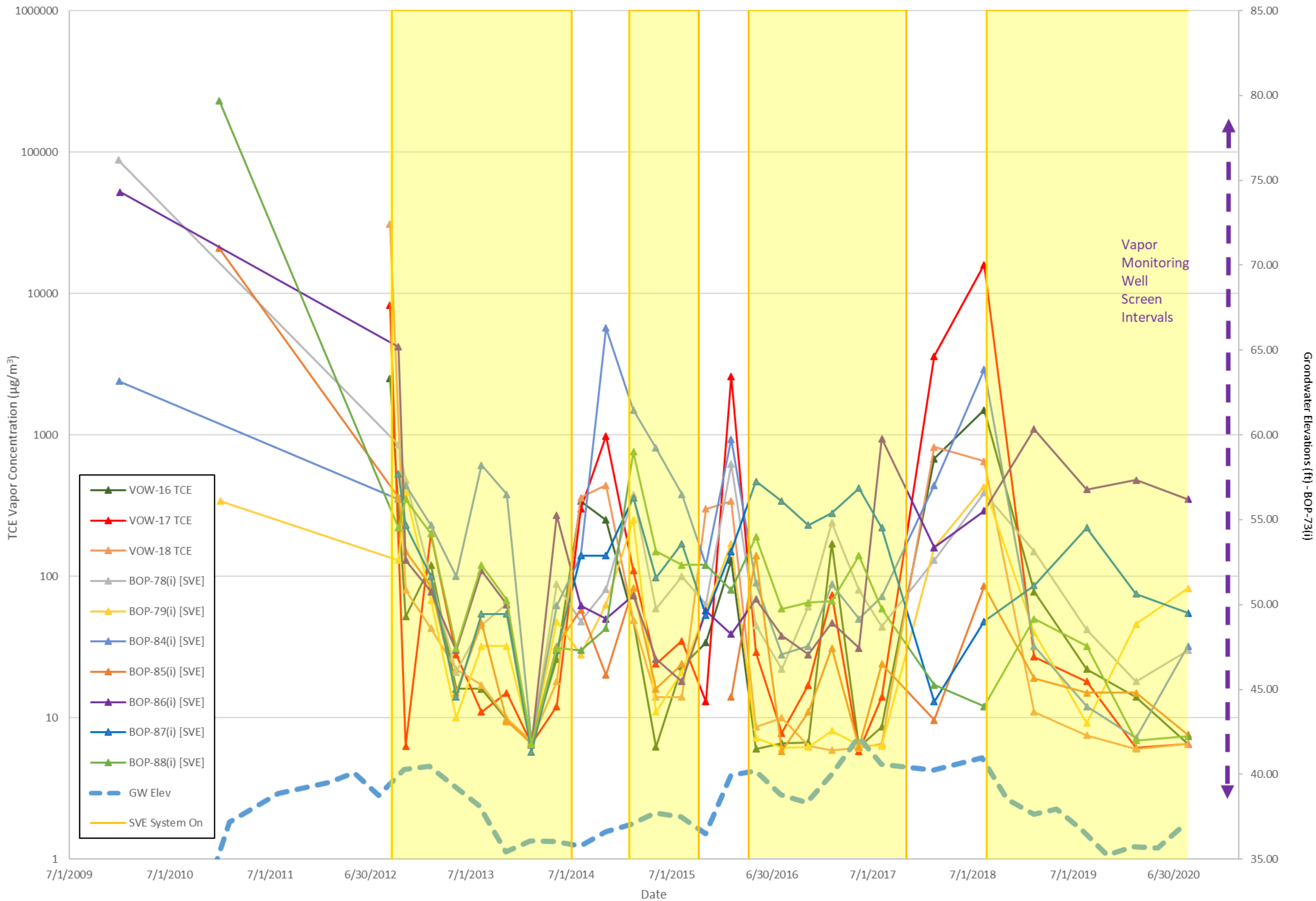
Sub-slab TCE Vapor Concentrations

Figure
4



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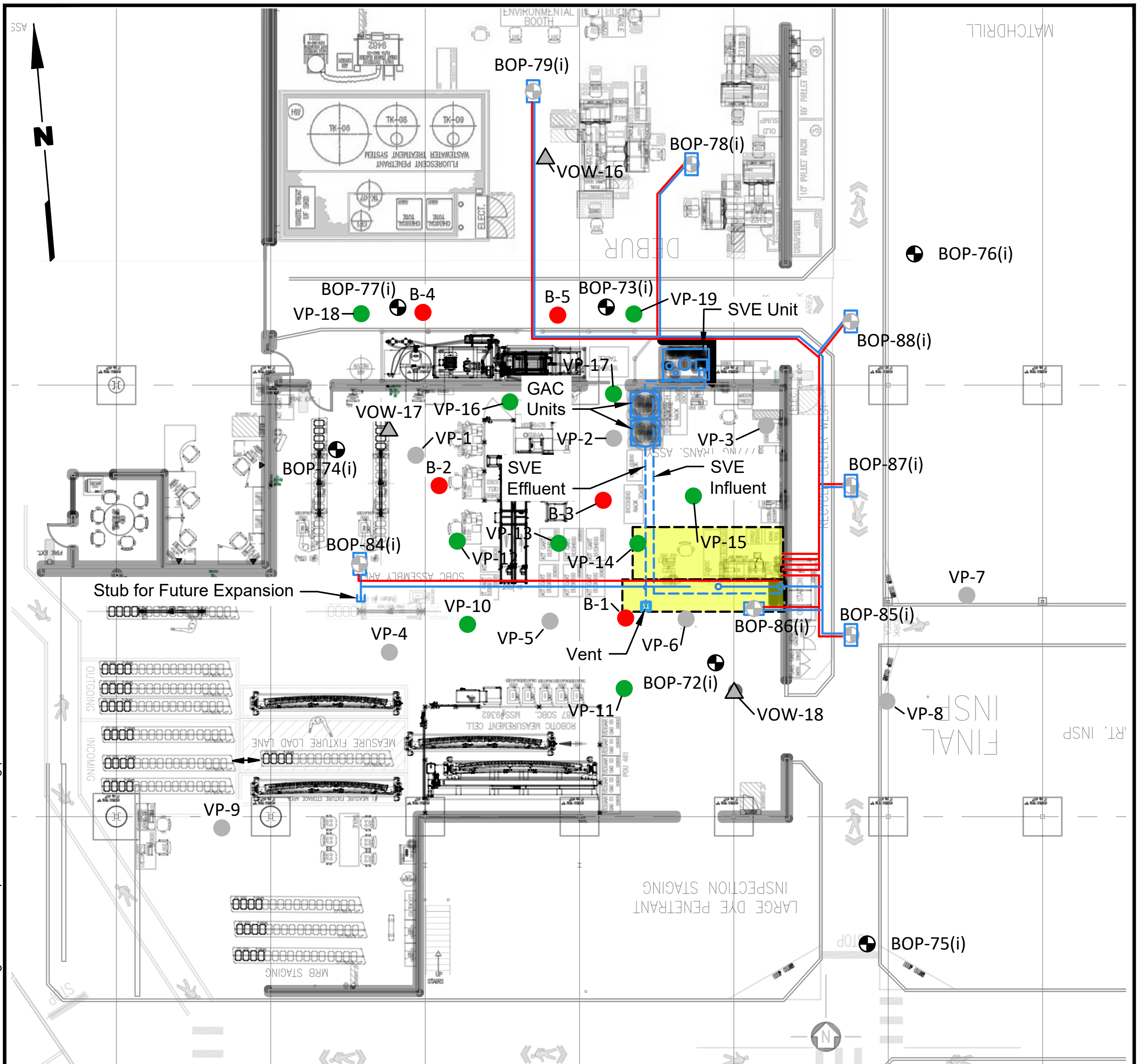
Gresham, Oregon

Monitoring Well TCE Vapor Concentrations

Figure
5



Legend

- Proposed Soil Boring (5 ft below ground surface) Location
- Proposed Sub-Slab Vapor Pin Location
- Sub-Slab Vapor Pin Location
- Multiple-Purpose SVE and Monitoring Well Location
- Monitoring Well Location
- Vapor Observation Well Location
- Approximate Location of Former Degreasers
- Below-ground Donor Injection Piping
- Below-ground SVE Piping
- Above-ground SVE Piping

0 20 40

Scale in Feet

Note

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

Source: The Boeing Company

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Boeing Portland
Gresham, Oregon

Proposed Sub-slab Vapor Pin and Soil Boring Locations

Figure 6

ATTACHMENT 1

Boeing Portland Health and Safety Plan

Health and Safety Plan
Boeing Portland
Gresham, Oregon

March 28, 2008
Revised: January 4, 2017
Revised October 16, 2017

Prepared for

The Boeing Company

LANDAU ASSOCIATES

130 2nd Avenue South
Edmonds, WA 98020
(425) 778-0907

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FIGURES

FORMS

TABLES

HEALTH AND SAFETY PLAN SUMMARY

SITE NAME:	Boeing of Portland: Troutdale Gravel Aquifer (TGA) and Troutdale Sandstone Aquifer (TSA) Remedies
LOCATION:	19000 NE Sandy Boulevard
CLIENT:	The Boeing Company (Boeing)
TYPE OF FACILITY:	Industrial/Aerospace Manufacturer
LAND USE OF AREA NEAR FACILITY:	Industrial, Commercial, and Residential
SITE ACTIVITIES:	Ongoing remediation of groundwater in two aquifers including: drilling, soil/vapor/groundwater sampling activities, construction oversight, and remedy system operation and maintenance (O&M).
POTENTIAL SITE HAZARDS:	Dermal exposure, incidental ingestion, and/or inhalation of contaminants; heat stress; slips, trips, and falls; work near heavy equipment and machinery; noise; storms; and work near pedestrians.
POTENTIAL SITE CONTAMINANTS:	Volatile organic compounds (VOCs) and diesel-range petroleum hydrocarbons (TPH-Dx).
ROUTES OF ENTRY:	Skin contact with or incidental ingestion of potentially contaminated soil, groundwater, solids; and inhalation of airborne droplets, dusts, or vapors.
PROTECTIVE MEASURES:	Protective clothing (including hard hat, steel-toed boots, safety glasses, nitrile gloves, coveralls); (stand-by) air purifying respirators, Tyvek suits; dust control; and ambient air monitoring equipment.
MONITORING EQUIPMENT:	Photoionization detector (PID) meter and chemical-specific detector tubes.

1.0 INTRODUCTION

This health and safety plan (HASP) presents requirements for remedial activities associated with both the Troutdale Gravel Aquifer (TGA) and the Troutdale Sandstone Aquifer (TSA) groundwater remedy and associated construction support activities. This HASP will be implemented for activities conducted on the Boeing Portland (Boeing) facility and in the local investigation and study areas, except for the Cascade Corporation (Cascade) facility, which will be addressed by separate Cascade health and safety plans.

Health and safety procedures to be used during these activities include descriptions of existing site conditions and organization, safety procedures, criteria for hazard and risk analysis, levels of personal protection and required equipment, air monitoring procedures, emergency response information, and requirements pertaining to training and medical monitoring of onsite personnel.

This HASP applies to Boeing personnel (associated with the site remedies) and Landau Associates (LAI) personnel. Contractors are required to submit a health and safety plan covering general safety for the contractors' specific work on the site, or adopt this plan as their own relative to potential exposure to volatile organic compounds (VOCs). The requirements outlined in this plan are considered the minimum health and safety requirements and are intended to be incorporated by each contractor into their respective health and safety plan. Contractors may choose to apply more stringent health and safety requirements. This plan does not address physical worker safety issues that may be associated with fall prevention, excavation trenching, shoring, hot work, and electrical work, as these activities are covered under the specific contractor HASP. Relevant federal, state, and local standards must be followed for all work related to the TGA corrective measures and TSA remedy implementation and associated construction support activities.

1.1 Site Description

The Boeing Portland facility is located in Gresham, Oregon at 19000 NE Sandy Boulevard as shown on Figure 1. The VOC plume in the TGA has been delineated and characterized through the Resource Conservation and Recovery Act (RCRA) facility investigations (RFI; LAI 1988, 1990, 1991, 1992, 1993, 1995a), and a corrective measures study (CMS; LAI 1995b, 1996) was performed to evaluate corrective measures alternatives and select a preferred corrective measure for remediation of the plume. Based on the CMS, the U.S. Environmental Protection Agency (EPA) issued a Statement of Basis (EPA 1997a) and a Final Decision (EPA 1997b) documenting the preferred corrective measure alternative. A corrective measure implementation was developed to describe the management strategy and present the conceptual design for conducting and implementing the design, construction, operation, maintenance, and monitoring of the selected corrective measure.

The TSA study area is located entirely in East Multnomah County and encompasses the TSA operable unit and surrounding area, including portions of Blue Lake, and Fairview Lake. The VOC plume has been delineated by investigations conducted separately by Boeing and Cascade and jointly as part of the TSA remedial investigation and feasibility study (EMCON and LAI 1995; LAI and EMCON 1996). Based on these investigations, the boundaries of the TSA study area, established in the Oregon Department of Environmental Quality (ODEQ) Record of Decision (ROD) are: NE 181st Avenue to the west, NE 223rd Avenue to the east, NE Halsey Street to the south, and the Columbia River to the north.

For the purposes of this document, the terms "the site" and "onsite" include the Boeing facility, the TGA offsite investigation area, and the TSA study area.

1.2 Purpose, Applicability, and Adherence

Activities in this HASP include, but are not limited to, oversight of drilling activities (borehole drilling, installing, and decommissioning of wells and or sub-slab vapor pins); collection of groundwater and soil vapor in both wells and sub-slab vapor pins; collecting borehole soil and groundwater samples; oversight of construction related activities for underground piping from extraction wells to the existing groundwater treatment system (GWTS). Construction support may include borehole soil, surface water, groundwater, and air sampling and monitoring during well installation, as well as piping and treatment facilities construction. Monitoring, including periodic groundwater and borehole soil sampling and analysis, occur during the entire period of remediation to track constituent distributions. The health and safety requirements described in this HASP are directed at protecting workers from exposure to organic vapors and potentially contaminated soil, groundwater, and surface water during these activities. These health and safety requirements apply to all personnel, contractors, and others entering locations at the site where invasive remedial activities or sampling are being conducted.

All LAI, Boeing personnel, and visitors must read this plan prior to participation in remediation field activities or site visits of the remediation system. If information presented in this plan is unclear, the reader must contact the Boeing representative (see Section 1.3) for clarification before participating in field activity. Once the information has been read and understood, the individual will sign the health and safety acknowledgment form (Form 1); the signed form be kept in the LAI's project files. After each individual has read this HASP, but before participating in field activities, a training session will be conducted by the contractor to familiarize Boeing personnel and visitors with health and safety requirements at the site.

This HASP has been designed to be flexible to allow unanticipated location-specific problems to be addressed, while providing adequate and suitable worker protection. These requirements may be modified at any time by the Boeing project manager or the designated Boeing representative. Any modification will be presented to the onsite team during a safety briefing and documented.

1.3 Project Organization and Responsibilities

1.3.1 Boeing Project Manager

The current Boeing project manager is Mr. Mike Gleason. Mr. Gleason, or other future Boeing-designated project managers, will have responsibility for project planning and execution relative to environmental affairs and concerns. The project managers will be responsible for making project-level decisions regarding safety rules and operations in consultation with the Boeing Field Engineer and the LAI Project Manager. The project managers may suspend environmental investigations and remedial construction activities, and recommend suspension of other onsite construction activities to the Boeing Portland facility's manager if health and safety issues warrant. Specific responsibilities of the project manager or their designee include monitoring the contractors for compliance with their project-specific health and safety plans according to the terms of the contract.

1.3.2 Boeing Field Engineer

Ms. Jennifer Parsons is the current Boeing Field Engineer. In this capacity, she is the Boeing representative responsible for:

- Monitoring daily activities
- Conducting orientation training for all Boeing personnel before beginning their activities
- Communicating with the project manager regarding investigation and remediation activities and health and safety conditions
- Acting as the project manager's liaison with Boeing site facilities, construction, investigation, and remediation activities representatives.

The Boeing Field Engineer may also be designated as the project health and safety officer (HSO) for Boeing activities onsite. In this capacity, he/she may be assisted by a representative of Boeing's remediation consultant, LAI. The Boeing Field Engineer may not be available during onsite activities and may transfer safety oversight activities to Boeing’s remediation consultant, LAI.

1.3.3 Landau Associates Safety Manager

Safety monitoring during site remedial activities will be the responsibility of the Boeing Project Managers, and the designated LAI’s Health and Safety Manager. The Landau Associates’ Health and Safety Manager, Ms. Christine Kimmel, will prepare safety plans, review safety documentation prior to the start of field activities, and be the priory point of contact in the case of an incident. The LAI Safety Manger will also review contractor safety plans and provide comments, as needed. The Safety Manager will oversee any required safety investigation within 24 hours of an incident, and develop corrective actions (as needed).

1.3.4 Landau Associates Site Safety Officer

The LAI Site Safety Officer, Ms. Erin Waibel, or equivalent designee, will be present at the site at all times during intrusive site activities related to the monitoring well installation, soil boring completion, and sampling activities. The LAI Site Safety Officer will review safety documents and conduct work in accordance with the plans. The LAI Site Safety Officer will oversee operation and maintenance (O&M) contractor activities and make observations on safety procedures, any safety concerns will be reported to the LAI Safety Manager.

1.3.5 Contractor Project Health and Safety Officer

Site O&M contractors will designate their own project HSO (CHSO) to be onsite at all times during intrusive and O&M activities. The CHSO be responsible to the Boeing Field Engineer and LAI for enforcing the provisions of their health and safety plan. He/she also monitors the implementation of contractor health and safety plans and notify the project manager, field engineer, and site facilities and contractor representatives of any conditions which may present a danger to personnel in the field or which may require modification of health and safety plans.

Contractor representatives will be present during all intrusive and O&M activities and audit health and safety conditions at the site. The Boeing representative, in coordination with the contractor and CHSO, will:

- Ensure that personnel are aware of health and safety requirements and the potential hazards associated with the work, instructed in safe work practices, and understand the planned procedures for dealing with emergencies.
- Ensure that all required forms are completed.
- Correct any work practices or conditions that may result in injury to personnel or exposure to hazardous substances.
- Require that appropriate personal protective equipment (PPE) is properly used by all onsite personnel.
- Report any deviations from the anticipated conditions described in this document to the project manager or his/her representative.
- Monitor decontamination procedures per Oregon Administrative Rule (OAR)-Occupational Safety and Health Administration (OSHA) 1910-132 and 134 (OSHA 1989a).

1.3.6 Work Area Security

Work areas where intrusive activities (i.e., drilling, excavating/trenching, extraction well cleaning, sampling, and pump replacement) are being conducted will be barricaded and separated from the general public. Ambient air quality monitoring will be conducted when personnel are located inside the secured work area to monitor for PPE protection/action levels. Work areas in and around groundwater extraction well and utility vaults will be barricaded and separated from the general public. Barricades consist of, but not be limited to, caution tape, flags, traffic cones, and traffic barricades. Only personnel who are familiar with the work procedures and have reviewed and signed the HASP acknowledgment form be allowed within the interior of the secured work area. Security in the contractor’s work area will be the responsibility of the contractor with Boeing concurrence.

2.0 SAFETY PROCEDURES

Safety must be the concern of every individual involved in project activities. Whether in the office or onsite, properly followed procedures are essential for personal safety and to minimize lost time due to injuries or accidents involving equipment. Potential hazards in the work area include, but are not limited to:

- Exposure to toxic or hazardous chemicals
- Physical hazards from heavy equipment
- Fire and explosion caused by flammable or combustible materials
- Weather stress caused by PPE or weather conditions.

2.1 Chemical Hazards

Volatile organic compounds and diesel-range petroleum hydrocarbons (TPH-Dx) compounds may be present in soil, shallow soil vapor, surface water, and groundwater at the site. The presence of these compounds, some of which are known or suspected human carcinogens, requires the special considerations outlined within these health and safety requirements and each contractor's health and safety plan. This plan identifies the specific compounds of concern and action levels of these compounds at which personal protection must be taken.

2.2 Physical Hazards

Field work near heavy equipment and vehicle operations poses physical hazards. Workers need to be aware of all heavy equipment activity and be ready to avoid moving vehicles. Mobile construction equipment be equipped with backup alarms and all workers be made aware of their use. Only operators of heavy equipment will be allowed to ride and operate the equipment. Relevant federal, state, and local laws and regulations governing construction will be followed. Workers avoid working in areas where heavy machinery is operating in accordance with the Oregon Administrative Rules (OAR) Occupational Safety and Health Administration (OSHA). Safety glasses, ear protection, and highly visible safety vests will be used around operating machinery. Field work in and around groundwater extraction well and utility vaults also pose physical hazards. Workers need to be aware of pedestrians and moving vehicles while working in and around open vaults. Barricades will be placed around the open vault and consist of, but not be limited to, caution tape, flags, traffic cones, and traffic barricades.

2.3 General Safety Requirements

Boeing and contractor personnel have the responsibility for:

- Taking reasonable precautions to prevent injury to themselves and others.
- Performing only those tasks that they believe they can do safely, and immediately reporting the presence of unsafe conditions.

- Implementing the health and safety requirements, and reporting a deviation from the procedures to the project manager or the field engineer.
- Notifying the project manager of special medical problems and ensuring that appropriate onsite personnel are aware of these problems.

The following general safety rules apply:

- All federal and state OSHA regulations related to contaminated sites and construction-related activities including fall prevention, excavation, trenching, shoring, hot work, and electrical work.
- All personnel will conduct themselves in a professional manner at all times.
- All Boeing facilities are tobacco free zones. No smoking or chewing of tobacco will be conducted on Boeing property.
- Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited. The use of any prescription drug will be reported to the project manager.
- Climbing or standing on machinery or equipment is prohibited unless authorized by the project manager or the field engineer and proper fall protection equipment is worn.
- Individuals required to wear respirators will have an updated respirator fit test and will not have beards.
- Contact with contaminated or potentially contaminated material should be avoided. Efforts will be made to stage site activity upwind of equipment, activities, and materials if dust is present.
- No use of phones while operating equipment, vehicles, or walking in areas of the site. Phone use is permitted in identified Safety Zones.
- Eating, drinking, or chewing gum, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited inside the designated secured work zones.
- Exchange of PPE will not be allowed.

2.4 Decontamination Procedures

In the case of an emergency, personal decontamination procedures will be speedily implemented, if possible. If a life-threatening injury occurs and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he or she will be transported wrapped in plastic sheeting if time allows and if consistent with the injury. The medical facility will be: 1) informed that the injured person has not been decontaminated, and 2) given information regarding the most probable contaminants.

2.4.1 Personal Decontamination

A combination of disposable PPE and non-disposable PPE will be utilized to reduce exposure to contaminated soil, soil vapor, surface water, and groundwater. Disposable PPE will include nitrile gloves, hearing protection, and Tyvek suits (if conditions warrant). Non-disposable PPE will include steel-toed boots, hard hats, and brightly colored vest or shirt. Disposable PPE be managed as solid waste and stored in a labeled 55-gallon drum. Non-disposable PPE will be routinely washed with hot water and detergent and any obvious signs of contamination be removed with paper toweling prior to conducting he appropriate decontamination process.

All personnel and equipment will undergo appropriate decontamination procedures before leaving the secured work zone. Personal decontamination will be as follows:

Step 1: Wash and rinse outer protective clothing (e.g., boots, and any rain gear).

Step 2: Remove disposable clothing (e.g., Tyvek and outer gloves). Place in marked receptacle.

Step 3: Remove, wash, rinse, and sanitize respirator (if used).

Step 4: Wash hands and face.

Certain parts of contaminated respirators such as the harness assembly or cloth components are difficult to decontaminate. If grossly contaminated, they will be discarded. Rubber components be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing in a detergent solution followed by a clear rinse, then hung to dry.

2.4.2 Heavy Equipment Decontamination

All heavy equipment must be thoroughly decontaminated before leaving the secured area or the designated decontamination area (i.e., decontamination pad located in the onsite Remediation Yard). Particular care be taken in decontaminating those parts of heavy equipment that have come into direct contact with soil, such as tracks, tires, shovels, grapples, and scoops.

For wet decontamination procedures, high-pressure water will be used (hot water if necessary). Physical scrubbing with disposable brushes will be used when necessary to loosen materials. Wet decontamination of heavy equipment will be conducted at the decontamination pad located in the remediation yard. Generated waste water will be cycled through the groundwater treatment system prior to discharge at the Storm Drain Creek, which discharges to the Columbia Slough. For dry decontamination procedures, the soil or groundwater will be brushed from the heavy equipment that has come into direct contact with potentially contaminated soil, such as tracts, tires, excavator bucket.

2.4.3 Sampling Equipment Decontamination

Disposable sampling equipment will be deposited in a labeled container and disposed as a solid waste. Non-disposable sampling equipment will be decontaminated between sampling intervals by a tap water and alconox soap mixture wash, followed by a tap water rinse, and a final distilled water rinse. If contamination is still observed, the process will be repeated.

2.5 Disposal of Contaminated Materials

Boeing Portland uses profiles to characterize hazardous waste streams for disposal purposes. These profiles are generated using a combination of process knowledge, manufacturers' safety data sheets (SDSs), and/or analytical test results. Waste is characterized in accordance with 40 CFR, parts 261 through 265, and 49 CFR, parts 78 through 215, and the Waste Characterization Manual maintained separately by Boeing Environmental Affairs. Initial laboratory analysis will be conducted whenever a hazardous waste is unknown. Unknown containerized wastes (label is missing or not legible) will be characterized in accordance with 40 CFR 261, sampled and analyzed per SW 846.

2.5.1 Hold for Analysis

"Hold for Analysis" labels (Boeing form X 24938) are used on containers of hazardous waste when the contents must be analyzed. Anytime a container has unknown contents, or if there are questions about compatibility, the Boeing Portland Environmental Affairs should be notified. Any container of hazardous waste bearing this label cannot be removed until its contents have been analyzed and identified by laboratory personnel or Environmental Affairs. In addition, no waste is to be added or removed from any container bearing this label. This container must also be stored for safe keeping at the hazardous waste storage facility.

2.5.2 Nonhazardous Waste

"Nonhazardous Waste" labels (Boeing form X-26893) are to be used on all containers that are legally defined as nonhazardous.

2.6 Housekeeping

Work areas will be kept clean and orderly at all times. Ordinary refuse will be placed in suitable rubbish or recycle bins. Extraneous materials will be minimized within the exclusion zone to reduce the decontamination load and possibilities for cross contamination. Contractors will not dispose of equipment maintenance waste materials at the site without prior approval of the Boeing project manager or designee.

2.7 Visitors

All visitors related to the ongoing remedy of the TGA and TSA must be cleared by the project manager or designee and will report to Boeing security to register their presence on the site and obtain an appropriate badge. Visitors must bring proof of citizenship to obtain access to the site. Visitors will only be allowed to observe operations and must obey all instructions of the project manager.

2.8 Spill Containment

It is not anticipated that bulk chemicals subject to spillage will be used by LAI’s or Contractor personnel on this project with the exception of electron donor material. Donor material will be limited to the planned activities and will temporarily stored in the onsite Remediation Yard. Containers will be closed to prevent rain water accumulation and will be labeled. Material will be stored either in a plastic lined berm or on the existing decontamination pad to eliminate potential runoff to stormwater system. When working near a storm drain, a protective storm drain cover will be installed to protect from spills or other unwanted material entering the stormwater system. Spill kits are stored onsite and will be delivered to the delineated work area for all intrusive activities to address small releases. Spill kits includes the following items:

- Absorbents – Universal spill pillow and absorbent pads.
- A 1:1:1 mixture of Flor-Dri (or unscented kitty litter), sodium bicarbonate, and sand.
- PPE – Nitrile gloves, heavy neoprene gloves, face shield, Tyvek coveralls and booties.
- Tools for Clean-up – Plastic dust pan and scoop, plastic bags for contaminated PPE, and paper towels.
- A shop vacuum to remove small volumes of liquid.

3.0 HAZARD/RISK ANALYSIS

Site remedy activities have aspects of risks associated with both physical and chemical exposure. Below is a summary of the most common identified risks; however, additional risks can be identified based on changing site conditions.

3.1 Physical Hazard Analysis

3.1.1 Slips/Trips/Falls

Keep work area clear of debris to minimize slips, trips, and falls. Keep engaged in site activities and awareness of body movement. Keep hands free of items to allow for bracing in the event of a slip/trip/fall by storing items in backpack or pockets of safety vest.

3.1.2 Arc Flash and Shock Hazard

Electrical work will be performed by certified electricians only. Arc flash and shock hazard warning labels exist on the GWTS electrical panels in the Control Room (85-118), GWTS building (85-124), and electrical panels located inside the individual extraction well vaults that will inform electricians of the necessary level of PPE required for working on a particular energized system. In 2014, a certified Electrical Engineer conducted a facility-wide Arc Flash Evaluation, which included the GWTS and remedial components.

3.1.3 Fire/Explosion

Although some of the chemical compounds can be explosive or flammable, they are found in relatively low concentrations, making the risk of fire or explosive conditions very unlikely during planned site activities. LAI vehicles will be stocked with an ABC fire extinguisher. If a fire or explosion becomes too large to easily resolve with the fire extinguisher than immediately call the Boeing Emergency Telephone (503) 676-1444).

3.1.4 Jib Crane Safety

The jib crane installed in the GWTS building (85-124) is used for air stripper tray maintenance. Use of the jib crane is an overhead hazard and shall only be operated by qualified contractors. When using the jib crane, proper PPE including a hard hat shall be worn at all times.

3.1.5 Confined Space Entry

A confined space is defined as an area that has limited work space and limited means of access and egress and is not designed for continuous employee occupancy. A permit-required confined space is a confined space that has the potential for any of the following characteristics:

- It contains or potentially contains a hazardous atmosphere.
- It contains a material that has the potential to engulf an entrant.
- It has an internal configuration that can trap or asphyxiate an entrant (such as tapering walls).
- It contains any other recognized serious safety or health hazards.

Due to the potential presence of VOC vapors at the site, extraction vaults are considered permitted confined space. Confined space work anticipated on this project involves work within groundwater extraction well vaults and utility vaults. Each extraction well vault has an exterior label to identify the location as a Confined Space.

Entering confined spaces requires specialized training and procedures outlined by the OSHA (1989b). OSHA issued a general industry standard (29 CFR 1910.146; the standard) to require protection for employees who enter permit-required confined spaces. Prior to each confined space entry, a safety plan and permit will be issued. The plan will identify roles, procedures, identify risks, and provide mitigation and monitoring procedures for each risk. In general, the confined space entry process will include the following steps:

1. Prepare work area (i.e., set up blowers and all ventilation, assess access/egress, and tripod, if necessary).
2. Ensure that all process piping, mechanical and electrical equipment, etc., have been disconnected, purged, blanked-off or tagged and locked, as necessary.
3. Ensure that hot work (e.g., welding, burning, open flames, or spark producing operation) that is to be performed in the confined space has been approved by the site HSO and is indicated on the confined space entry permit and coordinated with Boeing Security for a burn permit.
4. Test confined space atmosphere for oxygen (O2), lower explosive limit (LEL), carbon monoxide (CO), hydrogen sulfide (H2S), and VOCs using a calibrated multi-meter and photoionization detector (PID). Collect a 15-minute time-weighted average (TWA). In addition to the main space of occupancy, corners and pockets at both the top and bottom levels of the space should be tested as well.
5. Ventilate confined space for a minimum of 15 minutes while continuously monitoring for O2, LEL, CO, H2S, and VOCs. Ventilation will continue throughout confined space entry activities.
6. Fill out permit. Once the permit is complete, post it in a conspicuous location.
7. Don PPE (i.e., Tyvek, Tyvek booties, inner and outer gloves, respirator, rescue harness, etc., as necessary).
8. Conduct confined space entry while continuously monitoring for O2, LEL, CO, H2S, and VOCs. One PID and one multi-meter will be used in the immediate vicinity of the entrants. Both meters will be set with appropriate alarm levels, so that alarms are activated when action levels are met or exceeded.
9. If any action level is exceeded during entry, the entrant will immediately evacuate the confined space and the permit will be voided. A new permit will be issued once levels of all monitored constituents are below action levels.
10. Once the work is completed, void and file the permit.

The O&M contractor (Apollo Environmental) is trained in confined space rescue; however, in the event of an incident, Boeing Emergency Dispatch (503 676-1444) will be notified. The Emergency Dispatch will be notified prior to and upon completion of the confined space entry and will be provided with information related to the type and timing of activities, to ensure proper preparedness for an emergency requiring rescue services.

3.1.5.1 Confined Space Entry General Requirements

General requirements for work in a confined space are listed below:

1. Confined spaces will be identified with a posted sign that reads "DANGER, PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER."
2. When entrance covers are removed from permit-required confined spaces, the opening will be promptly guarded by a railing, temporary cover, or other temporary barrier.
3. Only personnel trained and knowledgeable in permit-required confined space entry procedures and rescue will be authorized to enter a permit-required confined space or be an attendant.
4. Natural ventilation will be provided for the permit-required confined space prior to initial entry and for the duration of the confined space entry procedure. Positive/forced mechanical ventilation may be required. However, care will be taken to not spread contamination outside of the enclosed area.
5. The contents of any confined space will, where necessary, be removed prior to entry. All sources of ignition must be removed prior to entry.
6. A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder will be secured and not removed until all employees have exited the space.
7. All equipment and hand tools used within permit-required confined space will be intrinsically safe and positively grounded if flammable liquids, gases, or vapors may be contained within the confined space. All power cords will be visually inspected.
8. Hand-held lights and other illumination utilized in permit-required confined spaces will be equipped with guards to prevent contact with the bulb and must be explosion proof.
9. Feed lines to confined spaces will be broken and blanked-out and sources of electrical or mechanical energy, which could activate any area of the confined space, must be identified, tagged, and locked out prior to anyone entering a confined space.
10. Compressed gas cylinders, except cylinders used for self-contained breathing apparatus, will not be taken into confined spaces. Gas hoses will be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.
11. If a permit-required confined space requires respiratory equipment or where rescue may be difficult, safety belts, body harnesses, and lifelines will be used. The outside observer will be provided with the same equipment as those working within the permit space.
12. Only self-contained breathing apparatus of National Institute for Occupational Safety and Health (NIOSH)-approved air line respirators equipped with a 5-minute emergency air supply (egress bottle) will be used in untested confined spaces or in any permit-required confined space with conditions determined to be immediately dangerous to life and health.
13. Where air-moving equipment is used to provide ventilation, chemicals will be removed from the vicinity to prevent introduction into the confined space.
14. Vehicles will not be left running near any confined work space or near air-moving equipment being used for any confined space ventilation.

15. Smoking in any confined space is prohibited.
16. Any deviation from these confined space entry procedures requires the prior permission of the project HSO or project manager.

3.2 Chemical Hazard Analysis

Previous investigations have identified the types and levels of constituents of concern at the site. Documents identified in the references (Section 8.0) were used in assessing site hazards/risks. Maximum reported concentrations and exposure limits are summarized in Table 1.

3.3 Suspected Hazardous Substances

Several VOCs have been detected at the site and are of concern because they may volatilize when exposed to the air column. Table 1 summarizes maximum concentrations of the various constituents found at the site in surface water, soil, soil vapor, and groundwater. The table also shows selected health and safety exposure limits for the identified constituents.

3.3.1 Electron Donor Injections

Currently, two TGA source areas are receiving electron donor material to reduce contaminant levels (Former Vapor Degreaser Source Area and the Coolant Release Area). Donor material for the Former Vapor Degreaser Source Area, located inside the 85-001 building, has consisted of a vegetable grade oil and surfactants to enhance biodegradation of VOCs. The Coolant Release Area, located inside the 85-105 building, has received injections of EHC-O™ oxygen-releasing compound in the 85-105 building to enhance the remediation of TPH-Dx-based coolant material. The potential hazards associated with injections are exposure to toxic or hazardous chemicals, physical hazards from slips and trips working in an active facility, and traffic from facility operations. Proper PPE must be worn at all times.

3.3.2 Exposure

The primary risk of exposure will be through handling potentially contaminated soil and from inhaling VOCs and TPH-Dx released from the soil, soil vapor, and/or groundwater. This risk will be greatly reduced by adherence to the minimum level of protection required by this HASP. Some inhalation and ingestion risk from exposure to contaminants as airborne particulates may exist. Good ventilation, including the possible use of soil wetting techniques, will reduce the exposure risk. Low to moderate exposure hazard is expected during TGA and TSA remedial activities.

3.4 Action Levels for Required Protection

Monitoring ambient air quality using real time instruments will be conducted to identify if action levels have been reached that will require upgrading PPE requirements. Action level are shown on Figure 2. The action levels listed assume sustained readings of 1 minute or more in the breathing zone. The PPE requirement applies to the area within a 30 ft radius of where measured. Justification for the action levels is presented in Section 3.3.

Air monitoring will be performed by the CHSO or their designee to determine necessary levels of respiratory protection. Background readings will be taken 50 ft upwind of site activities. Monitoring for organic vapors will be accomplished using a PID meter.

Monitoring will be conducted in the worker breathing zone at regular intervals during all site work in which airborne contamination may be present. During intrusive activities in these areas, breathing space monitoring will be conducted at least every 15 minutes.

3.5 Justification for Exposure Limits

It is anticipated that most of the project activities will be performed at Level D (modified), and supplemented with air purifying respirators if the action levels identified for Level C are reached.

Action levels for donning respiratory protection will be based on readings taken with a PID supplemented, as appropriate, with chemical-specific detector tubes. The PID detects all ionizable volatile constituents and does not provide reliable readings below 10 parts per million (ppm); therefore, for constituents with permissible exposure limits (PEL) less than 10 ppm, chemical-specific detector tubes must be used to determine if these constituents are present at concentrations below 10 ppm, but above their respective PELs. Exposure to volatile ionizable constituents with PELs greater than 10 ppm will be monitored using the PID; action levels based on this monitoring are specified on Figure 2.

Six potential TGA contaminant source areas were identified based on earlier investigations and current or past facility uses, as shown on Figure 3. Investigations have been conducted within all the source areas, based on these results and with ODEQ approval only the Former Degreaser Source Control Area remains in the Institutional Controls Plan (ICP; LAI 2005).

The ICP provides measures to restrict the potential ingestion of TGA groundwater exceeding the maximum cleanup levels; provides a work protection institutional control to restrict the potential exposure of workers during surface/subsurface disturbances within the Former Degreaser Source Control Area; and provides a restrictive covenant for the facility. The groundwater use institutional control regulates groundwater use in the area by granting the lead agency the authority to review any proposed actions involving the installation of wells or modifications of existing well water use within the dissolved-VOC plume. The worker protection institutional control provides procedures for notification to the lead agency of proposed worker activities within the source areas. Workers shall conduct activities under guidance of an approved health and safety plan, and disposal criteria will be coordinated with the lead agency. Personal protection equipment will be worn according to the action levels designated on Figure 2.

3.6 Level C (Modified) Action Levels

A half-face respirator, equipped with organic vapor and high efficiency particulate cartridges, provides a protection factor of 50 (NIOSH recommendation). Therefore, a half-face respirator may be worn in concentrations up to 50 times the threshold limit value (TLV) values noted in Table 1. Based on previous investigations, it is not expected that Level C action levels will be exceeded. However, if they are, half-face respirators will be worn.

Normal field conditions (e.g., drilling operations, groundwater sampling) are not expected to exceed the 50 protection factor level, such that Level B protection would be required. However, such conditions may be encountered during large-scale invasive activities such as piping construction excavation (see Section 3.4 above). If conditions are encountered that warrant Level B protection, safety procedures will be revised before beginning or continuing invasive activity.

4.0 PERSONAL SAFETY EQUIPMENT

Equipment required for the various levels of protection expected onsite is listed below.

Level D (Modified):

- Nitrile gloves
- Hard hat
- Safety glasses
- Steel-toe and steel-shank neoprene or rubber boots.

Level C (Modified):

- Level D (modified) equipment.
- Tyvek suit (Saranex or equivalent), water resistant coveralls, or rain gear when direct contact with wet soil and water is encountered.
- Half-face air-purifying respirator equipped with high efficiency air purifying organic vapor and HEPA cartridges. Respirators must be NIOSH approved. Cartridges will be changed daily (if used) or more frequently if directed by the project HSO.

5.0 EMERGENCY RESPONSE PLAN

This emergency response plan outlines the steps necessary for appropriate response to emergency situations. The following summarizes the key emergency response plan procedures for this project. Each Contractor vehicle associated with well installation and soil boring activities will be provided with a Boeing-supplied Dash-Board Safety Card (Form 3), which will summarize the emergency procedures described below.

5.1 Notification and Reporting

The LAI's Health and Safety Manager is to be notified immediately of any emergency situation. If the situation is life-threatening and notification of the LAI's Health and Safety Manager would delay emergency response, site personnel may initiate the appropriate emergency contacts as noted below prior to notifying the LAI's Health and Safety Manager. The LAI's Health and Safety Manager will initiate contacts as follows:

1. Call Boeing Emergency Dispatch (Form 3) and provide the following information:
   - Name and location of person reporting
   - Location of accident/incident
   - Name and affiliation of injured party
   - Description of injuries
   - Status of medical aid effort
   - Details of any chemicals involved
   - Summary of the accident, including the suspected cause and the time it occurred
   - Temporary control measures taken to minimize further risk.

   Note: This information is not to be released to parties other than the Landau Associates' Health and Safety Manager, Boeing and City personnel, Contractor personnel, and bona fide emergency response team members.
2. Call the Boeing Project Manager and provide information noted in Item 1 above.
3. Call Landau Associates' Corporate Health and Safety Manager and the Landau Associates' Project Manager with information in Item 1 above.
4. The Landau Associates' Health and Safety Manager will complete a written accident/incident report, using Form 4, within 24 hours, sending copies to Boeing's Project Manager.

Resources to be used in cases of emergency include:

- List of Emergency Contacts: Table 3 includes both the appropriate emergency services and the appropriate project contacts.
- Nearest Phone: Telephones are located inside buildings. Boeing and Landau Associates' site personnel also possess cellular phones.

- Onsite Emergency Equipment: An industrial first-aid kit, an ABC type portable fire extinguisher, and an eyewash kit accompany each site vehicle operated by Landau Associates.
- Offsite Emergency Services: Phone numbers for offsite emergency services are listed in Table 3. Copies of this table must be located in each vehicle.

5.2 Emergency Facilities and Numbers

Hospital: Legacy Mt. Hood Medical Center
24800 SE Stark Street
Gresham, OR 97030

Emergency: (503) 667-1122

Emergency Route: See Figure 4

Directions: Travel east on Sandy Boulevard to NE 223rd Ave. Turn south (right) onto NE 223rd Ave., and proceed to Stark Street. Turn east (left) onto Stark Street and proceed for approximately 1 mi to Legacy Mt. Hood Medical Center.

Boeing Emergency Telephone: (503) 676-1444 (Fire, ambulance, police, spill reporting)

Boeing Non-Emergency Security: (503) 676-1800

Emergency Contacts:

Boeing Security	(503) 676-1800
Mike Gleason (Boeing Project Manager)	Cell (206) 290-6576
Jennifer Parson (Boeing Field Engineer)	Cell (206) 715-7981
Christine Kimmel (LAI Project Manager)	Cell (206) 786-3801

In the event of an emergency, do the following:

1. Call Boeing Emergency number for help as soon as possible. Give the following information:
   - WHERE the emergency is - use cross streets or landmarks
   - PHONE NUMBER you are calling from
   - WHAT HAPPENED - type of injury
   - HOW MANY persons need help
   - WHAT is being done for the victim(s)
   - YOU HANG UP LAST - let the person you called hang up first.

2. Transport to the hospital will be performed by local emergency response professionals in all cases. If the injury or exposure is not life threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a sheet of plastic prior to transport.

3. Notify the project manager or representative.

5.3 Onsite Emergency Equipment

An industrial first aid kit, a 20-pound type ABC portable fire extinguisher, and an eyewash kit will be maintained by the contractor.

5.4 Offsite Emergency Services

A copy of EMERGENCY FACILITIES AND NUMBERS will be posted next to the contractor telephone identified for emergency use.

5.4.1 Weather-Related Illnesses

Weather-related (hot or cold weather conditions) illnesses can occur at any time when protective clothing is worn. For heat-related illnesses, workers wearing semipermeable or impermeable encapsulating clothing should be monitored when the temperature in the work area is above 70°F (21°C). Heat stress monitoring includes regular checks of heart rate.

Each employee should check his/her pulse rate at the beginning of each break period. The pulse rate should be taken at the wrist for 30 seconds, and multiplied by 2. If the pulse rate exceeds 110 beats per minute, the length of the next work period should be reduced by one-third (the rest period need not be lengthened). A pulse rate in excess of 150 beats per minute may indicate heat exhaustion, although this rate will vary among workers. All personnel will know what their baseline pulse rate is before working in elevated temperatures, so as to monitor themselves. Personnel should follow appropriate guidelines if any personnel exhibit these symptoms:

- Heat Rash – Redness of skin. Frequent rest and change of clothing.
- Heat Cramps – Painful muscle spasms in hands, feet, and/or abdomen. Administer lightly-salted water by mouth, unless there are medical restrictions.
- Heat Exhaustion – Clammy, moist, pale skin, along with dizziness, nausea, rapid pulse, fainting. Remove to cooler area and administer fluids.
- Heat Stroke – Hot dry skin; red, spotted, or bluish; high body temperature of 104^{o} F; mental confusion; loss of consciousness; convulsions; or coma. Immediately cool victim by immersion in cool water. Wrap with wet sheet while fanning; sponge with cool liquid while fanning; treat for shock. DO NOT DELAY TREATMENT. COOL BODY WHILE AWAITING AMBULANCE.

For cold-related illnesses site personnel may be subject to low temperatures, rain, and winds; therefore, proper protective clothing must be worn. Cold stress can be manifested as both hypothermia and frostbite:

- Hypothermia is a cold-induced decrease in the core body temperature that can increase the safety hazards associated with field work activities that require maximum attentiveness and manual dexterity. Hypothermia produces shivering, numbness, drowsiness, muscular weakness, and, if severe enough, death.
- Frostbite results from the constriction of blood vessels in the extremities, and decreasing the supply of warming blood to these areas. This drop in blood supply may result in the formation of ice crystals in the tissues, causing tissue damage. The symptoms of frostbite are white or grayish skin, blisters, or numbness.

If such conditions exist, the following procedures will be carried out to reduce weather-related stress:

- Acclimatization
- Work/rest cycles
- Heat stress monitoring
- Liquids that replace electrolytes/salty foods available during rest
- Use of buddy system.

The LAI's Health and Safety Manger and the CHSO will be trained in monitoring, treating, and recognizing the signs of heat stress. Unless the victim is obviously contaminated, decontamination should be minimized and treatment begun immediately.

5.5 Site Evaluation and Evacuation

The Landau Associates Health and Safety Manager in cooperation with the Boeing representative will be responsible for determining if circumstances exist that require re-evaluation or evacuation.

5.5.1 Withdraw from Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- Detection of VOCs or toxic gases at concentrations above action levels for the level of protection being worn.
- Occurrence of a minor accident - field operations resume after first-aid and decontamination procedures have been administered.
- Malfunction or failure of protective equipment, clothing, or respirator.

6.0 TRAINING

Orientation training will be held before beginning work. If appropriate, based on observation of the work area and air monitoring results, the Boeing project manager or the LAI site safety officer may require site personnel to have additional safety training. The initial training will be supplemented, as necessary, in subsequent safety meetings. Orientation training will include:

- Health effects and hazards of the chemicals identified or suspected to be at the site and in the work area.
- Personal protection requirements.
- Personal hygiene (beards, etc.).
- Use, care, maintenance, and fitting of PPE. Training in respiratory equipment use will conform to ANSI Z88.2 and 29 CFR 1910.134 (OSHA 1989a), which establishes the necessity, effectiveness, and limitations of respiratory equipment. Workers with limiting physical disabilities such as respiratory ailments will not be assigned to tasks requiring the use of respirators. Fit testing for respirators will have taken place prior to entry to the project site.
- Decontamination procedures.
- Accepted practices for entry, exit, and activities within specific areas of the site.
- Emergency response procedures.
- Review and assessment of equipment.

Written documentation of training will be maintained and will be available for Boeing review, if necessary.

7.0 ROUTINE HEALTH CARE AND MONITORING

A baseline medical evaluation will be required for all employees, contractors, and subcontractors performing intrusive activities. An annual update exam will be required for employees, contractors, and subcontractors performing intrusive activities regarding the use of respirators for more than 30 days per year or are exposed to air concentrations greater than permissible exposure limits. Follow-up examinations are appropriate if exposures are known or suspected to have occurred. Documentation of medical evaluations (including medical clearance for respirator use) will be maintained by the contractor and will be available to Boeing for inspection for all workers performing intrusive activities.

8.0 REFERENCES

American Conference of Governmental Industrial Hygienists. 1996. Threshold Limit Values and Biological Exposure Indices for 1995-1996.

EMCON and LAI. 1995. Remedial Investigation and Feasibility Study, Troutdale Sandstone Aquifer. Prepared for the Boeing Company. October 6.

EPA. 1997a. Statement of Basis for the Boeing Portland Facility Troutdale Gravel Aquifer. ORD 054964481. U.S. Environmental Protection Agency.

EPA. 1997b. Final Decision and Response to Comments f or The Boeing Portland Facility, Troutdale Gravel Aquifer. ORD 054964481. U.S. Environmental Protection Agency.

LAI. 2005. Institutional Controls Plan, Troutdale Gravel Aquifer, Boeing Portland, Gresham, Oregon. Prepared for The Boeing Company. December 20.

LAI. 1996. Phase 2 Corrective Measures Study. September 13.

LAI. 1995a. Phase III RCRA Facility Investigation Report. (Includes health and environmental assessment.) Prepared for The Boeing Company. July 31.

LAI. 1995b. Phase 1 Corrective Measures Study Report. Prepared for The Boeing Company. July 17.

LAI. 1993. Final Report, Phase II Investigation, Boeing Portland. Prepared for The Boeing Company. June 21.

LAI. 1992. Building 85-105 Expansion, Final Report, Gresham, Oregon. April 24.

LAI. 1991. Final Report, Hydrogeology Investigation, Southeast Corner, Boeing Portland. Prepared for The Boeing Company. June 17.

LAI. 1990. Final Report, Investigation of Troutdale Sandstone Aquifer, Boeing Portland, Gresham, Oregon. Prepared for The Boeing Company. February 26.

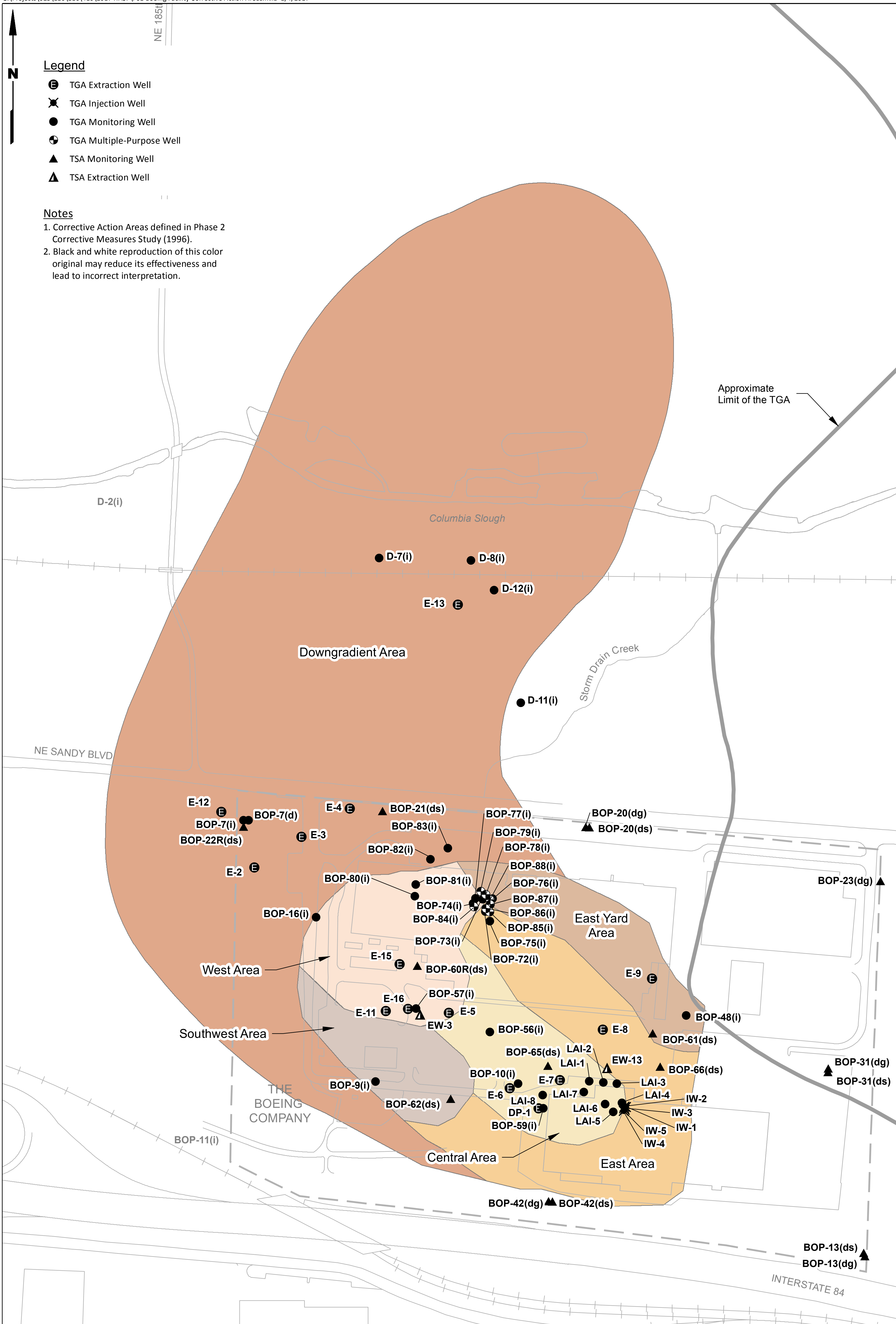
LAI. 1988. Boeing Portland Phase I Investigation, Final Report. March 17.

LAI and EMCON. 1996. Feasibility Study, Troutdale Sandstone Aquifer. Prepared for the Cascade Corporation and The Boeing Company. March 4.

OSHA. 1989a. Federal Register 29 CFR Part 1910, Hazardous Waste Operations and Emergency Response; Final Rule. U.S. Department of Labor Occupational Safety and Health Administration. March.

OSHA. 1989b. Federal Register 29 CFR Part 1910, Permit-Required Confined Spaces for General Industry; Final Rule. U.S. Department of Labor Occupational Safety and Health Administration.

G:\Projects\025\116\116\410\2017 HASP\F01 Boeing Facility Corrective Action Areas.mxd 1/4/2017

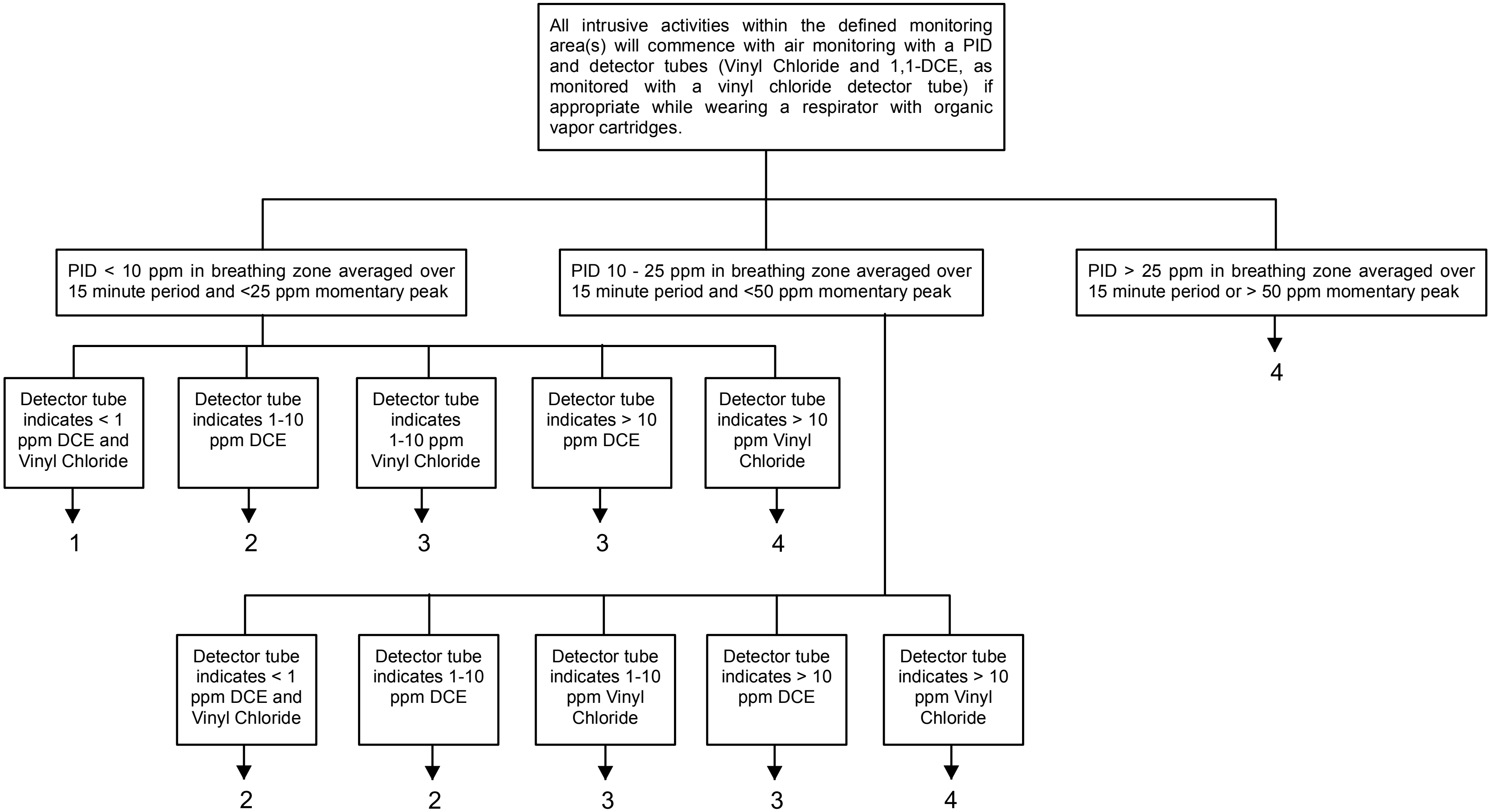


LANDAU ASSOCIATES

0 350 700

Scale in Feet

Boeing Portland Gresham, Oregon	**Boeing Facility and Corrective Action Areas**	Figure 1



1 = Level D and continued monitoring
2 = Level C (full-face respirator with organic vapor cartridges) and continued monitoring
3 = Level B revise safety procedures prior to commencing or continuing invasive activity
4 = Evacuate work area

Notes
1. 1 ppm 1,1-dichloroethylene = 2 ppm on a vinyl chloride detector tube.
2. Vinyl chloride detector tubes will only be used in some work areas.

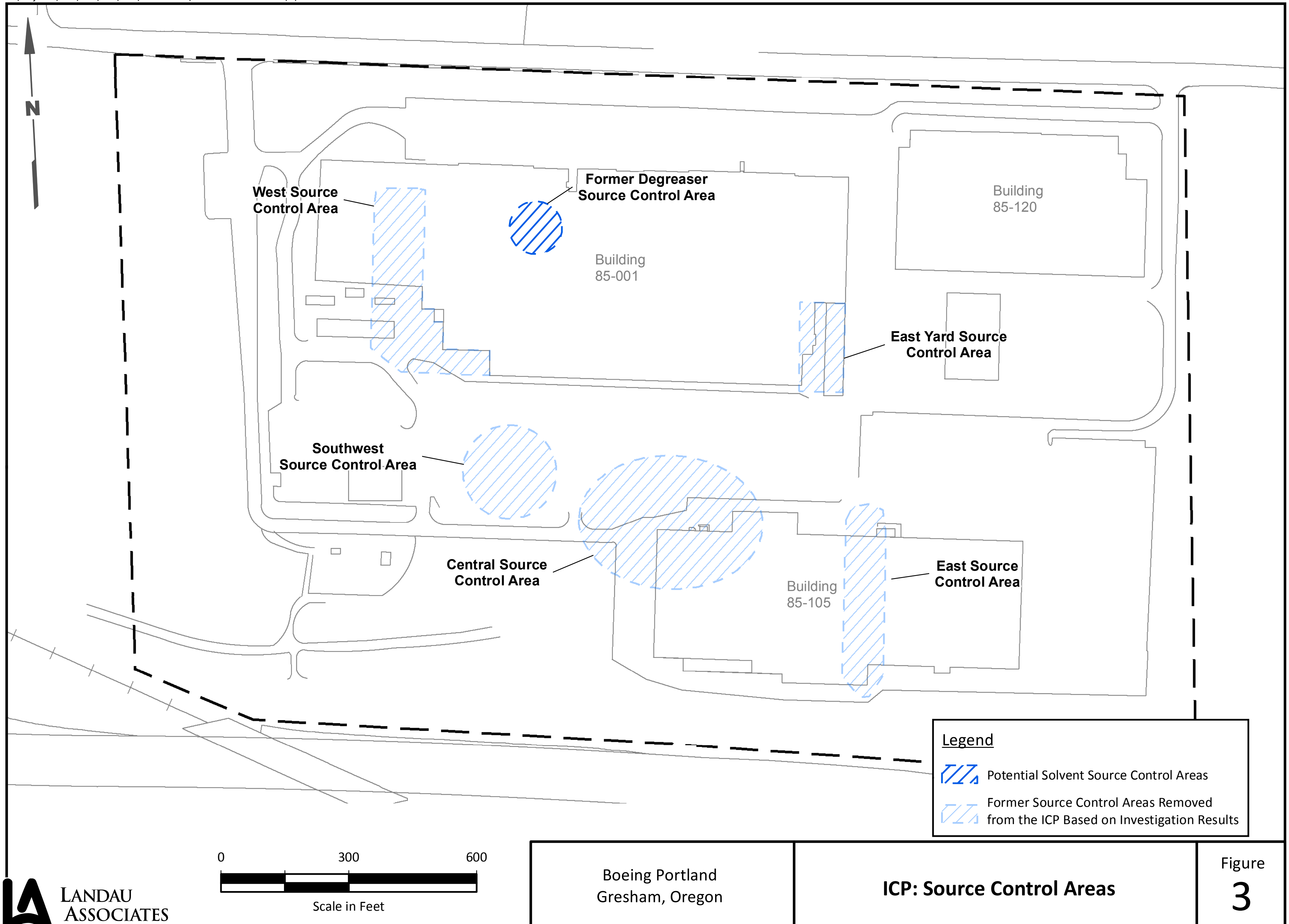
Landau Associates

Boeing Portland
Gresham, Oregon

PPE Action Levels for Intrusive Activity

Figure 2

G:\Projects\025\116\116\410\2017 HASP\F03 ICP Source.mxd 1/4/2017

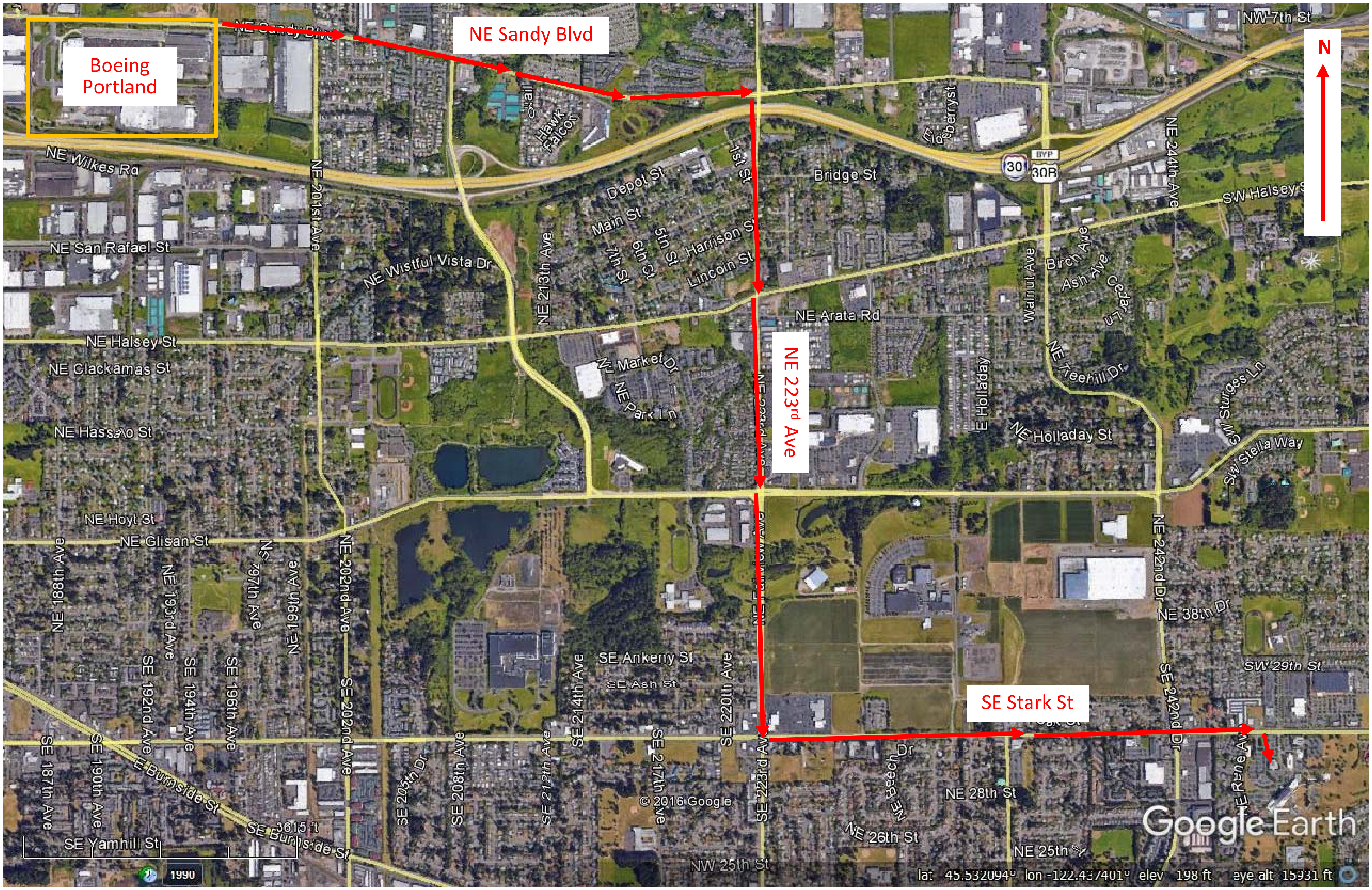


Landau Associates

Boeing Portland
Gresham, Oregon

ICP: Source Control Areas

Figure 3



Source: GoogleEarth 2016

Boeing Portland Gresham, Oregon	**Emergency Route to Hospital**	Figure 4

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TABLE 1
SURFACE WATER, SOIL, AND GROUNDWATER QUALITY AND SITE EXPOSURE ASSESSMENT

	Maximum Concentration Detected in Environmental Samples (1986 to Present)				Threshold Limit Values (a) Time-Weighted Average	Permissible Exposure Limit (b) Time-Weighted Average	Immediately Dangerous to Life and Health Concentrations (c)	
Chemical Constituent	Surface Water (ppb)	Soil (ppb)	Soil Vapor (ppbV)	Groundwater (ppb)	(ppm)	(ppm)	(ppm)	Routes (d)
Acetone	23	130		1,100	250	1000	2500	Inh, Ing, Con
Benzene	0.8			32	0.1	1	Ca (e) (500)	Inh, Abs, Ing, Con
Carbon disulfide				110	1 (f)	20 (f)	500	Inh, Abs, Ing, Con
Chloroethane (ethyl chloride)				1,600	1,000	1,000	3,800	Inh, Abs, Ing, Con
Chloroform	1			130	50	50 (g)	Ca (e) (500)	Inh, Abs, Ing, Con
Chloromethane (methyl chloride)				13	25 (f)	25	Ca (e) (2,300)	Inh, Con
1,1-Dichloroethane		780		5,100	100	100	3,000	Inh, Ing, Con
1,1-Dichloroethene		11	3,600	1,800	5	--	--	Inh
1,2-Dichloroethane				10	1	50	Ca (e) (50)	Inh, Ing, Abs, Con
1,2-Dichloroethene (total)	440	20	1,870 (h)	7,187	200	200	1,000	Inh, Ing, Con
1,2-Dichloropropane				17	75	75	Ca (e) (400)	Inh, Abs, Inc, Con
Ethyl benzene		1520		17	100	100	800	Inh, Ing, Con
Freon TF		0.5		890	1,000	1,000	2,000	Inh, Ing, Con
2-Hexanone				10	1 (f)	100	1,600	Inh, Abs, Ing, Con
Methyl ethyl ketone (2-butanone)		47		79	200	200	3,000	Inh, Ing, Con
Methylene chloride	8.2	13		330	25	25	Ca (e) (2,300)	Inh, Abs, Ing, Con
1,1,2,2-Tetrachloroethane				75	1 (f)	5 (f)	Ca (e) (100)	Inh, Abs, Ing, Con
Tetrachloroethene		19	1,300	500	25	100	Ca (e) (150)	Inh, Abs, Ing, Con
Toluene	6.1	1,730		56	100 (f)	200	500	Inh, Abs, Ing, Con
Trichloroethene	440	91	160,000	10,000	50	100	Ca (e) (1,000)	Inh, Abs, Ing, Con
1,1,1-Trichloroethane	1.8	4,670	35,000	39,000	350	350	700	Inh, Abs, Ing, Con
1,1,2-Trichloroethane				17	10 (f)	10 (f)	Ca (e) (100)	Inh, Abs, Ing, Con
Trichlorofluoromethane		44		2.7	1,000 (g)	1,000	2000	Inh, Ing, Con
Vinyl chloride		1,300	440	13	1	1	Ca (e) (ND)	Inh, Con
Xylenes (total)	0.4			250	100	100	900	Inh, Abs, Ing, Con
Diesel		45,600		16,600,000	444 (g)	500	1,100	Inh, Ing, Con
Motor Oil		5,100		15,200,000	444 (g)	500	1,100	Inh, Ing, Con
Total TPH-Dx		45,600		31,800,000	444 (g)	500	1,100	Inh, Ing, Con

ND = Not Determined.
ppb = parts per billion
ppm = parts per million

(a) Threshold Limit Values and Biological Exposure indices for 1996-1997 (ACGIH 1996).
(b) Oregon Adminstrative Rules (OAR 437-02, Subdivision Z, Air Contaminants [State of Oregon 1993]).
(c) Comptons Concise Chemical Contaminant Services 1997.
(d) Ing = Ingestion; Inh = Inhalation; Abs = Absorption; Con = Dermal Contact.
(e) Ca = National Institute of Occupational Safety and Health (NIOSH)-designated potential carcinogen.
(f) "Skin" = Potential significant contribution to the overall exposure by the cutaneous route.
(g) Ceiling limit that should not be exceeded.
(h) Value shown is for cis-1,2-Dichloroethene only

References:

ACGIH. 1996. Threshold Limit Values and Biological Exposure Indices for 1995-1996. American Conference of Governmental Industrial Hygienists.

State of Oregon. 1993. OAR 437, Division 2, General Occupational Safety and Health Rules, Subdivision Z - Toxic and Hazardous Substances. Oregon Administrative Rules, Oregon Occupational Safety and health Division.

FORM 1

HEALTH AND SAFETY PLAN
APPROVAL/SIGN OFF FORMAT

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
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Name	Signature	Date
Site Safety Coordinator	Signature	Date
Landau Health and Safety Manager	Signature	Date
Project Manager	Signature	Date

Personnel Health and Safety Briefing Conducted By:

Name	Signature	Date

FORM 2
Confined Space Entry Permit

Facility:

Date and time

Permit Valid From: ______________ To: ______________

Specific Entry Location: ______________

Purpose of Entry: ______________

(specify any additional) ______________

____

Entry Supervisor: ______________ Date: ______________ Time: ______________

Entry Attendant: ______________ Date: ______________ Time: ______________

(entrant may change, use personnel list on following page) ______________

Facility/Proj Manager(s): ______________ Date: ______________ Time: ______________

____

Emergency Contact Information: (In case of emergency, call in the order listed)

911 911

Potential Chemicals of Concern: (see HASP for more details)

Potential Physical Hazards: (see HASP for more details)
Equipment hazards (piping and pumps)
Slips, trips, and falls
Atmospheric conditions in work area
Energy sources
Drowing (if vaults fill with water)

REVIEW THE PLAN, CHECK FOR THE FOLLOWING:	YES	NO
Entry Plan Attached and Reviewed	☐	☐
Area Secured (barricades, cones, other)	☐	☐
Ventilation Equip. in Place, Operating and Grounded	☐	☐
Communication Equipment Tested (Voice and Visual)	☐	☐
Rescue Equipment In Place	☐	☐
Required PPE Equipment in Place & Available	☐	☐
(Half Face Respirators, PIDs, Hardhat, Steel Toe Boots, Hearing Protection,	☐	☐
Gloves, Eye Protection)	☐	☐
Fire Protection Equipment Available	☐	☐
Standby Personnel Available	☐	☐
Pre-Entry Atmospheric Conditions Within Acceptable Levels	☐	☐
All Personnel Understand PID Action Levels	☐	☐
Entry Conditions Acceptable	☐	☐

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ENVIRONMENTAL | GEOTECHNICAL | NATURAL RESOURCES

CONFINED SPACE ENTRY FORM

Atmospheric Hazards to be Monitored, and Acceptable Levels:

Oxygen	L.E.L	PID*	H2S	Other	Other	Other
>19.5%	<10%	<15ppm	10 ppm			
<23.5%						

* For PID Readings:			Then:
< 15 ppm			No Action Required
> 15 ppm	but	< 75 ppm	Evacuate Work Area or Establish Exclusion Zone Around Work Area and Upgrade to Level C Half Face Respirator with Organic Vapor/HEPA
>75 ppm			Evacuate Work Area

Types and Quantities of Monitoring Equipment:
MultiRAE Plus multi-gas meter w/ 10.6 ev PID lamp and O2, H2S, & LEL

Monitoring Instrument Calibration Data Log:

	Oxygen (%)	L.E.L (%)	H2S (ppm)	PID (ppm)
Calibration levels				
MultiRAE Plus multi-gas meter readings				

Monitoring Schedule:

Prior to entry, monitors & equipment will be run & watched continuously with readings documented every **5** minutes for 2 consecutive readings. During CSE work, document results every 30 minutes. Double check that PID alarm levels have been set at lowest setting (15 ppm - action Level for half face respirators)

Gas Testing Logsheet

Location	Time	Oxygen	L.E.L.	H2S	PID	Other

Entry/Attendant Personnel: All entrants & attendants listed below have completed confined space entry training.

Name	Entrant / Attendant	Entry Time	Exit Time	Entry Time	Exit Time	Entry Time	Exit Time	Entry Time	Exit Time	Entry Time	Exit Time

Signature (sign at end of each shift and save permit in project file for 1 year)

Entrant Name (Print)	Entrant Name (sign)	Date
Attendant Name (Print)	Attendant Name (sign)	Date
Supervisor Name (Print)	Supervisor Name (sign)	Date

BOEING PORTLAND
19000 NORTHEAST SANDY BLVD., PORTLAND, OREGON
STANDARD WORK PRACTICES

Health and Safety is **EVERYONE'S** responsibility and **NUMBER ONE PRIORITY**

- Regulatory compliance is **MANDATORY** – No work will begin and/or work will immediately stop unless the answer to the following question is a positive **"YES"** – AM I IN COMPLIANCE WITH ALL REGULATORY, FACILITY, PROJECT, AND HEALTH AND SAFETY REQUIREMENTS?

- All incidents and regulatory inspections must be reported immediately

    - **Incident definition**: Any event condition, or action (including near misses) that affects the safety of personnel, does not follow rules and guidelines for work implementation and regulatory compliance onsite
- Incident examples:
    - Spilled liquid in an uncontrolled environment
    - Working without correct/complete permit in place
    - Performing hot works without a "Hot Works Permit"

Before starting work, **HAVE YOU?** :

1. Reviewed the Health and Safety Plan prior to performing work?
2. Performed a Health and Safety "Tail Gate Meeting" and filled out the sign-in form prior to starting work?
3. Reviewed scope of work documents, permits, and other related items prior to performing work?
4. Provided correct Personal Protective Equipment (PPE) for the work to be performed?

IF YOU ARE UNSURE OF SAFETY PRACTICES FOR THE PARTICULAR WORK INVOLVED – GET CLARIFICATION PRIOR TO STARTING WORK

Working with subcontractors:

- Review Health and Safety Plan with subcontractor
- Review site "Incident Reporting Procedures"
- Perform "Tail Gate Safety Meeting" with subcontractor

SAFETY AND REGULATORY COMPLIANCE IS MY PRIORITY AND I MUST TAKE THE NECESSARY STEPS TO PROVIDE THIS SERVICE

I AM RESPONSIBLE AND I HAVE THE AUTHORITY TO STOP WORK IF THE TASK DOES NOT MEET THE SAFETY AND REGULATORY REQUIREMENTS

SAFETY DASHBOARD CARD
EMERGENCY AND INCIDENT REPORTING PROCEDURES

EMERGENCY PHONE NUMBER:
(503) 676-1444 Fire, Ambulance, Police, Spill Reporting
Non Emergency Security Phone Number:
(503) 676-1800 Non emergency security guard house
SITE ADDRESS:
19000 NE SANDY BLVD., PORTLAND, OREGON 97230
WORK LOCATION:
WEST SIDE OF 85-001
IN THE EVENT OF FIRE LINE BREACH:
- **REPORT WEST END FIRE LINE BREACH TO BOEING SECURITY**
- **SECURITY WILL CLOSE**
    1) **SECTIONAL VALVE 7 (EAST END OF 85-104)**
    2) **SECTIONAL VALVE 8 (NORTH SIDE 85-001 OUTSIDE CAFÉ)**

AN EMERGENCY IS AN UNCONTROLLED SITUATION, AN INJURY THAT IS MAJOR OR LIFE THREATENING, FIRE, OR ANYTHING THAT REQUIRES IMMEDIATE ASSISTANCE.

EMERGENCY REPORTING:
1. Contact the **BOEING PORTLAND** Emergency Response (fire, ambulance, police) at **(503) 676-1444**
2. Follow Incident Reporting procedures listed below

INCIDENT REPORTING:
Respond to the incident and get it under control. Contact the following by e-mail and brief phone message (**MUST DO BOTH**):

Name	Email Address	Phone Number	Position
Michael Gleason	**michael.j.gleason@boeing.com**	**(206) 290-6576 Cell**	**Boeing Project Manager**
Jennifer Parsons	**jennifer.a.parsons@boeing.com**	**(206) 715-7981 Cell**	**Boeing Field Engineer**
John Rusoff	**john.w.rusoff@boeing.com**	**(971) 563-0257 Cell**	**Boeing Site Focal**
Chris Kimmel	**ckimmel@landauinc.com**	**(206) 786-3801 Cell**	**Consultant Contact**
Mark Vealey	**Mark.Vealey@ApolloMech.com**	**(503) 313-9438 Cell**	**O&M Contractor Contact**

When leaving the message state the following:
1. **Date:** The date the incident occurred
2. **Time:** The approximate time the incident occurred
3. **Location:** Where the incident occurred, i.e.; Admin Compound…

When send the email include the following:
1. **Description:** Describe briefly what happened and what it may affect
2. **Time:** The approximate time the incident occurred
3. **Location:** Where the incident occurred, i.e.; Admin Compound…
4. **Description:** Describe briefly what happened and what it may affect

After the incident is under control, the sequence of events will be recorded, including probable cause, people who responded to the incident, the extents of the incident, and relevant dates and times

FROM SITE: 19000 N.E. Sandy Blvd., Gresham, Oregon 97230

TO HOSP: Mt. Hood Medical Center
24800 S.E. Stark Street
Gresham, OR 97030
503-667-1122

1. Go EAST on NE Sandy (US-30 Bypass)
2. Turn RIGHT (south) on NE 207th Avenue
3. Take ramp (left) onto I-84 (US-30) toward I-84/The Dalles
4. Take EXIT 16 and turn RIGHT onto ramp toward 238th Drive/Wood Village
5. Turn RIGHT onto NE 238th Drive
6. 238th Drive becomes NE 242nd Drive
7. Turn LEFT on SE Stark
8. End Mt. Hood Medical Center