Septic System and Area F Characterization
Former White Alice Communication System
Aniak, Alaska

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

SEPTIC SYSTEM AND AREA F CHARACTERIZATION
WHITE ALICE COMMUNICATION SYSTEM
ANIAK, ALASKA

1.0 INTRODUCTION

This report presents the results of our Septic System and Area F Characterization activities conducted at a former White Alice Communication System (WACS)/Aniak Middle School in Aniak, Alaska. Previous investigations have identified soil containing polychlorinated biphenyls (PCBs) at multiple locations in the immediate vicinity of the school. Metals and volatile organic compounds (VOCs) also have been documented at the site. The primary objective of this characterization effort was to further characterize the extent and nature of contamination in the vicinity of the former septic system and Area F (Project Site).

The project was administered under Alaska Department of Environmental Conservation (ADEC) Term Contract 18-9028-14, Notice to Proceed (NTP) No. 33. Authorization to proceed with the project was received from Mr. Dennis Harwood on September 12, 2006. The project was conducted in general accordance with our October 2006 work plan.

2.0 SITE DESCRIPTION

Aniak is located within the Kuskokwim River flood plain approximately 300 miles west of Anchorage. The city is bordered on the north by the Kuskokwim River and on the south by Aniak Slough, as shown on Figure 1. The Middle School site is approximately 2,000 feet southeast of the northwest end of the runway, and approximately 1,500 feet south of the Kuskokwim River, as shown in Figure 2. The Aniak High School is located to the southwest of the Middle School. Drinking water wells are located at both the Middle School and the High School, as shown on Figure 2. Areas to the southwest and southeast of the school sites are generally residential in nature. Based on information provided in the Alaska Community Database, a majority of the homes in Aniak are connected to individual wells.

The Middle School site is located in Section 12, Township 17 North, Range 57 West, Seward Meridian. The local topography is generally flat; however, much of the Project Site is situated on a gravel pad overlaying the native alluvial deposits, such that the former school facility is at an elevation approximately 10 feet higher than the area directly to the west/northwest. The surrounding area slopes generally east towards the Aniak Slough. A 2006 aerial photograph of the Project Site is included as Figure 3.

The former WACS facility, currently owned by the State of Alaska, is under the jurisdiction of the Alaska Department of Transportation and Public Facilities (ADOT&PF). The portion of the facility investigated during this characterization effort is leased by the State to the

Kuspuk School District (KSD). The KSD renovated the facility for use as a school. Three buildings, including the school, a maintenance building, and a storage building, and an aboveground storage tank (AST) array, currently occupy the Project Site. A detailed plan showing the pertinent site features is provided as Figure 4.

The following project-specific definitions have been established to clarify references in this report and to enhance consistency in narrative terminology.

- Project Site: The combined area comprising the Septic System Area and Area F
- Former septic system: The septic system in place and used during the operation of the Aniak WACS facility, including piping, potential septic tanks, access points, and seepage pit. This term does not include the new septic system lines or other components installed subsequent to 1980.
- Septic System Area: The former septic system and surrounding area, including outlying areas where Borings B4 and B5 were located.
- Septic Trench: The trench excavated for this project adjacent to the former septic lines. The trench was separated into to sections designated the northwest and southeast trenches.
- Area F: An area north of the former septic system defined during removal of 55-gallon drums and PCB-impacted soil during the fall of 1983. The boundaries for Area F were selected based on hand drawn sketches and notes completed by Bruce Erickson of ADEC during the 1983 cleanup effort

The focus of this characterization effort is limited to the vicinity of the former septic system and Area F.

3.0 BACKGROUND

The Aniak WACS was constructed in approximately 1958. The present site characterization efforts addressed two separate areas, referenced as the Septic System Area and Area F. Background information pertaining to the environmental assessment and cleanup work conducted at these two areas were obtained from the following sources:

- September 30, 1983 letter to the Kuspuk School District regarding PCB Sampling Results, prepared by ADEC;
- September 1997 "Final Site Inspection Report, White Alice Communication Site SI, Aniak, Alaska" prepared by Ecology and Environment, Inc. (E&E);

- April 1998 "Site Assessment Report, Middle and High Schools, Aniak, Alaska" prepared by Shannon & Wilson, Inc.;
- August 1999 "Additional Polychlorinated Biphenyl Assessment at Middle School, Aniak, Alaska" letter prepared by Shannon & Wilson, Inc.;
- ADEC's April 20, 2001 RFP;
- December 2001 "PCB Cleanup, Aniak Middle School" prepared by Shannon & Wilson, Inc.;
- March 2004 "Soil Sampling and Septic System Evaluation, Aniak Middle School" prepared by Shannon & Wilson, Inc.;
- June 2004 "Septic System Evaluation, Aniak Middle School" prepared by Shannon & Wilson, Inc.; and
- ADEC's June 30, 2006 RFP (including data from URS Corporation's 2004 Site Characterization work)

Former Septic System Area

Previous investigations have identified soil contaminated with PCBs at multiple locations in the immediate vicinity of the school. With respect to the former septic system, sludge from the seepage pit has been sampled and found to contain PCBs (~140 mg/kg), trichloroethene (TCE) (~1,880 ug/l), toluene (1,440 mg/kg), and metals (cadmium, lead, mercury, silver, and zinc). Soil sampling around the former septic system has also documented PCBs at concentrations greater than 1 and less than 10 mg/kg near the two vertical CMPs nearest the school building (assumed to be a septic tank). Surface and near surface soil samples, collected within 3 feet of the surface near the seepage pit CMP, did not contain PCB concentrations greater than 1 mg/kg. Likewise, the surface and shallow subsurface soil samples collected around the septic system did not contain metals, VOCs, and pesticides at concentrations greater than corresponding ADEC cleanup levels. Tables and figures from the 1997 site inspection by Ecology and Environment, Inc. and the 2004 site characterization efforts by URS Corporation are included in Appendix A.

The septic system construction has not been confirmed through as-built drawings or visual observation. A possible septic system configuration can be inferred based on our experience, 2006 field observations, and drawings of septic systems at other Alaska WACS sites. The primary elements appear to be one or more tanks and an infiltration/leaching pit. Two vertical pipes observed west of the school (designated CMP1 and CMP2 on Figure 4) appear to be inspection or access points to an underlying tank. Likewise, a third vertical pipe location about 90 feet west of CMP2 appears to be an access or cleanout for an infiltration pit (designated

Seepage Pit on Figure 4). The presumed tank appears to be connected to both the seepage pit and the building to the east via buried pipe. As described in this report, the buried pipe was observed during the 2006 characterization, although the tank and piping connections to the tank and seepage pit were not. Due to its speculative nature, this conceptual model is intended to provide context for interpreting project results, and should not be construed as a definite conclusion regarding the presence or construction features of the former septic system.

Area F

Under ADEC oversight, the US Air Force and KSD removed 55-gallon drums and PCB-impacted soil from Area F during the fall of 1983. Samples collected from the excavation limits contained elevated PCBs (Aroclor 1260), with a maximum concentration of 19,000 mg/kg. The 1983 report estimated that 5 drums of soil with PCB concentrations greater than 50 mg/kg remained in Area F. Documentation in ADEC files (December 1983) states additional cleanup was planned in 1984, although no records were located to confirm that cleanup occurred or if the drums were removed at that time. A 1997 Site Inspection conducted by E&E, under contract to US Environmental Protection Agency (EPA), identified PCBs in soil in the vicinity of Area F at a maximum concentration of 140 mg/kg.

Groundwater Flow Direction

Based on information contained in Shannon & Wilson's June 2006 report, *Drum and Battery Management and Water Sampling, ADOT&PF Aniak Airport Sites, Aniak, Alaska*, groundwater flow direction in the airport area appears to be northwest to northeast, towards the Kuskokwim River. Other Shannon & Wilson investigations in the area are documented in the June 2004 reports, *Additional Site Characterization, ADOT&PF Aniak Airport Facilities, Aniak, Alaska,* and *ADOT&PF Aniak Airport, Well Decommissioning and Drinking Water Well Survey, Aniak, Alaska*. Both reports indicate a north to northwest groundwater flow direction. Based on this information, Shannon & Wilson presumed that the groundwater in the vicinity of our project area is generally to the northeast to northwest.

4.0 SITE CHARACTERIZATION

The site characterization efforts were conducted between October 17 and October 26, 2006. Photographs of site activities are included in Appendix B.

4.1 Scope Overview

The Septic System and Area F Characterization work was conducted in general accordance with the 18 AAC 75 Oil and Other Hazardous Substances regulations, as amended through October 16, 2005, and Shannon & Wilson's October 2006 *Site Characterization Work Plan, Former White Alice Communication System Middle School Site, Aniak, Alaska.* The project tasks included in the Work Plan are listed below.

1. Work Plan Preparation and Approval;
2. Mobilization and Site Preparation;
3. Septic System Evaluation;
4. Area F Characterization;
5. Surveying;
6. Investigation Derived Waste Management;
7. Laboratory Analyses; and
8. Reporting

The Septic System and Area F Characterization project consisted of excavating a trench along former septic lines, investigating two vertical corrugated metal pipes (CMPs) and a seepage pit associated with the former septic system, advancing five soil borings, installing three monitoring wells, advancing shallow borings in Area F, and collecting soil and groundwater samples.

Shannon & Wilson, Inc. was retained to monitor site activities, develop monitoring wells, conduct PCB field screening, collect soil and water samples, and report results of these efforts. B.C. Excavating (BCX) provided the equipment and personnel to excavate the septic trench. Discovery Drilling (Discovery) provided the equipment and personnel to advance the borings and install the monitoring wells. Del Norte Surveying (Del Norte) prepared a survey of the trench, PCB grid, borings, monitoring wells, Area F location, and other applicable site features. SGS Environmental Services (SGS) provided laboratory analysis of the soil and water samples. Del Norte, Discovery, BCX, and SGS are located in Anchorage, Alaska and were under subcontract to Shannon & Wilson.

4.2 Work Plan Variances

Variances from the Work Plan were generally due to observed field conditions that were different from the assumptions made in the Work Plan. The principal scope variations associated with the project are listed below.

- The septic trench was excavated to a greater depth than the 10 feet anticipated in the Work Plan. The former septic line was encountered at approximately 9 to 10 feet below ground surface (bgs) in the trench, which was advanced to a maximum depth of approximately 11 feet. Due to the trench depth, the limitations of the backhoe, and the length of the septic trenches, analytical samples were collected within 1 to 1.5 feet beneath the septic line. According to the Work Plan, analytical sample collection was planned approximately 2 feet below the septic line. In addition, samples were collected at 15-foot intervals along the trench base, instead of at 25-foot linear intervals and at apparent breaks in the line.
- Split-spoons used to sample the CMPs and seepage pit were advanced 1.5 feet instead of 2 feet as stated in the work plan. Due to compression of surface debris and organic matter, this enabled limited recovery of 0.5 foot (a volume sufficient for sample collection).
- Boring B3, B4, and B5 locations were selected based on spatial representation and suspected groundwater flow direction, instead of field screening results as described in the Work Plan. Each borehole location was approved by the ADEC prior to drilling.
- A total of 79 field screening samples were collected from the PCB Grid (instead of the 60 specified in the work plan). A total of 17 analytical samples were collected from the PCB Grid area, including one duplicate sample, and 5 grab samples were collected outside the grid area.
- Duplicate soil samples collected as part of the chemical quality control were collected at a rate of 6 PCB field test kit duplicate samples for 156 project field screening samples. The goal of 1 duplicate for every 20 field screening samples was not met due to the increased number of samples collected and limited field screening supplies. Although the planned duplicate collection rate was one duplicate per analyte for every 10 project samples, duplicate analytical samples were collected at a rate of 1 duplicate for 13 VOC samples, 1 duplicate for 12 metals samples, and 3 duplicates for 53 PCB samples. Two duplicate PCB samples were inadvertently not submitted for analysis, though they were listed on the chain of custody.

4.3 Sample Collection Methods

Septic System and Area F Characterization activities included collecting samples for headspace screening, PCB field screening, and fixed-laboratory chemical analysis.

4.3.1 Headspace Screening

The soil at the Project Site was evaluated, or "screened", for volatile organic compounds using a Thermo Instruments OVM 580B photoionization detector (PID) calibrated with 100 parts per million (ppm) isobutylene standard gas. The PID was used to sample the volatile vapors released from the soil using an ADEC-approved headspace sampling method. Headspace samples were collected in resealable plastic bags by filling them with freshly exposed soil and then sealing the top. Headspace samples were warmed to a common temperature of at least 50 degrees Fahrenheit, and PID readings were obtained within 60 minutes of the sample collection.

4.3.2 PCB Field Screening

Field screening for PCBs was conducted using a Hach-brand PCB test kit to obtain estimated ranges of the PCB concentrations. The following samples were tested using the PCB screening kit.

- Selected samples from each of the 5 borings advanced in the Septic System Area. Portions of each of the four samples collected in the top 10 feet of each boring, and from samples at 5-foot intervals below 10 feet were set aside for PCB field screening. The PCB field screening samples for the borings were taken from the headspace screening bags collected from split-spoon sampling devices. Analytical soil samples were collected from each sample interval, although only a subset of these were submitted for fixed-laboratory chemical analysis.
- Each sample collected from the borings advanced in Area F.
- Surface and near-surface soil samples from the PCB Grid established around the former septic system CMPs. The grid soil samples were collected by hand excavating to 0.5 and/or 2 feet bgs. Grab samples collected from outside the grid were collected by hand excavating to 1 foot bgs.

Approximately 8 ounces of soil were collected for each field screening sample from the Area F borings and the PCB Grid. A small portion of each sample was removed from the sample bag and used for PCB field screening. Based on the results of the field screening, the remaining soil in the sample bag was either transferred to an analytical sample jar or replaced at the sample location.

Each field screening sample was placed in a labeled, disposable aluminum mixing pan and allowed to air dry. The air-dried soil was mixed until visually homogeneous. Approximately 5 grams of soil were placed in a soil extraction vial containing methanol to extract PCB constituents, then tested following the Hach test kit procedures, as shown in Photo 1

(Appendix B). The screening procedure consisted of sample dilutions, chemical treatment of the extract in antibody-coated test tubes, and electronic screening using a hand-held colorimeter. Standards for the Hach test kit screening were obtained at concentrations of 1.1 ppm, 4.9 mg/kg, 11 mg/kg and 38 mg/kg PCBs, normalized to the PCB congener Aroclor 1260. When the colorimeter indicated that the PCB concentration was less than the 1.1 mg/kg standard the screening value assigned to the sample was X < 1.1 mg/kg. A screening value of 1.1 mg/kg < X < 4.9 mg/kg was assigned to the sample when the colorimeter indicated that the PCB concentration was greater than 1.1 mg/kg but less than 4.9 mg/kg. The remaining possible screening values included: 4.9 mg/kg < x < 11 mg/kg; 11 mg/kg < x < 38 mg/kg; and x > 38 mg/kg. Field screening sample results are listed on Tables 1 and 3.

4.3.3 Analytical Samples

Analytical samples were generally collected based on field screening results and headspace screening readings. The soil samples analyzed for volatile constituents were collected using the ADEC sampling procedure for Alaska Method 101 (AK 101) and a field methanol extraction using Environmental Protection Agency (EPA) Method 5035. In accordance with the method, approximately 25 to 50 grams of soil were placed into a pre-weighed 4 ounce jar with septa lid. Afterward, 25 milliliters of reagent grade methanol were added to submerge the soil. The methanol extracted the volatile petroleum hydrocarbons from the soil at the time of sampling, thereby reducing the possible loss of volatile constituents prior to sample analysis.

Samples to be analyzed for non-volatile constituents were collected in 4-ounce jars with teflon-lined lids. Both the volatile and non-volatile sample jars were filled using decontaminated stainless steel spoons, and transferred to the laboratory in coolers with ice packs using chain-of-custody procedures. The number, depth, and classification of samples collected for the project are summarized in Table 1.

5.0 SEPTIC SYSTEM AREA

The former septic system is comprised of septic lines utilized during operation of WACS, and two CMPs and a seepage pit associated with the former septic system operation. Our septic trench investigation did not address the new septic system lines or other components installed subsequent to 1980, and the old septic line was not removed as part of this project. A general site plan identifying the Septic System Area site features is included as Figure 4.

5.1 Field Activities

As part of the current field efforts, a trench was excavated along the former septic line, the CMPs and seepage pit were investigated, borings were advanced in the Septic System Area, and a PCB grid was established in the vicinity of the CMPs. Photographs of site activities are included in Appendix B and boring logs and monitoring well construction details are included in Appendix C. Copies of the field notes, boring logs, and well development logs are included as Appendix D.

5.1.1 Septic Trench

BCX advanced trenches along the former septic system lines between October 18 and 19, 2006. Prior to advancing the septic trench, the local utilities, ADOT&PF, and the Federal Aviation Administration (FAA) were contacted to mark underground utilities within the project area. Due to the presence of the aboveground fuel lines crossing the former septic line, the septic trench was divided into two sections separated by the fuel lines and the PCB sampling grid. The two trench areas are referenced as the northwestern and southeastern trenches. With the permission of KSD personnel, the area around the northwestern trench was cleared of vegetation for proper access. After locating the former septic system line, the trenches were excavated along the north side of the line due to access limitations. The soil samples were collected from the trenches at depths of 10.5 to 11 feet bgs.

BCX began excavation of the northwestern trench adjacent to the new fuel pipelines and continued northwest along the former septic lines toward the seepage pit, as shown on Figure 5 and in Photo 2. The former septic line was encountered at approximately 9.5 to 10 feet bgs in the northwestern trench, as shown in Photo 3. The trench was advanced an additional 1 to 1.5 feet below the former septic line to collect soil samples. The northwestern trench was approximately 55 feet in length with a maximum depth of 11 feet bgs. Breaks in the septic line were not observed in the northwest trench; however, a water seep was observed approximately 15 feet from the fuel pipelines at a depth of 8 feet bgs. The source of the water seep is unknown but did not appear to be coming from the septic line.

The southeastern trench began at the edge of the PCB Grid and was advanced southeast toward the school for a total length of 35 feet, as shown on Figure 5 and in Photo 4. The former septic line was encountered at approximately 9 to 9.5 feet bgs in the southeastern trench. The trench was advanced to a maximum depth of 11 feet to facilitate sample collection. Two breaks in the septic line were noted in the southeast trench. A small puncture in the septic line was observed at the Sample TS8 location and a second break in the line was noted at the location of Sample TS9. The trench was extended past the second break in the septic line; however, the former septic line was not found beyond this break, as shown in Photo 5. The excavation activities were terminated when a wood board was encountered in the trench. The board was oriented perpendicular to the trench. It is presumed that the second break in the old septic line was created during installation of the existing septic system serving the school, and that the wooden board may mark the location of the existing system.

Soil excavated from each trench was placed on a 6-mil liner adjacent to the trench. Soil samples were collected from the trench base at 15-foot intervals and at breaks in the former septic line using the backhoe bucket. Following sample collection, the excavated soil was used to backfill the trench. The trench was compacted with the backhoe bucket and tracked equipment. Sample locations are shown on Figure 5 and listed in Table 1. Backfill activities are depicted in Photos 6 through 9.

The former septic line observed in both trenches appeared to be constructed of 3-foot sections of fiber-wrapped cement pipe. Shannon & Wilson personnel did not enter the trench; therefore, closer inspection of the pipe was not conducted. Based on the apparent construction of the septic line, the pipe material may potentially be asbestos containing. Additional testing should be conducted on the former septic line material prior to removal or demolition of the former septic system. The pipe connections to the CMPs and seepage pit were not directly observed by Shannon & Wilson field personnel. Additionally, the presence of a tank beneath the CMPs was not confirmed during excavation activities.

5.1.2 CMPs and Seepage Pit

Two vertical CMPs and one seepage pit associated with the former septic system were investigated. The CMPs are located northwest of the school and southeast of the fuel lines, as shown on Figure 5. The seepage pit is located at the northwest end of the old septic line. Both the CMPs and the seepage pit contained miscellaneous debris including wood, plastic, and metal scraps; paper and cardboard waste; and organic detritus. CMP1 and CMP2 were constructed of 4-foot diameter pipes extending to total depths of 7 and 7.5 feet, respectively. A 4-foot diameter pipe approximately 4 feet long accessed the seepage pit. Beneath the access pipe, the hole expands to a wider aperture to the pit bottom. The locations of the CMPs and seepage pit are shown on Figure 4 and in Photos 10 and 11, respectively.

Soil samples were collected from the bottom of the CMPs and seepage pit interiors by driving a split spoon sampler 1 to 1.5 feet into the sediment of the CMPs and seepage pit (Photo 12). Sample CMP1 was collected from a depth of approximately 7 to 8 feet bgs and Sample CMP2 was collected from about 7.5 to 8.5 feet bgs. The seepage pit sample, designated Sample SPS1, was collected from approximately 20 to 21 feet bgs. During advancement of the split spoon sampler in CMP2, the split spoon penetrated an approximately 2 to 3 foot deep void and appeared to be resting on a metal object at approximately 10 feet bgs. The sample collected from

CMP2 was wet and was classified as brown to gray, sandy gravel with numerous organics and a septic odor. It is possible that the split spoon punctured the top of the former septic tank during sampling activities. Note that it is unlikely that the split spoon was driven through the bottom of the tank because sample driving ceased once the split spoon passed through the void. Soil samples collected from the CMPs and seepage pit were submitted for analytical testing, no headspace screening or PCB field screening was conducted on these samples. Sample locations and descriptions are included in Table 1.

5.1.3 Soil Borings

Five borings, designated Borings B1 through B5, were advanced between October 20 and 23, 2006, by Discovery. The Boring B1 and B2 locations were pre-determined by ADEC and situated in the vicinity of the seepage pit and CMPs, respectively. As shown on Figure 4, Borings B3 and B4 were generally located to the north and northwest of the former septic system, and were positioned based on the suspected groundwater flow direction. At ADEC's request, Boring B5 was advanced to the southeast of Area F. A Shannon & Wilson representative was present during field activities to identify boring locations, log the materials encountered during drilling, and collect field and analytical soil samples.

Discovery provided a track mounted CME-55 Nodwell rig equipped with 4.25-inch inside diameter (I.D.) hollow stem augers to advance the soil borings. Boring depths ranged from approximately 18 to 30 feet bgs. Drill cuttings generated during the advancement of Borings B1, B2, and B5 were containerized in labeled 55-gallon open-top steel drums. Drill cuttings from Borings B3 and B4 were used as backfill in the associated bore hole.

Three-inch outside diameter (O.D.) split spoon samplers were used to collect soil samples. Soil samples were collected by driving the split-spoon sampler ahead of the auger flights using a 340-pound hammer. Soil samples were collected from the borings at 2.5-foot intervals beginning at the ground surface and continuing to the water bearing zone. During advancement of Boring B2, a thin water layer with a strong septic odor was noted at about 13 feet bgs. This water layer and septic odor may be associated with the CMP2 sampling activities that potentially punctured the old septic tank.

Soil samples collected during drilling were selectively screened for VOCs with a PID and for PCBs using the HACH field test kit. Samples from the top 10 feet bgs were screened for both VOCs and PCBs. Beneath 10 feet bgs, each sample was screened with the PID, and samples were screened for PCBs at 5-foot intervals. Based on the field screening results, three soil samples from each borehole were selected for laboratory analyses of PCBs. Given the low mobility of PCBs in soil, at least two of the three PCB samples per boring were selected from the upper 15 feet, unless the field screening indicated greater contamination at depth. Three soil samples from Boring B2 were submitted for PCB analysis. Sample B2S1 was submitted based on the field screening result. Sample B2S2 was submitted to confirm the field screening result of X<1.1 ppm. Sample B2S6 was submitted based on field observations (soil appeared wet and had a septic odor) and corresponding depth of Sample CMP2. Based on field screening results, there was no indication of PCB contamination at the B2S3 sample interval.

The sample with the highest PID value in each borehole was analyzed for VOCs, and one sample from each borehole was submitted for RCRA Metals analysis. The samples for metals analysis were obtained within 5 feet of the base of the septic lines or other potential sources - absent this information, the samples were collected in the upper 10 feet bgs. Sample locations and descriptions are included in Table 1, and summarized in individual boring logs included in Appendix C. Boring locations are shown in Photos 13 through 16.

5.1.4 Monitoring Well Installation, Development, and Sampling

Borings B1, B2, and B5 were completed as Monitoring Wells MW1, MW2, and MW3, respectively. The wells were constructed of 2-inch nominal I.D., schedule 40, polyvinyl chloride (PVC) pipe with threaded connections. The bottom 10 feet of each well consisted of "pre-pack" screened sections containing 20-40 silica sand. Solid 2-inch diameter PVC riser pipes were attached to the well screens and extended to the ground surface. The borings were backfilled with silica sand placing the screened portions of the wells so that the slotted interval will encompass the expected low and high groundwater levels. A continuous silica sand pack was used to backfill around the well screens and extended approximately 1.5 to 2.5 feet above the screen. Bentonite chips were used to backfill around the PVC located above the sand pack to approximately 1 to 3 feet below grade. Sand was placed over the bentonite chips to allow for drainage of water that might otherwise accumulate in the monument. Flush-mounted protective monuments were installed around the monitoring wells and embedded in cement. The monitoring well construction details are included in Appendix C, and Monitoring Well MW1 and MW2 locations are shown in Photo 17.

Prior to collecting groundwater samples, the wells were developed between October 23 and 24, 2006, using a submersible pump with disposable tubing and a surge block. During development, water quality parameters, including pH, temperature, specific conductivity, dissolved oxygen, oxidation reduction potential (ORP), and turbidity, were measured at regular intervals using YSI flow through cell and Hach water quality instruments. Well development was considered complete for Monitoring Wells MW2 and MW3 when the water quality parameters stabilized. The development process was considered complete in Monitoring Well MW1 when the well was purged dry 3 times. After purging Well MW1 dry, the well was allowed to recharge and then surged for 10 minutes before purging again. The well development data are summarized in Table 2.

Following development, the wells were allowed to equilibrate for at least 24 hours before sampling. The wells were then purged using low-flow methodology. The pump rate was set at approximately 0.3 to 0.5 liters per minute and drawdown was measured regularly throughout the purging/sampling process. A maximum drawdown of 3 inches was reported during the purging/sampling process. In accordance with EPA guidance (USEPA 1996), purging was considered complete when stabilization criteria were met over three successive readings. Samples were collected using a submersible pump and were transferred to their respective containers in order of volatility, sealed, and labeled. The development and purge water was placed in labeled 55-gallon drums and stored onsite.

5.1.5 PCB Grid

PCB-impacted surface and near surface soil has been documented in the vicinity of the CMPs. On October 17, 2006, a PCB Grid was established over the surface of the suspected PCB-contaminated soil area. The initial grid was 25 feet long and 25 feet wide and was centered around the CMPs, as shown on Figure 6 and in Photo 19. The grid was comprised of 25, five-foot squares designated A1 through A5 to E1 through E5. There were no notable signs of recent soil disturbance or of visually impacted soils in the vicinity of the PCB Grid. Based on the site activities (including truck and school bus traffic), it was difficult to determine if the area had been recently graded or was merely compacted by vehicle and foot traffic. There was vegetation within the PCB Grid and areas to the west and southwest of the PCB Grid.

Samples were collected from the center of each grid square except in grid Squares B3 and D3. Squares B3 and D3 were the CMP locations and the samples were shifted to the western and eastern sides of the grid square, respectively. Field screening samples were collected from individual grid squares at depths of 0.5 and 2 feet bgs.

Based on the results of the initial field screening, 17 additional grid squares were added along the grid's northeastern and southeastern corners on October 25, 2006. Due to limited PCB field screening supplies, screening samples were collected from the additional grid squares based on screening results of adjacent squares. Six additional grid squares were sampled at a depth of 0.5 foot, with the remaining 11 squares sampled at depths of both 0.5 and 2 feet. Field screening results from the additional squares indicated elevated PCB concentrations in four grid squares at the limits if the PCB grid, (Grid Squares B0, C0, D0, and C6). Due to the limited field screening supplies, the samples exceeding the lower screening level of 1.1 mg/kg to 4.9 mg/kg Aroclor 1260 were not screened at the higher level, 11 mg/kg to 38 mg/kg Aroclor 1260.

Analytical samples were collected from 11 locations within the grid, based on field screening results. The analytical samples were collected to characterize the areas with the highest PCB concentrations; be spatially representative of the PCB grid area; and determine the correlation between the field screening and analytical sample results over the range of screening concentration intervals. The analytical sample from Square C0 corresponds to the highest field screening reading measured in the grid screening samples.

At the request of ADEC, five additional PCB analytical samples were collected from the locations shown on Figure 6. These sample locations were selected because the field screening results for the outermost grids at these locations indicated potential PCB contamination. Three grab samples were collected from areas southwest of the PCB grid and two grab samples were collected from areas northeast of the grid. PCB field screening was not conducted on these samples because the supply of field screening kits was exhausted.

5.2 Field Observations of Septic System Elements

The former septic system elements observed during Shannon & Wilson's October 2006 field activities consisted of septic system piping, two CMPs, and a seepage pit. The field observations of the piping construction were conducted from the ground surface, as Shannon & Wilson personnel did not enter the trench.

Piping was observed in each of the two trenches excavated for this project. As shown on Figure 5, about 35 feet of pipe was observed in the southeast trench and about 70 feet of pipe was observed in the northwest trench. The piping was present at depths of approximately 9 to 9.5 feet bgs in the southeast trench, and approximately 9.5 to 10 feet bgs in the northwest trench. Connections between the septic pipe and the CMPs and seepage pit were not observed, but were inferred from the orientation of the pipe sections.

The piping observed in both trenches consisted of individual sections of solid pipe connected using bell couplings. The 3-foot pipe sections appeared to be constructed of fiber-wrapped cement pipe, with an estimated 6-inch diameter. When exposing the septic lines during the trenching activities, care was taken not to compromise the pipe integrity, and the trenching was conducted adjacent to the pipe. Despite this caution, the soil disturbance near the piping caused one joint to decouple. Based on the ease of this decoupling and the apparent absence of threaded connections, Shannon & Wilson's field representative concluded that the couplings between pipe sections were loose, and that the piping may be pervious to fluid flow and had the potential to leak.

Shannon & Wilson observed the aboveground sections of CMP and seepage pit access. Each of these three components was constructed of 48-inch diameter corrugated metal pipe that was generally flush with the ground surface. Soil and debris were encountered in CMP1 and approximately 7 feet bgs, at 7.5 feet bgs in CMP2, and approximately 20 feet bgs in the seepage pit. The subsurface construction of these pipes or of potential underlying tank(s) was not verified, although sample collection provided limited information regarding a potential septic tank. During advancement of a split spoon sampler in CMP2, the split spoon penetrated an approximately 2 to 3 foot deep void encountered at 7.8 feet bgs. The split spoon appeared to be resting on a metal object at a depth of approximately 10 to 11 feet. No other direct evidence of a septic tank(s) was noted.

5.3 Laboratory Analysis

The soil and water samples were selectively analyzed for PCBs by EPA 8082, volatile organic compounds (VOCs) by EPA Method 8260B, and Resource Conservation Recovery Act (RCRA) metals by EPA Method 6000/7000 series. Soil samples analyzed for VOCs were selected based on headspace screening results while samples analyzed for PCBs were selected based on PCB field screening results.

Quality control samples consisted of two methanol soil trip blanks, one water trip blank, and one decontamination water sample. The trip blanks were used to evaluate potential cross contamination of volatile constituents. The trip blanks were analyzed for VOCs by EPA Method 8260B. The results of the soil and water analyses are summarized in Tables 3 and 4, respectively. Detailed laboratory reports are included in Appendix E.

Under the sample numbering scheme used for this project, a typical analytical sample number is 17070-TS1 for septic trench samples, 17070-SPS1 for seepage pit samples, 17070-CMP1 for CMP samples, 17070-B1S3 for soil boring samples, 17070-C0S1 for PCB grid samples, 17070-MW1 for groundwater samples, and 17070-RS1 for decontamination/rinsate samples. The '17070' indicates the Shannon & Wilson job number. The 'TS1', 'SPS1', 'CMP1', 'B1S3', 'C0S1', and 'MW1' designations represent the sample identification numbers. For brevity in the text of this report, the '17070' prefix is omitted and samples are identified by their sample identification number.

5.4 Subsurface Conditions

The Septic System Area consisted of approximately 10 feet of fill in the vicinity of the on-site buildings and former septic line. Soil in the remaining areas was generally described as sandy silt to silt. The septic trench consisted primarily of sandy gravel, with sandy silt to silt in the northwestern portion of the northwest septic trench. Scattered organics were observed in the top 3 feet of the northwest septic trench.

The subsurface conditions in Borings B1, B3, and B5 generally consist of medium stiff, slightly sandy silt from the ground surface to 10 to 15 feet bgs. A layer of gravelly sand to sandy gravel underlies the sandy silt in Boring B1 followed by approximately 10 feet of sandy silt to silty sand. Boring B1, which was advanced deeper than B3 and B5, contained sandy gravel in the bottom 3 feet, from 27 to 30 feet bgs.

Borings B2 and B4 generally consisted of gravelly sand from the ground surface to about 7 feet bgs. Boring B4 contained an approximately 9-foot thick sandy gravel layer below 7 feet. The remaining soils in Borings B2 and B4 were generally described as silty sand to sandy silt to the bottom of the borings.

Groundwater was encountered between 17.5 to 27 feet bgs during drilling, with static water levels in the monitoring wells measured between 17.5 and 24 feet. Groundwater was encountered deeper in the borings located on the elevated portions of the Project Site along the former septic system and driveway areas (Borings B1, B2, and B4). Based on the October 25, 2006 water depth measurements from the three monitoring wells, the groundwater flow direction at the Project Site is to the southwest at a 0.07 percent gradient, as shown on Figure 4.

5.5 Discussion of Analytical Results

The results of the soil and groundwater testing are discussed below. The applicable soil and groundwater cleanup levels are contained in the October 16, 2005 Oil and Other Hazardous Substances Pollution Control Regulations of 18 AAC 75. The soil cleanup levels were developed using Tables B1 and B2 of 18 AAC 75.340 for Method Two 'under 40-inches' precipitation zone cleanup criteria. The listed cleanup levels include a default level of 1.0 mg/kg for PCBs. Note that the only PCB compound detected in the analytical samples collected during this characterization effort was Aroclor 1260. The groundwater cleanup levels are contained in Table C of 18 AAC 75. The soil and groundwater cleanup levels are listed in Tables 3 and 4, respectively.

5.5.1 Septic Trench Samples

A total of eight analytical samples were submitted from the septic trench: five from the northwest trench and three from the southeast trench.

VOC Results

Detectable VOC constituents were measured in three trench samples (Samples TS6, TS7, and TS8). Each of these three samples contained detectable TCE: Sample TS6 contained 0.0491 mg/kg, Sample TS7 contained 0.0755 mg/kg, and Sample TS8 contained 0.0414 mg/kg. As shown on Figure 5, Samples TS7 and TS8 are located near the CMPs in the trench's southeast end. Sample TS6, located adjacent to the seepage pit at the trench's northwest end, also contained detectable quantities of 1,4-Dichlorobenzene, and 1,2,4-trichlorobenzene.

PCB Results

PCBs were detected in five of the seven samples analyzed for PCBs. Sample TS7 contained 1.20 mg/kg. PCB concentrations less than 1 mg/kg were measured in Samples TS1, TS3, TS8, and TS9, at a maximum concentration of 0.819 mg/kg. The PCB concentrations were generally higher in the southeast trench.

Metals Results

RCRA metals were detected in Samples TS6 through TS9. Sample TS6 contained 12.2 mg/kg arsenic, exceeding the applicable ADEC cleanup level of 2 mg/kg. Samples TS7, TS8, and TS9 contained a maximum arsenic concentration of 6.68 mg/kg. A concentration of 27.4 mg/kg chromium was detected in Sample TS6 in excess of the ADEC cleanup level of 26 mg/kg. In Shannon & Wilson's opinion, the arsenic and chromium concentrations are generally typical of background concentrations. Concentrations of barium, cadmium, chromium, mercury, lead, selenium, and silver were detected in the septic trench samples at concentrations less than the applicable cleanup criteria.

The remaining target analytes were either not detected, or were measured at concentrations less than the applicable ADEC cleanup levels.

5.5.2 CMP and Seepage Pit Samples

Three samples were submitted, one each from CMP1, CMP2, and the seepage pit. Concentrations of VOCs, PCBs, and RCRA Metals were detected at concentrations greater than the applicable ADEC cleanup levels in each of these three samples. The compounds detected in the CMPs and seepage pit samples are largely the same as those detected in the septic trench and borehole soil samples, although in greater concentrations.

VOC Results

The VOC compounds TCE, cis-1,2-Dicloroethene, and 1,2-Dichloropropane were detected in Sample CMP2 at concentrations greater than the applicable cleanup criteria. Sample CMP2 contained 3.27 mg/kg TCE, 0.279 mg/kg cis-1,2-Dicloroethene, and 0.244 mg/kg 1,2-Dichloropropane. The seepage pit Sample SPS1 contained 2.84 mg/kg 1,2,4-Triclorobenzene, which exceeds the 2 mg/kg ADEC cleanup criterion. The remaining VOC analytes were either not detected, or were measured at concentrations less than the applicable cleanup levels.

PCB Results

Concentrations of PCBs greater than 1 mg/kg were detected in Samples CMP1, CMP2, and SPS1 at concentrations of 20.5 mg/kg, 40.6 mg/kg, and 262 mg/kg, respectively.

Metals Results

Arsenic concentrations, ranging from 5.64 mg/kg in Sample CMP2 to 48.2 mg/kg in Sample SPS1, were detected at concentrations greater than the applicable ADEC cleanup level. Whereas the 5.64 mg/kg arsenic in Sample CMP2 is generally considered consistent with background concentrations, the 20.5 mg/kg arsenic measured in Sample CMP1 and 48.2 mg/kg arsenic in Sample SPS1 are considered elevated above background concentrations. Maximum concentrations of 40.9 mg/kg cadmium, 76.7 mg/kg chromium, 604 mg/kg lead, 5.65 mg/kg mercury, 12.3 mg/kg selenium, and 64.8 mg/kg silver were detected at concentrations greater than applicable cleanup levels in Samples CM2 and/or SPS1. The remaining RCRA Metals were detected at concentrations less than the applicable ADEC cleanup criteria.

5.5.3 Soil Boring Samples

Twenty-one soil boring samples, including 2 duplicate samples, were submitted for analysis. One sample from each boring was submitted for VOC analysis, one for RCRA Metal analysis, and 3 for PCB analysis. Samples tested for PCB analyses were selected based on field screening results and discrete depth intervals of interest. For example, consider Boring B2 - Sample B2S1 (0 to 2 feet bgs) was selected based on the field screening result of X>1.1 ppm, Sample B2S2 (2.5 to 4.5 feet bgs) was selected to confirm the field screening result of X<1.1 ppm, and Sample B2S6 (12.5 to 14.5 feet bgs) was selected based on field observations (soil appeared wet and had a septic odor) and corresponding depth of Sample CMP2. Based on field screening results, there was no indication of PCB contamination at the B2S3 (5 to 7 feet bgs) sample interval.

VOC Results

Sample B4S8, collected from 17.5 to 19.5 feet bgs in Boring B4, contained 0.305 mg/kg TCE, exceeding the applicable ADEC cleanup criterion. The remaining VOC analytes were not detected in the soil boring samples. Note that the laboratory reporting limit for trichloroethene in Samples B1S11 (25 to 27 feet bgs), B2S3 (5 to 7 feet bgs), B3S1 (0 to 2 feet bgs), and B5S8 (17.5 to 19.5 feet bgs), and 1,2-Dichloropropane in Samples B4S8 and B5S8, exceed the cleanup criteria for trichloroethene and 1,2-Dichloropropane. Although the samples submitted for VOC analysis were selected based on headspace screening results, only Sample B1S11 was collected from a depth likely to detect a VOC release from either the septic line or base of the seepage pit.

PCB Results

PCBs were detected in 7 of the 16 soil boring samples submitted for PCB analysis, at concentrations less than 1.0 mg/kg. Samples B1S4 (7.5 to 9 feet bgs), B1S7 (15 to 17 feet bgs), B2S1 (0 to 2 feet bgs), B2S2 (2.5 to 4.5 feet bgs), B3S3 (5 to 7 feet bgs), B4S3 (5 to 7 feet bgs), and B5S1 (0 to 2 feet bgs) contained PCB concentrations ranging from 0.0627 mg/kg in Sample B5S1 to 0.684 mg/kg in Sample B1S7. The remaining samples did not contain detectable concentrations of PCBs.

Results of the soil boring samples indicate the presence of PCBs across the Septic System Area. At least one sample from each boring contained detectable PCBs, although no concentrations in these samples exceed the applicable cleanup level (1 mg/kg). The concentration of PCBs detected in Sample B1S7, collected from Boring B1 at a depth of 15-17 feet, may be the effect of a release from the former septic system (septic line and/or seepage pit).

The analytical results from the septic trench and boring soil samples indicate low level PCB contamination beneath the former septic line and in the vicinity of the seepage pit. In particular, the PCB concentrations detected in Borings B1 and B3 and the septic trench samples are likely associated with the former septic system. Based on the close proximity of Boring B1 to the seepage pit and the low/non-detect PCB concentrations reported in the samples collected from this borehole between 5 and 9 feet bgs, we conclude that the PCB concentration measured in the sample from 15 to 17 feet bgs is likely associated with the seepage pit. Because the ground surface along the former septic line is between 6 to 10 feet higher than the Boring B3 location, the PCB concentration detected at 5 to 7 feet bgs in Boring B3 may be a result of a release(s) in the vicinity of the former septic system (either from a distinct source and/or one associated with the septic system and piping). Because the near-surface sample from this boring did not contain detectable PCBs, it is unlikely that the source of the detected concentration is from a surface release in this location.

Metal Results

Concentrations of arsenic greater than the applicable cleanup level were measured in each of the soil boring samples submitted for RCRA Metal analysis. Arsenic concentrations ranged from 4.58 mg/kg in Sample B2S6 (12.5 to 14.5 feet bgs) to 12.8 mg/kg in Sample B1S7 (15 to 17 feet bgs). In Shannon & Wilson's opinion, the arsenic concentrations are generally within typical of background concentrations for the area. The remaining target metals were either not detected or not detected above applicable ADEC cleanup levels.

5.5.4 PCB Grid Samples

Seventeen samples associated with the PCB grid, including one duplicate sample, were submitted for PCB analysis. Twelve grid samples, including A1S1, B3S2, B5S1, C0S1, C2S2, D1S1, D2S1 (duplicate D2S3), D5S2, E2S2, F4S2, and F6S1 were collected from the PCB Grid. Five additional grab samples, designated Samples B^{-}1S1, C^{-}2S1, C7S2, D^{-}1S1, and F8S2, were collected from areas around the PCB Grid.

Seven of the grid samples contained concentrations of PCBs greater than 1 mg/kg. PCB concentrations ranged from 1.00 mg/kg in Sample D1S1 to 85.5 mg/kg in Sample C0S1. Samples B3S2, D5S2, E2S2, and F4S2 contained PCB concentrations less than 1 mg/kg.

The PCB grab samples contained a maximum of 433 mg/kg PCBs, measured in Sample D^{-}1S1 collected to the southwest of the PCB Grid at a depth of 1 foot bgs. Samples B^{-}1S1 and C^{-}2S1, collected 7 feet from D^{-}1S1, contained 82.2 mg/kg and 35.7 mg/kg PCBs, respectively. Sample F8S2 contained 3.79 mg/kg PCBs and was collected northeast of the PCB Grid. Sample C7S2 contained less than 1 mg/kg.

The distribution of PCBs in the PCB Grid Area indicates surface release(s), and/or movement of PCB-impacted soil during grading, snow plowing, excavating, or other site activities. The variability in concentrations suggests that there was likely not a single point-source release event, unless the release occurred in winter such that the spill took place on ice. The limited sampling conducted in Borings B2 and B4 provides indications of the vertical extent of PCB-impacted soil in the fill area east of the fuel lines. None of the analytical samples for these two borings at depths greater than 5 feet bgs contained detectable PCBs.

5.5.5 Field Screening Comparison

PCB field screening was conducted on samples from the soil borings and the PCB Grid. Fourteen PCB analytical samples and corresponding PCB screening samples were collected from the borings. Of the 14 PCB samples collected from the borings, 7 screening results were biased high relative to the corresponding analytical results, and the remaining 7 screening results were accurate. The screening results that were biased high were in the 1.1 to 4.9 mg/kg screening range, with corresponding analytical results ranging from non-detect to 0.684 mg/kg PCBs. The accurate screening results in the borings were in the less than 1.1 mg/kg range.

Analytical samples were collected from eleven locations within the PCB Grid. The comparison between analytical and field screening results indicate 7 of the 11 screening results were accurate, with the remaining 4 screening samples biased high. The accurate screening results were in the less than 1.1 mg/kg range, 1.1<x<4.9 mg/kg range, and 11<x<38 mg/kg range. The screening results that were biased high included the 1.1<x<4.9 mg/kg (3 samples) and 11<x<38 mg/kg (1 sample) ranges. For each of these samples, the concentration measured by the project lab was less than 1.0 mg/kg. Based on this comparison, the field screening appears to generally be accurate at very high and very low concentrations, with a tendency to be biased high in the 1.1<x<4.9 mg/kg range.

5.5.6 Groundwater Samples

Monitoring Wells MW1, MW2, and MW3 were sampled on October 25, 2006. With the exception of the concentration of TCE in the sample collected from Monitoring Well MW2, the target analytes were either not detected or below the applicable cleanup levels. Sample MW2 contained 0.00544 mg/L TCE which exceeds the applicable ADEC cleanup level of 0.005 ppm. The groundwater analytical results are summarized in Table 4.

6.0 AREA F

Samples collected from Area F in August and September 1983 contained a maximum PCB concentration estimated to be 19,000 mg/kg (depth of collection unknown). The boundaries of the Area F study area for this project were determined using hand drawn sketches and notes completed by Bruce Erickson of ADEC during the 1983 cleanup effort As part of the fall 2006 characterization effort, representatives of Shannon & Wilson conducted soil screening and sampling of surface and shallow subsurface soils to a maximum depth of 5 feet.

6.1 Field Activities

The Area F Characterization activities were conducted in general accordance with the 18 AAC 75 Oil and Other Hazardous Substances regulations, as amended through October 16, 2005.

On October 20, 2006, ten shallow soil borings, designated Borings FB1 through FB10, were advanced in Area F by Discovery in the locations shown on Figure 7. Three soil samples were collected from each boring at depths of 0 to 0.5 foot, 2 to 2.5 feet, and 4.5 to 5 feet. PCB field screening samples and analytical samples were collected from each sample collected from the borings. Based on the field screening results, one soil sample from each boring was submitted for analytical testing. Descriptions of the screening samples and soil samples are included in Table 5 and the analytical results are summarized in Table 6. Photos of Area F sampling activities are included as Photos 19 and 20 in Appendix B.

6.2 Laboratory Analysis

The soil samples were analyzed PCBs by EPA Method 8082. The results of the soil analysis are summarized in Table 6. Detailed laboratory reports are included in Appendix E.

Under the sample numbering scheme used for this project, a typical analytical sample number is 17070-FB1S1 for soil boring samples. The '17070' indicates the Shannon & Wilson job number. The 'FB1S1' designation represents the sample identification number. For brevity in the text of this report, the '17070' prefix is omitted and samples are identified by their sample identification number.

6.3 Subsurface Conditions

The subsurface conditions in Borings FB1, FB2, and FB3 consisted of an approximately 2 foot thick layer of loose, gravelly to silty sand. Borings FB4 through FB10 generally consisted of soft to medium stiff, sandy to organic silt in the top 2 feet. Below 2 feet, relatively uniform conditions exists, consisting of soft to medium stiff, sandy silt with scattered organics to 5 feet bgs. Groundwater was not encountered in the Area F borings.

6.4 Discussion of Analytical Results

The applicable soil and groundwater cleanup levels are contained in the October 16, 2005 Oil and Other Hazardous Substances Pollution Control Regulations of 18 AAC 75. The soil cleanup levels were developed using Tables B1 and B2 of 18 AAC 75.340 for Method Two 'under 40-inches' precipitation zone cleanup criteria. The soil cleanup levels are listed in Table 6.

6.4.1 Analytical Results

One analytical sample from each shallow boring in Area F was submitted for PCB analysis. The sample with the highest PCB field screening result from each boring was submitted for analysis. In the absence of a highest screening result, the samples were selected to be spatially representative of the area and collected from the top 2.5 feet. A PCB concentration of 2.56 mg/kg was detected in FB5S2, exceeding the applicable ADEC cleanup criterion of 1 mg/kg. Note that the duplicate soil sample, designated FB5S4, contained 0.83 mg/kg PCBs.

PCB concentrations between 0.0823 and 0.421 mg/kg were detected in five of the remaining samples, less than the applicable cleanup level. Samples FB1S2, FB3S1, FB7S2, and SB10S2 did not contain detectable concentrations of PCBs.

6.4.2 Field Screening Comparison

PCB field screening was conducted on each sample collected from the Area F soil borings. Ten PCB analytical samples were collected from the borings. Of the 10 PCB samples collected from the borings, 4 screening results were biased high, the remaining 6 screening results were accurate. The 4 screening results that were biased high were in the 1.1 to 4.9 mg/kg screening range and the corresponding analytical results ranged from non-detect concentration to 0.192 mg/kg PCBs. The accurate screening results in the borings were in the less than 1.1 mg/kg and 1.1<x<4.9 mg/kg ranges.

7.0 SURVEY

Del Norte prepared a survey of the former septic line, the PCB grid, soil borings, monitoring wells, Area F soil borings, and other applicable site features. The survey included recording ground elevations for the soil borings and the top of the casings for the groundwater monitoring wells. The points were surveyed to an accuracy of 0.01 foot. The coordinates and elevations are Alaska DOT local airport and derived from airport control monuments. The monitoring well locations were also surveyed in State plane coordinates, provided in NAD83 (CORS96) (EPOCH:2003.0000), zone 6, and expressed in U.S. Survey Feet. The vertical datum is based on ANIAK NE 1949, elevation of 84.00 feet (Alaska DOT airport control). The well elevations and corresponding groundwater elevations are included in Table 2 and groundwater contours are included on Figure 4. A copy of the survey map provided by Del Norte is included in Appendix F.

8.0 DATA QUALITY ASSESSMENT

The project laboratory follows on-going quality assurance/quality control procedures to meet applicable ADEC data quality objectives (DQO). Internal laboratory controls to ensure data quality for sample batches generally include method blanks, matrix spike/matrix spike duplicates (MS/MSD), and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to determine recovery rates, precision, and accuracy. If a DQO was not met, the project laboratory provides a report specific note identifying the problem in the Notes and Definitions section of their Laboratory Analysis Report (See Appendix E).

Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's Laboratory Data Review Checklist, which is included in Appendix E. The VOC surrogate, 1,2-

Dichloroethane-D4, recovery was biased high for samples B5S10, SPS1, CMP1, and CMP2. Because the remaining VOC surrogates are within the recovery control limits, the results are considered acceptable. The PCB surrogate decachlorobiphenyl was biased low in Samples CMP1 and SPS1 due to dilution; based on the results of the LCS and method blank, the results are acceptable. The laboratory reports indicate a high percent recovery for select VOC analytes in the LCS/LCSD. Analytes with high recoveries were not detected in the project samples, suggesting that the results are useable.

External quality controls include field records, field duplicate samples, and trip blanks. Data validation was performed to assess the field records and analytical test results. Field logs and records were checked for completeness, accuracy, and adherence to field procedures established in ADEC's guidance documents. No discrepancies were identified in the field records that would impact the validity of the data.

The analytical data evaluation included a review of six PCB field test kit duplicate sample sets, laboratory results for five field duplicate sets, one water trip blank, and two soil trip blanks. The PCB field test kit duplicate sample sets were collected to assess sampling and field screening precision. The relative percent difference (RPD) for the field test kit screening samples ranged between a minimum of 4 percent (%) and a maximum of 32.5 %. The RPD results are generally considered acceptable.

Four duplicate soil sample sets, Sample Sets FB5S2/FB5S4, B2S6/B2S14, B5S8/B5S10, and D2S1/D2S3 were collected. Two duplicate sample sets were analyzed for PCBs, the RPD for FB5S2/FB5S4 was 100 % and the RPD for D2S1/D2S3 was 1.6 %. The concentrations measured in Samples FB5S2 and FB5S4 are within 3 times of each other and are considered acceptable. One duplicate sample set was analyzed for RCRA Metals. RPDs were calculated for arsenic (5.7 %), barium (38.9%), chromium (20.6%), and lead (73.7%). The RPDs for barium and lead are considered acceptable because the sample results are within 2 to 2.2 times of each other. The RPDs for the remaining RCRA Metal target analytes could not be calculated due to non-detect result in one or both samples. One duplicate sample set was analyzed for VOCs, the RPD for VOC analytes could not be calculated because one or both of the samples contained non-detect concentrations of target analytes. The results of the duplicate sample sets are considered acceptable.

A field duplicate groundwater sample set, consisting of Samples MW2/MW4, was collected as part of the quality control program for this project. The RPDs for TCE and barium were 4.1% and 0%, respectively. The remaining RPDs could not be calculated for the target analytes because the results were non-detectable. The results of the duplicate sample set are considered acceptable.

Two soil trip blanks and one water trip blank accompanied the sample jars from the laboratory to the Project Site during sampling activities and back again to SGS. VOCs were not detected in the trip blanks, suggesting that contamination of the sample containers or samples did not occur during transport, handling, or storage processes of the project samples.

9.0 INVESTIGATION DERIVED WASTE

Investigation derived waste for this project included drill cuttings, purge water, decontamination water, and PCB contaminated waste. Drill cuttings from Borings B1, B2, and B5 were containerized in 55-gallon drums and stored adjacent to the boring location. Based on analytical results and conversations with the ADEC project manager, the concentrations of arsenic measured in each of the borings is generally considered background. The drill cuttings from each of these three borings will be land spread in the vicinity of the respective boring in the spring of 2007. Soil containing PCB concentrations greater than 1 mg/kg was not generated during this project.

Purgewater from Monitoring Wells MW1, MW2, and MW3 was contained in individual 55-gallon drums and stored adjacent to the school. Based on analytical results, purgewater from Monitoring Wells MW1 and MW3 will be discharged to the ground surface. Purgewater from Monitoring Well MW2 contained concentrations of TCE exceeding applicable cleanup criterion.

The decontamination water generated during field activities was containerized in a 55-gallon drum and stored adjacent to the school. An analytical sample was collected from the decontamination water for characterization and disposal purposes. Based the analytical results, concentrations of PCBs exceeding the ADEC cleanup criterion of 0.0005 were detected in the decontamination water.

One drum of liquid PCB field test kit waste was generated during the field activities. The MSDS for the field test kits was used to characterize the drum contents.

Monitoring Well MW2 purgewater, decontamination water, and PCB liquid waste was shipped back to Anchorage, Alaska. The purgewater and decontamination water was disposed at Emerald Alaska. The PCB liquid waste was transported to U.S. Ecology in Idaho for treatment. Disposal receipts are included in Appendix G.

Other waste generated during this project included used liner material, used sampling equipment, uncontaminated PCB test kit materials, and miscellaneous personal protective equipment (PPE). These wastes qualify as uncontaminated solid wastes, and were disposed at the local landfill.

10.0 CONCLUSIONS

Previous investigations have identified soil impacted with PCBs, TCE, and RCRA metals at the Project Site. As part of the Septic System and Area F Characterization activities trenches were excavated; CMPs and seepage pits were investigated and sampled; soil borings were advanced; monitoring wells installed, developed and sampled; a PCB grid was established; and headspace screening, PCB field screening, and analytical soil and water samples were collected. Based on field observations, and field screening and analytical results, impacted soil and water is present at the Project Site.

10.1 Septic System Area

Concentrations of PCBs, RCRA Metals, and/or VOCs in excess of the applicable cleanup levels were detected in each of the following areas within the Septic System Area.

10.1.1 Septic Trench

Concentrations of TCE, arsenic, and/or PCBs or chromium greater than the applicable ADEC cleanup criteria were detected in samples collected from the end of the northwest trench and throughout the southeast trench. The VOC and PCB-impacted media in the trench base is likely attributable to fluids conveyed through or otherwise introduced into the former septic system. In comparison, the arsenic and chromium concentrations in the trench soil samples are considered representative of background levels, based on typical concentrations in Alaska soils.

Laterally, impacted soil was encountered in the southeast trench and at the location of Sample T6 at the end of the northwest trench. Although analytical samples were not collected at depths greater than 11 feet, detection of target analytes in these samples suggest that the contamination extends below 11 feet. The total depth of the contamination is unknown; however, based on the concentration magnitude the contamination extent is likely limited in depth.

10.1.2 CMPs and Seepage Pit

VOCs, PCBs, and RCRA metals were detected at concentrations greater than the applicable ADEC cleanup levels in samples collected from the CMPs and seepage pit. Compounds detected in the CMPs and seepage pit are largely the same as those detected in the septic trench, although in greater concentrations. This finding is consistent with our conclusion that the fluids conveyed through or otherwise introduced to the former septic system are a source of the PCB and VOC compounds detected in the subsurface soil samples. Moreover, the PCB concentrations measured in the surface and near-surface soil samples may be attributable to one or more additional source(s).

The total depth of contamination in the vicinity of the CMPs is unknown. However, a PCB concentration greater than the applicable cleanup level was measured in Sample TS7, collected from the west end of the southeast septic trench. Soil samples from Boring B2, located 3 feet north of CMP2, either did not contain the PCB, VOC, and RCRA metal constituents detected in the CMP samples, or contained concentrations less than the applicable cleanup levels. It is noted that the Boring B2 soil sample selected for VOC analysis was too shallow to reflect a release from the CMPs. However, a septic odor was observed while drilling Boring B2, and TCE was detected in the water sample collected from the Monitoring Well MW2, installed in Boring B2.

The seepage pit sample contained concentrations of VOCs, PCBs and RCRA metals greater than applicable cleanup levels. The seepage pit sample contained 262 mg/kg PCBs, indicating PCB-impacted soil regulated by Toxic Substances Control Act (TSCA). Outside the seepage pit, PCBs were detected at multiple depths in samples from adjacent Boring B1, but at concentrations less than 1 mg/kg. Sample B1S11, from Boring B1, was submitted for VOC analysis and did not contain detectable concentrations of VOC analytes; however, TCE was detected in trench Sample TS6. With the exception of Sample B1S11 in Boring B1, soil samples were not collected deeper than 21 feet bgs in the vicinity of the seepage pit.

The data collected around the seepage pit are not sufficient to definitively identify the extent of contamination or the volume of impacted soil. However, the depth of the impacted seepage pit soil sample (greater than 15 feet bgs) suggests that the ingestion and dermal exposure pathways may not be concerns for current site conditions at this location. Moreover, results for nearby soil samples suggest that the VOC, PCB, and Metals-impacted soil in this area may be generally limited to the immediate vicinity of the seepage pit.

10.1.3 Soil Borings and Monitoring Wells

With the exception of Sample B4S8, collected from 17.5 to 19.5 feet bgs in Boring B4, arsenic was the only target analyte detected in the soil samples at a concentration greater than the corresponding cleanup level. A concentration of TCE greater than 10 times the cleanup level was measured in Sample B4S8 (17.5 to 19.5) collected from Boring B4. Because screening samples collected deeper than Sample B4S8 had lower headspace readings, it is possible that the TCE contamination in Boring B4 is limited to a depth of approximately 22 feet. However, samples collected above and below Sample B4S8 were not tested for VOCs. Compared to the Boring B4 screening results, the sample submitted for VOC analysis from Boring B2, Sample B2S3, is insufficient to draw conclusions regarding the presence or absence of VOCs at a greater depth. Sample B2S3 was collected from a depth of 5 to 7 feet bgs, compared to a sample depth of 7.5 to 8.5 feet bgs in CMP2 that may correlate to the top of a buried septic tank. The arsenic concentrations measured in the boring samples are generally consistent with both background levels and previous sample results.

The groundwater sample from Monitoring Well MW2 contained a TCE concentration that exceeds the cleanup criterion. Concentrations of target analytes were either not detected or not detected above cleanup levels in the remaining monitoring wells. The TCE impacted water appears to be limited to the vicinity of Monitoring Well MW2; however, the groundwater flow direction measured at the time of the site activities is to the southwest at a gradient of 0.07 percent. Additional groundwater monitoring wells were not installed to the south or southwest of Monitoring Wells MW1 and MW2, based on the suspected groundwater flow direction prior to drilling, and the access constraints posed by aboveground fuel lines, topography, and vegetation.

10.1.4 PCB Grid

Based on field screening and analytical data, PCB concentrations greater than 10 mg/kg were detected in the surface and near surface soils in the vicinity of the CMPs. The highest PCB concentrations were measured to the southwest of the PCB Grid. A concentration of 433 mg/kg PCBs was measured in Sample D^{-}1S1, collected at 1 foot bgs. Areas within 10 feet of CMP1 also appear to have elevated PCB concentrations -- these areas extend southwest of CMP1 approximately 20 to 25 feet and possibly northeast (based on the field screening results shown on Figure 6). The total depth and extent of the PCB impacted soil is unknown; however, based on field screening results, the PCB concentrations in most grids are lesser at the 2-foot level than at 0.5 foot. Likewise, PCB concentrations measured in Boring B2 indicate that contamination on the northern side does not extend deeper than 5 feet bgs. Assuming an impacted soil depth of $\leq$ 5 feet bgs, an estimated volume of 50 to 60 cubic yards of PCB impacted soil is located in the PCB Grid vicinity.

No PCB impacted soil was removed as part of this project. In the event of a future removal action, soil with PCB concentrations equal to or above 50 ppm must be handled as TSCA wastes and as U.S. Department of Transportation (DOT) hazardous waste in accordance with 40 Code of Federal Regulations (CFR) 761 and 49 CFR 172 and 173, respectively. In particular, excavated soil in the vicinity of the PCB Grid area may qualify as TSCA waste and must be handled accordingly.

10.2 Area F

Previous site investigations have documented PCB impacted soil at Area F. During this Septic System and Area F Characterization, 10 shallow soil borings were advanced in Area F, and PCB field screening and analytical samples were collected. Based on field screening and analytical results, PCB concentrations exceeding 1.0 mg/kg are present in Area F. Analytical Sample FB5S2, located in the central portion of Area F, contained 2.56 mg/kg PCBs, although a duplicate sample for this location contained 0.830 mg/kg. PCB field screening and analytical samples collected from surrounding borings indicated PCB concentrations generally less than 1 mg/kg. Based on these data, the area of soil potentially containing greater than 1.0 mg/kg PCBs is likely limited to near surface soils in the vicinity of Boring FB5.

10.3 Hach PCB Field Test Kit

Based on the field screening and analytical sample comparison, the PCB field test kit was effective in identifying elevated concentrations of PCBs at the Project Site. The field screening test kit is generally biased high in the $1.1<x<4.9$ mg/kg range, with multiple "false positive" results of samples that contained less than 1 mg/kg, based on laboratory testing. With the exception of Sample D5S2, the magnitude of the bias was less than 1 mg/kg. None of the PCB screening samples were biased low.

11.0 CLOSURE/LIMITATIONS

This report was prepared for the exclusive use of our client and their representatives in the study of this site. The findings we have presented within this report are based on the limited research, sampling, and analyses that we conducted. They should not be construed as definite conclusions regarding the site's soil and groundwater. It is possible that our subsurface tests missed higher levels of target analytes, although our intention was to sample areas likely to be impacted. As a result, the sampling and analysis performed can only provide you with our professional judgment as to the environmental characteristics of this site, and in no way guarantees that an agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. The data presented in this report should be considered representative of the time of our site assessment. Changes in site conditions can occur over time, due to natural forces or human activity. In addition, changes in government codes, regulations, or laws may occur. Because of such changes beyond our control, our observations and interpretations may need to be revised.

Shannon & Wilson has prepared the attachments in Appendix H "Important Information About Your Geotechnical/Environmental Report" to assist you and others in understanding the use and limitations of our reports. You are advised that various state and federal agencies (ADEC, EPA, etc.) may require the reporting of this information. Shannon & Wilson does not assume the responsibility for reporting these findings and therefore, has not, and will not, disclose the results of this study, unless specifically requested and authorized to do so. Please call the undersigned at (907) 561-2120 with any questions or comments concerning this report.

Sincerely,

SHANNON & WILSON, INC.

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