ConocoPhillips Alaska

OCTOBER 2018

2018

ALPINE SATELLITE DEVELOPMENT PLAN (ASDP) WATER QUALITY MONITORING

PREPARED BY:

Michael Baker INTERNATIONAL

MICHAEL BAKER INTERNATIONAL
3900 C STREET, SUITE 900
ANCHORAGE, AK 99503

TABLE OF CONTENTS

FIGURES

TABLES

PHOTOS

ACRONYMS & ABBREVIATIONS

°C	Degrees Celsius
ADEC	Alaska Department of Environmental Conservation
Arctic Fox	Arctic Fox Environmental, Inc.
ASDP	Alpine Satellite Development Plan
CPAI	ConocoPhillips Alaska, Inc.
DO	Dissolved oxygen
DRO	Diesel range organics
FID	Flame ionization detector
GC	Gas chromatography
ICP	Inductively coupled plasma
MS	Mass spectrometry
µS/cm	Microsiemens per centimeter
mS/cm	MilliSiemens per centimeter
mg/L	Milligrams per liter
Michael Baker	Michael Baker International
NTU	Nephelometric Turbidity Units
pH	Potential of hydrogen
ppt	Parts per thousand
PSS	Practical Salinity Scale
RCRA	Resource Conservation and Recovery Act
RRO	Residual range organics
SG	Silica gel
SU	Standard units

1. INTRODUCTION

The 2018 Alpine Satellite Development Plan (ASDP) Water Quality Monitoring Report presents the results of lake monitoring conducted in August 2018 for ConocoPhillips Alaska, Inc. (CPAI). Annual monitoring of three lakes, lakes L9323, L9324, and M9313, is required by North Slope Borough Ordinance Serial No. 75-6-46, Stipulation IV.2.4.3(h) (NSB 2004). Lakes L9323, L9324, and M9313 have been monitored annually since 2007. An overview of the three study lakes relative to Alpine facilities is presented in Figure 1.

During the winter of 1998/1999, CPAI initiated construction of the Alpine Facility, CD1 and CD2, in the Colville River Delta. Alpine operations expanded with the implementation of the ASDP during the 2004/2005 winter season. Construction included placement of gravel facilities for two satellite drill sites, CD3 and CD4. The CD3 development included an airstrip and pad/airstrip access road, apron, and taxiway adjacent to the south side of Lake M9313. The CD4 development included a gravel pad, access road connected to the CD2 access road, and pipeline parallel to the access road connecting to the existing Alpine Pipeline. The CD4 pad is located between Lake L9323 to the north and Lake L9324 to the south. Alpine operations expanded again with the construction of CD5, which included a gravel pad, access road connected to the CD4 access road, and pipeline parallel to the access road connecting to the existing Alpine Pipeline.

Michael Baker International (Michael Baker) field team members conducted in-situ field sampling of the three lakes for temperature, conductivity/specific conductance, dissolved oxygen (DO), salinity, turbidity, and pH. Water samples were collected at each lake for laboratory analyses of dissolved hydrocarbons: diesel range organics (DRO), residual range organics (RRO), and Resource Conservation and Recovery Act (RCRA) metals.

ConocoPhillips Alaska

Miles
0 0.5 1 2

Date: 10/03/2018	Project: 167433
Drawn: BTG	File: Figure 1
Checked: SME	Scale: 1 in = 2 miles

Legend

Sample Lake
Facility
Pipeline
Road

Michael Baker INTERNATIONAL
Michael Baker International
3900 C Street, Suite 900
Anchorage, AK 99503
Phone: (907) 273-1600
Fax: (907) 273-1699

2018 ASDP
Water Quality
Overview Map

FIGURE: 1

(SHEET 1 of 1)

2. METHODS

Field investigations were conducted at lakes L9323, L9324, and M9313 on August 30, 2018. Soloy Helicopters, LLC provided helicopter access to Lake M9313. An Alpine Environmental pickup truck was used to access lakes L9323 and L9324.

In-situ water quality data measurements and laboratory sample collections were performed at all three lakes by a two-person team on August 30, 2018. The team used inflatable kayaks with an attached support raft for transporting the sampling equipment (Photo 1 and Photo 2). In-situ water quality instruments were provided by TTT Environmental. Laboratory analyses and sample collection bottles were provided by Arctic Fox Environmental, Inc. (Arctic Fox). Prior to sampling, aerial reconnaissance was conducted to identify possible inflow and outflow sources, and to determine if lakes were hydraulically connected to other nearby surface water sources. It was also confirmed that each lake was well-mixed and lacked definable stratums prior to analytic sample collection. Field sampling methods were based on U.S. Geological Survey (USGS 2006), Ward and Harr (1990), and U.S. Army Corps of Engineers (USACE 1987) methods.

Safety precautions were followed, as outlined in the North Slope Water Resources 2018 Health, Safety, and Environmental Plan (Michael Baker 2018a) and the 2018 Summer Hydrology Monitoring – Job Safety Analysis (Michael Baker 2018b). Michael Baker employees worked in groups of two. Employees checked in with Alpine security before and after field work. Personnel were equipped with dry suits and U.S. Coast Guard-approved Type III personal floatation devices during lake access.

Photo 1: Equipment used to collect water quality data and samples; August 30, 2018

Photo 2: Preparing for sampling at Lake L9324; August 30, 2018

2.1 IN-SITU WATER QUALITY

SAMPLING LOCATIONS

Previous in-situ water quality monitoring of North Slope lakes indicate hydraulically isolated lakes are well-mixed during open water conditions. The likelihood of homogeneous conditions, which are verified at each lake with in-situ measurements, supports the use of single point sampling. For this project, it is assumed data collected at specific locations are representative of conditions throughout the well-mixed water body and thus, water samples collected at a single location are representative of the lake.

Selection of the appropriate location for samples was based on maximum lake depth and relative proximity to gravel facilities. The bathymetry of each lake was used to identify the deepest part of the water body, and a single representative sampling location was selected. The locations of the deepest part of lakes L9323, L9324, and M9313 were confirmed in 2010 using a hand-held sonar depth finder (Michael Baker 2010).

Sampling locations were identified in the field using a handheld global positioning system Garmin Oregon 650t referenced to the World Geodetic System of 1984 coordinate system. The sampling locations for lakes L9323 and L9324 are shown in Figure 2. Figure 3 shows the sampling location for Lake M9313.

ConocoPhillips Alaska

Feet
0 1,000 2,000

Date: 10/03/2018	Project: 167433
Drawn: BTG	File: Figure 2
Checked: SME	Scale: 1 in = 2000 feet

Legend

Water Quality Sampling Point
Pipeline
Road
Sample Lake
Facility

Michael Baker INTERNATIONAL
Michael Baker International
3900 C Street, Suite 900
Anchorage, AK 99503
Phone: (907) 273-1600
Fax: (907) 273-1699

Lakes L9323 & L9324
ASDP Water Quality
Sampling Locations

FIGURE: 2

(SHEET 1 of 1)

ConocoPhillips Alaska

Feet
0 500 1,000

Date: 10/03/2018	Project: 167433
Drawn: BTG	File: Figure 2
Checked: SME	Scale: 1 in = 1000 feet

Legend

- Water Quality Sampling Point
- Sample Lake
- Pipeline
- Facility

Michael Baker INTERNATIONAL
Michael Baker International
3900 C Street, Suite 900
Anchorage, AK 99503
Phone: (907) 273-1600
Fax: (907) 273-1699

Lake M9313
ASDP Water Quality Sampling Location

FIGURE: 2

(SHEET 1 of 1)

IN-SITU MEASUREMENTS

In-situ water quality was measured at 1- and 2-foot intervals throughout the water column. A list of water quality parameters collected is presented in Table 1.

Table 1: In-Situ Water Quality Parameters

Parameter	Units	
Total Depth	ft	feet
Temperature	°C	degrees Celsius
Turbidity	NTU	Nephelometric Turbidity Units
Conductivity	µS/cm	microsiemens per centimeter
Specific Conductance	µS/cm	microsiemens per centimeter
Dissolved Oxygen	mg/L	milligrams per liter
	% saturation	percent saturation
Salinity	ppt	parts per thousand
pH	SU	standard units

Turbidity refers to the cloudiness of a fluid caused by suspended solids that tend to be invisible to the naked eye. As particles in a fluid will scatter light focused on them, turbidity can be measured by the quantity of reflected light for a given amount of particulates. A Nephelometer is equipped with a detector next to the light beam and is used to measure turbidity. When using a calibrated Nephelometer, the units of turbidity are Nephelometric Turbidity Units (NTU).

Conductivity is a measurement of the water's ability to carry an electrical current. Dissolved salts (ions) are conductors of electrical current, and conductivity is proportional to the ion concentration (salinity) in an aqueous solution. The salinity is calculated using the in-situ conductivity and temperature, and the conversions defined by the Practical Salinity Scale (PSS) of 1978 (YSI 2012). The PSS is derived for standard seawater with a known ion composition; therefore, using the PSS for freshwater with unknown ion composition provides an estimate of the salinity.

Specific conductance is a metric commonly used to report the concentration of salts in freshwater. Conductivity measurements are temperature dependent. Specific conductance is calculated from in-situ conductivity and temperature using a site-specific temperature correction coefficient. The correction coefficient is determined for a site by relating the conductivity of a sample at the in-situ temperature and the conductivity of the same sample at 25 degrees Celsius (°C). Michael Baker completed this analysis for the Colville River in 2005 resulting in a correction coefficient of 0.0196 (Michael Baker 2006). The recharge of lakes from the Colville River flood waters during spring break-up justifies using the same correction coefficient for the lake measurements.

A. INSTRUMENT CALIBRATION

A YSI 650 MDS handheld unit with YSI 6920 V2 Sonde sensor was calibrated by TTT Environmental according to the manufacturer's specifications. The morning of sampling, the YSI 6920 V2 meter was calibrated for conductivity and pH and checked for DO by Michael Baker field team members as directed by the manufacturer. An optical DO sensor was used for the DO sampling. Prior to each field sampling event, the meter was thoroughly rinsed with lake water.

B. INSTRUMENT ACCURACY

The accuracies of the YSI 6920 V2 Sonde sensors are presented in Table 2 (YSI 2012).

Table 2: Instrument Accuracy

Parameter	Accuracy
Temperature	+/- 0.15°C
Turbidity	+/- 2% of the reading or 0.3 NTU (whichever is greater)
Conductivity	+/- 0.5% of reading + 0.001 mS/cm
Dissolved Oxygen	+/-1% of the reading or 0.1 mg/L (whichever is greater)
	+/-1% of the reading or 1% air saturation (whichever is greater)
Salinity	+/- 1.0% of reading or 0.1 ppt (whichever is greater)
pH	+/- 0.2 units

2.2 LABORATORY SAMPLE COLLECTION & ANALYSES

SAMPLE COLLECTION

Frequent wind and shallow depths typically prevent oxyclines (notable change in oxygen concentration with depth), haloclines (notable change in salinity with depth), and thermoclines (notable change in temperature with depth) from developing at any of lakes during the summer. The in-situ water quality measurements confirmed water quality constituents were relatively well-mixed within the water column at each lake; therefore, a representative single point laboratory sample at mid-depth was collected at each lake. For laboratory analysis quality control, a duplicate single point sample was collected at mid-depth from Lake L9324. In the event of significant lake stratification, multiple samples would have been collected throughout the water column and combined for laboratory analysis.

Samples were collected from lakes using a 1.6" x 12" disposable polyethylene bailer (350 milliliter capacity). Nitrile gloves were worn during sample collection and changed between samples. A new bailer was used for each lake and discarded after use.

Sample bottles provided by Arctic Fox were stored in the provided cooler before, during, and after sample collection to maintain adequate storage temperature and ensure chain of custody procedures were followed. Field samples were transported to Artic Fox within 24 hours of initial sample collection.

LABORATORY ANALYSES

The laboratory analyses performed for each water sample included RCRA metals, DRO, and RRO. The laboratory analyses were performed on water samples collected from lakes L9323, L9324, and M9313 on August 30, 2018.

A. SW6020 (RCRA METALS)

The RCRA metals laboratory analysis method SW6020, developed by the U.S. Environmental Protection Agency Office of Solid Waste, employs inductively coupled plasma– mass spectrometry (ICP-MS) to determine trace elements, including metals in solution (EPA 2006). Elements tested for include: arsenic, barium, cadmium, chromium, lead, selenium, and silver. This method measures ions produced by a radio frequency ICP. High temperatures are used to produce ions, which are then entrained in a plasma gas and extracted. The ions are separated on the basis of their mass-to-charge ratio with a mass spectrometer.

B. AK 102 (Diesel Range Organics)

The AK 102 method for DRO, developed by the Alaska Department of Environmental Conservation (ADEC), is based on a solvent extraction, gas chromatography (GC) procedure for the detection of semi-volatile petroleum products such as diesels. Other non-petroleum compounds of similar characteristics may be detected with this method. Samples spiked with a surrogate (o-Terphenyl) are extracted with methylene chloride. The GC is temperature programmed to facilitate separation of organic compounds detected by a flame ionization detector (FID). Quantification is based on FID response compared to a diesel calibration standard.

C. AK 103 (Residual Range Organics)

The AK 103 method for RRO, developed by ADEC, was originally designed to measure lubricating or motor oils and other heavy petroleum products in soils. The *Underground Storage Tanks Procedures* (ADEC 2009) identifies the method as adequate for determining such compounds in solution. The method is an extension of ADEC AK 102, employing solvent extractions and GC to identify heavier RRO. Quantification is based on FID response compared to a residuals calibration standard.

D. Silica Gel Cleanup for DRO & RRO

Laboratory samples containing organic plant material are especially susceptible to background biogenic interference and may result in false positive results for DRO or RRO defined petroleum hydrocarbon ranges (ADEC 2006). The silica gel (SG) procedure is recommended by the ADEC in *Technical Memorandum 06-001, Biogenic Interference and Silica Gel Cleanup* (ADEC 2006) to evaluate the presence and degree of biogenic interference. This procedure is used to preferentially remove biogenic compounds from a sample leaving the non-biodegraded petroleum hydrocarbon compounds. The remaining sample, presumably free of biogenic interference, is then tested for DRO and RRO according to AK 102 and AK 103, respectively.

3. RESULTS

3.1 IN-SITU WATER QUALITY – AUGUST 30, 2018

SAMPLING LOCATIONS

A. LAKE L9323

Located east of the Nigliq Channel, Lake L9323 is moderately sized with grassy banks and some taller vegetation on the periphery. Lake L9323 was hydraulically isolated at the time of sampling. No odor or film was observed while sampling the lake.

Photo 3: Lake L9323, looking south toward Nigliq Channel and CD4 pad; August 30, 2018

Photo 4: Lake L9323, looking north towards the CD5 road; August 30, 2018

Photo 5: Lake L9323, looking east; August 30, 2018

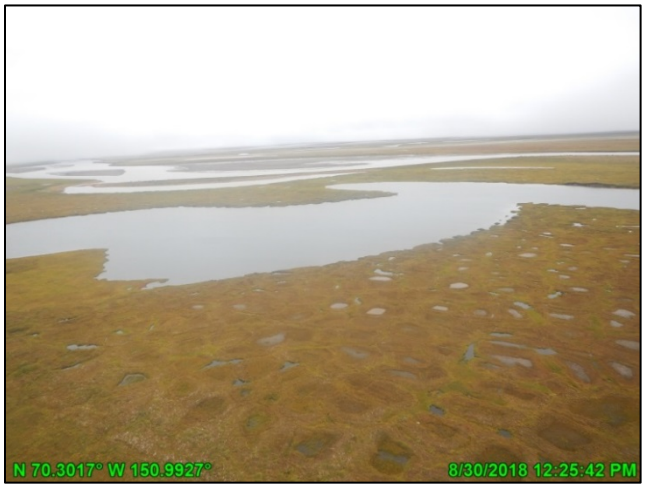


Photo 6: Lake L9323, looking west toward Nigliq Channel; August 30, 2018

B. LAKE L9324

Located east of the Nigliq Channel, Lake L9324 is moderately sized with grassy banks and willows. Some bluffs surround the lake. At the time of sampling, Lake L9324 was hydraulically connected to the South Paleo Lake and Sakoonang Channel. No odor or film was observed while sampling the lake.

Photo 7: Lake L9324, looking east near CD4; August 30, 2018

Photo 8: Lake L9324, looking northwest toward Nigliq Channel and CD4 pad; August 30, 2018

Photo 9: Hydraulic connection between Lake L9324 and South Paleo Lake, looking northeast; August 30, 2018

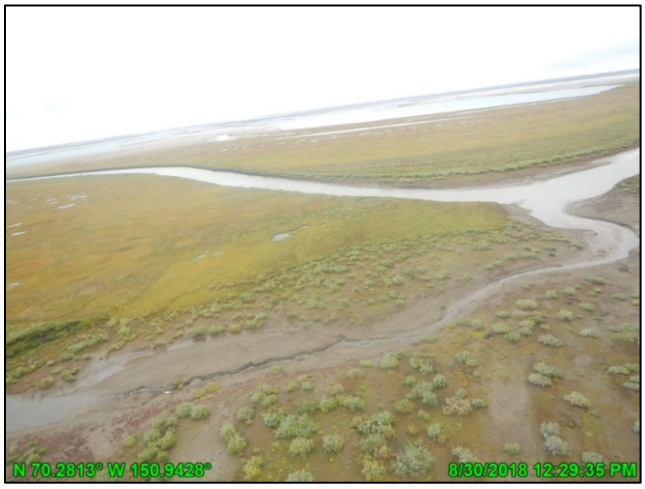


Photo 10: Hydraulic connection between South Paleo Lake and Sakoonang Channel, looking east; August 30, 2018

C. LAKE M9313

Located east of the Ulamnigiaq Channel, Lake M9313 is large with low grassy banks. At the time of sampling, Lake M9313 was not hydraulically connected to any major water bodies. No odor or film was observed while sampling the lake.

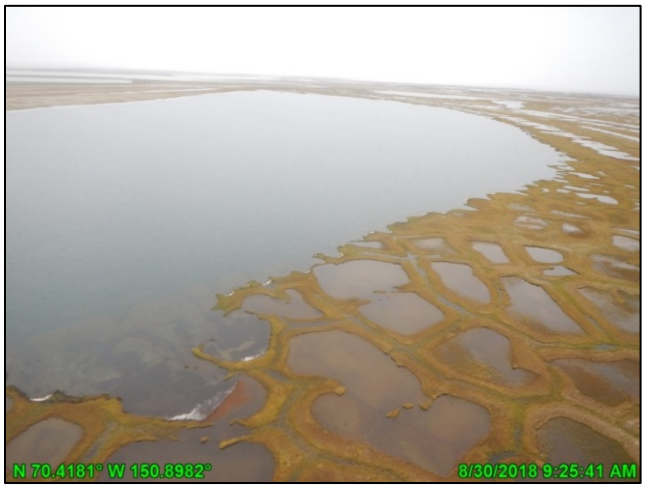


Photo 11: Lake M9313, looking north; August 30, 2018

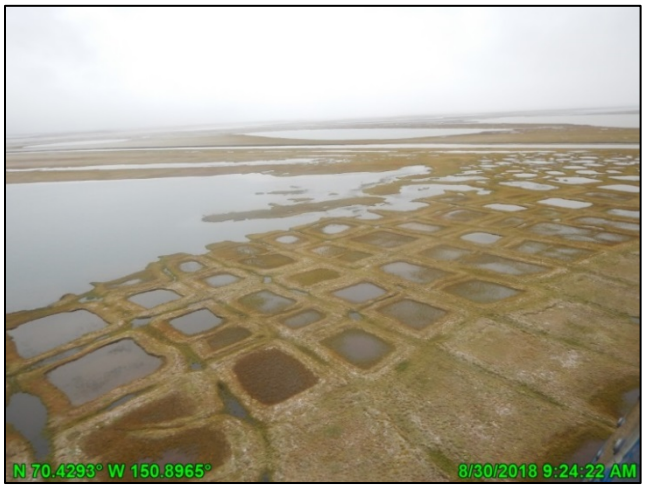


Photo 12: Lake M9313, north end of lake, looking west; August 30, 2018

Photo 13: Lake M9313, looking south toward CD3 pad; August 30, 2018

Photo 14: Lake M9313, looking south toward CD3 runway; August 30, 2018

IN-SITU MEASUREMENTS

In-situ measurements were collected throughout the water column at the deepest part of each lake. Based on the relative homogeneity of results in all locations, the study lakes were determined to be well-mixed at the time of sampling. The in-situ water quality results are tabulated in Table 3.

Table 3: In-Situ Water Quality Results

Lake, Location & Time	Total Depth (ft)	Turbidity (NTU)	Depth (ft)	Temp (°C)	Conductivity (µS/cm)	Specific Conductance (µS/cm)	DO (mg/L)	DO (% Saturation)	Salinity (ppt)	pH SU
L9323 N70.2960° W150.9887° 2:30 p.m.	13.3	0.6	1	4.4	87	146	18.33	143.2	0.07	8.1
			3	4.4	87	146	18.51	143.5	0.07	8.1
			5	4.4	87	146	18.61	143.3	0.07	8.1
			7	4.4	87	146	18.90	144.1	0.07	8.1
			9	4.4	87	146	19.22	146.3	0.07	8.1
			11	4.4	87	146	19.34	148.7	0.07	8.1
			13	4.4	87	146	20.01	157.6	0.07	8.1
L9324 N70.2902° W150.9827° 3:15 p.m.	7.4	3.3	1	4.0	60	102	18.18	139.1	0.05	8.3
			2	4.0	60	102	18.24	139.6	0.05	8.3
			3	4.1	60	102	18.40	140.3	0.05	8.3
			4	4.0	60	102	18.53	141.2	0.05	8.3
			5	4.0	60	102	18.63	142.3	0.05	8.3
			6	4.1	60	102	18.86	143.9	0.05	8.3
			7	4.0	60	102	19.62	149.5	0.05	8.3
M9313 N70.4217° W150.8999° 11:00 a.m.	14.5	0.8	2	3.9	393	671	17.66	133.6	0.32	8.1
			4	3.9	393	671	18.01	135.6	0.32	8.1
			6	3.9	393	670	17.96	136.8	0.32	8.1
			8	3.9	393	670	18.15	136.4	0.32	8.1
			10	3.9	393	670	18.14	137.6	0.32	8.1
			12	3.9	393	671	18.50	141.5	0.32	8.1
			14	3.9	393	670	18.95	144.4	0.32	8.0

Notes:
1. Sample depth is measured from the water surface
2. Turbidity, temperature, conductivity, dissolved oxygen, salinity, and pH were measured using a YSI 650-6920V2 meter
3. Turbidity is presented as an average of the sampled values in the water column
4. Specific conductance (referenced to 25°C) was obtained using a conversion coefficient of 0.0196 based on empirical data (Michael Baker 2006)

Average turbidity for lakes L9323, L9324, and M9313 was 0.6 NTU, 3.3 NTU, and 0.8 NTU, respectively. The higher NTU value for Lake L9324 has been observed in previous years of sampling and is likely the result of the hydraulic connection to the South Paleo Lake and Sakoonang Channel during sampling.

Temperatures in all lakes ranged from a maximum of 4.4°C in Lake L9323 to a minimum of 3.9°C in Lake M9313. The temperature in all three lakes remained consistent with depth. Specific conductance was homogenous throughout the water column at all sample locations but was notably different between lakes. Measured specific conductance values exceeding 500 µS/cm are indicative of saline environments which are usually observed in lakes near the coast (ADF&G 2008). Specific conductance was 146 µS/cm in Lake L9323 and 102 µS/cm in Lake L9324. Specific conductance in Lake M9313, located nearest to the coast, was 671 µS/cm.

Concentrations of DO were relatively homogenous throughout the water column at all sample locations though a slight oxycline was present in each; concentrations increased with depth. The average DO in Lake L9323 was 18.99 mg/L, in Lake L9324 was 18.64 mg/L, and in Lake M9313 was 18.20 mg/L. A 100% saturation level is based on standard temperature and pressure conditions. The average percent-saturation in Lake L9323 was 146.7%, in Lake L9324 was 142.3%, and in Lake M9313 was 138.0%.

Salinity remained consistent with depth at all sampling locations. The greatest concentration was measured in Lake M9313 at 0.32 ppt, likely due to its coastal proximity. Lake L9323 and Lake L9324 had concentrations of 0.07 ppt and 0.05 ppt, respectively.

Average pH was 8.1 in Lake L9323, 8.3 in Lake L9324, and 8.1 in Lake M9313 and remained consistent with depth at all sampling locations.

3.2 LABORATORY ANALYSES

Lakes L9323, L9324, and M9313 were sampled on August 30, 2018 and analyzed using standard methods.

With the exception of barium, analytical results from both sampling events show that RCRA targeted metals were not detected above the laboratory detection limit. Barium was detected in all lakes at concentrations below the ADEC cleanup level of 2.0 mg/L. The greatest measured concentration of barium was 0.2 mg/L in Lake M9313. Barium is not uncommon in arctic waters at concentrations similar to those measured at the three lakes (Guay and Falkner 1998).

The laboratory results indicated DRO and RRO were not detected above the laboratory detection limits in samples collected from all three of the lakes. Laboratory analytical results are presented in Table 4 and are provided in Appendix A.

Table 4: Laboratory Analytical Results Summary

Parameter	ADEC Cleanup Level[1] (mg/L)	Lake L9323 (mg/L)	Lake L9324 (mg/L)	Lake L9324 Duplicate (mg/L)	Lake M9313 (mg/L)
Arsenic	0.01	ND[2]	ND	ND	ND
Barium	2.0	0.051	0.059	0.056	0.2
Cadmium	0.005	ND	ND	ND	ND
Chromium	0.1	ND	ND	ND	ND
Lead	0.015	ND	ND	ND	ND
Mercury	0.002	ND	ND	ND	ND
Selenium	0.05	ND	ND	ND	ND
Silver	0.1	ND	ND	ND	ND
DRO (water)	1.5	ND	ND	ND	ND
RRO (water)	1.1	ND	ND	ND	ND
DRO (silica gel)	1.5	ND	ND	ND	ND
RRO (silica gel)	1.1	ND	ND	ND	ND

Notes:
1. ADEC Water Quality Standards 18 AAC 75.345 Table C Groundwater Cleanup Waters (ADEC 2009)
2. ND indicates analyte was not detected above the laboratory detection limit

4. REFERENCES

Alaska Department of Environmental Conservation (ADEC). 2006. Biogenic Interference and Silica Gel Cleanup. Technical Memorandum – 06-001. Division of Spill Prevention and Response, Contaminated Sites Remediation Program.

-------- 2009. Water Quality Standards. 18 AAC 70. Underground Storage Tanks Procedures. Division of Spill Prevention and Response, Contaminated Sites Remediation Program.

Alaska Department of Fish and Game (ADF&G). 2008. Fish Habitat Permit FH04-111-0135 Amendment #1.

Guay, C.K. and K.K. Falkner (Guay and Falkner). 1998. A Survey of Dissolved Barium in the Estuaries of Major Arctic Rivers and Adjacent Seas. *Continental Shelf Research* 18:8 859-882.

Michael Baker International (Michael Baker) 2018a. North Slope Water Resources 2018 Health, Safety, and Environment Plan. Prepared for ConocoPhillips Alaska, Inc.

-------- 2018b. 2018 Summer Hydrology Monitoring Programs – Job Safety Analysis. Prepared for ConocoPhillips Alaska, Inc.

------- 2006. Colville River Ice Bridge Monitoring. April.

North Slope Borough (NSB). 2004 North Slope Borough Ordinance Serial No. 75-6-46

United States Army Corps of Engineers (USACE). 1987. Reservoir Water Quality Analysis. Engineering Manual EM-1110-2-1201.

United States Environmental Protection Agency (EPA). 2006. 2006 Edition of the Drinking Water Standards and Health Advisories. EPA 822-R-06-013.

United States Geological Survey (USGS). 2006. National Field Manual for the Collection of Water-Quality Data. Book 9 Handbooks for Water-Resources Investigations. Chapter A4 Collection of Water Samples.

Ward, J.R. and C.A. Harr eds. 1990. Methods for Collection and Processing Surface-Water and Bed-Material Samples for Physical and Chemical Analyses. Open-File Report 90-147.

YSI Incorporated. 2012. YSI 6-Series Multiparameter Water Quality Sonde User Manual.

Appendix A LABORATORY ANALYTICAL RESULTS

Arctic Fox Environmental, Inc.
Pouch 340043 | Prudhoe Bay, AK 99734 | Phone: (907) 659-2145 | Fax: (907) 659-2146
arcticfox@astacalaska.com | www.arcticfoxenv.com

Analytical Services Order and Chain of Custody Form

89100

0818-3696

Client Name and Address:
MICHAEL BAKER INTL.
3900 C ST, SUITE 900
ANCHORAGE, AK 99503
Contact Person: SARA ERLUND
Phone Number: 719-671-9223 Fax Number:
E-mail: SERLUND@MBAKERINTL.COM
Project Name: 2018 ASDP WATER QUALITY
Data Deliverables: Level I ❑ Level II ❑ Level III ❑ EDD/Format:

Account Number:
P.O. or Contract Number:
Authorization Number:
Sampled By: DEVON ROE 231-7305
PWS Number:
Send Results to ADEC: ❑ YES ❑ No

Requested Turnaround Time and Special Instructions:

Client Sample ID	Date Sampled	Time Sampled	Matrix	AF Sample ID	Number of Containers	DRO/RRO WATER 1L AMBER	DRO/RRO GEL/SOLID 250mL AMBER	TOTAL RCRA METALS 250mL PLASTIC	Preservative	Remarks
M9313	8/30/18	11:00		AF65312		1	2	1		
L9323	8/30/18	14:30		AF65313		1	2	1		
L9324	8/30/18	15:15		AF65314		1	2	1		
L9324-DUP	8/30/18	15:20		AF65315		1	2	1		

Sample Time = 2.0 hrs.
Mileage = 77 miles

	Date	Time	
Relinquished By (1): DEVON ROE	8/31/18	12:05	Received By:
Relinquished By (2):	Date:	Time:	Received By:
Relinquished By (3):	Date:	Time:	Received for lab by:

TO BE COMPLETED BY LABORATORY

Location Received/ Temp on Arrival: ANC ❑ _____ °C FBK ❑ _____ °C PB ❑ 6.1 °C

111898870

Chain of Custody Seal ❑ INTACT ❑ BROKEN ❑ ABSENT

Shipping Bill Number: _____

Arctic Fox Environmental, Inc.
PO Box 340043 | Prudhoe Bay, AK 99734 | PHONE: (907) 659-2145 | FAX: (907) 659-2146 | www.arcticfoxenv.com

Michael Baker International
3900 C St Ste 900
Anchorage, AK 99503

Attn: Sara Eklund
Phone: (719) 671-9233
Fax:
Email: seklund@mbakerintl.com

Report Date: 9/14/2018
Date Arrived: 8/31/2018
Date Sampled: 8/30/2018
Time Sampled: See Below
Collected By: Devon Roe

AF Lab #: AF65312-65315
Client Sample ID: See Below
Location/Project: 2018 ASDP Water Quality
COC#: 89100
Sample Matrix: See Below

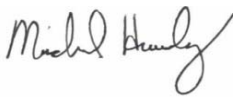
Comments: Attached are the results for analyses of your samples.
These samples were analyzed by Test America in Tacoma, Washington.
Tracking information is as follows:

Michael Baker Intl Sample ID: M9313
Analyses Requested: DRO/RRO, Total Metals
Arctic Fox ID: AF65312
Time Sampled: 1100
Matrix: Water
Test America Lab ID: 580-80276-1

Michael Baker Intl Sample ID: L9323
Analyses Requested: DRO/RRO, Total Metals
Arctic Fox ID: AF65313
Time Sampled: 1430
Matrix: Water
Test America Lab ID: 580-80276-2

Michael Baker Intl Sample ID: L9324
Analyses Requested: DRO/RRO, Total Metals
Arctic Fox ID: AF65314
Time Sampled: 1515
Matrix: Water
Test America Lab ID: 580-80276-3

Michael Baker Intl Sample ID: L9324-Dup
Analyses Requested: DRO/RRO, Total Metals
Arctic Fox ID: AF65315
Time Sampled: 1520
Matrix: Water
Test America Lab ID: 580-80276-4



Reported By: Ralph E. Allphin/Michael J. Hawley/Timothy D. Johnson
Arctic Fox Environmental, Inc.

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-80276-1
Client Project/Site: 2018-3696/2018 ASDP Water Quality

For:
Arctic Fox Environmental, Inc
Pouch 340043
Prudhoe Bay, Alaska 99734

Attn: Arctic Fox

Kayse Zalmai

Authorized for release by:
9/13/2018 3:12:00 PM

Kayse Zalmai, Project Manager I
(253)922-2310
kayse.zalmai@testamericainc.com

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Job ID: 580-80276-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-80276-1

Receipt
The samples were received on 9/1/2018 8:50 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 3.4º C.

GC Semi VOA
Method(s) AK102 & 103: Continuing calibration verification (CCV 580-283845/19) standard associated with batch 580-283845 recovered outside %Drift acceptance criteria for o-Terphenyl surrogate. The %Recovery is within acceptance criteria for the surrogate in the CCV and associated samples; therefore, the data are qualified and reported.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: AF65312

Date Collected: 08/30/18 11:00
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-1

Matrix: Water

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/12/18 21:35	1
RRO (nC25-nC36)	ND		0.28		mg/L		09/12/18 14:47	09/12/18 21:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*108*		*50 - 150*	*09/12/18 14:47*	*09/12/18 21:35*	*1*
n-Triacontane-d62	*102*		*50 - 150*	*09/12/18 14:47*	*09/12/18 21:35*	*1*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/13/18 00:16	1
RRO (nC25-nC36)	ND		0.28		mg/L		09/12/18 14:47	09/13/18 00:16	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*112*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:16*	*1*
n-Triacontane-d62	*107*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:16*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		09/12/18 18:09	09/13/18 11:25	5
Barium	**0.20**		0.0060		mg/L		09/12/18 18:09	09/13/18 11:25	5
Cadmium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:25	5
Chromium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:25	5
Lead	ND		0.0040		mg/L		09/12/18 18:09	09/13/18 11:25	5
Selenium	ND		0.040		mg/L		09/12/18 18:09	09/13/18 11:25	5
Silver	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:25	5

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00030		mg/L		09/12/18 13:08	09/12/18 17:51	1

Client: Arctic Fox Environmental, Inc
Project/Site: 2018-3696/2018 ASDP Water Quality

TestAmerica Job ID: 580-80276-1

Client Sample ID: AF65313
Date Collected: 08/30/18 14:30
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-2
Matrix: Water

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/12/18 21:55	1
RRO (nC25-nC36)	ND		0.28		mg/L		09/12/18 14:47	09/12/18 21:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*116*		*50 - 150*	*09/12/18 14:47*	*09/12/18 21:55*	*1*
n-Triacontane-d62	*113*		*50 - 150*	*09/12/18 14:47*	*09/12/18 21:55*	*1*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/13/18 00:36	1
RRO (nC25-nC36)	ND		0.28		mg/L		09/12/18 14:47	09/13/18 00:36	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*119*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:36*	*1*
n-Triacontane-d62	*115*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:36*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		09/12/18 18:09	09/13/18 10:47	5
Barium	**0.051**		0.0060		mg/L		09/12/18 18:09	09/13/18 10:47	5
Cadmium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 10:47	5
Chromium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 10:47	5
Lead	ND		0.0040		mg/L		09/12/18 18:09	09/13/18 10:47	5
Selenium	ND		0.040		mg/L		09/12/18 18:09	09/13/18 10:47	5
Silver	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 10:47	5

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00030		mg/L		09/12/18 13:08	09/12/18 18:00	1

Client Sample ID: AF65314

Date Collected: 08/30/18 15:15
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-3

Matrix: Water

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/12/18 22:15	1
RRO (nC25-nC36)	ND		0.27		mg/L		09/12/18 14:47	09/12/18 22:15	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*113*		*50 - 150*	*09/12/18 14:47*	*09/12/18 22:15*	*1*
n-Triacontane-d62	*107*		*50 - 150*	*09/12/18 14:47*	*09/12/18 22:15*	*1*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/13/18 00:57	1
RRO (nC25-nC36)	ND		0.27		mg/L		09/12/18 14:47	09/13/18 00:57	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*115*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:57*	*1*
n-Triacontane-d62	*112*		*50 - 150*	*09/12/18 14:47*	*09/13/18 00:57*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		09/12/18 18:09	09/13/18 11:29	5
Barium	**0.059**		0.0060		mg/L		09/12/18 18:09	09/13/18 11:29	5
Cadmium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:29	5
Chromium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:29	5
Lead	ND		0.0040		mg/L		09/12/18 18:09	09/13/18 11:29	5
Selenium	ND		0.040		mg/L		09/12/18 18:09	09/13/18 11:29	5
Silver	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:29	5

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00030		mg/L		09/12/18 13:08	09/12/18 18:02	1

Client: Arctic Fox Environmental, Inc
Project/Site: 2018-3696/2018 ASDP Water Quality

TestAmerica Job ID: 580-80276-1

Client Sample ID: AF65315
Date Collected: 08/30/18 15:20
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-4
Matrix: Water

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/12/18 22:35	1
RRO (nC25-nC36)	ND		0.27		mg/L		09/12/18 14:47	09/12/18 22:35	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*111*		*50 - 150*	*09/12/18 14:47*	*09/12/18 22:35*	*1*
n-Triacontane-d62	*104*		*50 - 150*	*09/12/18 14:47*	*09/12/18 22:35*	*1*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.12		mg/L		09/12/18 14:47	09/13/18 01:17	1
RRO (nC25-nC36)	ND		0.27		mg/L		09/12/18 14:47	09/13/18 01:17	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*118*		*50 - 150*	*09/12/18 14:47*	*09/13/18 01:17*	*1*
n-Triacontane-d62	*113*		*50 - 150*	*09/12/18 14:47*	*09/13/18 01:17*	*1*

Method: 6020A - Metals (ICP/MS) - Total Recoverable

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0050		mg/L		09/12/18 18:09	09/13/18 11:33	5
Barium	**0.056**		0.0060		mg/L		09/12/18 18:09	09/13/18 11:33	5
Cadmium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:33	5
Chromium	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:33	5
Lead	ND		0.0040		mg/L		09/12/18 18:09	09/13/18 11:33	5
Selenium	ND		0.040		mg/L		09/12/18 18:09	09/13/18 11:33	5
Silver	ND		0.0020		mg/L		09/12/18 18:09	09/13/18 11:33	5

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00030		mg/L		09/12/18 13:08	09/12/18 18:04	1

Method: AK102 & 103 - Alaska - Diesel Range Organics & Residual Range Organics (GC)

Lab Sample ID: MB 580-283806/1-A
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 283806

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.11		mg/L		09/12/18 14:47	09/12/18 20:34	1
RRO (nC25-nC36)	ND		0.25		mg/L		09/12/18 14:47	09/12/18 20:34	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*119*		*50 - 150*	*09/12/18 14:47*	*09/12/18 20:34*	*1*
n-Triacontane-d62	*107*		*50 - 150*	*09/12/18 14:47*	*09/12/18 20:34*	*1*

Lab Sample ID: LCS 580-283806/2-A
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 283806

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
DRO (nC10-<nC25)			0.500	0.487		mg/L		97	75 - 125		
RRO (nC25-nC36)			0.500	0.534		mg/L		107	60 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*111*		*50 - 150*
n-Triacontane-d62	*112*		*50 - 150*

Lab Sample ID: LCSD 580-283806/3-A
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 283806

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
DRO (nC10-<nC25)			0.500	0.499		mg/L		100	75 - 125	3	20
RRO (nC25-nC36)			0.500	0.554		mg/L		111	60 - 120	4	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*124*		*50 - 150*
n-Triacontane-d62	*124*		*50 - 150*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up

Lab Sample ID: MB 580-283806/1-B
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 283806

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
DRO (nC10-<nC25)	ND		0.11		mg/L		09/12/18 14:47	09/12/18 23:16	1
RRO (nC25-nC36)	ND		0.25		mg/L		09/12/18 14:47	09/12/18 23:16	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
o-Terphenyl	*122*		*50 - 150*	*09/12/18 14:47*	*09/12/18 23:16*	*1*
n-Triacontane-d62	*115*		*50 - 150*	*09/12/18 14:47*	*09/12/18 23:16*	*1*

Method: AK102/103 - Diesel Range Organics & Residual Range Organics with Silica Gel Clean-Up (Continued)

Lab Sample ID: LCS 580-283806/2-B
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 283806

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
DRO (nC10-<nC25)			0.500	0.496		mg/L		99	75 - 125		
RRO (nC25-nC36)			0.500	0.545		mg/L		109	60 - 120		

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
o-Terphenyl	*120*		*50 - 150*
n-Triacontane-d62	*113*		*50 - 150*

Lab Sample ID: LCSD 580-283806/3-B
Matrix: Water
Analysis Batch: 283845

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 283806

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
DRO (nC10-<nC25)			0.500	0.507		mg/L		101	75 - 125	2	20
RRO (nC25-nC36)			0.500	0.561		mg/L		112	60 - 120	3	20

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
o-Terphenyl	*123*		*50 - 150*
n-Triacontane-d62	*126*		*50 - 150*

Method: 6020A - Metals (ICP/MS)

Lab Sample ID: MB 580-283841/22-A
Matrix: Water
Analysis Batch: 283922

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010		mg/L		09/12/18 18:09	09/13/18 10:30	1
Barium	ND		0.0012		mg/L		09/12/18 18:09	09/13/18 10:30	1
Cadmium	ND		0.00040		mg/L		09/12/18 18:09	09/13/18 10:30	1
Chromium	ND		0.00040		mg/L		09/12/18 18:09	09/13/18 10:30	1
Lead	ND		0.00080		mg/L		09/12/18 18:09	09/13/18 10:30	1
Selenium	ND		0.0080		mg/L		09/12/18 18:09	09/13/18 10:30	1
Silver	ND		0.00040		mg/L		09/12/18 18:09	09/13/18 10:30	1

Lab Sample ID: LCS 580-283841/23-A
Matrix: Water
Analysis Batch: 283922

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic			4.00	3.99		mg/L		100	80 - 120		
Barium			4.00	3.98		mg/L		99	80 - 120		
Cadmium			0.100	0.101		mg/L		101	80 - 120		
Chromium			0.400	0.397		mg/L		99	80 - 120		
Lead			1.00	0.989		mg/L		99	80 - 120		
Selenium			4.00	4.01		mg/L		100	80 - 120		
Silver			0.600	0.618		mg/L		103	80 - 120		

Method: 6020A - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 580-283841/24-A
Matrix: Water
Analysis Batch: 283922

Client Sample ID: Lab Control Sample Dup
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic			4.00	4.09		mg/L		102	80 - 120	3	20
Barium			4.00	4.05		mg/L		101	80 - 120	2	20
Cadmium			0.100	0.107		mg/L		107	80 - 120	5	20
Chromium			0.400	0.406		mg/L		102	80 - 120	2	20
Lead			1.00	0.999		mg/L		100	80 - 120	1	20
Selenium			4.00	4.06		mg/L		102	80 - 120	1	20
Silver			0.600	0.630		mg/L		105	80 - 120	2	20

Lab Sample ID: 580-80276-2 MS
Matrix: Water
Analysis Batch: 283922

Client Sample ID: AF65313
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Arsenic	ND		4.00	4.37		mg/L		109	80 - 120		
Barium	0.051		4.00	4.28		mg/L		106	80 - 120		
Cadmium	ND		0.100	0.105		mg/L		105	80 - 120		
Chromium	ND		0.400	0.430		mg/L		108	80 - 120		
Lead	ND		1.00	1.06		mg/L		106	80 - 120		
Selenium	ND		4.00	4.21		mg/L		105	80 - 120		
Silver	ND		0.600	0.653		mg/L		109	80 - 120		

Lab Sample ID: 580-80276-2 MSD
Matrix: Water
Analysis Batch: 283922

Client Sample ID: AF65313
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	ND		4.00	4.46		mg/L		112	80 - 120	2	20
Barium	0.051		4.00	4.37		mg/L		108	80 - 120	2	20
Cadmium	ND		0.100	0.112		mg/L		112	80 - 120	6	20
Chromium	ND		0.400	0.440		mg/L		110	80 - 120	2	20
Lead	ND		1.00	1.06		mg/L		106	80 - 120	0	20
Selenium	ND		4.00	4.40		mg/L		110	80 - 120	4	20
Silver	ND		0.600	0.667		mg/L		111	80 - 120	2	20

Lab Sample ID: 580-80276-2 DU
Matrix: Water
Analysis Batch: 283922

Client Sample ID: AF65313
Prep Type: Total Recoverable
Prep Batch: 283841

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Arsenic	ND			ND		mg/L				NC	20
Barium	0.051			0.0517		mg/L				1	20
Cadmium	ND			ND		mg/L				NC	20
Chromium	ND			ND		mg/L				NC	20
Lead	ND			ND		mg/L				NC	20
Selenium	ND			ND		mg/L				NC	20
Silver	ND			ND		mg/L				NC	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 580-283793/20-A
Matrix: Water
Analysis Batch: 283864

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 283793

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00030		mg/L		09/12/18 13:08	09/12/18 17:27	1

Lab Sample ID: LCS 580-283793/21-A
Matrix: Water
Analysis Batch: 283864

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 283793

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury			0.00200	0.00213		mg/L		107	80 - 120		

Lab Sample ID: LCSD 580-283793/22-A
Matrix: Water
Analysis Batch: 283864

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 283793

Analyte			Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury			0.00200	0.00209		mg/L		104	80 - 120	2	20

Lab Sample ID: 580-80276-1 MS
Matrix: Water
Analysis Batch: 283864

Client Sample ID: AF65312
Prep Type: Total/NA
Prep Batch: 283793

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Mercury	ND		0.00200	0.00207		mg/L		104	80 - 120		

Lab Sample ID: 580-80276-1 MSD
Matrix: Water
Analysis Batch: 283864

Client Sample ID: AF65312
Prep Type: Total/NA
Prep Batch: 283793

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00200	0.00202		mg/L		101	80 - 120	3	20

Lab Sample ID: 580-80276-1 DU
Matrix: Water
Analysis Batch: 283864

Client Sample ID: AF65312
Prep Type: Total/NA
Prep Batch: 283793

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Mercury	ND		ND		mg/L		NC	20

Lab Chronicle

Client: Arctic Fox Environmental, Inc
Project/Site: 2018-3696/2018 ASDP Water Quality

TestAmerica Job ID: 580-80276-1

Client Sample ID: AF65312

Date Collected: 08/30/18 11:00
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-1

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Analysis	AK102 & 103		1	283845	09/12/18 21:35	TL1	TAL SEA
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Cleanup	3630C			283828	09/12/18 16:59	JCM	TAL SEA
Total/NA	Analysis	AK102/103		1	283845	09/13/18 00:16	TL1	TAL SEA
Total Recoverable	Prep	3005A			283841	09/12/18 18:09	T1H	TAL SEA
Total Recoverable	Analysis	6020A		5	283922	09/13/18 11:25	FCW	TAL SEA
Total/NA	Prep	7470A			283793	09/12/18 13:08	T1H	TAL SEA
Total/NA	Analysis	7470A		1	283864	09/12/18 17:51	FCW	TAL SEA

Client Sample ID: AF65313

Date Collected: 08/30/18 14:30
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-2

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Analysis	AK102 & 103		1	283845	09/12/18 21:55	TL1	TAL SEA
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Cleanup	3630C			283828	09/12/18 16:59	JCM	TAL SEA
Total/NA	Analysis	AK102/103		1	283845	09/13/18 00:36	TL1	TAL SEA
Total Recoverable	Prep	3005A			283841	09/12/18 18:09	T1H	TAL SEA
Total Recoverable	Analysis	6020A		5	283922	09/13/18 10:47	FCW	TAL SEA
Total/NA	Prep	7470A			283793	09/12/18 13:08	T1H	TAL SEA
Total/NA	Analysis	7470A		1	283864	09/12/18 18:00	FCW	TAL SEA

Client Sample ID: AF65314

Date Collected: 08/30/18 15:15
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-3

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Analysis	AK102 & 103		1	283845	09/12/18 22:15	TL1	TAL SEA
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Cleanup	3630C			283828	09/12/18 16:59	JCM	TAL SEA
Total/NA	Analysis	AK102/103		1	283845	09/13/18 00:57	TL1	TAL SEA
Total Recoverable	Prep	3005A			283841	09/12/18 18:09	T1H	TAL SEA
Total Recoverable	Analysis	6020A		5	283922	09/13/18 11:29	FCW	TAL SEA
Total/NA	Prep	7470A			283793	09/12/18 13:08	T1H	TAL SEA
Total/NA	Analysis	7470A		1	283864	09/12/18 18:02	FCW	TAL SEA

Lab Chronicle

Client: Arctic Fox Environmental, Inc
Project/Site: 2018-3696/2018 ASDP Water Quality

TestAmerica Job ID: 580-80276-1

Client Sample ID: AF65315

Date Collected: 08/30/18 15:20
Date Received: 09/01/18 08:50

Lab Sample ID: 580-80276-4

Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Analysis	AK102 & 103		1	283845	09/12/18 22:35	TL1	TAL SEA
Total/NA	Prep	3510C			283806	09/12/18 14:47	JCM	TAL SEA
Total/NA	Cleanup	3630C			283828	09/12/18 16:59	JCM	TAL SEA
Total/NA	Analysis	AK102/103		1	283845	09/13/18 01:17	TL1	TAL SEA
Total Recoverable	Prep	3005A			283841	09/12/18 18:09	T1H	TAL SEA
Total Recoverable	Analysis	6020A		5	283922	09/13/18 11:33	FCW	TAL SEA
Total/NA	Prep	7470A			283793	09/12/18 13:08	T1H	TAL SEA
Total/NA	Analysis	7470A		1	283864	09/12/18 18:04	FCW	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Arctic Fox Environmental, Inc
TestAmerica Job ID: 580-80276-1
Project/Site: 2018-3696/2018 ASDP Water Quality

Laboratory: TestAmerica Seattle

All accreditations/certifications held by this laboratory are listed. Not all accreditations/certifications are applicable to this report.

Authority	Program	EPA Region	Identification Number	Expiration Date
Alaska (UST)	State Program	10	17-024	01-19-19
ANAB	DoD ELAP		L2236	01-19-19
ANAB	ISO/IEC 17025		L2236	01-19-19
California	State Program	9	2901	11-05-18
Montana (UST)	State Program	8	N/A	04-30-20
Nevada	State Program	9	WA000502019-1	07-31-19
Oregon	NELAP	10	WA100007	11-05-18
US Fish & Wildlife	Federal		LE058448-0	07-31-19
USDA	Federal		P330-14-00126	02-10-20
Washington	State Program	10	C553	02-17-19

Sample Summary

Client: Arctic Fox Environmental, Inc
Project/Site: 2018-3696/2018 ASDP Water Quality

TestAmerica Job ID: 580-80276-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-80276-1	AF65312	Water	08/30/18 11:00	09/01/18 08:50
580-80276-2	AF65313	Water	08/30/18 14:30	09/01/18 08:50
580-80276-3	AF65314	Water	08/30/18 15:15	09/01/18 08:50
580-80276-4	AF65315	Water	08/30/18 15:20	09/01/18 08:50

TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
phone 253.922.2310 fax 253.922.5047

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

TestAmerica Laboratories, Inc.

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Mike Hawley / Tim Johnson	Site Contact: Mike H. / Tim J.	Date:	COC No: 1 of 1 COCs
Arctic Fox Environmental	Tel/Fax: 907-659-2145	Lab Contact: Mike H. / Tim J.	Carrier:	Sampler: D.R.
Pouch 340043	**Analysis Turnaround Time**			For Lab Use Only:
Prudhoe Bay, AK 99734	☑ CALENDAR DAYS ☐ WORKING DAYS			Walk-in Client: No
Phone 907-659-2145	TAT if different from Below ____			Lab Sampling: No
FAX 907-659-2146	☐ 2 weeks ☐ 1 week ☐ 2 days ☐ 1 day — Std.		Loc: 580 80276	Job / SDG No.:
Project Name: 2018 ASDP Water Quality				
Site:				
PO # 0818-3696				

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	DRO/RRO	DRO/RRO Silica Gel Solid	Total RCRA Metals	Sample Specific Notes:
AF65312 M9313	8/30/18	1100	G	W	4			X	X	X	
AF65313 L9323		1430						X	X	X	
AF65314 L9324		1515						X	X	X	
AF65315 L9324-Dup.		1520						X	X	X	

580-80276 Chain of Custody

Therm. ID: A2 Cor: 3.4 ° Unc: 3.3 °
Cooler Dsc: Lrg Blue
Packing: Bubble
Cust. Seal: Yes ___ No X
Wet/Gel/Dry Ice/None
FedEx: ___
UPS: ___
Lab Cour: G.S.
Other: ___

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other ___

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☑ Disposal by Lab ☐ Archive for ___ Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: ___ Corr'd: ___ | Therm ID No.: ___

	Company	Date/Time	Received by	Company	Date/Time
Relinquished by:	AFE	8/31/18@1500			
Relinquished by:					
Relinquished by:			Received in Laboratory by:	SEA TA	9.1.18 0850

Form No. CA-C-WI-002, Rev. 4.2, dated 04/02/2013

Login Sample Receipt Checklist

Client: Arctic Fox Environmental, Inc

Job Number: 580-80276-1

Login Number: 80276
List Number: 1
Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	