



Technical Memorandum

Results of the May 2007 Monitoring Well Sampling at the Taku Gardens Site, Fort Wainwright, Alaska (Final)

Prepared for:



U.S. Army Corps of Engineers, Alaska District
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September 2007

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NWI-2316-002
Project No. 2316

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Contract No: W911KB-04-P-0136

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EXECUTIVE SUMMARY

North Wind, Inc. performed well development and sampling activities at the Taku Gardens site located at Fort Wainwright, Alaska during May of 2006. The purpose of the project was to develop the monitoring wells installed during the summer of 2006 and to collect ground water samples to assist in the determination of the nature and extent of possible contamination within the groundwater. The activities consisted of the following components:

- Redevelopment of monitoring wells installed during the summer of 2006,
- Collection and shipment of water samples,
- Photographs and documentation of the activities, and
- Completion of the Alaska Department of Environmental Conservation checklists for the sample analyses.

A total of nine wells were redeveloped during May of 2007, followed by sampling using low flow techniques for gasoline range organics (AK-101), diesel range organics (AK-102), residual range organics (AK-103), volatile organic compounds (SW8260B), semivolatile organic compounds (SW8270C), total metals plus strontium (SW6020), explosives (SW8330 and SW8321), chlorinated pesticides (SW8081), mercury (SW7470A), polychlorinated biphenyls (SW8082), perchlorates (SW6850), and chlorinated herbicides (SW8151) analyses.

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ACRONYMS

ADEC	Alaska Department of Environmental Conservation
ASTM	American Society for Testing and Materials Standards
bgs	below ground surface
DRO	diesel range organics
EPA	Environmental Protection Agency
FSP	Field Sampling Plan
GRO	gasoline range organics
ID	inside diameter
IDW	investigative derived waste
LNAPL	light non-aqueous phase liquid
NTU	nephelometric turbidity unit
North Wind	North Wind, Inc.
OD	outside diameter
PVC	polyvinyl chloride
RRO	residual range organics
SVOC	semi-volatile organic compound
TOC	top of casing
USACE	United States Army Corps of Engineers (Alaska District)
VOC	volatile organic compound

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Technical Memorandum

Results of the May 2007 Monitoring Well Sampling at the Taku Gardens Site, Fort Wainwright, Alaska (Final)

1. INTRODUCTION

This Technical Memorandum documents the development and sampling of groundwater monitoring wells at the Taku Gardens site located at Fort Wainwright, Alaska. This memorandum also contains a brief summary of the installation of the wells in the summer of 2006. North Wind, Inc. (North Wind) performed this work for the U.S. Army Corps of Engineers (USACE), Alaska District under Contract No. W911KB-04-P-0136.

2. MONITORING WELL INSTALLATION AND CONSTRUCTION

Eight 2-inch inside diameter (ID) monitoring wells (MW-04, MW-05, MW06A, MW-07, MW-08, MW-09, MW-10, and MW-11) were installed in August 2006 at the Taku Gardens site. Two additional 1-inch ID monitoring wells were installed in September 2006. All of the 2-inch ID monitoring wells were installed with a large, truck-mounted drilling rig. This rig is equipped with both direct-push and hollow-stem auger capabilities. The two 1-inch ID monitoring wells, MW-06B and MW-12, were installed with a small track mounted direct push rig.

Four of the 2-inch wells (MW-04, MW-08, MW-09, and MW-11) were installed through 4-1/4-inch ID hollow stem augers. These wells, each approximately 20 feet in depth, were constructed using a 10-foot section of 10-slot screen set across the water table. The screens were typically set at 10 to 20 feet below ground surface (bgs). The remainder of the each well was constructed of 2-inch schedule 40 polyvinyl chloride (PVC) riser, with an approximate stick-up of 2 feet. The annulus between the well and the 8-1/2-inch borehole was backfilled with 20-40 Colorado silica sand to a minimum of 2 feet above the screened portion of the well. The remainder of the annulus was backfilled with a hydrated, granular bentonite seal.

During the installation of the initial four monitoring wells, well sorted, poorly graded, fine to medium sands were continuously heaving into the borehole due to the unconsolidated fluvial deposits. Heaving sands are common in this type of geologic setting and make installation of monitoring wells with conventional hollow stem auger methods difficult. To mitigate these effects, direct push technology was used to install the remaining monitoring wells at the site. Direct push monitoring wells have been demonstrated to be advantageous over conventional rotary drilled monitoring wells for ground water investigations in unconsolidated formations because they reduce disturbance to the formation (EPA 2005; Farrington et al. 2003).

The four remaining 2-inch wells (MW-05, MW-06A, MW-07, and MW-10) were constructed with AMS pre-packed PVC screens. These commercially available systems are manufactured of pre-cleaned, machine-slotted PVC wrapped with a sand filter and stainless steel screen to assure high integrity samples. These systems meet the requirements for American Society for Testing and Materials Standards (ASTM) standard D6725 for direct push installation of pre-packed screen monitoring wells. To install these systems, a 3-1/2-inch outside diameter (OD) steel direct-push casing was advanced to the desired depth and the screen and riser were placed inside of the casing. As specified by the manufacturer, a 4-inch foam bridge was installed just above the top of the pre-packed screen section in each direct-push well

(Figure 1). The purpose of the foam bridge is to prevent the downward migration of the granular bentonite used to seal the borehole. The remainder of the annulus is backfilled with a hydrated, granular bentonite seal. This installation technique was successful at all locations.

Monitoring wells MW-06A and MW-12 were constructed as 1-inch diameter monitoring wells. Because these well locations were identified late in the season after completion of the other field activities, the larger drill rig was no longer available. Therefore, a small VTR-100 rig was utilized. A 1-inch diameter, 10-foot section of 10-slot screen and 1-inch schedule 40 PVC riser were installed inside of the 2-2/4-inch OD direct push steel casing. As the drive casing was withdrawn, the annulus between the screen and the 2-3/4-inch borehole was backfilled with 20-40 Colorado silica sand to a point approximately 2 feet above the screened portion of the well. The remainder of the annulus was backfilled with a hydrated, granular bentonite seal.

All wells were developed after installation in accordance with the approved project Field Sampling Plan (FSP) (NWI 2006a). Well development employed a surge-and-pump technique to remove fine materials from the surrounding aquifer and to establish a good hydraulic connection between each well and the surrounding aquifer. A minimum of 45 gallons of development water was removed from each well during this process and transported to the Fort Wainwright Investigative Derived Waste (IDW) Facility for processing and disposal.

With the exception of MW-12, well risers were cut to a nominal 2-foot stick-up and a monitoring point was marked at the top of casing (TOC) from which to measure groundwater depths at each well. A J-plug was installed in each well to prevent the introduction of surface materials into the wells. Surface monuments were installed at all monitoring well locations at the Taku Gardens site. The surface monuments consist of an aluminum protective cover with a locking cap set around each well. Permanent identification tags were affixed to each well. The protective casings were tamped into the soil surrounding each well to a nominal depth of 2 feet. To prevent frost damage during the winter months, the protective casings were not set in concrete and concrete pads were not constructed, similar to other monitoring wells at Fort Wainwright. Three yellow bollard posts were placed around each well location in the same manner as the steel protective casing. MW-12 was completed using a flush-mounted manhole to minimize interference with traffic in that location. Well construction diagrams for each of the monitoring wells can be found in Appendix K of the Taku Gardens Preliminary Source Evaluation II Report (NWI 2007).

All monitoring wells were surveyed by a State of Alaska licensed surveyor. Geographic coordinates and groundwater depth measuring points were surveyed to 0.1-foot and 0.01-foot accuracy, respectively. Groundwater depths at all 13 monitoring wells were measured and the groundwater elevation at each location was determined. Results of the monitoring well survey can be found in Appendix L of the Preliminary Source Evaluation II Report (NWI 2007).

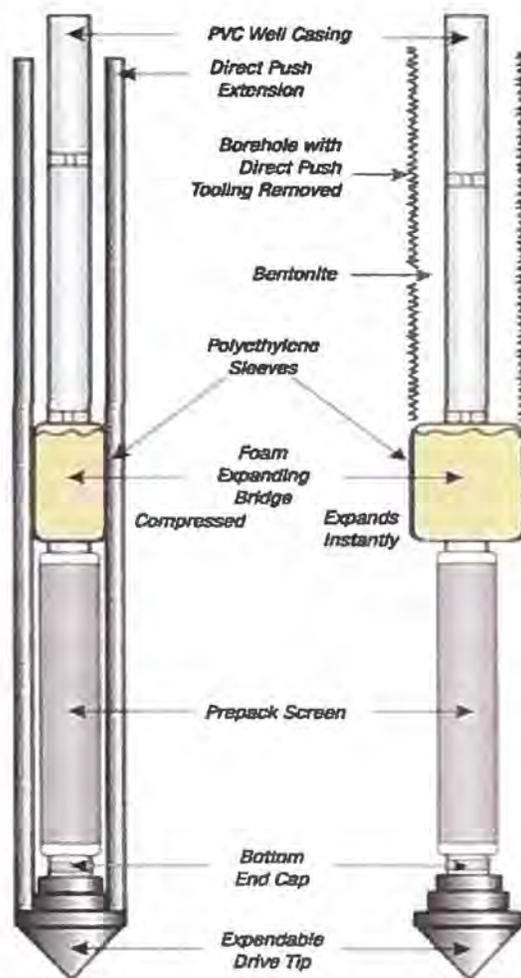


Figure 1. Schematic of pre-packed direct push groundwater monitoring wells.

3. SPRING 2007 MONITORING WELL DEVELOPMENT

Monitoring wells MW-04 through MW-12 were redeveloped during May of 2007 in accordance with the approved project FSP (NWI 2006a) and North Wind procedure ENV-005, "Design, Installation, and Development of Monitoring Wells" (NWI 2006b). Well development in the 2-inch diameter wells employed a surge-and-pump technique to remove fine materials from the surrounding aquifer and to establish a good hydraulic connection between each well and the surrounding aquifer. The 1-inch diameter wells were developed through over-pumping, as a surge block would not fit within the small well diameters. Water quality parameters were measured and recorded during the pumping portion of well development. Development water was transported to the Fort Wainwright IDW Facility for processing and disposal.

3.1 Development Methodology

Re-development of wells at the Taku Housing site began on May 9, 2007, and was completed on May 13, 2007. The following steps were utilized at each well for development:

- Inspected each well for damage and usability.
- Measured and recorded the depth of water from the TOC. All data were recorded on the applicable well development log sheets.
- Investigated each well for the presence of a light non-aqueous phase liquid (LNAPL) using an oil/water interface probe.
- Measured and recorded the total depth of the well.
- Surged the 2-inch diameter wells with a stainless steel surge block. The surge block was lowered to the bottom of the well and then lifted 6 inches above the bottom.
- Surged each 2-inch diameter well over a 2- to 5-foot section of the well screen with 20 up and down cycles per section. The surge block was then raised to the next portion of the screen and the up and down cycles were repeated until all portions of the wetted screen area had been surged.
- Placed a 2-inch diameter, 12-volt submersible pump into the well; accumulated sediment and purge water was removed from the well. The pump was initially placed in the bottom of the well and was then moved slowly up and down through the water column to remove sediment and water from all portions of the wetted screen. The pump discharge rate was measured and recorded.
- Used a centrifugal pump to pump MW-04, MW-06b, and MW-12 (due to heavy sediment accumulation in MW-04 and the 1-inch diameter of wells MW-06B and MW-12). The pump intake line was placed in the bottom of the well and then was moved slowly up and down through the water column to remove sediment and water from all portions of the wetted screen.
- Placed the pump, or intake line in the case of centrifugal pump, in the center of the wetted portion of the screen and pumping continued until the pH, conductivity, and temperature had stabilized and the turbidity was measured at <50 nephelometric turbidity units (NTUs).
- Measured water levels in each well with an electronic water level indicator during pumping.

- Recorded the water parameter data and draw down data on the applicable well development form (provided in Appendix A).
- Collected and transported all development water to the Fort Wainwright IDW Facility for processing and disposal.
- Locked the well and picked up the development materials. The surge block and submersible pump were decontaminated in an Alconox solution and rinsed. The discharge tubing from the submersible pump, or the intake tubing for the centrifugal pump, were drained and transferred to the Fort Wainwright IDW Facility for disposal.

The well development forms are provided as Appendix A. Photographs of the development of the wells are provided in Appendix B.

4. SPRING 2007 MONITORING WELL SAMPLING

Sampling of monitoring wells MW-01 through MW-12 was conducted in May of 2007 in accordance with the approved project FSP (NWI 2006a) and North Wind procedure ENVP-006, "Ground Water Sampling" (NWI 2006c). Figure 2 presents the location of the 12 sampled monitoring wells at the Taku Gardens site. Well purging and sampling were conducted using the low-flow approach based on Environmental Protection Agency (EPA) recommendations (Puls and Barcelona, 1996). The overall approach of low-flow sampling is to extract groundwater at a flow rate such that the water that is representative of the formation adjacent to the well screen is extracted, while minimizing the mobilization of colloidal particles or other fine-grained soil particles in the formation or in the bottom of the well. This approach includes a maximum flow rate limitation that is proportional to the wetted portion of well screen length, and a maximum drawdown limitation that does not depend on well screen length. The flow rate for the low flow purging and sampling of wetted screen lengths less than 10 feet is a maximum of 1 liter of ground water per minute, while the maximum allowable draw down for the water level is 0.3 feet. Water quality parameters and water levels were measured and recorded during the purging and sampling. Purge water was transported to the Fort Wainwright IDW Facility for processing and disposal. All wells were sampled more than 48 hours after their development. The times of development and of sampling are included in Table 1.

4.1 Purge and Sampling Methodology

Sampling of wells at the Taku Gardens site began on May 11, 2007, and was completed on May 17, 2007. Samples were collected for gasoline range organics (GRO) (AK-101), diesel range organics (DRO) (AK-102), residual range organics (RRO) (AK-103), volatile organic compounds (VOCs) (SW8260B), semivolatile organic compounds (SVOCs) (SW8270C), total metals plus strontium (SW6020), explosives (SW8330 and SW8321), chlorinated pesticides (SW8081), mercury (SW7470A), polychlorinated biphenyls (SW8082), perchlorates (SW6850), and chlorinated herbicides (SW8151) analyses.

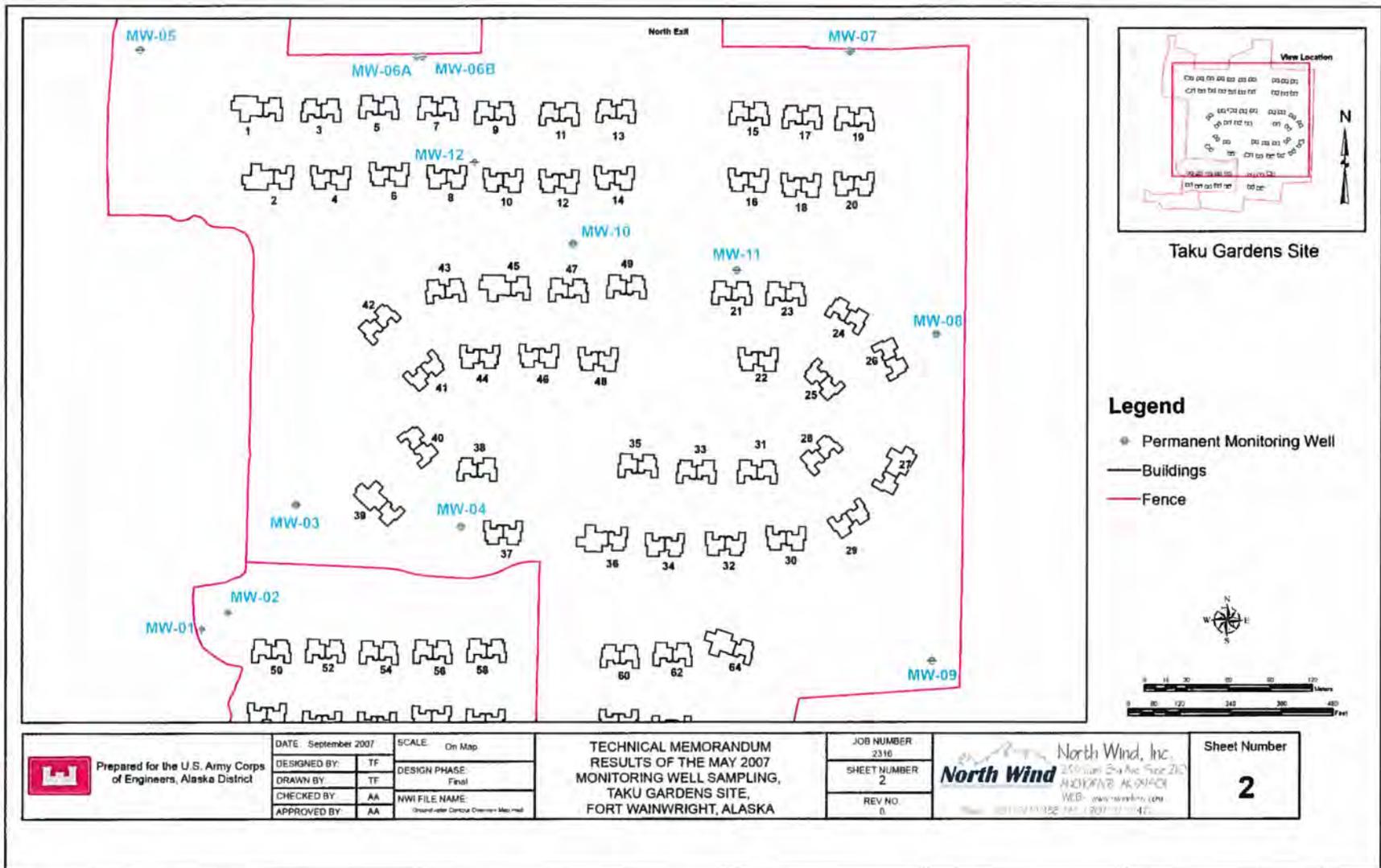


Figure 2. Location map of the 12 sampled monitoring wells at the Taku Gardens site.

Table 1. Development and sampling dates.

Well Number	Developed (Date and Time)	Sampled (Date and Time)	Elapsed Time Since Development (Approximate Hours)
MW-01	NA	5/15/07 0949	NA
MW-02	NA	5/15/07 1054	NA
MW-03	NA	5/11/07 1140	NA
MW-04	5/09/07 1314	5/11/07 1315	48
MW-05	5/11/07 1525	5/14/07 1030	67
MW-06a	5/13/07 1010	5/17/07 0951	96
MW-06b	5/13/07 1055	5/17/07 1123	96
MW-07	5/11/07 1843	5/14/07 1230	66
MW-08	5/12/07 1107	5/14/07 1529	52
MW-09	5/12/07 1220	5/15/07 1226	72
MW-10	5/13/07 1640	5/16/07 0952	65
MW-11	5/13/07 1540	5/16/07 1231	69
MW-12	5/13/07 1209	5/17/07 1303	97

The following steps were utilized for well purging and sampling:

- Calibrated the HORIBA multi-parameter water quality monitoring instrument at the beginning of each day according to the manufacturer's procedure.
- Inspected each well for damage and usability.
- Measured and recorded the depth of water from the TOC. All data were recorded on the applicable well development log sheets.
- Investigated each well for the presence of a LNAPL using an oil/water interface probe.
- Measured and recorded the total depth of the well.
- Computed the length of the wetted screen.

- Calculated the well volume based on water level and the bottom of well.
- Lowered the peristaltic pump intake line into the well to the center point of the wetted screen.
- Installed a flow-through cell for the water quality instrument sonde in the effluent line of the sampling pump.
- Recorded the pumping rate, water quality parameters, and water level every 3 to 5 minutes after initial pumping.
- Purged the well until parameters had stabilized, based on the last three parameter recordings or until more than three well volumes had been purged.
- Removed the flow-through cell from the system and collected water samples directly from the peristaltic pump discharge line.
- Water samples were collected in the designated bottles, sealed, and packed in coolers with ice.
- Field filtered all samples for perchlorate analysis through a 0.2-micron sterile filter at the time of collection.
- Packed and shipped samples to the analytical laboratory by overnight delivery service.
- Collected and transported all purge water and pump tubing to the Fort Wainwright IDW Facility for processing and disposal.

The well purge and sampling forms are provided in Appendix C. Photos of the sampling of the wells are provided in Appendix B.

5. RESULTS

5.1 Ground Water Analysis

Data summary tables showing the positive analytical detections have been compiled and are provided in Appendix D. These data are from ground water sampling conducted during May 2007 at the Taku Gardens Communications Site, Fort Wainwright, Alaska. The full set of electronic analytical data are provided on compact disc in Appendix E. In addition, the associated COELT files have been provided to Arensault-Legg for inclusion in the Taku Gardens site environmental database. Alaska Department of Environmental Conservation (ADEC) checklists, which have been prepared in accordance with ADEC guidance, are provided in Appendix F. All samples were submitted to the project laboratory (Severn Trent) for the following analysis: GRO (AK-101), DRO (AK-102), RRO (AK-103), VOCs (SW8260B), SVOCs (SW8270C), total metals plus strontium (SW6020), explosives (SW8330 and SW8321), chlorinated pesticides (SW8081), mercury (SW7470A), polychlorinated biphenyls (SW8082), perchlorates (SW6850), and chlorinated herbicides (SW8151).

5.2 Development and Purge Water Analysis

A composite sample was collected from the development water and purge waters and analyzed for the presence of dioxins and furans. The Fort Wainwright IDW Facility contractor collected this sample in response to the concern that these analytes may be present within the Taku groundwater. Results of the sampling are provided in Appendix G.

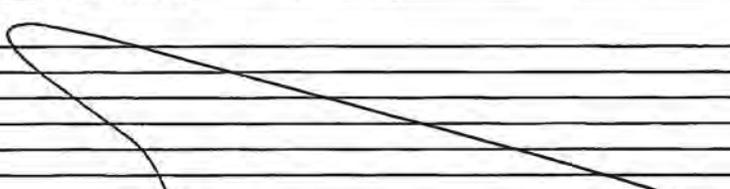
6. REFERENCES

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- Farrington, S.P., M.L. Gildea, J.D. Shinn, 2003, "Demonstration/Validation of Long-term Monitoring Using Wells Installed by Direct Push Technologies," Air Force Research Laboratory, AFRL-ML-TY-TR-2003-4533.
- NWI, 2006a, "Delineation and Remediation of Contaminated Soil, Groundwater, and Debris at Stryker Brigade Cantonment and FWA-102 Areas, Field Sampling Plan for the Communications Site, Taku Gardens, Fort Wainwright, Alaska," North Wind, Inc., June 2006.
- NWI, 2006b, "Design, Installation, and Development of Monitoring Wells," ENV-005, Revision 1, North Wind, Inc., March 13, 2006.
- NWI, 2006c, "Ground Water Sampling," ENVP-006 Revision 3, North Wind, Inc., December 2006.
- NWI, 2007, "Preliminary Source Evaluation II Report, Taku Gardens, Fort Wainwright, Alaska," North Wind, Inc., May 2007.
- Puls, R.W. and M.J. Barcelona, 1996, "Low-Flow (Minimal Drawdown) Ground Water Sampling Procedures," U.S. EPA, Ground Water Issue, Publication Number EPA/540/S-95/504, April 1996.

APPENDIX A
Well Development Forms

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Monitoring Well Development Form

Site Location <u>Taku Housing/Garden Area</u>		Well ID <u>MW04, AW-9478</u>						
Project Number <u>2316-600</u>		Well Type <input checked="" type="checkbox"/> Monitoring <input type="checkbox"/> Extraction <input type="checkbox"/> Probe						
Weather <u>mostly cloudy, slight wind, 250°</u>		Well Material <input checked="" type="checkbox"/> PVC <input type="checkbox"/> Stainless Steel <input type="checkbox"/> Steel						
Field Crew <u>Arden Bailey, Serray Pitt</u>		Date <u>5-9-07, 11:40am</u>						
<u>Don McGaughey</u>		Sample Time _____						
INITIAL MEASUREMENTS								
Casing Diameter <input type="checkbox"/> 1-inch <input checked="" type="checkbox"/> 2-inch <input type="checkbox"/> 4-inch <input type="checkbox"/> 6-inch <input type="checkbox"/> Other _____								
Total Depth of Casing (TD in feet BTOC) <u>21.15</u>		Water Level Depth (WL in feet BTOC) <u>16.08</u>						
Screen Interval (feet BTOC) from <u>~10.65</u> to <u>~20.65</u>		<u>H₂O column = 5.07</u>						
LNAPL OR DNAPL Thickness: <u>no LNAPL</u>								
PURGE METHOD								
Boiler Type: <input type="checkbox"/> Teflon <input type="checkbox"/> Stainless Steel <input checked="" type="checkbox"/> Other _____								
Pump Type: <input type="checkbox"/> Peristaltic <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Centrifugal <input type="checkbox"/> Other _____								
TOTAL DEVELOPMENT PUMPING TIME		TOTAL PURGE VOLUME	AVERAGE PURGE RATE					
Start <u>12:15</u> Stop <u>13:08</u> Elapsed <u>50</u> minutes		<u>~47</u> gallons	Flow Rate <u>~2.4</u> gpm					
FIELD PARAMETER MEASUREMENTS								
Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
<u>12:18</u>	<u>0</u>		<u>PL</u>					<u>16.08</u>
<u>12:23</u>	<u>~5</u>	<u>5.4</u>		<u>0.42</u>	<u>0.5</u>			
<u>12:36</u>	<u>~20</u>	<u>6.4</u>		<u>0.43</u>	<u>12.2</u>			
<u>12:44</u>	<u>~25</u>	<u>6.6</u>	<u>6.0</u>	<u>0.46</u>	<u>1.0</u>			<u>16.54</u>
<u>12:52</u>	<u>~32</u>	<u>6.7</u>	<u>5.7</u>	<u>0.47</u>	<u>0</u>			<u>16.60</u>
<u>12:59</u>	<u>~40</u>	<u>6.8</u>	<u>5.4</u>	<u>0.48</u>	<u>0</u>	<u>~2.3</u>		<u>16.53</u>
<u>13:08</u>	<u>~47</u>	<u>6.5</u>	<u>4.5</u>	<u>0.47</u>	<u>0.7</u>	<u>~2.75</u>		<u>16.85</u>
WATER DATA AFTER DEVELOPMENT								
Color: <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Amber <input type="checkbox"/> Tan <input type="checkbox"/> Brown <input type="checkbox"/> Gray <input type="checkbox"/> Milky White <input type="checkbox"/> Other _____								
Odor: <input checked="" type="checkbox"/> None <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> Very Strong <input type="checkbox"/> Sulfur <input type="checkbox"/> Hydrocarbon <input type="checkbox"/> Other _____								
Turbidity: <input checked="" type="checkbox"/> Clear <input type="checkbox"/> Low <input type="checkbox"/> Medium <input type="checkbox"/> High <input type="checkbox"/> Very Turbid <input type="checkbox"/> Other _____								
WATER DEVELOPMENT METHOD								
Boiler - Type: <input type="checkbox"/> Teflon <input type="checkbox"/> Stainless Steel <input type="checkbox"/> Disposable <input type="checkbox"/> Other _____								
Pump - Type: <input type="checkbox"/> Peristaltic <input type="checkbox"/> Submersible <input checked="" type="checkbox"/> Centrifugal <input type="checkbox"/> Other _____								
SUPPLEMENTAL INFORMATION								
								
Water Disposal <input checked="" type="checkbox"/> Ft. Wainwright IDW Disposal Facility <input type="checkbox"/> Other _____								

North Wind, Inc

1

MW04, AP-9478

Monitoring Well Development Form

11:40, Start setup on well AP-9478
measured depth to water & total depth, no gravel
detected. Cut tubing set up pump, surged by
lowering surge block to bottom of well and
lifted 6 inches to get to bottom of the screen.
Surged 20 up & down cycles over 3' section
screen. Raised block 2' & surged to portion of
washed screen. Pumped w/ Honda GX31 to
get initial sediment out. Pumped at ~ 2.3 L/min
for sustained rate with little draw down.
Turbidity dropped quickly. Pumped until well
was developed.

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Monitoring Well Development Form

Site Location Taku Housing/ Garden Area Well ID W11205, AP-9479
 Project Number 2316600 Well Type Monitoring Extraction Probe
 Weather Partly cloudy, slight wind, ~50°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Swamp Talk Date 5-11-07, 14:30
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter: 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 22.79 Water Level Depth (WL in feet BTOC) 15.85
 Screen Interval (feet BTOC) from ~12.29 to ~22.29 H₂O column = 6.94
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Boiler Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME **TOTAL PURGE VOLUME** **AVERAGE PURGE RATE**
 Start 14:40 Stop 15:12 Elapsed 32 minutes ~45 gallons Flow Rate ~1.5 gpm ~1.41

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
14:40	0		0C			~1.5		15.55
14:50	~15					~1.5		15.92
15:00	~35	7.57	2.1	0.50	5.0	~1.0		16.47
15:03	-	7.39	2.0	0.50	3.5	~1.0		16.47
15:06	-	7.33	2.0	0.50	3.4	~1.0		16.47
15:09	-	7.30	2.0	0.50	3.1	~1.0		16.43
15:12	~45	7.29	2.0	0.50	2.9	~1.0		16.43

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other paint solvent like odor
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Boiler Type: Teflon Stainless Steel Disposable Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal Ft. Wainwright IDW Disposal Facility Other _____

North Wind, Inc.

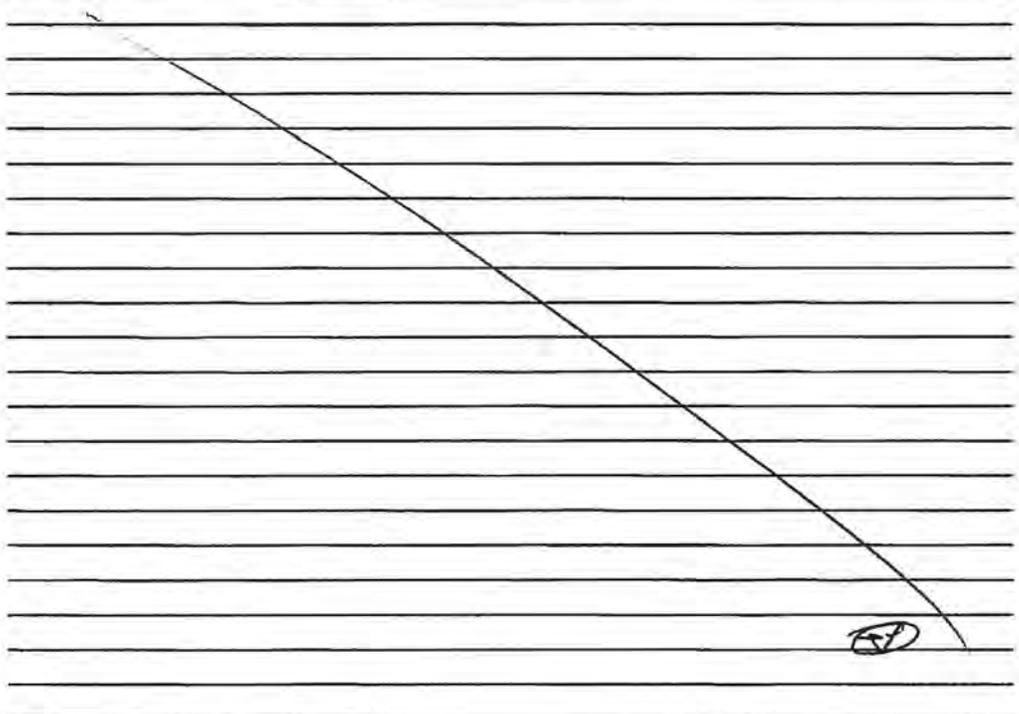
MW05, AP-9479

Monitoring Well Development Form

14:30, Measured Depth to water & total depth of well. Placed surge block in well till ~6 inch. From bottom of well. Surged 20 up & down cycles over 3' section of screen. Raised block ~25' & surged 20 up & down cycles of top portion of wetted screen.

14:40, pumped well w/ submersible pump. pumped at ~1.5 gpm for sustained rate w/ draw down (see field parameter measurements). Turbidity dropped quickly. to get initial sediment out.

15:00 Hooked up Horiba w/ Flow through cell & dropped pump rate to ~1.0 gpm. pump rate decreased due to use of Horiba Flow through cell. pumped well until parameters stabilized & well was developed.



Monitoring Well Development Form

Site Location Taku Housing / Gordon Ave Well ID MWD06A, AP-9480
 Project Number 2316-6005 Well Type Monitoring Extraction Probe
 Weather fully cloudy, ~45°F Well Material PVC Stainless Steel Steel
 Field Crew Adrian Bailey, Sunny Plak Date 5-13-07, 9:00 am
 Sample Time _____

INITIAL MEASUREMENTS
 Casing Diameter 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 22.72 Water Level Depth (WL in feet BTOC) 16.79
 Screen Interval (feet BTOC) from ~11.22 to ~22.22 1120 column = 5.93
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD
 Bailor Type: Tension Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME **TOTAL PURGE VOLUME** **AVERAGE PURGE RATE**
 Start 9:10 Stop 9:50 Elapsed 40 minutes ~45 gallons Flow Rate ~1.12 gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
9:10	0		2.6	0.51	15.5	1.5		16.79
9:20			2.6	0.51	15.2	1		17.03
9:25		6.52	2.6	0.51	15.2	1		16.94
9:30		6.29	2.6	0.51	13.4	1		16.94
9:30-35		7.1	2.6	0.51	11.9	1		16.94
9:40		7.33	2.6	0.51	11.1	1		16.94
9:45		7.40	2.6	0.51	11.1	1		16.94
9:50	~45	7.43	2.6	0.51	11.1	1		16.94

WATER DATA AFTER DEVELOPMENT
 Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD
 Bailor - Type: Teflon Stainless Steel Disposable Other _____
 Pump - Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal FL Wainwright IDW Disposal Facility Other _____

MW06A, AP-9480

Monitoring Well Development Form

9:00am, measured depth to H₂O & total depth of well. Placed surge block in well till ~6 inches from bottom of well. Surged 20 up & down cycles over ~3' of screen. Raised block ~2' & surged 20 up & down cycles at top portion of wetted screen.
Cal. Horiba ^{CP}

9:10am, pumped well w/ swimmer side pump. pumped at ~1.5 gpm for sustained rate to get initial sediment out. Turbidity cleared quickly.
Cal. Horiba.

9:25am Hooked up Horiba w/ flow through cell & dropped pump rate to ~1 gpm. Pumped well till parameters stabilized & well was developed.

30

Monitoring Well Development Form

Site Location Taku Housing Complex Area Well ID MWLAB, AP-9481
 Project Number 2316-000 Well Type Monitoring Extraction Probe
 Weather partly cloudy, ~45F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Sunny PHL Date 5-13-07, 10:15am
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter
 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 25.15 Water Level Depth (WL in feet BTOC) 16.63
 Screen Interval (feet BTOC) from ~24.68 to ~24.68 H₂O column = 8.55
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Bailer Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME TOTAL PURGE VOLUME AVERAGE PURGE RATE

Start 10:20 Stop 10:34 Elapsed 14 minutes 250 gallons Flow Rate ~35 gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
<u>10:20</u>	<u>0</u>		<u>0C</u>			<u>3.5</u>		<u>16.63</u>
<u>10:25</u>	<u>-</u>	<u>7.68</u>	<u>3.9</u>	<u>0.48</u>	<u>38.5</u>	<u>3.5</u>		
<u>10:28</u>	<u>-</u>	<u>7.74</u>	<u>3.5</u>	<u>0.48</u>	<u>19.4</u>	<u>3.5</u>		
<u>10:31</u>	<u>-</u>	<u>7.78</u>	<u>3.5</u>	<u>0.49</u>	<u>14.4</u>	<u>3.5</u>		
<u>10:34</u>	<u>~50</u>	<u>7.79</u>	<u>3.5</u>	<u>0.49</u>	<u>10.7</u>	<u>3.5</u>		

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Bailer - Type: Teflon Stainless Steel Disposable Other _____
 Pump - Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal Ft. Wainwright, IDW Disposal Facility Other _____

North Wind, Inc.

1

mwd06B, AP-9481

Monitoring Well Development Form

10:15am, measured depth to H₂O & total depth of well.
well is too small diam. for surge block.

10:20am, cut tubing and placed it in the well till
tubing reached well bottom. pumped from all
portions of wetted screen w/ centrifugal
pump at pump rate of ~3.5 gpm - (lifted
& lowered intake tubing 20 times w/ wetted
portion of screen. H₂O table will not fit in
well with pump tubing - (well diam. is too small
for both to fit at the same time.)

at sustained pump rate.)

10:25am, Hooked up Horiba w/ flow through cell. pump
rate did not change. Pumped well until
parameters stabilized & well was developed.

Monitoring Well Development Form

Site Location Taku Housing/Arden Area Well ID MW07, AP-9452
 Project Number 2310-600 Well Type Monitoring Extraction Probe
 Weather Partly cloudy, slight wind, ~50°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Swamp Pit Date 5-11-07, 17:50
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 22.61 Water Level Depth (WL in feet BTOC) 17.07
 Screen Interval (feet BTOC) from ~22.11 to ~22.11 H₂O column = 5.54
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Boiler Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME	TOTAL PURGE VOLUME	AVERAGE PURGE RATE
Start <u>18:00</u> Stop <u>18:30</u> Elapsed <u>30</u> minutes	<u>~35</u> gallons	Flow Rate <u>1.17</u> gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
18:00	0		10			~1.5		17.07
18:03	~13					~1.5		18.84
18:09	—	7.66	8.1	0.61	0.0	~0.5	Ticks Flooding	18.26
18:12	—	7.57	8.1	0.61	0.0	~0.5		18.26
18:15	—	7.50	8.1	0.61	0.0	~0.5		18.26
18:24	—	7.11	8.1	0.64	0.0	~0.5		18.28
18:27	—	7.19	8.0	0.64	0.0	~0.5		18.25
18:30	~35	7.16	8.1	0.64	0.0	~0.5		18.25

Handwritten note: Re-rod Probe with an arrow pointing to the 18:03 and 18:09 rows.

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

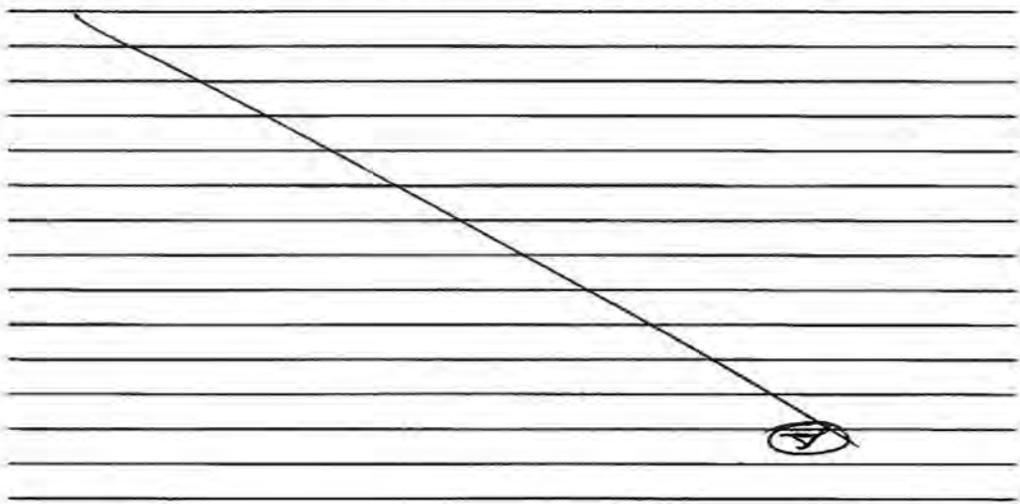
Boiler - Type: Teflon Stainless Steel Disposable Other _____
 Pump - Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal Ft. Wainwright IDW Disposal Facility Other _____

Monitoring Well Development Form

- 17:50, measured depth to water & total depth of well. Placed surge block in well till ~6' high. From bottom of well. Surged 20 up & down cycles over 3' section of screen. Raised block ~2' & surged 20 up & down cycles of top portion of untraced screen.
- 18:00, pumped well with submersible pump. pumped at ~1.5 gpm to get initial ~~for~~ sustained rate to get initial sediment out. well draw down from 17.07' to 15.84' in 3 min. Turned off pump, let well recover, & re-started pump. Turbidity dropped quickly.
- 18:09, Hooked up Hrika w/ Flow through cell & dropped pump rate to ~0.5 gpm.
- 18:16, Re-cal. probe because turbidity was flashing 0.0
- 18:24, began taking parameter readings again. Parameters began to stabilize & H₂O appeared clear. pumped well until ~~was~~ well was developed.



Monitoring Well Development Form

Site Location Taku Housing / Garden Area Well ID MW05, AP-9483
 Project Number 2316 600 Well Type Monitoring Extraction Probe
 Weather Fully cloudy, wind, rain, 45°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Sunny Plak Date 5-10-07, 9:55am
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter 2-inch 1-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 2230 Water Level Depth (WL in feet BTOC) 19.06
 Screen Interval (feet BTOC) from 11.80 to 21.50 H₂O column = 3.24
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Boiler Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME

TOTAL PURGE VOLUME

AVERAGE PURGE RATE

Start 10:20 Stop 10:45 Elapsed 25 minutes ~40 gallons Flow Rate ~1.6 gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate	Notes	Depth to Water
10:20	0		0C			0 gpm		19.06
10:25						~2		21.25
10:30		7.32	9.5	0.55	16.0	~1.5		21.10
10:35		7.46	9.5	0.53	6.5	~1.5		20.92
10:40		7.49	9.4	0.52	2.2	~1.5		20.96
10:45	~40	7.50	9.5	0.52	0.7	~1.5		20.95

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Boiler - Type: Teflon Stainless Steel Disposable Other _____
 Pump - Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

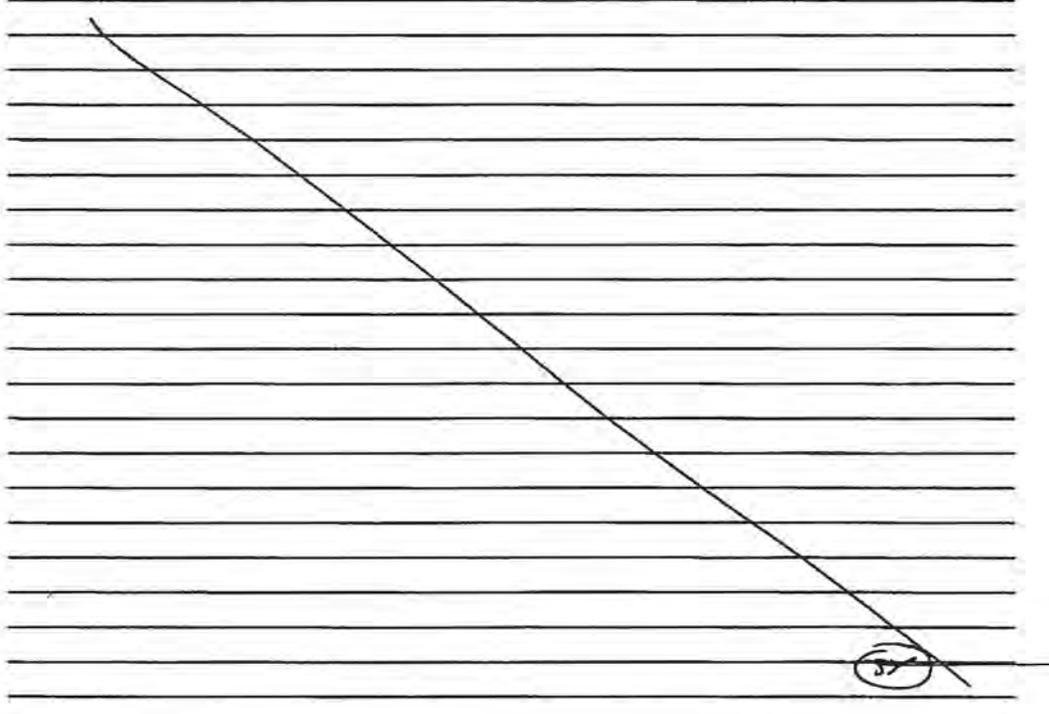
Water Disposal Wainwright IDW Disposal Facility Other _____

Monitoring Well Development Form

9:55am, Measured depth to H₂O & total depth of well. Placed surge block in well till ~6 inches from bottom of well. Surged 20 up & down cycles over 3' section of screen. Raised block ~2' & surged 20 up & down cycles of top portion of wetted screen.
 Cal. Horiba probe.

10:20am, pumped well with submersible pump. pumped at ~2 gpm for sustained rate to get initial sediment out. Turbidity cleared quickly.

10:30am, Hooked up Horiba w/ Flow Through Cell & dropped pump rate to ~1.5 gpm. pumped well until parameters stabilized & well was develop.



Monitoring Well Development Form

Site Location Taku Nursery/Garden Area Well ID MW009, AP-9487
 Project Number 2316-600 Well Type Monitoring Extraction Probe
 Weather Fully cloudy, wind, rain ~45°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Sergey Plak Date 5-12-07, 11:10am
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter
 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 21.70 Water Level Depth (WL in feet BTOC) 17.56
 Screen Interval (feet BTOC) from ~11.2 to ~21.2 H₂O column = 4.14
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Bailer Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME TOTAL PURGE VOLUME AVERAGE PURGE RATE

Start 11:25 Stop 11:50 Elapsed 25 minutes ~40 gallons Flow Rate ~1.6 gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature (°C)	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
11:25	0	—	—	—	—	2	—	17.56
11:30	—	—	—	—	—	2	—	19.57
11:35	—	7.61	1.5	0.83	5.2	1.5	—	19.28
11:40	—	7.51	1.3	0.84	3.6	1.5	—	19.30
11:45	—	7.44	1.3	0.84	3.3	1.5	—	19.30
11:50	~40	7.42	1.3	0.84	2.5	1.5	—	19.31

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other from leaching pipe
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Bailer - Type: Teflon Stainless Steel Disposable Other _____
 Pump - Type: Peristaltic Submersible Centrifugal Other _____

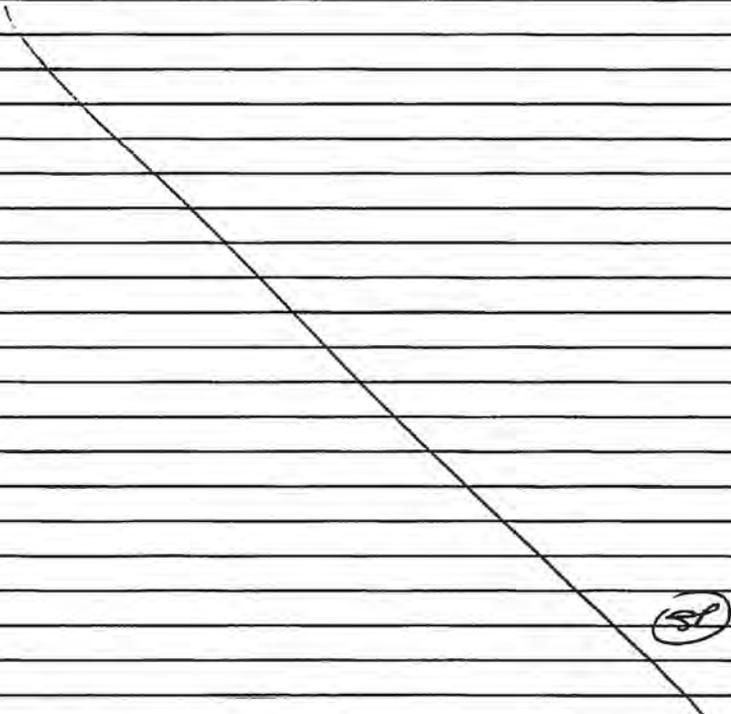
SUPPLEMENTAL INFORMATION

Water Disposal Wainwright IDW Disposal Facility Other _____

North Wind, Inc.

Monitoring Well Development Form

- 11:10am, Measured depth to H₂O & total depth of well. Placed surge block in well till 26 inches from bottom of well. Surged 20 up & down cycles over 3' section of screen. Moved surge block 21' & surged 20 up & down cycles of top portion of wetted screen.
- 11:25am, pumped well with submersible pump. Pumped at ~2 gpm for sustained rate to get initial sediment out. Turbidity cleared quickly.
- 11:35am, Hooked up Hema Hema w/ flow through cell & dropped pump rate to ~1.5 gpm. pumped well until parameters stabilized & well was develop.



Monitoring Well Development Form

Site Location Taku Housing/Garden Area Well ID MW10, AP-9485
 Project Number 2316-600 Well Type Monitoring Extraction Probe
 Weather Fully cloudy, Slight wind, ~45°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Jeremy Platt Date 5-12-07, 15:45
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter 2-inch 1-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 22.69 Water Level Depth (WL in feet BTOC) 14.31
 Screen Interval (feet BTOC) from -12.19 to -22.19 H₂O column = 9.38
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Boiler Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME TOTAL PURGE VOLUME AVERAGE PURGE RATE

Start 15:55 Stop 16:25 Elapsed 30 minutes 50 gallons Flow Rate 22 gpm ~167

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
<u>15:55</u>	<u>0</u>		<u>0C</u>			<u>2</u>		<u>14.31</u>
<u>16:05</u>						<u>2</u>		<u>14.69</u>
<u>16:10</u>		<u>7.75</u>	<u>2.9</u>	<u>0.50</u>	<u>11.6</u>	<u>1.5</u>		<u>14.59</u>
<u>16:15</u>		<u>7.67</u>	<u>2.8</u>	<u>0.50</u>	<u>7.10</u>	<u>1.5</u>		<u>14.61</u>
<u>16:20</u>		<u>7.50</u>	<u>2.8</u>	<u>0.50</u>	<u>4.60</u>	<u>1.5</u>		<u>14.60</u>
<u>16:25</u>	<u>50</u>	<u>7.79</u>	<u>2.7</u>	<u>0.50</u>	<u>3.9</u>	<u>1.5</u>		<u>14.59</u>

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Boiler Type: Teflon Stainless Steel Disposable Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal Ft. Wainwright IDW Disposal Facility Other _____

Monitoring Well Development Form

15:45, measured depth to H₂O & total depth of well. Placed surge block in well till ~6 inches from bottom of well. Surged 20 up & down cycles over 15' section of screen. Raised block ~2.5' & surged 20 up & down cycles of top portion of wetted screen.

15:55, pumped well with submersible pump. Pumped at ~2 gpm ~~for 15 minutes~~ ^{for 15 minutes} to get initial sediment out. Turbidity cleared quickly.

16:10, Hooked up Horiba w/ Flow through cell & developed ~~well~~ ^{dropped pump rate to ~.5 gpm}. Pumped well till parameters stabilized & well was developed.

Monitoring Well Development Form

Site Location Taku Housing/landfill Area Well ID MW11, AP-9486
 Project Number 2316-1000 Well Type Monitoring Extraction Probe
 Weather Fully cloudy, wind, rain, ~45°F Well Material PVC Stainless Steel Steel
 Field Crew Aden Bailey, Sunny Palk Date 5-12-07, 14:42
 Sample Time _____

INITIAL MEASUREMENTS
 Casing Diameter 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 22.88 Water Level Depth (WL in feet BTOC) 16.54
 Screen Interval (feet BTOC) from 12.38 to 22.38 H₂O Column = 6.34
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD
 Boiler Type: Teflon Stainless Steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME **TOTAL PURGE VOLUME** **AVERAGE PURGE RATE**
 Start 14:50 Stop 15:25 Elapsed 35 minutes 255 gallons Flow Rate 7.2 gpm ~1.57

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
14:50	0	7.6	4.0			2		16.54
15:00						2		18.09
15:05		7.22	4.9	0.47	20.3	1.5		17.89
15:10		7.54	3.9	0.49	9.3	1.5		17.89
15:15		7.64	3.9	0.50	6.7	1.5		17.89
15:20		7.51	3.9	0.50	5.6	1.5		17.89
15:25	255	7.51	4.0	0.51	4.7	1.5		17.89

WATER DATA AFTER DEVELOPMENT
 Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other fruit dump like odor
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD
 Boiler Type: Teflon Stainless Steel Disposable Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Water Disposal Wainwright IDW Disposal Facility Other _____

North Wind, Inc.

1

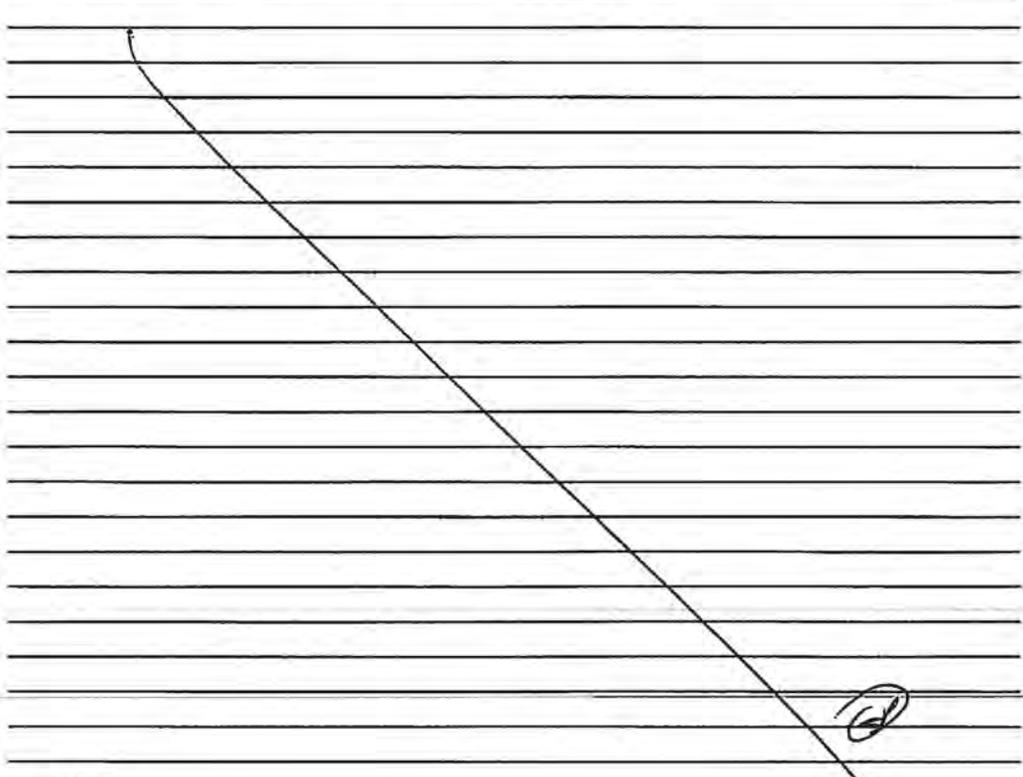
mwell, AR29486

Monitoring Well Development Form

14:40, Measured depth to H₂O & total depth of well. Placed surge block in well till 1/2 inch. From bottom of well. Surged 20 up & down cycles over ~3' section of screen. raised block ~2' & surged 20 up & down cycles of top portion of well screen.

14:50, pumped well with submersible pump. pumped at ~2gpm for ¹⁰ minutes to get initial sediment out. Turbidity cleared quickly.

15:05, Hooked up Horiba w/ Flow through cell & dropped pump rate to ~1.5gpm. Pumped well till parameters stabilized & well was develop.



Monitoring Well Development Form

Site Location Taku Housing/ Gardens Well ID MW12, AP-9457
 Project Number 2316-600 Well Type Monitoring Extraction Probe
 Weather Partly cloudy, 245°F Well Material PVC Stainless Steel Steel
 Field Crew Arden Bailey, Jimmy Pate Date 5-13-07, 11:25am
 Sample Time _____

INITIAL MEASUREMENTS

Casing Diameter 1-inch 2-inch 4-inch 6-inch Other _____
 Total Depth of Casing (TD in feet BTOC) 15.91 Water Level Depth (WL in feet BTOC) 13.01
 Screen Interval (feet BTOC) from ~8.91 to ~15.91 H₂O column = 5.9
 LNAPL OR DNAPL Thickness: NO LNAPL

PURGE METHOD

Boiler Type: Teflon stainless steel Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

TOTAL DEVELOPMENT PUMPING TIME **TOTAL PURGE VOLUME** **AVERAGE PURGE RATE**
 Start 11:30 Stop 11:44 Elapsed 14 minutes 245 gallons Flow Rate: 232 gpm

FIELD PARAMETER MEASUREMENTS

Time	Volume (gallons)	pH	Temperature	Conductivity	Turbidity (<50 NTU)	Pumping Rate (gpm)	Notes	Depth to Water
<u>11:30</u>	<u>0</u>	—	<u>92</u>	—	—	<u>3</u>	—	<u>13.01</u>
<u>11:35</u>	—	<u>7.72</u>	<u>2.9</u>	<u>0.50</u>	<u>21.3</u>	<u>3</u>	—	—
<u>11:38</u>	—	<u>7.58</u>	<u>2.3</u>	<u>0.53</u>	<u>14.9</u>	<u>3</u>	—	—
<u>11:41</u>	—	<u>7.54</u>	<u>2.2</u>	<u>0.53</u>	<u>15.2</u>	<u>3</u>	—	—
<u>11:44</u>	<u>245</u>	<u>7.53</u>	<u>2.2</u>	<u>0.53</u>	<u>14.2</u>	<u>3</u>	—	—

WATER DATA AFTER DEVELOPMENT

Color: Clear Amber Tan Brown Gray Milky White Other _____
 Odor: None Low Medium High Very Strong Sulfur Hydrocarbon Other _____
 Turbidity: Clear Low Medium High Very Turbid Other _____

WATER DEVELOPMENT METHOD

Boiler Type: Teflon Stainless Steel Disposable Other _____
 Pump Type: Peristaltic Submersible Centrifugal Other _____

SUPPLEMENTAL INFORMATION

Flush invert well

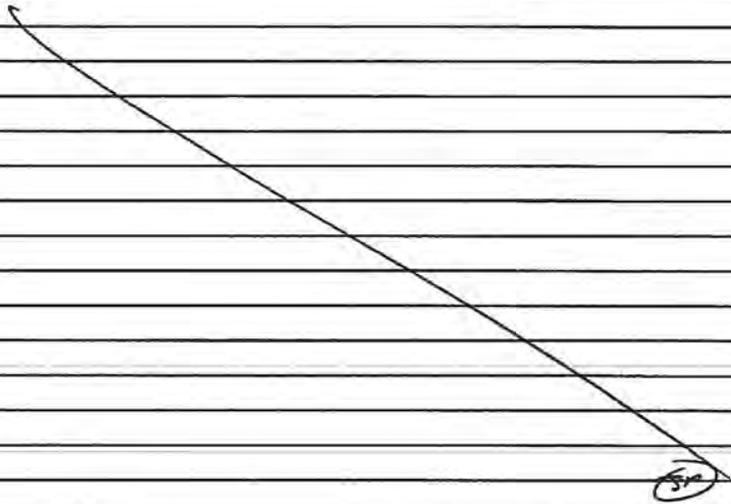
Water Disposal Wainwright IDW Disposal Facility Other _____

Monitoring Well Development Form

11:25am, well had a thin ice plug at ~ 2' down into the well. Poured 2 1/2 gal. of warm tap H₂O into well to melt ice plug. measured depth to H₂O & total depth of well. well is too small diam. for surge blocks.

11:30am, cut tubing & placed in in the well till tubing reached well bottom. pumped from all portions of wetted screen w/ centrifugal pump at pump rate of ~ 3 gpm. (lifted & lowered intake tubing 20 times w/ wetted portion of screen at sustained pump rate.) H₂O tape will not fit in well with pump tubing - (well diam. is too small for both to fit at the same time.)

11:35am, Hooked up Horiba w/ Flow through cell. pump rate did not change. Pumped well until parameters stabilized & well was developed.



APPENDIX B
Photographic Log
(additional photographs provided on CD)

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Well Development Photographs



Stainless steel surge block.



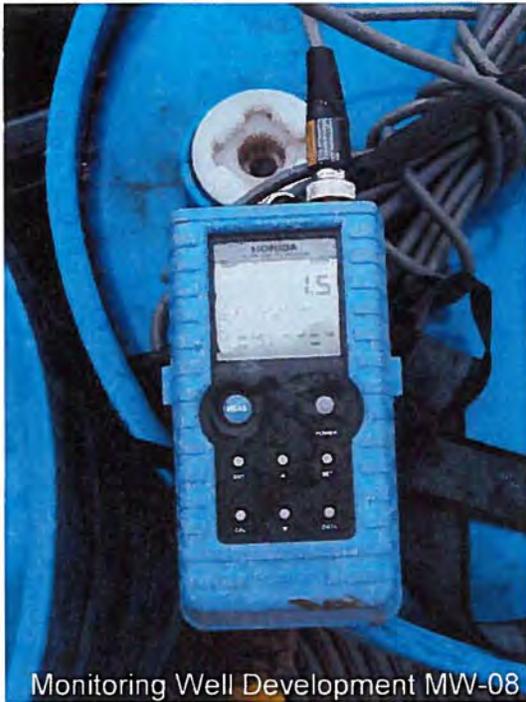
Two inch diameter, 12 volt submersible pump.



Purge water was transported to IDW.



Water parameters and pump rate were measured.



HORIBA display unit.



Water clarity after well development.

Well Sampling Photographs



Monitoring wells were sampled utilizing low-flow techniques. Drawdown and discharge rates were measured and recorded. Purge water was collected and transported to IDW.



Monitoring Well Sampling MW-016

A peristaltic pump was used for sampling.



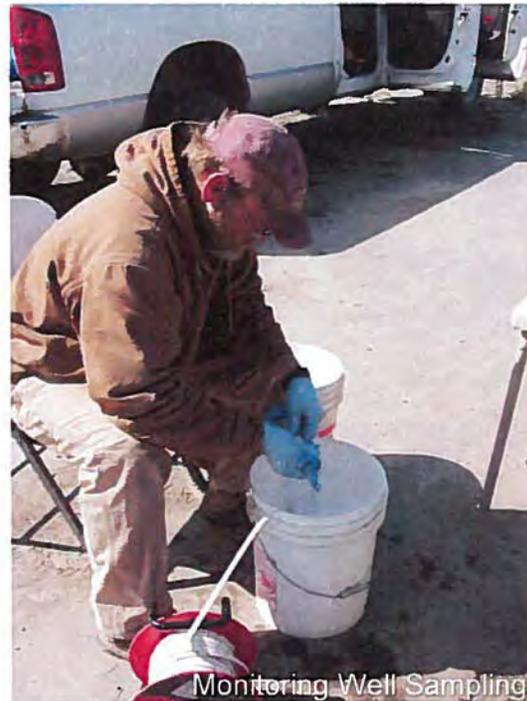
Monitoring Well Sampling MW-07

A flow through cell was used for water parameter measurements.



Monitoring Well Sampling

Perchlorate samples were filtered in the field.



Monitoring Well Sampling

All equipment was decontaminated between wells.

APPENDIX C
Well Sampling Forms

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APPENDIX D
Data Summary Tables
(Positive Analytical Detects)

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Taku Gardens May 2007 Ground Sampling, AK101/AK102/AK103 Sample Hits Only Table

Location	MW05	MW06A	MW06B	MW10	MW11
Sample ID	07MW05S01	07MW06AS01	07MW06BS01	07MW10S01	07MW11S01
Collection Date	5/14/2007	5/17/2007	5/17/2007	5/16/2007	5/16/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E160200001	G7E190213001	G7E190213002	G7E170329001	G7E170329002
QC Type	Primary	Primary	Primary	Primary	Primary

Analyte	Method	Units					
Gasoline Range Organics	AK101	mg/L	--	0.073	0.029 J	--	--
Diesel Range Organics	AK102	mg/L	0.063	5.8	4	0.044 J	0.051 J
Residual Range Organics	AK103	mg/L	0.15 J	--	--	--	--

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit.
 -- = analyte was not detected at the laboratory reporting limit.

Taku Gardens May 2007 Ground Sampling, AK101/AK102/AK103 Sample Hits Only Table

Location	MW11	MW12
Sample ID	07MW11S02	07MW12S01
Collection Date	5/16/2007	5/17/2007
Laboratory	STLS	STLS
Lab Sample ID	G7E170329003	G7E190213003
QC Type	Duplicate	Primary

Analyte	Method	Units		
Gasoline Range Organics	AK101	mg/L	--	0.094
Diesel Range Organics	AK102	mg/L	0.025 J	5.9
Residual Range Organics	AK103	mg/L	--	--

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit.
 -- = analyte was not detected at the laboratory reporting limit.

Taku Gardens May 2007 Ground Sampling, SW6020 Sample Hits Only Table

Location	MW01	MW02	MW03	MW04	MW05
Sample ID	07MW01S01	07MW02S01	07MW03S01	07MW04S01	07MW05S01
Collection Date	5/15/2007	5/15/2007	5/11/2007	5/11/2007	5/14/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E170413001	G7E170413002	G7E120234001	G7E120234002	G7E160200001
QC Type	Primary	Primary	Primary	Primary	Primary

Analyte	Method	Units					
Aluminum	SW6020	mg/L	--	0.03 J	--	--	--
Arsenic	SW6020	mg/L	0.015	0.022	0.021	0.0021 J	0.0098
Barium	SW6020	mg/L	0.11	0.087	0.13	0.097	0.24
Boron	SW6020	mg/L	0.029 J	0.045 J	0.024 J	0.021 J	0.022 J
Calcium	SW6020	mg/L	95.5	148	67.6	67.2	73.7
Cobalt	SW6020	mg/L	0.002 J	--	0.001 J	0.0054	--
Copper	SW6020	mg/L	--	--	--	--	--
Iron	SW6020	mg/L	12.5	17.9	11.1	3	7.7
Magnesium	SW6020	mg/L	26.3	44.7	18.6	18.4	18
Manganese	SW6020	mg/L	0.94	1	0.52	1.5	0.77
Nickel	SW6020	mg/L	0.0039	0.0027 J	0.0023 J	0.0053	0.0016 J
Phosphorus, Total (as P)	SW6020	mg/L	--	--	0.19	--	0.044 J
Potassium	SW6020	mg/L	--	--	3.9	3.7	4.7
Sodium	SW6020	mg/L	5.7	7.1	5.2	5.1	4.9
Strontium	SW6020	mg/L	0.34	0.43	0.28	0.28	0.27
Vanadium	SW6020	mg/L	--	--	--	--	--
Zinc	SW6020	mg/L	0.043	0.0086 J	0.0085 J	0.0084 J	0.012

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit.
 -- = analyte was not detected at the laboratory reporting limit

Taku Gardens May 2007 Ground Sampling, SW6020 Sample Hits Only Table

Location	MW06A	MW06B	MW07	MW08	MW08
Sample ID	07MW06AS01	07MW06BS01	07MW07S01	07MW08S01	07MW08S02
Collection Date	5/17/2007	5/17/2007	5/14/2007	5/14/2007	5/14/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E190213001	G7E190213002	G7E160200002	G7E160200003	G7E160200004
QC Type	Primary	Primary	Primary	Primary	Duplicate

Analyte	Method	Units					
Aluminum	SW6020	mg/L	--	--	--	--	--
Arsenic	SW6020	mg/L	0.0049	0.0066	0.026	--	--
Barium	SW6020	mg/L	0.23	0.21	0.28	0.12	0.12
Boron	SW6020	mg/L	0.022 J	0.022 J	0.052	0.041 J	0.04 J
Calcium	SW6020	mg/L	66.9	63.5	86.3	71.6	74.4
Cobalt	SW6020	mg/L	--	--	--	0.0069	0.0069
Copper	SW6020	mg/L	--	--	--	0.0013 J	0.0013 J
Iron	SW6020	mg/L	15.9	15	12.5	0.19	0.2
Magnesium	SW6020	mg/L	16	15.6	20.8	24.6	21.1
Manganese	SW6020	mg/L	1.1	1	1.1	0.62	0.63
Nickel	SW6020	mg/L	--	--	0.0021 J	0.0073	0.0072
Phosphorus, Total (as P)	SW6020	mg/L	0.16	0.15	0.11	--	--
Potassium	SW6020	mg/L	3.9	4	7.3	6.5	--
Sodium	SW6020	mg/L	5.1	5.3	10.2	12.4	11.4
Strontium	SW6020	mg/L	0.27	0.27	0.37	0.31	0.31
Vanadium	SW6020	mg/L	0.0055 J	--	--	--	--
Zinc	SW6020	mg/L	0.012	0.0084 J	0.017	0.0066 J	0.0096 J

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit.
 -- = analyte was not detected at the laboratory reporting limit

Taku Gardens May 2007 Ground Sampling, SW6020 Sample Hits Only Table

Location	MW09	MW10	MW11	MW11	MW12
Sample ID	07MW09S01	07MW10S01	07MW11S01	07MW11S02	07MW12S01
Collection Date	5/15/2007	5/16/2007	5/16/2007	5/16/2007	5/17/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E170413003	G7E170329001	G7E170329002	G7E170329003	G7E190213003
QC Type	Primary	Primary	Primary	Duplicate	Primary

Analyte	Method	Units	MW09	MW10	MW11	MW11	MW12
Aluminum	SW6020	mg/L	--	--	--	--	--
Arsenic	SW6020	mg/L	0.0037	0.018	0.012	0.013	0.0035
Barium	SW6020	mg/L	0.16	0.17	0.19	0.2	0.23
Boron	SW6020	mg/L	0.027 J	0.015 J	0.019 J	0.015 J	0.097
Calcium	SW6020	mg/L	156	54.3	54.8	56.6	77.7
Cobalt	SW6020	mg/L	0.011	--	--	--	0.0028 J
Copper	SW6020	mg/L	--	--	--	--	--
Iron	SW6020	mg/L	8.6	10	11.8	12.3	11
Magnesium	SW6020	mg/L	22.4	15.2	14.3	15.4	19.2
Manganese	SW6020	mg/L	0.71	0.8	0.92	0.98	1.2
Nickel	SW6020	mg/L	0.012	0.0016 J	0.001 J	0.001 J	0.0052
Phosphorus, Total (as P)	SW6020	mg/L	--	0.099 J	0.11	0.11	0.093 J
Potassium	SW6020	mg/L	--	4.2	4.1	4.3	4.6
Sodium	SW6020	mg/L	5.6	4.8	5.5	5.9	4.8
Strontium	SW6020	mg/L	0.62	0.24	0.25	0.27	0.31
Vanadium	SW6020	mg/L	--	--	--	--	--
Zinc	SW6020	mg/L	0.0066 J	0.0081 J	0.0098 J	0.0085 J	0.012

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit.
 -- = analyte was not detected at the laboratory reporting limit.

Taku Gardens May 2007 Ground Sampling, ASW8081A Sample Hits Only Table

Location	MW06A	MW06B	MW07	MW11	MW12
Sample ID	07MW06AS01	07MW06BS01	07MW07S01	07MW11S01	07MW12S01
Collection Date	5/17/2007	5/17/2007	5/14/2007	5/16/2007	5/17/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E190213001	G7E190213002	G7E160200002	G7E170329002	G7E190213003
QC Type	Primary	Primary	Primary	Primary	Primary

Analyte	Method	Units	MW06A	MW06B	MW07	MW11	MW12
4,4'-DDT	SW8081A	mg/L	--	--	0.0000052 J.PI	0.0000058 J.PI	--
Heptachlor	SW8081A	mg/L	--	0.00013 J.PI	--	--	0.00014 J.PI
delta-BHC	SW8081A	mg/L	0.00018 J.PI	--	--	--	--

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit
 PI = The percent difference between the original and confirmation analyses is greater than 40%
 -- = analyte was not detected at the laboratory reporting limit

Taku Gardens May 2007 Ground Sampling, SW8260B Sample Hits Only Table

Location	MW01	MW06A	MW06B	MW08	MW08	MW09
Sample ID	07MW01S01	07MW06AS01	07MW06BS01	07MW08S01	07MW08S02	07MW09S01
Collection Date	5/15/2007	5/17/2007	5/17/2007	5/14/2007	5/14/2007	5/15/2007
Laboratory	STLS	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E170413001	G7E190213001	G7E190213002	G7E160200003	G7E160200004	G7E170413003
QC Type	Primary	Primary	Primary	Primary	Duplicate	Primary

Analyte	Method	Units	MW01	MW06A	MW06B	MW08	MW08	MW09
1,1-Dichloroethene	SW8260B	mg/L	--	--	--	--	--	--
1,3,5-Trimethylbenzene	SW8260B	mg/L	--	--	--	--	--	--
Acetone	SW8260B	mg/L	--	0.0014 J	0.0021 J	0.0014 J	--	0.0013 J
Dichlorodifluoromethane	SW8260B	mg/L	0.0017	--	--	0.00035 J	0.00044 J	--
Isopropylbenzene	SW8260B	mg/L	--	0.00015 J	--	--	--	--
cis-1,2-Dichloroethene	SW8260B	mg/L	--	0.00015 J	0.00019 J	--	--	--
sec-Butylbenzene	SW8260B	mg/L	--	0.00027 J	0.00013 J	--	--	--
tert-Butylbenzene	SW8260B	mg/L	--	0.00025 J	--	--	--	--

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit
 -- = analyte was not detected at the laboratory reporting limit.

Taku Gardens May 2007 Ground Sampling, SW8260B Sample Hits Only Table

Location	MW10	MW11	MW11	MW12	Trip Blank
Sample ID	07MW10S01	07MW11S01	07MW11S02	07MW12S01	07TB04
Collection Date	5/16/2007	5/16/2007	5/16/2007	5/17/2007	5/16/2007
Laboratory	STLS	STLS	STLS	STLS	STLS
Lab Sample ID	G7E170329001	G7E170329002	G7E170329003	G7E190213003	G7E170329004
QC Type	Primary	Primary	Duplicate	Primary	Trip Blank

Analyte	Method	Units					
1,1-Dichloroethene	SW8260B	mg/L	--	--	--	0.0011	--
1,3,5-Trimethylbenzene	SW8260B	mg/L	--	--	--	0.00019 J	--
Acetone	SW8260B	mg/L	0.0044 J	--	0.0016 J	0.0025 J	0.0011 J
Dichlorodifluoromethane	SW8260B	mg/L	0.00026 J	0.00093 J	0.00093 J	--	--
Isopropylbenzene	SW8260B	mg/L	--	--	--	--	--
cis-1,2-Dichloroethene	SW8260B	mg/L	--	--	--	--	--
sec-Butylbenzene	SW8260B	mg/L	--	--	--	--	--
tert-Butylbenzene	SW8260B	mg/L	--	--	--	0.00026 J	--

mg/L = milligrams per Liter
 J = Estimated result. Result is less than reporting limit
 -- = analyte was not detected at the laboratory reporting limit

Taku Gardens May 2007 Ground Sampling, SW8321A Sample Hits Only Table

Location	MW06A	MW06B	MW12
Sample ID	07MW06AS01	07MW06BS01	07MW12S01
Collection Date	5/17/2007	5/17/2007	5/17/2007
Laboratory	STLS	STLS	STLS
Lab Sample ID	G7E190213001	G7E190213002	G7E190213003
QC Type	Primary	Primary	Primary

Analyte	Method	Units	MW06A	MW06B	MW12
1,3,5-Trinitrobenzene	SW8321A	mg/L	0.000094 J	0.00006 J	0.00009 J
2,4,6-Trinitrotoluene	SW8321A	mg/L	0.000052 J	--	0.000063 J
4-Amino-2,6-dinitrotoluene	SW8321A	mg/L	0.000018 J	--	--
Hexahydro-1,3,5-trinitro-1,3,5-triazin	SW8321A	mg/L	0.0011	0.00071	0.001

mg/L = milligrams per Liter

J = Estimated result. Result is less than reporting limit

-- = analyte was not detected at the laboratory reporting limit

Taku Gardens May 2007 Ground Sampling, SW8330 Sample Hits Only Table

	Location	MW06A	MW06B	MW07	MW09	MW12
Sample ID	07MW06AS01	07MW06BS01	07MW07S01	07MW09S01	07MW12S01	
Collection Date	5/17/2007	5/17/2007	5/14/2007	5/15/2007	5/17/2007	
Laboratory	STLS	STLS	STLS	STLS	STLS	
Lab Sample ID	G7E190213001	G7E190213002	G7E160200002	G7E170413003	G7E190213003	
QC Type	Primary	Primary	Primary	Primary	Primary	

Analyte	Method	Units	MW06A	MW06B	MW07	MW09	MW12
1,3,5-Trinitrobenzene	SW8330	mg/L	--	0.01	--	--	0.004
2,4-Dinitrotoluene	SW8330	mg/L	--	0.001 PI	--	--	--
2-Nitrotoluene	SW8330	mg/L	--	--	--	--	0.00015 J
Hexahydro-1,3,5-trinitro-1,3,5-triazin	SW8330	mg/L	0.0032 PI	--	--	--	--
Nitrobenzene	SW8330	mg/L	0.0079	0.0061	--	--	0.0051
Octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocin	SW8330	mg/L	--	--	0.000038 J	0.000047 J	--

mg/L = milligrams per liter

J = Estimated result. Result is less than reporting limit

PI = The percent difference between the original and confirmation analyses is greater than 40%

-- = analyte was not detected at the laboratory reporting limit.

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APPENDIX E
Electronic Analytical Data
(included on CD)

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APPENDIX F
ADEC Checklists

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Data Package G7E170413

Laboratory Data Review Checklist

1. Laboratory

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

Yes

Comments: See Ft. Wainwright QAPP. Labs approved for the project. Severn Trent Laboratories, Inc.(STL), Sacramento, CA

- 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

Comments: See Ft. Wainwright QAPP. Labs approved for the project. STL-Seattle used also.

2. Chain of Custody (COC)

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

Yes

Comments: COC for STL-Sac to STL-Seattle also present.

- b. Correct analyses requested?

Yes

Comments: Verified by field sampler.

3. Laboratory Sample Receipt Documentation

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

Yes

Comments: None

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

Yes

Comments: Preservations were appropriate for the requested analyses.

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

Yes

Comments: No variances noted.

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

Yes

Comments: No variances noted.

- e. Data quality or usability affected?

Explain: Data did not require qualification.

4. Case Narrative

a. Present and understandable?

Yes

Comments: Laboratory lists only methods which require comment. Elements not included.

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

Yes

Comments: Discrepancies identified by the laboratory are against acceptance criteria in data package. Discrepancies that affect this project are discussed in the appropriate sections of this checklist.

c. Were all corrective actions documented?

Yes

Comments: The laboratory documents the corrective actions it has performed.

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

Lab sites matrix effects and method limitations. The data is qualified for this review according to QAPP criteria.

5. Sample Results

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

Yes

Comments: None

b. All applicable holding times met?

No

Comments: Holding times were met for the original analyses, but not for all re-extractions or re-analyses.

c. All soils reported on a dry weight basis?

Yes

Comments: Samples are aqueous.

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

Yes

Comments: No samples were diluted without explanation.

e. Data quality or usability affected?

Explain: Re-extracted DRO outside holding time; 07MW01S01, 07MW02S01, 07MW09S01, qualified as non-detected estimated. RRO re-extracted outside holding time, 07MW01S01, 07MW02S01, 07MW09S01, qualified as non-detected estimated. Pesticides re-extracted outside holding time, 07MW01S01, 07MW02S01, 07MW09S01, qualified as non-detected estimated. PCBs re-extracted outside holding time, 07MW01S01, 07MW02S01, 07MW09S01, qualified as non-detected estimated.

6. QC Samples

a. Method Blank

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

Yes Comments: None

- ii. All method blank results less than PQL?

Yes Comments: All results reported as non-detected.

- iii. If above PQL, what samples are affected?

No samples affected.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- v. Data quality or usability affected?

Explain: No effect.

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

- i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

No

Comments: One LCS per STL-Sacramento analysis; parent sample for MS/MSD was not reported in this data package. VOA, GRO, Explosives, re-extractions of DRO and GRO, no MS/MSD; LCS only. Herbicides analyzed at STL-Seattle had LCS/LCSD, parent sample for MS/MSD was not reported in this data package. . No data were qualified due to absence of LCSD.

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

No

Comments: One LCS per STL-Sacramento analysis; parent sample for MS/MSD was not reported in this data package. No data were qualified due to absence of LCSD.

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

No

Comments: For GRO, LCS above acceptance criteria. For initial extraction of DRO, LCS below acceptance criteria. Pesticides endrin aldehyde and endosulfan sulfate below acceptance criteria for batch 7138370.

- iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes Comments: None

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

Comments: GRO not affected, all samples U. DRO sample 07MW01S01, 07MW02S02 and 07MW09S01 qualified as estimated (J). Endrin aldehyde and endosulfan sulfate qualified as non-detected estimated for initial extraction of 07MW01S01, 07MW02S01, 07MW09S01.

- vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?
Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.
- vii. Data quality or usability affected?
Explain: Potential for low bias for initial DRO results. Potential for low bias and false negatives for initial endrin aldehyde and endosulfan sulfate results.

c. Surrogates – Organics only

- i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?
Yes Comments: None
- ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? Or project specified DQOs? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)
No Comments: RRO above acceptance criteria for re-extraction of 07MW09S01. Pesticides below acceptance criteria for initial extraction of 07MW01S01, 07MW09S01. PCBs below acceptance criteria for initial extraction of 07MW01S01, 07MW02S01, 07MW09S01.
- iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?
Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.
- iv. Data quality or usability affected?
Explain: Associated sample results for RRO reported U and are not qualified. Pesticide, all qualified non-detected estimated. PCBs, all qualified non-detected estimated.

d. Trip Blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): water and soil

- i. One trip blank reported per matrix, analysis and cooler?
Yes Comments: None.
- ii. All results less than PQL?
Yes Comments: No contamination and no TICs were detected for the trip blank; all TICs are qualified as "N" for this project. No GRO contamination was detected in the trip blank.
- iii. If above PQL, what samples are affected?
 None
- iv. Data quality or usability affected?
Explain: No data were qualified.

e. Field Duplicate

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

Yes Comments: Field duplicates are determined on a project, not SDG basis.

ii. Submitted blind to lab?

Yes Comments: None.

iii. Precision - All relative percent differences (RPD) less than specified DQOs?

(Recommended: 30% water, 50% soil) $RPD = \frac{|R_1 - R_2|}{((R_1 + R_2)/2)} \times 100\%$, R = concentration

Yes Comments: No field duplicate samples were reported in this data package.

iv. Data quality or usability affected?

Explain: No.

f. Decontamination or Equipment Blank (if applicable)

Not Applicable

i. All results less than PQL?

Comments: **Not Applicable**

ii. If above PQL, what samples are affected?

iii. Data quality or usability affected?

Explain: **Not Applicable**

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

Yes No Comments: Project specific. See final report.

Completed by: Deborah L. Smith

Title: Chemist/Project Data Evaluator

Date: August 17, 2007

CS Report Name: _____

Report Date: June 21, 2007

Consultant Firm: Kestrel Environmental Technologies, Inc.

Laboratory Name: Severn Trent Laboratories,
Sacramento and Seattle

Laboratory Report Number: G7E170413

ADEC File Number: _____ ADEC RecKey Number: _____

Version 2.1

(see following page for information on MS/MSD and positive results between MDL and PQL)

Data Package G7E170413

MS/MSD

GRO, VOA, re-extractions of DRO and RRO, Explosives/8330: no MS/MSD, LCS only
DRO, RRO, Pesticides, PCBs, SVOA, Perchlor, Elements: MS/MSD with parent sample from G7E170329, LCS only

Pesticides: MS/MSD from 5/18 extraction of 07MW11S01; all analytes failed for precision and/or accuracy. Initial MS/MSD not reported in G7E170329; re-extracted within holding time.

Herbicides: MS/MSD with parent sample from G7E170329, LCS/LCSD analyzed

Positive Results between PQL and MDL, qualified as estimated (J) for:

VOA: 07MW09S01, acetone

DRO: initial analysis of 07MW01S01, 07MW02S01, 07MW09S01

Pesticides: 07MW01S01 4,4'-DDT (also >40%D, dual column, not applicable to results < PQL)

Explosives/8330: 07MW09S01 HMX

Elements: B,P, Co for 07MW01S01; B, Al, Ni, Zn for 07MW02S01; B,P, Zn for 07MW09S01

Data Package G7E170329

Laboratory Data Review Checklist

1. Laboratory

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

Yes

Comments: See Ft. Wainwright QAPP. Labs approved for the project. Severn Trent Laboratories, Inc.(STL), Sacramento, CA

- c. 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

Comments: See Ft. Wainwright QAPP. Labs approved for the project. STL-Seattle used also.

2. Chain of Custody (COC)

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

Yes

Comments: COC for STL-Sac to STL-Seattle also present.

- b. Correct analyses requested?

Yes

Comments: Verified by field sampler.

3. Laboratory Sample Receipt Documentation

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

Yes

Comments: None

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

Yes

Comments: Preservations were appropriate for the requested analyses.

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

Yes

Comments: Trip blank had bubbles at sample receipt (<6mm), not noted in narrative as having been present at time of analysis. No bubbles in field samples.

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

Yes

Comments: No vials received for GRO samples; VOA vial used for GRO analyses. No missing data. No results are qualified.

- e. Data quality or usability affected?

Explain: Data did not require qualification.

4. Case Narrative

a. Present and understandable?

Yes

Comments: Laboratory lists only methods which require comment. Methods 8330 and 8321A were not included.

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

Yes

Comments: Discrepancies identified by the laboratory are against acceptance criteria in data package. Discrepancies that affect this project are discussed in the appropriate sections of this checklist.

c. Were all corrective actions documented?

Yes

Comments: The laboratory documents the corrective actions it has performed.

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

Lab sites matrix effects and method limitations. The data is qualified for this review according to QAPP criteria.

5. Sample Results

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

Yes

Comments: None

b. All applicable holding times met?

No

Comments: Holding times were met for the original analyses, but not for all re-extractions or re-analyses.

c. All soils reported on a dry weight basis?

Yes

Comments: Samples are aqueous.

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

Yes

Comments: No samples were diluted without explanation.

e. Data quality or usability affected?

Explain: Re-extracted DRO outside holding time; 07MW10S01, 07MW11S01 qualified as non-detected estimated and 07MW11S02 as estimated. RRO re-extracted outside holding time qualified as non-detected estimated. Lab states re-extraction for PCB was outside holding time; it was within 7 day holding time, narrative is incorrect. No PCBs qualified.

6. QC Samples

a. Method Blank

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

Yes Comments: None

- ii. All method blank results less than PQL?

Yes Comments: All results reported as non-detected.

- iii. If above PQL, what samples are affected?

No samples affected.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- v. Data quality or usability affected?

Explain: No effect.

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

- i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

No Comments: One LCS and MS/MSD per STL-Sacramento analysis. Parent sample for MS/MSD was reported in this data package. Herbicides analyzed at STL-Seattle had LCS/LCSD and MS/MSD. Parent sample for MS/MSD was reported in this data package. No data were qualified due to absence of LCSD.

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

No Comments: One LCS and MS/MSD per STL-Sacramento analysis. Parent sample for MS/MSD was reported in this data package. No data were qualified due to absence of LCSD.

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

No Comments: The initial extraction of DRO for 07MW10S01, 07MW11S01 and 07MW11S02 below acceptance criteria

- iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes Comments: None

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

Comments: The initial extraction of DRO for 07MW10S01, 07MW11S01 and 07MW11S02 are qualified as estimated (J).

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- vii. Data quality or usability affected?

Explain: Potential for low bias with initial analysis of DRO for 07MW10S01, 07MW11S01 and 07MW11S02. Re-extracted

outside holding time; 07MW10S01, 07MW11S01 qualified as non-detected estimated and 07MW11S02 as estimated.

c. Surrogates – Organics only

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

Yes Comments: None

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

No Comments: RRO above acceptance criteria for initial extraction of 07MW10S01, 07MW11S01. PCB below acceptance criteria for initial extraction of 07MW11S01.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- iv. Data quality or usability affected?

Explain: Associated sample results for RRO reported as non-detected and are not qualified. PCB results reported as non-detected and qualified as non-detected estimated. Potential for low bias and false negatives for PCBs; re-extracted within holding time with acceptable surrogate results (all U).

d. Trip Blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):
water and soil

- i. One trip blank reported per matrix, analysis and cooler?

Yes Comments: None.

- ii. All results less than PQL?

Yes Comments: Acetone was detected in 07TB04 at 1.1 ug/L (below PQL). No acetone was detected in the associated field samples. No TICs were detected for the trip blank; all TICs are qualified as "N" for this project. No GRO contamination was detected in the trip blank.

- iii. If above PQL, what samples are affected?

Acetone results for 07MW10S01 and 07MW11S02 qualified as non-detected estimated (UJ) at reported concentration (below PQL). Actual reporting level should be PQL, qualified U.

- iv. Data quality or usability affected?

Explain: No data were qualified.

e. Field Duplicate

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

Yes Comments: Field duplicates are determined on a project, not SDG basis.

- ii. Submitted blind to lab?
Yes Comments: None.
- iii. Precision - All relative percent differences (RPD) less than specified DQOs?
 (Recommended: 30% water, 50% soil) $RPD = \frac{|R_1 - R_2|}{((R_1 + R_2) / 2)} \times 100\%$, R = concentration
Yes Comments: Field duplicate samples 07MW11S01 and 07MW11S02 were reported in this data package.
- iv. Data quality or usability affected?
Explain: No.

f. Decontamination or Equipment Blank (if applicable)

Not Applicable

- i. All results less than PQL?
Comments: **Not Applicable**
- ii. If above PQL, what samples are affected?
- iii. Data quality or usability affected?
Explain: **Not Applicable**

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

Yes No Comments: Project specific. See final report.

Completed by: Deborah L. Smith

Title: Chemist/Project Data Evaluator

Date: August 17, 2007

CS Report Name: _____

Report Date: June 30, 2007

Consultant Firm: Kestrel Environmental Technologies, Inc.

Laboratory Name: Severn Trent Laboratories,
 Sacramento and Seattle

Laboratory Report Number: G7E170329

ADEC File Number: _____ ADEC RecKey Number: _____

Version 2.1

(see following page for information on MS/MSD and positive results between MDL and PQL)

Data Package G7E170329:

MS/MSD

G7E170329-002 (07MW11S01)

GRO: %Rs above acceptance criteria, sample result U, not qualified

SVOA: %R for benzoic acid, <10% and sample result U, qualify as rejected (QAPP)

Herbicides: %R for 2,4,5-T above acceptance criteria, sample result U, not qualified

Positive Results between PQL and MDL, qualified as estimated (J) for:

VOA: 07MW10S01, 07MW11S01, 07MW11S02 - dichlorodifluoromethane (Freon 12).

Acetone results for 07MW10S01, 07MW11S02 qualified as non-detected estimated (UJ) due to trip blank contamination. Acetone in trip blank 07TB04 qualified as J.

DRO: initial extraction 07MW10S01, 07MW11S01, 07MW11S02, re-extraction of 07MW11S02

Pesticides: 07MW11S01 4,4'-DDT (also >40%D, dual column, not applicable to results < PQL)

Elements: B, P, Ni, Zn for 07MW10S01; B, Ni, Zn for 07MW11S01 and 07MW11S02

Data Package G7E160200

Laboratory Data Review Checklist

1. Laboratory

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

Yes

Comments: See Ft. Wainwright QAPP. Labs approved for the project. Severn Trent Laboratories, Inc.(STL), Sacramento, CA

- d. 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

Comments: See Ft. Wainwright QAPP. Labs approved for the project. STL-Seattle used also.

2. Chain of Custody (COC)

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

Yes

Comments: COC for STL-Sac to STL-Seattle also present.

- b. Correct analyses requested?

No

Comments: Verified by field sampler, however perchlorate analysis for sample 07MW05S01 was not listed on the COC. Perchlorate analysis was performed for 07MW05S01. Time collected for sample 07MW07S01 was corrected on the COC to 12:30, as is consistent with the bottles.

3. Laboratory Sample Receipt Documentation

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

No

Comments: 8151A herbicide shipment to STL-Seattle at 0.5° C, Samples not documented as frozen; data not qualified. One cooler received with temperature blank at 8.5° C and samples at 5.8° C. The laboratory was to have used back-up bottles from other coolers, which were within acceptance criteria, for the affected analyses. This failed to happen; method 8330 and 8321A explosives were omitted for affected sample 07MW08S02. No other analyses were requested from the affected cooler.

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

Yes

Comments: Preservations were appropriate for the requested analyses.

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

Yes

Comments: Sample log-in documentation notes VOA vials as

having bubbles; however, specific samples affected are not listed. Laboratory protocol is to list in narrative if bubble > 8mm at receipt or if bubbles still present at analysis. No notation was included in the narrative.

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

Yes Comments: Discrepancies were noted.

- e. Data quality or usability affected?

Explain: None.

4. Case Narrative

- a. Present and understandable?

Yes Comments: Laboratory lists only methods which require comment.

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

Yes Comments: Discrepancies identified by the laboratory are against acceptance criteria in data package. Discrepancies that affect this project are discussed in the appropriate sections of this checklist.

- c. Were all corrective actions documented?

Yes Comments: The laboratory documents the corrective actions it has performed.

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

Lab sites matrix effects and method limitations. The data is qualified for this review according to QAPP criteria.

5. Sample Results

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

Yes Comments: None

- b. All applicable holding times met?

No Comments: Holding times were met for the original analyses, but not for all re-extractions or re-analyses.

- c. All soils reported on a dry weight basis?

Yes Comments: Samples are aqueous.

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

No

Comments: DRO and RRO re-extractions were outside holding time. Pesticide and PCB re-extractions were outside holding time. Re-extraction of sample 07MW08S01 for method 8330 was outside of holding time.

e. Data quality or usability affected?

Explain: DRO and RRO positive results for 07MW05S01, 07MW07S01, 07MW08S01 and 07MW08S02 for re-extractions are qualified as estimated; non-detected results qualified as non-detected estimated. Pesticide and PCB results for 07MW05S01, 07MW07S01, 07MW08S01 and 07MW08S02 for re-extractions are qualified as non-detected estimated. Results for re-extraction of method 8330 PCB 07MW08S01 qualified as non-detected estimated. Potential for low bias and false negatives.

6. QC Samples

a. Method Blank

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

Yes Comments: None

ii. All method blank results less than PQL?

Yes Comments: All results reported as non-detected.

iii. If above PQL, what samples are affected?

No samples affected.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

v. Data quality or usability affected?

Explain: No effect.

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

No Comments: One LCS per STL-Sacramento analysis, except VOA. VOA had LCS/LCSD. No MS/MSD for GRO, VOA, 8321A, 8330. Parent sample for MS/MSD for DRO, GRO, pesticides, PCBs, SVOA was not reported in this data package. Herbicides analyzed at STL-Seattle had LCS/LCSD, no MS/MSD. No data were qualified due to absence of LCSD.

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

No Comments: One LCS per STL-Sacramento analysis. For elements, parent sample for MS/MSD was reported in this data package. For perchlorate, parent sample for MS/MSD was not reported in this data package. No data were qualified due to absence of LCSD.

iii. Accuracy - All percent recoveries (%R) reported and within method or laboratory limits? And project specified DQOs? (AK Petroleum methods:

AK101 60%-120%, AK102 75%-125 %; AK103 60%-120%; all other analyses see the laboratory QC pages.)

No Comments: LCS for original extractions of DRO below acceptance criteria. LCS for original extractions of pesticides endrin aldehyde and endrin ketone below acceptance criteria.

- iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes Comments: None

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

Comments: DRO results for original extraction of 07MW05S01, 07MW07S01, 07MW08S01 and 07MW08S02 are qualified as estimated. Endrin aldehyde and endrin ketone results for original extraction of 07MW05S01, 07MW07S01, 07MW08S01 and 07MW08S02 are qualified as non-detected estimated.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- vii. Data quality or usability affected?

Explain: Potential for high bias for DRO results for original extraction of 07MW05S01, 07MW07S01, 07MW08S01 and 07MW08S02.

c. Surrogates – Organics only

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

Yes Comments: None

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

No Comments: RRO above acceptance criteria for re-extraction of 07MW05S01 and 07MW07S01. PCB below acceptance criteria for initial extraction of 07MW05S01 and 07MW07S01. Initial extraction of 07MW08S01 <10% with results reported as U.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- iv. Data quality or usability affected?

Explain: RRO re-extraction qualified as estimated (J) for 07MW05S01 due to potential for high bias. RRO re-extraction for 07MW07S01 was reported as U and is not qualified. Results for initial extraction of PCB for 07MW05S01 and 07MW07S01 are qualified as non-detected estimated. Results for the initial 8330 extraction of 07MW08S01 are qualified as rejected (R). There is the potential for low bias and false negatives.

<p>d. Trip Blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>water and soil</u></p> <p>i. One trip blank reported per matrix, analysis and cooler? Yes <u>Comments:</u> None.</p> <p>ii. All results less than PQL? Yes <u>Comments:</u> No contamination was detected in the VOA trip blank. No TICs were detected for the trip blank; all TICs are qualified as "N" for this project. No GRO contamination was detected in the trip blank.</p> <p>iii. If above PQL, what samples are affected? None</p> <p>iv. Data quality or usability affected? <u>Explain:</u> No data were qualified.</p>		
<p>e. Field Duplicate</p> <p>i. One field duplicate submitted per matrix, analysis and 10 project samples? Yes <u>Comments:</u> Field duplicates are determined on a project, not SDG basis.</p> <p>ii. Submitted blind to lab? Yes <u>Comments:</u> None.</p> <p>iii. Precision - All relative percent differences (RPD) less than specified DQOs? (Recommended: 30% water, 50% soil) $RPD = \frac{ R_1 - R_2 }{((R_1 + R_2) / 2)} \times 100\%$, R =concentration Yes <u>Comments:</u> No field duplicate samples were reported in this data package.</p> <p>iv. Data quality or usability affected? <u>Explain:</u> No.</p>		
<p>f. Decontamination or Equipment Blank (if applicable) Not Applicable</p> <p>i. All results less than PQL? <u>Comments:</u> Not Applicable</p> <p>ii. If above PQL, what samples are affected?</p> <p>iii. Data quality or usability affected? <u>Explain:</u> Not Applicable</p>		
<p>7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab specific, etc.) Yes No <u>Comments:</u> Project specific. See final report.</p>		

Completed by: Deborah L. Smith

Title: Chemist/Project Data Evaluator

Date: August 17, 2007

CS Report Name: _____

Report Date: June 28, 2007

Consultant Firm: Kestrel Environmental Technologies, Inc.

Laboratory Name: Severn Trent Laboratories,
Sacramento and Seattle

Laboratory Report Number: G7E160200

ADEC File Number: _____ ADEC RecKey Number: _____

Version 2.1

(see following page for information on MS/MSD and positive results between MDL and PQL)

Data Package G7E120234:

MS/MSD

No MS/MSD, except elements, had parent sample for MS/MSD reported in this data package.

Positive Results between PQL and MDL, qualified as estimated (J) for:

VOA: Acetone, dichlorodifluoromethane (Freon 12), for 07MW08S01; dichlorodifluoromethane (Freon 12), for 07MW08S02

RRO for original extraction of 07MW05S01, re-extraction of 07MW05S01, original extraction of 07MW08S02,

DRO for original extraction of 07MW07S01

Pesticide 4,4'-DDT for original extraction of 07MW07S01. Also qualified by lab as PG, dual column results >40%D. The %D criteria are not applicable for results below the PQL.

Explosives HMX for 07MW07S01.

Elements: B, P, Ni for 07MW05S01; Ni for 07MW07S01; B, Cu, Zn for 07MW08S01; B, Cu, Zn for 07MW08S02

Data Package G7E120234

Laboratory Data Review Checklist

1. Laboratory

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

Yes

Comments: See Ft. Wainwright QAPP. Labs approved for the project. Severn Trent Laboratories, Inc.(STL), Sacramento, CA

- e. 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

Comments: See Ft. Wainwright QAPP. Labs approved for the project. STL-Seattle used also.

2. Chain of Custody (COC)

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

Yes

Comments: COC for STL-Sac to STL-Seattle also present.

- b. Correct analyses requested?

Yes

Comments: Verified by field sampler.

3. Laboratory Sample Receipt Documentation

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

No

Comments: 8151A herbicide shipment to STL-Seattle at 0.5°C , Samples not documented as frozen; data not qualified.

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

Yes

Comments: Preservations were appropriate for the requested analyses.

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

Yes

Comments: No discrepancies noted.

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

Yes

Comments: The narrative notes that the internal standard perylene d-12 for SVOA for 07MW04S01 was below acceptance criteria on initial injection, but upon re-injection was within acceptance criteria. Internal standards not reviewed as part of this assessment; however data would not be qualified due to this deviation. Two or more internal standards from one fraction (acid or base/neutral)

must be outside acceptance criteria for qualification of SVOA data unless there is a gross exceedence. The recovery for perylene d-12 on 5/18 was 53%; acceptance criteria is <50%.

- e. Data quality or usability affected?
Explain: None.

4. Case Narrative

- a. Present and understandable?
Yes Comments: Laboratory lists only methods which require comment.
- b. Discrepancies, errors or QC failures identified by the lab?
Yes Comments: Discrepancies identified by the laboratory are against acceptance criteria in data package. Discrepancies that affect this project are discussed in the appropriate sections of this checklist.
- c. Were all corrective actions documented?
Yes Comments: The laboratory documents the corrective actions it has performed.
- d. What is the effect on data quality/usability according to the case narrative?
Lab sites matrix effects and method limitations. The data is qualified for this review according to QAPP criteria.

5. Sample Results

- a. Correct analyses performed/reported as requested on COC?
Yes Comments: None
- b. All applicable holding times met?
No Comments: Lab error; SVOA extracted outside holding time for samples 07MW06AS01, 07MW06BS01, 07MW12S01, at 20 days. Holding time = 7.
- c. All soils reported on a dry weight basis?
Yes Comments: Samples are aqueous.
- d. Are the reported PQLs less than the Cleanup Level or the minimum required detection level for the project?
No Comments: RRO were diluted by factor of 5 and reported as U. High concentration of DRO in samples. Pesticides are diluted ~20 fold, 07MW06AS01 delta-BHC, 07MW06BS01 and 07MW12S01 between MDL and PQL, all other pesticides U.

e. Data quality or usability affected?

Explain: DRO contamination between 4000 and 5800 ug/L, no effect. Pesticides had elevated detection limits. SVOA, potential for low bias and false negatives.

6. QC Samples

a. Method Blank

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

Yes Comments: None

ii. All method blank results less than PQL?

Yes Comments: All results reported as non-detected.

iii. If above PQL, what samples are affected?

No samples affected.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

v. Data quality or usability affected?

Explain: No effect.

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

i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

No Comments: One LCS per STL-Sacramento analysis except VOA trip blank. LCS/LCSD for VOA for trip blank only. No MS/MSD. Herbicides analyzed at STL-Seattle had LCS/LCSD, no MS/MSD. No data were qualified due to absence of LCSD.

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

No Comments: One LCS per STL-Sacramento analysis. For elements, parent sample for MS/MSD not reported in this data package. For perchlorate, parent sample for MS/MSD is reported in this data package. No data were qualified due to absence of LCSD.

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

No Comments: SVOA benzoic acid below 10%, with sample results reported as non-detected.

iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes Comments: None

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

Comments: Benzoic acid results rejected (R) for 07MW03S01 and 07MW04S01.

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

<p>Yes</p> <p>vii. Data quality or usability affected?</p>	<p><u>Comments:</u> Separate flags are being assessed by the data evaluator and are in the final report.</p> <p><u>Explain:</u> Benzoic acid results rejected (R) for 07MW03S01 and 07MW04S01.</p>
<p>c. Surrogates – Organics only</p> <p>i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?</p> <p>Yes</p> <p>ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? Or project specified DQOs? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)</p> <p>Yes</p> <p>iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?</p> <p>Yes</p> <p>iv. Data quality or usability affected?</p>	<p><u>Comments:</u> None</p> <p><u>Comments:</u> None</p> <p><u>Comments:</u> Separate flags are being assessed by the data evaluator and are in the final report.</p> <p><u>Explain:</u> No data were qualified.</p>
<p>d. Trip Blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>water and soil</u></p> <p>i. One trip blank reported per matrix, analysis and cooler?</p> <p>Yes</p> <p>ii. All results less than PQL?</p> <p>Yes</p> <p>iii. If above PQL, what samples are affected?</p> <p>iv. Data quality or usability affected?</p>	<p><u>Comments:</u> None.</p> <p><u>Comments:</u> No contamination was detected in the VOA trip blank. No TICs were detected for the trip blank; all TICs are qualified as "N" for this project. No GRO contamination was detected in the trip blank.</p> <p>None</p> <p><u>Explain:</u> No data were qualified.</p>
<p>e. Field Duplicate</p> <p>i. One field duplicate submitted per matrix, analysis and 10 project samples?</p> <p>Yes</p> <p>ii. Submitted blind to lab?</p> <p>Yes</p> <p>iii. Precision - All relative percent differences (RPD) less than specified DQOs?</p>	<p><u>Comments:</u> Field duplicates are determined on a project, not SDG basis.</p> <p><u>Comments:</u> None.</p> <p>(Recommended: 30% water, 50% soil) $RPD = \frac{ R_1 - R_2 }{((R_1 + R_2) / 2)} \times 100\%$, R = concentration</p>

Yes	<u>Comments:</u> No field duplicate samples were reported in this data package.
iv. Data quality or usability affected?	<u>Explain:</u> No.
f. Decontamination or Equipment Blank (if applicable)	
Not Applicable	
i. All results less than PQL?	<u>Comments:</u> Not Applicable
ii. If above PQL, what samples are affected?	
iii. Data quality or usability affected?	<u>Explain:</u> Not Applicable
7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab specific, etc.)	
Yes	No
<u>Comments:</u> Project specific. See final report.	

Completed by: Deborah L. Smith

Title: Chemist/Project Data Evaluator

Date: August 24, 2007

CS Report Name: _____

Report Date: June 21, 2007

Consultant Firm: Kestrel Environmental Technologies, Inc.

Laboratory Name: Severn Trent Laboratories,
Sacramento and Seattle

Laboratory Report Number: G7E120234

ADEC File Number: _____ ADEC RecKey Number: _____

Version 2.1

(see following page for information on MS/MSD and positive results between MDL and PQL)

Data Package G7E120234:

MS/MSD

No MS/MSD reported except perchlorate. Parent sample for MS/MSD, 07MW04S01, is reported in this data package. No qualifications required.

Positive Results between PQL and MDL, qualified as estimated (J) for:

Elements: B, Co, Ni, Zn for 07MW03S01; B, As, Zn for 07MW04S01

Data Package G7E190213

Laboratory Data Review Checklist

1. Laboratory

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

Yes

Comments: See Ft. Wainwright QAPP. Labs approved for the project. Severn Trent Laboratories, Inc.(STL), Sacramento, CA

- f. 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

Comments: See Ft. Wainwright QAPP. Labs approved for the project. STL-Seattle used also.

2. Chain of Custody (COC)

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

Yes

Comments: COC for STL-Sac to STL-Seattle also present.

- b. Correct analyses requested?

Yes

Comments: Verified by field sampler.

3. Laboratory Sample Receipt Documentation

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

Yes

Comments: None

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

Yes

Comments: Preservations were appropriate for the requested analyses.

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

Yes

Comments: None reported.

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

No

Comments: method 8330 not reported for 07MW06AS01; not addressed in narrative.

- e. Data quality or usability affected?

Explain: Missing data, method 8330 07MW06AS01, requested from lab on 8/16/07. Received 8/17/07.

4. Case Narrative

a. Present and understandable?

Yes

Comments: Laboratory lists only methods which require comment.

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

No

Comments: Discrepancies identified by the laboratory are against acceptance criteria in data package. Discrepancies that affect this project are discussed in the appropriate sections of this checklist. Lab failed to note reason for 20 fold dilution of pesticides.

c. Were all corrective actions documented?

Yes

Comments: The laboratory documents the corrective actions it has performed.

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

Lab sites matrix effects and method limitations. The data is qualified for this review according to QAPP criteria.

5. Sample Results

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

Yes

Comments: None

b. All applicable holding times met?

No

Comments: Lab error; SVOA extracted outside holding time for samples 07MW06AS01, 07MW06BS01, 07MW12S01, at 20 days. Holding time = 7 days.

c. All soils reported on a dry weight basis?

Yes

Comments: Samples are aqueous.

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

No

Comments: RRO were diluted by factor of 5 and reported as U. High concentration of DRO in samples. Pesticides are diluted ~20 fold, 07MW06AS01 delta-BHC, 07MW06BS01 and 07MW12S01 between MDL and PQL, all other pesticides U.

e. Data quality or usability affected?

Explain: DRO contamination between 4000 and 5800 ug/L, no effect. Pesticides had elevated detection limits. SVOA, potential for low bias and false negatives.

6. QC Samples

a. Method Blank

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

Yes Comments: None

- ii. All method blank results less than PQL?

Yes Comments: All results reported as non-detected.

- iii. If above PQL, what samples are affected?

No samples affected.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

- v. Data quality or usability affected?

Explain: No effect.

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

- i. Organics - One LCS/LCSD reported per matrix, analysis and 20 samples?

No Comments: One LCS per STL-Sacramento analysis except VOA and GRO. No MS/MSD. Lab analyzed LCS/LCSD for VOA and GRO. Herbicides analyzed at STL-Seattle had LCS/LCSD, no MS/MSD. No data were qualified due to absence of LCSD.

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

No Comments: One LCS per STL-Sacramento analysis. Parent sample for MS/MSD for perchlorate and elements not reported in this data package. No data were qualified due to absence of LCSD.

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

No Comments: VOA 1,2,3-trichlorobenzene above acceptance criteria for LCSD. SVOA pentachlorophenol below acceptance criteria and benzoic acid below 10%, with sample results reported as non-detected.

- iv. Precision - All relative percent differences (RPD) reported and less than method or laboratory limits? And project specified DQOs? (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes Comments: None

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

Comments: Associated VOA results for 1,2,3-trichlorobenzene (07TB05) reported as U, no effect. Benzoic acid results rejected (R) for 07MW06AS01, 07MW06BS01, 07MW12S01. Pentachlorophenol for 07MW06AS01, 07MW06BS01, 07MW12S01 qualified as non-detected estimated.

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

Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.
vii. Data quality or usability affected?
Explain: No data qualified.

c. Surrogates – Organics only

i. Are surrogate recoveries reported for organic analyses – field, QC and laboratory samples?
Yes Comments: None

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits? Or project specified DQOs? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)
No Comments: DRO above acceptance criteria for 07MW06AS01, 07MW06BS01, 07MW12S01. Potential for high bias; significant concentrations of DRO detected. Pesticide surrogates diluted out (20 fold). High bias for 8330, 07MW06AS01, 07MW06BS01, 07MW12S01 (762%, 723%, 435%).

iii. Do the sample results with failed surrogate recoveries have data flags? If so, are the data flags clearly defined?
Yes Comments: Separate flags are being assessed by the data evaluator and are in the final report.

iv. Data quality or usability affected?
Explain: DRO potential for high bias. Positive results for reported explosives qualified as estimated, potential for high bias. Gross problems exist, professional judgment is to qualify all 8330 results as non-detected estimated or estimated. It appears lab may be reporting positive results if confirmation cannot be obtained due to interference.

d. Trip Blank – Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.):
water and soil

i. One trip blank reported per matrix, analysis and cooler?
Yes Comments: None.

ii. All results less than PQL?
Yes Comments: No contamination was detected in the VOA trip blank. No TICs were detected for the trip blank; all TICs are qualified as "N" for this project. No GRO contamination was detected in the trip blank.

iii. If above PQL, what samples are affected?
None

iv. Data quality or usability affected?
Explain: No data were qualified.

e. Field Duplicate

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

Yes

Comments: Field duplicates are determined on a project, not SDG basis.

ii. Submitted blind to lab?

Yes

Comments: None.

iii. Precision - All relative percent differences (RPD) less than specified DQOs?

(Recommended: 30% water, 50% soil) $RPD = \frac{|R_1 - R_2|}{((R_1 + R_2) / 2)} \times 100\%$, R = concentration

Yes

Comments: No field duplicate samples were reported in this data package.

iv. Data quality or usability affected?

Explain: No.

f. Decontamination or Equipment Blank (if applicable)

Not Applicable

i. All results less than PQL?

Comments: **Not Applicable**

ii. If above PQL, what samples are affected?

iii. Data quality or usability affected?

Explain: **Not Applicable**

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

Yes

No

Comments: Project specific. See final report.

Completed by: Deborah L. Smith

Title: Chemist/Project Data Evaluator

Date: August 17, 2007

CS Report Name: _____

Report Date: June 28, 2007

Consultant Firm: Kestrel Environmental Technologies, Inc.

Laboratory Name: Severn Trent Laboratories,

Laboratory Report Number: G7E190213

Sacramento and Seattle

ADEC File Number: _____ ADEC RecKey Number: _____

Version 2.1

(see following page for information on MS/MSD and positive results between MDL and PQL)

Data Package G7E190213:

MS/MSD

No MS/MSD reported except perchlorate. Parent sample for MS/MSD not reported in G7E190213.

Positive Results between PQL and MDL, qualified as estimated (J) for:

GRO: 07MW06BS01

VOA: 07MW06AS01, acetone, sec-butylbenzene, tert-butylbenzene, cis-1,2-dichloroethene, isopropylbenzene, p-isopropyltoluene; 07MW06BS01, acetone, sec-butylbenzene, cis-1,2-dichloroethene, p-isopropyltoluene; 07MW12S01, acetone, tert-butylbenzene, 1,1-dichloroethene, p-isopropyltoluene, 1,3,5-trimethylbenzene.

Pesticides: 07MW06AS01 delta-BHC, 07MW06BS01 and 07MW12S01 heptachlor (also >40%D, dual column, not applicable to results < PQL). Note - samples are diluted ~20 fold, all other results reported as U.

Elements: B, V for 07MW06AS01; B, Zn for 07MW06BS01; P, Co for 07MW06AS01

Explosives:

	PQL	MDL	07MW06AS01	07MW06BS01	07MW12S01
Method 8321A	ug/L	ug/L	ug/L	ug/L	ug/L
1,3,5-trinitrobenzene	0.21	0.017	0.094 J	0.060 J	0.090 J
HMX	0.21	0.021	1.1	0.71	1.0
2,4,6-trinitrobenzene	0.21	0.011	0.052 J		0.063 J
4-amino-2,6-dinitrotoluene	0.21	0.016	0.018 J		
Method 8330					
2,4-dinitrotoluene	0.15	0.048		1.0 PG	
nitrobenzene	0.15	0.048	7.9	6.1	5.1
2-nitrotoluene	0.50	0.087			0.15 J
1,3,5-trinitrobenzene	0.099	0.029		10	4.0
RDX	0.25	0.036	3.2 PG		
surrogate				723%	435%

PG = 40%D, dual column, not applicable to results < PQL

APPENDIX G
Analytical Results of Development and Purge Water

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Field Sample ID	Analyte	Result (ng/L)
07TGGWWA	OCDD	0.00966
	1, 2, 3, 7, 8-PeCDF	0.00228
	2, 3, 4, 7, 8-PeCDF	0.00290
	1, 2, 3, 4, 7, 8-HxCDF	0.00981
	1, 2, 3, 4, 6, 7, 8-HpCDF	0.0207
	OCDF	0.0588

ng/L = nanogram per Litre

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