



## Memo

To: Byung Maeng, Ecology  
Carl Bach, Boeing  
Project: 8888.006.0

From: Dave Haddock, AMEC  
cc: Ray Power, Boeing  
Project File

Tel: (206) 342-1760

Fax: (206) 342-1761

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**Subject: Investigation of SWMU-168, Former Fuel Farm, and Building 4-78/79**  
Boeing Renton Facility  
Renton, Washington

### 1.0 INTRODUCTION

This memorandum summarizes additional investigational work conducted for selected areas of concern (AOC) and solid waste management units (SWMUs) at the Boeing Renton Facility (the Facility) in Renton, Washington. The objective of this work was to address data gaps identified by the Washington Department of Ecology (Ecology) during Ecology's review of the Draft Cleanup Action Plan (DCAP) for the facility (AMEC, 2009). This objective was accomplished by collecting and analyzing soil and groundwater samples from SWMU-168, the Former Fuel Farm, and the Building 4-78/79 SWMU/AOC group.

### 2.0 SITE BACKGROUND

This section presents background for each of the AOCs/SWMUs investigated.

#### 2.1 SWMU-168

SWMU-168 is located near the northeast corner of Building 5-50 on leased property at the Renton Municipal Airport and consists of the area around a former underground storage tank (UST) designated URE-31 (for underground tank Renton, number 31) (see Figure 1). URE-31 was a 1,000-gallon concrete tank that was installed in 1979 and removed in September 1985. This UST was used for the storage of solvent waste generated in Building 5-50. There is no documented information regarding releases from this SWMU.

#### 2.2 Former Fuel Farm

The Former Fuel Farm consisted of three steel underground storage tanks (USTs) used to store Jet A Fuel (URE-033, URE-034, URE-035), located near the south end of Renton Municipal Airport, about 200 feet southeast of Building 5-02 (see Figure 2). The former USTs were installed in 1956 and 1957 and removed during closure activities at the Former Fuel Farm in 1993. URE-033 and -034 had capacities of 50,000 gallons; URE-035 had a capacity of 12,000 gallons.

Since closure, the Former Fuel Farm site, which is owned by the City of Renton and is leased to Boeing, has been used for employee parking. The nearby Boeing-leased buildings and areas are currently used for industrial purposes and are expected to remain in industrial use for the foreseeable future.

### **2.3 Building 4-78/79 SWMU/AOC Group**

The Building 4-78/79 SWMU/AOC Group is located adjacent to the east side of the Cedar River Waterway, in the west-central portion of the Boeing-owned part of the Facility. This SWMU/AOC group includes a former dangerous waste storage area (SWMU-181), four former gasoline USTs (UREs-17, -23, -24 and -54), a former gasoline dispenser, and two former USTs used to store methyl ethyl ketone (MEK) (UREs-18 and -25). The location for this site is shown on Figure 3.

Buildings 4-61 and 4-73 were demolished in early 2004 and converted to parking facilities. Building 4-78 is still being used for temporary storage of hazardous wastes. Building 4-79 is still used for painting of aircraft parts to support airplane manufacturing activities conducted at the Renton Facility. These two buildings and adjacent buildings and areas are currently used for industrial purposes and are expected to remain in industrial use for the foreseeable future.

## **3.0 SAMPLING AND ANALYSIS**

This section describes the approach that was used to complete the investigations at SWMU-168, the Former Fuel Farm, and the Building 4-78/79 SWMU/AOC Group. Figures 1, 2 and 3 show the location and general layout of these areas and the approximate sampling locations.

### **3.1 Direct-Push Sampling**

Drilling was completed with a direct-push drill rig operated by Cascade Drilling of Woodinville, Washington. Discrete soil cores were collected from each boring. Borings were logged in the field by AMEC Geomatrix, Inc. (AMEC), staff, and soil samples were collected for laboratory analysis from each core. Cores were screened in the field for potential VOCs using a photoionization detector (PID). Where grab groundwater samples were collected a temporary well was screened across the water table using a 4-foot section of 3/4-inch-diameter, Schedule 40 polyvinyl chloride (PVC) screen. A grab groundwater sample was collected from each temporary well. Soil and groundwater samples were collected in laboratory-supplied sample jars, labeled, and stored in an ice-cooled chest for transport to the laboratory following chain-of-custody procedures.

Copies of the boring logs, including the soil descriptions and PID readings, are provided in Attachment A.

#### **3.1.1 SWMU-168**

On June 9, 2009, AMEC oversaw the completion of one direct push boring (PP202) in the area northeast of Building 5-50 (Figure 1). The boring was installed in the vicinity of former borings

PP002 and PP166 to support the conclusion that methylene chloride has degraded at SWMU-168. One sample was collected from PP202 from a depth of 5.5 to 6.5 feet below ground surface (bgs).

### **3.1.2 Former Fuel Farm**

On June 9, 2009, AMEC oversaw the completion of three direct push borings in the approximate source area to obtain data needed to determine if the discontinuation of soil sampling in the Former Fuel Farm source area is appropriate. Borings PP198, PP199, and PP200 were completed in the vicinity of former borings PP405, PP420, and PP430, respectively (Figure 2). Samples from borings PP198 and PP199 were collected from 11 to 12 feet bgs. A sample was collected from 11.5 to 12.5 feet bgs in PP200.

### **3.1.3 Building 4-78/79**

On June 10, 2009, AMEC oversaw the completion of one direct-push boring (PP201) in the area north of Building 4-78 (Figure 3). The boring was installed north of former boring PP178 to determine the extent of elevated concentrations of constituents of concern (COCs) reported from PP178. One soil sample was collected from a depth of 5.5 to 6.5 feet bgs. A grab groundwater sample was collected from a temporary well screened from 5 to 9 feet bgs.

## **3.2 Field Procedures**

Sample collection was conducted in accordance with the Ecology-approved Remedial Investigation (RI) Work Plan (Weston, 1998) as subsequently amended, which details field methods for sample collection, sample designation, equipment decontamination, and documentation. These methods include soil sampling procedures following U.S. Environmental Protection Agency (EPA) Method 5035A (EPA, 2002) and Ecology's Implementation Memo #5 (Ecology, 2004). A peristaltic pump was used to collect the groundwater sample from the temporary well. Tables 1 and 2 list the specific samples collected from each location.

## **3.3 Analytical Methods**

The samples were analyzed by Analytical Resources, Inc., of Tukwila, Washington. The soil sample collected from SWMU-168 (PP202) was analyzed for methylene chloride using EPA Method 8260. Soil samples collected from the Former Fuel Farm (PP198, PP199, PP200) were analyzed for diesel-range total petroleum hydrocarbons (TPH-Dx), including Jet-A, using Method NWTPH-Dx; benzene, toluene, ethylbenzene, and xylenes (BTEX) using EPA Method 8021; and PAHs using EPA Method 8270. Soil and groundwater samples from Building 4-78/79 (PP201) were analyzed for gasoline-range total petroleum hydrocarbons (TPH-G) using Method NWTPH-G and volatile organic compounds (VOCs) using EPA Method 8260 with low-level 10-milliliter (mL) purge.

## **3.4 Quality Control**

The quality assurance and quality control (QA/QC) procedures outlined in the Quality Assurance Project Plan (QAPP) presented in Section 6.0 of the approved RI Work Plan (Weston, 1998)

were followed for sampling performed during this project. All analytical data generated by the laboratory were reviewed in accordance with the QAPP. The data validation memorandum and the analytical data are presented in Attachment B.

### **3.5 Waste Management**

Management of wastes generated during field activities followed the guidelines described in the approved RI Work Plan (Weston, 1998). Soil cuttings, decontamination water, and groundwater from the push-probe sampling activities were managed by Boeing.

## **4.0 RESULTS**

Results of laboratory analyses of soil and groundwater samples are summarized in Tables 1 and 2. The conditionally approved cleanup levels from the DCAP (AMEC, 2009) were used to evaluate soil and groundwater results. If cleanup levels were not available, the preliminary cleanup levels (PCLs) developed in the Remedial Investigation (RI) (Weston, 2001) were used.

### **4.1 SWMU-168**

Methylene chloride was not detected in the soil sample collected from SWMU-168 at the detection limit of 2.2 micrograms per kilogram ( $\mu\text{g}/\text{kg}$ ). This soil sample was collected from the depth interval 5.5 to 6.5 feet, where methylene chloride had been detected during the RI. This more recent sample provides additional evidence that methylene chloride has degraded in this area since the RI samples were collected. The soil cleanup level for methylene chloride is 24  $\mu\text{g}/\text{kg}$ , and soil cleanup levels for SWMU-168 are provided in the DCAP, Table 1 (AMEC, 2009). Sample analytical results are shown on Figure 1.

### **4.2 Former Fuel Farm**

Diesel- and jet fuel-range hydrocarbons were detected in all three soil samples collected from the Former Fuel Farm. Diesel concentrations ranged from 500 to 1,200 milligrams per kilogram ( $\text{mg}/\text{kg}$ ), but did not exceed the conditionally approved site-specific cleanup level of 2,000  $\text{mg}/\text{kg}$ . Jet-A fuel concentrations ranged from 430 to 1,500  $\text{mg}/\text{kg}$  and were below the conditionally approved cleanup level of 2,000  $\text{mg}/\text{kg}$ . Motor oil was detected in PP199 at a concentration of 96  $\text{mg}/\text{kg}$ . Motor oil is not a COC for this site, and the observed concentrations did not exceed the PCL developed in the RI. Benzene was not detected in the three soil samples collected from the Former Fuel Farm. 2-Methylnaphthalene was detected in the sample from PP198 at a concentration of 1,800  $\mu\text{g}/\text{kg}$ , well below the cleanup level of 45,800  $\mu\text{g}/\text{kg}$ . Other constituents were detected in the Former Fuel Farm samples, including toluene, ethylbenzene, xylenes, naphthalene, 1-methylnaphthalene, fluorene, and phenanthrene. These constituents are not COCs at this site, and observed concentrations did not exceed the PCLs, where available. Soil detections and cleanup levels are presented in Table 3, and sample analytical results are shown on Figure 2.

### **4.3 Building 4-78/79**

Analytical results for soil and groundwater samples collected at the Building 4-78/79 SWMU/AOC Group are presented in Sections 4.3.1 and 4.3.2.

#### **4.3.1 Soil Analytical Results**

Gasoline-range hydrocarbons, benzene, carbon disulfide, and tetrachloroethene (PCE) are all COCs at the Building 4-78/79 SWMU/AOC Group that were not detected in the soil sample collected from boring PP201. The detection limits for these compounds did not exceed the conditionally approved site-specific cleanup levels. *cis*-1,2-Dichloroethene (*cis*-1,2-DCE) and vinyl chloride (VC) were both detected at concentrations (24 µg/kg and 4.1 µg/kg, respectively) below the cleanup levels. Trichloroethene (TCE) was the only COC detected above the cleanup level, with a concentration of 110 µg/kg, but this concentration is only slightly above the cleanup level of 100 µg/kg. 1,1-Dichloroethane (1,1-DCA) and acetone were also detected in the soil sample from PP201, but concentrations of both constituents were several orders of magnitude below the PCLs. Table 3 presents analytical results for detected analytes in soil, together with associated cleanup levels or PCLs.

#### **4.3.2 Groundwater Analytical Results**

Gasoline-range hydrocarbons and benzene are COCs at Building 4-78/79 that were not detected in the groundwater sample collected from boring PP201. The detection limits for these two compounds did not exceed the site-specific groundwater cleanup levels. TCE was detected at a concentration of 5.4 µg/L, which exceeds the cleanup level of 0.23 µg/L. The cleanup level for *cis*-1,2-DCE (0.70 µg/L) was also exceeded with a sample concentration of 21 µg/L. VC was also detected in the groundwater sample at a concentration of 13 µg/L, which exceeded the groundwater cleanup level of 0.2 µg/L. Acetone, 1,1-DCA, 2-butanone, carbon disulfide, chloroethane, *trans*-1,2-DCE, and toluene were also detected in the groundwater sample, but are not COCs and did not exceed the PCLs developed in the RI. Table 4 presents analytical results for detected analytes in groundwater together with the applicable cleanup level or PCL.

### **5.0 RECOMMENDATIONS**

The results of this investigation have been incorporated into a revised DCAP for Ecology review. The results from SWMU-168 provide additional evidence that methylene chloride has degraded in that area since the RI samples were collected. Sample results from the Former Fuel Farm indicate that COC concentrations have dropped to below cleanup levels in source area soils and support the conclusion that monitored natural attenuation (MNA) is an appropriate remedy at the Former Fuel Farm. As a result, no additional soil samples are needed as part of the final remedy. Data from the Building 4-78/79 SWMU/AOC Group show that concentrations of COCs decrease in soil north of Building 4-78 and north of PP178. This finding provides additional evidence that Building 4-78 is the likely source of COCs in this area. Further recommendations based on the findings are provided in the revised DCAP (AMEC, 2009).

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## 6.0 REFERENCES

AMEC (AMEC Geomatrix, Inc.), 2009, Revised Draft Cleanup Action Plan, Boeing Renton Facility, Renton, Washington: Prepared for The Boeing Company, July.

Ecology (Washington State Department of Ecology), 2004, Implementation Memorandum #5, Collecting and Preparing Soil Samples for VOC Analysis, 04-09-087, June 17.

EPA (U.S. Environmental Protection Agency), 2002, EPA Method 5035A, Closed-System Purge-and-Trap and Extraction for Volatile Organics in Soil and Waste Samples, EPA SW-846, July.

Weston (Roy F. Weston), 1998, Remedial Investigation Work Plan, Boeing Renton Plant, Renton, Washington.

Weston, 2001, Remedial Investigation Report, Boeing Renton Plant, Renton, Washington: Prepared for The Boeing Company, Boeing Shared Services Group, Energy and Environmental Affairs, August 10.

- Attachments:
- Table 1 – Soil Analytical Results, SWMU-168, Former Fuel Farm, and Building 4-78/79 Investigation, June 2009
  - Table 2 – Groundwater Analytical Results, SWMU-168, Former Fuel Farm, and Building 4-78/79 Investigation, June 2009
  - Table 3 – Soil Detections and Cleanup Levels, SWMU-168, Former Fuel Farm, and Building 4-78/79 Investigation, June 2009
  - Table 4 – Groundwater Detections and Cleanup Levels, SWMU-168, Former Fuel Farm, and Building 4-78/79 Investigation, June 2009
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- Figure 1 – SWMU-168 Site Location and Soil Analytical Results
  - Figure 2 – Former Fuel Farm Site Location and Detected Soil Results
  - Figure 3 – Building 4-78/79 SWMU/AOC Group Site Location and Detected Soil and Groundwater Results
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- Attachment A – Boring Logs
  - Attachment B – Data Validation Memorandum and Analytical Data