APPENDIX A

Area 1 Remedial Investigation and Property Transfer

Area 1 Remedial Investigation and Property Transfer Boeing Auburn Facility Auburn, Washington

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Prepared for

The Boeing Company
Seattle, Washington

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Area 1 Remedial Investigation and Property Transfer
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AREA 1

This appendix presents a summary of the Area 1 remedial investigation (RI) conducted at solid waste management units (SWMUs) and areas of concern (AOCs) in November 2003 through February 2004 and additional investigations and remediation completed as part of the sale of Area 1 in areas not previously designated as SWMUs or AOCs. The Area 1 RI was conducted on an expedited basis, separate from the Site-wide RI, to facilitate sale of the Area 1 property. In addition to a general groundwater quality study, four SWMUs and two AOCs were evaluated. Additional investigation and cleanup related to the property sale and building demolition included investigation of three locations identified during an environmental review, investigation and removal of chrome waste pipe lines, the Building 17-05 elevator shaft, and the Building 17-05 Autoclave. An interim remedial action was also conducted in former Building 17-05 at SWMU S-12a and AOC A-08. Details of the interim remedial action and results are described in Section 7.0 of the 2016 RI Report and thus are not discussed in this appendix.

Area 1 Remedial Investigation

The Area 1 expedited RI included soil and groundwater investigations at three SWMUs and one AOC in former Building 17-05 and one SWMU and AOC in former Building 17-03:

- Building 17-05:
  - S-12b - Former TCE Degreaser and TCA Storage Area
  - S-12c - Former TCA vapor degreaser
  - S-19 - Former waste oil underground storage tank
  - A-08 - Former Metal Bond Tank Line
- Building 17-03:
  - S-12a – Former TCA vapor degreaser
  - A-02a – Former fuel oil and diesel USTs.

Sixteen borings were advanced and five new groundwater monitoring wells were installed as part of the Area 1 RI. Data collected from these borings and monitoring wells as well as samples collected from 43 previously installed groundwater monitoring wells were used to evaluate SWMUs, AOCs, and general groundwater quality within Area 1. Soil and/or groundwater samples were collected for field screening, measurement of field parameters, and laboratory analysis. Primary contaminants of potential concern included total petroleum hydrocarbons; trichloroethene (TCE); trichloroethane (TCA); TCE and TCA breakdown products; and metals. Selected samples were also analyzed for semi-volatile organic compounds (SVOCs) and monitored natural attenuation parameters. Area 1 RI results are documented in an Area 1 RI Report (LAI 2004a) and Supplemental Area 1 RI Report (LAI 2004b).

Based on the RI investigations, Washington State Department of Ecology (Ecology) issued a letter of determination indicating no further action was necessary for all Area 1 SWMUs and AOCs except

SWMU S-12b and AOC A-08 (Ecology 2004). SWMU S-12b and AOC A-08 are discussed in Section 7.0 of the 2016 RI Report.

Additional Investigations and Remediation

During the Area 1 property transfer process, additional remedial actions were conducted as part of the environmental site assessment process and building demolition.

Property Transfer Areas

In support of the Area 1 property transfer, The Boeing Company (Boeing) contracted Environmental Partners Incorporated (EPI) to perform an environmental Site review of the property (EPI 2005). The EPI report identified nine areas within Area 1 for further review that were not addressed in the RI work plan or the Agreed Order. Landau Associates, Inc. (LAI) subsequently prepared a work plan (LAI 2005c) that documented existing information addressing six of the nine locations, but recommended further field investigation for three of the identified areas:

- An acid paint striper that was located in former Building 17-02. Hexavalent chromium is the primary constituent of concern at this location
- The east side of former Building 17-03 where a 55-gallon TCA spill occurred
- A former hazardous waste storage area located on the east side of Building 17-05.

The investigation approach for each location was to drill one boring to the water table for collection of soil and groundwater samples. Two soil samples were collected from each boring for laboratory analysis. Groundwater samples were collected from temporary well screens installed to approximately 5 ft below the water table. Chemical analyses for analytes specific to each investigation area were performed on the soil and groundwater samples including volatile organic compounds (VOCs), SVOCs, diesel-range total petroleum hydrocarbons (TPH-D), and target analyte list metals. Figure A-1 shows the identified areas and subsequent borings. A list of detections for the samples collected at each boring is presented in Table A-1[1].

VOCs, SVOCs, and metals in soil and/or groundwater were detected; however, none exceeded screening levels at the time of the investigation with the exception of one sample with elevated manganese concentrations. Manganese is naturally occurring and is not associated with releases from the Facility. Groundwater concentrations of TCE at ASB0174 and ASB0176 are consistent with the concentrations found in monitoring wells in the vicinity related to the Area 1 TCE plume. No further investigation or cleanup of these areas was recommended in a summary memorandum submitted to Ecology in September 2005 (LAI 2005a).

[1] These data are not included in the RI database.

Chrome Line

As part of the Area 1 property sale agreement, Boeing agreed to remove two Area 1 chrome lines after the planned demolition of Building 17-05 and the Building 17-14 shed. The chrome lines reportedly transported wastewater from manufacturing operations in Area 1 to the treatment plant located on the eastern portion of the Boeing Facility near Building 17-15. Based on Facility drawings and previous investigations, each chrome line actually consisted of two separate lines: an older high-density polyethylene line and a newer PVC line. Samples of the lines and liquid in the lines were collected and analyzed for waste disposal purposes. None of the results from samples collected in Area 1 exceeded dangerous waste thresholds. However, results indicated that the lines might designate as listed hazardous or dangerous waste for disposal purposes. Consequently, the decision was made to remove the lines from Area 1. The liquid content of the lines was removed in October 2005 from discrete points accessed through backhoe excavations. The chrome lines were subsequently removed between June 12 and June 22, 2006. The former location of the lines is shown on Figure A-1.

During line removal, there was no visual indication of impacted soil anywhere along the lines. However, four areas were identified where the outside of the pipe was discolored. Soil in contact with discolored pipe (approximately 1 cubic yard at each location) was removed and disposed of with the pipe material. After soil removal, confirmation samples were collected from each location and analyzed for metals. Confirmation soil sampling results indicated that any potentially contaminated soil associated with the discolored pipe locations was removed.

Soil removed during excavation of the pipe was stockpiled next to the trench and asphalt was separated from the soil. Relatively dry weather throughout the duration of the project resulted in the moisture content of the excavated soil remaining near optimum and allowed effective reuse of the soil for backfilling. During backfilling, stockpiled soil was placed in the excavation and compacted using the backhoe bucket. A detailed summary of chrome line removal was submitted to Ecology in May 2007 (LAI 2007).

Elevator Shaft

An elevator and elevator shaft was present in the south end of the former Building 17-05. Previous samples of the hydraulic oil used to operate the elevator contained polychlorinated biphenyls (PCBs). Consequently, samples of concrete from the elevator shaft floor, an I-beam, and the concrete sump were collected and analyzed; wipe samples of concrete and painted surfaces were also analyzed. The maximum concentration was 53 milligrams per kilogram (mg/kg) from the sump concrete. Because the elevator shaft meets the criteria for a low occupancy area as defined in 40 Code of Federal Regulations (CFR) Section 761.2, a cleanup level of 25 mg/kg [40 CFR 761.61(a)(4)(i)(B)] was identified for the elevator shaft. The only sample that exceeded the cleanup level was the sample collected from the base of the concrete sump. The approximate location of the elevator shaft is shown on Figure A-1.

Because there was a cleanup level exceedance, Boeing appropriately disposed of PCB-impacted surfaces and notified the U.S. Environmental Protection Agency (EPA) of their remediation plans under the Toxic Substances Control Act in a letter dated August 18, 2005 (Boeing 2005). EPA provided approval of the planned remediation in a letter to Boeing dated August 28, 2005 (EPA 2005). The cleanup action activities began on September 20, 2005 and were completed on September 23, 2005. All PCB-contaminated material removed from the elevator shaft during implementation of the cleanup action was disposed of at a Chemical Waste Management EPA-approved hazardous waste landfill in accordance with 40 CFR 761 (a)(5)(v). This included concrete removed during the scarification of the sump sidewalls and elevator shaft concrete floor, the concrete removed from the base of the sump, the concrete associated with the steel I-beam, and the steel I-beam. Following removal, confirmation samples were collected from the soil below the base of the concrete sump and the sidewalls. The PCB concentrations detected in the confirmation soil samples were below the cleanup level. The cleanup action was documented in a cleanup action report submitted to Ecology and EPA (LAI 2005b).

Autoclave

Demolition of Building 17-05 resulted in removal of the building superstructure, concrete slab, and shallow underground utilities. During excavation near the southern portion of the original building footprint, evidence of petroleum-impacted soil was observed. The impacted soil is located near a former autoclave racking system that was operated in Building 17-05. Initial sample results indicated the presence of diesel, motor oil, carcinogenic polycyclic aromatic hydrocarbons (cPAHs), and PCBs. Additional test pits were conducted on June 8 and 12, 2006 to delineate the extent of soil contamination. The location of the autoclave excavation is shown on Figure A-1.

On June 21 and 22, 2006, excavation of contaminated soil was performed. Contaminated soil was excavated directly into trucks for disposal. Approximately 164 cubic yards of contaminated soil were disposed of offsite. During soil excavation, deeper soil contamination was found within the excavation at a depth of approximately 12.5 ft; however, the area of this deeper zone was limited to an area of about 15 ft by 15 ft. On June 29 and 30, 2006, the excavation was continued to a depth of approximately 20 ft; groundwater was encountered at a depth of approximately 16 ft. This additional excavation produced approximately 96 cubic yards of impacted soil, which was loaded into 8 roll-off boxes. The roll-off boxes were shipped offsite for disposal as soil with listed dangerous waste constituents on July 11 and 12, 2006.

Confirmation soil samples were collected from the excavation base and sidewalls and analyzed for TPH-D, PCBs, and cPAHs. With the exception of a single sample, all confirmation sampling results were either non-detect or below Model Toxics Control Act cleanup levels. A summary of these results was provided to Ecology in a follow-up notification letter dated June 28, 2006 (Boeing 2006).

Prior to backfilling, 18 buckets (approximately 450 pounds) of Regenesis Advanced Oxygen Releasing Compound was mixed with exposed water at the base of the excavation to address the possibility of residual petroleum compounds in groundwater. The excavation was backfilled with quarry spalls, pit run gravel, and clean overburden material that had been segregated and stockpiled. Backfill activities were completed on July 6, 2006. A summary of the autoclave investigations and remediation were documented in an August 2006 memorandum to Ecology (LAI 2006).

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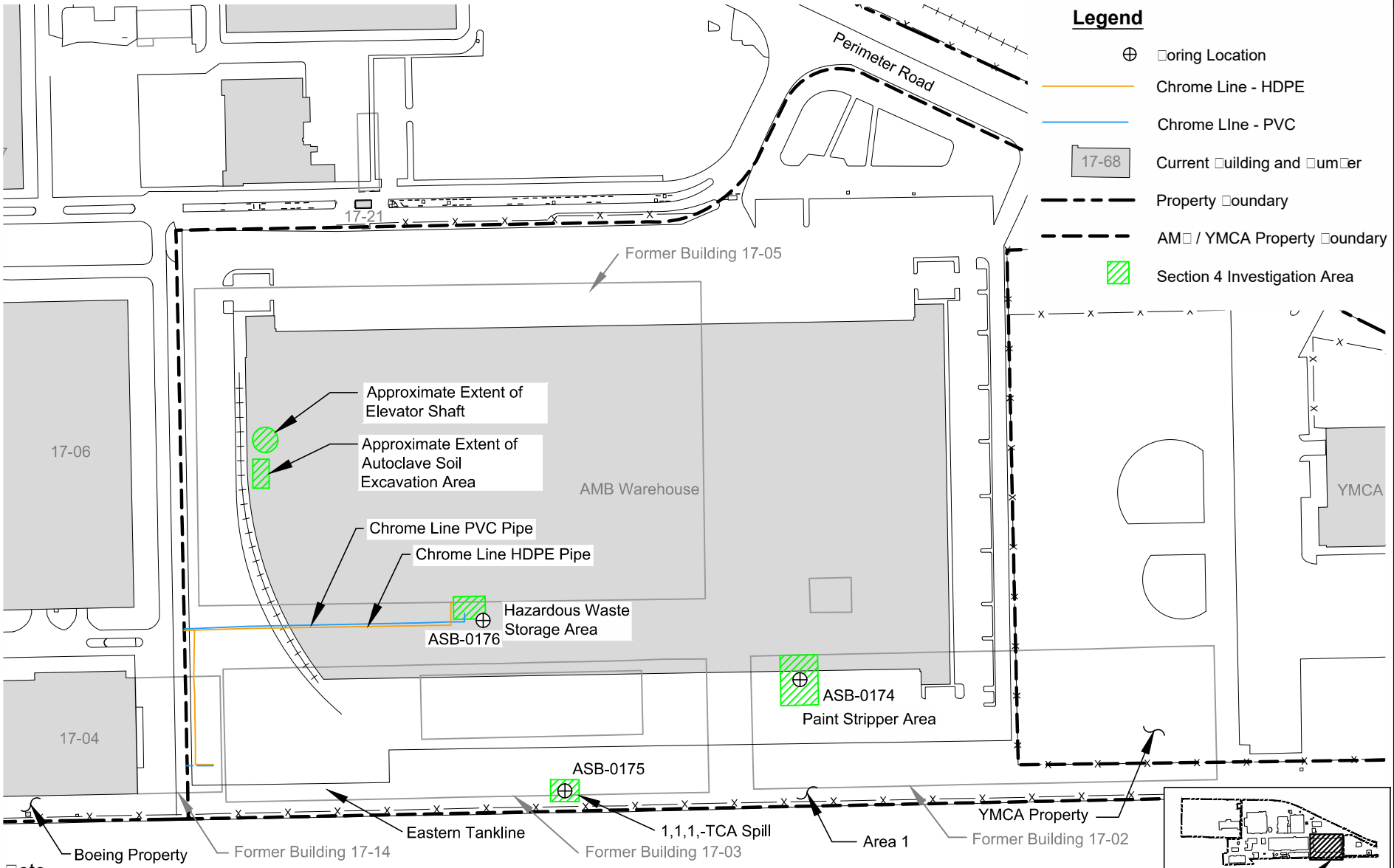

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Scale in Feet

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Additional Investigation and Remediation Areas

Figure
A-1

Table A-1
Property Transfer Area Detection Summary Area 1
Boeing Auburn Remedial Investigation
Auburn, Washington

Boring ID	Building	Description	Number of Explorations	Total Depth (ft)	Depth (ft)	Sample Matrix	Analyte	Detection	Unit	Screening Criteria (a)
ASB0174	17-02	Paint Stripper	1	19	7	Soil	Methylene Chloride	2.7	µg/kg	20
					7	Soil	Chromium	11.5	mg/kg	2000
					17	Soil	Methylene Chloride	2.2	µg/kg	20
					17	Soil	Acetone	6.4	µg/kg	3211
					17	Soil	Chromium	12.5	mg/kg	2000
					19	Water	Acetone	2.9	µg/L	800
					19	Water	1,1,1-Trichloroethane	0.6	µg/L	200
					19	Water	Tricloroethene	2.8	µg/L	5
ASB0175	17-03	55-gallon drum of 1,1,1-TCA spill	1	19	7	Soil	Methylene Chloride	2.3	µg/kg	20
					19	Water	Acetone	2.3	µg/L	800
					19	Water	1,1-Dichloroethane	0.4	µg/L	800
					19	Water	1,1,1-Trichloroethane	1.6	µg/L	200
ASB0176	17-05	Hazardous Waste Storage Area Catch Basin	1	19	7	Soil	Methylene Chloride	6	µg/kg	20
					7	Soil	Bis (2-Ethylhexyl) phthalate	110	µg/kg	13359
					7	Soil	Aluminum	8650	mg/kg	NL
					7	Soil	Barium	26.1	mg/kg	923
					7	Soil	Calcium	4150	mg/kg	NL
					7	Soil	Chromium	8.3	mg/kg	2000
					7	Soil	Cobalt	3.1	mg/kg	NL
					7	Soil	Copper	12.3	mg/kg	263
					7	Soil	Iron	10300	mg/kg	43100
					7	Soil	Magnesium	1420	mg/kg	NL
					7	Soil	Manganese	102	mg/kg	1200
					7	Soil	Nickel	6	mg/kg	130
					7	Soil	Potassium	290	mg/kg	NL
					7	Soil	Sodium	860	mg/kg	NL

Table A-1
Property Transfer Area Detection Summary Area 1
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Boring ID	Building	Description	Number of Explorations	Total Depth (ft)	Depth (ft)	Sample Matrix	Analyte	Detection	Unit	Screening Criteria (a)
					7	Soil	Vanadium	39.4	mg/kg	2240
					7	Soil	Zinc	17.1	mg/kg	5971
					17	Soil	Acetone	6.1	µg/kg	3211
ASB0176	17-05	Hazardous Waste Storage Area Catch Basin	1	19	17	Soil	Methylene Chloride	3.4	µg/kg	20
					17	Soil	Bis (2-Ethylhexyl) phthalate	130	µg/kg	13359
					17	Soil	Aluminum	8870	mg/kg	NL
					17	Soil	Barium	29.7	mg/kg	923
					17	Soil	Beryllium	0.1	mg/kg	63.2
					17	Soil	Calcium	4030	mg/kg	NL
					17	Soil	Chromium	14.1	mg/kg	2000
					17	Soil	Cobalt	4	mg/kg	NL
					17	Soil	Copper	16.5	mg/kg	263
					17	Soil	Iron	12600	mg/kg	43100
					17	Soil	Mangesium	2650	mg/kg	NL
					17	Soil	Manganese	144	mg/kg	1200
					17	Soil	Nickel	9	mg/kg	130
					17	Soil	Potassium	440	mg/kg	NL
					17	Soil	Sodium	700	mg/kg	NL
					17	Soil	Vanadium	40.1	mg/kg	2240
					17	Soil	Zinc	22.7	mg/kg	5971
					19	Water	Acetone	2.0	µg/L	800
					19	Water	1,1,1-Trichloroethane	0.2	µg/L	200
					19	Water	Trichloroethene	1.2	µg/L	5
					19	Water	Tetrachloroethane	0.4	µg/L	5
					19	Water	Di-n-Butylphthalate	3.5	µg/L	1600
					19	Water	Aluminum	0.26	mg/L	NL
					19	Water	Barium	0.009	mg/L	1.12
					19	Water	Iron	0.12	mg/L	NL

Table A-1
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Boring ID	Building	Description	Number of Explorations	Total Depth (ft)	Depth (ft)	Sample Matrix	Analyte	Detection	Unit	Screening Criteria (a)
					19	Water	Magnesium	6.89	mg/L	NL
					19	Water	Manganese	**0.05**	mg/L	0.050
					19	Water	Potassium	4.0	mg/L	NL
					19	Water	Sodium	24.6	mg/L	NL

Notes:

RI Reference concentrations are noted in the same units as results are reported in.
Bold and highlighted values meet or exceed the screening criteria.
a. Screening criteria are derived Washington MTCA Method A, Method B, or Federal MCL
(listed screening criteria were in effect at the time of the investigation and have not updated to current values).

Abbreviations/Acronyms:

ft = feet
µg/kg = micrograms per kilogram
mg/kg = milligrams per kilogram
µg/L = micrograms per liter
mg/L = milligrams per liter
NL = not listed