

Date 28 May 2015

To Meseret Ghebreslassie (USACE)
Pat Roth (USAF)

From Kevin Maher (Jacobs)

Subject **Results of 2014 Sampling for PCBs in Sediment and Surface Soil at Source Area SS67, Eielson Air Force Base, Alaska (Final)**

This technical memorandum describes sediment and soil sampling activities conducted in 2014 related to Source Area SS67 at Eielson Air Force Base (AFB), Alaska (Figure 1). The purpose of the sampling effort was to refine the northern extent of polychlorinated biphenyl (PCB) contamination in sediments in Garrison Slough and to refine the lateral extent of PCB contamination in surface soil in the source area. This work was performed as described in *Additional Sampling at Source Area SS67, Eielson Air Force Base, Alaska* (Additional Sampling Tech Memo) (Jacobs Engineering Group Inc. [Jacobs] 2014) and the *2013 Supplement to the Quality Assurance Project Plan for Remedial Investigation at Source Area SS67* (QAPP Supplement) (U.S. Air Force [USAF] 2013) under U.S. Army Corps of Engineers (USACE), Alaska District Hazardous, Toxic, or Radioactive Waste Contract No. W911KB-11-D0005, Task Order No. 0007.

The 2014 sampling effort, which comprised 24 primary sediment samples and 13 primary surface soil samples, fills data gaps in the 2013 Supplemental Remedial Investigation (SRI) (USAF 2014). The 2013 work, guided by the *Phase I Remedial Investigation Management Plan, Source Area SS67* (Management Plan) (U.S. Air Force [USAF] 2012) and the QAPP Supplement, confirmed that sediment and surface soil samples were below the remedial action objective of 10 milligrams per kilogram (mg/kg) PCBs, as specified in the *Sitewide Record of Decision* (ROD) (USAF 1996), but did not completely delineate the extent of PCBs above the project action levels (PAL) for sediment (0.000048 mg/kg) and surface soil (1 mg/kg). Complete delineation will assist with the placement of land-use control boundaries for Source Area SS67 to fully encompass the extent of PCB contamination above the surface soil PAL.

Project Execution

Jacobs personnel stationed in Fairbanks finalized the dig permit and staked out the planned sediment and surface soil sampling locations using real-time kinematic (RTK)-global positioning

system (GPS) equipment on 18 and 19 August 2014. One member of the Jacobs field team for SS67 sampling mobilized to Eielson AFB on the morning of 19 August 2014 and assisted with stake-out. The second member of the sampling team arrived in the evening. The team spent the morning of 20 August 2014 clearing brush from the access road and the slough and identifying a launch location for the inflatable boat. In the afternoon, the third member of the team (the Jacobs unexploded ordnance [UXO] specialist) arrived onsite, and UXO avoidance and sediment sampling commenced.

Stage I sediment sampling concluded at the end of the day on 21 August 2014. Stage I consisted of nine locations at 50-foot intervals, two locations at 200-foot intervals, and four locations at 400-foot intervals along the slough downstream from the northern border of the historical source area boundary. The channel was sampled at random from the eastern, central, or western portions. Only one location had sufficient soft sediment thickness to warrant collection of both a shallow and a deep sample. In conjunction with sampling, UXO avoidance was conducted at all Stage I and potential Stage II soft sediment locations, and all magnetic anomalies (Figure 2) were flagged with survey ribbon. The UXO specialist demobilized from the site at the end of the work day on 21 August 2014.

Stage I surface soil sampling (eight samples) occurred on 22 August 2014. These locations were east of the source area, between the slough and the railroad tracks, and did not require UXO avoidance.

On 23 August 2014, additional soft sediment samples were collected from three Stage I locations where initial sampling efforts yielded insufficient fines (organic matter, silt, and fine to medium sand) for analysis. These samples were collected at the same distance downstream as the original samples but at alternate positions across the channel.

Stage II sediment sampling occurred on 24 August 2014 after receipt of preliminary results for Stage I samples. Because all Stage I detections or detection limits for total PCBs exceeded the PAL of 0.000048 mg/kg, all 10 potential additional locations between the more widely spaced Stage I samples were sampled.

The SS67 field sampling team shipped the final samples, pulled marker stakes, and demobilized on 25 August 2014. Other Jacobs personnel on Base sampled the wastewater (from equipment

decontamination) on 4 September 2014, repackaged the waste on 9 September 2014, and supervised waste load-out on 1 October 2014.

Stage II surface soil sampling (five locations) occurred on 9 September 2014. These locations were step-outs to the south of the Stage I samples (SO40, SO41, and SO42) and to the east across the railroad tracks (SO38 and SO39), as may be seen in Figure 3. Jacobs personnel collected these samples while on Base for other work. Attachment 1 contains a photo log documenting the project activities, Attachment 2 contains dig permits and field notes, Attachment 3 contains checklists for review of laboratory data, Attachment 4 contains laboratory results (laboratory reports are provided electronically on the included CD), Attachment 5 contains the survey report, Attachment 6 documents waste disposal, and Attachment 7 presents the statistical calculations.

Sample Collection

Sediment

Sediment samples were collected as described in the Additional Sampling Tech Memo (Jacobs 2014). At each preselected downstream distance, UXO avoidance measures employed prior to sampling consisted of a trained UXO specialist using a Schonstedt magnetic locator to identify anomalies. All anomalies were flagged with survey ribbon, and anomalies at SS107 and farther downstream were GPS-surveyed. At each distance, the sample was obtained from the eastern, central, or western side of the channel. The channel side was selected at random, but the precise location was adjusted to be at least 3 feet from any magnetic anomalies or was moved when only gravel was encountered.

At each sample location, a 1-inch-diameter sediment core was collected using a coring tool driven by a manual slide hammer. Each sediment core was driven to the bottom of the soft sediment layer (refusal), at depths below the sediment-water interface ranging from 0.3 to 2.0 feet. In this manner, sampling targeted the full thickness of soft sediment down to the interface with sediment hard pack (basin-fill sediments deposited by the Tanana River). At each location, multiple cores were collected until a 4-ounce sample jar was filled.

The Additional Sampling Tech Memo called for a second, deeper sample at locations where the coring tool penetrated to depths greater than 1.0 foot. This occurred at four locations, but three of these contained so little fines that only one sample could be composited from all of the

recovered material. At the fourth location (SS102), samples were collected from depths of 0 to 0.6 feet and 0.6 to 1.3 feet.

Sediment sample locations were surveyed via RTK-GPS at the time of sampling.

Surface Soil

Surface soil samples were collected as described in the QAPP Supplement (USAF 2013). At each location, a 0.5-foot-deep pit was dug using a shovel, and a 4-ounce glass jar was filled with soil from the bottom of the pit. Pit locations were staked via RTK-GPS, and pits were dug at the marked locations.

Analytical Results

Five batches of samples were submitted to GEL Laboratories, LLC for analysis of PCBs by Method SW8082. Results were reported for seven specific PCBs (Aroclor 1016, Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260). For calculation of total PCBs, nondetects were treated as zeroes; if all specific PCBs were nondetect, total PCBs were also reported as nondetect with the same limit of detection as that for each of the specific PCBs. Aroclor 1260 was the only PCB detected in any of the samples.

Data Quality Assessment

Data quality was assessed by the Jacobs Project Chemist and included a review of the laboratory case narrative, laboratory data deliverables, analytical and quality control sample results, and the completion of Alaska Department of Environmental Conservation (ADEC) checklists (Attachment 3). Data flags were applied as needed per the Management Plan (USAF 2012). Data quality was evaluated against the following requirements: U.S. Department of Defense (DoD) *Quality Systems Manual for Environmental Laboratories*, version 4.2 (DoD 2010), ADEC and U.S. Environmental Protection Agency (EPA) analytical methods (EPA 2007), and laboratory limits.

The data quality assessment found that all sample results were usable and no results were rejected. The following issues resulted in flagging of the affected results:

- Field duplicate relative percent difference greater than 50 percent (batch 355366). The affected samples are flagged “JD” and are considered to be of lesser quality than unflagged results, but they remain usable for this investigation.

- Cooler temperature greater than 4 degrees Celsius (°C) upon receipt by the laboratory (batch 355384). The affected samples are flagged JTE, but this has no effect on usability of the data because PCBs are neither volatile nor subject to degradation.
- Surrogate recovery low (batch 356203). The affected sample (wastewater) is flagged JS-, and the result is considered estimated and biased low. This nondetect result remains usable for waste characterization; however, because the highest soil result reported was less than 50 mg/kg (which indicates that the dissolved PCB concentration must have been far lower than 50 milligrams per liter [mg/L] due to the very low solubility of PCBs).

Sediment Results

Table 1 lists the analytical detections (Aroclor 1260 only) obtained from the 25 planned sediment sampling locations. Samples from two locations (SS97 and SS100) contained insufficient fines and could not be analyzed. Only one location was sampled at two depths (SS102 at 0 to 0.6 feet and 0.6 to 1.3 feet). Results range from nondetect to 0.625 mg/kg, and only three results exceed the Aroclor 1260 sediment PAL of 0.22 mg/kg. When the results are expressed as total PCBs, all results and detection limits exceed the relevant sediment PAL of 0.000048 mg/kg.

Surface Soil Results

Table 2 lists the analytical detections (Aroclor 1260 only) obtained from the 13 soil sampling locations. All samples but one contained quantifiable Aroclor 1260 (0.00778 to 43.6 mg/kg), and the remaining sample (SO39) contained detectable Aroclor 1260 (an estimated 0.0260 mg/kg). The PAL for both Aroclor 1260 and total PCBs in surface soil is 1 mg/kg, which was exceeded at eight of the 13 locations. Three of these locations also exceeded the ROD-specified remedial action objective of 10 mg/kg.

Other Observations

Beaver Dams

Two beaver dams exist in the sampled reach of the slough. As shown on Figure 2, the upstream dam (Beaver Dam 2) is near SS107 at 465 feet downstream from the SS67 boundary, and the downstream dam (Beaver Dam 1) is near SS102 at 818 feet downstream from the SS67 boundary. The dams are stout structures that span the full width and depth of the channel. The water level behind the dams was 1 to 2 feet higher than the downstream water level, but this resulted in only minor ponding because the steep banks of the slough prevented the impounded water from spreading. Upstream of Beaver Dam 2, the water depth was as great as 4.3 feet at

sampled locations, whereas it was less than 3 feet at all downstream locations (including Beaver Dam 1).

Magnetic Anomalies

Twenty-three magnetic anomalies were distributed among 16 of the 25 soft sediment locations sampled in the slough, as listed in Table 3 and shown on Figure 2. Four anomalies were flagged but not surveyed in conjunction with locations upstream of SS107 and Beaver Dam 2, and 19 magnetic anomalies were surveyed and flagged in conjunction with downstream locations. All anomalies were localized features and were avoided during sampling.

Drums

Eight drums were found embedded in the northeast bank of the slough along a reach extending from 40 to 105 feet southeast of sample location SS116, as shown on Figure 2. Based on Photo Nos. 14 and 15 in the photo log (Attachment 1), the drums are rusted to the extent that no markings remain, and some are perforated and open, without lids. No soil staining or stressed vegetation was evident. To confirm the apparent absence of contamination, surface soil samples should be collected adjacent to each drum or group of drums and analyzed for petroleum hydrocarbons, volatile organic compounds, semivolatile compounds, pesticides, and metals.

Waste Management

Used core sleeves and disposable personal protective equipment was containerized in a 55-gallon United Nations (UN)-specification steel drum and stored inside the secure fenced yard at the Eielson Hazardous Waste Facility (HWF). For disposal, this waste was profiled as nonhazardous PCB debris with 0 to 5 percent dirt and PCB concentration between 0.01 and 49.9 mg/kg.

Water from decontamination of sampling equipment was accumulated in a labeled 5-gallon bucket with screw-on lid, which was stored inside the secure fenced yard at the HWF. Analysis of this water for PCBs (Table 4 in Attachment 4) returned only nondetect results with a limit of detection of 0.000067 mg/L. For disposal, the wastewater was conservatively profiled as nonhazardous PCB water with 0 to 5 percent dirt and PCB concentration between 0.01 and 49.9 mg/L. For shipment, the 5-gallon bucket was packed in a 55-gallon UN-specification steel drum.

The two waste containers were shipped by truck, barge, truck, and rail to Arlington, Oregon, for disposal in the regulated landfill operated by Chemical Waste Management of the Northwest. Waste profiles and the shipping manifest comprise Attachment 6.

Discussion and Conclusions

Downstream Sediments

Sediment sampling in 2014 sought to delineate the extent and magnitude of PCBs in Garrison Slough downstream of Source Area SS67. Prior sediment sampling in 2013 within Source Area SS67 (USAF 2014) found significant PCB concentrations near the downstream boundary. As shown in Figure 2, total PCBs close to the boundary were 0.327 mg/kg at SS70 (100 feet upstream) and were 1.84 mg/kg at SS61 (275 feet upstream). Both results vastly exceeded the sediment PAL of 0.00048 mg/kg, and the higher result also exceeded the surface soil PAL of 1 mg/kg. These levels raised concerns about the potential for similar occurrences downstream of the source area boundary.

The 2014 set of sediment samples characterizes PCBs in Garrison Slough throughout the next 2,450 feet of channel downgradient of the SS67 boundary. As shown in Figure 2, the first 850 feet of this reach was sampled at 50-foot intervals, and the remaining 1,600 feet was sampled at 200-foot intervals. Although all results (or associated detection limits in the case of nondetects) exceeded the sediment PAL, none of the results exceeded the surface soil PAL.

Figure 4 visualizes the spatial distribution of PCBs in soft sediments along the slough by plotting both the 2013 and 2014 results versus downstream distance. The concentration axis (vertical axis) is logarithmic, which reveals variations at low concentrations but compresses variations at high concentrations. Attachment 7 presents a statistical analysis of these data, which includes comparison-of-means t-tests among sequential pairs of sample groupings and calculations of confidence intervals for each grouping. The statistical analysis supports the following observations regarding the spatial distribution of PCBs:

- Average PCB concentrations decline markedly at the limit of previous investigations. Among the 10 upstream samples (Jacobs 2013), only one had a PCB concentration less than 0.1 mg/kg, whereas four of the eight closest downstream samples were less than this value. Quantitatively, the geometric mean of the 10 upstream samples is 0.31 mg/kg, whereas the geometric mean of the eight downstream samples is 0.068 mg/kg. Although the variability of each data set is large, the comparison-of-means t-test found that this difference is significant at the 99.3 percent confidence level.

- PCB concentrations are unlikely to exceed the soil PAL (1 mg/kg) in the reach of Garrison Slough investigated in 2014. Non-parametrically, because all 24 results are less than 1 mg/kg, the likelihood of an exceedance is less than one in 24 (less than 4.2 percent). The geometric 95 percent confidence interval for these results is 0.0069 to 0.80 mg/kg, and the high-concentration tail of this lognormal distribution has only a 3.5 percent probability of exceeding the 1 mg/kg soil PAL. The average (arithmetic mean) of these results—important for evaluating direct human exposure to sediments—is 0.13 mg/kg.
- Low PCB concentrations persist to the downstream limit of investigation. The four samples farthest downstream all contained less than 0.08 mg/kg PCBs and may be statistically lower in PCBs than the other 2014 samples. Although the pooled-variance t-test indicates that these four results are lower with only 89 percent confidence, the Welch-Satterthwaite unequal-variance t-test indicates that the difference is significant with approximately 97 percent confidence. Results from the last 700 feet have a geometric mean of 0.051 mg/kg.

In summary, low-level PCBs in excess of the sediment PAL are present throughout the reach of Garrison Slough sampled in 2014. The degree of contamination appears to decline only slowly with distance, which suggests that a similar degree of contamination is present for an unknown distance downstream. Exceedances of the soil PAL of 1 mg/kg—important for establishing an appropriate land-use control boundary—were not encountered, but such exceedances are estimated to have a probability of approximately 4 percent of occurring if additional samples were to be collected in this reach. Additionally, the average PCB concentration in soft sediments in this reach is only 0.13 mg/kg. The absence of exceedances of the soil PAL and the low average PCB concentration indicate that the reach of Garrison Slough investigated in 2014 need not be included in the land-use control area for SS67.

Surface Soil Opposite the Drainage Ditch

Surface soil sampling conducted in 2014 sought to delineate the extent of PCB contamination in surface soil between Garrison Slough and the railroad tracks to the east across from the drainage ditch, which is identified as the historical source of contamination. Here, historical sampling and sampling conducted in 2013 appeared to delineate the extent of contamination greater than the remedial action objective (10 mg/kg) but did not achieve delineation with respect to the surface soil PAL (1 mg/kg).

The 2014 effort extended the 20- to 25-foot sampling grid with three samples to the north and 10 samples to the south and east, and included two samples on the eastern side of the railroad tracks. Figure 3 portrays the 2014 and 2013 PCB results along with locations of historical exceedances and clean samples. The 2014 results bound the northern extent of PCB

contamination with low-level results at SO36 and SO37. Low-level results on the eastern side of the railroad tracks at SO38 and SO39 suggest that contamination greater than the PAL may be limited to the western side of the tracks, but additional samples are needed to the north and south to confirm this hypothesis. West of the tracks, the 2014 results range up to 43.6 mg/kg and identified a new area of surface soil contamination greater than 10 mg/kg. This new area is bounded to the south by samples between 1 and 10 mg/kg (SO41 and SO42) and to the west by a low-level detection (SO30), but the eastern boundary may lie beneath the railroad tracks and has not been delineated.

In summary, the extent of surface soil PCB contamination to the east of the slough appears to be delineated with respect to the remedial action objective of 10 mg/kg but is unbounded to the northeast, southeast, and south with respect to the PAL of 1 mg/kg, and further investigation will be needed to support the development of an appropriate land-use control area for SS67. Figure 5 portrays proposed surface soil locations to complete the delineation of surface soil PCB contamination in this area. The eight Stage I locations would be sampled first, and then the four Stage II locations would be sampled, as appropriate, in the event that one or more Stage I samples contains total PCBs in excess of the surface soil PAL (1 mg/kg).

The relationship of the PCB contamination near the railroad tracks to contamination identified with the SS67 Source Area to the west of the slough is unknown. Because the east bank of the slough is topographically higher than the west bank and much higher than the delta at the terminus of the drainage ditch (where the highest SS67 PCB concentrations in sediment were identified [USAF 1997]), gravity-driven transport processes may be ruled out. The PCB contamination to the south and east of the SS67 Source Area appears to represent a previously unidentified source area.

References

- DoD (U.S. Department of Defense). 2010 (October). *Quality Systems Manual for Environmental Laboratories*. DoD Environmental Quality Workgroup, Department of the Navy, Lead Service. Version 4.2, Final.
- EPA (U.S. Environmental Protection Agency). 2007 (February). *Test Methods for Evaluating Solid Waste*. SW846, Third Edition.
- Jacobs (Jacobs Engineering Group Inc.) 2014 (August). *Additional Sampling at Source Area SS67, Eielson Air Force Base, Alaska*. Technical memorandum from K. Maher to M. Ghebreslassie and P. Roth.
- TPECI (Travis/Peterson Environmental Consulting, Inc.). 2013 (August). *EIE 344 Repair Utilidors, CE Shops, Eielson Air Force Base, Alaska, Field Report*. Prepared for Patrick Mechanical, LLC.
- USAF (U.S. Air Force). 2014 (October). *2013 Supplemental Remedial Investigation of Source Area SS67, Eielson Air Force Base, Alaska*. Prepared by Jacobs Engineering Group Inc.
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- USAF. 2012 (December). *Phase I Remedial Investigation Management Plan, Source Area SS67*. Eielson Air Force Base, Alaska. Prepared by EA Engineering, Science, and Technology.
- USAF. 1997 (December). *1996-1997 Garrison Slough Pilot Study Report*. Final. Prepared by EA Engineering, Science, and Technology. Administrative Record #00463.
- USAF. 1996 (September). *Sitewide Record of Decision*. Final. Administrative Record #00414.

Tables**Figures****Attachments**

- Attachment 1 Photo Log
- Attachment 2 Field Notes
- Attachment 3 Laboratory Data Review Checklists
- Attachment 4 Laboratory Results
- Attachment 5 Survey Report
- Attachment 6 Waste Tracking
- Attachment 7 Statistical Calculations

TABLES

**Table 1
Analytical Detections for Sediment Samples**

Location	Channel Side	Core Bottom ¹ (feet)	Aroclor 1260 (mg/kg)	Total PCBs ² (mg/kg)
			0.22	0.000048
PAL³				
SS92	center	0.6	0.0740 J	0.0740 J
SS93	west	2.0	0.164 JD	0.164 JD
SS93*	west	2.0	0.0423 J, JD	0.0423 J, JD
SS94	west	0.3	0.0142	0.0142
SS95	west	0.8	0.188	0.188
SS96	east	0.7	0.625	0.625
SS97 [†]	west	0.7	—	—
SS98	west	0.6	0.00440 J	0.00440 J
SS99	east	1.0	0.0190 J	0.0190 J
SS100 [†]	west	1.0	—	—
SS101	center	0.7	0.0426 J	0.0426 J
SS102	west	0.6	0.0632	0.0632
SS102*	west	0.6	0.0432 J	0.0432 J
SS102	west	1.3	ND [0.0278]	ND [0.0278]
SS103	east	0.9	0.184	0.184
SS104	west	1.2	0.526	0.526
SS105	center	0.8	0.0573	0.0573
SS106	center	0.8	0.0753	0.0753
SS107	center	0.7	ND [0.115]	ND [0.115]
SS108	center	1.2	0.0498	0.0498
SS109	east	1.6	0.0550 J, JD	0.0550 J, JD
SS109*	east	1.6	0.230 JD	0.230 JD
SS110	west	1.0	0.201	0.201
SS111	west	0.9	0.0831	0.0831
SS112	east	0.8	0.0316	0.0316
SS113	center	0.9	0.0577 J	0.0577 J
SS114	west	0.8	0.250	0.250
SS115	west	0.8	ND [0.0452]	ND [0.0452]
SS116	west	1.0	0.0349	0.0349

Notes:

¹ Depth of the bottom the sample below the sediment-water interface.

² Total PCBs = sum of Aroclor detections (ND values treated as zeroes). If all are ND, the largest detection limit is reported.

³ PALs are from QAPP Table 15-1 in the *Phase I Remedial Investigation Management Plan, Source Area SS67* (USAF 2012). The Aroclor 1260 PAL originated from the May 2012 EPA Regional Screening Levels for residential soil (<http://www.epa.gov/region9/superfund/prg/>). The Total PCBs PAL is based on bioaccumulation in fish and subsequent human ingestion and originated from Table A-1a in *Guidance for Assessing Bioaccumulative Chemicals of Concern in Sediment* (State of Oregon Department of Environmental Quality 2007).

* Duplicate sample.

[†] Analysis was infeasible because only gravel could be retrieved.

[] = detection limit

EPA = U.S. Environmental Protection Agency

J = positively identified; result less than the limit of quantitation but greater than or equal to the detection limit.

JD = estimated result; the field duplicate relative percent difference was greater than the precision limit.

Bold results or detection limits exceed associated PALs.

mg/kg = milligrams per kilogram

ND = nondetect

PAL = project action level

PCB = polychlorinated biphenyl

USAF = U.S. Air Force

Table 2
Analytical Detections for Surface Soil Samples

Location	Aroclor 1260 (mg/kg)	Total PCBs (mg/kg)¹
PAL²	1	1
SO30	0.516 JTE	0.516 JTE
SO31	10.5 JTE	10.5 JTE
SO32	20.9 JTE	20.9 JTE
SO33	43.6 JTE	43.6 JTE
SO34	3.85 JTE	3.85 JTE
SO35	1.67 JTE	1.67 JTE
SO36	0.146 JTE	0.146 JTE
SO36*	0.156 JTE	0.156 JTE
SO37	0.00778 JTE	0.00778 JTE
SO38	0.0821	0.0821
SO39	0.0260 J	0.0260 J
SO40	7.65	7.65
SO40*	6.29	6.29
SO41	4.65	4.65
SO42	4.85	4.85

Notes:

¹ Total PCBs = sum of Aroclor detections (ND values treated as zeroes).

² PALs are from Worksheet #15 in the 2013 Supplement to the Quality Assurance Project Plan for Remedial Investigation at Source Area SS67 (USAF 2013). They originated from ADEC soil cleanup levels in Table B2 (Method Two, most conservative, under 40-inch zone) in 18 AAC 75 Oil and other Hazardous Substances Pollution Control (ADEC 2012).

* Duplicate sample.

Bold results or detection limits exceed associated PALs.

AAC = Alaska Administrative Code

ADEC = Alaska Department of Environmental Conservation

J = positively identified; result less than the limit of quantitation but greater than or equal to the detection limit.

JTE = cooler temperature upon receipt at the laboratory exceeded 6 °C

mg/kg = milligrams per kilogram

PAL = project action level

PCB = polychlorinated biphenyl

Table 3
Magnetic Anomalies Identified During UXO Avoidance

Anomaly	Nearby Sample Location	Downstream Distance¹ (feet)
South of SS92*	SS92	33
East of SS95*	SS95	194
West of SS96*	SS96	242
East of SS97*	SS97	295
ANOM01	SS107	494
ANOM02	SS108	545
ANOM03	SS109	594
ANOM04		
ANOM05	SS101	638
ANOM06	SS111	750
ANOM07		
ANOM08	SS112	795
ANOM09		
ANOM10		
ANOM11	SS113	1,045
ANOM12		
ANOM13	SS103	1,240
ANOM14	SS114	1,444
ANOM15	SS104	1,640
ANOM16		
ANOM17	SS115	1,842
ANOM18		
ANOM19	SS116	2,450

Notes:

¹ Downstream distance is measured from the SS67 historical source area boundary to the nearby sample location.

* Marked with flagging at the time of sampling but not surveyed.

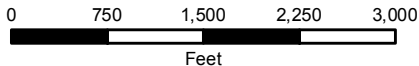
FIGURES



EIELSON AIR FORCE BASE

SS67

- Historical source area
- Extent of investigations 1991-2013



WGS 1984 UTM Zone 6N
Imagery: Provided by Eielson AFB GeoBase

SS67 GARRISON SLOUGH
LOCATION AND VICINITY MAP

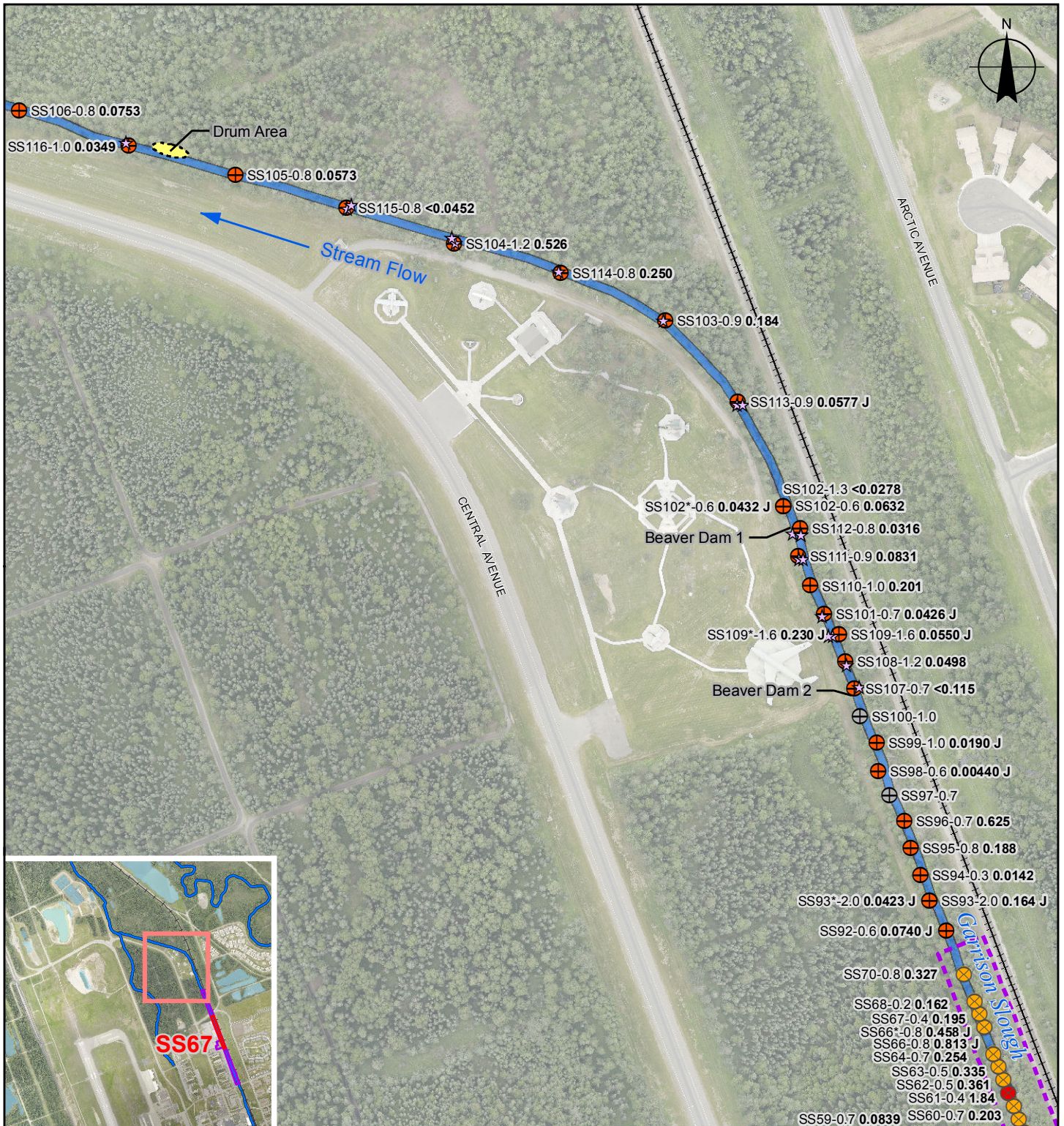
SOURCE AREA SS67, EIELSON AIR FORCE BASE, ALASKA

JACOBS

DATE:
05 MAR 2015

PROJECT MANAGER:
K. MAHER

FIGURE NO.
1



P:\AK_Eielson_AFB\GIS\IMXDIT\0072014_SS67_Sampling_Results_TMI\Fig2_SS67_SedimentResults.mxd dward

☆ Magnetic anomalies

Extent of SS67 investigations 1991-2013

2014 Soft Sediment

- ⊕ No recovery of fines
- ⊕ Total PCBs > PAL and < 1 mg/kg

2013 Soft Sediment

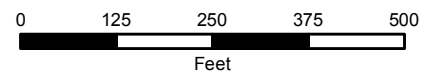
- ⊗ Total PCBs > PAL and < 1 mg/kg
- Total PCBs > 1 mg/kg

Data Sources:

2013: USAF. 2014 (October). 2013 Supplemental Remedial Investigation of Source Area SS67, Eielson Air Force Base, Alaska.
 2014: This report.

Notes:

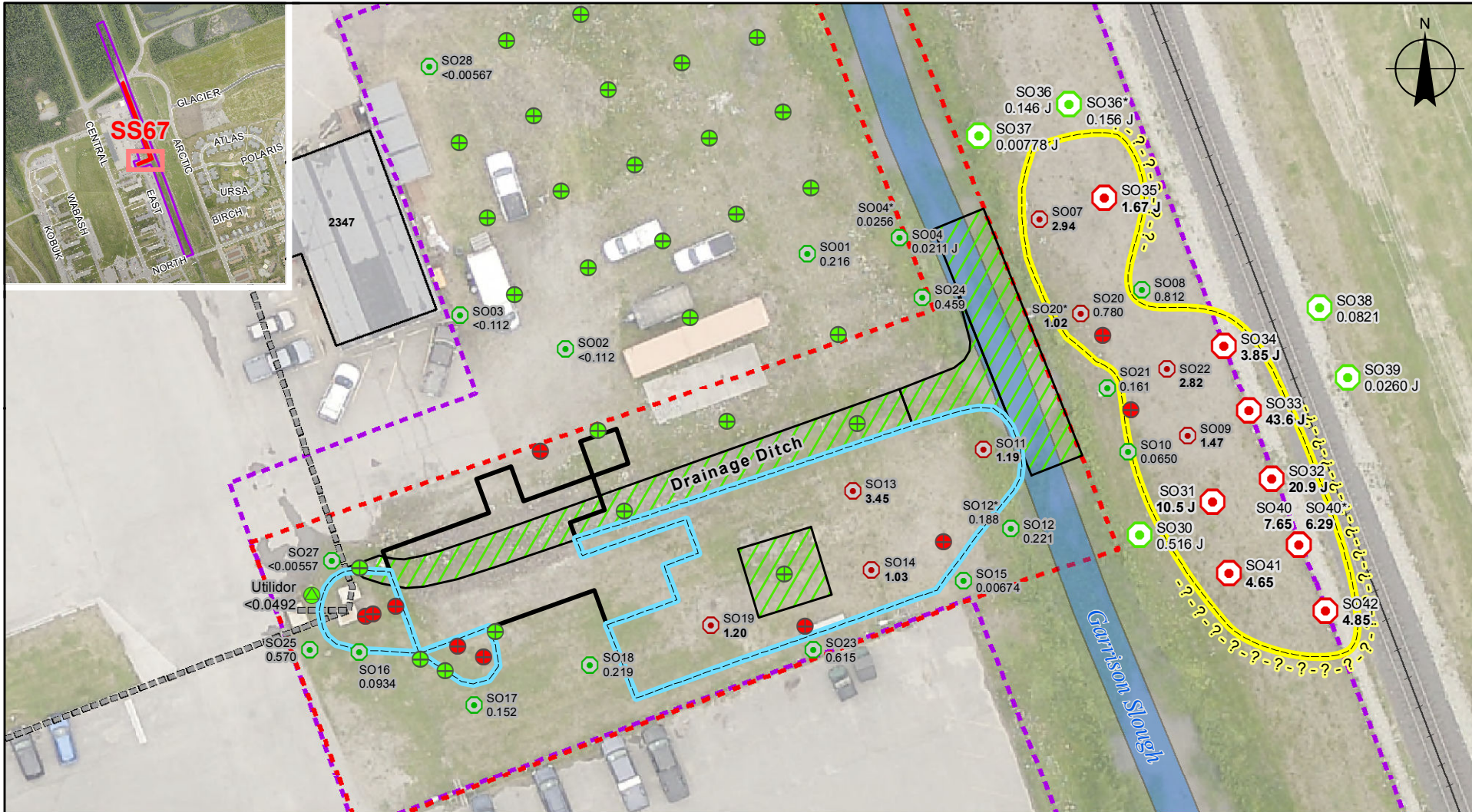
Point names = "Location-Depth (ft)" "Total PCBs (mg/kg)"
 PAL = project action limit (0.000048 mg/kg)
 < = non-detect result displaying the associated detection limit
Bold values exceed the PAL. (All values shown exceed the PAL.)
 * = duplicate sample
 J = estimated value



WGS 1984 UTM Zone 6N
 Imagery: Provided by Eielson AFB GeoBase

**2014 SEDIMENT SAMPLE LOCATIONS
 AND PCB RESULTS DOWNSTREAM OF SS67
 SOURCE AREA SS67, EIELSON AIR FORCE BASE, ALASKA**

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO.:
	05 MAR 2015	K. MAHER	2



2014 Surface Soil

- Green circle with white center: Total PCBs < PAL (1 mg/kg)
- Red circle with white center: Total PCBs > PAL (1 mg/kg)

2013 Surface Soil

- Green circle with white center: Total PCBs < PAL (1 mg/kg)
- Red circle with white center: Total PCBs > PAL (1 mg/kg)

1991-1998 Surface Soil

- Green circle with green center: Total PCBs < PAL (1 mg/kg)
- Red circle with red center: Total PCBs > PAL (1 mg/kg)
- Green circle with green center: Total PCBs < PAL (1 mg/kg)

- Black outline: 1998 PCB Ditch excavation
- Green hatched area: 1996-1997 excavation (approximate)
- Red dashed line: Approximate historical source area (SS67)
- Purple dashed line: Extent of investigations 1991-2013

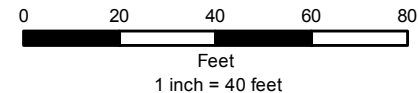
Notes:

Surface soil is the top two feet of soil
 Point labels = "Location", "Total PCBs (mg/kg)"
 PAL = project action limit (1 mg/kg)
 < = non-detect result displaying the associated detection limit.

Bold values exceed the PAL
 * = duplicate sample
 J = estimated value
 -? = undefined extent (no bounding samples)

Data Sources:

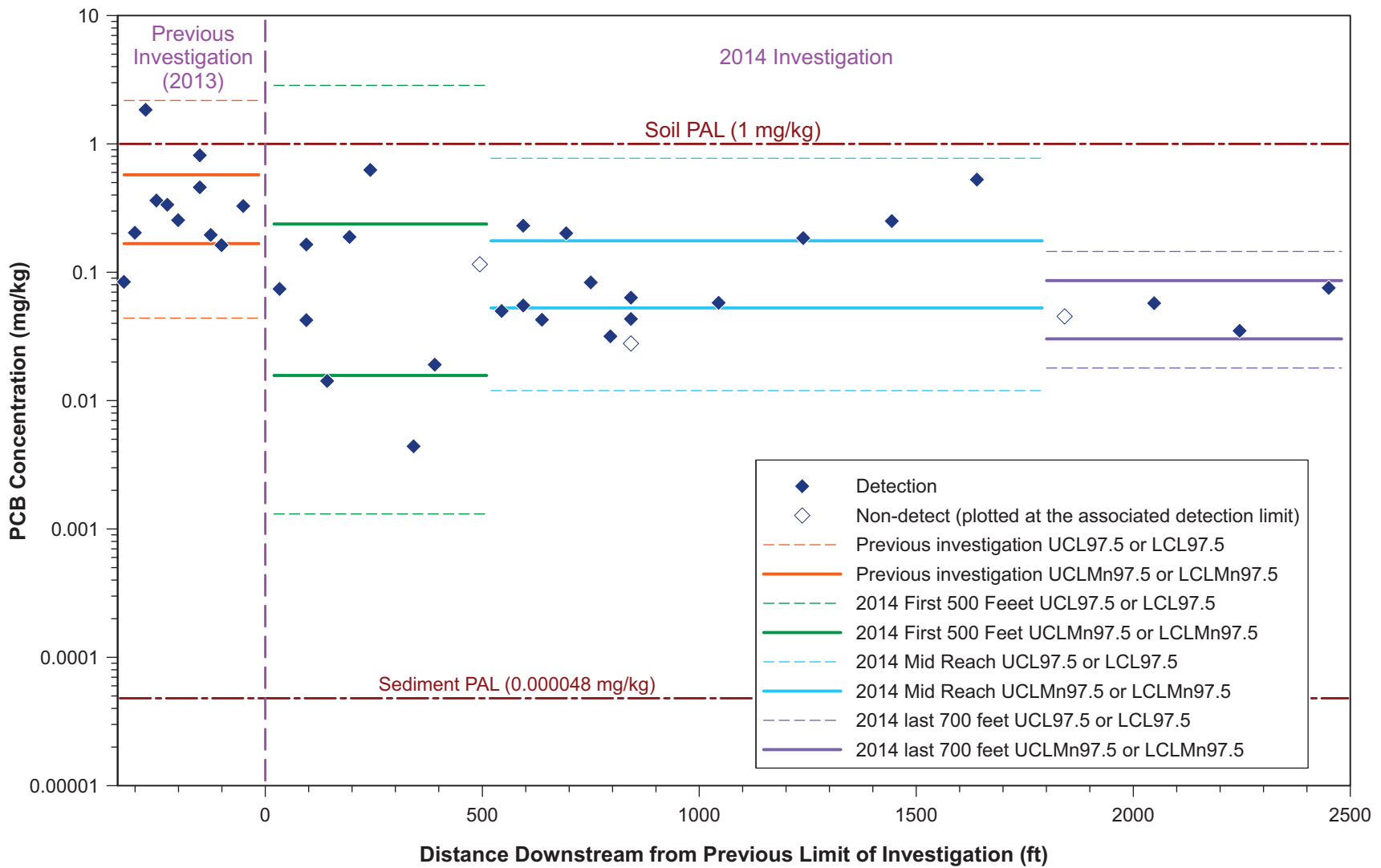
Utilidor: TEPCI. 2013 (August). *EIE 344 Repair Utilidor, CE Shops, Eielson Air Force Base, Alaska, Field Report.*
 2013: USAF. 2014 (October). 2013 *Supplemental Remedial Investigation of Source Area SS67, Eielson Air Force Base, Alaska.*
 2014: This report.



WGS 1984 UTM Zone 6N
 Imagery from Eielson AFB GeoBase (2012)

**2014 AND 2013 SURFACE SOIL
 SAMPLE LOCATIONS AND PCB RESULTS
 SOURCE AREA SS67, EIELSON AIR FORCE BASE, ALASKA**

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO:
	19 MAY 2015	K. MAHER	3



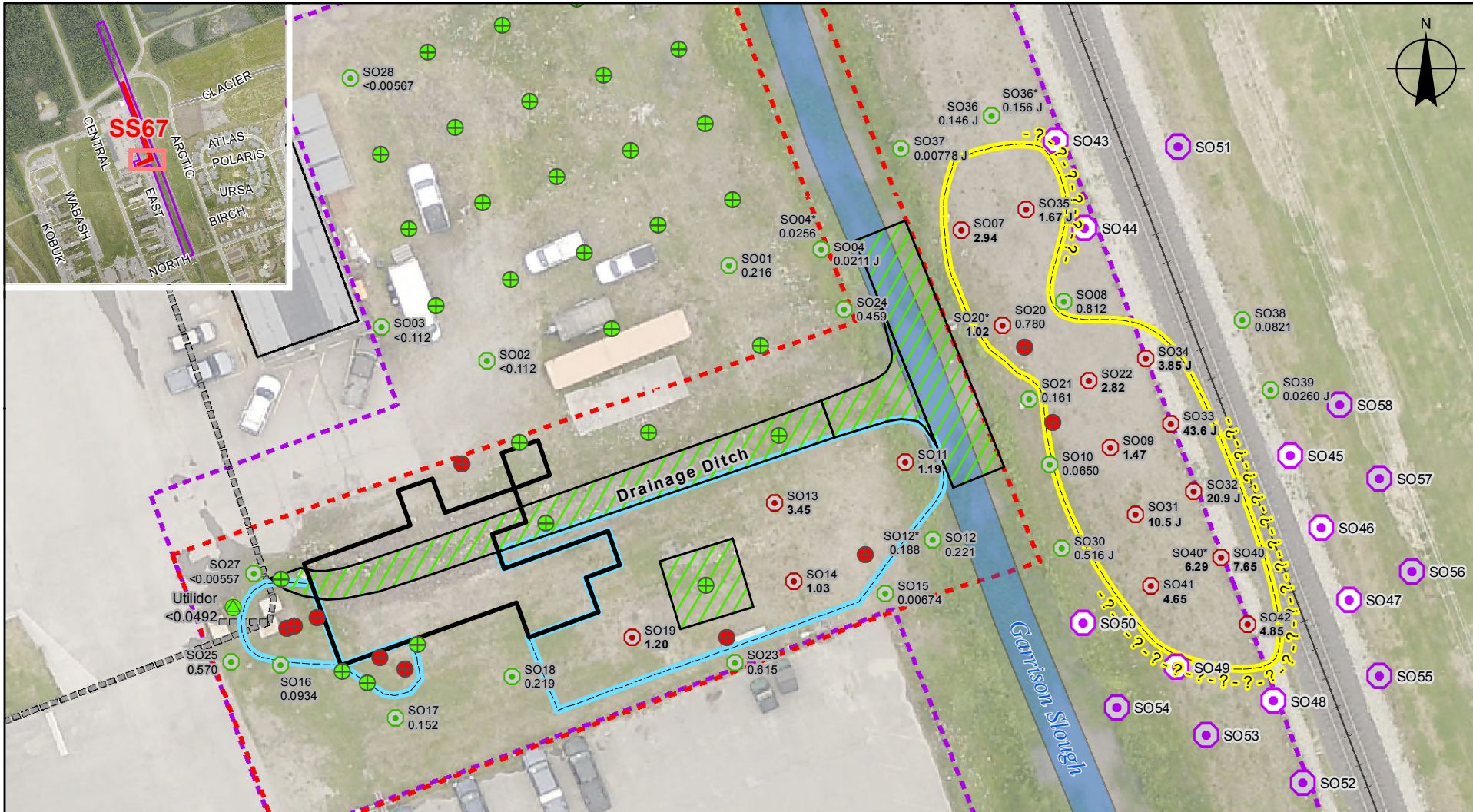
Notes:

UCL97.5 = upper confidence limit of the 95 percent confidence interval.
 UCLMn97.5 = upper confidence limit of the 95 percent confidence interval of the mean.
 LCLMn97.5 = lower confidence limit of the 95 percent confidence interval of the mean.
 LCL97.5 = lower confidence limit of the 95 percent confidence interval.

**SEDIMENT PCB CONCENTRATION VERSUS
 DOWNSTREAM DISTANCE**

SOURCE AREA SS67, EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO.:
	24 FEB 2015	K. MAHER	4



P:\AK_Eielson_AFB\GIS\IMX\DOT072014_SS67_Sampling_Results_TMI\Fig5_SS67_ProposedSoilSamples.mxd dward

Proposed Surface Soil

- Stage 1
- Stage 2

2013-2014 Surface Soil

- Total PCBs < PAL (1 mg/kg)
- Total PCBs > PAL (1 mg/kg)

1991-1998 Surface Soil

- + Total PCBs < PAL (1 mg/kg)
- + Total PCBs > PAL (1 mg/kg)
- + Total PCBs < PAL (1 mg/kg)
- Estimated Extent of SS67 Surface Soil Contamination
- Estimated Extent of New Source Area

- 1998 PCB Ditch excavation
- 1996-1997 excavation (approximate)
- Approximate historical source area (SS67)
- Extent of investigations 1991-2013
- Utilidor

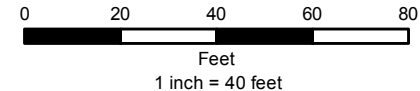
Notes:

Surface soil is the top two feet of soil
 Point labels = "Location", "Total PCBs (mg/kg)"
 PAL = project action limit (1 mg/kg)
 < = non-detect result displaying the associated detection limit.

Bold values exceed the PAL
 * = duplicate sample
 J = estimated value
 -? = undefined extent (no bounding samples)

Data Sources:

Utilidor: TEPCI. 2013 (August). *EIE 344 Repair Utilidors, CE Shops, Eielson Air Force Base, Alaska, Field Report.*
 2013: USAF. 2014 (October). 2013 *Supplemental Remedial Investigation of Source Area SS67, Eielson Air Force Base, Alaska.*
 2014: This report.



WGS 1984 UTM Zone 6N
 Imagery from Eielson AFB GeoBase (2012)

PROPOSED SAMPLE LOCATIONS TO COMPLETE PCB DELINEATION IN SURFACE SOIL

SOURCE AREA SS67, EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE:	PROJECT MANAGER:	FIGURE NO.:
	19 MAY 2015	K. MAHER	5

ATTACHMENT 1

Photo Log

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 1 – 19 August 2014.

A broken tree lay across the access road along the west side of the slough north of McKinley Street (looking north).



Photo No. 2 – 19 August 2014.

This portion of Garrison Slough north of McKinley Street was choked with tree branches (looking northeast).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 3 – 20 August 2014.

A foot pump inflated the boat for sediment sampling (looking south).



Photo No. 4 – 22 August 2014.

A 5-gallon bucket for waste water and a 55-gallon drum for used personal protective equipment (PPE) and sampling equipment were staged in the yard of the Hazardous Waste Facility (looking northeast).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 5 – 22 August 2014.
The drum of used PPE and sampling equipment was properly labeled (close-up view).



Photo No. 6 – 22 August 2014.
The bucket of wastewater was properly labeled (close-up view).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 7 – 23 August 2014.
The sediment sample at location SS96 consisted of fine gravel covered in black muck (close-up view).



Photo No. 8 – 23 August 2014.
This core sleeve from location SS97 contained only gravel (close-up view).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 9 – 23 August 2014.

This gravel sample on a paper towel illustrates the absence of fine material at location SS97, where no sample was collected (close-up view).



Photo No. 10 – 23 August 2014.

Fallen trees inhibited navigation of the slough along some reaches north of McKinley Street (looking north-northwest).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 11 – 23 August 2014.
Rowing the sampling boat in tight quarters was challenging (looking north-northwest).

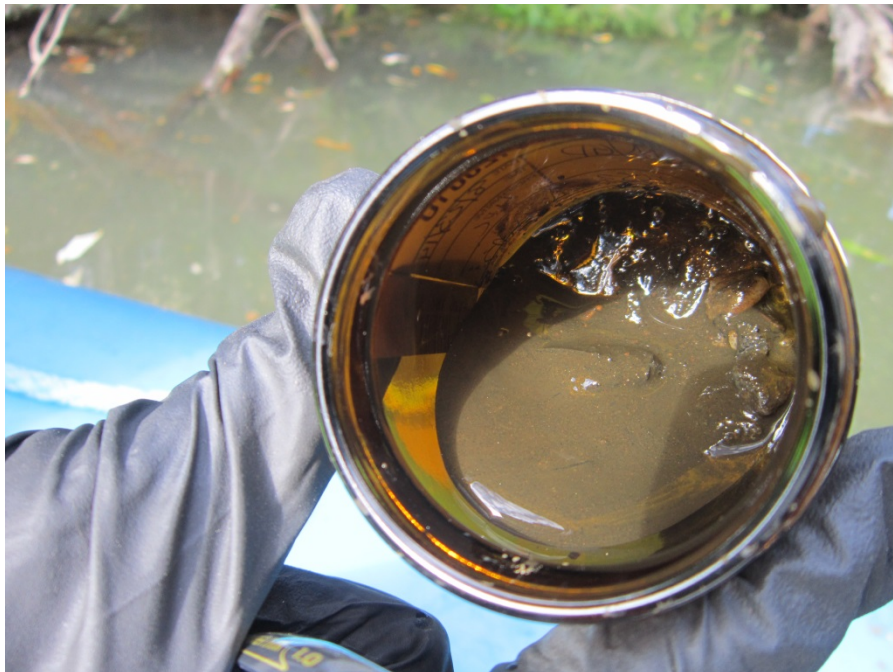


Photo No. 12 – 23 August 2014.
Location SS100 yielded this small sample of gravel with fines (close-up view).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 13 – 23 August 2014.

An attempt to collect additional material at location SS100 yielded only well-washed gravel (close-up view).



Photo No. 14 – 24 August 2014.

Three drums are visible partially buried in the northeast bank of Garrison Slough southeast of location 116 (looking northeast).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 15 – 24 August 2014.
Three more drums are visible partially buried in the northeast bank of Garrison Slough southeast of location 116 (looking northeast).



Photo No. 16 – 09 September 2014.
The 5-gallon waste water bucket was placed in a 55-gallon drum prior to waste loadout (close-up view).

SS67 Garrison Slough – Eielson Air Force Base



Photo No. 17 – 01 October 2014.

A Zoom Boom made short work of picking up the palletized waste from SS67 and the Compliance Restoration Projects (CRP) (looking south-southeast).



Photo No. 18 – 01 October 2014.

The Zoom Boom easily positioned the waste pallets as needed inside the freight trailer.

ATTACHMENT 2

Field Notes

BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST <small>(See Instructions on Reverse)</small>		DATE PREPARED 8/15/14
1. Clearance is requested to proceed with work at <u>Garrison Mough, NE & SE of Heritage Park</u> on Work Order No. <u>NA</u> , Contract No. <u>W911KB-11-D0005</u> , involving excavation or utility disturbance per attached sketch. This area <input type="checkbox"/> has <input checked="" type="checkbox"/> has not been staked or clearly marked.		
2. TYPE OF FACILITY/WORK INVOLVED <u>sediment cores (w/1") collected to approximately 6" or bottom of soft sediment layer</u>		
<input type="checkbox"/> A. PAVEMENTS	<input type="checkbox"/> D. FIRE DETECTION & PROTECTION SYSTEMS	<input type="checkbox"/> G. AIRCRAFT OR VEHICULAR TRAFFIC FLOW
<input type="checkbox"/> B. DRAINAGE SYSTEMS	<input checked="" type="checkbox"/> E. UTILITY	<input type="checkbox"/> OVERHEAD <input checked="" type="checkbox"/> UNDERGROUND
<input type="checkbox"/> C. RAILROAD TRACKS	<input checked="" type="checkbox"/> F. COMM	<input type="checkbox"/> OVERHEAD <input checked="" type="checkbox"/> UNDERGROUND
3. DATE CLEARANCE REQUIRED 8/20/14		4. DATE OF CLEARANCE
5. SIGNATURE OF REQUESTING OFFICIAL <u>Ariane Staples</u> <u>Ariane Staples</u>		6. TELEPHONE NO. 941-962-2595
7. ORGANIZATION Jacobs Engineering		REVIEWER'S NAME AND INITIALS
B. B. A. S. E. C. I. V. I. L. E. N. G. I. N. E. E. R. I. N. G.	ORGANIZATION	REMARKS (Use Reverse for additional)
A. ELECTRICAL DISTRIBUTION		MSgt Ulibari, 377-2297 Call before digging, Bldg. 1132
B. STEAM DISTRIBUTION		Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
C. WATER DISTRIBUTION		Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
D. POL DISTRIBUTION		Mr. Dave Frey, 377-2140 Call before digging, Bldg. 4231
E. SEWER DISTRIBUTION		Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
F. ENVIRONMENTAL		Ms. Diane Bryan, 377-1815 Obtain Hazmat Brief, Bldg. 2258
G. PAVEMENTS/ GROUNDS		MSgt Fleming, 377-1270 Call before digging, Bldg. 4105
H. FIRE PROTECTION		Mr. Grant Smith, 377-1293 Do not block roads or fire hydrants, Bldg. 4870
I. ZONE <u>CEOHS</u>		Mr. Shamon Rubin, 377-5281 Call before digging, Bldg. 2350
J. OTHER (Specify) <u>Natural Resources</u>		Mr. Thomas Slater, 377-5182 Bldg. 2310
9. SECURITY POLICE		SSgt Matthew Carr, 377-2933 Obtain Security briefing, Bldg. 3134
10. SAFETY		SSgt Devon Ellis, 377-4260 Obtain Safety briefing, Bldg. 3112 Rm. 181
11. COMMUNICATIONS		Mr. John Williams, 377-2368 Call 24 hours before digging, Bldg. 1127
12. BASE OPERATIONS		TSgt Joshua Stillwagon, 377-3233 If airfield vehicle pass needed, Bldg. 1215
13. CABLE TV		See block 14. ACS - No conflict per Bernadette via phone 8/22/14 (907) 378-8093. CICI - No conflict per Leonard Wagner via email 8/21/14. CFC Fiber - No conflict per Leonard Wagner via email on 8/21/14.
14. COMMERCIAL UTILITY COMPANY		Alaska Dig Line, 1-800-478-3121 or 811 Control Number 201-332-0360 Ticket # 2014340409
<input checked="" type="checkbox"/> TELEPHONE		
<input type="checkbox"/> GAS		
<input type="checkbox"/> ELECTRIC		
15. OTHER (Specify) <u>Contact Housing office at 372-2299 and resident prior to digging. Locatacted at 354 Broadway Suite 215</u>		
16. REQUESTED CLEARANCE <input checked="" type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED		
17. TYPED NAME AND SIGNATURE OF APPROVING OFFICER (Chief of Operations Flight or Chief of Engineering Flight) <u>Craig Hollenbeck</u> <u>Craig Hollenbeck</u>		17a. DATE SIGNED 20 Aug 2014

INSTRUCTIONS

The BCE work clearance request is used for any work (contract or in-house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience to a minimum. It is also used to identify potentially hazardous work conditions in an attempt to prevent accidents. The work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

18. REMARKS. *(This section must describe specific precautionary measure to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment, should be included.)*

Aug-28

PAPER

JACOBS

**WORK CLEARANCE REQUEST
PROCESSING FOLDER
PLEASE FOLLOW THE INSTRUCTIONS FOR PROCESSING
(AF Form 103)**

LAST REVIEWER: Please move this file and PDF of the 103 into 'Signed Work Orders' folder. Fill out the date of initial circulation and list each document by building number that is in the folder. This, along with a copy of the signed off document is our control. Don't forget to enter the information into our database prior to circulation. Q: CEA/CEAN/45 working papers/CEAN Files/work orders/Unsigned Work Orders/Work Order Spreadsheet.

WR#'s	Building #'s	Date of Initial Circulation
W911 KB-11-00005	Garrison Slough NE & SE Heritage Park Sediment Cores collected to 6"	18 August

Initials & Date

*Tom Slater, 7-5182, Natural Resources Bldg 2215 Central Ave
Alternate: Ron Gunderson, Bldg 2215

TSB 18 Aug 2014

Kristina Schlosbon 377-1659 (Hazardous & Solid Waste, & LBP) 2nd floor Rm 214
See for HAZWASTE Briefing if needed

KAS 18 Aug 2014

*Holly Sandberg, 7-7725 (Storm Water) 2nd floor Rm 212

HSS 18 Aug 14

* Capt Ryan Winsor, 7-1164, (Wastewater), 2nd Floor Rm 210

RW 20 Aug 14

*Alan Simmons, 7-3836 (Tanks), 2nd floor 212 See for HazMat Briefing if needed

NA

* Kathy Stringham, IST/Hickam/449-1094 (ir & Generators Issues)

NA

Comments:

Alternate: Julene May, 7-4342, 2nd floor Rm 215

* Carolyn Tallant, 7-1666 2nd Floor Rm 213 (Restoration)
Alternate: 2nd Floor Rm 213 (Restoration)

see email from Carolyn
CTB 20 Aug 14

*Diane Bryan, 7-1815, 2nd floor Rm 214 (FINAL SIGNATURE)
Alternate: Capt Ryan Winsor, 7-1164, (CEI), 2nd Floor Rm 210

DB 20 Aug 14

* Comply with the Construction General Permit. If disturbing 1 acre or more, or project is part of multiple related projects disturbing 1 acre or more, a SWPPP, NOI, & NOT will be necessary. HSS

Aug-28

JACOBS

BRYAN, DIANE L GS-11 USAF PACAF 354 CES/CEIEC

From: TALLANT, CAROLYN A CIV USAF HAF 354 CES/OLAE
Sent: Tuesday, August 19, 2014 3:47 PM
To: Maher, Kevin; BRYAN, DIANE L GS-11 USAF PACAF 354 CES/CEIEC
Cc: Staples, Ariane; ROTH, PATRICK A GS-13 USAF AFCEC PACAF/OLAE
Subject: RE: Eielson Dig Permits

Take them to Diane Bryan, she is the final signature. Julene appears to be out.

Diane, sign away for me on Jacobs permits!

-----Original Message-----

From: Maher, Kevin [mailto:Kevin.Maher@jacobs.com]
Sent: Tuesday, August 19, 2014 6:45 PM
To: TALLANT, CAROLYN A CIV USAF HAF 354 CES/OLAE
Cc: Staples, Ariane; ROTH, PATRICK A GS-13 USAF AFCEC PACAF/OLAE
Subject: Eielson Dig Permits

Carolyn,

We are working on our dig permit for sediment/surface soil collection at SS67. We are planning to take the permit to Julienne May for the environmental group signature since yourself and Captain Windsor are out of the office. Is this acceptable, or should we be taking them to someone else for signature?

Thank you,

Kevin

Kevin Maher | JACOBS ENGINEERING

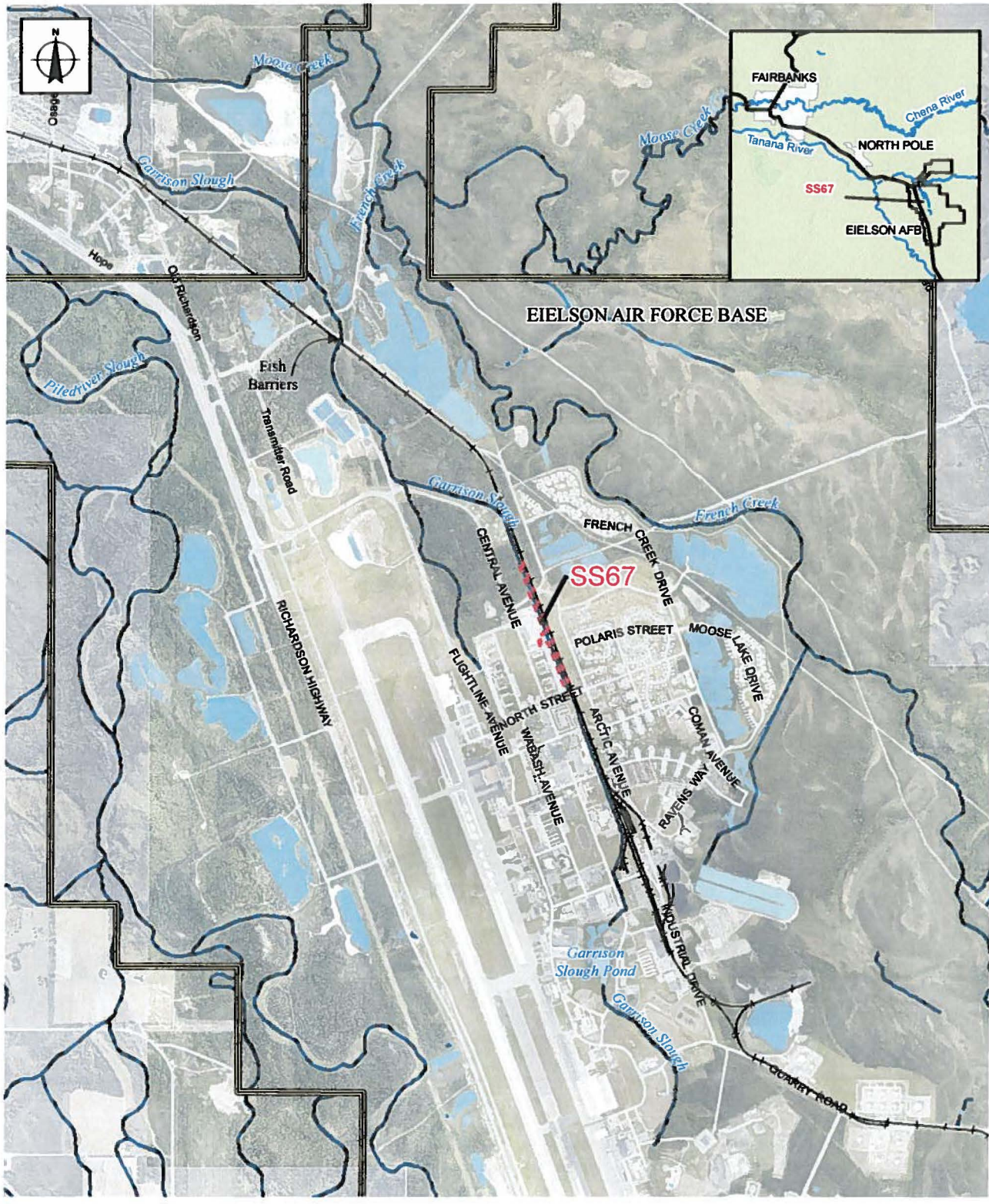
Project Manager

4300 B. STREET | SUITE 600 | ANCHORAGE, AK 99503

OFFICE: 907.751.3429 | FAX: 907.563.3320

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P:\AK_Eielson_AFB\GIS\WAXD10076867 Technical Memorandum\Fig_L_8667_GarrisonSlough.mxd wettis

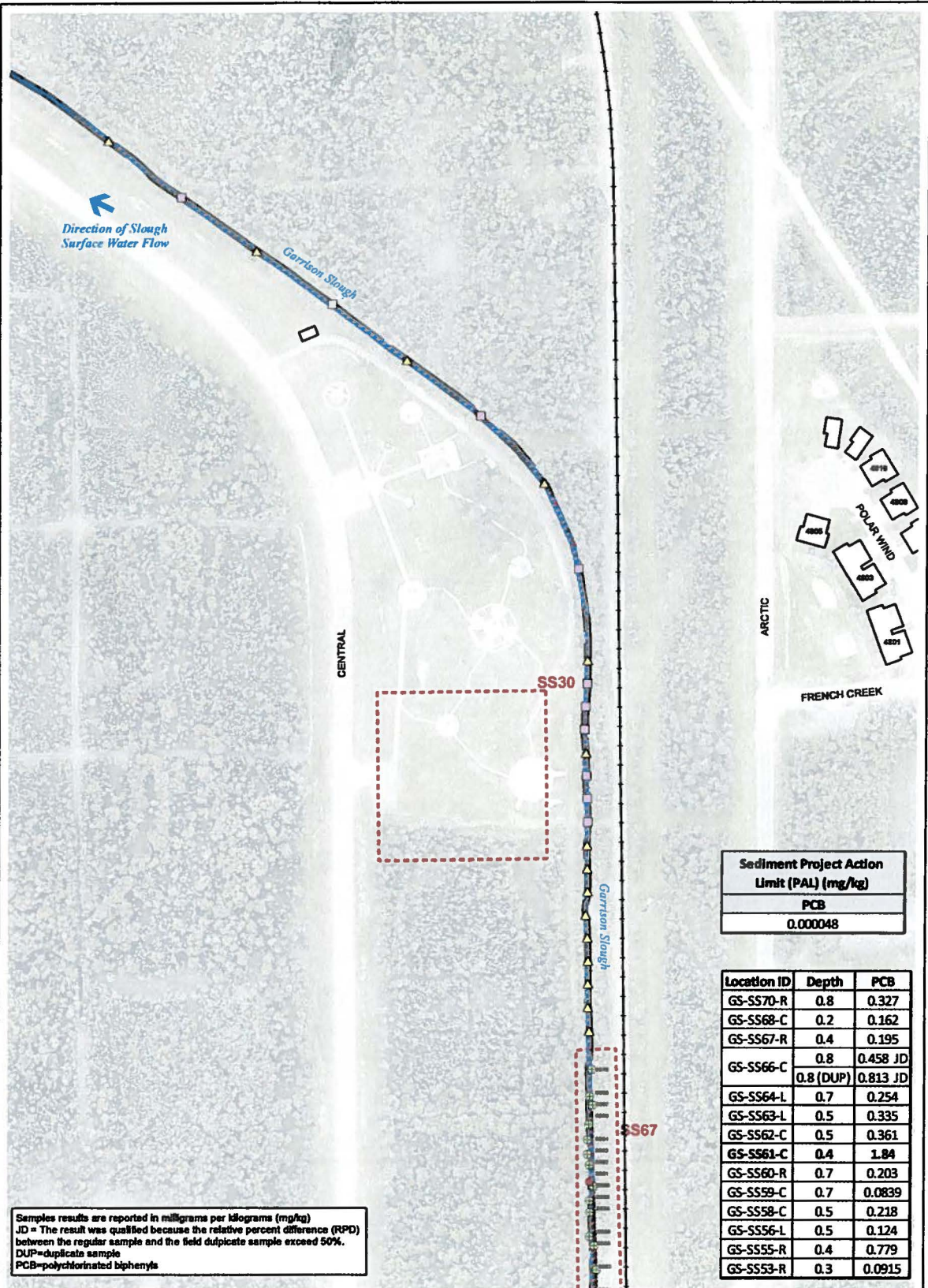


Garrison Slough
 Historic Source Area Boundary
 Eielson AFB Boundary

All Locations Are Approximate
 0 0.25 0.5 0.75 1
 Miles
 WGS 1984 UTM Zone 6N
 Imagery: Provided by
 Eielson AFB GeoBase

GARRISON SLOUGH
SS67 LOCATION AND VICINITY MAP
EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE: 05 AUG 2014	PROJECT MANAGER: K. MAHER
		FIGURE NO: 1



Samples results are reported in milligrams per kilograms (mg/kg)
 JD = The result was qualified because the relative percent difference (RPD) between the regular sample and the field duplicate sample exceed 50%.
 DUP=duplicate sample
 PCB=polychlorinated biphenyls

Sediment Project Action Limit (PAL) (mg/kg)	
PCB	0.000048

Location ID	Depth	PCB
GS-SS70-R	0.8	0.327
GS-SS68-C	0.2	0.162
GS-SS67-R	0.4	0.195
GS-SS66-C	0.8	0.458 JD
	0.8 (DUP)	0.813 JD
GS-SS64-L	0.7	0.254
GS-SS63-L	0.5	0.335
GS-SS62-C	0.5	0.361
GS-SS61-C	0.4	1.84
GS-SS60-R	0.7	0.203
GS-SS59-C	0.7	0.0839
GS-SS58-C	0.5	0.218
GS-SS56-L	0.5	0.124
GS-SS55-R	0.4	0.779
GS-SS53-R	0.3	0.0915



- △ 2014 Proposed Stage I Soft Sediment Sample
- 2014 Conditional Stage II Soft Sediment Sample
- ⊕ 2013 PCB Result < 1 mg/kg
- ⊙ 2013 PCB Result > 1 mg/kg
- ▭ Historic Source Area Boundary
- ▨ Not UXO Cleared, Not Dredged
- Garrison Slough

All Locations Are Approximate

0 100 200 300 400
Feet

WG8 1984 UTM Zone 6N Imagery: From GeoBase, 2012, 4 inch pixels 1 inch = 200 feet

**2014 PROPOSED SOFT SEDIMENT SAMPLING
 GARRISON SLOUGH
 SS67 (NORTH)
 EIELSON AIR FORCE BASE, ALASKA**

JACOBS	DATE	PROJECT MANAGER	FIGURE NO.
	05 AUG 2014	K. MAHER	2

P:\M\Chang_A\FINAL\2014\20140805\20140805_Tribunal_Memoir\Map\Map_PCB_08E_SoftSediment.mxd

Clear / Hand Dig

BASE CIVIL ENGINEERING WORK CLEARANCE REQUEST <small>(See Instructions on Reverse)</small>		DATE PREPARED 8/18/14
1. Clearance is requested to proceed with work at <u>E of Garrison Slough @ Bldg 2347, W of RR tracks; NE of OFCE Bldg.</u> on Work Order No. <u>N/A</u> , Contract No. <u>W911KB-11-00005</u> , involving excavation or utility disturbance per attached sketch. This area <input type="checkbox"/> has <input checked="" type="checkbox"/> has not been staked or clearly marked.		
2. TYPE OF FACILITY/WORK INVOLVED <u>Surface soil sampling to 6" deep, hand-digging only.</u>		
<input type="checkbox"/> A. PAVEMENTS	<input type="checkbox"/> D. FIRE DETECTION & PROTECTION SYSTEMS	<input type="checkbox"/> G. AIRCRAFT OR VEHICULAR TRAFFIC FLOW
<input type="checkbox"/> B. DRAINAGE SYSTEMS	<input checked="" type="checkbox"/> E. UTILITY <input type="checkbox"/> OVERHEAD <input checked="" type="checkbox"/> UNDERGROUND	<input type="checkbox"/> H. SECURITY
<input type="checkbox"/> C. RAILROAD TRACKS	<input checked="" type="checkbox"/> F. COMM <input type="checkbox"/> OVERHEAD <input checked="" type="checkbox"/> UNDERGROUND	<input type="checkbox"/> I. OTHER
3. DATE CLEARANCE REQUIRED 8/20/14		4. DATE OF CLEARANCE
5. SIGNATURE OF REQUESTING OFFICIAL <i>Ariane Staples</i>		6. TELEPHONE NO. 941-962-2595
		7. ORGANIZATION Jacobs Engineering
	ORGANIZATION	REMARKS (Use Reverse for additional)
B A S E C I V I L E N G I N E E R I N G	A. ELECTRICAL DISTRIBUTION	MSgt Ulibari, 377-2297 Call before digging, Bldg. 1132
	B. STEAM DISTRIBUTION	Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
	C. WATER DISTRIBUTION	Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
	D. POL DISTRIBUTION	Mr. Dave Frey, 377-2140 Call before digging, Bldg. 4231
	E. SEWER DISTRIBUTION	Mr. Sheldon Sites, 377-2172 Call before digging, Bldg. 1128
	F. ENVIRONMENTAL	Ms. Diane Bryan, 377-1815 Obtain Hazmat Brief, Bldg. 2258
	G. PAVEMENTS/ GROUNDS	MSgt Fleming, 377-1270 Call before digging, Bldg. 4105
	H. FIRE PROTECTION	Mr. Grant Smith, 377-1293 - check back @ 3pm Do not block roads or fire hydrants, Bldg. 4870
	I. ZONE <u>CEOHS</u>	Mr. Shannon Rubin, 377-5281 Call before digging, Bldg. 2350
	J. OTHER (Specify) <u>Natural Resources</u>	Mr. Thomas Slater, 377-5182 Bldg. 2310
9. SECURITY POLICE		SSgt Matthew Carr, 377-2933 SSgt Bratcher (Change) Obtain Security briefing, Bldg. 3134 Mgt Malerins
10. SAFETY		SSgt Devon Ellis, 377-4260 Obtain Safety briefing, Bldg. 3112 Rm. 181
11. COMMUNICATIONS <u>14-58</u>		Mr. John Williams, 377-2368 Call 24 hours before digging, Bldg. 1127
12. BASE OPERATIONS		TSgt Joshua Stillwagon, 377-3233 If airfield vehicle pass needed, Bldg. 1215
13. CABLE TV		See block 14. ACS FB - No conflict per Bernadette Nelson via phone on 8/22/14 (907) 378-8093 AFS ACSFB - No conflict per Bernadette Nelson via phone on 8/22/14 (907) 378-8093
14. COMMERCIAL UTILITY COMPANY		Alaska Dig Line, 1-800-478-3121 or 811 Control Number 201-332-0360 Ticket # 2014340398
<input checked="" type="checkbox"/> TELEPHONE		ARRC - No conflict
<input type="checkbox"/> GAS		GCI - No conflict per Leonard Wagner via email on 8/20/14
<input type="checkbox"/> ELECTRIC		GCI Fiber - 4
15. OTHER (Specify) <u>Contact Housing office at 372-2299 and resident prior to digging. Locatacted at 354 Broadway Suite 215</u>		
16. REQUESTED CLEARANCE <input checked="" type="checkbox"/> APPROVED <input type="checkbox"/> DISAPPROVED		
17. TYPED NAME AND SIGNATURE OF APPROVING OFFICER (Chief of Operations Flight or Chief of Engineering Flight) <i>Craig Hollenbeck</i>		17a. DATE SIGNED 20 Aug 2014

INSTRUCTIONS

The BCE work clearance request is used for any work (contract or in-house) that may disrupt aircraft or vehicular traffic flow, base utility services, protection provided by fire and intrusion alarm system, or routine activities of the installation. This form is used to coordinate the required work with key base activities and keep customer inconvenience to a minimum. It is also used to identify potentially hazardous work conditions in an attempt to prevent accidents. The work clearance request is processed just prior to the start of work. If delays are encountered and the conditions at the job site change (or may have changed) this work clearance request must be reprocessed.

18. REMARKS. *(This section must describe specific precautionary measure to be taken before and during work accomplishment. Specific comments concerning the approved method of excavation, hand or powered equipment, should be included.)*

AUG-27

JACOBS

BRYAN, DIANE L GS-11 USAF PACAF 354 CES/CEIEC

From: TALLANT, CAROLYN A CIV USAF HAF 354 CES/OLAE
Sent: Tuesday, August 19, 2014 3:47 PM
To: Maher, Kevin; BRYAN, DIANE L GS-11 USAF PACAF 354 CES/CEIEC
Cc: Staples, Ariane; ROTH, PATRICK A GS-13 USAF AFCEC PACAF/OLAE
Subject: RE: Eielson Dig Permits

Take them to Diane Bryan, she is the final signature. Julene appears to be out.

Diane, sign away for me on Jacobs permits!

-----Original Message-----

From: Maher, Kevin [mailto:Kevin.Maher@jacobs.com]
Sent: Tuesday, August 19, 2014 6:45 PM
To: TALLANT, CAROLYN A CIV USAF HAF 354 CES/OLAE
Cc: Staples, Ariane; ROTH, PATRICK A GS-13 USAF AFCEC PACAF/OLAE
Subject: Eielson Dig Permits

Carolyn,

We are working on our dig permit for sediment/surface soil collection at SS67. We are planning to take the permit to Julienne May for the environmental group signature since yourself and Captain Windsor are out of the office. Is this acceptable, or should we be taking them to someone else for signature?

Thank you,

Kevin

Kevin Maher | JACOBS ENGINEERING

Project Manager

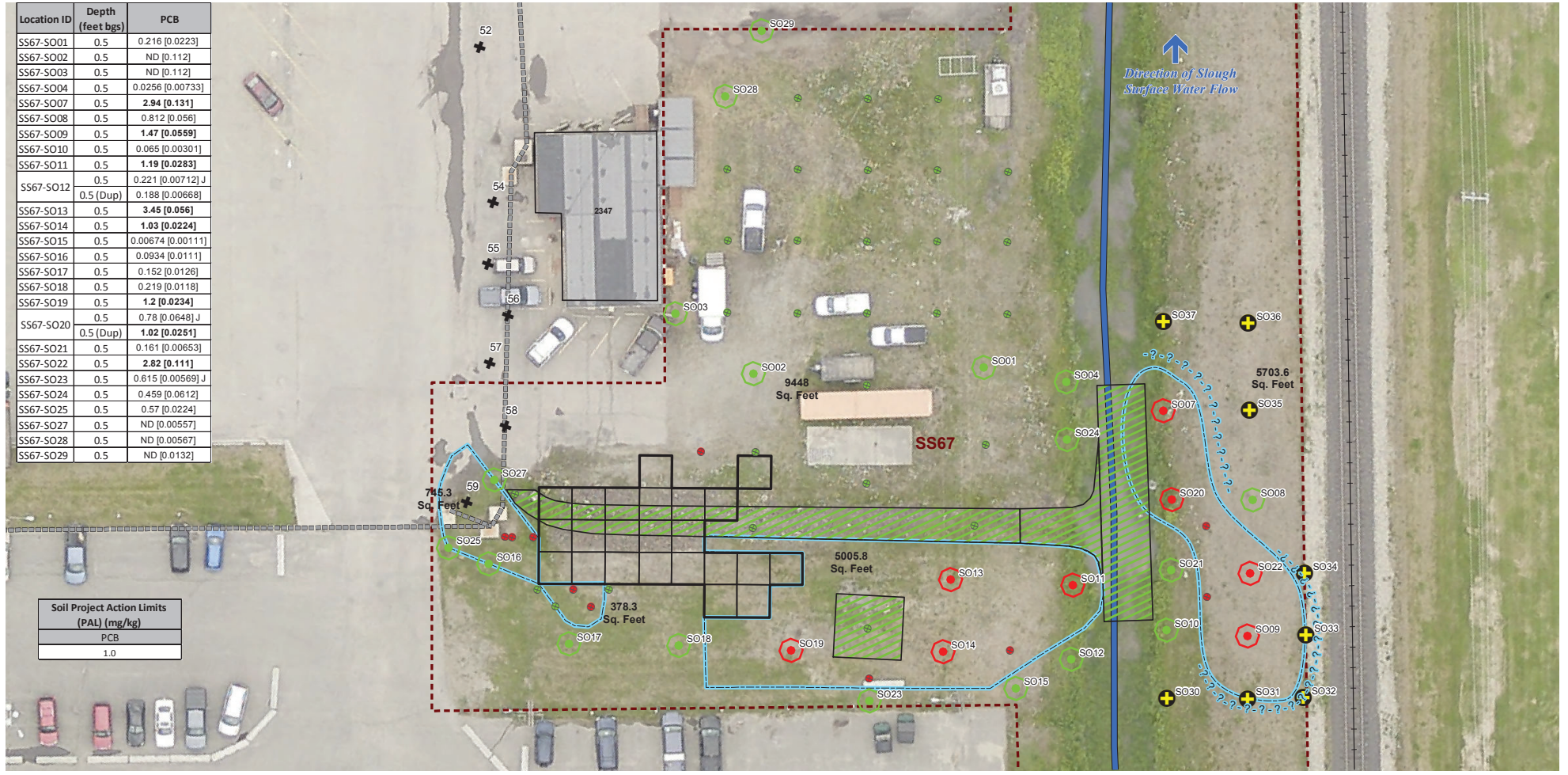
4300 B. STREET | SUITE 600 | ANCHORAGE, AK 99503

OFFICE: 907.751.3429 | FAX: 907.563.3320

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Location ID	Depth (feet bgs)	PCB
SS67-SO01	0.5	0.216 [0.0223]
SS67-SO02	0.5	ND [0.112]
SS67-SO03	0.5	ND [0.112]
SS67-SO04	0.5	0.0256 [0.00733]
SS67-SO07	0.5	2.94 [0.131]
SS67-SO08	0.5	0.812 [0.056]
SS67-SO09	0.5	1.47 [0.0559]
SS67-SO10	0.5	0.065 [0.00301]
SS67-SO11	0.5	1.19 [0.0283]
SS67-SO12	0.5	0.221 [0.00712] J
SS67-SO12	0.5 (Dup)	0.188 [0.00668]
SS67-SO13	0.5	3.45 [0.056]
SS67-SO14	0.5	1.03 [0.0224]
SS67-SO15	0.5	0.00674 [0.00111]
SS67-SO16	0.5	0.0934 [0.0111]
SS67-SO17	0.5	0.152 [0.0126]
SS67-SO18	0.5	0.219 [0.0118]
SS67-SO19	0.5	1.2 [0.0234]
SS67-SO20	0.5	0.78 [0.0648] J
SS67-SO20	0.5 (Dup)	1.02 [0.0251]
SS67-SO21	0.5	0.161 [0.00653]
SS67-SO22	0.5	2.82 [0.111]
SS67-SO23	0.5	0.615 [0.00569] J
SS67-SO24	0.5	0.459 [0.0612]
SS67-SO25	0.5	0.57 [0.0224]
SS67-SO27	0.5	ND [0.00557]
SS67-SO28	0.5	ND [0.00567]
SS67-SO29	0.5	ND [0.0132]

Soil Project Action Limits (PAL) (mg/kg)	
PCB	1.0



- + 2014 Proposed Surface Soil Sample
- 2013 Surface Soil Sample PCB Result <1 mg/kg
- 2013 Surface Soil Sample PCB Result >1 mg/kg
- + Utilidor Field Screening Sample Location (TPECI 2013a)
- 1991-1998 Surface Soil Sample PCB Result <1 mg/kg
- 1991-1998 Surface Soil Sample PCB Result >1 mg/kg
- 1998 PCB Ditch Excavation Major Grid
- 1998 PCB Ditch Excavation Minor Grid
- 1996-1997 Excavation
- Estimated Extent of PCB Contamination in Surface Soil
- ~ Garrison Slough
- Utilidor
- Historic Source Area Boundary

Notes:
 Surface soil is the top two feet of soil.
 -? = undefined extent (no bounding samples)
 Sample results are reported in milligrams per kilograms (mg/kg)
 Concentrations exceeding the Project Action Limit (PAL) are **bold**
 Data qualifiers are defined in the Data Quality Assessment (Appendix F)
 ND=not detected above the limit of detection
 [] = limit of detection
 PCB=polychlorinated biphenyls
 DDT=4,4-Dichlorodiphenyltrichloroethane
 DDD=4,4-Dichlorodiphenyldichloroethane
 DDE=4,4-Dichlorodiphenyldichloroethylene

All Locations Are Approximate

0 30 60 90
Feet

WGS 1984 UTM Zone 6N Imagery: From GeoBase, 2012, 4 inch pixels

**2014 PROPOSED SURFACE SOIL SAMPLES
SOURCE AREA SS67 (SOUTH)**

EIELSON AIR FORCE BASE, ALASKA

JACOBS	DATE 15 AUG 2014	PROJECT MANAGER K. MAHER	FIGURE NO 3
---------------	---------------------	-----------------------------	----------------

Eielson AFB, AK

SS67 SURVEY



Rite in the Rain[®]
ALL-WEATHER
**ENVIRONMENTAL
FIELD BOOK**
No 550

Logbook 1

AUTHORS:

A. STAPLES

HTRW-J07-05F45701-N04-0015

No. 550 Environmental - Poly



6 3 2 2 8 1 5 5 0 1 1 2
ISBN 978-1-932149-36-4

Did you remember ... ???

Daily Logbook Checklist

- Project name / Site ID / Client
- Date
- Weather, site conditions, and other salient observations
- Level of PPE used
- Full names of onsite personnel and affiliations (including all visitors)
- Daily objectives
- Field measurements and calibrations
- Time and location of activity
- Field observations and comments
- Deviations from the Work Plan
- Site photographs
- Site sketches (with reference i.e. "N" arrow)
- Survey and location i.e. samples or debris (GPS coordinates when possible)
- For each sample record:
 - Date, time, sampler(s)
 - Sample ID
 - Media, container(s), preservatives
 - QC (dup/MS/MSD)
 - Analysis
 - MeOH lot #
 - Tare weight
- Sample shipments (when, what, destination)
- Waste tracking (when, how much, destination)
- Daily summary of activities (i.e. # of samples collected)



Location Eielson AFB Date 8/18/14
 Project / Client SS67 Garrison Slough

1200 Set up base station at CTL100.
 Antennae height = 82.9 cm = 0.829 m

CTL100 Published:

N - 7,173,260.469 m

E - 495,643.601 m

Ell HT - 173.577 m

UTM Z6N W951984

1230 Upload files for stakeout to controller

1300 Collect checkshot at SS67

Pt. ID = CS5567 CHK1

N - 7,173,263.491 m

E - 495,432.184 m

Ell HT - 173.670 m

1400 Stakeout sediment sample offset locations
 along Garrison Slough at SS67.

1750 Depart site. Return to field trailer.

Location Eielson AFB Date 8/18/14
 Project / Client SS67 Garrison Slough

1800 Collect checkshot @ CS5567. Pt. ID = CS5567 CHK2

N - 7,173,263.471 m

E - 495,632.186 m

Ell HT - 173.679 m

$\Delta X = 0.020$ m

$\Delta Y = 0.002$ m

$\Delta Z = 0.009$ m

1805 Break down base station at CTL100

1830 Depart site.

Daily summary:

- Completed stakeout for sediment sampling at SS67
- Collected ^{an} dig permit signatures ^{for} sediment & soil sampling

Location Egelson AFB Date 8/19/14
 Project / Client SS67 Garrison Slough

Personnel: Ariane Staples

Weather: 61°F cloudy, rainy

High: 63°F

Low: 45°F

Wind: 6 mph

PPE: Modified level D (Hard hat, safety toe boots, high vis vork, safety glasses, task appropriate gloves), rain gear.

Equipment: Leica Viva GS15 1511039 (Rover)
 Leica Viva GS15 150016 (Base)
 Leica Viva CS15 1590097 (Controller)

Set up base station at CTL100
 Antenna Height = 0.828 m

CTL100 Published:

N - 7,173, 260, 469 m

E - 495, ~~693~~⁶³⁹, 601 m

EllipH - 173.577 m

UTM Z6N WGS1984

Location Egelson AFB Date 8/19/14
 Project / Client SS67 Garrison Slough

1207 Collect check-shot at C55567.

Pt. ID: C55567 CHK1

N - 7,173, 263, 465 m

E - 495, 632, 183 m

EllipH - 173.661 m

Stake out soil sampling locations at SS67.

S037 - moved 2m east, off incline, out of slough

S036, S035, S034, S033, S032, S031

S030 - moved 2m east off bank, out of slough

1255 Collect dig permit signatures for soil sampling @ SS67.
 (Water, POL, Fire, Security Police, Safety, Base Ops)

1458 Collect check-shot at C55567

Pt ID: C55567 CHK2

N - 7,173, 263, 471 m

E - 495, 632, 175 m

EllipH - 173.655 m

1500 Left message for comm. - Will stop by comm of electric shops tomorrow. (Neither in office)

Location Eielson AFB Date 9/2/14

Project / Client SS67 - Garrison Slough

Personnel: Ariane Staples Jacobs
Andrew Moore Jacobs

Weather: 42°F sunny, partly cloudy
High: 52°F
Low: 34°F
Wind: 15mph

PPE: Modified Level D (hard hat, safety toe boots, safety vest, safety glasses, task appropriate gloves.

1533 Set up Base station at CTL100.

Equipment: Leica Viva GS15 1511039 (Rover)
Leica Viva GS15 150014 (Base)
Leica Viva CS15 1590097 (Controller)

1603 Collect checkshot at CS 5567 (Job 0902 EAFA)

Pt. ID: CS5567 CHK1

N: 7,173,263.477m ΔX: 0.003m
E: 495,632.188m ΔY: 0.002m
EllHt: 173.669m ΔZ: 0.010m

1645 Arrive at 5567.

Job ID change to: EI_5567_090214

Location Eielson AFB Date 9/2/14

Project / Client SS67 - Garrison Slough

Compute stakeout of locations 5038 through 5041.

1645 Depart 5567.

1800 Return to CTL100 to collect check shot at CS5567.

Pt ID = CS 5567 CHK2

N: 7,173,263.477m
E: 495,632.183m
EllHt: 173.660m

ΔX = 0.003m
ΔY = 0.003m
ΔZ = 0.001m

CS5567 Published:

N: 7,173,263.480m
E: 495,632.186m
EllHt: 173.659m

see published

1845 Depart site.

Ariane Staples 9/2/14

10 Location Eielson AFB 5567 Date 9/9/14
Project / Client OSF45701 / USACE
SUNNY 50°F

0730 Tailgate
personnel onsite
Dove Ward
Angela DiBernardino
Andrew Moore
Genevieve Pettit

0908 need to write card to
obtain PCB contaminated
voucher for additional
soil samples after
prepping glassware and
set up for the day at
CRP sites

naming convention:

14GS-SO-#-depth

0954 collect sample GP/AD

14GS-SO-41-0.5

NS/MSD
1 X 8oz amber (SW8082)

11 Location Eielson AFB 5567 Date 9/9/14
Project / Client OSF45701

1008 collected by GP/AD
14GS-SO-40-0.5 (SW8082)
1 X 8oz amber

1008 14GS-SO4-40-0.5
1 X 8oz amber (SW8082)

1019 collected by GP/AD
1 X 8oz amber (SW8082)
14GS-SO-42-0.5

1029 collected by GP/AD
1 X 8oz amber (SW8082)
14GS-SO39-0.5

1038 collected by GP/AD
1 X 8oz glass (SW8082)
14GS-SO-38-0.5

Back to job trailer for
sample management and
continue with CRP site
work

G. Pettit
9/9/14

Eielson 2014 SS67
Sampling Notes



Rite in the Rain®
ALL-WEATHER
**ENVIRONMENTAL
FIELD BOOK**
No 550

Brian Menghini
Genevieve Pettit

550 - Environmental - Poly - 4 3/4 in x 7 1/2 in



9 3 2 2 8 1 1 5 5 0 1 1 2
ISBN 978-1-932149-36-4

HTRW-J07-05F45701-H04-001

4 Location Eielson 5567 Date 8-19-14

Project / Client USACE

WX: Sunny, rain, 50's

1900 Performed recon of the proposed slough sampling points (soft sediment)

2 Beaver Dams discovered one just downstream of SS112, the other about 3 meters upstream of SS107

All locations downstream of SS112 should be able to be collected w/ chest waders.

Staked out points SS92 OFF through SS100 OFF w/ survey grade accuracy. Pounded bath @ each loc to use as measurement Ref while were in the slough.

1915 Tear down Base Station

5 Location 5567 Date 8-19-14

Project / Client USACE

WX: Partly cloudy, calm, 60's

1945 Brian Demobe from 5567 site

20:40 Genevieve Pettit (Tacobbs) arrives in Fairbanks



Brian Demobe
8-19-14

Location SS67 Date 8-20-14
 Project / Client USACE 05F45701
 wx: 40s, overcast, Calm

07:40 Tailgate
 B. Menghini > JEG
 G. Pettit

12:30 Cleared brush from
 access road along slough.
 Truck can now access
 every sample location.

Found put-in location for
 boat. ~~Can~~ Can access
 SS92 - SS100 from
 here.

Cleared overhanging
 brush in this area with
 loppers

Pete said he could
 be here btwn 13:30 - 14:30

Bm + GP will run to
 FBX to get waters.

Location SS67 Date 8-20-14
 Project / Client USACE 05F45701

1440 Pete Redmond on site
 SS67

1445 Set up Base Station
 @ SS67 ~~TRF~~ 100
 CTL

Set up over "over last setup"

Ant Hgt. = 82.9 cm

Chae GS 15 Tripod
 Vertical offset: 0.360 m

1520 Bm/GP/PR move
 to slough @ SS96
 ready to perform
 UXO avoidance

~~Confirmed Sweep locations~~

Anomaly loc

- Center, log across slough
 south of SS92, btwn Y5
- left @ SS92

8 Location SS67 Date 8/20/14
Project / Client USACE / 05F45701
WX, overcast, 90's, calm

~~Confirmed sweep log
(cont'd)~~

Safe location confirmed left
offshore of right side for
sample location SS92 marked
with pink flagging tape
above

location SS93, cleared 1m
laterally from survey ~~later~~
future locations of similar
nature will be labeled as
'clear' for future notes
in the logbook

SS94 - cleared

SS95 - anomaly located on right
side of the slough (sample
left or middle)

SS96 - anomaly located in center
of slough under underwater
log and marked w/ tape

9 Location Edson AFB SS67 Date 8/20/14
Project / Client 05F45701 / USACE

sample location cleared to
the right of surveyed stick
and to the left of above
water vertical stick

SS97 anomaly detected on
right side of slough marked
by flagging (sample between
flagging) and left brush

1417 Begin sampling SS98

collect 1 X 4oz amber (SW8082)
check over

sample ID: 14GS-SS-98-C-1.0
by PR/BM/GP

minimal recovery perform 2nd
attempt

1452 Begin sampling SS99

collect 1 X 4oz amber (SW8082)

sample ID: 14GS-SS-99-R-1.0
by BM/PR/GP E
BCM

10 Location Eickson AFB SS67 Date 8/20/14

Project / Client 05F45701 / USACE
wx: overcast, light rain, 50s

1818 collect SS100 over 2 cores
1 X 4oz amber (SN8082)

by BM/PR/EP
sample ID: 14GS-SS-100-^{ECM}110
w

1907 finish unpacking sample
supplies at job trailer

0934 updated sample summary
and broke down base
station

~~G. Pettit
8/20/14~~

Location Eickson SS67 Date 8-21-14¹¹

Project / Client USACE 05F45701

Goals for today

- Finish collecting SS92-SS97
- Call Summerville to see if lab is ready to receive samples + weekends too.
- Call Goldstreak + ask the flight schedule. whether 13:00 or 18:45 cooler dropoff makes a difference
- Confirm w/ Pete whether we have him on Friday
- Survey / Swing tie anomaly locations
- See if Ariane / Kari can support our ops today
- try to re-collect SS98 @ secondary location
- take pictures of our material we recovered

12 Location Eie SS67 Date 8-20-14
Project / Client OSF45701 / USAACE
WX: clear, calm, sunny

8:26 set up base station
@ SS67 CTL 100'

Ant. Hgt. = 82.9 cm

"over last setup"

RTK Antenna: GS15 Tripod
vert offset: 0.360 m

0840 Tailgate
BM & GP

0923 Finish loading up boat
onsite: prepare for launch
w/ iete Redmond

launch boat and move to
SS92 anomaly across center
and left throughout 1° and
2° sampling locations. Small
location cleared in center of
slough at 4.3 ft for
water depth

13 Location Eielson AFB SS67 Date 8/21/14
Project / Client OSF45701 / USAACE

1008 collect SS92
by PR/BM/GP 1 X 4oz amber (SW8082)
sample ID: 14GS-SS-92-C-0.6
1st core = 0.4" = 0.3'
2nd core = 0.3'
3rd core = 0.3'

1030 collect SS93 by PR/BM/GP
1 X 4oz amber (SW8082)
sample ID: 14GS-SS-93-W-~~0.8~~
H₂O depth 2.6'
1st core = 0.3'
2nd core = 0.5' GP

dup: sample ID: 14GS-SS-93X-0.8
-W-2.0
1st core = 0.5'
2nd core = 0.3'
3rd core = 0.4'

1114 collect SS94 by PR/BM/GP
H₂O depth = 2'
1 X 4oz amber (SW8082)
sample ID: 14GS-SS-94-W-0.3
1st core = 0.2'
2nd core = 0.1'

Location Eielson AFB SS67 Date 8/21/14
 Project / Client OSF 45701 / USACE
 wx! clear, sunny, 70's, calm

1136 collect SS95 by BM/PR/GP
 sample ID: 14GS-SS-95-W-0.8
 2 X 4oz amber (SW8082) 1
 1st core = 0.4'
 MS/MSD 2nd core = 0.4'
 3.3' for H₂O depth

1203 collect SS96 by BM/PR/GP
 sample ID: 14GS-SS-96-C-0.7
 1 X 4oz amber (SW8082)
 1st core = 0.2' 2nd core = 0.5'
 H₂O depth = 4.1'

1222 collect SS97 by BM/PR/GP
 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-97-W-0.7
 1st core = 0.3' 2nd core = 0.4'
 small anomaly to south of sample
 location
 H₂O depth 3.5'

1300 BM & GP back to job trailer
 to update sample summary
 & drop off samples

Location Eielson AFB SS67 Date 8/21/14
 Project / Client OSF 45701 / USACE

1310 Arrive back onsite
 relocate boat to area between
 beaver dams for UXO
 avoidance and collection of
 one phase I sample

SS107 large anomaly on east
 side of slough near shore
 (GS ANOM 01) taken w/GPS

SS108 anomaly south of center
 sample location - marked
 (GS ANOM 02) w/GPS

Pete Redmond moves into waters
 after ensuring water level is
 safe & remaining boat from
 slough

SS109 anomalies: medium to
 left bank, small. about
 2 ft E of the first anomalies
 small (GS ANOM 03)
 medium (GS ANOM 04)

Location Eielson AFB SS67 Date 8/21/14
 Project / Client OSF45701 / USACE
 WX: clear, sunny, calm, 70s

SS101 anomaly located on left bank
 'GS ANOM 05 RP 1'
 tape measure extended to
 PR holding where anomaly
 is present to 'GS ANOM 05 RP 1'
 (33.0')

SS101 collected by PR/BM/GP
 1446 sample ID: 14GS-SS-101-C-07
 1st core = 0.1 2nd core = 0.6
 1 X 4oz amber (SW8082)

SS110 avoidance cleared

SS111 large, deep anomaly located
 near the west shoreline
 'GS ANOM 06'
 2nd anomaly located in center
 south slough
 'GS ANOM 07'

SS112 Two anomalies located
 on east side of slough
 'GS ANOM 09' & 'GS ANOM 10'

Location Eielson AFB SS67 Date 8/21/14
 Project / Client OSF45701 / USACE

One anomaly located at
 west side 'GS ANOM 08'



From west bank
 collect SS102 by PR/BM/GP
 1518 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-102-W-06
 1st core = 1.3' recovery
 split into 2 samples @
 2 depths

1520 1.3
 sample ID: 14GS-SS-102-W-03
 1 X 4 oz amber (SW8082)

1518 0.3 + 0.3
 sample ID: 14GS-SS-102-W-03 BM
 1 X 4 oz amber (SW8082) 0.6
 1st core 0.3' recor

DUP

Location Eielson AFB S67 Date 8/21/14
 Project / Client OSF45701 / USACE
WX: sunny, calm, 70's

1532 Survey loc SS102L
 by RP
 $\text{SS102LRP01} = 24' \text{ OFF}$
 $\text{SS102LRP02} = 35' \text{ OFF}$

SS103 2 anomalies present
 'GS ANOM 11' on the
 west side and 'GS ANOM 12'
 on the east side

SS103 anomaly on east
 side of slough 'GS ANOM 13'

1557
 collect by PR/BM/GP
 1 X 4oz amber
 sample ID: 14GS-SS103-E-~~2.0~~^{16M}
 1st core = 0.9' recov
 water depth 2.0'

SS104 one anomaly located
 at west shore possibly
 a wire (GS ANOM 14)

Location Eielson AFB S67 Date 8/21/14
 Project / Client OSF45701 / USACE

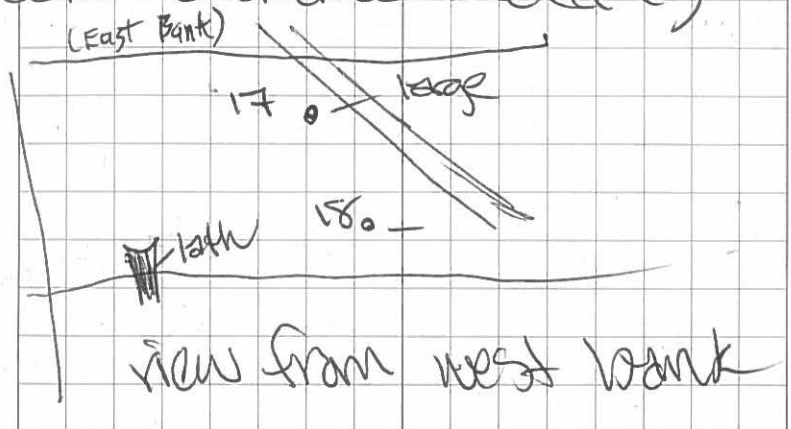
SS04 anomalies scattered
 throughout sample location

1626 collect by PR/BM/GP
 1 X 4oz amber (SN8082)
 sample ID: 14GS-SS-104-C-06
 1st core = 0.6

2 anomalies located in center
 of slough. sample offset
 ~3 ft south for avoidance

anomalies marked
 'GS ANOM ~~15~~ 15' & 'GS ANOM ~~16~~ 16'
 by GP

SS105 anomalies located (2) ¹⁶ GP



Location Eelton AFB 5567 Date 8/21/14
 Project / Client 05F4570 / USACE
 wx: clear, calm, sunny, 70s

1656 collect 55105
 by PR / BM / GP
 1 X 4oz amber (~~SW8082~~)
 sample ID: 14GS-SS-105-C-0.8
 1st core = 0.8' recovery

55116
 drum visible on east
 shore ~ 50 ft south
 of location

anomaly present on west
 bank
 'GS ANOM 19'

1721 collect 55106 by PR / BM / GP
 1 X 4oz amber (~~SW8082~~)
 sample ID: 14GS-SS-106-C-0.8
 1st core = 0.8'

1803 collect 5598 by PR / BM / GP
 1 X 4oz amber (~~SW8082~~) ^{KCM}
 sample ID: 14GS-SS-98-W-~~15~~
 1st core = 0.0
 2nd core = 0.6' 0.6

Location Eelton AFB 5567 Date 8/21/14²¹
 Project / Client 05F4570 / USACE

recollection of 5598 due to
 recovery content when
 sampled 8/20/14

1848 Pete R. drum obs
 from site

1940 BM / GP depart
 site

Survey Note: Vertical elevation
 of survey points in the slough
 (sample locs & anomalies) will
 vary due to water depth &
 tree cover.

~~Mini
 8-21-14~~

Location Ele/5567 Date 8-22-14
 Project / Client 05F45701 / USACE
 WX: high 40's, clear, calm

8:35 Morning tailgate
 BM / GP

08:47 Dropped off cooler
 Bonsai @ FedEx for
 deliv. to GEL on
 Saturday

Spoke to Heather Shaffer
 @ GEL, she said they
 could prob. receive the
 cooler on Sat. & possibly
 have results on Sunday

FedEx online credentials
 UserID: ~~Jacobsak~~ jacobsak
 Pass: Jacobs77

1022 Set up Base @ 5567
 over "CTL 100" (over last setup)
 Ant. Hgt: 83.1 cm
 RTK Ant: GS15 Tripod
 Vert offset: 36 cm

Location Ele/5567 Date 8-22-14²³
 Project / Client 05F45701 / USACE

1029 Collect check shot
 5567

Point ID: "CS 5567 082214-1"
 N: 717 3263.463 m
 E: 495632.192 m
 El. Hgt: 173.757 m

1104 Collect Sample Soil
 5567

1465-50-36-0.5
 X1 4oz amber SW8082

1104 Collect Sample Soil
 1465-50Z-36-0.5
 X1 4oz amber SW8082

DUPLICATE

1102 Collect Sample Soil
 1465-50-34-0.5
 X1 4oz amber SW8082

Location Eie / 5567 Date 8-22-14
 Project / Client OSF45701 / USAACE
 WX: Sunny, 70's, Calm

116 Collect Sample Soil
 1465-50-33-0.5
 X1 4-oz amber SW8082

1120 Collect Sample Soil
 1465-50-32-0.5
 X1 4-oz amber SW8082

1125 Collect Sample Soil
 1465-50-31-0.5
 X1 4-oz amber SW8082

1131 Collect Sample Soil
 1465-50-30-0.5
 X2 4-oz amber SW8082
MS/MSD

1141 Collect Sample Soil
 1465-50-35-0.5
 X1 4-oz amber SW8082

1148 Collect Sample
 1465-50-37-0.5
 X1 4-oz amber SW8082

Location Eie / 5567 Date 8-22-14
 Project / Client OSF45701 / USAACE
 WX: Sunny, Calm, 70s

1498 Generated Waste

(W)

X1 55-gal steel BM
 Black

14EI-5567-01
 PCB-contaminated IDW

X1 5-gal Poly DF
 White

14EI-5567-02
 PCB-contaminated H₂O

1530 Shut down base &
 re-started to apply the
 proper antenna type
 over "CTL too"
 Ant. Hgt: 83.1 cm
 RTK: Ant. GS19 Tripod Short
 vert offset: 25.5 cm

1535 Re-collect 5567
 Check shot

1645 BM/GP Depart 5567 site
 for FedEx

26 Location Eiel 5567 Date 8-22-14

Project / Client OSF4570

wx: Partly cloudy, 66°F, calm

1725 Drop off cooler @

"Fedex
"PONDEROSA"
Co C #145567-02



Location Eiel 5567 Date 8-23-14

Project / Client OSF4570

wx: 46°F, light drizzle of rain, calm

0900 tailgate

1008 Set up base station @
"CTL 100"

Ant Hgt: 83.0 cm
Ant type: GS15 Tripod short
vert. offset: 25.5 cm

1116 collect 55916 by BM/EP
1x 4oz amber (SN8082)
sample ID: 14GS-55-916-E-0.7
1st core = 0.3' 2nd core = 0.4'

H₂O depth = 4.1'
2 photos taken of sample

~~1140 collect 55917 by BM/EP
1x 4oz amber (SN8082)
sample ID: 14GS-55-917-E-0.7
1st core = 0.3' gravel~~

H₂O depth = 2.9'

gravel encountered across the
slough basin on west of center
anomalies located on east
side of slough

28 Location Eielson AFB 5567 Date 8/23/14
Project / Client OSF45701 / USACE
WX: 60's, sunny, calm

core barrel sank in 1.75'
resulting in 0.3 recovery of
gravel = no collection

SS100 appears to have no
anomalies from prior notes
on 8/20/14

SS100

1240 collect by BM/GP
sample ID: 1465-SS-100-C-

1 X 4oz amber (SW8082)
1st core: 0.3' of gravel

2nd core: 0.4' recovery

3rd core: no recovery

#268/269 photos

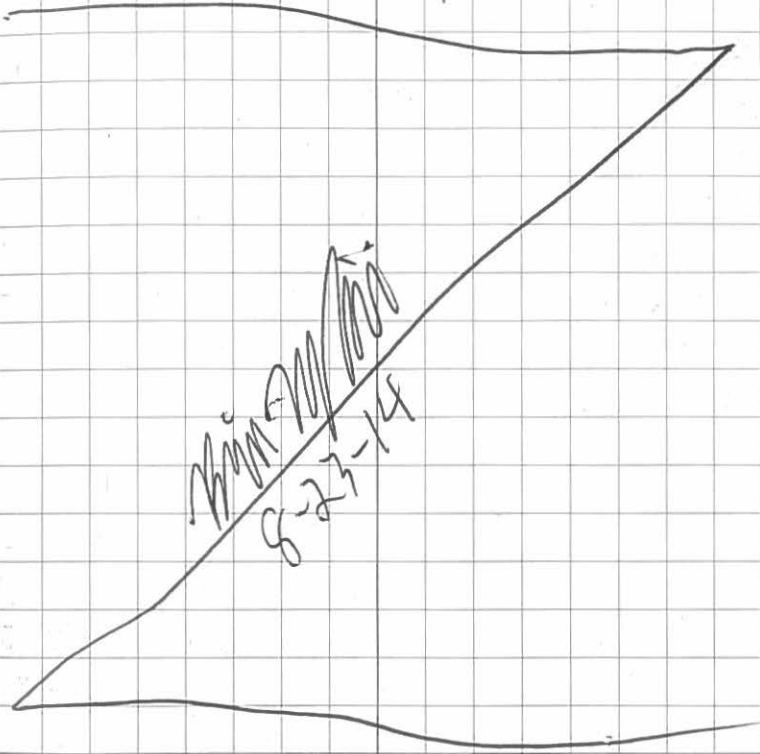
not enough recovery for
analysis

SS104 Attempt to collect
sample from west side
of slough due to consistency
of center sample location

Location Eielson AFB 5567 Date 8/23/14²⁹
Project / Client OSF45701 / USACE

1333
~~US/USDI~~
1st core = 0.3' 3rd core =
2nd core = 0.5' 0.4'
collected by BM/GP
2X 4oz amber (SW8082)
sample ID: 1465-SS-104-W-1-Z

1745 BM/GP depart from site



30 Location Eie/SS67 Date 8-24-14

Project / Client OSF45701 / USACE

WX. 55°F, sunny, calm

0915 Morning Tailgate
BM / GP

1017. Set up Base Station @
SS67 "CTL 100"
"over last setup"
Ant. Hgt: 83.0 cm
Ant. type: GS15 Tripod short
Vert. off: 25.5 cm

1042 BM / GP @ FS site

1101 SS104 collected by BM / GP
H₂O depth = 1.5'

1 X 4oz amber (SW8082)

Sample ID: 14GS-SS-107-C-0.7
1st core = 0.3 2nd core = 0.4

recovery was rocky & wet
collect 2^o sample for analysis
keep on hold should 1^o be ineffective

1111 collect 1 X 4oz amber (SW8082)
Sample ID: 14GS-SS-107-W-0.6
1st core = 0.3 2nd core = 0.3
H₂O depth = 2.1'

31 Location Eitan AFB/SS067 Date 8/24/14

Project / Client OSF45701 / USACE

1132 collected by BM / GP
1 X 4oz amber (SW8082)
H₂O depth = 2'
Sample ID: 14GS-SS-108-C-1.2
1st core = 0.8 quite rocky
Sample take 2nd core for
sediment attempt 2nd core = 0.4

1204 collected by BM / GP (SS109)
1 X 4oz amber (SW8082)
Sample ID: 14GS-SS-109-E-1.6
1st core = 0.4 2nd core = 0.8

DUP H₂O depth = 2.5' 2nd = 0.4
3rd = all rocks 0.5

1204 sample ID: 14GS-SSX-109-E-1.6

1255 ~~SS100~~ collect by BM / GP
1 X 4oz amber (SW8082)
Sample ID: 14GS-SS-110-W-1.0

H₂O depth = 2.7'
1st core = 0.3' 2nd = 0.7' very sandy
bits of H₂O w/ sediment suspended

try 2^o location:

1244 ID: 14GS-SS-110-E-0.9
1st core = 0.6 2nd core = 0.3

Location Edson AFB SSG7 Date 8/24/14
 Project / Client OSF45701 / USACE

1301 collected by BM/GP S511
 H₂O depth = 2.4'
 sample ID: 14GS-SS-111-W-0.95
 1st core = 0.95
 1 X 4oz amber (SW8082)

1321 collected by BM/GP S512
 sample ID: 14GS-SS-112-E-0.8
 1 X 4oz amber (SW8082)
 H₂O depth = 2.3'
 1st core = 0.2 / 2nd = 0.3 / 3rd = 0.3
 sample had suspended sediment
 throughout H₂O

1350 collected by BM/GP
 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-113-C-0.9
 H₂O depth = 1.8'
 1st core = 0.2 / 2nd core = 0.7
 (relocated 5' north due to gravel)

1409 collected by BM/GP
 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-114-W-0.8
 H₂O depth = 2.5'
 1st core = 0.2 next 3 cores = 0.2

Location Edson AFB SSG7 Date 8/24/14
 Project / Client OSF45701 / USACE

1435 collected by BM/GP
 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-115-W-0.8
 1st core = 0.2 / 2nd core = 0.6'
 H₂O depth = 2'

1450 collected by BM/GP
 1 X 4oz amber (SW8082)
 sample ID: 14GS-SS-116-W-1.0
 relocated 5' south due
 to anomaly
 H₂O depth = 1.9'
 1st core = 0.2 / 2nd = 0.8

more drums visible lined
 up along bank (E) of slough
 ~25' south of 1st drum
 (which is 50' south of
 S511)
 surveyed start and finish
 (DRM01, DRM02, DRM03)
 furthest south and north
 (03) and (01)

34 Location Eielson AFB SSG7 Date 8/24/14
Project / Client OSF 45701 / USA CE

- ✓ Before leaving tomorrow:
- ✓ Pull lath from slough bank
- ✓ Waste loadout (back in PPE)
- ✓ Download GPS points
- General garbage → cardboard
- ✓ Finish packing supplies
- Pack 3 ship cooler
- Drop off supplies at Lynden
- Clean out truck

1900 get ready to leave
job trailer

G. Pettit

8/24/14

Location Eiel SSG7 Date 8-25-14³⁵
Project / Client OSF 45701 / USA CE
wx! 90's, light rain, calm

07:30 Morning Tailgate
BM / GP

0820 Pack cooler "REDWOOD"
145567-03

0900 Dropped all remaining
SSG7 ID w/ Decon H₂O
@ Waste staging area
still only 2 containers:
X1 55-gal steel w/ IDW
X1 5-gal bucket w/ Decon
H₂O

0930 Pulled lath along GS
Bank

0955 Call Kevin M.

~~0950~~

1040 BM + GP depart
job trailer

1115 Drop off cooler
"Red Wood" @ FedEx

36 Location Fic/SS67 Date 8-25-14
Project / Client 05749701 / USACE
WX:

Cooler should arrive @
GEL on Tuesday

12:15 Drop of SS67 Gear @
Clyden FBX.

In Anchorage:

- ✓ Email Tracy AWB,
- ✓ Email Lab about "Redwood"
- ✓ Email Larry, Andrew, Dave,
Arione, Kevin about
room key + truck transfer

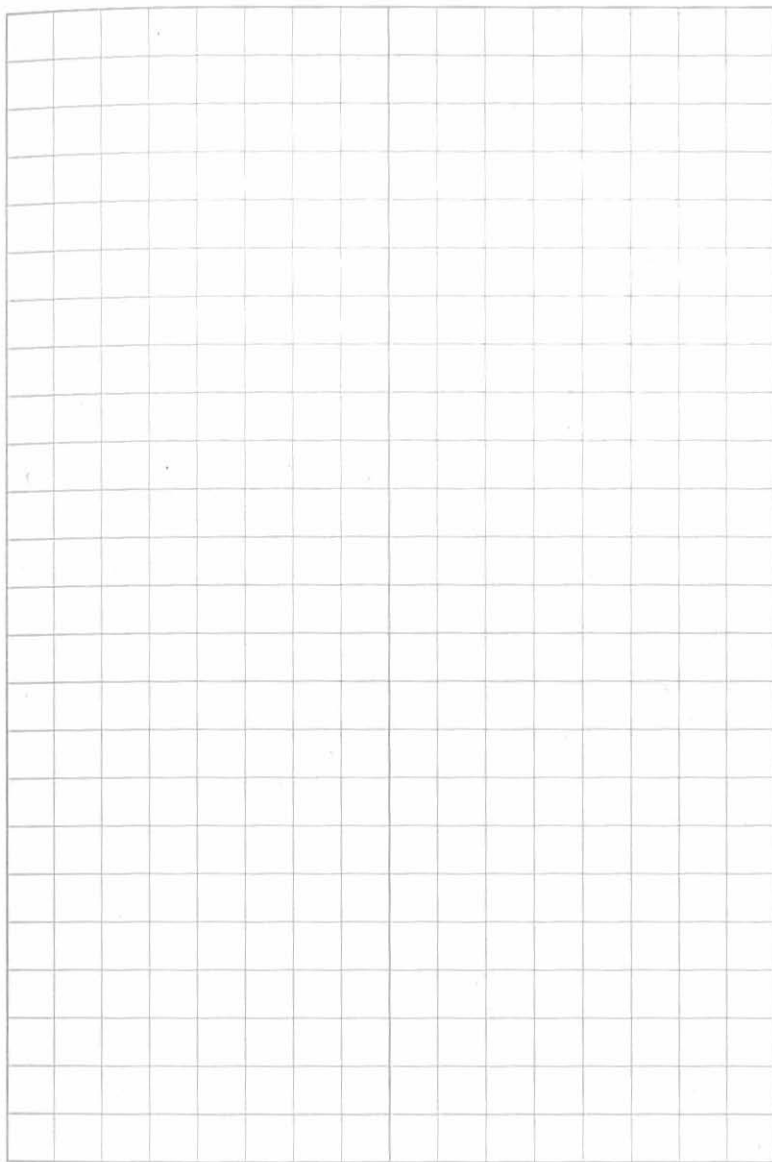
13:10 BM/GP Arrive @ FBX
airport

15:30 BM/GP in Anchorage

Brian spent \$36 cash on
cab from Wedgewood to
FBX Airport

37 Location _____ Date _____

Project / Client _____



Eielson AFB



Rite in the Rain[®]
ALL-WEATHER
**ENVIRONMENTAL
FIELD BOOK**
No 550

Logbook 3

Logbook 3



AKERS-UR-05F563-1104-0003

30 Location Evelson CRP Date 9/24/14
Project / Client Waste Sampling #2 (Phur)

0730 On site. Sunny, clear, calm, 29°F.

0745 Tailgate

Jacobs: Larry Amstold, Angela DiBernardino,
Andrew Moore, Genevieve Pettit,
Ariane Staples, David Ward
Hammer: Ryan Reynolds, Jacob Dargis

Plan: Continue drilling at 55534 + 55535.

- Finish surveying.
- Finish waste sampling.
- Call DigLine for 5567.

1300 Ryan (Weldin 907-372-4388) - Power
disconnect on 9/10 at end of day.

1307 Waste yard for sampling (Dave)

All containers from yesterday's CRP10 sample
dumped back into CRP-10 drum.

1320 14E-WSTCRP10-001 DW/GP/AD ^{from drum} CRP-10
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

31 Location Evelson CRP Date 9/24/14 cont'd
Project / Client Waste Sampling #2 cont'd

1335 14E-WSTCRP03-001 DW/GP/AD ^{from drum} CRP-03
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

1351 14E-WSTCRP02-001 DW/GP/AD ^{from drum} CRP-02
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

1405 14E-WSTCRP08-001 DW/GP/AD ^(drum) ^{from} CRP-08
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

1420 14E-WSTCRP06-001 DW/GP/AD ^(drum) ^{from} CRP-06
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

1437 14E-WSTCRP05-001 DW/GP/AD ^(drum) ^{from} CRP-05
3 x 40 ml VOA + HCl 1311 (VOCs)
1 x 250 ml poly + HNO₃ 1311 (metals)
2 x 1 L amber glass 1311 (SVOCs)

Location Eielson CRP Date 9/4/14 cont'dProject / Client Waste Sampling #2 cont'd

1452 14E-8WSTSSCT^{OL}-061 DW/GP/AD from SS67-02 (5gal bucket)
 1 x 1L amber glass SW8082 (PCBs)
 ~1.5 gal remains in the bucket

1505 Bag of SSS34 soil added to 14E-CRP-11.
 This SS is now full.

1530 Staged an empty drum and Saper Sack
 14E-CRP-13 Gen date = today, but no waste
 added at this time.

DW


Location Eielson CRP Date 9/5/14Project / Client Sealer at SS083

0730 Tailgate

Jacobs: Larry Amshold, Angela DiBerardino,
 Andrew Moore, Genevieve Pettit, Dove
 Ward

Hammer: Ryan Reynolds, Jacob Dargis

Plan: Finish SSS35, then SSS34.
 Drill TW077 if there is time
 Seal asphalt at SS083.

1130 SSS33 water reuser

1200 SS083 sealing

- Sealmaster PMCTS

- mixed with a stick until homogeneous.
- industrial sand (from Lowe's) used as aggregate.

Procedure: sprinkle a layer of sand, then
 mix in the sealer using a short-handled
 scrub brush

1330 Lunch break

1430 Return

40 Location Evelson CRP Date 9/9/14
Project / Client Final Sampling (Tues)
of Waste

0800 Tailgate - Jacobs only today (Angela, Andrew, Genevieve, Dave)

0820 Jason Wilson - Clear to be ~~me~~ next to RR until noon.

1345 Waste yard

- Drum 14E-CRP-12. Added water from S5534, S5501, and CS082. 80% full.

1400 Sample 14E-WSTCRP12-^{DW}~~1001~~ DW/GP/AD
3 x 40ml VOA + HCl for 1311 (VOCs)
1 x 250ml poly + HNO₃ for 1311 (metals)
2 x 1L Amber glass for 1311 (SVOCs)

1418 Sample 14E-WSTCRP13-^{DW}~~1001~~ DW/GP/AD
1 802 glass for 1311 (VOCs, SVOCs, metals)
From Super Sack 14E-CRP-13, CS082 logg

- 14E-CRP-13 added bags from CS082, S5501. Added 4 waste buckets. Space for 8 more buckets? 70% full.

41 Location Evelson CRP Date 9/9/14
Project / Client Final Sampling cont'd cont'd

1430 Placed 14E1-SSG7-02 (5 gal bucket) in a similarly labeled 55 gal drum.

Note: Other CRP Super Sacks can probably hold another 8-12 buckets.

1445 Leaving waste yard.

1520 Coal tar sealer at S5083

- 9 locs got first coat
- All others now have two coats
- Recoat the 9 in the morning and collect all cones.

1640 Back at field office.

DW

Location Edison Date 10-1-14Project / Client USACE / AFCEC
Kevin Mueher *(initials)*

Waste Load out

07:30 Held tailgate + completed
SAA.waited for coordination of
Base Access for ELM.09:15 Head out to waste
staging area (Bldg 43 EB)Weather: Overcast, light snow
Temp 35°F calm winds.personnel: Kevin Mueher (JACONS)
Mike Gortner (ELM)
Mark Foster (ELM)Goals: Load 2014 EDU + transport
off of Edison to TSD.

Equipment:

pallet jack
8' step ladder
Zucchi boom (fork truck)Location Edison Date 10-1-14Project / Client USACE / AFCEC
*(initials)*10:00 Completed equipment inspection and
obtained signatures on manifests
from Randy Smith

Waiting for truck to arrive.

1:45 truck arrived + waste
was loaded using boom

2:15 Left the site.

End of Day

10-1-14

ATTACHMENT 3
Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:

Title: **Date:**

CS Report Name: **Report Date:**

Consultant Firm:

Laboratory Name: **Laboratory Report Number:**

ADEC File Number: **ADEC Hazard ID:**

1. Laboratory

a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?
 Yes No NA (Please explain.) Comments:

b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
 Yes No NA (Please explain.) Comments:

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?
 Yes No NA (Please explain.) Comments:

b. Correct Analyses requested?
 Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?
 Yes No NA (Please explain.) Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?
 Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.)

Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.)

Comments:

No discrepancies were documented.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain.)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.)

Comments:

No discrepancies were noted by the laboratory

c. Were all corrective actions documented?

Yes No NA (Please explain.)

Comments:

N/A

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The data quality and usability were not affected.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain.)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.)

Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain.)

Comments:

All method blank results were ND

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

N/A

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.)

Comments:

A client specific MS/MSD was not analyzed in prep batch 1414045 as required by the DoD QSM.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

No metals/inorganics were submitted.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The MS recovery for PCB-1016 and the MS/MSD recoveries for PCB-1260 for sample 14GS-SS-95-W-0.8 were above the upper control limits due to dilution.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The 14GS-SS-95-W-0.8 MS/MSD RPD for PCB-1016 was greater than 30%.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

14GS-SS-95-W-0.8

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flags were required for the MS/MSD recovery/RPD exceedances since sample 14GS-SS-95-W-0.8 was analyzed at a dilution factor of 5.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.) Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.) Comments:

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

N/A

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):

Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

No volatiles were submitted.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

N/A

iii. All results less than PQL?

Yes No NA (Please explain.) Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

N/A

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.) Comments:

One duplicate was submitted with 13 primary samples. The 1 duplicate per 10 primary samples was not met for this SDG, but was met for the project overall.

ii. Submitted blind to lab?

Yes No NA (Please explain.) Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

The RPD for PCB-1260 in sample/duplicate 14GS-SS-93-W-2.0/14GS-SSX-93-W-2.0 was greater than 50 % (118%).

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The PCB-1260 results for samples 14GS-SS-93-W-2.0 and 14GS-SSX-93-W-2.0 were flagged JD due precision exceedance. The higher result will be used for reporting purposes. Both sample results (0.164 mg/kg/0.0423 mg/kg) exceed the Project Action Limit of 0.000048 mg/kg for total PCBs.

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.)

Comments:

A decon/equipment blank was not collected

i. All results less than PQL?

Yes No NA (Please explain.)

Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.)

Comments:

The data qualifiers applied to the results are defined in the footer of each Results table.

Laboratory Data Review Checklist

Completed by:

Title: **Date:**

CS Report Name: **Report Date:**

Consultant Firm:

Laboratory Name: **Laboratory Report Number:**

ADEC File Number: **ADEC Hazard ID:**

1. Laboratory

a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (Please explain.) Comments:

b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes No NA (Please explain.) Comments:

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain.) Comments:

b. Correct Analyses requested?

Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No NA (Please explain.) Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.)

Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.)

Comments:

The sample temperature outside of acceptable range was noted on the cooler receipt form.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were minimally affected. The samples were shipped on Friday after the overnight deadline for FedEx. The samples were not shipped until Monday and arrived Tuesday at the laboratory. The sample results from cooler “Ponderosa” will be flagged JTE due to thermal preservation exceedance. PCBs are not volatile and no significant loss of target analytes is expected.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain.)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.)

Comments:

QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

Yes No NA (Please explain.)

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The data quality and usability were not affected.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain.)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.)

Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain.)

Comments:

All method blank results were ND

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

N/A

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.)

Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

No metals/inorganics were submitted.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The 14GS-S0-30-0.5 MS/MSD recoveries for PCB-1260 were outside of QC criteria due to high target analyte concentration.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

14GS-S0-30-0.5

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flags were required for sample 14GS-S0-30-0.5 since the MS/MSD spike concentration was less than the sample concentration and the parent sample dilution factor was greater than 5.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.) Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.) Comments:

The Decachlorobiphenyl surrogate recovery for samples 14GS-SO-34-0.5 (154%), 14GS-SO-33-0.5 (0%), 14GS-SO-32-0.5 (209%), 14GS-SO-30-0.5 (128%), 14GS-SO-35-0.5 (147%), and 14GS-SO-31-0.5 (164%) were outside of QC criteria (60-125%).

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flags were required since all samples had a dilution factor of 5 or greater due to high target analyte concentration.

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):

Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes No NA (Please explain.)

Comments:

No volatiles were submitted.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes No NA (Please explain.)

Comments:

N/A

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

N/A

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

One duplicate was submitted with 8 primary samples.

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

All sample results were ND or the RPD was less than 50% for sample/duplicate 14GS-SO-36-0.5/14GS-SOZ-36-0.5.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and usability were not affected.

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.) Comments:

A decon/equipment blank was not collected

i. All results less than PQL?

Yes No NA (Please explain.) Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.) Comments:

The data qualifiers applied to the results are defined in the footer of each Results table.

Laboratory Data Review Checklist

Completed by:

Title: **Date:**

CS Report Name: **Report Date:**

Consultant Firm:

Laboratory Name: **Laboratory Report Number:**

ADEC File Number: **ADEC Hazard ID:**

1. Laboratory

a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (Please explain.) Comments:

b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes No NA (Please explain.) Comments:

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain.) Comments:

b. Correct Analyses requested?

Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No NA (Please explain.) Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.)

Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.)

Comments:

N/A

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain.)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.)

Comments:

QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

Yes No NA (Please explain.)

Comments:

N/A

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The data quality and usability were not affected.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain.)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.)

Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain.)

Comments:

Aroclor 1260 was detected in the method blank for batch 1414447/8 at a concentration of 0.0188 mg/kg.

iii. If above PQL, what samples are affected?

Comments:

Samples 14GS-SS-10-W-1.2, 14GS-SS-110-W-1.0, 14GS-SS-114-W-0.8, 14GS-SS-96-E-0.7, 14GS-SSX-109-E-1.6 had detections of Aroclor-1260 10X greater than the method blank and were reported in batch 1414447. All other samples were re-extracted/reanalyzed and reported in batch 1414843. The MB for batch 1414843 was ND for all analytes.

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

No samples were flagged since the concentrations of Aroclor-1260 in the samples were 10X greater than the concentration detected in the method blank.

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.)

Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

No metals/inorganics were submitted.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The 14GS-SS-10-W-1.2 MS/MSD recoveries for PCB-1260 were outside of QC criteria due to high target analyte concentration.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

14GS-SS-10-W-1.2

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flag was required for sample 14GS-SS-10-W-1.2 since the MS/MSD spike concentration was less than the sample concentration and the parent sample dilution factor was 5.

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.) Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.) Comments:

The Decachlorobiphenyl surrogate recovery for sample 14GS-SS-109-E-1.6 (53%) was outside of QC criteria (60-125%).

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flag was required since the sample had a dilution factor of 5 due to high target analyte concentration.

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):
Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes No NA (Please explain.)

Comments:

No volatiles were submitted.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes No NA (Please explain.)

Comments:

N/A

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

N/A

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

One duplicate was submitted with 12 primary samples. The overall duplicate frequency was met for the project.

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

The Aroclor-1260 RPD for sample/duplicate 14GS-SS-109-E-1.6/ 14GS-SSX-109-E-1.6 was greater than 50% (118%). The higher result will be used for reporting.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and usability were minimally affected. The sample/duplicate 14GS-SS-109-E-1.6/ 14GS-SSX-109-E-1.6 results for Aroclor-1260 were flagged JD to indicate sample precision exceedance. Both results exceed the sediment screening criterion. The higher value will be used for reporting purposes (14GS-SSX-109-E-1.6).

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.) Comments:

A decon/equipment blank was not collected.

i. All results less than PQL?

Yes No NA (Please explain.) Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.) Comments:

The data qualifiers applied to the results are defined in the footer of each Results table.

Laboratory Data Review Checklist

Completed by:

Title: **Date:**

CS Report Name: **Report Date:**

Consultant Firm:

Laboratory Name: **Laboratory Report Number:**

ADEC File Number: **ADEC Hazard ID:**

1. Laboratory

a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?

Yes No NA (Please explain.) Comments:

b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes No NA (Please explain.) Comments:

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?

Yes No NA (Please explain.) Comments:

b. Correct Analyses requested?

Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No NA (Please explain.) Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.)

Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.)

Comments:

N/A

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

4. **Case Narrative**

a. Present and understandable?

Yes No NA (Please explain.)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.)

Comments:

QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

Yes No NA (Please explain.)

Comments:

N/A

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The data quality and usability were not affected.

5. **Samples Results**

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain.)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.)

Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain.)

Comments:

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

N/A

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.)

Comments:

No MS/MSD was submitted with the wastewater characterization sample.

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

No metals/inorganics were submitted.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.)

Comments:

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.)

Comments:

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

N/A

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

N/A

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.)

Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.)

Comments:

The decachlorobiphenyl and tetrachlorometaxylene surrogate recoveries for 14E-WSTSS6702-001 (2% and 1% respectively) were outside of QC criteria (biased low).

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

Sample 14E-WSTSS6702-001 was flagged JS- due to low surrogate recoveries. The laboratory indicated a significant emulsion formed during the extraction. The sample was wastewater and Alconox detergent from decontamination water was present.

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

The data quality and usability were minimally affected. The results for sample 14E-WSTSS6702-001 were not rejected and are considered estimated and biased low. The sample results were used solely for waste characterization. Additionally, the highest soil result reported was less than 50 ppm.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):

Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes No NA (Please explain.) Comments:

No volatiles were submitted.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes No NA (Please explain.) Comments:

N/A

iii. All results less than PQL?

Yes No NA (Please explain.) Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

N/A

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.) Comments:

No field duplicate was submitted with the wastewater characterization sample

ii. Submitted blind to lab?

Yes No NA (Please explain.) Comments:

N/A

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2) / 2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

N/A

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and usability were not affected.

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.)

Comments:

Only disposable sampling equipment was used.

i. All results less than PQL?

Yes No NA (Please explain.)

Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.)

Comments:

The data qualifiers applied to the results are defined in the footer of each Results table.

Laboratory Data Review Checklist

Completed by:

Title: **Date:**

CS Report Name: **Report Date:**

Consultant Firm:

Laboratory Name: **Laboratory Report Number:**

ADEC File Number: **ADEC Hazard ID:**

1. Laboratory

a. Did an ADEC CS-approved laboratory receive and perform all of the submitted sample analyses?
 Yes No NA (Please explain.) Comments:

b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?
 Yes No NA (Please explain.) Comments:

2. Chain of Custody (CoC)

a. CoC information completed, signed, and dated (including released/received by)?
 Yes No NA (Please explain.) Comments:

b. Correct Analyses requested?
 Yes No NA (Please explain.) Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?
 Yes No NA (Please explain.) Comments:

b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?
 Yes No NA (Please explain.) Comments:

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes No NA (Please explain.)

Comments:

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes No NA (Please explain.)

Comments:

There were no sample receipt discrepancies.

e. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain.)

Comments:

b. Discrepancies, errors or QC failures identified by the lab?

Yes No NA (Please explain.)

Comments:

QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

Yes No NA (Please explain.)

Comments:

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The data quality and usability were not affected.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes No NA (Please explain.)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain.)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain.)

Comments:

d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?

Yes No NA (Please explain.)

Comments:

e. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

6. QC Samples

a. Method Blank

i. One method blank reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain.)

Comments:

All method blank results were ND

iii. If above PQL, what samples are affected?

Comments:

N/A

iv. Do the affected sample(s) have data flags and if so, are the data flags clearly defined?

Yes No NA (Please explain.)

Comments:

N/A

v. Data quality or usability affected? (please explain)

Comments:

The data quality and usability were not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes No NA (Please explain.)

Comments:

ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes No NA (Please explain.)

Comments:

No metals/inorganics were submitted.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The 14GS-S0-41-0.5 MS/MSD recoveries for PCB-1016 and PCB-1260 were outside of QC criteria due to high target analyte concentration.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs, if applicable. RPD reported from LCS/LCSD, MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes No NA (Please explain.) Comments:

The 14GS-S0-41-0.5 MS/MSD RPD for PCB-1260 was outside of QC criteria due to high target analyte concentration.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

14GS-S0-41-0.5

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flags were required for sample 14GS-S0-41-0.5 since the parent sample dilution factor was greater significantly greater than 5 (200).

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

The data quality and usability were not affected.

c. Surrogates – Organics Only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?

Yes No NA (Please explain.) Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs, if applicable. (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes No NA (Please explain.) Comments:

The Decachlorobiphenyl and Tetrachlorometaxylene surrogate recoveries for samples 14GS-SO-42-0.5, 14GS-SO-41-0.5 (and associated MS/MSD), 14GS-SO-40-0.5, and 14GS-SO-40Y-0.5 were outside of QC criteria due to sample dilution (high target analyte concentration).

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?

Yes No NA (Please explain.) Comments:

No flags were required since all samples had a dilution factor of 5 or greater due to high target analyte concentration.

iv. Data quality or usability affected? (Use the comment box to explain.)

Comments:

The data quality and usability were not affected.

d. Trip blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):

Water and Soil

i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes No NA (Please explain.)

Comments:

No volatiles were submitted.

ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes No NA (Please explain.)

Comments:

N/A

iii. All results less than PQL?

Yes No NA (Please explain.)

Comments:

N/A

iv. If above PQL, what samples are affected?

Comments:

N/A

v. Data quality or usability affected? (Please explain.)

Comments:

N/A

e. Field Duplicate

i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes No NA (Please explain.)

Comments:

One duplicate was submitted with 6 primary samples.

ii. Submitted blind to lab?

Yes No NA (Please explain.)

Comments:

iii. Precision – All relative percent differences (RPD) less than specified DQOs?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration
 R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

All sample results were ND or the RPD was less than 50% for sample/duplicate 14GS-SO-40-0.5/14GS-SO-40Y-0.5.

iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

The data quality and usability were not affected.

f. Decontamination or Equipment Blank (If not used explain why).

Yes No NA (Please explain.) Comments:

A decon/equipment blank was not collected

i. All results less than PQL?

Yes No NA (Please explain.) Comments:

N/A

ii. If above PQL, what samples are affected?

Comments:

N/A

iii. Data quality or usability affected? (Please explain.)

Comments:

The data quality and usability were not affected.

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab-Specific, etc.)

a. Defined and appropriate?

Yes No NA (Please explain.) Comments:

The data qualifiers applied to the results are defined in the footer of each Results table.

ATTACHMENT 4
Laboratory Results

(Laboratory reports are provided separately on CD)

Table 1
2014 Sample Summary from SS67

Location	Depth (ft)	Sample ID	Collection Date & Time	Analysis	Matrix	Container			QC	Laboratory	SDG Number	Preservation	Cooler Name	Sampler	TAT
						Count	Type	Volume							
SS-98	1.0	14GS-SS-98-C-1.0	8/20/14 17:17	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-99	1.0	14GS-SS-99-E-1.0	8/20/14 17:52	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-100	1.0	14GS-SS-100-W-1.0	8/20/14 18:18	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-92	0.6	14GS-SS-92-C-0.6	8/21/14 10:08	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-93	2.0	14GS-SS-93-W-2.0	8/21/14 10:30	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-93	2.0	14GS-SS-93X-W-2.0	8/21/14 10:30	SW8082	sediment	1	amber glass	4 oz	Dup	GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-94	0.3	14GS-SS-94-W-0.3	8/21/14 11:14	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-95	0.8	14GS-SS-95-W-0.8	8/21/14 11:36	SW8082	sediment	2	amber glass	4 oz	MS/MSD	GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-96	0.7	14GS-SS-96-C-0.7	8/21/14 12:03	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-97	0.7	14GS-SS-97-W-0.7	8/21/14 12:22	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-102	0.7	14GS-SS-101-C-0.7	8/21/14 14:46	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-102	0.6	14GS-SS-102-W-0.6	8/21/14 15:18	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-102	1.3	14GS-SS-102-W-1.3	8/21/14 15:20	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-102	0.6	14GS-SS-102-W-0.6	8/21/14 15:18	SW8082	sediment	1	amber glass	4 oz	Dup	GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-103	0.9	14GS-SS-103-E-0.9	8/21/14 15:57	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-104	0.6	14GS-SS-104-C-0.6	8/21/14 16:26	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-105	0.8	14GS-SS-105-C-0.8	8/21/14 16:56	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-106	0.8	14GS-SS-106-C-0.8	8/21/14 17:21	SW8082	sediment	1	amber glass	4 oz		GEL	335366	4°C	Bonsai	BM/PR/GP	1 day
SS-98	0.6	14GS-SS-98-W-0.6	8/21/14 18:03	SW8082	sediment	1	amber glass	4 oz		GEL	355366	4°C	Bonsai	BM/PR/GP	1 day
SO-36	0.5	14GS-SO-36-0.5	8/22/14 11:04	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-36	0.5	14GS-SOZ-36-0.5	8/22/14 11:04	SW8082	soil	1	amber glass	4 oz	Dup	GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-34	0.5	14GS-SO-34-0.5	8/22/14 11:12	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-33	0.5	14GS-SO-33-0.5	8/22/14 11:16	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-32	0.5	14GS-SO-32-0.5	8/22/14 11:20	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-31	0.5	14GS-SO-31-0.5	8/22/14 11:25	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-30	0.5	14GS-SO-30-0.5	8/22/14 11:31	SW8082	soil	2	amber glass	4 oz	MS/MSD	GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-35	0.5	14GS-SO-35-0.5	8/22/14 11:41	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SO-37	0.5	14GS-SO-37-0.5	8/22/14 11:48	SW8082	soil	1	amber glass	4 oz		GEL	355384	4°C	Ponderosa	GP/BM	1 day
SS-96	0.7	14GS-SS-96-E-0.7	8/23/14 11:16	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-104	1.2	14GS-SS-104-W-1.2	8/23/14 13:33	SW8082	sediment	2	amber glass	4 oz	MS/MSD	GEL	355417	4°C	Redwood	BM/GP	1 day
SS-107	0.7	14GS-SS-107-C-0.7	8/24/14 11:01	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-108	1.2	14GS-SS-108-C-1.2	8/24/14 11:32	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-109	1.6	14GS-SS-109-E-1.6	8/24/14 12:04	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-109	1.6	14GS-SSX-109-E-1.6	8/24/14 12:04	SW8082	sediment	1	amber glass	4 oz	Dup	GEL	355417	4°C	Redwood	BM/GP	1 day
SS-110	1.0	14GS-SS-110-W-1.0	8/24/14 12:35	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-111	1.0	14GS-SS-111-W-0.95	8/24/14 13:01	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day

**Table 1
2014 Sample Summary from SS67**

Location	Depth (ft)	Sample ID	Collection Date & Time	Analysis	Matrix	Container			QC	Laboratory	SDG Number	Preservation	Cooler Name	Sampler	TAT
						Count	Type	Volume							
SS-112	0.8	14GS-SS-112-E-0.8	8/24/14 13:21	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-113	0.9	14GS-SS-113-C-0.9	8/24/14 13:50	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-114	0.8	14GS-SS-114-W-0.8	8/24/14 14:09	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-115	0.8	14GS-SS-115-W-0.8	8/24/14 14:35	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SS-116	1.0	14GS-SS-116-W-1.0	8/24/14 14:50	SW8082	sediment	1	amber glass	4 oz		GEL	355417	4°C	Redwood	BM/GP	1 day
SO-41	0.5	14GS-SO-41-0.5	9/9/14 9:54	SW8082	soil	1	amber glass	8 oz	MS/MSD	GEL	356487	4°C	Black Spruce	GP/AD	3 day
SO-40	0.5	14GS-SO-40-0.5	9/9/14 10:08	SW8082	soil	1	amber glass	8 oz		GEL	356487	4°C	Black Spruce	GP/AD	3 day
SO-40	0.5	14GS-SO-40Y-0.5	9/9/14 10:08	SW8082	soil	1	amber glass	8 oz	Dup	GEL	356487	4°C	Black Spruce	GP/AD	3 day
SO-42	0.5	14GS-SO-42-0.5	9/9/14 10:19	SW8082	soil	1	amber glass	8 oz		GEL	356487	4°C	Black Spruce	GP/AD	3 day
SO-39	0.5	14GS-SO-39-0.5	9/9/14 10:29	SW8082	soil	1	amber glass	8 oz		GEL	356487	4°C	Black Spruce	GP/AD	3 day
SO-38	0.5	14GS-SO-38-0.5	9/9/14 10:38	SW8082	soil	1	glass	8 oz		GEL	356487	4°C	Black Spruce	GP/AD	3 day
WasteYard	NA	14E-WSTSS6702-001	9/4/14 14:52	SW8082	water	1	amber glass	1 L		GEL	356203	4°C	Polecats	DW/GP/AD	1 day

**Table 2
2014 Sediment Analytical Results from SS67**

				Location ID	SS-92	SS-93	SS-93	SS-94
				Sample ID	14GS-SS-92-C-0.6	14GS-SS-93-W-2.0	14GS-SS-93X-W-2.0	14GS-SS-94-W-0.3
				Lab Sample ID	355366004	355366005	355366006	355366007
				SDG	355366	355366	355366	355366
				Collection Date	8/21/2014	8/21/2014	8/21/2014	8/21/2014
				Matrix	SO	SO	SO	SO
				Laboratory QA/QC	GELC Primary	GELC Primary	GELC Duplicate	GELC Primary
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0541]	ND [0.0278]	ND [0.0345]	ND [0.00363]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.074 [0.0541] J	0.164 [0.0278] JD	0.0423 [0.0345] J, JD	0.0142 [0.00363]	
SW8082	Total PCBs	0.000048	mg/kg	0.074 [0.0541] J	0.164 [0.0278] JD	0.0423 [0.0345] J, JD	0.0142 [0.00363]	

Notes:

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mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

**Table 2
2014 Sediment Analytical Results from SS67**

				Location ID	SS-95	SS-96	SS-98	SS-99
				Sample ID	14GS-SS-95-W-0.8	14GS-SS-96-E-0.7	14GS-SS-98-W-0.6	14GS-SS-99-E-1.0
				Lab Sample ID	355366008	355417001	355366019	355366002
				SDG	355366	355417	355366	355366
				Collection Date	8/21/2014	8/23/2014	8/21/2014	8/20/2014
				Matrix	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Primary
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0210]	ND [0.279]	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0210]	<i>ND [0.279] E</i>	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0210]	<i>ND [0.279] E</i>	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0210]	<i>ND [0.279] E</i>	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0210]	<i>ND [0.279] E</i>	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0210]	<i>ND [0.279] E</i>	ND [0.00304]	ND [0.0136]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.1880 [0.0210]	0.625 [0.279]	0.00440 [0.00304] J	0.019 [0.0136] J	
SW8082	Total PCBs	0.000048	mg/kg	0.1880 [0.0210]	0.625 [0.279]	0.00440 [0.00304] J	0.019 [0.0136] J	

Notes:

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SO = soil

Table 2
2014 Sediment Analytical Results from SS67

				Location ID	SS-101	SS-102	SS-102	SS-102
				Sample ID	14GS-SS-101-C-0.7	14GS-SS-102-W-0.6	14GS-SS-102-W-1.3	14GSY-SS-102-W-0.6
				Lab Sample ID	355366011	355366012	355366013	355366014
				SDG	355366	355366	355366	355366
				Collection Date	8/21/2014	8/21/2014	8/21/2014	8/21/2014
				Matrix	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Duplicate
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0311]	ND [0.0409]	ND [0.0278]	ND [0.0293]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.0426 [0.0311] J	0.0632 [0.0409]	ND [0.0278]	0.0432 [0.0293] J	
SW8082	Total PCBs	0.000048	mg/kg	0.0426 [0.0311] J	0.0632 [0.0409]	<i>ND [0.0278] E</i>	0.0432 [0.0293] J	

Notes:

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SO = soil

**Table 2
2014 Sediment Analytical Results from SS67**

				Location ID	SS-103	SS-104	SS-105	SS-106
				Sample ID	14GS-SS-103-E-0.9	14GS-SS-10-W-1.2	14GS-SS-105-C-0.8	14GS-SS-106-C-0.8
				Lab Sample ID	355366015	355417002	355366017	355366018
				SDG	355366	355417	355366	355366
				Collection Date	8/21/2014	8/23/2014	8/21/2014	8/21/2014
				Matrix	SO	SO	SO	SO
				Laboratory QA/QC	GELC Primary	GELC Primary	GELC Primary	GELC Primary
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0148]	ND [0.0537]	ND [0.0276]	ND [0.0177]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.184 [0.0148]	0.526 [0.0537]	0.0573 [0.0276]	0.0753 [0.0177]	
SW8082	Total PCBs	0.000048	mg/kg	0.184 [0.0148]	0.526 [0.0537]	0.0573 [0.0276]	0.0753 [0.0177]	

Notes:

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SO = soil

Table 2
2014 Sediment Analytical Results from SS67

				Location ID	SS-107	SS-108	SS-109	SS-109
				Sample ID	14GS-SS-107-C-0.7	14GS-SS-108-C-1.2	14GS-SS-109-E-1.6	14GS-SSX-109-E-1.6
				Lab Sample ID	355417003	355417005	355417006	355417007
				SDG	355417	355417	355417	355417
				Collection Date	8/24/2014	8/24/2014	8/24/2014	8/24/2014
				Matrix	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Duplicate
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.115]	ND [0.0126]	ND [0.0677]	ND [0.0657]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.115]	ND [0.0126]	ND [0.0677]	ND [0.0657]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.115]	ND [0.0126]	ND [0.0677]	ND [0.0657]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.115]	ND [0.0126]	ND [0.0677]	ND [0.0657]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.115]	ND [0.0126]	ND [0.0677]	ND [0.0657]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	<i>ND [0.115] E</i>	ND [0.0126]	<i>ND [0.0677] E</i>	<i>ND [0.0657] E</i>	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	ND [0.115]	0.0498 [0.0126]	0.0550 [0.0677] J, JD	0.230 [0.0657] JD	
SW8082	Total PCBs	0.000048	mg/kg	<i>ND [0.115] E</i>	0.0498 [0.0126]	0.0550 [0.0677] J, JD	0.230 [0.0657] JD	

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**Table 2
2014 Sediment Analytical Results from SS67**

				Location ID	SS-110	SS-111	SS-112	SS-113
				Sample ID	14GS-SS-110-W-1.0	14GS-SS-111-W-0.95	14GS-SS-112-E-0.8	14GS-SS-113-C-0.9
				Lab Sample ID	355417008	355417010	355417011	355417012
				SDG	355417	355417	355417	355417
				Collection Date	8/24/2014	8/24/2014	8/24/2014	8/24/2014
				Matrix	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Primary
Method	Analyte	Sediment Screening Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0167]	ND [0.0464]	ND [0.0132]	ND [0.0525]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.201 [0.0167]	0.0831 [0.0464]	0.0316 [0.0132]	0.0577 [0.0525] J	
SW8082	Total PCBs	0.000048	mg/kg	0.201 [0.0167]	0.0831 [0.0464]	0.0316 [0.0132]	0.0577 [0.0525] J	

Notes:

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SO = soil

**Table 2
2014 Sediment Analytical Results from SS67**

				Location ID	SS-114	SS-115	SS-116
				Sample ID	14GS-SS-114-W-0.8	14GS-SS-115-W-0.8	14GS-SS-116-W-1.0
				Lab Sample ID	355417013	355417014	355417015
				SDG	355417	355417	355417
				Collection Date	8/24/2014	8/24/2014	8/24/2014
				Matrix	SO	SO	SO
				Laboratory	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary
Method	Analyte	Sediment Screening Level ¹	Units				
SW8082	PCB-1016 (Aroclor 1016)	0.39	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1221 (Aroclor 1221)	0.14	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1232 (Aroclor 1232)	0.14	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1242 (Aroclor 1242)	0.22	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1248 (Aroclor 1248)	0.22	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1254 (Aroclor 1254)	0.06	mg/kg	ND [0.0585]	ND [0.0452]	ND [0.00710]	
SW8082	PCB-1260 (Aroclor 1260)	0.22	mg/kg	0.250 [0.0585]	ND [0.0452]	0.0349 [0.00710]	
SW8082	Total PCBs	0.000048	mg/kg	0.250 [0.0585]	<i>ND [0.0452] E</i>	0.0349 [0.00710]	

Notes:

¹Sediment screening levels from QAPP Table 15-1 in the *Phase I Remedial Investigation Management Plan, Source Area SS67* (USAF 2012).

ND = nondetect

Bold = The result exceeds the sediment criteria.

E and Italics = The result was nondetect and the limit of detection was greater than the screening level.

J = The analyte was positively identified, and the associated result was less than the LOQ but greater than or equal to the DL.

JD = The result was estimated because the field duplicate relative percent difference was greater than the precision limit.

mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

**Table 3
2014 Soil Analytical Results from SS67**

				Location ID	SO-30	SO-31	SO-32	SO-33	SO-34
				Sample ID	14GS-SO-30-0.5	14GS-SO-31-0.5	14GS-SO-32-0.5	14GS-SO-33-0.5	14GS-SO-34-0.5
				Lab Sample ID	355384007	355384006	355384005	355384004	355384003
				SDG	355384	355384	355384	355384	355384
				Collection Date	8/22/2014	8/22/2014	8/22/2014	8/22/2014	8/22/2014
				Matrix	SO	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Primary	Primary
Method	Analyte	ADEC Cleanup Level ¹	Units						
SW8082	PCB-1016 (Aroclor 1016)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1221 (Aroclor 1221)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1232 (Aroclor 1232)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1242 (Aroclor 1242)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1248 (Aroclor 1248)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1254 (Aroclor 1254)	1	mg/kg	ND [0.0269] JTE	ND [0.240] JTE	ND [0.482] JTE	<i>ND [2.42] JTE, E</i>	ND [0.24] JTE	
SW8082	PCB-1260 (Aroclor 1260)	1	mg/kg	0.516 [0.0269] JTE	10.5 [0.240] JTE	20.9 [0.482] JTE	43.6 [2.42] JTE	3.85 [0.24] JTE	
SW8082	Total PCBs	1	mg/kg	0.516 [0.0269] JTE	10.5 [0.240] JTE	20.9 [0.482] JTE	43.6 [2.42] JTE	3.85 [0.24] JTE	

Notes:

¹ ADEC Cleanup Level from 18 AAC 75, Table B2, 'Under 40 Inch, Direct Contact' Soil Cleanup Level

ND = nondetect

Bold = The result exceeds the ADEC Cleanup Level.

E and Italics = The result was nondetect and the limit of detection was greater than the ADEC Cleanup Level.

J = The analyte was positively identified, and the associated result was less than the LOQ but great than or equal to the DL.

JTE = The sample cooler temperature upon receipt at the laboratory exceeded 6 degrees Celsius.

mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

**Table 3
2014 Soil Analytical Results from SS67**

				Location ID	SO-35	SO-36	SO-36	SO-37
				Sample ID	14GS-SO-35-0.5	14GS-SO-36-0.5	14GS-SOZ-36-0.5	14GS-SO-37-0.5
				Lab Sample ID	355384008	355384001	355384002	355384009
				SDG	355384	355384	355384	355384
				Collection Date	8/22/2014	8/22/2014	8/22/2014	8/22/2014
				Matrix	SO	SO	SO	SO
				Laboratory QA/QC	GELC Primary	GELC Primary	GELC Duplicate	GELC Primary
Method	Analyte	ADEC Cleanup Level ¹	Units					
SW8082	PCB-1016 (Aroclor 1016)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1221 (Aroclor 1221)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1232 (Aroclor 1232)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1242 (Aroclor 1242)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1248 (Aroclor 1248)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1254 (Aroclor 1254)	1	mg/kg	ND [0.096] JTE	ND [0.0122] JTE	ND [0.0122] JTE	ND [0.00257] JTE	
SW8082	PCB-1260 (Aroclor 1260)	1	mg/kg	1.67 [0.096] JTE	0.146 [0.0122] JTE	0.156 [0.0122] JTE	0.00778 [0.00257] JTE	
SW8082	Total PCBs	1	mg/kg	1.67 [0.096] JTE	0.146 [0.0122] JTE	0.156 [0.0122] JTE	0.00778 [0.00257] JTE	

Notes:

¹ ADEC Cleanup Level from 18 AAC 75, Table B2, 'Under 40 Inch, Direct Contact' Soil Cleanup Level

ND = nondetect

Bold = The result exceeds the ADEC Cleanup Level.

E and Italics = The result was nondetect and the limit of detection was greater than the ADEC Cleanup Level.

J = The analyte was positively identified, and the associated result was less than the LOQ but great than or equal to the DL.

JTE = The sample cooler temperature upon receipt at the laboratory exceeded 6 degrees Celsius.

mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

Table 3
2014 Soil Analytical Results from SS67

				Location ID	SO-38	SO-39	SO-40	SO-40	SO-41
				Sample ID	14GS-SO-38-0.5	14GS-SO-39-0.5	14GS-SO-40-0.5	14GS-SO-40Y-0.5	14GS-SO-41-0.5
				Lab Sample ID	356487006	356487005	356487002	356487003	356487001
				SDG	356487	356487	356487	356487	356487
				Collection Date	9/9/2014	9/9/2014	9/9/2014	9/9/2014	9/9/2014
				Matrix	SO	SO	SO	SO	SO
				Laboratory	GELC	GELC	GELC	GELC	GELC
				QA/QC	Primary	Primary	Primary	Duplicate	Primary
Method	Analyte	ADEC Cleanup Level ¹	Units						
SW8082	PCB-1016 (Aroclor 1016)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1221 (Aroclor 1221)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1232 (Aroclor 1232)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1242 (Aroclor 1242)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1248 (Aroclor 1248)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1254 (Aroclor 1254)	1	mg/kg	ND [0.0236]	ND [0.0238]	ND [0.485]	ND [0.494]	ND [0.489]	
SW8082	PCB-1260 (Aroclor 1260)	1	mg/kg	0.0821 [0.0236]	0.0260 [0.0238] J	7.65 [0.485]	6.29 [0.494]	4.65 [0.489]	
SW8082	Total PCBs	1	mg/kg	0.0821 [0.0236]	0.0260 [0.0238] J	7.65 [0.485]	6.29 [0.494]	4.65 [0.489]	

Notes:

¹ ADEC Cleanup Level from 18 AAC 75, Table B2, 'Under 40 Inch, Direct Contact' Soil Cleanup Level

ND = nondetect

Bold = The result exceeds the ADEC Cleanup Level.

E and Italics = The result was nondetect and the limit of detection was greater than the ADEC Cleanup Level.

J = The analyte was positively identified, and the associated result was less than the LOQ but greater than or equal to the DL.

JTE = The sample cooler temperature upon receipt at the laboratory exceeded 6 degrees Celsius.

mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

**Table 3
2014 Soil Analytical Results from SS67**

				Location ID	SO-42
				Sample ID	14GS-SO-42-0.5
				Lab Sample ID	356487004
				SDG	356487
				Collection Date	9/9/2014
				Matrix	SO
				Laboratory	GELC
				QA/QC	Primary
Method	Analyte	ADEC Cleanup Level ¹	Units		
SW8082	PCB-1016 (Aroclor 1016)	1	mg/kg	ND [0.487]	
SW8082	PCB-1221 (Aroclor 1221)	1	mg/kg	ND [0.487]	
SW8082	PCB-1232 (Aroclor 1232)	1	mg/kg	ND [0.487]	
SW8082	PCB-1242 (Aroclor 1242)	1	mg/kg	ND [0.487]	
SW8082	PCB-1248 (Aroclor 1248)	1	mg/kg	ND [0.487]	
SW8082	PCB-1254 (Aroclor 1254)	1	mg/kg	ND [0.487]	
SW8082	PCB-1260 (Aroclor 1260)	1	mg/kg	4.85 [0.487]	
SW8082	Total PCBs	1	mg/kg	4.85 [0.487]	

Notes:

¹ ADEC Cleanup Level from 18 AAC 75, Table B2, 'Under 40 Inch, Direct Contact' Soil Cleanup Level

ND = nondetect

Bold = The result exceeds the ADEC Cleanup Level.

E and Itallics = The result was nondetect and the limit of detection was greater than the ADEC Cleanup Level.

J = The analyte was positively identified, and the associated result was less than the LOQ but great than or equal to the DL.

JTE = The sample cooler temperature upon receipt at the laboratory exceeded 6 degrees Celsius.

mg/kg = milligrams per kilogram

SDG = sample delivery group

SO = soil

Table 4
2014 Wastewater Analytical Results from SS67

		Location ID	WSTSS6702
		Sample ID	14E-WSTSS6702-001
		Lab Sample ID	356203001
		SDG	356203
		Collection Date	9/4/2014
		Matrix	W
		Laboratory	GELC
Method	Analyte	Units	
SW8082	PCB-1016 (Aroclor 1016)	mg/L	ND [0.000067] JS-
SW8082	PCB-1221 (Aroclor 1221)	mg/L	ND [0.000067] JS-
SW8082	PCB-1232 (Aroclor 1232)	mg/L	ND [0.000067] JS-
SW8082	PCB-1242 (Aroclor 1242)	mg/L	ND [0.000067] JS-
SW8082	PCB-1248 (Aroclor 1248)	mg/L	ND [0.000067] JS-
SW8082	PCB-1254 (Aroclor 1254)	mg/L	ND [0.000067] JS-
SW8082	PCB-1260 (Aroclor 1260)	mg/L	ND [0.000067] JS-

Notes:

mg/L = milligrams per liter

ND = nondetect

JS- = The result was estimated because at least one surrogate failed recovery criteria for that sample.

SDG = sample delivery group

W = water

ATTACHMENT 5
Survey Report

2014 Surveying at SS67 Garrison Slough, Eielson AFB, Alaska

1.0 ACRONYMS, ABBREVIATIONS, AND DEFINITIONS

AKDT	Alaska Daylight Time	RMS	root mean square (comparable in magnitude to 1 SD)
COGO	coordinate geometry	RTK	real-time kinematic
GEOID12A	mean sea level model based on control data through 10 August 2012	SD	standard deviation
GPS	global positioning system	TL	tolerance limit
m	meters	UTC	universal coordinated time
NAVD88	North American Vertical Datum of 1988	UTM 6N	Universal Transverse Mercator projection, Zone 6 North
OPUS	Online Positioning User Service	WGS84	World Geodetic System of 1984

2.0 GENERAL INFORMATION

Dates of Survey	19 to 24 August 2014
Methodology	RTK-GPS
Equipment	Base station: Leica Viva controller + GS-15 antenna on tripod, Pacific Crest transmitter Rover: Leica Viva controller + GS-15 antenna on adjustable pole (1.8 or 2 m)
Personnel	Jacobs: Ariane Staples, Brian Menghini
Horizontal Datum	WGS84 ellipsoid
Horizontal Units	m
Horizontal Projection	UTM 6N
Elevation Datum	NAVD88 calculated via GEOID12A
Vertical Units	m
Points Surveyed	21 magnetic anomalies identified during UXO avoidance, 2 beaver dams, 3 drum locations, 13 surface soil sample locations, 29 soft sediment sample locations, and 1 fallen tree across the access road

3.0 CONTROL POINTS

Point Name	Northing (m)	Easting (m)	Ellipsoid Height (m)	Elevation (m)	Use, Description, Basis
CTL100	7173260.469 ±0.016	495639.601 ±0.013	173.577 ±0.028	163.861 ±0.029	<ul style="list-style-type: none"> • Base station location. • Jacobs control point established in 2012. Rebar (0.61 m) with yellow plastic cap. • Coordinates from OPUS on static data from 14 November 2012 19:25 to 19:59 UTC. Precisions are RMS as reported by OPUS. Coordinates confirmed by longer static data sets collected on 14 and 14 November 2012 and 7, 8, and 10 September 2014.
CSSS67	7173263.472 ±0.006	495632.189 ±0.007	173.662 ±0.007	163.946 ±0.007	<ul style="list-style-type: none"> • Rover check shot location to verify system setup. • Jacobs control point established in 2012. Rebar (0.61 m) with yellow plastic cap. • Coordinates from the averages ± 1 SD of check-shots during this project.

4.0 PRECISION FROM CHECK SHOTS

The scatter of the repeated check shots on CSSS67 provides a measure of the precision of the survey method relative to the base-station control point (CTL100). Check shots were made at least at the beginning and end of each survey session to verify system configuration. These 20 measurements exhibited a horizontal precision (RMS of northing and easting SDs) of ±0.006 m and a vertical precision (1 SD) of ±0.007 m. Control plots with 95% TLs illustrate the scatter graphically (Figure 1). Although the northings, eastings, and elevations each contain an exceedance of the associated ±95% TL, the exceedances are only slightly greater than the ±95% TL and are associated with separate measurements and are therefore regarded as the product of GPS variability rather than indicators of errors in system configuration.

5.0 ADJUSTMENTS TO THE DATA SET

5.1 Base Station Height Error

The wrong antenna profile was used for the base station on 20 August 2014 (all day) and on 21 August 2014 (before 15:00) such that the base station antenna offset was too large, and the actual antenna elevation was lower than its nominal elevation by 0.105 meters. The instantaneous RTK corrections were thus too large by the same amount and resulted in overestimation of the height of the antenna. To correct this error, 0.105 m was subtracted from the measured elevations for this period. Check shots confirm the appropriateness of this correction. This adjustment had no effect on data quality.

5.2 Projections from Sighting Points

At two locations (ANOM05 and SS102-W), the thick tree canopy prevented direct surveying. Instead, a tape was stretched from the covered location to a nearby clear area and two sighting points were surveyed along the tape separated by a distance similar to that between the location and the closest sighting point. The horizontal coordinates of the location were calculated from the two sighting points

and their known distances from the location, or from one known distance and the known geometry of the sighting points relative to the location. These calculations were carried out in Leica GeoOffice using the COGO tool (Traverse, Angle Right options). This adjustment had a minimal effect on data quality because the precision of the calculated location is approximately the same as the precision of the sighting points. This adjustment does not provide elevations, but elevations are not required in order to meet project objectives.

6.0 DATA QUALITY AND DEVIATIONS FROM REQUIRED PRECISION

Required precision is “sub-meter accuracy” (USAF 2012), which is in accord with the quality prescribed by the *Manual for Electronic Deliverables* (USACE 2011) for sample locations and other features surveyed for remedial investigations. No elevation data are required. In conformance with standard practice, quality is equated with the RMS scatter of the GPS solution, which is functionally equivalent to 1 SD.

Table 1 provides survey results, and the Horizontal Precision column contains the horizontal RMS precision reported by the RTK-GPS system. Precisions of 0.030 m or better reflect routine operation of the RTK-GPS under good conditions, whereas worse precisions (highlighted in ***bold italic***) reflect degradation of the satellite signals by overhead foliage. Degradation affected 19 of the 76 RTK-GPS measurements, with degradations up to 0.812 m. The horizontal precisions are accepted as representative of the horizontal accuracies of the surveyed points, and all surveyed points meet the required horizontal precision.

Vertical precisions are similar to horizontal precisions under good conditions but range up to 2.884 m due to degradation by overhead foliage. These precisions reflect only the RMS scatter in the GPS solutions and do not incorporate the uncertainty present in GEOID12A (approximately 0.035 m based on the difference in RMS precisions reported by OPUS for ellipsoid and orthometric heights). The vertical precisions are accepted as representative of the vertical accuracies of the surveyed points; there is no precision requirement for elevations.

7.0 REFERENCES

- USACE (U.S. Army Corp of Engineers). 2011 (October). Alaska District. *Manual for Electronic Deliverables*.
- USAF (U.S. Air Force). 2012 (December). *Phase I Remedial Investigation Management Plan, Source Area SS67, Eielson Air Force Base, Alaska*. Prepared by EA Engineering, Science, and Technology.

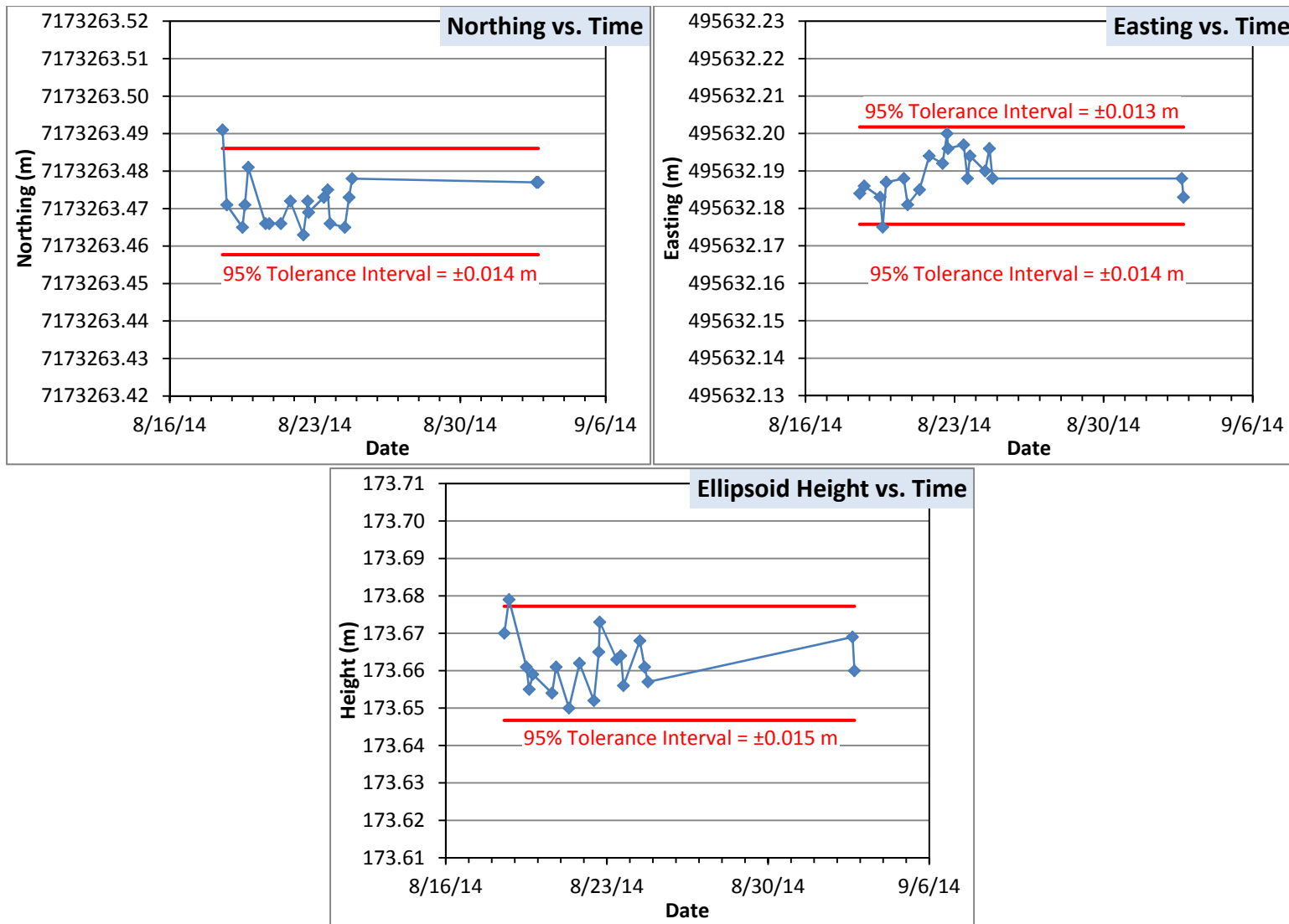


Figure 1
Measurements and 95% Tolerance Intervals for CSS67 Check Shots

Table 1
2014 Survey Summary from SS67 Garrison Slough

Location	Northing ¹ (m)	Easting ¹ (m)	Elevation ² (m)	Description	Date and Time ³	Horizontal Precision ⁴ (m)	Vertical Precision ⁴ (m)
ANOM01	7173867.945	495419.871	160.141	Magnetic anomaly identified during UXO avoidance	8/21/14 14:10:01	0.055	0.176
ANOM02	7173879.567	495412.890	160.379	Magnetic anomaly identified during UXO avoidance	8/21/14 14:30:19	0.016	0.034
ANOM03	7173895.720	495405.462	161.420	Magnetic anomaly identified during UXO avoidance	8/21/14 14:34:20	0.457	0.814
ANOM04	7173895.778	495403.278	165.533	Magnetic anomaly identified during UXO avoidance	8/21/14 14:35:04	0.810	1.706
ANOM05RP1	7173904.679	495393.387	162.218	Backsight from ANOM05 and ANOM05RP2	8/21/14 14:41:02	0.014	0.029
ANOM05RP2	7173903.891	495390.114	161.944	Offset from ANOM05 (33.0 feet)	8/21/14 14:41:35	0.007	0.015
ANOM05*	7173906.245	495399.893	—	Magnetic anomaly identified during UXO avoidance	8/21/14 14:41:35	—	-
ANOM06	7173937.123	495387.089	160.376	Magnetic anomaly identified during UXO avoidance	8/21/14 15:00:29	0.009	0.015
ANOM07	7173937.085	495389.495	160.212	Magnetic anomaly identified during UXO avoidance	8/21/14 15:00:50	0.010	0.015
ANOM08	7173950.915	495383.740	160.366	Magnetic anomaly identified during UXO avoidance	8/21/14 15:08:20	0.037	0.034
ANOM09	7173950.553	495388.209	160.095	Magnetic anomaly identified during UXO avoidance	8/21/14 15:09:10	0.011	0.015
ANOM10	7173950.346	495388.354	161.581	Magnetic anomaly identified during UXO avoidance	8/21/14 15:09:49	0.602	0.821
ANOM11	7174021.247	495353.492	161.515	Magnetic anomaly identified during UXO avoidance	8/21/14 15:44:24	0.018	0.026
ANOM12	7174021.078	495356.486	162.572	Magnetic anomaly identified during UXO avoidance	8/21/14 15:46:29	0.629	0.747
ANOM13	7174066.880	495313.600	160.637	Magnetic anomaly identified during UXO avoidance	8/21/14 16:03:51	0.350	0.876
ANOM14	7174093.134	495256.973	162.977	Magnetic anomaly identified during UXO avoidance	8/21/14 16:14:44	0.436	1.326
ANOM15	7174108.697	495200.669	151.818	Magnetic anomaly identified during UXO avoidance	8/21/14 16:28:39	0.812	2.884
ANOM16	7174111.263	495199.027	158.890	Magnetic anomaly identified during UXO avoidance	8/21/14 16:29:10	0.593	2.389
ANOM17	7174127.384	495142.345	159.922	Magnetic anomaly identified during UXO avoidance	8/21/14 16:45:35	0.013	0.027
ANOM18	7174129.135	495144.449	159.826	Magnetic anomaly identified during UXO avoidance	8/21/14 16:46:17	0.795	2.127
ANOM19	7174163.019	495022.315	164.871	Magnetic anomaly identified during UXO avoidance	8/21/14 17:13:14	0.650	0.894
BEAVER1	7173951.707	495374.742	162.636	West bank adjacent to Beaver dam	8/19/14 17:13:42	0.008	0.013
BEAVER2	7173860.384	495409.428	163.070	West bank adjacent to Beaver dam	8/19/14 17:15:36	0.014	0.022
DRUM1	7174148.477	495035.199	161.854	SW bank adjacent to drums in NE bank (NW limit)	8/24/14 14:59:58	0.008	0.011
DRUM2	7174145.248	495049.072	161.780	SW bank adjacent to drums in NE bank (intermediate)	8/24/14 15:00:30	0.012	0.017
DRUM3	7174144.621	495049.995	161.815	SW bank adjacent to drums in NE bank (S limit)	8/24/14 15:01:15	0.017	0.020
PAD1	7173230.714	495630.764	163.957	SW corner of concrete pad near the PCB ditch	8/24/14 18:48:39	0.005	0.010
PAD2	7173230.686	495641.118	163.998	SE corner of concrete pad near the PCB ditch	8/24/14 18:49:20	0.005	0.009
PAD3	7173234.109	495639.903	163.987	NE corner of concrete pad near the PCB ditch	8/24/14 18:49:37	0.005	0.009
SO30	7173218.060	495671.839	162.726	Surface soil sample location	8/22/14 11:24:22	0.005	0.010
SO31	7173220.836	495677.896	164.097	Surface soil sample location	8/22/14 11:15:57	0.005	0.010
SO32	7173222.751	495682.762	164.123	Surface soil sample location	8/22/14 11:12:13	0.005	0.010
SO33	7173228.362	495680.864	164.118	Surface soil sample location	8/22/14 11:11:28	0.005	0.011
SO34	7173233.714	495678.796	164.182	Surface soil sample location	8/22/14 11:08:57	0.005	0.010
SO35	7173246.007	495668.892	164.300	Surface soil sample location	8/22/14 11:52:09	0.005	0.009
SO36	7173253.742	495666.011	164.275	Surface soil sample location	8/22/14 10:59:51	0.005	0.010
SO37	7173251.104	495658.560	162.099	Surface soil sample location	8/22/14 11:00:32	0.005	0.009
SO38	7173236.912	495686.729	163.570	Surface soil sample location	9/2/14 17:01:13	0.007	0.013
SO39	7173231.150	495689.046	163.496	Surface soil sample location	9/2/14 17:02:37	0.006	0.010
SO40	7173217.310	495685.013	164.084	Surface soil sample location	9/2/14 17:04:41	0.005	0.009
SO41	7173214.927	495679.217	164.042	Surface soil sample location	9/2/14 17:06:31	0.005	0.009
SO42	7173211.794	495687.201	164.063	Surface soil sample location	9/2/14 17:05:28	0.005	0.009
SS92-C	7173735.535	495466.978	160.510	Sediment location (water surface)	8/21/14 10:23:46	0.015	0.022
SS93-W	7173752.041	495458.004	161.132	Sediment location (water surface)	8/21/14 11:01:22	0.021	0.047
SS94-W	7173765.934	495452.974	160.874	Sediment location (water surface)	8/21/14 11:23:33	0.037	0.111
SS95-W	7173780.698	495447.700	161.134	Sediment location (water surface)	8/21/14 11:52:02	0.016	0.031
SS96-C	7173795.149	495444.294	160.935	Sediment location (water surface)	8/21/14 12:15:01	0.011	0.018
SS97-C	7173810.051	495439.834	160.527	Sediment location (water surface)	8/23/14 12:47:09	0.008	0.016
SS97-W	7173809.346	495436.251	160.853	Sediment location (water surface)	8/21/14 12:38:58	0.010	0.019

Table 1
2014 Survey Summary from SS67 Garrison Slough

Location	Northing ¹ (m)	Easting ¹ (m)	Elevation ² (m)	Description	Date and Time ³	Horizontal Precision ⁴ (m)	Vertical Precision ⁴ (m)
SS98-C	7173824.738	495432.932	160.700	Sediment location (water surface)	8/20/14 17:42:42	0.012	0.020
SS98-W	7173822.086	495430.051	160.803	Sediment location (water surface)	8/21/14 18:08:13	0.458	0.866
SS99-E	7173837.962	495429.588	162.933	Sediment location (water surface)	8/20/14 18:08:19	0.012	0.022
SS100-C	7173852.025	495422.541	160.502	Sediment location (water surface)	8/23/14 12:43:47	0.018	0.032
SS100-W	7173851.746	495420.186	160.824	Sediment location (water surface)	8/20/14 18:32:14	0.013	0.020
SS101-C	7173907.546	495400.852	162.074	Sediment location (water surface)	8/21/14 14:52:39	0.453	0.837
SS102-WRP1	7173964.710	495371.560	162.549	Offset from SS201-W (24.0 feet)	8/21/14 15:29:34	0.011	0.015
SS102-WRP2	7173964.115	495368.281	162.488	Backsight from SS102-W and SS102-WRP1	8/21/14 15:30:01	0.014	0.018
SS102-W*	7173966.018	495378.758	—	Sediment location (water surface)	8/21/14 15:30:01	—	—
SS103-E	7174066.797	495314.601	160.994	Sediment location (water surface)	8/21/14 16:01:24	0.664	1.445
SS104-C	7174109.177	495201.343	159.841	Sediment location (water surface)	8/21/14 16:30:39	0.014	0.041
SS104-W	7174108.365	495200.254	160.346	Sediment location (water surface)	8/23/14 13:44:13	0.024	0.038
SS105-C	7174145.595	495081.604	160.261	Sediment location (water surface)	8/21/14 16:58:49	0.014	0.022
SS106-C	7174180.893	494964.190	160.606	Sediment location (water surface)	8/21/14 17:25:21	0.576	0.762
SS107-C	7173867.081	495417.104	161.014	Sediment location (water surface)	8/24/14 11:20:18	0.021	0.047
SS107-W	7173866.072	495415.300	161.046	Sediment location (water surface)	8/24/14 11:20:47	0.017	0.039
SS108-C	7173881.624	495412.325	160.974	Sediment location (water surface)	8/24/14 11:41:36	0.016	0.021
SS109-E	7173896.487	495408.732	161.146	Sediment location (water surface)	8/24/14 12:17:58	0.020	0.031
SS110-E	7173924.576	495396.873	161.058	Sediment location (water surface)	8/24/14 12:51:08	0.015	0.029
SS110-W	7173922.909	495393.241	161.154	Sediment location (water surface)	8/24/14 12:51:41	0.037	0.046
SS111-W	7173938.878	495386.801	160.970	Sediment location (water surface)	8/24/14 13:07:40	0.008	0.015
SS112-E	7173954.081	495388.082	161.296	Sediment location (water surface)	8/24/14 13:36:50	0.013	0.025
SS113-C	7174022.443	495354.182	160.345	Sediment location (water surface)	8/24/14 13:58:26	0.018	0.045
SS114-W	7174092.479	495257.909	160.652	Sediment location (water surface)	8/24/14 14:24:30	0.017	0.050
SS115-W	7174127.845	495141.879	160.590	Sediment location (water surface)	8/24/14 14:40:20	0.012	0.021
SS116-W	7174161.473	495023.678	160.075	Sediment location (water surface)	8/24/14 14:55:22	0.031	0.027
TREE	7173651.914	495490.799	163.240	Fallen tree across access road	8/19/14 16:39:57	0.019	0.054

Notes:

¹ Coordinates are projected to UTM 6N based on the WGS84 ellipsoid.

² Elevations are relative to NAVD88 as represented by the GEOID12A geoid.

³ Times are AKDT.

⁴ Precision is the RMS precision of the GPS solution.

Bold italic quality values exceed 0.030 meters; such values reflect degradation due to foliage interference.

* Horizontal coordinates calculated from associated offset and backsight locations; elevation not measured.

All GPS measurements were made using a Leica Viva RTK-GPS system.

ATTACHMENT 6
Waste Tracking



Requested Facility: Chemical Waste Management (Hazardous Waste Facility) Unsure Profile Number: OR325221
 Multiple Generator Locations (Attach Locations) Request Certificate of Disposal Renewal? Original Profile Number: _____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)
1. Generator Name: USAF EIELSON AFB - 354 CES/CEOIC
2. Site Address: 2310 CENTRAL AVENUE., SUITE 100
(City, State, ZIP) Eielson AFB AK 99702
3. County: _____
4. Contact Name: Randy Smith
5. Email: _____
6. Phone: (907) 377-2574 7. Fax: _____ N/A
8. Generator EPA ID: AK1570028646 N/A
9. State ID: _____

C. MATERIAL INFORMATION
1. Common Name: PCB Contaminated Debris See Attached
Describe Process Generating Material: _____

Site Investigation

2. Material Composition and Contaminants: See Attached

1. Plastic, PPE, Liner, Sampling Debris, etc.	95-100 %
2. Dirt	0-5 %
3. PCB Contamination	.01-49.9
4.	

Total composition must be equal to or greater than 100% ≥100%
3. State Waste Codes: X002 N/A
4. Color: Varies
5. Physical State at 70°F: Solid Liquid Other: _____
6. Free Liquid Range Percentage: _____ to _____ N/A
7. pH: _____ to _____ N/A
8. Strong Odor: Yes No Describe: _____
9. Flash Point: <140°F 140°-199°F ≥200° N/A

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION
1. Analytical attached Yes
Please identify applicable samples and/or lab reports:

2. Other information attached (such as MSDS)? Yes

B. BILLING INFORMATION SAME AS GENERATOR
1. Billing Name: ELM Solutions Corp.
2. Billing Address: 17701 108th Ave. SE, Ste. 427
(City, State, ZIP) Renton WA 98055
3. Contact Name: Mike Gortner
4. Email: mikeg@elmsolutionscorp.com
5. Phone: (425) 591-2267 6. Fax: (888) 356-3299
7. WM Hauled? Yes No
8. P.O. Number: _____
9. Payment Method: Credit Account Cash Credit Card

D. REGULATORY INFORMATION
1. EPA Hazardous Waste? Yes* No
Code: _____
2. State Hazardous Waste? Yes No
Code: X002
3. Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? Yes* No
4. Contains Underlying Hazardous Constituents? Yes* No
5. From an industry regulated under Benzene NESHAP? Yes* No
6. Facility remediation subject to 40 CFR 63 GGGGG? Yes* No
7. CERCLA or State-mandated clean-up? Yes* No
8. NRC or State-regulated radioactive or NORM waste? Yes* No

***If Yes, see Addendum (page 2) for additional questions and space.**
9. Contains PCBs? → If Yes, answer a, b and c. Yes No
a. Regulated by 40 CFR 761? Yes No
b. Remediation under 40 CFR 761.61 (a)? Yes No
c. Were PCB imported into the US? Yes No
10. Regulated and/or Untreated Medical/Infectious Waste? Yes No
11. Contains Asbestos? Yes No
→ If Yes: Non-Friable Non-Friable - Regulated Friable

F. SHIPPING AND DOT INFORMATION
1. One-Time Event Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: 10
 Tons Yards Drums Gallons Other: _____
3. Container Type and Size: 55 Gallon, CY Sacks N/A
4. USDOT Proper Shipping Name: _____
Material Not Regulated by DOT (PCB Contaminated Debris)

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)
By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): Randall AC Smith Date: 09/22/2014
Title: Hazardous Waste Supervisor
Company: USAF

Certification Signature _____



Requested Facility: Chemical Waste Management (Hazardous Waste Facility) Unsure Profile Number: OR325220
 Multiple Generator Locations (Attach Locations) Request Certificate of Disposal Renewal? Original Profile Number: _____

A. GENERATOR INFORMATION (MATERIAL ORIGIN)

1. Generator Name: USAF EIELSON AFB - 354 CES/CEOIC
2. Site Address: 2310 CENTRAL AVENUE, SUITE 100
(City, State, ZIP) Eielson AFB AK 99702
3. County: _____
4. Contact Name: Randy Smith
5. Email: _____
6. Phone: (907) 377-2574 7. Fax: _____
8. Generator EPA ID: AK1570028646 N/A
9. State ID: _____ N/A

C. MATERIAL INFORMATION

1. Common Name: PCB Contaminated Waters
Describe Process Generating Material: _____ See Attached
Site Investigation

Site Investigation

2. Material Composition and Contaminants: See Attached

1. Water	95-100 %
2. Dirt	0-5 %
3. PCB Contamination	.01-49.9
4.	

Total composition must be equal to or greater than 100% $\geq 100\%$

3. State Waste Codes: X002 N/A
4. Color: Varies
5. Physical State at 70°F: Solid Liquid Other: _____
6. Free Liquid Range Percentage: 95 to 100 N/A
7. pH: 4 to 10 N/A
8. Strong Odor: Yes No Describe: _____
9. Flash Point: <140°F 140°-199°F $\geq 200^\circ$ N/A

E. ANALYTICAL AND OTHER REPRESENTATIVE INFORMATION

1. Analytical attached Yes
Please identify applicable samples and/or lab reports:

2. Other information attached (such as MSDS)? Yes

G. GENERATOR CERTIFICATION (PLEASE READ AND CERTIFY BY SIGNATURE)

By signing this EZ Profile™ form, I hereby certify that all information submitted in this and all attached documents contain true and accurate descriptions of this material, and that all relevant information necessary for proper material characterization and to identify known and suspected hazards has been provided. Any analytical data attached was derived from a sample that is representative as defined in 40 CFR 261 - Appendix 1 or by using an equivalent method. All changes occurring in the character of the material (i.e., changes in the process or new analytical) will be identified by the Generator and be disclosed to Waste Management prior to providing the material to Waste Management.

If I am an agent signing on behalf of the Generator, I have confirmed with the Generator that information contained in this Profile is accurate and complete.

Name (Print): _____ Date: 09/22/2014
Title: _____
Company: _____

B. BILLING INFORMATION

SAME AS GENERATOR
1. Billing Name: ELM Solutions Corp
2. Billing Address: 17701 108th Ave. SE, Ste. 427
(City, State, ZIP) Renton WA 98055
3. Contact Name: Mike Gortner
4. Email: mikeg@elmsolutionscorp.com
5. Phone: (425) 591-2267 6. Fax: (888) 356-3299
7. WM Hauled? Yes No
8. P.O. Number: _____
9. Payment Method: Credit Account Cash Credit Card

D. REGULATORY INFORMATION

1. EPA Hazardous Waste? Yes* No
Code: _____
2. State Hazardous Waste? Yes No
Code: X002
3. Is this material non-hazardous due to Treatment, Delisting, or an Exclusion? Yes* No
4. Contains Underlying Hazardous Constituents? Yes* No
5. From an industry regulated under Benzene NESHAP? Yes* No
6. Facility remediation subject to 40 CFR 63 GGGGG? Yes* No
7. CERCLA or State-mandated clean-up? Yes* No
8. NRC or State-regulated radioactive or NORM waste? Yes* No
***If Yes, see Addendum (page 2) for additional questions and space.**
9. Contains PCBs? Yes No
a. Regulated by 40 CFR 761? Yes No
b. Remediation under 40 CFR 761.61 (a)? Yes No
c. Were PCB imported into the US? Yes No
10. Regulated and/or Untreated Medical/Infectious Waste? Yes No
11. Contains Asbestos? Yes No
 Non-Friable Non-Friable - Regulated Friable

F. SHIPPING AND DOT INFORMATION

1. One-Time Event Repeat Event/Ongoing Business
2. Estimated Quantity/Unit of Measure: 10
 Tons Yards Drums Gallons Other: _____
3. Container Type and Size: 55 Gallon
4. USDOT Proper Shipping Name: _____ N/A

Material Not Regulated by DOT (PCB Contaminated Water)

Certification Signature

NON-HAZARDOUS WASTE MANIFEST

1. Generator ID Number
AK1570028646

2. Page 1 of **2**

3. Emergency Response Phone
907-377-2574

4. Waste Tracking Number
JEAFB1014-01

5. Generator's Name and Mailing Address
**USAF EIELSON AFB - 354 CES/CEOIC
2310 CENTRAL AVENUE, SUITE 100
EIELSON AFB, AK 99702**

Generator's Site Address (if different than mailing address)
**USAF EIELSON AFB - 354 CES/CEOIC
Site: WP45/SS57
2681 to 2723 Flightline Blvd.**

Generator's Phone: **907-377-2574**

6. Transporter 1 Company Name

U.S. EPA ID Number

Carlile Transportation

AKR000005611

7. Transporter 2 Company Name

U.S. EPA ID Number

Samson Tug & Barge Co

WAD980981849

8. Designated Facility Name and Site Address

U.S. EPA ID Number

**CWMNW - ARLINGTON
17629 CEDAR SPRINGS LANE
ARLINGTON, OR 97812**

Facility's Phone:

541-454-2643

ORD089452353

9. Waste Shipping Name and Description

10. Containers

No. Type

11. Total Quantity

12. Unit Wt./Vol.

1. **MATERIAL NOT REGULATED BY DOT
(POL CONTAMINATED DEBRIS)**

06

BA

5880

P

2. **MATERIAL NOT REGULATED BY DOT
(POL CONTAMINATED WATER)**

07

DM

333

G

3. **MATERIAL NOT REGULATED BY DOT
(PCB CONTAMINATED DEBRIS)**

01

DM

52

P

4. **MATERIAL NOT REGULATED BY DOT
(PCB CONTAMINATED WATER)**

01

DM

2

G

13. Special Handling Instructions and Additional Information

- 1) PROFILE # OR325222, Nonhazardous POL Debris
 - 2) PROFILE # OR325219, Nonhazardous POL Water
 - 3) PROFILE # OR325221, Nonhazardous PCB Debris
 - 4) PROFILE # OR325220, Nonhazardous PCB Water
- CERTIFICATES OF DISPOSAL REQUIRED**

14. GENERATOR'S/OFFEROR'S CERTIFICATION: I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labeled/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations.

Generator's/Offoror's Printed/Typed Name

Signature

Month Day Year

Randall AC Smith

[Signature]

10 | 01 | 14

15. International Shipments

Import to U.S.

Export from U.S.

Port of entry/exit:

Transporter Signature (for exports only):

Date leaving U.S.:

16. Transporter Acknowledgment of Receipt of Materials

Transporter 1 Printed/Typed Name

Signature

Month Day Year

Transporter 2 Printed/Typed Name

Signature

Month Day Year

17. Discrepancy

17a. Discrepancy Indication Space

Quantity

Type

Residue

Partial Rejection

Full Rejection

Manifest Reference Number:

U.S. EPA ID Number

17b. Alternate Facility (or Generator)

Facility's Phone:

Month Day Year

17c. Signature of Alternate Facility (or Generator)

18. Designated Facility Owner or Operator: Certification of receipt of materials covered by the manifest except as noted in Item 17a

Month Day Year

Printed/Typed Name

Signature

DESIGNATED FACILITY TO GENERATOR

NON-HAZARDOUS WASTE MANIFEST
(Continuation Sheet)

19. Generator ID Number

AK1570028646

20. Page

2 OF 2

21. Waste Tracking Number

JEA FB1014-01

22. Generator's Name

USAF EIELSON AFB - 354 CES/CEIC
2310 CENTRAL AVENUE, SUITE 100
EIELSON AFB, AK 99702

U.S. EPA ID Number

WAH000028338

23. Transporter

3

Company Name

R TRANSPORT

24. Transporter

4

Company Name

UNION PACIFIC RAILROAD

U.S. EPA ID Number

NED001792910

25. Waste Shipping Name and Description

26. Containers

No.

Type

27. Total
Quantity

28. Unit
Wt./Vol.

GENERATOR

29. Special Handling Instructions and Additional Information

TRANSPORTER

30. Transporter Acknowledgment of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

31. Transporter Acknowledgment of Receipt of Materials

Printed/Typed Name

Signature

Month Day Year

DESIGNATED FACILITY

32. Discrepancy

ATTACHMENT 7
Statistical Calculations

STATISTICAL ANALYSIS OF DOWNSTREAM PCBs IN SEDIMENTS

Introduction

This attachment describes the statistical analysis applied to the 2014 sediment PCB results provided in this technical memorandum and a subset of the 2013 sediment PCB results (Jacobs 2014) to evaluate the following questions:

- Are PCB concentrations in the reach of stream channel investigated in 2014 less than those previously investigated upstream?
- Are PCB concentrations in the first 500 feet of the 2014 reach different from the reach as a whole?
- Are PCB concentrations in the last 700 feet of the 2014 reach different from the reach as a whole?

These questions are answered by calculating 95-percent confidence intervals (CI95) and 95-percent confidence intervals of the mean (CIM95) for each of the sample groupings. Qualitative inferences about whether one grouping differs significantly from another can be made based on overlap of the CIM95s, and quantitative inferences are supplied by the pooled-variance t-test. Further qualitative inferences about differences are based on comparisons of CI95s (i.e., the scatter of each grouping).

The PCB data are log-transformed before analysis because environmental data typically exhibit log-normal distributions. Statistics calculated from the log-transformed data are referred to here as geometric statistics because the geometric mean (the n^{th} root of the product of n values) is the same as the anti-logarithm of the arithmetic mean (the sum of n values divided by n) of the logarithms of the values. Log-normality has not been quantitatively assessed for these data, but the logarithmic plot of these data versus downstream distance (Figure 4 in this report) exhibits no obvious skewness; the groupings appear to be randomly and symmetrically distributed about their geometric means.

Although the logarithmic results of the statistical analysis have been exponentiated for presentation as concentrations, these statistics have rigorous significance only for the log-transformed data. For example, the geometric mean under-predicts the expected concentration that would result if n samples from the same group were mixed together (a scenario relevant for estimating exposure-point concentrations for human risk assessment). If additional samples of a group were to be collected, the geometric CI95 is expected to encompass 95 percent of the

future results, but a slight exceedance for log-transformed data would be significantly larger than the upper limit of the CI95 when exponentiated.

The methods used here are basic statistical methods that may be found in most introductory statistical textbooks and in numerous on-line resources. They are also summarized in EPA guidance for groundwater monitoring (EPA 2009) and have been implemented in ProUCL (EPA 2013).

Calculation of Two-Sample t-Test (Comparison of Means)

The hypothesis that two sets of samples a and b are from the same underlying population (i.e., their means are not significantly different) is evaluated through the pooled-variance t-test:

$$t = \frac{\bar{x}_a - \bar{x}_b}{\sqrt{\frac{(n_a - 1)s_a^2 + (n_b - 1)s_b^2}{n_a + n_b - 2} \left(\frac{1}{n_a} + \frac{1}{n_b} \right)}} \quad (1)$$

Where: \bar{x} is the mean ($\sum_{i=1}^n x_i / n$) of the subscripted sample set
 n is the number of values in the subscripted sample set
 s is the standard deviation [$\sum_{i=1}^n (x_i - \bar{x}) / (n - 1)$] of the subscripted sample set

Both sets of samples must have the same variance. The calculated t value follows Student's t-distribution for $n_a + n_b - 2$ degrees of freedom and may be used to calculate the probability (P) that the observed difference in means arose purely by chance. In Microsoft Excel:

$$P = \text{T.DIST.RT}(\text{ABS}[t], [n_a + n_b - 2]) \quad (2)$$

If P is less than 0.05, then the hypothesis of equal means is rejected at the 95-percent confidence level or better in favor of the hypothesis that the sample set with the greater mean came from a population with a greater mean. These calculations were made using both Microsoft Excel and ProUCL (EPA 2013). The ProUCL output is attached.

ProUCL also reports the Welch-Satterthwaite unequal-variance t-test, in which the two sample sets may come from different populations and hence have different variances. Those results are interpreted in the same manner as the pooled-variance results.

Calculation of Confidence Intervals

For a set of n samples from a normally distributed population, the confidence interval expected to encompass a specified fraction of the population is given by:

$$CI = \bar{x} \pm t_{1-\alpha} * s \quad (3)$$

Where: *CI* is the confidence interval

\bar{x} is the sample mean ($\sum_{i=1}^n x_i/n$)

$t_{1-\alpha}$ is the two-tailed Student's t-statistic for $n - 1$ degrees of freedom and confidence level $1 - \alpha$

s is the sample standard deviation [$\sum_{i=1}^n (x_i - \bar{x})/(n - 1)$]

Similarly, the confidence interval for the estimated population mean (*CIM*) is given by:

$$CIM = \bar{x} \pm t_{1-\alpha} * \frac{s}{\sqrt{n}} \quad (4)$$

For a 95 percent *CI* or *CIM*, α is set to 0.05 so that $1 - \alpha = 0.95$, and the resulting two-tailed confidence interval is designated as a CI95 or CIM95. The upper and lower one-tailed confidence limits of these intervals are designated as UCL97.5 and LCL97.5 or UCLMn97.5 and LCLMn97.5

These calculations are readily implemented in Microsoft Excel:

$$UCL97.5 = \text{AVERAGE}([\text{data}]) + \text{T.INV}([1 - \alpha/2], \text{COUNT}([\text{data}]) - 1) * \text{STDEV.S}([\text{data}]) \quad (5)$$

$$LCL97.5 = \text{AVERAGE}([\text{data}]) - \text{T.INV}([1 - \alpha/2], \text{COUNT}([\text{data}]) - 1) * \text{STDEV.S}([\text{data}]) \quad (6)$$

$$\begin{aligned} UCLMn97.5 &= \text{AVERAGE}([\text{data}]) + \text{T.INV}([1 - \alpha/2], \text{COUNT}([\text{data}]) - 1) * \\ &\text{STDEV.S}([\text{data}]) / \text{SQRT}(\text{COUNT}([\text{data}])) \end{aligned} \quad (7)$$

$$\begin{aligned} LCLMn97.5 &= \text{AVERAGE}([\text{data}]) - \text{T.INV}([1 - \alpha/2], \text{COUNT}([\text{data}]) - 1) * \\ &\text{STDEV.S}([\text{data}]) / \text{SQRT}(\text{COUNT}([\text{data}])) \end{aligned} \quad (8)$$

Where: $[1 - \alpha/2]$ is set to 0.975 because the T.INV function returns one-tailed t-statistic values

[data] is the worksheet range containing the sample values

Data and Results

Table 1 contains the sediment PCB data used as input to the statistical calculations, Table 2 contains the results of comparison-of-means calculations, and Table 3 contains intermediate values and resulting confidence limits for the analyzed data sets. The data were analyzed in four groups

- Previous Investigations (2013). These ten locations were sampled in 2013 (Jacobs 2014) from the downstream 330 feet of the reach of Garrison Slough investigated at that time.
- 2014 First 500 Feet. These eight locations are from the upstream 500 feet of Garrison Slough investigated in 2014.
- 2014 Mid Reach. These 12 locations are from the mid portion of Garrison Slough sampled in 2014.
- 2014 Last 700 Feet. These four locations are from the downstream 700 feet of Garrison Slough investigated in 2014.

Comparison-of-means tests (Table 2) and confidence limits (Table 3) show that:

- Upstream concentrations of PCBs in sediments are significantly higher than downstream concentrations. The analyzed 2013 results have a geometric mean of 0.31 mg/kg, whereas the results from the first 500 feet of the reach investigated in 2014 have a geometric mean of 0.068 mg/kg
- The first 500 feet and the mid portion of the reach investigated in 2014 had statistically similar concentrations of PCBs. Results from the mid portion of the reach have a geometric mean of 0.096 mg/kg.
- The last 700 feet of the reach investigated in 2014 may contain significantly lower PCB concentrations with less scatter than the mid portion of the reach. Although the pooled-variance t-test indicates that these four results are lower with only 89 percent confidence, the Welch-Satterthwaite unequal-variance t-test indicates that the difference is significant with approximately 97 percent confidence. Results from the last 700 feet have a geometric mean of 0.051 mg/kg.

References

- EPA (Environmental Protection Agency). 2013 (September). *Statistical Software ProUCL Version 5.00.00 for Environmental Applications for Data Sets with and without Nondetect Observations*. <http://www.epa.gov/osp/hstl/tsc/software.htm> (accessed 23 February 2015).
- EPA. 2009 (March). *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance*. EPA 530-R-09-007.
- Jacobs (Jacobs Engineering Group Inc.) 2014 (August). *Additional Sampling at Source Area SS67, Eielson Air Force Base, Alaska*. Technical memorandum from K. Maher to M. Ghebreslassie and P. Roth.

TABLES

Table 1
Sediment PCB Data for Statistical Analysis

Grouping	Location	Easting (m)	Northing (m)	Down-stream Distance ¹ (ft)	Sample Depth (ft)	Sample ID	PCBs (mg/kg)	Log ₁₀ PCBs
Previous Investigation (2013)	SS59	495506.5	7173633.7	-326	0.7	13-GS-SS59-C-0.7	0.0839	-1.076
	SS60	495503.8	7173640.8	-301	0.7	13-GS-SS60-R-0.7	0.203	-0.693
	SS61	495500.7	7173647.7	-276	0.4	13-GS-SS61-C-0.4	1.84	0.265
	SS62	495498.0	7173654.9	-251	0.5	13-GS-SS62-C-0.5	0.361	-0.442
	SS63	495495.4	7173662.0	-226	0.5	13-GS-SS63-L-0.5	0.335	-0.475
	SS64	495492.7	7173669.1	-201	0.7	13-GS-SS64-L-0.7	0.254	-0.595
	SS66	495487.6	7173683.5	-151	0.8*	13-GSZ-SS66-C-0.8	0.813 JD	-0.090
	SS67	495484.9	7173690.6	-126	0.4	13-GS-SS67-R-0.4	0.195	-0.710
	SS68	495482.2	7173697.8	-101	0.2	13-GS-SS68-C-0.2	0.162	-0.790
	SS70	495476.8	7173712.0	-51	0.8	13-GS-SS70-R-0.8	0.327	-0.485
2014 First 500 Feet	SS92	495467.0	7173735.5	33	0.6	14GS-SS-92-C-0.6	0.0740	-1.131
	SS93	495458.0	7173752.0	95	2.0*	14GS-SS-93-W-2.0	0.164	-0.785
	SS94	495453.0	7173765.9	143	0.3	14GS-SS-94-W-0.3	0.0142	-1.848
	SS95	495447.7	7173780.7	194	0.8	14GS-SS-95-W-0.8	0.188	-0.726
	SS96	495444.3	7173795.1	242	0.7	14GS-SS-96-E-0.7	0.625	-0.204
	SS98	495430.1	7173822.1	342	0.6	14GS-SS-98-W-0.6	0.0044	-2.357
	SS99	495429.6	7173838.0	391	1.0	14GS-SS-99-E-1.0	0.0190	-1.721
	SS107	495417.1	7173867.1	494	0.7	14GS-SS-107-C-0.7	ND [0.115]	-0.939 [†]
2014 Mid Reach	SS108	495412.3	7173881.6	545	1.2	14GS-SS-108-C-1.2	0.0498	-1.303
	SS109	495408.7	7173896.5	594	1.6*	14GS-SSX-109-E-1.6	0.230	-0.638
	SS101	495400.9	7173907.5	638	0.7	14GS-SS-101-C-0.7	0.0426	-1.371
	SS110	495393.2	7173922.9	694	1.0	14GS-SS-110-W-1.0	0.201	-0.697
	SS111	495386.8	7173938.9	750	0.9	14GS-SS-111-W-0.9	0.0831	-1.080
	SS112	495388.1	7173954.1	795	0.8	14GS-SS-112-E-0.8	0.0316	-1.500
	SS102	495378.8	7173966.0	843	0.6*	14GS-SS-102-W-0.6	0.0632	-1.199
		495378.8	7173966.0	843	1.3	14GS-SS-102-W-1.3	ND [0.0278]	-1.556 [†]
	SS113	495354.2	7174022.4	1045	0.9	14GS-SS-113-C-0.9	0.0577	-1.239
	SS103	495314.6	7174066.8	1240	0.9	14GS-SS-103-E-0.9	0.184	-0.735
	SS114	495257.9	7174092.5	1444	0.8	14GS-SS-114-W-0.8	0.250	-0.602
	SS104	495200.3	7174108.4	1640	1.2	14GS-SS-10-W-1.2	0.526	-0.279
2014 Last 700 Feet	SS115	495141.9	7174127.8	1842	0.8	14GS-SS-115-W-0.8	ND [0.0452]	-1.345 [†]
	SS105	495081.6	7174145.6	2048	0.8	14GS-SS-105-C-0.8	0.0573	-1.242
	SS116	495023.7	7174161.5	2245	1.0	14GS-SS-116-W-1.0	0.0349	-1.457
	SS106	494964.2	7174180.9	2450	0.8	14GS-SS-106-C-0.8	0.0753	-1.123

Notes

¹ Measured from the boundary of previous investigations (see Figure 2 in this report).

* Sampled in duplicate; the larger result is used.

[†] ND result evaluated at its detection limit.

JD = estimated result (duplicate relative percent difference greater than the precision limit)

m = meters

mg/kg = milligrams per kilogram

ND = nondetect

ft = feet

Log₁₀ = base 10 logarithm

[] = detection limit

Table 2
Summary of t-Test Comparison of Means

Comparison	Degrees of Freedom	<i>t</i> (calculated)	<i>t</i> (critical, $\alpha = 0.05$)	<i>P</i> of difference arising by chance	Conclusion
Previous Investigation (2013) versus 2014 First 500 Feet	16*	2.73	1.75	0.7%	Upstream sediment PCB concentrations are significantly greater than those found in the first 500 feet of Garrison Slough investigated in 2014.
2014 First 500 Feet versus 2014 Mid Reach	18*	-0.79	1.73	78.1%	PCB concentrations in the first 500 feet of Garrison Slough investigated in 2014 are no different than those in the middle of the reach investigated in 2014.
2014 Mid Reach versus 2014 Last 700 Feet	14*	1.29	1.76	11.0%	PCB concentrations in the last 700 feet of Garrison Slough investigated in 2014 could be lower than those in the middle of the reach investigated in 2014, but the confidence level of this statement is only 89.0%.
	13.8	1.99	1.76	3.4%	Welch-Satterthwaite unequal variance t-test indicates that concentrations in the last 700 feet are significantly lower than in the middle of the reach.

Notes:

* Calculated via the pooled-variance method.

t = test statistic with Student's *t* distribution.

α = one-tailed probability at which to evaluate Student's *t* distribution.

P = One-tailed area under Student's *t* distribution lying to the right of *t* (calculated). If *P* is less than 5%, then the confidence level is greater than 95% that the observed difference arose by chance.

Table 3
Confidence Limits for Groupings of PCB Data

Geometric Parameter	Previous Investigation (2013)		2014 All Reaches		2014 First 500 Feet		2014 Mid Reach		2014 Last 700 Feet	
	$n = 10$ $t = 2.262$		$n = 24$ $t = 2.069$		$n = 8$ $t = 2.365$		$n = 12$ $t = 2.201$		$n = 4$ $t = 3.182$	
	Log ₁₀	Anti-Log ₁₀ (mg/kg)	Log ₁₀	Anti-Log ₁₀ (mg/kg)	Log ₁₀	Anti-Log ₁₀ (mg/kg)	Log ₁₀	Anti-Log ₁₀ (mg/kg)	Log ₁₀	Anti-Log ₁₀ (mg/kg)
\bar{x}	-0.509	0.31	-1.128	0.074	-1.214	0.068	-1.017	0.096	-1.292	0.051
s	0.375	—	0.499	—	0.706	—	0.411	—	0.143	—
UCL97.5	0.338	2.2	-0.096	0.80	0.456	2.9	-0.112	0.77	-0.838	0.15
UCLMn97.5	-0.241	0.57	-0.918	0.12	-0.624	0.24	-0.755	0.18	-1.065	0.086
LCLMn97.5	-0.777	0.17	-1.339	0.046	-1.804	0.016	-1.278	0.053	-1.519	0.030
LCL97.5	-1.357	0.044	-2.160	0.0069	-2.883	0.0013	-1.922	0.012	-1.746	0.018

Notes:

n = number of observations.

t = Student's t statistic for $n - 1$ degrees of freedom and two-tailed confidence level of 0.95.

Log₁₀ = base 10 logarithm.

Anti-Log₁₀ = base 10 exponentiation (10 raised to the Log₁₀ power).

mg/kg = milligrams per kilogram.

\bar{x} = sample mean.

s = sample standard deviation.

— = not meaningful (s is defined relative to the geometric mean, and its use must be confined to the log-transformed data).

UCL97.5 = upper confidence limit of the 95 percent confidence interval .

UCLMn97.5 = upper confidence limit of the 95 percent confidence interval of the mean.

LCLMn97.5 = lower confidence limit of the 95 percent confidence interval of the mean.

LCL97.5 = lower confidence limit of the 95 percent confidence interval.

ProUCL OUTPUT

ProUCL Output for Previous Investigation (2013) and 2014 First 500 Feet

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs				
User Selected Options				
Date/ Time of Computation	2/ 24/ 15 10:21:33			
From File	ProUCLinput.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Substantial Difference (S)	0.000			
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)			
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean			
Sample 1 Data: log2013				
Sample 2 Data: log1st500				
Raw Statistics				
	Sample 1	Sample 2		
Number of Valid Observations	10	8		
Number of Distinct Observations	10	8		
Minimum	-1.076	-2.357		
Maximum	0.265	-0.204		
Mean	-0.509	-1.214		
Median	-0.54	-1.035		
SD	0.375	0.706		
SE of Mean	0.118	0.25		
Sample 1 vs Sample 2 Two-Sample t-Test				
H0: Mean of Sample 1 - Mean of Sample 2 <= 0				
		t-Test	Critical	
Method	DF	Value	t (0.05)	P-Value
Pooled (Equal Variance)	16	2.726	1.746	0.007
Welch-Satterthwaite (Unequal Variance)	10.1	2.550	1.812	0.014
Pooled SD 0.545				
Conclusion with Alpha = 0.050				
Student t (Pooled) Test: Reject H0, Conclude Sample 1 > Sample 2				
Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2				
Test of Equality of Variances				
	Variance of Sample 1	0.14		
	Variance of Sample 2	0.498		
Numerator DF	Denominator DF	F-Test Value	P-Value	
7	9	3.551	0.081	
Conclusion with Alpha = 0.05				
Two variances appear to be equal				

ProUCL Output for 2014 First 500 Feet and 2014 Mid Reach

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs				
User Selected Options				
Date/ Time of Computation	2/ 24/ 15 10:22:12			
From File	ProUCLinput.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Substantial Difference (S)	0.000			
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)			
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean			
Sample 1 Data: log1st500				
Sample 2 Data: logMid				
Raw Statistics				
	Sample 1	Sample 2		
Number of Valid Observations	8	12		
Number of Missing Observations	0	8		
Number of Distinct Observations	8	12		
Minimum	-2.357	-1.556		
Maximum	-0.204	-0.279		
Mean	-1.214	-1.017		
Median	-1.035	-1.14		
SD	0.706	0.411		
SE of Mean	0.25	0.119		
Sample 1 vs Sample 2 Two-Sample t-Test				
H0: Mean of Sample 1 - Mean of Sample 2 <= 0				
		t-Test	Critical	
Method	DF	Value	t (0.05)	P-Value
Pooled (Equal Variance)	18	-0.793	1.734	0.781
Welch-Satterthwaite (Unequal Variance)	10.2	-0.714	1.812	0.754
Pooled SD 0.545				
Conclusion with Alpha = 0.050				
Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2				
Welch-Satterthwaite Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2				
Test of Equality of Variances				
	Variance of Sample 1	0.498		
	Variance of Sample 2	0.169		
Numerator DF	Denominator DF	F-Test Value	P-Value	
7	11	2.948	0.107	
Conclusion with Alpha = 0.05				
Two variances appear to be equal				

ProUCL Output for 2014 Mid Reach and 2014 Last 700 Feet

t-Test Sample 1 vs Sample 2 Comparison for Uncensored Full Data Sets without NDs				
User Selected Options				
Date/ Time of Computation	2/ 24/ 15 10:22:44			
From File	ProUCLinput.xls			
Full Precision	OFF			
Confidence Coefficient	95%			
Substantial Difference (S)	0.000			
Selected Null Hypothesis	Sample 1 Mean <= Sample 2 Mean (Form 1)			
Alternative Hypothesis	Sample 1 Mean > the Sample 2 Mean			
Sample 1 Data: logMid				
Sample 2 Data: logLast700				
Raw Statistics				
	Sample 1	Sample 2		
Number of Valid Observations	12	4		
Number of Missing Observations	8	20		
Number of Distinct Observations	12	4		
Minimum	-1.556	-1.457		
Maximum	-0.279	-1.123		
Mean	-1.017	-1.292		
Median	-1.14	-1.293		
SD	0.411	0.143		
SE of Mean	0.119	0.0713		
Sample 1 vs Sample 2 Two-Sample t-Test				
H0: Mean of Sample 1 - Mean of Sample 2 <= 0				
		t-Test	Critical	
Method	DF	Value	t (0.05)	P-Value
Pooled (Equal Variance)	14	1.287	1.761	0.110
Welch-Satterthwaite (Unequal Variance)	13.8	1.987	1.761	0.034
Pooled SD 0.370				
Conclusion with Alpha = 0.050				
Student t (Pooled) Test: Do Not Reject H0, Conclude Sample 1 <= Sample 2				
Welch-Satterthwaite Test: Reject H0, Conclude Sample 1 > Sample 2				
Test of Equality of Variances				
	Variance of Sample 1	0.169		
	Variance of Sample 2	0.0204		
Numerator DF	Denominator DF	F-Test Value	P-Value	
11	3	8.302	0.108	
Conclusion with Alpha = 0.05				
Two variances appear to be equal				